



**CITY OF TEMISKAMING SHORES
NEW WASTE MANAGEMENT CAPACITY
ENVIRONMENTAL ASSESSMENT STUDY REPORT
TECHNICAL SUPPORT DOCUMENT:
*TERRESTRIAL ENVIRONMENT***

Submitted to:

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FOREWORD

As of January 1, 2015, we have changed our company name from AMEC Environment & Infrastructure, a Division of AMEC Americas Limited to Amec Foster Wheeler Environment & Infrastructure, a Division of Amec Foster Wheeler Americas Limited (Amec Foster Wheeler). This reflects the combination of our parent company, AMEC plc, and Foster Wheeler AG. This name change is administrative in nature and we assure you that we will continue to maintain the current resources, contracts or other existing services you have with Amec Foster Wheeler. We will continue to provide the same quality of services and the same dedicated team of consultants, project managers, engineers and scientists. Our focus remains on delivering projects safely and successfully for you. You can find more information on Amec Foster Wheeler at www.amecfw.com.

EXECUTIVE SUMMARY

The City of Temiskaming Shores was formed in January 2004 through the amalgamation of the towns of Haileybury and New Liskeard and Township of Dymond into a single tier municipality. The City has two existing landfill sites: the New Liskeard Landfill (formerly the Town of New Liskeard Landfill) and the Haileybury Landfill (formerly the Town of Haileybury Landfill).

The New Liskeard Landfill, located approximately 3 kilometres west of the former Town of New Liskeard off of Rockley Road, has been used for landfilling since 1916 (Earth Tech, 2008). The Haileybury Landfill, located approximately 9 km southwest of the former Town of Haileybury off of Highway 11 along Dump Road, has been in operation since 1975 (Earth Tech, 2008).

Prior to amalgamation, the New Liskeard Landfill received waste only from the former Town of New Liskeard, while the Haileybury Landfill received waste from the former Town of Haileybury, the former Town of Dymond, the Town of Cobalt, and from residents of Firstbrooke and Lorrain Townships (Earth Tech, 2008). The New Liskeard Landfill reached its approved landfill capacity in June 2009, and is currently no longer accepting waste. Currently, the Haileybury Landfill accepts landfill waste from the City of Temiskaming Shores and the Town of Cobalt.

Based on waste generation projections (AMEC, 2010), the Haileybury Landfill is expected to reach its approved landfill capacity by mid-2016. As such, the City's draft Solid Waste Management Master Plan identified the provision of additional landfill capacity to facilitate long-term waste disposal as the second key objective in establishing a sustainable solid waste management program for the City of Temiskaming Shores (Earth Tech, 2009). Through the EA process, the City evaluated different ways to manage waste and ultimately selected landfilling. Subsequently, the City evaluated different methods (locations) for managing waste through landfilling. The selected preferred alternative is the expansion of the New Liskeard Landfill (the Project).

Amec Foster Wheeler has completed a biological baseline of the Project as a Technical Support Document in support of the Environmental Assessment. This baseline environmental study evaluates and documents the terrestrial natural resources present within the footprint of the proposed landfill expansion area. Within this report, an overview of natural areas, significant wildlife habitats, flora and fauna species, including potential Species at Risk that may occur within the Project area, and identification of potential Project constraints are provided.

At the completion of the baseline environmental studies an analysis was conducted to predict effects the Project may have on identified environmental components, taking into consideration the application of avoidance and mitigation measures to reduce or eliminate residual effects. Environmental components are those aspects of the natural environment that are particularly notable or valued because of their ecological, scientific or resource importance, and that have a potential to be adversely affected by the Project development. The following environmental

indicators were considered: i) habitat, vegetation communities, plant life, ii) Protected Areas, iii) wetlands, iv) birds, v) other wildlife, and vi) rare species/Species at Risk.

The analysis to predict potential Project effects determined that some vegetation communities (and associated wildlife habitat) will be lost and wildlife species will be displaced; however, displaced species and their preferred habitats are common throughout the study area, the Extended Study Area, and in the greater region and these species will be able to settle in nearby suitable habitats. Planning efforts for the Project have focused, where practical, on using lands that have been previously disturbed by past anthropogenic disturbance. Conducting construction activities between September and April would avoid sensitive summer breeding seasons for wildlife (April 15 to August 30). Enforcement of speed limits along proposed access roads reduce the potential adverse effects of increased vehicular traffic associated with the Project such as dust generation on plant life and increased risk of wildlife mortality due to vehicular collisions. Mitigation measures described in this report are expected to be effective for their intended purposes and in many instances can be further optimized in response to monitoring data.

TABLE OF CONTENTS

	Page
EXECUTIVE SUMMARY	i
GLOSSARY AND ABBREVIATIONS	vi
1.0 INTRODUCTION	1
1.1 Background.....	1
1.2 Objective and Scope.....	2
1.3 Study Area and General Setting.....	3
2.0 METHODOLOGY	5
2.1 Existing Data Sources	5
2.2 Natural Areas and Wildlife Concentration Areas	5
2.3 Vegetation Community Mapping and Plant Inventory Surveys	6
2.4 Ecosite Determination.....	7
2.5 Wildlife Surveys	8
2.5.1 Birds.....	8
2.5.2 Mammals.....	9
2.5.3 Amphibians and Reptiles	9
2.5.4 Species at Risk and Provincially Rare Species	10
2.5.5 Prediction of Effects	10
3.0 RESULTS.....	15
3.1 General Site Description.....	15
3.2 Natural Heritage Features	15
3.3 Vegetation Community and Ecosite Classification	15
3.3.1 Vegetation Community Classification	15
3.3.2 Ecosite Classification	19
3.4 Wildlife	19
3.4.1 Birds.....	19
3.4.2 Mammals.....	20
3.4.3 Amphibians and Reptiles	21
3.5 Species at Risk and Provincially Rare Species	21
3.5.1 Bird Species at Risk.....	21
3.5.2 Mammal Species at Risk	22
3.5.3 Reptile Species at Risk	23
4.0 PREDICTION OF EFFECTS.....	39
4.1 Habitat, Vegetation Communities, and Plant Life	39
4.1.1 Wildlife Habitat and Linkages.....	39
4.2 Habitat, Vegetation Communities, and Plant Life	43
4.2.1 Predicted Effects on Habitat, Vegetation Communities, and Plant Life.....	43
4.2.2 Mitigation Measures for Habitat, Vegetation Communities, and Plant Life	44
4.3 Protected Areas	45
4.4 Wetlands.....	45
4.5 Birds.....	45

4.5.1	Predicted Effects on Birds.....	45
4.5.2	Mitigation Measures for Birds	47
4.6	Other Wildlife	49
4.6.1	Predicted Effects on Other Wildlife	49
4.6.2	Mitigation Measures for Other Wildlife	50
4.7	Species at Risk and Rare Wildlife	51
5.0	SUMMARY AND CONCLUSION.....	66
6.0	REFERENCES.....	67

LIST OF FIGURES

Figure 1.1:	Project Location	4
Figure 2.1:	Terrestrial Study Areas and Wildlife Survey Station Locations.....	14
Figure 3.1:	Forest Ecosystem Classification and Ecological Land Classification	36
Figure 3.2:	Distribution of Bird Species Diversity	37
Figure 3.3:	Distribution of Bird Species Density.....	38
Figure 4.1:	Effect Assessment of Terrestrial Environmental Components	65

LIST OF TABLES

Table 2.1:	Details of Field Surveys Undertaken in 2014.....	12
Table 2.2:	Existing Data Sources.....	13
Table 3.1:	Vegetation Communities	24
Table 3.2:	Compiled Plant Species List	26
Table 3.3:	FEC/ELC and Provincial Ecosites.....	28
Table 3.4:	Compiled Bird Species List	29
Table 3.5:	2014 Breeding Bird Survey Results	31
Table 3.6:	Compiled Mammal Species List.....	32
Table 3.7:	Compiled Amphibian and Reptile Species List	34
Table 3.8:	Potential Species at Risk and Provincially Rare Species List	35
Table 4.1:	Seasonal Concentration Areas of Animals	52
Table 4.2:	Rare Vegetation Communities	55
Table 4.3:	Specialized Habitat for Wildlife	58
Table 4.4:	Habitat for Species of Conservation Concern.....	62
Table 4.5:	Animal Movement Corridors	63
Table 4.6:	Area of Vegetation Removal for Various Vegetation Community Types for the Construction of the Project.....	64

LIST OF APPENDICES

Appendix A:	MNRF Consultation Records
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GLOSSARY AND ABBREVIATIONS

ANSI	Area of Natural and Scientific Interest
CWCS	Canadian Wetland Classification System
CWS	Canadian Wildlife Services
EA	Environmental Assessment
ELC	Ecological Land Classification
ESA	Endangered Species Act
FEC	Forest Ecosystem Classification
FWCA	Fish and Wildlife Conservation Act
GPS	Global Positioning System
ha	hectare
IBP	International Biological Program
km	kilometre
LIO	Land Information Ontario
m	metre
mm	millimetre
MBCA	Migratory Bird Convention Act
MNR	Ministry of Natural Resources
MNRF	Ministry of Natural Resources and Forestry
NHIC	Natural Heritage Information Centre
OIP	Ontario Institute of Pedology
OWES	Ontario Wetland Ecosystem Classification
PSW	Provincially Significant Wetland
SAR	Species at Risk
SARA	Species at Risk Act
SWH	Significant Wildlife Habitat
TSD	Technical Support Document
WMMP	Solid Waste Management Master Plan

1.0 INTRODUCTION

1.1 Background

The City of Temiskaming Shores was formed in January 2004 through the amalgamation of the towns of Haileybury and New Liskeard and Township of Dymond into a single tier municipality. The City has two existing landfill sites: the New Liskeard Landfill (formerly the Town of New Liskeard Landfill) and the Haileybury Landfill (formerly the Town of Haileybury Landfill).

The New Liskeard Landfill, located approximately 3 kilometres (km) west of the former Town of New Liskeard off of Rockley Road, has been used for landfilling since 1916 (Earth Tech, 2008). The Haileybury Landfill, located approximately 9 km southwest of the former Town of Haileybury off of Highway 11 along Dump Road, has been in operation since 1975 (Earth Tech, 2008). The general site location is presented on Figure 1.1.

Prior to amalgamation, the New Liskeard Landfill received waste only from the former Town of New Liskeard, while the Haileybury Landfill received waste from the former Town of Haileybury, the former Town of Dymond, the Town of Cobalt, and from residents of Firstbrooke and Lorrain Townships (Earth Tech, 2008). The New Liskeard Landfill reached its approved landfill capacity in June 2009, and is currently no longer accepting waste. Currently, the Haileybury Landfill accepts landfill waste from the City of Temiskaming Shores and the Town of Cobalt.

Based on waste generation projections (AMEC, 2010), the Haileybury Landfill is expected to reach its approved landfill capacity by mid-2016. As such, the City's draft Solid Waste Management Master Plan (WMMP) identified the provision of additional landfill capacity to facilitate long-term waste disposal as the second key objective in establishing a sustainable solid waste management program for the City of Temiskaming Shores (Earth Tech, 2009). Through the environmental assessment (EA) process, the City evaluated different ways to manage waste and ultimately selected landfilling. Subsequently, the City evaluated different methods (locations) for managing waste through landfilling. The selected preferred alternative is the expansion of the New Liskeard Landfill (the Project).

The New Liskeard Landfill (Site) is situated approximately 1 km west of Highway 11 along the north side of Rockley Road in Dymond Township. The legal description of the landfill property is the west half of Lot 5, Concession 2 of the former Town of New Liskeard (MOECC, 2007). This Site is located approximately 3 km west of the former Town of New Liskeard.

The total property area is 32 hectares (ha), of which approximately 5 ha have been landfilled. The Project property access is from the south gate located along Rockley Road. A series of granular haul roads have been constructed on the Site, one running from the gate adjacent to the west property boundary, one running south and east of the landfill and one running over the capped landfill area towards the most recent active disposal area.

A detailed history of landfilling activities is provided in the Feasibility Study (AMEC, 2010).

This Technical Support Document (TSD) of the potential terrestrial environment effects of the Project has been prepared by Amec Foster Wheeler and is one of a series of technical reports that support the EA for the Project.

1.2 Objective and Scope

The key objective and scope of this TSD is to provide sufficient baseline information to complete an effects assessment of the proposed landfill expansion relative to existing site features, wildlife habitat, and wildlife species. As such, the terrestrial resources baseline study included the following activities.

- Conduct initial reviews of all available background information on the Project area, including species inventory information and resource mapping;
- Conduct field inventories to identify the presence, abundance and distribution of plant and animal species within the Project area;
- Document the distribution of vegetation communities and wetlands within the Project area;
- Document the abundance, distribution and availability of significant wildlife habitats (SWH) within the Project area; and
- Provide potential environmental constraints relative to SWH, Species at Risk (SAR) and wetlands.

This baseline study evaluates and documents the terrestrial natural resources present within the footprint of the proposed landfill expansion area. Within this report, an overview of natural areas, significant wildlife habitats, flora and fauna species, including potential SAR that may occur within the Project area, and identification of potential Project constraints are provided.

At the completion of the baseline environmental study, an analysis was conducted to predict effects the Project may have on identified environmental components, taking into consideration the application of avoidance and mitigation measures to reduce or eliminate residual effects. Environmental components are those aspects of the natural environment that are particularly notable or valued because of their ecological, scientific or resource importance, and that have a potential to be adversely affected by the Project development. The following environmental indicators were considered:

- Habitat, vegetation communities, and plant life;
- Protected Areas;
- Wetlands;
- Birds;

- Other wildlife; and
- Rare species/SAR.

1.3 Study Area and General Setting

The Site Study Area used for the terrestrial study is defined by the lands owned by the City that lie adjacent to the existing New Liskeard Landfill, which is located on the west ½ of Lot 5, Concession 2 within the City of Temiskaming Shores, in the District of Temiskaming. It is the proposed 2.61 ha expansion area and includes the existing 5 ha landfill footprint. The Site-vicinity Study Area includes a 500 metre (m) buffer on the existing and proposed areas. The Site-vicinity Study Area was extended to the north (~50 m), east to the Canadian Solar facility, to the south to Rockley Road, and to the west (~75 m) to capture additional terrestrial environment characteristics. For secondary research an Extended Study Area which includes an area of 1.5 km around the Site was used.

Site lies in the northwest portion of the Ontario Ministry of Natural Resources and Forestry (MNRF; formerly the Ministry of Natural Resources [MNR]) North Bay District administrative boundary. The Site Study Area is located in the northeastern region of Ontario in Ecoregion 4E and Ecodistrict 4E-5. The climate in this ecoregion is humid and cool. Mean annual precipitation ranges between 725 and 1,148 millimetres (mm); the mean annual temperature ranges from 0.8 to 4.3 °C; and the mean growing season length is 171 to 200 days. The ecoregion is situated on the Precambrian Shield where the bedrock is predominantly granitic and gneissic. The Little Clay Belt is situated at the eastern edge of this ecoregion (where the Site Study Area occurs) and differs from the rest of the ecoregion because it is underlain with Paleozoic limestone and related rocks, and as a result, has richer calcareous substrates. These generally are Gray Brown Luvisols on well drained sites, and peats and Gleysols on wetter, poorly drained sites (Crins *et al.*, 2009).

The Site is located within the Wabi River Watershed, which drains into Lake Temiskaming (Figure 1.1) and ultimately drains southward to Lakes Superior and Huron and to the Ottawa/St. Lawrence Rivers. This area is a part of the Great Lakes-St. Lawrence Forest Region and comprises a mosaic of deciduous, coniferous and mixed forest ecosites, open and treed peatland, shrub and treed swamps, marshes and open barren rock. The upland forests have a history of forestry operations and are in various stages of re-growth. Although commercial forestry is the predominant land use activity in the ecoregion, agriculture is important in the Little Clay Belt (Crins *et al.*, 2009). Wildlife and vegetation species in the area are generally typical of those inhabiting the broader mixed and boreal forests of northern Ontario.

2.0 METHODOLOGY

As part of the overall work program, Amec Foster Wheeler undertook a biophysical inventory of the Extended Study Area (extended by 1.5 km in order to capture ecosite continuity up to hard breaks in ecological features) and the Site-vicinity Study Area (extended 500 m past the Site Study Area boundaries to capture additional characteristics; Figure 2.1). The purpose of the inventory was to characterize and evaluate the existing biophysical environment, to provide baseline data as input to pre-Project conditions and to support the design and permitting of the Project. The biophysical inventory comprised a review of existing secondary data sources directly relevant to the Extended Study Area, as well as a number of specific field surveys conducted in the Site-vicinity Study Area during the spring and summer of 2014. The existing secondary data sources were used to obtain a general understanding of the biophysical site characteristics. Field surveys were completed on 13, 14, 25, and 26 June 2014. Survey dates, times, weather conditions and field personnel are summarized in Table 2.1.

2.1 Existing Data Sources

Material relevant to the biophysical inventory of the Extended Study Area was identified at the start of the inventory and reviewed. Reviewed documents are presented in Table 2.2, together with a brief synopsis of the key content and relevance of the individual source to the Project. The documents provide information with respect to biophysical site characteristics, habitat, wildlife, rare species and communities, and general cultural/historic aspects of the Extended Study Area.

Database searches were undertaken to ascertain species, including SAR, potentially present within or adjacent to the Extended Study Area. These resources included a review of the MNRF's Natural Heritage Information Centre (NHIC) database (MNRF, 2015a), the Atlas of the Breeding Bird of Ontario (Cadman *et al.*, 2007), the Atlas of the Mammals of Ontario (Dobbyn, 1994), and the Ontario Reptile and Amphibian Atlas (Ontario Nature, 2013). The NHIC database and the Atlas of the Breeding Bird of Ontario utilize a 10 km x 10 km system whereby species documented within a specific square can be used to generate a list of species potentially present within a given area. In this case, the Extended Study Area overlaps one atlas square: 17NN96. The lists of mammals and herpetofauna which may be found in the Extended Study Area were similarly generated, but instead were extrapolated based on visual interpretation of inventory mapping provided within each atlas.

Suitable survey methods for ascertaining the presence of SAR species were included in Site inventory methodologies presented below.

2.2 Natural Areas and Wildlife Concentration Areas

Natural Areas are areas having significant or unique natural heritage features. Natural Areas listed in the NHIC Natural Areas Database may be identified by the MNRF, Conservation Authorities, the International Biological Program (IBP), or by non-governmental organizations, such as the Federation of Ontario Naturalists, the Nature Conservancy of Canada, or Bird Studies Canada.

Natural areas include evaluated wetlands, Earth and Life Science Areas of Natural and Scientific Interest (ANSI), provincial and national parks, Conservation Areas, IBP Sites, and nature reserves. In addition, the MNR's Land Information Ontario (LIO) database provides information on Provincially Significant Wetlands (PSW) and other unevaluated wetlands.

Wildlife Concentration Areas are areas defined as having significant importance to wildlife during a critical component of their life history. Wildlife Concentration Areas include Moose Late Winter Habitat, Bat Hibernaculum/Nursery, Colonial Waterbird Nesting Area, Freshwater Mussel Concentration Area, Mixed Wader Nesting Colony, Raptor Winter Concentration Area, Shorebird Migratory Concentration Area, and Waterfowl Concentration Area.

To determine the presence of Natural Areas and Wildlife Concentration Areas within the Extended Study Area, a review of the NHIC (MNR, 2015a) and LIO (MNR, 2015b) databases was undertaken. In addition, the MNR was consulted (Appendix A) to determine the presence of any occurrences not available through a review of the NHIC and LIO databases.

2.3 Vegetation Community Mapping and Plant Inventory Surveys

Vegetation community mapping was undertaken in the Extended Study Area. In order to satisfy ecosite continuity, vegetation community polygon delineations were extended past the boundaries of the Site up to the edges of hard boundaries representing a definite break in ecological features. Capturing the extent of the ecosite communities provides valuable information on wildlife habitat and movement corridors. Hard boundaries surrounding the Site Study Area include the hydro power line corridor to the west and north of the Site, Canadian Solar's New Liskeard sites to the east, and Rockley Road to the south (Figure 2.1). The Extended Study Area is located in the northeastern region of Ontario in Ecoregion 4E and Ecodistrict 4E-5. Forest habitat types are best described by the Field Guide to Forest Ecosystems of Northeastern Ontario (Taylor *et al.*, 2000), commonly referred to as the Forest Ecosystem Classification of Northeastern Ontario (FEC). The FEC mainly classifies mature, undisturbed forests, although disturbed (harvested) forests can be described using FEC. Other vegetation types such as wetlands (non-forested), cliffs, rock barrens, and communities created by human disturbance (cultural areas) are not covered by the FEC. The Ecological Land Classification (ELC) system (Lee *et al.*, 1998) was used to describe communities not included in FEC (typically non-forested wetland communities). It should be noted that the ELC classification was written for plant communities south of the Canadian Shield, and as such, the classifications are approximations of the plant communities located within the Extended Study Area.

Wetlands can be described using several different, but equally established, classification systems in Ontario. Such systems include FEC, ELC, Ontario Wetland Evaluation System (OWES) for northern Ontario (MNR, 2013), and the Canadian Wetland Classification System (CWCS; National Wetland Working Group, 1997). In Ontario, wetlands are classified to the ecosite level as fen, bog, swamp, marsh, and shallow water (although often combined with marsh-type) wetland. In addition to classification, the CWCS provides functional values to wetland

classification. All systems of wetland classification are provided in this report where applicable (e.g., for non-forested wetlands, FEC does not apply).

Vegetation surveys were conducted on 13 and 14 June 2014. All vegetation communities were delineated through interpretation of aerial photography and/or using a Global Positioning System (GPS) device with 5 m accuracy. Ecosystems were classified based on the composition of the dominant species (based on Taylor *et al.*, 2000 and Lee *et al.*, 1998). Scientific names are based on the current nomenclature as listed in the MNR's NHIC database (<http://nhic.mnr.gov.on.ca/>). During the vegetation surveys, the study team recorded any signs of wildlife or wildlife activity encountered and locations of reported and confirmed rare species.

The field inventory information was used in the preparation of mapping which delineates the boundaries of the vegetation communities.

2.4 Ecosite Determination

As a component of FEC, forested ecosystem can be further described to the ecosite level, similar to ELC in southern Ontario. Ecosite determination depends partially on vegetation communities and the classification of soils based on the Ontario Institute of Pedology's (OIP) Field Manual for Describing Soils in Ontario (OIP, 1993). Soil classifications were not undertaken as a component of the vegetation community analysis; however, based on vegetation communities and an understanding of the soil composition in the area (Ecoregion 4E-5) as determined by a review of soils mapping, probable FEC ecosites can be extrapolated given the range of soil parameters within ecosites. As such, the FEC protocol was applied to determine probable Ecosites within the Extended Study Area in the context of V-types.

In addition to FEC/ELC ecosites, the MNR has developed Ecosites of Ontario – Operational Draft documents for this region of Ontario. The Extended Study Area is located in two overlapping regions: the Boreal Region (Banton *et al.*, 2009a) and the Great Lakes-St. Lawrence Region (Banton *et al.*, 2009b). For the purpose of this assessment, the Boreal Ecoregion classification was applied. The Ecosites of Ontario – Operational Draft applies a much broader scope of ecosite classification, but uses the principles of soil classification and vegetation community characterization applied in the FEC manuals. The Ecosites of Ontario are also a valuable tool for determining the presence of potential significant wildlife habitat. In order to allow for comparisons between FEC protocols and future ecosystem classification protocols in Ontario, probable Provincial Ecosites within the Extended Study Area are provided in the context of V-types and ELC codes.

2.5 Wildlife Surveys

Specific wildlife surveys were undertaken in the Site-vicinity Study Area in the spring and summer of 2014 with the aim of confirming the presence/absence and habitat utilization of breeding birds, amphibians, reptiles, and mammals. Incidental wildlife observations (based on tracks, calls and scat) were also recorded during the vegetation surveys. Wildlife habitat features were identified, including snags, burrows and other habitat features that may be important to wildlife. Particular attention was focused on documenting any federally or provincially designated species as listed under Ontario's *Endangered Species Act, 2007* (ESA) and the federal *Species at Risk Act, 2002* (SARA).

2.5.1 Birds

Species-specific bird surveys were conducted throughout the breeding season. Distinct methods were applied based on the groups of species targeted.

Point Count Surveys

Point count surveys were undertaken in partial accordance with the protocols described for the Atlas of Breeding Birds of Ontario (Cadman et al., 2007). These surveys target the majority of breeding birds. Two rounds of bird surveys were conducted by two qualified biologists skilled in the identification of birds by sight and sound. Surveys were initiated prior to sunrise and extended to five hours after sunrise, depending on the weather conditions. Point count surveys were aborted or postponed if weather conditions were not optimal (high winds or light rain). Surveys were conducted for ten minutes at each listening station (instead of the five minute listening period outlined in the Atlas of Breeding Birds of Ontario) and consisted of recording the diversity and density of bird species. Bird observations were recorded at four distance regimes: within 50 m; 50 to 100 m; outside 100 m; and flyovers (birds seen flying overhead).

A total of 12 point count stations were established in a range of habitats and vegetation communities (e.g., mixed forest, coniferous forest, meadow and thicket). Point count stations were pre-determined using aerial imagery and stationed approximately 250 m apart from each other to maximize coverage with little overlap (Figure 2.1). Stations were geo-referenced in the field using a hand-held GPS unit with 5 m accuracy. The first round of surveys was conducted on 14 June 2014 and the second round of surveys was conducted on 26 June 2014. During the second round of sampling, stations were surveyed in the reverse order from the first round (to the greatest extent possible) to reduce temporal sampling bias. Incidental sightings were documented, particularly for SAR and species not detected during standardized point counts.

Crepuscular Bird / Owl Surveys

Two rounds of crepuscular bird¹ surveys were conducted on 13 and 25 June 2014. A total of eight survey locations were situations along the existing road network and along the edge of the clear-cut area (Figure 2.1). Surveys were conducted 30-minutes after sunset and did not go beyond midnight. Surveys involved listening for calling males which can be detected from several hundred metres away.

The owl breeding season varies by species, but can begin as early as January and some young won't leave the nest until June. Owls are most vocal during this period as they are attempting to establish and defend territories. Surveys for this project began after the optimum survey period for owls; however, attempts to identify calling owls were conducted during the 13 and 25 June 2014 crepuscular bird surveys. Surveys involved listening for calling males, which can be detected from several hundred metres away depending on the species.

Visual Surveys

Binocular searches were conducted daily throughout the field program to identify birds not detected through the standardized surveys described above and to document nesting sites for raptors (e.g., hawks, eagles, owls, falcons).

2.5.2 Mammals

Mammal surveys were conducted concurrently with other targeted surveys (e.g., bird surveys, vegetation and wetland surveys, amphibian surveys). Mammal species were detected by visual observation, tracks, scat or vocalizations.

2.5.3 Amphibians and Reptiles

Amphibian and reptile surveys were conducted concurrently with crepuscular bird surveys described in Section 2.5.1. The surveys partially followed protocols outlined in the MNR's Amphibian Road Call Count program (Konze and McLaren, 1997). Surveys were conducted during the recommended timing window between a half hour after sunset and midnight.

Surveys involved the surveyor standing at each selected station and listening for three minutes. All calling activity was ranked using one of the following three abundance code categories:

- Level 1 - indicates that individuals can be counted and calls are not simultaneous;
- Level 2 - indicates that calls are still distinguishable with some simultaneous calling; and
- Level 3 - indicates a full chorus where calls are continuous and overlapping.

¹ Crepuscular birds are those species primarily active during dusk and dawn (twilight) such as Common Nighthawk and Whip-poor-will.

Herpetiles (amphibians and reptiles) are particularly difficult to document and are mainly identified by targeted surveys, searching for evidence of activity in suitable habitats or through incidental observation. As such, surveys consisted of searching for:

- Evidence of, and potential nesting sites for, turtles;
- Evidence of potential overwintering habitats for turtles;
- Potential turtle basking sites in suitable marsh wetlands; and
- Evidence of potential snake hibernacula sites.

2.5.4 Species at Risk and Provincially Rare Species

Species at Risk are plant or animal species whose individuals or populations are considered *Extirpated*, *Endangered*, *Threatened* or *Special Concern* in Canada (SARA) and/or in Ontario (ESA). SAR and their habitat (species listed as Extirpated, Endangered or Threatened) are protected from harm or destruction under both ESA and SARA.

A preliminary review of potential SAR present in the Site-vicinity Study Area were identified through consultation with the MNRF, a review of the MNRF's NHIC, and a review of bird, herpetile and mammal atlases for Ontario. The presence of these species protected under federal and provincial legislation was surveyed concurrently with survey methods presented in previous sections.

2.5.5 Prediction of Effects

A prediction of effects analysis has been conducted in order to identify potential environmental effects the Project may have on identified environmental components, as described in the approved Terms of Reference. Environmental components are those aspects of the natural environment that are particularly notable or valued because of their ecological, scientific, or resource importance, and that have a potential to be adversely affected by the Project development, and include:

- Habitat, vegetation communities, plant life;
- Protected Areas;
- Wetlands;
- Birds;
- Other wildlife; and
- Rare species/SAR.

The effects analysis takes into consideration the application of avoidance and mitigation measures to reduce or eliminate residual effects. Data gathered through secondary source review and through field studies were used to predict effects of the Project on flora and fauna and their habitat within the Site-vicinity Study Area, and are discussed in Section 4.0.

Table 2.1: Details of Field Surveys Undertaken in 2014

Date (2014)	Surveyors ¹	Survey Type	Time (hours)	Weather			
				Temp. (°C) ²	Cloud Cover (%)	Wind ³	Precip. ⁴
June 13	BH, DC	Crepuscular Bird, Nocturnal Owl, Amphibian Calling, Vegetation Mapping	12:00 - 17:00 20:30 - 22:30	10-22	50	1	0-1
June 14	BH, DC	Breeding Bird, Vegetation Mapping	06:30 - 09:45 10:00 - 17:00	7-15	30	3	0
June 25	BH, EH	Crepuscular Bird, Nocturnal Owl, Amphibian Calling	21:10 – 22:45	16	30	1	0
June 26	BH, EH	Breeding Bird	06:30 – 09:40	10	40-50	0	0

¹ Surveyors: BH = Becky Harris, DC = Dominic Cormier, EH = Erin Hellinga

² Data retrieved January 2015 from Environment Canada weather station Timmins, Ontario (Environment Canada, 2015)

³ Beaufort wind scale: 0 – calm; 1 – light air; 2 – light breeze; 3 – gentle breeze; 4 – moderate breeze.

⁴ Beaufort rain scale: 0 – Complete dryness; 1 – Mist or fog; 2 – Individual drops; 3 – Fine rain; 4 – Visible light shower.

Table 2.2: Existing Data Sources

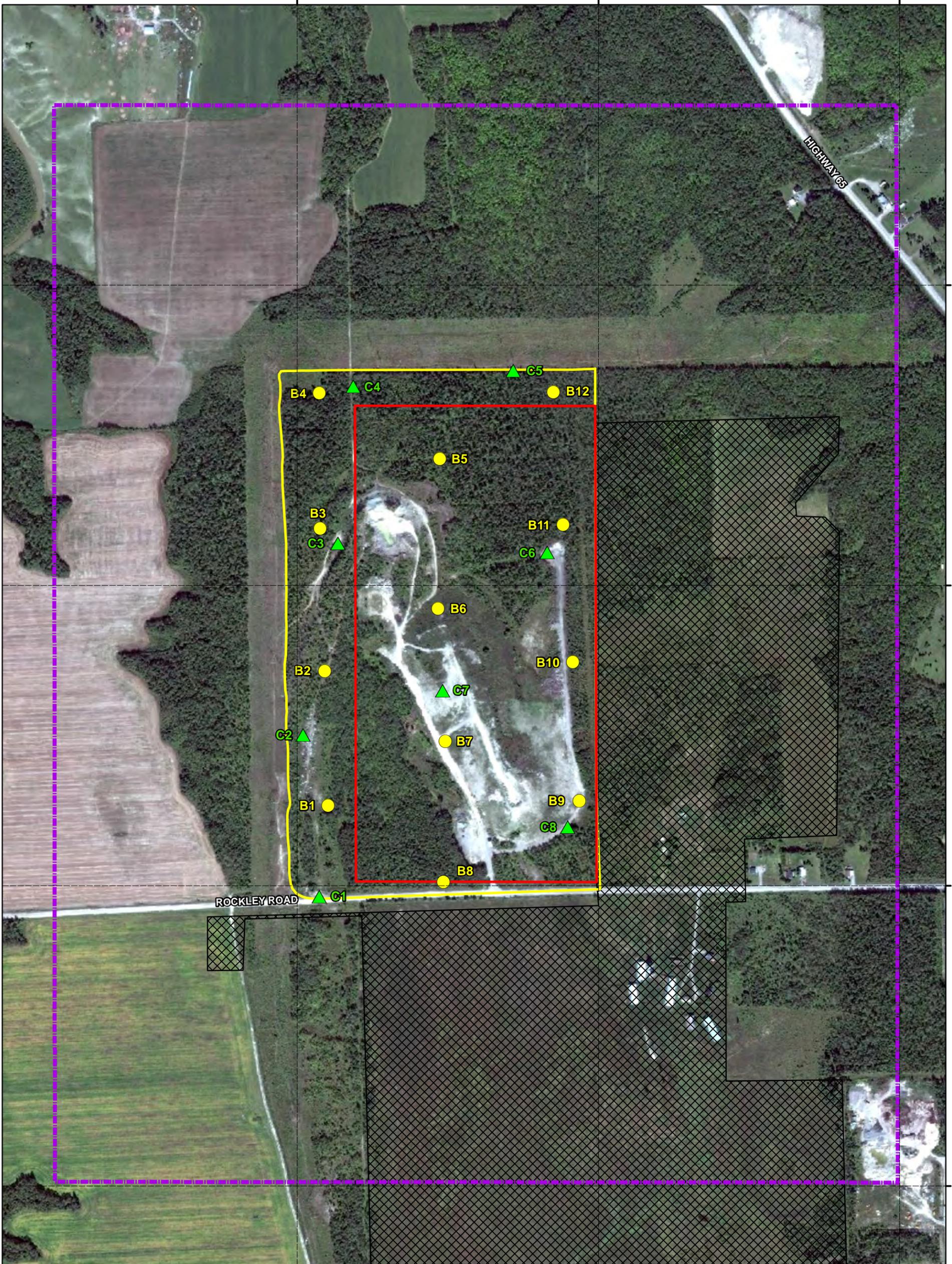
Organization	Data Type	Natural Features/Values
Canadian Solar, Dillon Consulting Limited	Canadian Solar Project Liskeard Project 1, 3 and 4 Natural Heritage Assessment Records Review Report and Evaluation of Significance Report	Local background information, species lists, valued ecosystem components
Ontario Ministry of Natural Resources – North Bay District Office	Agency consultation – Records Request	Natural Heritage Features and Species at Risk
Bird Studies Canada, Environment Canada, Ontario Field Ornithologists, Ontario Ministry of natural Resources, and Ontario Nature	Atlas of the Breeding Birds of Ontario, 2001-2005	Avian breeding records and occurrences
Ontario Nature	Ontario Reptile and Amphibian Atlas	Amphibian and reptile species occurrences and conservation ranks
Ontario Ministry of Natural Resources – Natural Heritage Information Centre	Natural Heritage Information	SAR, ANSI's, Wildlife Concentration Areas
Ontario Ministry of Natural Resources – Land Information Ontario	Land Information Ontario	ANSI's, PSW's, Wildlife Concentration Areas
Federation of Ontario Naturalists	Atlas of the Mammals of Ontario	Mammal species lists
Environment Canada - <i>Migratory Birds Convention Act</i>	Bird species list that fall under this Act	Avian species lists
Environment Canada - <i>Fish and Wildlife Conservation Act</i>	Wildlife that falls under this Act	Wildlife species lists
Environment Canada	<i>Species at Risk Act</i> and wildlife that fall under this Act	SAR lists

Notes: ESA – Environmentally Sensitive Area

596500

597000

597500



5263500

5263000

5262500

5262000

- LEGEND**
- Breeding Bird Survey Stations
 - ▲ Crepuscular Bird/Amphibian Survey Stations
 - Site Study Area
 - Site-vicinity Study Area
 - Extended Study Area
 - Canadian Solar's New Liskeard Project (approx. boundary)

NOTES:

- Background image extracted from ESRI World Topo Map.
- All base data on this map was extracted from Land Information
- Geonames extracted from Geobase.



**TECHNICAL SUPPORT DOCUMENT: TERRESTRIAL BIOLOGY
NEW WASTE MANAGEMENT CAPACITY
TEMISKAMNG SHORES ONTARIO**

**Study Areas and Wildlife
Survey Station Locations**

Datum & Projection:
NAD 1983 UTM Zone 17N



PROJECT N^o: TY910491

FIGURE: 2.1

SCALE: 1:6,000

DATE: September 2015



3.0 RESULTS

3.1 General Site Description

The Site-vicinity Study Area is located on the Canadian Shield within the Haileybury Clay portion, also called the “Little Clay Belt”. Here the forests are transitional in nature, with close affinities to those of the Northern Clay Section, but also strongly influenced by the more southern hardwood species, especially in the vicinity of Lake Temiskaming. Topographically the region has few hills and the underlying rocks, mainly of sedimentary and volcanic origin and of Precambrian age, are covered by lacustrine clays and sands from glacial Lake Barlow. Surface drainage is generally poor and organic soils occupy a large percentage of the area. Much of the upland has been cleared for cultivation, and the extent of the natural forest has been further reduced by past fires. Gray luvisols and humo-ferric podzols are typical of the well-drained sites, with humic gleysols and organic soils on the poorly drained sites. (Rowe, 1972)

Black spruce (*Picea mariana*) communities are characteristic on lacustrine flats, but continual cutting has reduced their area of distribution. With the spruce are associated balsam fir (*Abies balsamea*), white birch (*Betula papyrifera*), and trembling aspen (*Populus tremuloides*), the prominence of the latter two being greatly increased as the result of fires. On moist flats and river banks are stands of balsam poplar (*Populus balsamifera*) and eastern white cedar (*Thuja occidentalis*; Rowe, 1972).

3.2 Natural Heritage Features

Based on a review of the NHIC database and consultation with the MNRF, no Natural Areas, Wildlife Concentration Areas, or other Natural Heritage Features were identified within the vicinity of the Site-vicinity Study Area.

3.3 Vegetation Community and Ecosite Classification

3.3.1 Vegetation Community Classification

Five distinct plant communities (upland and wetland) and seven distinct polygon types are present within the Site-vicinity Study Area, as summarized in Table 3.1 and illustrated on Figure 3.1. Upland and wetland communities are also differentiated in Figure 3.1. All of the vegetation polygons and their associated ecosite/vegetation community classification, characterization, description and disturbance, as well as the area covered by each ecosite/vegetation type are summarized in Table 3.1. The compiled plant species list (including Latin names), associated ranks and protective status, and occurrence in each community/polygon type are presented in Table 3.2.

3.3.1.1 Upland Vegetation Communities

Upland vegetation communities present within the Site-vicinity Study Area include deciduous and mixed wood forests, and cultural meadows and thickets. Upland vegetation communities are characterized by plant species that are typically not well adapted, or marginally adapted, to hydrophytic (wet) conditions. Soils are non-hydric and mineral (non-wetland), and indicators of wetland hydrology are absent (e.g., saturated soils, oxidized rhizospheres on living roots or water-stained leaves). Areas with upland vegetation communities are illustrated on Figure 3.1.

Deciduous Forest

Deciduous forests are typically described as those containing greater than 75% deciduous trees by percent cover, but may contain up to 25% coniferous trees. Based on FEC, the deciduous forest community present in the study area is the Trembling Aspen – Black Spruce – Bush Honeysuckle – Herb Rich (V11) community type. This forest type is present throughout the extent of the Site-vicinity Study Area, comprising 19.2 ha (42.2%) of the total Site-vicinity Study Area. The community is distinguished into two separate polygon types; one which is a young regenerating stand (Polygon A; 9.1 ha in the Site-vicinity Study Area) and one which is a mid-aged stand (Polygon B; 10.1 ha in the Site-vicinity Study Area). Both polygon types are comprised of the same species composition. The canopy is predominantly comprised of trembling aspen, with white birch and black spruce associates. The shrub layer includes those species present in the canopy as well as red-osier dogwood (*Cornus stolonifera*), serviceberry (*Amelanchier sp.*), buffalo-berry (*Shepherdia canadensis*), pin cherry (*Prunus pensylvanica*), bush honeysuckle (*Diervilla lonicera*), staghorn sumac (*Rhus typhina*), highbush cranberry (*Viburnum trilobum*), prickly wild rose (*Rosa acicularis*), Manitoba maple (*Acer negundo*), ash species (*Fraxinus sp.*), alder-leaved buckthorn (*Rhamnus alnifolia*), raspberry species (*Rubus sp.*), red-berried elderberry (*Sambucus racemosa ssp. pubens*), swamp red currant (*Ribes triste*), round-leaved dogwood (*Cornus rugosa*), balsam poplar, and eastern white cedar. The herbaceous layer is comprised of abundant grass species and bracken fern (*Pteridium aquilinum*) as well as tall buttercup (*Ranunculus acris*), crown vetch (*Vicia sativa*), orange hawkweed (*Hieracium aurantiacum*), wild lily-of-the-valley (*Maianthemum canadense*), spreading dogbane (*Apocynum androsaemifolium*), and yellow lady's slipper (*Cypripedium parviflorum var. pubescens*). Non-native species are abundant and widespread. Tracks, trails and miscellaneous waste from human activity (i.e., non-regulated waste facility) are also extensive within these polygons.

Mixed Forest

Mixed forests are typically described as those containing at least 25% deciduous and 25% coniferous trees by percent cover. Based on FEC, the mixed forest communities present in the study area is the Black Spruce – Herb Rich (V15) community type. This forest type is present throughout the extent of the Site-vicinity Study Area, comprising 8.9 ha (19.7%) of the total Site-vicinity Study Area. This community is dominated by black spruce, with trembling aspen and white birch associates. Balsam Fir is rare. The shrub layer includes those tree species present in the canopy as well as dwarf raspberry (*Rubus pubescens*), prickly wild rose, red-osier dogwood, green alder (*Alnus viridis spp. crispa*), buffalo berry, serviceberry, eastern white cedar, balsam

popular, bunchberry (*Cornus canadensis*), and bush honeysuckle. Herbaceous species present include wild lily-of-the-valley, wild strawberry (*Fragaria virginiana*), and aster species (*Symphotrichum sp.*). The community is mid-aged. Faint trails, and miscellaneous waste (from human activity) and earth displacement is present. There was moderate flooding at the time of surveys.

Cultural Meadow

The Mineral Cultural Meadow Ecosite (CUM1) community originates from, or is maintained by, anthropogenic influences and culturally based disturbance, and often contain a large proportion of non-native species. The community is composed of mostly non-woody vegetation, with shrub cover $\leq 25\%$ and tree cover $\leq 25\%$. The cultural meadow is located as a large polygon within the centre of the study area as well as a couple of small scattered patches. In total, this community type comprises 8.7 ha of the Site-vicinity Study Area (19.2%) of the total Site-vicinity Study Area. Shrub and tree cover is rare and is mainly composed of bush honeysuckle, willow sp. (*Salix sp.*), serviceberry, prickly wild rose, pin cherry, jack pine (*Pinus banksiana*), and Manitoba maple. Herbaceous species present include abundant crown vetch, northern bedstraw (*Galium boreale*), and grass species. Field horsetail (*Equisetum arvense*), common burdock (*Arctium minus*), bird's-foot trefoil (*Lotus corniculatus*), hooked agrimony (*Agrimonia gryposepala*), and alsike clover (*Trifolium hybridum ssp. elegans*) are also common. Non-native species are abundant and widespread. Trails, miscellaneous waste (from human activity), and earth displacement is extensive.

Cultural Thicket

The Mineral Cultural Thicket Ecosite (CUT1) community originates from, or is maintained by, anthropogenic influences and culturally based disturbance, and often contain a large proportion of non-native species. The community is composed of shrub cover $>25\%$ and tree cover $\leq 25\%$; large portions of the community may be open with non-woody vegetation. Within the Site-vicinity Study Area, this community type is distinguished into two polygon types; one which is a mosaic of mixed woody species (Polygon A; 1.2 ha in the Site-vicinity Study Area) and one which is dominated by red-osier dogwood (Polygon B; 0.8 ha in the Site-vicinity Study Area). Despite this difference in dominant woody cover, the remainder of the species composition is similar and is described together. These cultural thickets are small polygons scattered through the Site-vicinity Study Area, comprising a total of 2.0 ha (4.5%) of the total Site-vicinity Study Area. Tree and shrub species present include red-osier dogwood (dominant in polygon type B), balsam poplar, willow species, trembling aspen, white birch, pin cherry, and staghorn sumac. The herbaceous layer includes abundant grasses as well as alsike clover, goldenrod species (*Solidago sp.*), vetch species (*Vicia sp.*), common burdock, orange hawkweed, common dandelion (*Taraxacum officinale*), bird's-foot trefoil, and wild strawberry. Non-native species are abundant and widespread. Tracks, miscellaneous waste (from human activity), and earth displacement is widespread within the community.

Other Upland Communities

A total of 4 ha (8.9%) of the total Site-vicinity Study Area was documented as being un-vegetated following site disturbance and/or clear-cut and, as such, vegetation community classification was not possible.

3.3.1.2 Wetland Vegetation Communities

Wetland vegetation communities are present in the Site-vicinity Study Area and include one treed swamp; however, they are absent from the Site Study Area. Wetland vegetation communities are characterized by plant species typically well adapted to hydrophytic conditions. Soils are hydric and mineral or organic, and indicators of hydrology are present (e.g., saturated soils, oxidized rhizospheres on living roots or water-stained leaves). Areas with wetland vegetation communities are illustrated on Figure 3.1.

Swamp

Treed swamp wetlands are wooded wetlands with greater than 25% cover of trees. One organic swamp is located within the Site-vicinity Study Area, the Eastern White Cedar – Spruce – Balsam Fir – Ferns (V16) community type, comprising 1.2 ha (2.7%) of the total Site-vicinity Study Area. This community is present as two polygons along the western extent of the study area, surrounded by upland communities, and likely exist as small depressions (no drainages leading in or out of the communities were evident). Based on OWES, the wetland community is classified as a coniferous (c), tall shrub (ts), low shrub (ls), ground cover (gc) Swamp. Based on the CWCS, the wetland is classified as a Flat Swamp (subform: Basin Swamp)². The community is mainly comprised of eastern white cedar, with black spruce associate. White birch, trembling aspen, and balsam poplar are rare. The shrub layer is comprised of those species present in the canopy as well as willow species, red-osier dogwood, prickly wild rose, serviceberry, and buffalo-berry. Bracken fern is occasional within the herbaceous layer. Other species include yellow lady's slipper and grass species. Moss and lichen species are rare. The vegetation community is generally mature though there are large and extensive gaps within the forest canopy. Faint trails are present. Miscellaneous waste from human activity is moderate and widespread. No wetland communities are present within the Site Study Area.

² Flat Swamps develop in topographically defined basins, kettle holes or bedrock where the water is derived by surface runoff, groundwater or precipitation and occasionally by small inflowing surface streams. Flat swamps may also occupy poorly defined basins such as those in broad, shallow depressions in glacial lakebeds and outwash plains. Flat Basin Swamps occur in well-defined basins in glacial deposits or bedrock. The edges are well-defined by the sides of the basin and the surrounding mineral soil uplands (National Wetland Working Group, 1997).

3.3.2 Ecosite Classification

As identified in Section 3.3.1, five distinct vegetation communities were documented within the Site-vicinity Study Area, of which three communities could be identified using FEC V-type classifications. The three vegetation communities were matched with FEC Ecosites. Soil types were approximated to be largely clay-dominated based on available Site history information (Rowe, 1972; Crins *et al.*, 2009). FEC Ecosite codes include ES10 (community V11), ES6f (community V15), and ES13r (community V16). Overall, these communities represent fine clay substrates and organic substrates which are common in the Little Clay Belt and Ecoregion 4E-5.

The three FEC codes and two ELC Ecosite code correspond to five Provincial Ecosites used to describe the vegetation communities present within the Site-vicinity Study Area (Table 3.3 and Figure 3.1). The value of identifying a Provincial Ecosite code relative to FEC/ELC communities allows for the identification of significant wildlife habitat. The Draft Significant Wildlife Habitat Ecoregion 3E Criterion Schedule (MNR, 2012) lists candidate significant wildlife habitat based on the presence of Provincial Ecosites, and provides a rational and approach for determining the presence of significant wildlife habitat. Though the Criteria Schedule was developed for Ecoregion 3E, it is sufficiently applicable to the Site-vicinity Study Area within Ecoregion 4E, as the two Ecoregions occur immediately adjacent to one another and vegetation communities are described with the same Provincial Ecosite codes. An evaluation of candidate significant wildlife habitat within the Site-vicinity Study Area is provided in Section 4.3.1 (also see Table 4.1 to 4.5).

3.4 Wildlife

The following subsections provide the results of the desktop review of terrestrial wildlife in the Extended Study Area and the detailed field program undertaken in the Site-vicinity Study Area. In general, wildlife species identified within the Site-vicinity Study Area are typical of mixed boreal forest ecosystems. A complete list of the wildlife species identified through a review of secondary source information and recorded during field surveys are provided in Tables 3.4 to 3.8. Tables include lists of species, their federal and provincial ranks, and their protective status (if any).

3.4.1 Birds

Data from the Atlas of Breeding Birds in Ontario (Cadman *et al.*, 2007) describes 24 species as possible, probable or confirmed breeders in the vicinity of the Extended Terrestrial Study Area; however, due to the northern position of the Extended Terrestrial Study Area relative to urban and rural areas in southern Ontario, the avian diversity of the region is under-reported. A total of 32 bird species were recorded within the Site-vicinity Study Area during standardized point counts surveys, of which 18 species had not previously been identified in the Extended Terrestrial Study Area (were not listed in the Ontario Breeding Bird Atlas; see Table 3.4).

The six most common birds, recorded an average of at least once at each station, include the American Goldfinch (*Spinus tristis*), White-throated Sparrow (*Zonotrichia albicollis*), Song Sparrow (*Melospiza melodia*), Cedar Waxwing (*Bombycilla cedrorum*), Red-eyed Vireo (*Vireo olivaceus*), and Black-capped Chickadee (*Poecile atricapillus*). Recorded observations for these

species include: 43 American Goldfinches (average birds/count = 3.58, percent occurrence/count = 75%), 24 White-throated Sparrows (average birds/count = 2.00, percent occurrence/count = 83%), 22 Song Sparrows (average birds/count = 1.83, percent occurrence/count = 75%), 21 Cedar Waxwings (average birds/count = 1.75, percent occurrence/count = 67%), 21 Red-eyed Vireos (average birds/count = 1.75, percent occurrence/count = 100%), and 16 Black-capped Chickadees (average birds/count = 1.33, percent occurrence/count = 58%; see Table 3.5). Of the 32 bird species (277 total birds) recorded, the American Goldfinch, White-throated Sparrow, Song Sparrow, Cedar Waxwing, Red-eyed Vireo, and Black-capped Chickadee represented 53% of all observations.

Bird species richness ranged from 10 to 16 species at point count stations and averaged 12.4 bird species per station. In general, species diversity was higher in the northern areas of the Site-vicinity Study Area, near to the edges of forest communities, ranging from 14 to 16 species per point count station (Stations 3, 4, 10-12). Species diversity was relatively low in the central portion of the Site-vicinity Study Area within the Cultural Meadow Ecosite with a total of 10 species (Stations 6 and 7). Bird species density followed a similar trend as species richness, with the greatest bird densities occurring in the northern areas of the Site-vicinity Study Area. Overall, the average species density at each point count station was 23.08 birds. Breeding bird observations at each point count station are provided in Table 3.5. Breeding bird diversity and density at each point count station are illustrated in Figure 3.2 and Figure 3.3, respectively.

No additional bird species were recorded during crepuscular bird surveys.

Of the 43 total species identified through the review of background information and field surveys, 36 total bird species are expected to be breeding or potentially breeding within the Site-vicinity Study Area (see Table 3.5). Thirty-nine (39) of the 43 (91%) bird species are seasonal migrants, occurring in northern Ontario only during the summer breeding season.

Two SAR birds were identified through the review of background information. Consultation with the MNRF revealed the presence of a historically recorded occurrence of a Black Tern (*Chlidonias niger*) within 2 km of the Site, while the Atlas of Breeding Birds of Ontario listed a “possible” occurrence of Barn Swallow (*Hirundo rustica*). Species at Risk are further discussed in Section 3.5.1.

3.4.2 Mammals

The review of the Atlas of the Mammals of Ontario indicated that 41 mammalian species may occur in the general vicinity of the Extended Terrestrial Study Area (Dobbyn, 1994). Visual sightings, evidence (e.g., scat, tracks and vocalizations) did not reveal any mammal species occurring within the Site-vicinity Study Area.

The majority of the species listed in the Atlas of the Mammals of Ontario as potentially occurring within the Extended Terrestrial Study Area are both small and difficult to detect using standard, non-invasive methods, and/or are elusive, large mammals; nonetheless, many of these species

may occur within the Extended Terrestrial Study Area. A complete list of the mammal species identified through a review of secondary source information is provided in Table 3.6.

The Atlas of the Mammals of Ontario indicated that two SAR mammal species, including northern myotis (*Myotis septentrionalis*) and little brown myotis (*Myotis lucifugus*; both provincially *Endangered*) may occur within, or within the vicinity of, the Extended Terrestrial Study Area. Species at Risk are further discussed in Section 3.5.2.

3.4.3 Amphibians and Reptiles

Ten amphibian species were identified in the review of the Ontario Reptile and Amphibian Atlas (Ontario Nature, 2013) as occurring within the vicinity of the Extended Terrestrial Study Area (Table 3.7). These species include: American toad (*Anaxyrus americanus*), gray treefrog (*Hyla versicolor*), Spring peeper (*Pseudacris crucifer*), green frog (*Lithobates clamitans*), wood frog (*Lithobates sylvatica*), northern leopard frog (*Lithobates pipiens*), and mink frog (*Lithobates septentrionalis*) as well as spotted salamander (*Ambystoma laterale*), blue-spotted salamander (*Ambystoma maculatum*), and Jefferson/blue-spotted salamander Complex (*Ambystoma jeffersonianum/laterale*). Spring peeper was heard at two survey stations in the Site-vicinity Study Area (C3 and C6) and at low densities (one and four individuals, respectively), while American toad was heard at station C6 (two individuals).

Four reptile species were identified in the review of the Ontario Reptile and Amphibian Atlas (Ontario Nature, 2013) as occurring within the vicinity of the Extended Study Area (Table 3.7); eastern gartersnake (*Thamnophis sirtalis*), red-bellied snake (*Storeria occipitomaculata*), midland painted turtle (*Chrysemys picta marginata*), and snapping turtle (*Chelydra serpentina*). No reptile species were identified during field surveys in the Site-vicinity Study Area. Snapping turtle, a provincially *Special Concern* SAR, is further discussed below in Section 3.5.3.

3.5 Species at Risk and Provincially Rare Species

Based on a review of secondary source information and consultation with the MNRF, five SAR were identified as occurring or potentially occurring with the vicinity of the Extended Terrestrial Study Area, including two bird species, one reptile species, and two mammal species (Table 3.8). None of these SAR were recorded during field surveys. Detailed habitat descriptions and potential for occurrence of SAR within the Extended Terrestrial Study Area are provided in the subsections below.

3.5.1 Bird Species at Risk

Based on a review of the Atlas of Breeding Birds in Ontario and correspondence with MNRF North Bay District, two avian SAR were identified as potentially occurring within the Extended Terrestrial Study Area including Barn Swallow and Black Tern.

Barn Swallow

Before European settlement in Ontario, Barn Swallows nested mostly in caves, holes, crevices and ledges in cliff faces (COSEWIC, 2011). Although Barn Swallows continue to nest in traditional natural habitats, they are now most closely associated with human structures in rural areas. Such nesting sites include a variety of artificial structures that provide either a horizontal nesting surface (e.g., a ledge) or a vertical face, often with some sort of overhang that provides shelter (COSEWIC, 2011). Nests are most commonly located in and around open barns, garages, sheds, boat houses, bridges and road culverts, and are situated on such surfaces as beams and posts, light fixtures, and ledges over windows and doors (COSEWIC, 2011). Because Barn Swallow nests are constructed of mud pellets, Barn Swallows require nest sites that have a source of nearby mud, which makes bridges and large culverts ideal sites for nesting (COSEWIC, 2011). Barn Swallows typically select foraging sites close to open habitats such as farmlands of various descriptions, wetlands, road rights-of-way and large forest clearings (COSEWIC, 2011).

During breeding bird surveys, no Barn Swallows were identified in the Site-vicinity Study Area and no suitable nesting habitat is available within the Site-vicinity Study Area.

Black Tern

The Black Tern is a small tern that nests semi-colonially in freshwater marshes amidst emergent vegetation in biologically rich fresh-water wetlands, including prairie sloughs, margins of lakes, and occasionally river or island edges (Heath *et al.*, 2009). Habitat suitability appears to be determined more by landscape structure at a larger scale (wetland complex) than local vegetation conditions within wetlands (Heath *et al.*, 2009). Black Terns selectively choose wetlands located in high-density wetland landscapes within areas where less than 50% of upland habitat is tilled. Black Terns are less likely to occur in wetlands surrounded by woody vegetation. Black Terns generally prefer marshes or marsh complexes of more than 20 ha in size for breeding; the smallest reported breeding habitat is 5.3 ha (Heath *et al.*, 2009).

During breeding bird surveys and vegetation surveys, no individual Black Terns or evidence of nesting colonies were observed within the Site-vicinity Study Area. Based on the habitat preferences of Black Terns (large marsh wetlands or wetland complexes), no suitable nesting habitat is present within the Site-vicinity Study Area.

3.5.2 Mammal Species at Risk

Bats

The Atlas of the Mammals of Ontario indicated that two mammal SAR, including northern myotis and little brown myotis may occur within, or in the vicinity of, the Extended Terrestrial Study Area. Both species have recently been listed both provincially and nationally as *Endangered*. Since it first appeared in upstate New York in 2006, the fungal disease known as White Nose Syndrome has decimated millions of bats throughout eastern North America and is rapidly spreading westward (Frick *et al.*, 2010). The natural histories of the two species most impacted by White Nose Syndrome are very similar in that both rely on old growth forest stands where they form

maternity colonies in tree cavities. Both also rely on caves and abandoned mines as hibernacula and staging points for reproductive activities (Norquay *et al.*, 2013).

Three critical bat habitat types are recognized by the MNRF: 1) bat hibernacula, 2) bat maternity roost sites and 3) bat migration stopover sites (MNR, 2011). Little is known regarding bat migratory stopover habitat in Ontario and there are currently no provincial criteria for identifying critical bat migratory stopover habitat (MNR, 2011). During the spring and early summer, most Ontario bat species rely on forest habitat that supports a healthy density of large-diameter cavity trees. Females form maternity colonies of tens to hundreds of individuals in cavities that provide a warm, humid microclimate that optimizes gestation and growth of offspring (Kunz and Anthony, 1982). Maternity colonies are generally located in mature (dominant trees >80 years old) deciduous or mixed forest stands with a density of at least 10 trees/ha of cavity trees with a diameter at breast height of 25 cm or greater. In August and September, bats congregate at the entrance of caves or mine shafts which are used as hibernacula during the winter (Norquay *et al.* 2013). During winter, suitable hibernacula maintain temperatures slightly above freezing, a consistent air flow and high humidity levels (Raesly and Gates, 1987).

Targeted surveys for bat species, such as acoustic monitoring, were not conducted during baseline field surveys. However, no critical habitat for bats was identified during vegetation surveys. Deciduous and mixed forests which were identified were too young to provide habitat and large diameter snags for maternity colonies and no caves or deep rock fissures were found. As such, the Site-vicinity Study Area is not likely to provide critical habitat for either the northern myotis or the little brown myotis.

3.5.3 Reptile Species at Risk

Snapping Turtle

The preferred habitats for the snapping turtles are characterized by slow-moving water with a soft mud bottom and dense aquatic vegetation. Established populations are most often located in ponds, sloughs, shallow bays or river edges and slow streams, or areas combining several of these wetland habitats (COSEWIC, 2008). Although individual turtles will persist in heavily urbanized water bodies (e.g. golf course ponds, irrigation canals), it is unlikely that populations persist in such habitats (COSEWIC, 2008). No open water bodies are present within or near to the Site-vicinity Study Area and, as such, no habitat for snapping turtles is present.

Table 3.1: Vegetation Communities

Vegetation Community Type ¹	V-type Community Characterization ²	Vegetation Description ³	Stand Description/ Disturbance ³	Total Community Area (Site-vicinity Study Area)
UPLAND COMMUNITIES				
FEC: V11 (Trembling Aspen – Black Spruce – Bush Honeysuckle – Herb Rich) ES10 (Trembling Aspen – Black Spruce – Balsam Poplar – Moist)	<ul style="list-style-type: none"> A hardwood stand dominated by trembling aspen, with black spruce, balsam fir, white spruce, balsam poplar, and jack pine associates. Abundant low shrubs consisting of regenerating canopy species. Speckled alder, twinflower, bunchberry, red raspberry, dwarf raspberry, bristle wild rose, serviceberry, honeysuckles, mountain ash, current species, and squashberry are often present. Characteristic boreal forest species including blue bead-lily, wild lily-of-the-valley and starflower are present. Large-leaved aster, wild strawberry, spinulose wood fern, sweet coltsfoot, fireweed, fragrant bedstraw, violets, sarsaparilla, and clubmosses are common. Mosses, lichens and liverworts are uncommon. 	<ul style="list-style-type: none"> This community is distinguished into two separate polygon types; one which is considered to be a young regenerating stand (A), one which is considered to be mid-aged (B). The canopy is predominantly trembling aspen with white birch and black spruce associates. The shrub layer includes those species present in the canopy as well as red-osier dogwood, serviceberry, buffalo-berry, pin cherry, bush honeysuckle, staghorn sumac, highbush cranberry, prickly wild rose, Manitoba maple, ash species, alder-leaved buckthorn, raspberry species, red-berried elderberry, swamp red currant, round-leaved dogwood, balsam poplar, and eastern white cedar. The herbaceous layer is comprised of abundant grass species and bracken fern as well as tall buttercup, crown vetch, orange hawkweed, wild lily-of-the-valley, spreading dogbane, and yellow lady's slipper. 	<ul style="list-style-type: none"> This community is distinguished into two separate polygon types; one which is considered to be a young regenerating stand (A), one which is considered to be mid-aged (B). Widespread logging has occurred in both polygon types. Non-native species are abundant and widespread. Tracks, trails and miscellaneous waste (from human activity) is extensive. 	19.2 ha 42.2% cover (9.1 ha in Polygon A; 10.1 ha in Polygon B)
FEC: V15 (Black Spruce – Herb Rich) ES6f (Black Spruce – Trembling Aspen – Fine Soil)	<ul style="list-style-type: none"> A mixedwood stand dominated by black spruce. Associated tree species include balsam fir and trembling aspen. Medium number of shrubs. Shrub layer species vary and are generally of low abundance. Shrub species that may be present include balsam fir, black spruce, trembling aspen, twinflower, dwarf raspberry, bunchberry, prickly rose, northern mountain-ash, creeping snowberry, swamp red currant, speckled alder, velvetleaf blueberry, bush honeysuckle, serviceberries, bristly black currant, American fly-honeysuckle, and squashberry. Mosses and liverworts are common, with the forest floor dominated by feathermoss. Fine loamy, clayey textured soils deposited by glacial ice or of glaciolacustrine origin. Occurs mainly on fresh to moist soils, with a moisture regime of 2 or 3 occurring most frequently. 	<ul style="list-style-type: none"> The community is dominated by black spruce with trembling aspen and white birch associates. Balsam Fir is rare, The shrub layer includes those tree species present in the canopy as well as dwarf raspberry, prickly wild rose, red-osier dogwood, green alder, buffalo berry, serviceberry, eastern white cedar, balsam poplar, bunchberry, and bush honeysuckle. Herbaceous species present include wild lily-of-the-valley, wild strawberry, and aster species. 	<ul style="list-style-type: none"> The community is mid-aged. Faint trails, miscellaneous waste (from human activity) and earth displacement is present. There was light pooling at the time of surveys. 	8.9 ha 19.7% cover
ELC: CUM1 (Cultural Meadow Ecosite)	<ul style="list-style-type: none"> Community resulting from, or maintained by, cultural or anthropogenic-based disturbance. Vegetation communities often have a large proportion of non-native plant species. Dominated by non-woody herbaceous vegetation. Shrub cover is ≤25% and tree cover is ≤25%. 	<ul style="list-style-type: none"> Community in mainly dominated by non-woody herbaceous vegetation. Regeneration shrub and tree species is occasional. Herbaceous species present include abundant crown vetch, northern bedstraw, and grass species. Field horsetail, common burdock, bird's-foot trefoil, hooked agrimony, and alsike clover are also common. Shrub and tree cover is rare and is mainly composed of bush honeysuckle, willow sp., serviceberry, prickly wild rose, pin cherry, jack pine, and Manitoba maple. 	<ul style="list-style-type: none"> The community is culturally maintained and/or created and is mostly composed of upland vegetation including non-native species. Trails, miscellaneous waste (from human activity), and earth displacement is extensive. 	8.7 ha 19.2% cover
ELC: CUT1 (Cultural Thicket Ecosite)	<ul style="list-style-type: none"> Community resulting from, or maintained by, cultural or anthropogenic-based disturbance. Vegetation communities often have a large proportion of non-native plant species. 	<ul style="list-style-type: none"> Community in mainly dominated by mosaic of herbaceous and shrubby vegetation. Some regenerating tree species are present. Two polygon types are present; one which is a mosaic of mixed woody species (A), and one which is dominated by red-osier dogwood (B). 	<ul style="list-style-type: none"> Two polygon types are present; one which is a mixed species type (A), and one which is dominated by red-osier dogwood (B). 	2.0 ha 4.5% cover (1.2 ha in

Vegetation Community Type ¹	V-type Community Characterization ²	Vegetation Description ³	Stand Description/ Disturbance ³	Total Community Area (Site-vicinity Study Area)
	<ul style="list-style-type: none"> Complex of regenerating tree/shrub species scattered throughout ecosite. 	<ul style="list-style-type: none"> Tree and shrub species present include red-osier dogwood (dominant in polygon type B), balsam poplar, willow species trembling aspen, white birch, pin cherry, and staghorn sumac. The herbaceous layer includes abundant grasses as well as alsike clover, goldenrod species, vetch species, common burdock, orange hawkweed, common dandelion, bird's-foot trefoil, and wild strawberry. 	<ul style="list-style-type: none"> Non-native species are abundant and widespread. Miscellaneous waste (from human activity), tracks, and earth displacement is widespread within the community. 	Polygon A; 0.8 ha in Polygon B)
WETLAND COMMUNITIES				
<p>FEC: V16 (Eastern White Cedar – Spruce – Balsam Fir – Ferns) ES13r (Eastern White Cedar – Black Spruce – Organic – Species Rich)</p> <p>OWES: Swamp – coniferous (c), tall shrub (ts), low shrub (ls), ground cover (gc)</p> <p>CWCS: Flat Swamp (subform: Basin Swamp)</p>	<ul style="list-style-type: none"> A coniferous stand dominated by white cedar, black spruce, white spruce, and balsam fir. Tall and low shrubs consist of regenerating canopy species. White birch, dwarf raspberry, bunchberry, twinflower, American fly-honeysuckle, northern mountain-ash, creeping snowberry, mountain maple, speckled alder, bristly black currant, red-osier dogwood, swamp red currant, prickly rose, and serviceberries may be present in lower numbers. Mosses are abundant on the forest floor; common species include Schreber's moss and stair-step moss. Other species may include shaggy moss, knight's plume moss, curly heron's-bill moss, common green peat moss, sickle moss, wavy-leaved moss, and <i>Mnium</i> species. Mainly on moist to wet soils, with a moisture regime of 6 or 7 occurring most frequently. 	<ul style="list-style-type: none"> The community is mainly comprised of eastern white cedar, with black spruce associate. White birch, trembling aspen, and balsam poplar are rare. The shrub layer is comprised of those species present in the canopy as well as willow species, red-osier dogwood, prickly wild rose, serviceberry, and buffalo-berry. Bracken fern is occasional within the herbaceous layer. Other species include yellow lady's slipper, and grass species. Moss and lichen species are rare. 	The vegetation community is generally mature. Gaps within the canopy are large and widespread. Faint trails are present. Miscellaneous waste (from human activity) is moderate and widespread.	1.2 ha 2.7% cover

¹ Community type based on the Field Guide to Forest Ecosystems of Northeastern Ontario (FEC; Taylor *et al.*, 2000), the Ecological Land Classification for Southern Ontario (ELC; Lee *et al.*, 1998), the Ontario Wetland Evaluation System (OWES; MNR, 1993) and/or the Canadian Wetland Classification System (CWCS; Warner and Rubec, 1997).

² Multiple classifications systems possible. Primarily based on community characteristics as described in the Field Guide to Forest Ecosystems of Northeastern Ontario (FEC; Taylor *et al.*, 2000). Secondly based on characteristics as described in the Ecological Land Classification for Southern Ontario (ELC; Lee *et al.*, 1998).

³ Vegetation communities and stand description/disturbance are based on field observations. Note: Black spruce is differentiated from red spruce. Habitat and tree form were used to differentiate species; however, hybrids of these two trees are likely present.

Table 3.2: Compiled Plant Species List

Common Name	Scientific Name	ELC Community ¹							Provincial S-Rank	Provincial Designation (ESA)	Federal Designation (SARA)	
		V11/ ES10 (A)	V11/ ES10 (B)	V15/ ES6f	V16/ ES13r	CUM1-1	CUT1 (A)	CUT1 (B)				
TREES												
Balsam Fir	<i>Abies balsamea</i>		R	R						S5	----	----
Manitoba Maple	<i>Acer negundo</i>	R				R				S5	----	----
White Birch	<i>Betula papyrifera</i>	O	O	O	R		R	R		S5	----	----
Ash Species	<i>Fraxinus sp.</i>	O				R				S5	----	----
Black Spruce	<i>Picea mariana</i>	R	O	D	O			R		S5	----	----
Jack Pine	<i>Pinus banksiana</i>					R				S5	----	----
Balsam Poplar	<i>Populus balsamifera</i>		O	R	R		A	R		S5	----	----
Trembling Aspen	<i>Populus tremuloides</i>	A	A	O	R		R	R		S5	----	----
Pin Cherry	<i>Prunus pensylvanica</i>	O				R	R			S5	----	----
Choke Cherry	<i>Prunus virginiana</i>		R	R		R		R		S5	----	----
Eastern White Cedar	<i>Thuja occidentalis</i>	R		R	A			R		S5	----	----
SHRUBS AND WOODY VINES												
Green Alder	<i>Alnus viridis spp. crispa</i>			O						S5	----	----
Serviceberry Species	<i>Amelanchier sp.</i>	O	O	O	O	R				----	----	----
Bunchberry	<i>Cornus canadensis</i>			O						S5	----	----
Round-leaved Dogwood	<i>Cornus rugosa</i>		O					D		S5	----	----
Red-osier Dogwood	<i>Cornus stolonifera</i>	O	O	O	O	R				S5	----	----
Northern Bush-honeysuckle	<i>Diervilla lonicera</i>	O	R							S5	----	----
Canada Fly-honeysuckle	<i>Lonicera canadensis</i>			R		R		R		S5	----	----
Virginia Creeper	<i>Parthenocissus quinquefolia</i>	O					R			S4?		
Alderleaf Buckthorn	<i>Rhamnus alnifolia</i>	R								S5	----	----
Staghorn Sumac	<i>Rhus typhina</i>	O				R	O	O		S5	----	----
Swamp Red Currant	<i>Ribes triste</i>		O	R						S5	----	----
Prickly Wild Rose	<i>Rosa acicularis</i>	O	O	O	O	R		R		S5	----	----
Dwarf Raspberry	<i>Rubus pubescens</i>			O				R		S5	----	----
Raspberry Species	<i>Rubus sp.</i>		O			R				----	----	----
Willow Species	<i>Salix sp.</i>				O	R	A	O		----	----	----
Red-berried Elder	<i>Sambucus racemosa ssp. pubens</i>		O		O					S5	----	----
Canada Buffalo-berry	<i>Shepherdia canadensis</i>	R		A						S5	----	----
Highbush Cranberry	<i>Viburnum trilobum</i>	R	R							S5	----	----
HERBACEOUS (Vascular and non-vascular)												
Common Yarrow	<i>Achillea millefolium</i>							R		SE?	----	----
Hooked Agrimony	<i>Agrimonia gryposepala</i>		R			O				S5	----	----
Spreading Dogbane	<i>Apocynum androsaemifolium</i>	O						R		S5	----	----
Wild Columbine	<i>Aquilegia canadensis</i>						R			S5	----	----

Common Name	Scientific Name	ELC Community ¹							Provincial S-Rank	Provincial Designation (ESA)	Federal Designation (SARA)
		V11/ES10 (A)	V11/ES10 (B)	V15/ES6f	V16/ES13r	CUM1-1	CUT1 (A)	CUT1 (B)			
Wild Sarsaparilla	<i>Aralia nudicaulis</i>			R					S5	----	----
Common Burdock	<i>Arctium minus</i>		R			O		O	SE5	----	----
Canada Thistle	<i>Cirsium arvense</i>		R			R			SE5	----	----
Large Yellow Lady's-slipper	<i>Cypripedium parviflorum var. pubescens</i>	R		R	R			R	S5	----	----
Field Horsetail	<i>Equisetum arvense</i>					O			S5	----	----
Large-leaved Aster	<i>Eurybia macrophylla</i>			R					S5	----	----
Wild Strawberry	<i>Fragaria virginiana</i>			O				R	SU	----	----
Northern Bedstraw	<i>Galium boreale</i>					A			S5	----	----
Grass Species	<i>Grass sp.</i>	A			R	A	A	A	----	----	----
Cow-parsnip	<i>Heracleum lanatum</i>					R			S5	----	----
Orange Hawkweed	<i>Hieracium aurantiacum</i>	A						O	SE5	----	----
Oxeye Daisy	<i>Leucanthemum vulgare</i>					R			SE5	----	----
Bird's-foot Trefoil	<i>Lotus corniculatus</i>				R	O		O	SE5	----	----
Wild-lily-of-the-valley	<i>Maianthemum canadense</i>	O	O	A					S5	----	----
Forget-me-not Species	<i>Myosotis sp.</i>		R						----	----	----
Phlox Species	<i>Phlox sp.</i>					R		R	----	----	----
Bracken Fern	<i>Pteridium aquilinum</i>	O	A		O				S5	----	----
Tall Buttercup	<i>Ranunculus acris</i>	O	R			R		R	SE5	----	----
Goldenrod Species	<i>Solidago sp.</i>		R					O	----	----	----
Field Sowthistle	<i>Sonchus arvensis</i>					R		R	SE5	----	----
Aster Species	<i>Symphyotrichum sp.</i>		R	O		R			----	----	----
Common Dandelion	<i>Taraxacum officinale</i>							O	SE5	----	----
Tall Meadowrue	<i>Thalictrum pubescens</i>			R					S5	----	----
Alsike Clover	<i>Trifolium hybridum ssp. elegans</i>					O		O	SE5	----	----
Common Mullein	<i>Verbascum thapsus</i>					R		R	SE5	----	----
Crown Vetch	<i>Vicia sativa</i>	O				A			SE5	----	----
Vetch Species	<i>Vici asp.</i>							O	----	----	----
Moss Species	----				R				----	----	----
Lichen Species	----				R				----	----	----

¹ S-Rank – S3: Uncommon or vulnerable species; S4 - Apparently Secure Species; S5 – Secure Species; SNA – Non-native

² ESA - Endangered Species Act, 2007

³ SARA - Species at Risk Act, 2003 – Schedule 1: Full protection under SARA

Table 3.3: FEC/ELC and Provincial Ecosites

FEC/ELC V-Type	FEC/ELC Ecosite ^{1, 2}		Provincial Ecosites ³	
	Code	Code Description	Code	Code Description
V11	ES10	Trembling Aspen – Black Spruce – Balsam Poplar – Moist	B119	Moist, Fine: Aspen – Birch Hardwood
V15	ES6f	Black Spruce – Trembling Aspen – Fine Soil	B083	Fresh, Clayey: Black Spruce - Pine Conifer
V16	ES13r	Eastern White Cedar – Black Spruce – Organic – Species Rich	B129	Organic Rich Conifer Swamp
CUM1-1	--	Dry-Fresh Cultural Meadow	B078	Fresh, Clayey: Field
CUT1	--	Cultural Thicket	B080	Fresh, Clayey: Shrub

¹ Based on Field Guide to Forest Ecosystems of Northeastern Ontario (Taylor *et al.*, 2000)

² Based on Ecological Land Classification for Southern Ontario (Lee *et al.*, 1998)

³ Based on Ecosites of Ontario – Operational Draft document for the Boreal Region of Ontario (MNR, 2009a)

Table 3.4: Compiled Bird Species List

Common Name	Scientific Name	Observed on Site	Potentially Breeding on Site	Provincial S-Rank ¹	Provincial Designation (ESA) ²	Federal Designation (SARA) ³	Other Protective Acts ⁴
Alder Flycatcher	<i>Empidonax alnorum</i>	■	■	S5B	--	--	MBCA
American Crow ^β	<i>Corvus brachyrhynchos</i>	■	■	S5B	--	--	FWCA
American Goldfinch ^β	<i>Spinus tristis</i>	■	■	S5B	--	--	MBCA
American Kestrel ^β	<i>Falco sparverius</i>		■	S5	--	--	FWCA
American Redstart	<i>Setophaga ruticilla</i>	■	■	S5B	--	--	MBCA
American Robin ^β	<i>Turdus migratorius</i>	■	■	S5B	--	--	MBCA
Barn Swallow ^β	<i>Hirundo rustica</i>			S4B	THR	--	MBCA
Belted Kingfisher ^β	<i>Ceryle alcyon</i>			S4B	--	--	FWCA
Black Tern ^α	<i>Chlidonias niger</i>			N4B	SC	--	MBCA
Black-and-white Warbler	<i>Mniotilta varia</i>	■	■	S5B	--	--	MBCA
Blackburnian Warbler	<i>Setophaga fusca</i>	■	■	S5B	--	--	MBCA
Black-capped Chickadee	<i>Poecile atricapillus</i>	■	■	S5	--	--	MBCA
Blue Jay ^β	<i>Cyanocitta cristata</i>		■	S5B	--	--	FWCA
Broad-winged Hawk ^β	<i>Buteo platypterus</i>	■	■	S5	--	--	FWCA
Cedar Waxwing ^β	<i>Bombycilla cedrorum</i>	■	■	S5B	--	--	MBCA
Chestnut-sided Warbler	<i>Setophaga pensylvanica</i>	■	■	S5B	--	--	MBCA
Chipping Sparrow ^β	<i>Spizella passerina</i>	■	■	S5B	--	--	MBCA
Common Grackle ^β	<i>Quiscalus quiscula</i>	■	■	S5B	--	--	MBCA
Common Raven ^β	<i>Corvus corax</i>	■	■	S5B	--	--	FWCA
Common Yellowthroat	<i>Geothlypis trichas</i>	■	■	S5B	--	--	MBCA
Downy Woodpecker	<i>Picoides pubescens</i>	■	■	S5B	--	--	MBCA
Eastern Kingbird ^β	<i>Tyrannus tyrannus</i>		■	S4B	--	--	MBCA
European Starling ^β	<i>Sturnus vulgaris</i>		■	SNA	--	--	--
Herring Gull ^β	<i>Larus argentatus</i>			S5B, S5N	--	--	MBCA
Magnolia Warbler	<i>Setophaga magnolia</i>	■	■	S5B	--	--	MBCA
Mourning Dove ^β	<i>Zenaidura macroura</i>	■	■	S5	--	--	MBCA

Common Name	Scientific Name	Observed on Site	Potentially Breeding on Site	Provincial S-Rank ¹	Provincial Designation (ESA) ²	Federal Designation (SARA) ³	Other Protective Acts ⁴
Mourning Warbler	<i>Geothlypis philadelphia</i>	■	■	S4B	--	--	MBCA
Nashville Warbler ^β	<i>Oreothlypis ruficapilla</i>	■	■	S5B	--	--	MBCA
Northern Flicker ^β	<i>Colaptes auratus</i>	■	■	S4B	--	--	MBCA
Northern Harrier	<i>Circus cyaneus</i>	■		S4B	--	--	FWCA
Ovenbird	<i>Seiurus aurocapilla</i>	■	■	S4B	--	--	MBCA
Purple Finch	<i>Haemorhous purpureus</i>	■	■	S5B	--	--	MBCA
Red-breasted Nuthatch	<i>Sitta canadensis</i>	■	■	S5	--	--	MBCA
Red-eyed Vireo	<i>Vireo olivaceus</i>	■	■	S5B	--	--	MBCA
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	■	■	S4	--	--	MBCA
Ring-billed Gull ^β	<i>Larus delawarensis</i>			S5B, S4N	--	--	MBCA
Rock Pigeon ^β	<i>Columbina inca</i>		■	SNA	--	--	--
Savannah Sparrow ^β	<i>Passerculus sandwichensis</i>	■	■	S4B	--	--	MBCA
Song Sparrow ^β	<i>Melospiza melodia</i>	■	■	S5B	--	--	MBCA
Tree Swallow ^β	<i>Tachycineta bicolor</i>			S4B	--	--	MBCA
Veery	<i>Catharus fuscescens</i>	■	■	S4B	--	--	MBCA
White-throated Sparrow ^β	<i>Zonotrichia albicollis</i>	■	■	S5B	--	--	MBCA
Yellow-rumped Warbler	<i>Setophaga coronata</i>	■	■	S5B	--	--	MBCA

¹ S-Rank - S3: Uncommon or vulnerable species; S4 - Apparently Secure Species; S5 – Secure Species

² ESA - *Endangered Species Act, 2007*

³ SARA - *Species at Risk Act, 2003* – Schedule 1: Full protection under SARA

⁴ MBCA – *Migratory Birds Conventions Act*; FWCA – *Fish and Wildlife Conservation Act*

^β Species listed as occurring within NHIC square 17NN96 by the Atlas of Breeding Birds of Ontario (Cadman *et al.*, 2007)

^α Species record provided through correspondence with MNRF or through review of NHIC records

Table 3.5: 2014 Breeding Bird Survey Results

Species	Point Count Station ¹												Total Number of Birds Observed ²	Average Number of Birds Per Station ³	Species Occurrences	
	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12			Number of Point Counts Observed	Percent Occurrence (per 12 Counts)
American Goldfinch	5	0	5	2	1	4	8	0	4	10	0	4	43	3.58	9	75.0
White-throated Sparrow	2	2	3	1	3	3	0	0	1	4	3	2	24	2.00	10	83.3
Song Sparrow	1	0	1	3	0	3	4	2	4	3	1	0	22	1.83	9	75.0
Cedar Waxwing	0	8	1	1	1	0	0	0	3	1	1	5	21	1.75	8	66.7
Red-eyed Vireo	3	1	3	1	2	2	1	2	2	1	2	1	21	1.75	12	100.0
Black-capped Chickadee	3	2	2	2	0	0	0	1	0	4	2	0	16	1.33	7	58.3
Chestnut-sided Warbler	3	2	4	2	0	1	0	2	0	0	1	0	15	1.25	7	58.3
American Crow	2	1	2	1	1	0	3	0	2	1	0	0	13	1.08	8	66.7
American Robin	0	1	2	1	0	1	2	0	3	1	1	0	12	1.00	8	66.7
Veery	0	1	1	2	3	0	0	1	0	1	2	1	12	1.00	8	66.7
Alder Flycatcher	1	0	1	0	0	1	1	0	0	3	1	1	9	0.75	7	58.3
Common Yellowthroat	0	0	0	0	1	1	1	1	2	2	1	0	9	0.75	7	58.3
Ovenbird	1	2	1	2	1	0	0	2	0	0	0	0	9	0.75	6	50.0
American Redstart	0	1	1	1	0	0	0	1	1	0	2	1	8	0.67	7	58.3
Magnolia Warbler	0	0	1	1	2	0	1	1	0	0	0	1	7	0.58	6	50.0
Mourning Warbler	0	0	0	0	0	1	0	1	1	1	1	0	5	0.42	5	41.7
Black-and-white Warbler	0	0	1	0	1	0	0	0	0	0	1	1	4	0.33	4	33.3
Nashville Warbler	0	0	1	0	1	0	0	0	0	0	2	0	4	0.33	3	25.0
Yellow-rumped Warbler	0	0	0	0	1	0	1	0	0	0	0	2	4	0.33	3	25.0
Northern Flicker	1	0	0	1	0	0	0	0	0	0	0	1	3	0.25	3	25.0
Common Raven	0	0	0	2	0	0	0	0	0	0	0	0	2	0.17	1	8.3
Northern Harrier	0	0	0	0	0	0	0	0	0	2	0	0	2	0.17	1	8.3
Purple Finch	0	0	0	0	0	0	0	0	0	2	0	0	2	0.17	1	8.3
Savannah Sparrow	0	0	0	0	0	0	2	0	0	0	0	0	2	0.17	1	8.3
Blackburnian Warbler	0	0	0	1	0	0	0	0	0	0	0	0	1	0.83	1	8.3
Broad-winged Hawk	0	0	0	0	0	0	0	1	0	0	0	0	1	0.83	1	8.3
Chipping Sparrow	0	0	0	0	0	1	0	0	0	0	0	0	1	0.83	1	8.3
Common Grackle	0	0	0	0	0	0	0	0	1	0	0	0	1	0.83	1	8.3
Downy Woodpecker	0	0	0	0	0	0	0	0	0	0	0	1	1	0.83	1	8.3
Mourning Dove	0	1	0	0	0	0	0	0	0	0	0	0	1	0.83	1	8.3
Red-breasted Nuthatch	0	0	0	0	0	0	0	0	0	0	0	1	1	0.83	1	8.3
Red-winged Blackbird	0	0	0	0	0	0	0	0	0	0	1	0	1	0.83	1	8.3
Species Richness	10	11	16	16	12	10	10	11	11	14	15	13	32	--	--	--
Species Density	22	22	30	24	18	18	24	15	24	36	22	22	277	--	--	--

¹ Survey station values represent the maximum number of birds detected at each point count station. Two surveys conducted per station.

² Calculated from the sum of the survey maximum number of birds detected at each point count station.

³ Calculated from sum of the maximum number of birds observed divided by the number of point count station (n=38).

Table 3.6: Compiled Mammal Species List

Common Name	Scientific Name	Provincial S-Rank ¹	Provincial Designation (ESA) ²	Federal Designation (SARA) ³	Other Protective Acts ⁴
Masked Shrew	<i>Sorex cinereus</i>	S5	--	--	FWCA
Smoky Shrew	<i>Sorex fumeus</i>	S5	--	--	FWCA
Pygmy Shrew	<i>Sorex hoyi</i>	S4	--	--	FWCA
Water Shrew	<i>Sorex palustris</i>	S5	--	--	FWCA
Northern Short-tailed Shrew	<i>Blarina brevicauda</i>	S5	--	--	FWCA
Star-nosed Mole	<i>Condylura cristata</i>	S5	--	--	--
Little Brown Myotis	<i>Myotis lucifugus</i>	S4	END	END	FWCA
Northern Myotis	<i>Myotis septentrionalis</i>	S3	END	END	FWCA
Snowshoe Hare	<i>Lepus americanus</i>	S5	--	--	FWCA
Eastern Chipmunk	<i>Tamias striatus</i>	S5	--	--	FWCA
Least Chipmunk	<i>Tamias minimus</i>	S5	--	--	FWCA
Woodchuck	<i>Marmota monax</i>	S5	--	--	--
Red Squirrel	<i>Tamiasciurus hudsonicus</i>	S5	--	--	FWCA
Northern Flying Squirrel	<i>Glaucomys sabrinus</i>	S5	--	--	FWCA
Beaver	<i>Castor canadensis</i>	S5	--	--	FWCA
Deer Mouse	<i>Peromyscus maniculatus</i>	S5	--	--	--
Southern Red-backed Vole	<i>Clethrionomys gapperi</i>	S5	--	--	--
Rock Vole	<i>Microtus chrotorrhinus</i>	S4	--	--	--
Muskrat	<i>Ondatra zibethicus</i>	S5	--	--	FWCA
Southern Bog Lemming	<i>Synaptomys cooperi</i>	S4	--	--	--
Meadow Vole	<i>Microtus pennsylvanicus</i>	S5	--	--	--
Meadow Jumping Mouse	<i>Zapus hudsonicus</i>	S5	--	--	--
Woodland Jumping Mouse	<i>Napaeozapus insignis</i>	S5	--	--	--
Porcupine	<i>Erethizon dorsatum</i>	S5	--	--	--
Coyote	<i>Canis latrans</i>	S5	--	--	FWCA
Grey Wolf	<i>Canis lupus</i>	S4	--	--	FWCA
Red Fox	<i>Vulpes vulpes</i>	S5	--	--	FWCA

Common Name	Scientific Name	Provincial S-Rank ¹	Provincial Designation (ESA) ²	Federal Designation (SARA) ³	Other Protective Acts ⁴
American Black Bear	<i>Ursus americanus</i>	S5	--	--	FWCA
Raccoon	<i>Procyon lotor</i>	S5	--	--	FWCA
Marten	<i>Martes americana</i>	S5	--	--	FWCA
Fisher	<i>Martes pennanti</i>	S5	--	--	FWCA
Ermine	<i>Mustela erminea</i>	S5	--	--	FWCA
Least Weasel	<i>Mustela nivalis</i>	SU	--	--	FWCA
Long-tailed Weasel	<i>Mustela frenata</i>	S4	--	--	FWCA
Mink	<i>Mustela vison</i>	S5	--	--	FWCA
Striped Skunk	<i>Mephitis mephitis</i>	S5	--	--	FWCA
River Otter	<i>Lutra canadensis</i>	S5	--	--	FWCA
Lynx	<i>Lynx canadensis</i>	S5	--	--	FWCA
Bobcat	<i>Lynx rufus</i>	S4	--	--	FWCA
White-tailed Deer	<i>Odocoileus virginianus</i>	S5	--	--	FWCA
Moose	<i>Alces alces</i>	S5	--	--	FWCA

¹ S-Rank - S3: Uncommon or vulnerable species; S4 - Apparently Secure Species; S5 – Secure Species

² SARO - Species at Risk in Ontario (listed under *Endangered Species Act*)

³ SARA - *Species at Risk Act* – Schedule 1: Full protection under SARA

⁴ *MBCA – Migratory Birds Conventions Act; FWCA – Fish and Wildlife Conservation Act*

Table 3.7: Compiled Amphibian and Reptile Species List

Common Name	Scientific Name	Provincial S-Rank ¹	Provincial Designation (ESA) ²	Federal Designation (SARA) ³	Other Protective Acts ⁴
AMPHIBIANS⁵					
Spotted Salamander	<i>Ambystoma laterale</i>	S4	--	--	FWCA
Blue-spotted Salamander	<i>Ambystoma maculatum</i>	S4	--	--	FWCA
Jefferson/Blue-spotted Salamander polyploids	<i>Ambystoma jeffersonianum/ laterale</i>	S4	--	--	FWCA
American Toad	<i>Anaxyrus americanus</i>	S5	--	--	--
Tetraploid Gray Treefrog	<i>Hyla versicolor</i>	S5	--	--	FWCA
Spring Peeper	<i>Pseudacris crucifer</i>	S5	--	--	--
Northern Green Frog	<i>Lithobates clamitans</i>	S5	--	--	--
Wood Frog	<i>Lithobates sylvatica</i>	S5	--	--	--
Northern Leopard Frog	<i>Lithobates pipiens</i>	S5	--	--	--
Mink Frog	<i>Lithobates septentrionalis</i>	S5	--	--	--
REPTILES⁵					
Eastern Gartersnake	<i>Thamnophis sirtalis</i>	S5	--	--	--
Red-bellied Snake	<i>Storeria occipitomaculata</i>	S5			
Midland Painted Turtle	<i>Chrysemys picta marginata</i>	S4			
Snapping Turtle	<i>Chelydra serpentina</i>	S3	SC	SC	FWCA

¹ S-Rank - S3: Uncommon or vulnerable species; S4 - Apparently Secure Species; S5 – Secure Species

² ESA - *Endangered Species Act, 2007*

³ SARA - *Species at Risk Act, 2007* – Schedule 1

⁴ FWCA – *Fish and Wildlife Conservation Act*

⁵ Records from the Ontario Reptile and Amphibian Atlas (Ontario Nature, 2013)

Table 3.8: Potential Species at Risk and Provincially Rare Species List

Common Name	Scientific Name	Source ¹	Provincial S-Rank ²	Provincial Designation (ESA) ³	Federal Designation (SARA) ⁴	Other Protective Acts ⁵
BIRDS						
Barn Swallow	<i>Hirundo rustica</i>	ABBO	S4B	THR	THR	MBCA
Black Tern	<i>Chidonias niger</i>	MNRF	S3B	SC	-	MBCA
REPTILES						
Snapping Turtle	<i>Chelydra serpentina</i>	ORAA	S3	SC	SC	FWCA
MAMMALS						
Little Brown Myotis	<i>Myotis lucifuga</i>	AMO	S4	END	END	FWCA
Northern Myotis	<i>Myotis septentrionalis</i>	AMO	S3	END	END	FWCA

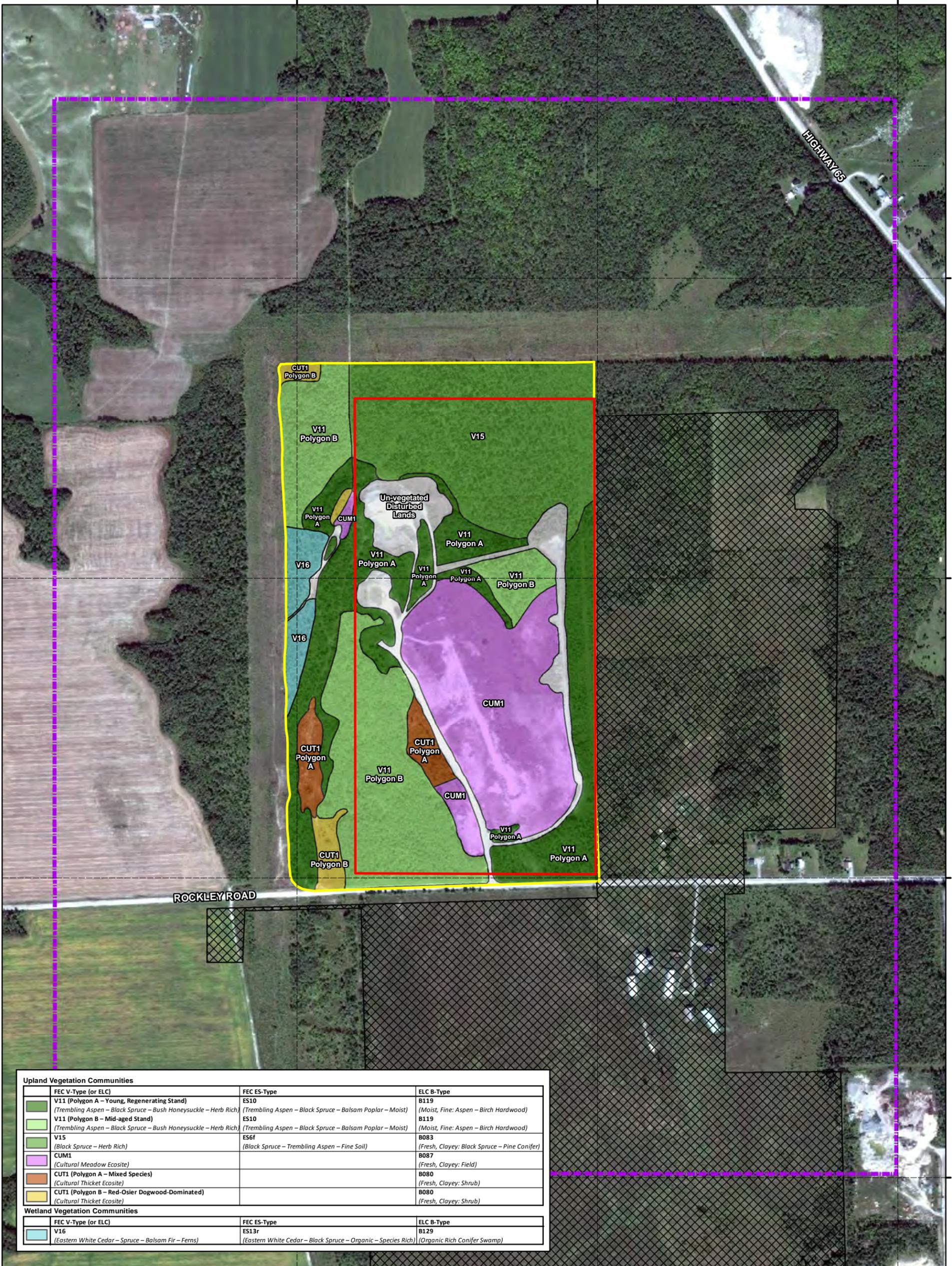
¹ Source: MNRF – Consultation with Ministry of Natural Resources and Forestry; ABBO – Atlas of Breeding Birds of Ontario (Cadman *et al.*, 2007); AMO – Atlas of Mammals of Ontario (Dobbyn, 1994); ORRA – Ontario Reptile and Amphibian Atlas (Ontario Nature, 2013)

² S-Rank - S3: Uncommon or vulnerable species; S4 - Apparently Secure Species; S5 – Secure Species; SNA – Non-native

³ ESA - *Endangered Species Act, 2003*

⁴ SARA - *Species at Risk Act, 2007* – Schedule 1

⁵ MBCA – *Migratory Birds Conventions Act, 1994*; FWCA – *Fish and Wildlife Conservation Act, 1997*.



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Upland Vegetation Communities		
FEC V-Type (or ELC)	FEC ES-Type	ELC B-Type
V11 (Polygon A – Young, Regenerating Stand) (Trembling Aspen – Black Spruce – Bush Honeysuckle – Herb Rich)	ES10 (Trembling Aspen – Black Spruce – Balsam Poplar – Moist)	B119 (Moist, Fine: Aspen – Birch Hardwood)
V11 (Polygon B – Mid-aged Stand) (Trembling Aspen – Black Spruce – Bush Honeysuckle – Herb Rich)	ES10 (Trembling Aspen – Black Spruce – Balsam Poplar – Moist)	B119 (Moist, Fine: Aspen – Birch Hardwood)
V15 (Black Spruce – Herb Rich)	ES6f (Black Spruce – Trembling Aspen – Fine Soil)	B083 (Fresh, Clayey: Black Spruce – Pine Conifer)
CUM1 (Cultural Meadow Ecosite)		B087 (Fresh, Clayey: Field)
CUT1 (Polygon A – Mixed Species) (Cultural Thicket Ecosite)		B080 (Fresh, Clayey: Shrub)
CUT1 (Polygon B – Red-Osier Dogwood-Dominated) (Cultural Thicket Ecosite)		B080 (Fresh, Clayey: Shrub)
Wetland Vegetation Communities		
FEC V-Type (or ELC)	FEC ES-Type	ELC B-Type
V16 (Eastern White Cedar – Spruce – Balsam Fir – Ferns)	ES13r (Eastern White Cedar – Black Spruce – Organic – Species Rich)	B129 (Organic Rich Conifer Swamp)

LEGEND

- Surveyed Terrestrial Study Area
- Site Study Area
- Extended Terrestrial Study Area
- Approximate Boundary of Proposed Solar Facility
- Un-vegetated Disturbed Lands

NOTES:
 - Background image extracted from ESRI World Topo Map.
 - All base data on this map was extracted from Land Information
 - Geonames extracted from Geobase.



**ENVIRONMENTAL ASSESSMENT
 NEW WASTE MANAGEMENT CAPACITY
 TEMISKAMING SHORES ONTARIO**

**Forest Ecosystem Classification
 and Ecological Land Classification**

Datum & Projection:
 NAD 1983 UTM Zone 17N



PROJECT N°:TY910491

FIGURE: 6.13

SCALE: 1:6,000

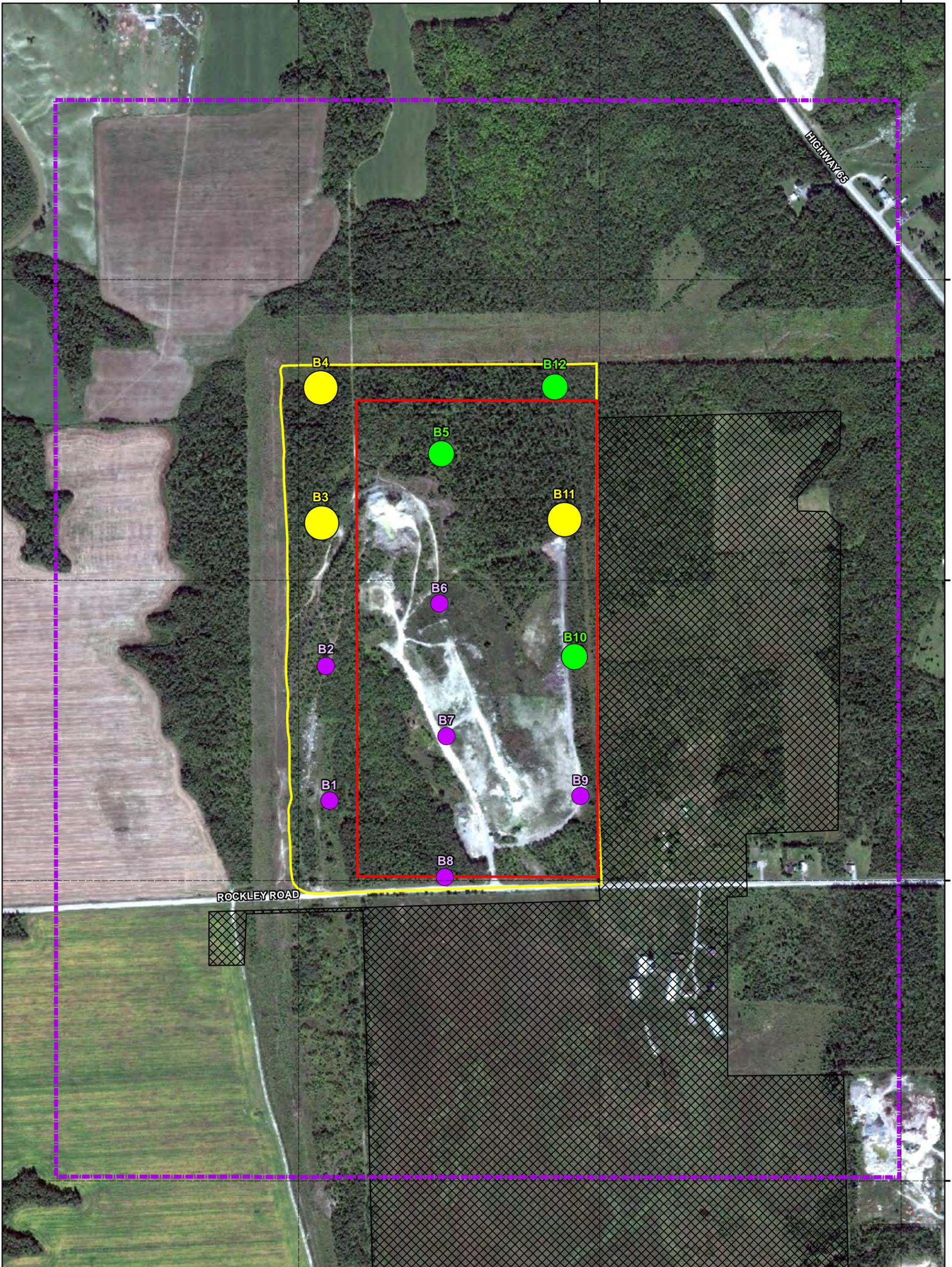
DATE: September 2015



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LEGEND

Breeding Bird Point Count Richness

- 10 - 11 Species
- 12 - 14 Species
- 15 - 16 Species

- Site- vicinity Study Area
- Site Study Area
- Extended Study Area
- Canadian Solar's New Liskeard Project (approx. boundary)

NOTES:
 - Background image extracted from ESRI World Topo Map.
 - All base data on this map was extracted from Land Information
 - Geonames extracted from Geobase.

Datum & Projection:
 NAD 1983 UTM Zone 17N



**TECHNICAL SUPPORT DOCUMENT: TERRESTRIAL BIOLOGY
 NEW WASTE MANAGEMENT CAPACITY
 TEMISKAMNG SHORES ONTARIO**

Distribution of Bird Diversity

PROJECT N°: TY910491

FIGURE: 3.2

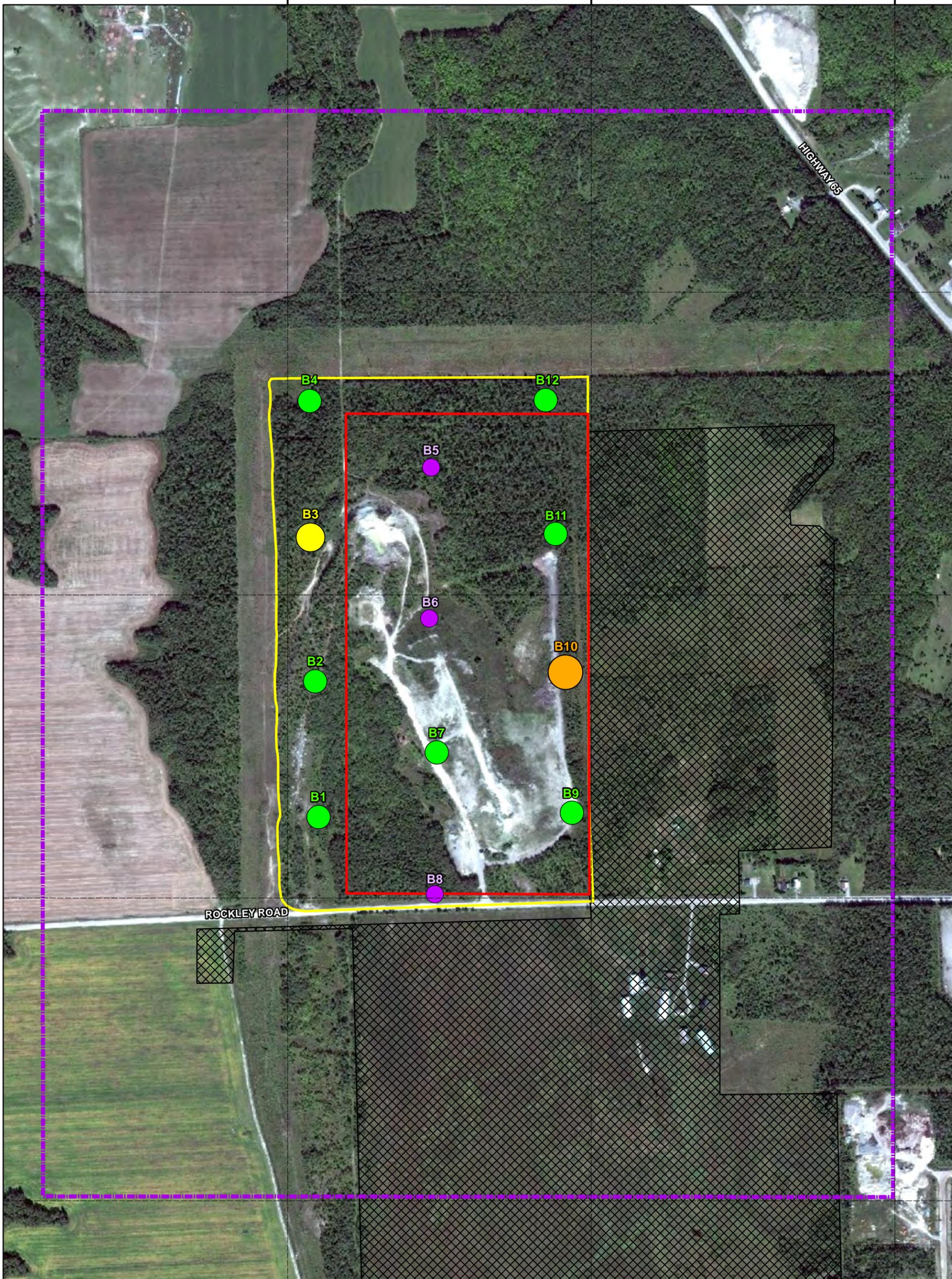
SCALE: 1:6,000

DATE: September 2015

596500

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LEGEND

**Breeding Bird Point
Count Density**

- 15 - 20 Species
- 21 - 25 Species
- 26 - 30 Species
- > 31 Species

- Extended Study Area
- Site Study Area
- Site-vicinity Study Area
- Canadian Solar's New Liskeard Project (approx. boundary)

NOTES:
 - Background image extracted from ESRI World Topo Map.
 - All base data on this map was extracted from Land Information
 - Geonames extracted from Geobase.

Datum & Projection:
 NAD 1983 UTM Zone 17N



**TECHNICAL SUPPORT DOCUMENT: TERRESTRIAL BIOLOGY
 NEW WASTE MANAGEMENT CAPACITY
 TEMISKAMING SHORES ONTARIO**

Distribution of Bird Species Density

PROJECT N°: TY910491

FIGURE: 3.3

SCALE: 1:6,000

DATE: September 2015

4.0 PREDICTION OF EFFECTS

Environmental components are those aspects of the natural environment that are particularly notable or valued because of their ecological, scientific or resource importance, and that have a potential to be adversely affected by the Project development. These environmental components are identified in the approved Terms of Reference and include:

- Habitat, vegetation communities, plant life;
- Protected Areas;
- Wetlands;
- Birds;
- Other wildlife; and
- Rare species/SAR.

Analysis was conducted to predict effects the Project may have on identified environmental components, taking into consideration the application of avoidance and mitigation measures to reduce or eliminate residual effects. The effect assessment considers the four phases of the Project:

- Phase 1 Construction (Year 1), includes the construction of Cell 1 base and associated perimeter access roads and drainage ditches;
- Phase 2 Operations (Years 2 to 20), includes landfilling at active cells (1 through 5) and concurrent development of cells (2 through 5) and subsequent closure of cells (1 through 4) as they reach the designed final contours;
- Phase 3 Closure (Years 20 to 21), includes closure of Cell 5 and placement of final capping and cover; and
- Phase 4 Post-Closure (Years 21 to 45), includes post-closure monitoring (groundwater).

4.1 Habitat, Vegetation Communities, and Plant Life

4.1.1 Wildlife Habitat and Linkages

The MNRF defines Significant Wildlife Habitat (SWH; MNR, 2000) as ecologically important in terms of features, functions, representation or amount, and contributing to the quality and diversity of an identifiable geographic area or Natural Heritage System (MNR, 2000). SWH are divided into four main categories: Seasonal Concentration Areas of Animals, Rare Vegetation Communities and Specialized Habitat for Wildlife, Habitat for Species of Conservation Concern (excluding *Endangered or Threatened Species*) and Animal Movement Corridors. The Draft Significant

Wildlife Habitat Ecoregion 3E Criterion Schedules (MNR, 2012) provide further information on determining the presence of significant wildlife habitat.

Seasonal Concentration Areas of Animals

The Draft Significant Wildlife Habitat Ecoregion 3E Criterion Schedules outlines 12 wildlife habitats meeting the criteria for Seasonal Concentration Areas of Animals, including:

- Moose Late Winter Cover;
- Waterfowl Stopover and Staging Areas (Terrestrial);
- Waterfowl Stopover and Staging Areas (Aquatic);
- Shorebird Migratory Stopover Area;
- Bat Hibernacula;
- Bat Maternity Colonies;
- Bat Migratory Stopover Areas;
- Turtle Wintering Areas;
- Reptile Hibernacula;
- Colonially Nesting Bird Breeding Habitat (Bank and Cliff);
- Colonially Nesting Bird Breeding Habitat (Tree/Shrubs); and
- Colonially Nesting Bird Breeding Habitat (Ground).

Based on a review of Ecosites present, there are no potential Seasonal Concentration Areas of Animals present within the Site-vicinity Study Area (see Table 4.1). Shorebirds, bats, turtles, reptiles, nor colonial nesting birds were observed nor was suitable habitat for any of these species.

Rare Vegetation Communities and Specialized Habitat for Wildlife

As documented in Section 3.3, the Site-vicinity Study Area is comprised of a mixture of deciduous, mixed wood and coniferous forests, and one wetland ecosite. The Draft Significant Wildlife Habitat Ecoregion 3E Criterion Schedules outlines 11 habitats meeting the criteria for Rare Vegetation Communities, including:

- Cliffs and Talus Slopes;
- Rare Treed Type: Red and White Pine Stands;
- Rare Treed Type: Black Ash;
- Rare Treed Type: Elm;
- Rare Treed Type: Oak;

- Rare Treed Type: Red and Sugar Maple;
- Rare Treed Type: Yellow Birch;
- Rock Barren;
- Sand Dunes (Notably: American Dune Grass Type);
- Great Lakes Arctic-Alpine Shoreline Type; and
- Hardwood Swamps.

Based on field surveys, none of the rare vegetation communities are present within the Site-vicinity Study Area (see Table 4.2).

The Draft Significant Wildlife Habitat Ecoregion 3E Criterion Schedules outlines 13 wildlife habitats meeting the criteria for Specialized Habitat for Wildlife, including:

- Waterfowl Nesting Area;
- Bald Eagle and Osprey Nesting Habitat;
- Woodland Raptor Nesting Habitat;
- Turtle Nesting Areas;
- Seeps and Springs;
- Aquatic Feeding Habitat;
- Mineral Licks;
- Denning Sites for Mink, Otter, Gray Wolf, Eastern Wolf, Canada Lynx, Marten, Fisher, Black Bear;
- Wolf Rendezvous Sites;
- Amphibian Breeding Habitat (Wetlands);
- Amphibian Breeding Habitat (Woodland);
- Mast Producing Areas; and
- Sharp-tailed Grouse Leks.

Based on a review of Ecosites present, two potential Specialized Habitats for Wildlife are identified within the Site-vicinity Study Area, including Woodland Raptor Nesting Habitat and Mast Producing Areas (see Table 4.3). Woodland Raptor Nesting Habitat is considered to have a low probability of occurrence. Stick nests of these species are typically found in a variety of intermediate-aged to mature conifer, deciduous or mixed forests within tops or crotches of trees; though forest stands are present and a Broad-winged Hawk was observed during field surveys, mature trees suitable for raptor nesting are mainly absent. Mast producing species, such as

raspberries and cherries, were present within all ecosites within the Site-vicinity Study Area; however, their abundances were limited from rare to occasional.

Habitat for Species of Conservation Concern

The Draft Significant Wildlife Habitat Ecoregion 3E Criterion Schedules outlines four wildlife habitats meeting the criteria for Habitat for Species of Conservation Concern, including:

- Marsh Bird Breeding Habitat;
- Open Country Bird Breeding Habitat;
- Shrub/Early Successional Bird Breeding Habitat; and
- Special Concern and Rare Wildlife Species.

Based on a review of Ecosites and wildlife observed, none of the above habitat types are present within the Site-vicinity Study Area (see Table 4.4). Potential Open Country and Shrub/Early Successional Bird Breeding Habitat communities are all much smaller than the required criteria threshold of >50 ha. No marsh bird species or *Special Concern* and provincially rare species were recorded during field surveys.

Animal Movement Corridors

The Draft Significant Wildlife Habitat Ecoregion 3E Criterion Schedules outlines three wildlife habitats meeting the criteria for Animal Movement Corridor habitat, including:

- Amphibian Movement Corridors;
- Cervid Movement Corridors; and
- Furbearer Movement Corridor.

Based on a review of Ecosites and wildlife present, none of these Animal Movement Corridors are present in the Site-vicinity Study Area (see Table 4.5).

Two candidate significant wildlife habitats are present in the Site-vicinity Study Area, including woodland raptor nesting habitat and mast producing areas. Woodland Raptor Nesting Habitat is considered to have a low probability of occurrence. Stick nests of these species are typically found in a variety of intermediate-aged to mature conifer, deciduous or mixed forests within tops or crotches of trees; though forest stands are present and a Broad-winged Hawk was observed during field surveys, mature trees suitable for raptor nesting are mainly absent. Mast producing species, such as raspberries and cherries, were present within all ecosites within the Site-vicinity Study Area; however, their abundances were limited from rare to occasional.

Potential impacts and associated mitigation measures related to wildlife habitat are discussed below under Section 4.1.2 (Vegetation Communities and Plant Life), Section 4.3 (Birds), and Section 4.4 (Other wildlife).

4.2 Habitat, Vegetation Communities, and Plant Life

4.2.1 Predicted Effects on Habitat, Vegetation Communities, and Plant Life

The majority of the Site-vicinity Study Area is covered by young upland forest communities, and open cultural meadows and successional thickets following land disturbance. The canopy of these upland forest communities are most commonly dominated by trembling aspen, white birch, balsam fir, and black spruce (see Table 3.1). In total, 61.9% of the Site-vicinity Study Area is comprised of upland deciduous or mixed wood forest communities. The Trembling Aspen – Black Spruce – Bush Honeysuckle – Herb Rich (V11) community was most abundant in the Site-vicinity Study Area, comprising 42.2% of the total area, while the Black Spruce – Herb Rich (V15) comprises 19.7% of the upland forest habitat. Only one forest community type was noted as being mature, the Eastern White Cedar – Spruce – Balsam Fir – Ferns (V16) coniferous swamp community, which covers 1.2 ha (2.7% of total area) within the Site-vicinity Study Area. This swamp community is also the only wetland community identified within the Site-vicinity Study Area and is further discussed as an environmental component in Section 4.4. Cultural meadow (CUM1) covers 19.2% of the Site-vicinity Study Area while cultural thicket (CUT1) covers 4.5%. As discussed above, there are no Rare Vegetation Communities in the Site-vicinity Study Area (Section 4.1.1).

Indicator wildlife species are thought to offer an indication of the biological condition in an ecosystem, which in this circumstance is a healthy ecosystem able to support numerous wildlife species. MNR forest management guidelines use American marten as an indicator species, as its preferred habitat is interior, mature forests of the Boreal region and territories are determined by the amount of dense forest cover and availability of food (MNR, 2001). Marten tracks or potential denning sites were not observed during the field surveys of the Site-vicinity Study Area.

Forest birds such as Ovenbird, Hermit Thrush (*Catharus guttatus*), Veery (*Catharus fuscescens*), Black-throated Blue Warbler (*Dendroica caerulescens*), Blackburnian Warbler (*Dendroica fusca*), Mourning Warbler (*Oporornis philadelphia*) and woodpecker species (e.g., Pileated Woodpecker, *Dryocopus pileatus*; Hairy Woodpecker, *Picoides villosus*; Yellow-bellied Sapsucker, *Sphyrapicus varius*) are also good indicators of mature and/or healthy forest ecosystems. Only the Downy Woodpecker (*Picoides pubescens*), Ovenbird, Veery, and Mourning Warbler were detected within the Site-vicinity Study Area. This suggests that the forest communities are healthy, but perhaps still within a process of succession toward maturity.

Environmental effects to vegetation communities within the Project footprint are direct (clearing) and are localized (see Table 4.6 and Figure 4.1 for areas of vegetation loss). The majority of vegetation loss will occur in the already disturbed cultural meadow (5.0 ha; 57.9% of the total cultural meadow present in the Site-vicinity Study Area). The total area of forest habitat that would

be displaced by the proposed Project development is approximately 2.2 ha of deciduous forest and 1.5 ha of mixed forest (13.3% of the total upland forest present in the Site-vicinity Study Area). The remaining direct Project impacts overlap with already un-vegetated/disturbed lands. All of the vegetation communities present within the Site-vicinity Study Area are common in the larger region. No wetland vegetation communities are directly impacted by the Project footprint. No locally significant plant communities have been identified within the proposed footprint and no provincially rare plant species or community types were located.

Indirect effects to adjacent vegetation communities include dust generation. Without mitigation, an increase in vehicle traffic in the Project footprint will result in increased dust generation and deposition on vegetation. Dust can affect photosynthesis, respiration, and transpiration in plants and allow the penetration of phytotoxic gaseous pollutants (Farmer, 1993). Overall, dust deposition on plants results in some visible injury symptoms and a general decrease in plant productivity. The structure of vegetation communities may also be affected. Those vegetation communities that are dominated by epiphytic lichen and *Sphagnum* moss species are typically the most sensitive of those studied (Farmer, 1993).

4.2.2 Mitigation Measures for Habitat, Vegetation Communities, and Plant Life

The following mitigation measures are applicable to all four phases of the Project. The principal mitigation measures that are proposed to limit short and long term adverse effects to local vegetation communities as a result of Project activities include:

- Minimize the Project footprint and vegetation removal to the extent practicable;
- Use existing permanent road / trail infrastructure to avoid creation of new access roads;
- Minimize dust production along service roads through the implementation of dust suppression methods such as road watering and/or minimizing the speed of vehicles along these roads to limit the zone of influence;
- Construction should occur in winter, where feasible, to avoid sensitive wildlife breeding seasons, such as the migratory bird nesting season, and to minimize the potential for ground disturbance and soil erosion during construction;
- Install silt fencing around the perimeter of the construction footprint for erosion and sediment control (silt fencing should also be sufficient to exclude wildlife from entering the construction area);
- Re-vegetate exposed soils as soon as possible;
- Refuelling and maintenance of vehicles should not be allowed within 30 m of a natural vegetated area;
- Water pumped during dewatering activities should be directed away from natural features; the water should be discharged to a settling pond or disposed off-site; and

- Use of industry best management practices for Project design and construction management.

Planning efforts for the Project have focused, where practical, on using lands that have been previously disturbed by past anthropogenic disturbance such as logging and clearing. This is advantageous to environmental protection as it reduces the location of vegetation clearing to already disturbed site and limits the creation of new negative edge effects. The clearing of sensitive wetland habitats was avoided.

4.3 Protected Areas

There are no Areas of Scientific and Natural Interest, Provincially Significant Wetlands, Wildlife Concentration Areas or other Natural Areas within the Site-vicinity Study Area (MNRF, 2015a; MNRF, 2015b).

4.4 Wetlands

Wetlands of all types provide important habitat that is often utilized by species that can survive nowhere else. In particular, aquatic/terrestrial ecotones provide a high diversity of habitats, which support a large number of species. There are many wildlife and plant species that exclusively use these specialized habitats including birds, reptiles, amphibians, insect larvae and orchid species.

Only one wetlands was identified within the Site-vicinity Study Area, two small polygons of organic coniferous swamp totaling an area of 1.2 ha (2.7% of the total area). This wetland was noted to be somewhat disturbed with large and extensive gaps within the forest canopy, faint trails, but moderate and widespread miscellaneous waste (from human activity). This wetland lays outside of the Site Study Area.

There will be no direct (vegetation clearing) impacts on wetlands within the Site-vicinity Study Area and the Project footprint is sufficiently offset to eliminate potential indirect effects such as dust generation (Figure 4.1).

4.5 Birds

4.5.1 Predicted Effects on Birds

Migratory Birds

A total of 32 bird species were recorded within the Site-vicinity Study Area during field surveys. Based on a review of background information in addition to the field surveys, a total of 43 species were recorded, of which 36 total bird species are expected to be breeding or potentially breeding within the Site-vicinity Study Area (see Table 3.5). Thirty-nine (39) of the 43 (91%) bird species are seasonal migrants, occurring in northern Ontario only during the summer breeding season.

Breeding bird point count data indicates that breeding bird species diversity was higher in the northern areas of the Site-vicinity Study Area, near to the edges of forest communities, ranging from 14 to 16 species per point count station (Stations 3, 4, 10-12). Species diversity was relatively low in the central portion of the Site-vicinity Study Area within the Cultural Meadow Ecosite with a total of 10 species (Stations 6 and 7). Bird species density followed a similar trend as species richness, with the greatest bird densities occurring in the northern areas of the Site-vicinity Study Area. Breeding bird diversity and density at each point count station are illustrated in Figure 3.2 and Figure 3.3, respectively. The Project footprint relative to breeding bird point count stations is illustrated in Figure 4.1.

The overall amount of terrestrial habitat lost within the Project footprint due to new clearing of vegetation is 8.7 ha; of these, 3.7 ha will be deciduous/mixed forest and 5.0 ha will be cultural meadow (Figure 4.1; Table 4.6). The loss of this terrestrial habitat is not expected to result in any direct mortalities of birds, nor in a decrease in reproductive effort of any bird species if clearing takes place outside of the breeding bird season (outside of April 12 – August 30) and if proper mitigation measures are implemented (discussed further below). Vegetation removal will result in direct habitat loss causing displacement of individuals when they return to breed in the spring; however, these habitat types are common and widespread within the greater region.

Adverse effects to breeding bird populations will be largely associated with direct habitat loss from forest and vegetation clearing, potentially coupled with changes to habitat suitability related to the production of edge effects (such as increased predation and brood parasitism); however, no SWH for birds (except raptors which are discussed in Section 4.6.2) was identified within the Site-vicinity Study Area (see Section 4.1.1). Additionally, NHIC Natural Areas Database did not identify any areas within the Extended Terrestrial Study Area as having significant or unique natural heritage features pertaining to migratory bird species and no Important Bird Areas or nature reserves were identified.

Some species are not expected to be overly sensitive to human presence or temporary heavy equipment usage during construction. Other species may be affected by noise effects and other disturbance related to construction, operation, and closure activities. Sound can cause adverse effects on birds in a variety of ways including masking important communication signals, loss of the ability to hear important behavioural triggers such as the songs of territorial males, calls of females, begging calls of nestlings, approaching predators, or the presence of prey items. As a result, long-term noise disturbance can decrease breeding success or bird density in a chronically noisy habitat. Although tolerance of noise levels varies species by species, 50 dB has recently been recommended as the minimum threshold for impacts to birds (Environment Canada, pers. comm.). Based on 50 dB contour lines for each phase of the Project, periodic noise production will occur during construction and operation of the Project (see Figure 4.1). Sound emissions will be greatest in areas of concentrated heavy equipment operation (during vegetation clearing, construction, and Project operation). The production of noise during construction of the Project will take place primarily during the winter months when migratory bird species are not present. Operational effects of noise are predicted to extent up to 300 m from the Project footprint;

however, much up the areas are either not expected to support significant bird populations (i.e., the solar facility to the east), overlaps with lands which were recently disturbed, or already experience intermittent disturbance from land use activities. In addition, production of noise during Project operation will be limited to occasional heavy truck activity (waste disposal). Therefore, the construction of the Project is not expected to have an appreciable effect on species diversity, density, or behaviour within the local area.

There is some potential for increased road kills along roads, but this effect is considered to be limited because of the low traffic volumes and frequency expected, and reduced traveling speeds.

Raptors

Raptor species recorded within the Site-vicinity Study Area during field surveys included Broad-winged Hawk and Northern Harrier. Vegetation clearing for construction of the Project is anticipated to remove 3.7 ha of forested land capable of providing woodland raptors nesting habitat (for Broad-winged Hawk); however, the SWH Woodland Raptor Nesting Habitat is considered to have a low probability of occurrence. Stick nests of these species are typically found in a variety of intermediate-aged to mature conifer, deciduous or mixed forests within tops or crotches of trees; though forest stands are present, mature trees suitable for raptor nesting are mainly absent. The Northern Harrier breeds in large, undisturbed tracts of wetlands (marshes) and grasslands with low, thick vegetation. Such habitat is absent from the Site-vicinity Study Area; though open meadows do occur, they are small and associated with recent anthropogenic disturbance. As such, it is not expected that vegetation removal will affect raptor nests through loss of habitat.

There is some potential for increased road kills along roads, but this effect is considered to be limited because of the low traffic volumes and frequency expected, and reduced traveling speeds.

4.5.2 Mitigation Measures for Birds

The following mitigation measures are applicable to all four phases of the Project. Mitigation measures that will be used to reduce potential adverse effects to birds as a result of Project activities will include the following:

- Minimize the Project footprint to the extent practicable;
- Undertake vegetation clearing in winter to avoid the migratory bird nesting season, where practical (outside of 12 April – 30 August);
- Minimize the level of potentially disturbing activities near any active nest sites that may be discovered during construction, until the nest is vacated;
- Enforce speed limits along proposed access roads to reduce the potential adverse effects of increased vehicular traffic associated with the Project. Signs warning drivers of the possibility of wildlife encounters should be posted in areas of high wildlife activity;

- Avoid idling of vehicles. Equipment and vehicles should be turned off when not in use unless required for construction activities and/or effective operation;
- When appropriate, contractors will be required to provide properly working machinery and equipment with adequate noise suppression devices that meet current government requirements;
- As appropriate, cover or otherwise contain loose materials that have potential to release airborne particulates during their transport, installation or removal;
- Inclusion of wildlife awareness information into regular safety and environmental inductions given to Project workers. Wildlife sighting logs or information boards will be available to notify workers of local observations. Workers will be made aware of seasonal changes in local wildlife behaviour or presence in proximity to the Project;
- Construction crews will be advised not to interfere or harass wildlife. Disciplinary actions will be taken should this occur; and
- Stockpiled soils and excavation slopes should be maintained at slopes greater than 45 degrees between April 12 and August 30 to prevent birds from nesting in these areas.

Vegetation clearing activities should be avoided during the breeding bird season, as there is currently no permit for incidental take of migratory bird nests/eggs and/or individuals. For Bird Conservation Region (BCR) 12, Environment Canada outlines that the breeding season extends from 12 April to 30 August. As such, vegetation clearing activities should be undertaken between 1 September and 11 April to avoid disrupting bird species during their nesting season, as is required under the MBCA and FWCA. Consultation with the MNRF and Environment Canada should be undertaken prior to clearing activities to confirm season restrictions.

If vegetation clearing activities must be undertaken between April 12 and August 30, Environment Canada must be contacted prior to any activities to determine if confirmatory nest searching is permissible. Should vegetation clearing activities be permitted by Canadian Wildlife Services (CWS) during the breeding season, a combination of point count surveys and nest searching activities (for select species such as woodpeckers, colonial-breeding species or those species nesting of man-made structures) may be required to document the presence of breeding birds and to avoid disturbance and/or destruction of breeding birds and/or their nests. Should migratory birds and/or nesting sites be confirmed within these areas through point count surveys and active nest searching, appropriate avoidance buffer areas around active breeding areas and/or nesting sites would be required until the young have left the nest on their own accord. Appropriate buffers will vary depending on the species and should be implemented based on consultation with Environment Canada and the MNRF.

In the event that future raptor nesting is observed within or in proximity to the Project footprint, an acceptable buffer defined in the *Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales* (MNR, 2010) should be observed until breeding activities have ended and

the nesting site has been abandoned. Workers should be made aware of locally nesting raptors to avoid unnecessary disturbance.

Mitigation measures described in this section are expected to be effective for their intended purposes and in many instances can be further optimized in response to monitoring data.

4.6 Other Wildlife

4.6.1 Predicted Effects on Other Wildlife

The review of the Atlas of the Mammals of Ontario indicated that 41 mammalian species may occur in the general vicinity of the Extended Terrestrial Study Area (Table 3.6; Dobbyn, 1994). Visual sightings, evidence (e.g., scat, tracks and vocalizations) did not reveal any mammal species occurring within the Site-vicinity Study Area. Additionally, no SWH associated with denning or breeding sites, moose habitat, bat habitat, or linkage corridors were identified as occurring within the Site-vicinity Study Area. Mast Producing Areas (SWH) were identified as having a low to moderate change of occurring within the Site-vicinity Study Area. Though mast producing species such as raspberries and cherries were present within all ecosites within the Site-vicinity Study Area, their abundances were limited from rare to occasional.

Ten amphibian species and four reptile species were identified in the review of the Ontario Reptile and Amphibian Atlas (Ontario Nature, 2013) as occurring within the vicinity of the Extended Terrestrial Study Area (Table 3.7). Spring peeper was heard at two survey stations in the Site-vicinity Study Area (C3 and C6) and at low densities (one and four individuals, respectively), while American toad was heard at station C6 (two individuals). No SWH for amphibians or reptiles was identified as occurring within the Site-vicinity Study Area.

Potential adverse effects to wildlife populations in the Project footprint may include i) direct loss of habitat due to vegetation clearing, ii) long-term displacement due to habitat loss, iii) short-term displacement due to disturbance during construction and iv) potential habitat abandonment along the edges of cut forest. Direct mortality is not an expected effect from Project activities and is discussed further below.

The majority of vegetation (and potential wildlife habitat) loss will occur in the already disturbed cultural meadow (5.0 ha; 57.9% of the total cultural meadow present in the Site-vicinity Study Area; Figure 4.1). The total area of forest habitat that would be displaced by the proposed Project development is approximately 2.2 ha of upland forest and 1.5 ha of mixed forest (13.3% of the total upland forest present in the Site-vicinity Study Area). All of the vegetation communities present within the Site-vicinity Study Area are common in the larger region. No wetland vegetation communities are directly impacted by the Project footprint. Loss of any potential wildlife habitat is not expected to have any long-term effects on local and regional populations.

4.6.2 Mitigation Measures for Other Wildlife

The following mitigation measures are applicable to all four phases of the Project. Mitigation measures that will be used to reduce potential adverse effects to wildlife as a result of Project activities will include the following:

- Minimize the Project footprint to the extent practicable to reduce overall habitat loss and to limit the potential adverse effects related to interference with wildlife movement, to the extent practicable;
- Undertake vegetation clearing in winter to avoid sensitive wildlife breeding seasons, where practical;
- Enforce speed limits along proposed access roads to reduce the potential adverse effects of increased vehicular traffic associated with the Project. Signs warning drivers of the possibility of wildlife encounters should be posted in areas of high wildlife activity;
- Avoid idling of vehicles. Equipment and vehicles should be turned off when not in use unless required for construction activities and/or effective operation;
- When appropriate, contractors will be required to provide properly working machinery and equipment with adequate noise suppression devices that meet current government requirements;
- As appropriate, cover or otherwise contain loose materials that have potential to release airborne particulates during their transport, installation or removal;
- Installation of wildlife exclusion fencing around perimeter of the construction site to limit attraction to wildlife;
- The use of noise barriers and use of properly working machinery and equipment with adequate noise suppression devices that meet current government requirements;
- As appropriate, cover or otherwise contain loose materials that have potential to release airborne particulates during their transport, installation or removal;
- Inclusion of wildlife awareness information into regular safety and environmental inductions given to Project workers. Wildlife sighting logs or information boards will be available to notify workers of local observations. Workers will be made aware of seasonal changes in local wildlife behaviour or presence in proximity to the Project; and
- Construction crews will be advised not to interfere or harass wildlife. Disciplinary actions will be taken should this occur.

Planning efforts for the Project have focused, where practical, on using lands that have been previously disturbed by past anthropogenic disturbance such as logging and clearing. This is advantageous to environmental protection as it reduces the location of vegetation clearing to already disturbed site and limits the creation of new negative edge effects. The clearing of sensitive wetland habitats was avoided.

Mitigation measures described in this section are expected to be effective for their intended purposes and in many instances can be further optimized in response to monitoring data.

4.7 Species at Risk and Rare Wildlife

Based on a review of secondary sources, five SAR were identified as potentially occurring within the Extended Terrestrial Study Area (Barn Swallow, Black Tern, little brown myotis, northern myotis, and snapping turtle); however, based on baseline surveys, neither these wildlife species nor potentially suitable habitat was identified to be within or near to the Surveyed Terrestrial Study Area. As such, it was determined that SAR are not present (see Section 3.5) and are not predicted to be impacted by the Project.

Table 4.1: Seasonal Concentration Areas of Animals

Wildlife Habitat ¹	Candidate Significant Wildlife Habitat ¹		Potential Significant Wildlife Habitat within the Site-vicinity Study Area
	Provincial Ecosite Codes	Habitat Criteria	
Moose Late Winter Cover	B036-038, B049-053, B065-068, B081-087, B098-102, B114-117	Late winter moose habitat is characterized by dense conifer cover with greater than 60% canopy closure and >6m in height. Upland sites are preferred. More common on deeper soils with dense conifer cover and vegetation in the understory for browse. Snow depth in excess of 70cm restrict moose movement during winter, however late winter thermal refuge is important in relieving heat stress. These habitats are extensively used by moose during late spring and summer due to the shade provided. Conifer stands >50ha, dominated by tall trees >6m, on gentle to moderately rugged sites with deep soils.	None – Ecosite B083 is present, but no continuous coniferous habitats >50 ha present. Total representation of habitat only 1.2 ha.
Waterfowl Stopover and Staging Areas (Terrestrial)	B060-062, B077-079, B093-095, B109-111	Includes fields with sheet water during spring (mid-March to May) and flood plains (flooded river banks). Cultivated fields with waste grains commonly used by waterfowl are not considered significant wildlife habitat. Any mixed species aggregations of 100 or more individuals required to be considered significant wildlife habitat.	None – Ecosite B078 present, but is associated with disturbed lands. Flooding is not present within Ecosite.
Waterfowl Stopover and Staging Areas (Aquatic)	B142-152	Ponds, marshes, lakes, bays, coastal inlets, and watercourses used during migration. Sewage treatment ponds and storm water ponds do not qualify as a SWH: however, a reservoir managed as a large wetland or pond/lake does qualify. Aggregations of 100 or more individuals of listed species for 7 days (results in > 700 waterfowl use days) must be present.	None – No suitable Ecosite present.
Shorebird Migratory Stopover Area	B005-006, B160-162, B170-172, B176-178, B186-188, B204, B207	Shorelines of lakes, rivers and wetlands, including beach areas, bars and seasonally flooded, muddy and un-vegetated shoreline habitats. Great Lakes coastal shorelines, including groynes and other forms of armour rock lakeshores, are extremely important for migratory shorebirds in May to mid-June and early July to October.	None – No suitable Ecosite present.

Wildlife Habitat ¹	Candidate Significant Wildlife Habitat ¹		Potential Significant Wildlife Habitat within the Site-vicinity Study Area
	Provincial Ecosite Codes	Habitat Criteria	
Bat Hibernacula	B158-159, B164-165, B174-175, B180-181	Hibernacula may be found in abandoned caves, mine shafts, underground foundations and karsts. Commonly associated as components of either Cliff or Rock Barren ecosites. The locations and site characteristics of bat hibernacula are relatively poorly known. The primary criteria are identification of known features.	None – No suitable Ecosite present.
Bat Maternity Colonies	B015-019, B023-028, B039-043, B054-059, B069-076, B087-092, B103-108, B118-125	Maternity colonies can be found in tree cavities and vegetation. Maternity roosts are not found in caves and mines in Ontario. Aspen is an important feature in Ecoregion 3E Maternity colonies located in mature (dominant trees > 80yrs old) deciduous or mixed forest stands with >10 large diameter (>25cm dbh) wildlife trees per hectare. Female bats prefer wildlife trees (snags) of decay class 1-4: can be living or with bark mostly intact.	None – Ecosite B119 present, but mature trees and snags of large diameter are absent.
Turtle Wintering Areas	B128-142, B145-152	For most turtles, wintering areas are in the same general area as their core habitat. Water has to be deep enough not to freeze and have soft mud substrates. Over-wintering sites are permanent water bodies, large wetlands, and bogs or fens with adequate dissolved oxygen. Year-round persistence of standing or flowing water to depth, or presence of springs to prevent freezing is critical.	None – Ecosite B129 present, but no permanent water is present. No records or sightings of turtles within vicinity.
Reptile Hibernacula	B008-028, B128-139, B158-159, B164-165, B167-172, B174-175, B180-181, B183-188	For snakes, hibernation takes place in sites located below frost lines in burrows, rock crevices and other natural locations. Areas of broken and fissured rock are particularly valuable since they provide access to subterranean sites below the frost line. Wetlands can also be important over-wintering habitat in conifer or shrub swamps and swales, poor fens, or depressions in bedrock terrain with sparse trees or shrubs with sphagnum moss or sedge hummock ground cover, but talus, rock barren, crevice and caves are more typically related to these habitats.	None – Ecosite B129 present, but no potential hibernacula were observed. No rocky areas or wetlands to provide access to subterranean sites below the frost line. No records or sightings of snakes within vicinity.

Wildlife Habitat ¹	Candidate Significant Wildlife Habitat ¹		Potential Significant Wildlife Habitat within the Site-vicinity Study Area
	Provincial Ecosite Codes	Habitat Criteria	
Colonially - Nesting Bird Breeding Habitat (Bank and Cliff)	B001-004, B157-159, B173-175	Any site or areas with exposed soil banks, undisturbed or naturally eroding that is not a licensed/permitted aggregate area. Typically eroding banks, sandy hills, borrow pits, steep slopes, and sand piles for Bank Swallow and cliff faces, bridge abutments, silos and barns for Cliff Swallows.	None – No suitable Ecosite present.
Colonially - Nesting Bird Breeding Habitat (Tree/Shrubs)	B045-059, B064-076, B081-092, B097-108, B113-137, B161-162, B177-178	May include a wide variety of tall treed ecosites. Great Blue Herons nest in live or dead standing trees in wetlands, lakeshores, islands, and peninsulas. Shrubs and occasionally emergent vegetation may also be used. Most nests in trees are 11 to 15 m from ground, near the top of the tree. Bonaparte's Gulls nest in coniferous trees (preferably spruce-fir) near fens, bogs, swamps, ponds or lakes. Double-crested Cormorants prefer to nest in trees but will nest on the ground as well where trees are limited or have died and fallen.	None – Ecosites B083 and B119 present, but no nest colonies or evident of herons, gulls or cormorants observed.
Colonially - Nesting Bird Breeding Habitat (Ground)	B008, B020-021, B030-031, B045-046, B061-062, B078-079, B094-095, B110-111, B142-144, B160-165, B169-172, B176-181, B185-188	Nesting colonies of gulls and terns are on islands or peninsulas (natural or artificial) associated with open water or in marshy areas, lakes or large rivers. Brewers Blackbird colonies are found loosely on the ground or in low bushes in close proximity to streams and irrigation ditches within farmlands.	None – Ecosites B078 present, but are associated with disturbed lands. No gulls, terns or Brewer's Blackbird colonies observed.

¹ Based on the Draft Significant Wildlife Habitat Ecoregion 3E Criterion Schedules (MNR, 2012)

Table 4.2: Rare Vegetation Communities

Wildlife Habitat ¹	Candidate Significant Wildlife Habitat ¹		Potential Significant Wildlife Habitat within the Site-vicinity Study Area
	Provincial Ecosite Codes	Habitat Criteria	
Cliffs and Talus Slopes	B157-159, B173-175, B201-203, B166-168, B182-184	Cliffs: Vertical consolidate bedrock communities with a minimum height of 3 m and a slope of >60° or 173%. Talus: Rock accumulations at the base of cliffs, or former cobble beaches left behind after lake levels drop.	None – No Ecosites present.
Rare Treed Type: Red and White Pine Stands	B011, B015, B023, B027, B033, B039, B048, B054, B064, B069, B081, B087, B097, B103, B113, B118	Red and white pine stands attain their northern limit near the northern margin of the Clay Belt. They occur as sporadic, small stands and are generally found on dry, often exposed, and rocky sites. However, these conditions can vary.	None – No Ecosites present.
Rare Treed Type: Black Ash	B019, B028, B056, B059, B071, B076, B089, B092, B105, B108, B120, B125	Black ash stands are found within low lying, predominantly alluvial material throughout the Clay Belt.	None – No Ecosites present.
Rare Treed Type: Elm	B019, B043, B056, B059, B071, B076, B089, B092, B105, B108, B120, B125	Elm stands are found within low lying, predominantly alluvial material throughout the Clay Belt.	None – No Ecosites present.
Rare Treed Type: Oak	B017, B019, B028, B041, B043, B057, B059, B072, B076, B090, B092, B106, B108, B121, B125	Hardwood canopy within lower topographic positions. Fresh to moist moisture regimes with variable substrate textures.	None – No Ecosites present.

Wildlife Habitat ¹	Candidate Significant Wildlife Habitat ¹		Potential Significant Wildlife Habitat within the Site-vicinity Study Area
	Provincial Ecosite Codes	Habitat Criteria	
Rare Treed Type: Red and Sugar Maple	B018, B019, B028, B042, B043, B058, B059, B073(Mh), B074(Mr), B075, B076, B091, B092, B107, B108, B122(Mh), B123(Mr), B124, B125	Hardwood canopy containing red and/or sugar maple. Generally on warmer-than-normal sites with a higher nutrient regime.	None – No Ecosites present.
Rare Treed Type: Yellow Birch	B019, B028, B040, B043, B055, B059, B070, B076, B088, B092, B104, B108, B119, B125	Hardwood canopy consisting mostly of yellow birch. Generally on warmer-than-normal sites with a higher nutrient regime.	None – Ecosites B119 present, but no yellow birch within the ecosites.
Rock Barren	B179, B180, B181, B163, B164, B165	Exposed bedrock areas (mostly exposed rock with < 5 cm mineral or < 10 cm organic material) and < 25% vascular vegetation.	None – No Ecosites present.
Sand Dunes Notably: American Dune Grass Type	B005, B006, B142	Exposed mineral material community often associated with shorelines of lakes or exposed inland mineral material that has been shaped by eolian (wind) processes. American Dune Grass Type: Open grassy sand dunes with Indicator Species: American dune grass, beach pea, and sand cherry. Scattered white spruce forest islands may also occur.	None – No Ecosites present.
Great Lakes Arctic-Alpine Shoreline Type	B161, B162	Found on the shoreline of Lake Superior on open basic bedrock. Vegetation consists mostly of arctic-alpine species.	None – No Ecosites present.

Wildlife Habitat ¹	Candidate Significant Wildlife Habitat ¹		Potential Significant Wildlife Habitat within the Site-vicinity Study Area
	Provincial Ecosite Codes	Habitat Criteria	
Hardwood Swamps	B130, B131, B132, B133	Dominant hardwood canopy that is located within lower topographic positions and subject to flooding. Nutrient regime is rich and substrate is mostly moderately deep to deep with variable textures.	None – No Ecosites present.

¹ Based on the Draft Significant Wildlife Habitat Ecoregion 3E Criterion Schedules (MNR, 2012)

Table 4.3: Specialized Habitat for Wildlife

Wildlife Habitat ¹	Candidate Significant Wildlife Habitat ¹		Potential Significant Wildlife Habitat within the Site-vicinity Study Area
	Provincial Ecosite Codes	Habitat Criteria	
Waterfowl Nesting Area	All upland habitats located adjacent to ELC ecosites: B129-135, B140-152, B224	A waterfowl nesting area extends 120 m from a wetland (> 0.5 ha) or a cluster of 3 or more small (<0.5 ha) wetlands within 120 m of each individual wetland where waterfowl nesting is known to occur. Presence of 10 or more nesting pairs for listed species.	None – Upland habitats adjacent to Ecosites B129 present, but no waterfowl or suitable nesting sites (large diameter cavity trees) observed during field surveys.
Bald Eagle and Osprey Nesting Habitat	Treed communities directly adjacent to riparian areas – rivers, lakes, ponds and wetlands.	Nests are associated with lakes, ponds, rivers or wetlands along treed shorelines, islands, or on structures over water. Osprey nests are usually at the top of a tree whereas Bald Eagle nests are typically in super canopy trees in a notch within the tree’s canopy.	None – No riparian areas present.
Woodland Raptor Nesting Habitat	May be found in all forested ELC Ecosites.	All natural or conifer plantation woodland/forest stands. Stick nests found in a variety of intermediate-aged to mature conifer, deciduous or mixed forests within tops or crotches of trees. Species such as Merlin or Coopers Hawk nest along forest edges sometimes on peninsulas or small off-shore islands.	Low – Treed communities present and Broad-winged Hawk observed during field surveys; however, mature trees suitable for raptor nesting are mainly absent.
Turtle Nesting Areas	B003, B006-007, B031, B171-172, B187-188	Best nesting habitat for turtles are close to water and away from roads and sites less prone to loss of eggs by predation from skunks, raccoons or other animals. For an area to function as a turtle-nesting area, it must provide sand and gravel that turtles are able to dig in and are located in open, sunny areas. Nesting areas on the sides of municipal or provincial road embankments and shoulders are not significant wildlife habitat. Sand and gravel beaches adjacent to undisturbed shallow weedy areas of marshes, lakes, and rivers are most frequently used.	None – No Ecosites present.

Wildlife Habitat ¹	Candidate Significant Wildlife Habitat ¹		Potential Significant Wildlife Habitat within the Site-vicinity Study Area
	Provincial Ecosite Codes	Habitat Criteria	
Seeps and Springs	Any forested Ecosite within the headwater areas of a stream could have seeps/springs.	Seeps/Springs are areas where ground water comes to the surface. Often they are found within headwater areas within forested habitats. Any forested area (with <25% meadow/field/ pasture) within the headwaters of a stream or river system. Seeps and springs are important feeding and drinking areas especially in the winter will typically support a variety of plant and animal species.	None – No headwaters of streams or rivers systems. No groundwater seepage visible.
Aquatic Feeding Habitat	Habitat may be found in all forested ecosites adjacent to water.	Wetlands and isolated embayments in rivers or lakes which provide an abundance of submerged aquatic vegetation such as pondweeds, water milfoil and yellow water lily are preferred sites. Adjacent stands of lowland conifer or mixed woods will provide cover and shade.	None – No suitable aquatic habitats with abundant submerged vegetation such as pondweeds, water milfoil and yellow water lily.
Mineral Licks	Habitat may be found in all treed ecosites.	This habitat component is found in upwelling groundwater and the soil around these seepage areas. It typically occurs in areas of sedimentary and volcanic bedrock. In areas of granitic bedrock, the site is usually overlain with calcareous glacial till.	None – No groundwater seepage identified.
Denning Sites for Mink, Otter, Gray Wolf, Eastern Wolf, Canada Lynx, Marten, Fisher, Black Bear	Habitat may be found in all treed ecosites.	Dens usually underground, old beaver lodges, log jams and crevices in rock piles, cavities in large trees or under large downed woody debris or hollow trees. Generally, mature, continuous forests. Extensive searches for denning sites are not recommended as they are very difficult to locate.	None – No denning sites were observed during field surveys. Old beaver lodges are absent.

Wildlife Habitat ¹	Candidate Significant Wildlife Habitat ¹		Potential Significant Wildlife Habitat within the Site-vicinity Study Area
	Provincial Ecosite Codes	Habitat Criteria	
Wolf Rendezvous Sites	Isolated open areas including bogs, fens, meadows, clearcuts.	Rendezvous sites may be found in a variety of habitats such as open bogs, burns, clearcuts, beaver meadows, and open forest. Rendezvous sites are often used by wolf packs during multiple years.	None – Potential habitat present, but no evidence of wolves (i.e., tracks, scat, fur, kill sites) were observed during field surveys.
Amphibian Breeding Habitat (Wetlands)	B128-135, B141-152, B223-224	Rich swamps and thickets, vernal/seasonal pooling, riparian and variety of wetland interiors and margins. Wetlands and pools (including vernal pools) >500 m ² (about 25 m diameter) supporting high species diversity are significant: some small or ephemeral habitats may be important amphibian breeding habitats. Wetlands and pools need to persist until mid-July. Presence of shrubs and logs increase significance of pond for some amphibian species because of available structure for calling, foraging, escape and concealment from predators.	None – Ecosite B129 present; however, standing water was absent from this ecosite and amphibian call surveys suggest frog populations are low.
Amphibian Breeding Habitat (Woodland)	All treed upland ecosites, however more likely on fine textured moist ecosites B119-125	Presence of a wetland, lake or pond of area >500 m ² (about 25 m diameter) within or adjacent (within 120 m) to a woodland (no minimum size) are significant: some small or ephemeral habitats may be important amphibian breeding habitats. Wetlands and pools need to persist until mid-July.	None – Vernal pooling absent from areas adjacent to wetland ecosites and do not support suitable habitats for breeding woodland species.
Mast Producing Areas	All shrub and treed ecosites capable of producing mast.	Significant tree species include mountain ash and pin cherry. Significant shrub species include blueberries, raspberries, beaked hazel and choke cherry. Some oak or other hard-mast producing species may be present in 3E. Permanent open sites providing long-term food sources are more significant.	Low to Moderate – Mast producing species such as raspberries and cherries present within upland and wetland ecosites; however, the abundance of these species is limited from rare to occasional.

Wildlife Habitat ¹	Candidate Significant Wildlife Habitat ¹		Potential Significant Wildlife Habitat within the Site-vicinity Study Area
	Provincial Ecosite Codes	Habitat Criteria	
Sharp-tailed Grouse Leks	B029-031, B044-046, B060-062, B077-079, B093-095, B109-111, B126, B136-141	The lek or dancing ground consists of bare, grassy area as the core of the lekking area, and may contain some sparse shrubland. There is often a knoll or slightly elevated rise in topography associated with the site. Leks are typically a grassy field/meadow separated by >15 ha from adjacent shrublands and >30 ha from adjacent treed areas.	None – Ecosite B078 present, but no Sharp-tailed Grouse observed or known to occur. Ecosites associated with disturbed lands.

¹ Based on the Draft Significant Wildlife Habitat Ecoregion 3E Criterion Schedules (MNR, 2012)

Table 4.4: Habitat for Species of Conservation Concern

Wildlife Habitat ¹	Candidate Significant Wildlife Habitat ¹		Potential Significant Wildlife Habitat within the Site-vicinity Study Area
	Provincial Ecosite Codes	Habitat Criteria	
Marsh Bird Breeding Habitat	B134-B152	Nesting occurs in wetlands. All wetland habitats are is to be considered as long as there is shallow water with emergent aquatic vegetation present.	None – No Ecosites present.
Open Country Bird Breeding Habitat	B008-009, B020-021, B029-031, B044-046, B060-062, B077-079, B093-095, B109-111	Large field/meadow areas (includes natural and cultural fields and meadows) >30 ha. Field/meadow not Class 1 or 2 agricultural lands, and not being actively used for farming (i.e., no row cropping or intensive hay or livestock pasturing in the last 5 years). Field/meadow sites considered significant should have a history of longevity, either abandoned fields, mature hayfields and pasturelands that are at least 5 years or older.	None – Ecosite B078 present, but no habitats >30 ha present. Ecosites also associated with disturbed lands.
Shrub/Early Successional Bird Breeding Habitat	B009-010, B021-022, B031-032, B046-047, B062-063, B079-080, B095-096, B111-112, B134-135	Large natural field areas succeeding to shrub and thicket habitats >30 ha in size. Shrub land or early successional fields, not class 1 or 2 agricultural lands, not being actively used for farming (i.e. no row-cropping, haying or live-stock pasturing in the last 5 years). Shrub and thicket habitat sites considered significant should have a history of longevity, either abandoned fields or pasturelands.	None – Ecosite B078 present, but no habitats >30 ha present.
Special Concern and Rare Wildlife Species	All plant and animal element occurrences (EO).	Species dependent.	None – No SAR or potential SAR habitat is present.

¹ Based on the Draft Significant Wildlife Habitat Ecoregion 3E Criterion Schedules (MNR, 2012)

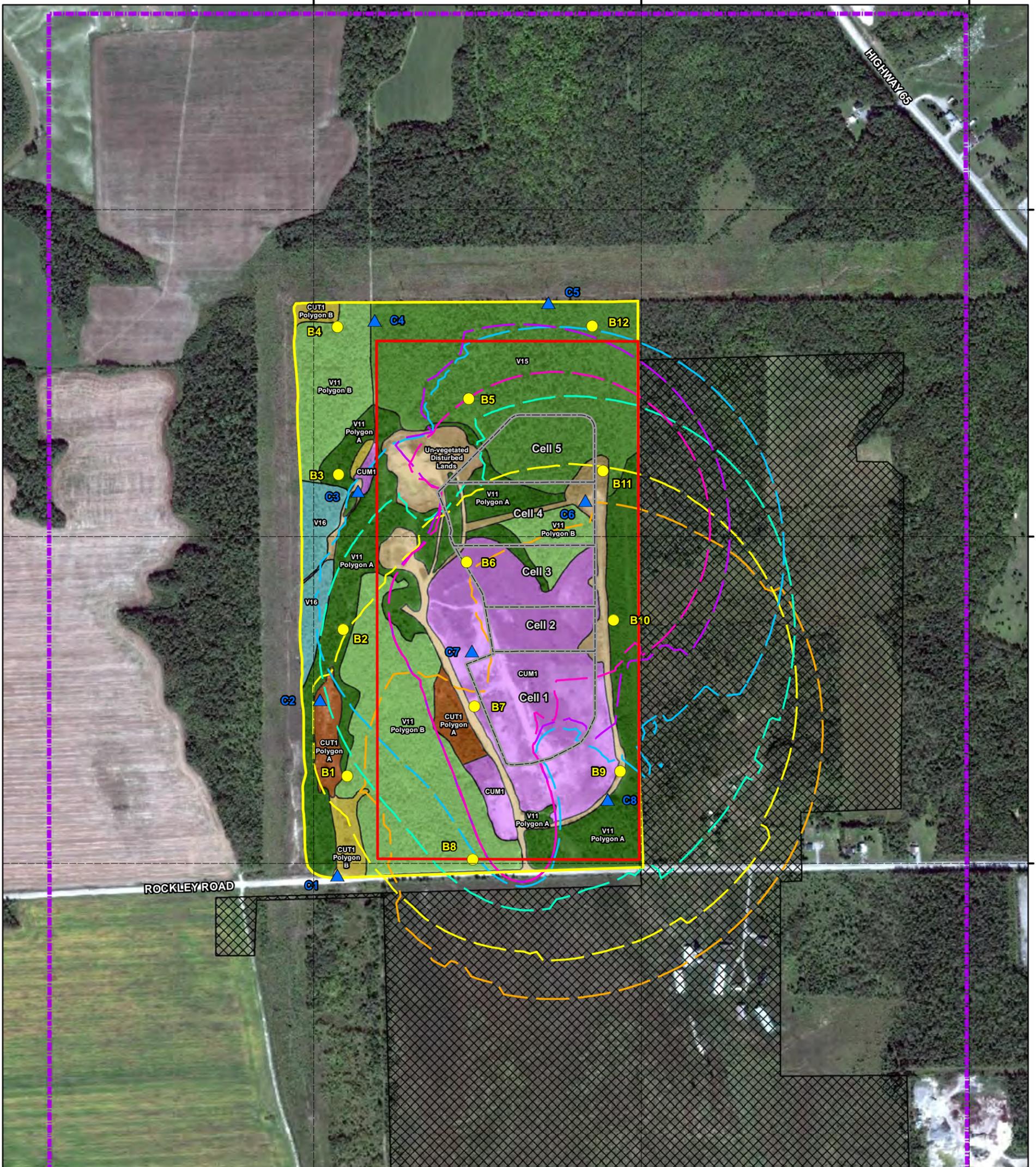
Table 4.5: Animal Movement Corridors

Wildlife Habitat ¹	Candidate Significant Wildlife Habitat ¹		Potential Significant Wildlife Habitat within the Site-vicinity Study Area
	Provincial Ecosite Codes	Habitat Criteria	
Amphibian Movement Corridors	Corridors may be found in all ecosites associated with water.	Movement corridors between breeding habitat and summer habitat. Movement corridors must be determined when amphibian breeding habitat is confirmed as SWH	None – No amphibian breeding habitat was confirmed as SWH (see Table 4.3). Amphibian call surveys suggest frog populations are low. No ecosites are associated with water.
Cervid Movement Corridors	Corridors may be found in all treed ecosites.	Movement corridor must be determined when Moose Aquatic Feeding Area and Mineral Lick Habitat are confirmed. Corridors typically follow riparian areas, woodlots, areas of physical geography (ravines, or ridges).	None – No Moose Aquatic Feeding Area and Mineral Lick Habitat habitats present.
Furbearer Movement Corridor	All treed Ecosites adjacent to or within shoreline habitats.	Mink and otter den sites are typically found within a riparian area of a lake, river, stream or wetland. The den site will potentially have a movement corridor associated with it. Den sites of other furbearer species may be more associated with social, hunting, breeding or other behaviours. All den sites identified under the habitat of Denning Sites for Mink, Otter, Marten Fisher and Eastern Wolf should be considered for an animal movement corridor.	None – No shorelines habitat present.

¹ Based on the Draft Significant Wildlife Habitat Ecoregion 3E Criterion Schedules (MNR, 2012)

Table 4.6: Area of Vegetation Removal for Various Vegetation Community Types for the Construction of the Project

Vegetation Community Type (FEC V-type)	Boreal ELC Code	Area (hectares) Removed in Construction of the Project	Percent (%) Removed of Total Available Area within the Site-vicinity Study Area
Trembling Aspen – Black Spruce – Bush Honeysuckle – Herb Rich (V11)	B119	2.2	11.5
Black Spruce – Herb Rich (V15)	B083	1.5	17.3
Cultural Meadow Ecosite (CUM1)	B087	5.0	57.9
Un-vegetated Disturbed Lands	--	0.7	17.6



Upland Vegetation Communities		
FEC V-Type (or ELC)	FEC ES-Type	ELC B-Type
V11 (Polygon A – Young, Regenerating Stand) (Trembling Aspen – Black Spruce – Bush Honeysuckle – Herb Rich)	ES10 (Trembling Aspen – Black Spruce – Balsam Poplar – Moist)	B119 (Moist, Fine: Aspen – Birch Hardwood)
V11 (Polygon B – Mid-aged Stand) (Trembling Aspen – Black Spruce – Bush Honeysuckle – Herb Rich)	ES10 (Trembling Aspen – Black Spruce – Balsam Poplar – Moist)	B119 (Moist, Fine: Aspen – Birch Hardwood)
V15 (Black Spruce – Herb Rich)	ES6f (Black Spruce – Trembling Aspen – Fine Soil)	B083 (Fresh, Clayey: Black Spruce – Pine Conifer)
CUM1 (Cultural Meadow Ecosite)		B087 (Fresh, Clayey: Field)
CUT1 (Polygon A – Mixed Species) (Cultural Thicket Ecosite)		B080 (Fresh, Clayey: Shrub)
CUT1 (Polygon B – Red-Osier Dogwood-Dominated) (Cultural Thicket Ecosite)		B080 (Fresh, Clayey: Shrub)
Wetland Vegetation Communities		
FEC V-Type (or ELC)	FEC ES-Type	ELC B-Type
V16 (Eastern White Cedar – Spruce – Balsam Fir – Ferns)	ES13r (Eastern White Cedar – Black Spruce – Organic – Species Rich)	B129 (Organic Rich Conifer Swamp)

LEGEND

- Breeding Bird Survey Stations
- ▲ Crepuscular Bird and Amphibian Survey Stations
- ▭ Proposed Landfill Boundary
- ▭ Site-vicinity Study Area
- ▭ Project Study Area
- ▭ Extended Study Area
- ▭ Canadian Solar's New Liskeard Project (approx. boundary)
- ▭ Un-vegetated Disturbed Lands
- 50db Noise Contours
 - ▭ Phase 1 - Construction / Phase 2a - Operation Cell 1
 - ▭ Phase 2b - Operation Cell 2
 - ▭ Phase 2c - Operation Cell 3
 - ▭ Phase 2d - Operation Cell 4
 - ▭ Phase 2e - Operation Cell 5
 - ▭ Phase 3 - Closure

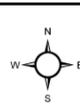
NOTES:
 - Background image extracted from ESRI World Topo Map.
 - All base data on this map was extracted from Land Information
 - Geonames extracted from Geobase.



**TECHNICAL SUPPORT DOCUMENT: TERRESTRIAL BIOLOGY
 NEW WASTE MANAGEMENT CAPACITY
 TEMISKAMNG SHORES ONTARIO**

**Effects of Assessment
 Terrestrial Environmental Components**

Datum & Projection:
 NAD 1983 UTM Zone 17N



PROJECT N°: TY910491

FIGURE: 4.1

SCALE: 1:6,000

DATE: September 2015



5.0 SUMMARY AND CONCLUSION

This TSD has identified vegetation and wildlife communities located within the Extended Terrestrial Study Area for the City of Temiskaming Shores' proposed expansion of the New Liskeard Landfill. Vegetation and wildlife communities identified are typical of those inhabiting the mixed-boreal forest region of northern Ontario. Upland communities and ecosites consisted of deciduous and mixedwood forests, and cultural habitats. Wetland communities and ecosites consist of coniferous swamp; however, cover just 2.7% of the Site-vicinity Study Area. No SAR or potential SAR habitat was identified within the Site-vicinity Study Area.

The analysis to predict potential Project effects determined that some vegetation communities (and associated wildlife habitat) will be lost and wildlife species will be displaced; however, displaced species and their preferred habitats are common throughout the study area, the Site-vicinity Study Area, and in the greater region and these species will be able to settle in nearby suitable habitats. Planning efforts for the Project have focused, where practical, on using lands that have been previously disturbed by past anthropogenic disturbance. Conducting construction activities between September and April would avoid sensitive summer breeding seasons for wildlife (April 15 to August 30). Enforcement of speed limits along proposed access roads reduce the potential adverse effects of increased vehicular traffic associated with the Project such as dust generation on plant life and increased risk of wildlife mortality due to vehicular collisions. Mitigation measures described in this report are expected to be effective for their intended purposes and in many instances can be further optimized in response to monitoring data.

Regards,

Amec Foster Wheeler Environment & Infrastructure
a Division of Amec Foster Wheeler Americas Limited

Written by: Izabela Kalkowski, M.F.C., Senior Terrestrial Ecologist

Signature:



Reviewed by: Jeff Balsdon, M.Sc., Senior Terrestrial Ecologist

Signature:



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APPENDIX A

MNRF CONSULTATION RECORDS

Hellinga, Erin

From: Beresford, Aden (MNR) <Aden.Beresford@ontario.ca>
Sent: October-28-14 9:50 AM
To: Hellinga, Erin
Cc: Mccrudden, Chuck (MNR); Robinson, Julie (MNR)
Subject: Re: Temiskaming Shores Information Request

Dear Ms. Hellinga,

We have reviewed your request for Species at Risk Data for the New Liskeard Landfill Site in Temiskaming Shores, Ontario.

We would like to take this time to remind you that simply because MNR may not currently have a SAR species recorded for an area, does not mean that this SAR species is not present or has the potential to be present in the future. We do not know the explicit distribution of every SAR species nor have we conducted a comprehensive habitat analysis on the district landscape for all species. Beyond what you have listed in your Summary of Species of Conservation Concern, the MNR have historically recorded an occurrence of Black Tern within 2km from the site in question.

Can you share your plans for SAR field investigations on the site(timing, methodology etc.)?

Best Regards,

Aden Beresford
Planning Intern
Ministry of Natural Resources and Forestry
North Bay District
705-475-5604

From: Hellinga, Erin [<mailto:erin.hellinga@amec.com>]
Sent: September-29-14 4:48 PM
To: Fluri, Dave (MNR); Vaillancourt, Valerie (MNR)
Cc: Young, Rob
Subject: Temiskaming Shores Information Request

Dear Mr. Fluri/Ms. Vaillancourt:

I am writing to follow-up on a Species at Risk information request, for the expansion of New Liskeard Landfill Site in Temiskaming Shores, Ontario, submitted via email August 11, 2014 and via registered mail shortly thereafter. Please find attached the original Information Request for your review.

Kind Regards,

Erin M. Hellinga, B.Sc.
Environmental Technician
AMEC Environment & Infrastructure
Tel + 905-568-2929 x 4163

From: Hellinga, Erin
Sent: August-11-14 10:34 AM
To: dave.fluri@ontario.ca

Cc: Young, Rob

Subject: Temiskaming Shores Information Request

Dear Mr. Fluri:

Please find attached a formal Species at Risk information request for the expansion of New Liskeard Landfill Site in Temiskaming Shores, Ontario.

Kind Regards,

Erin M. Hellinga, B.Sc.
Environmental Technician
AMEC Environment & Infrastructure
160 Traders Blvd. E., Suite 110,
Mississauga, ON L4Z 3K7
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erin.hellinga@amec.com

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