ENVIRONMENTAL IMPACT STUDY
MUSKOKA ROYALE COLLEGE

BRACEBRIDGE, ONTARIO

Prepared for:

Muskoka Royale Developments Inc.

September 2018

Michalski Nielsen
ASSOCIATES LIMITED
ENVIRONMENTAL PLANNING BIOPHYSICAL ANALYSIS
LAKE CAPACITY ASSESSMENT RESOURCE MANAGEMENT

Michalski Nielsen
ASSOCIATES LIMITED

September 27, 2018

Muskoka Royale Developments Inc.
c/o George Chen
22 Fairway Heights Cres.
Thornhill, ON L3T 1K2

Re: Muskoka Royale; Our File 3517

Mr. George Chen:

Enclosed please find our report entitled **ENVIRONMENTAL IMPACT STUDY – MUSKOKA ROYALE COLLEGE, BRACEBRIDGE, ONTARIO** (September 2018).

Should you have any questions, or if further clarification is required, do not hesitate to call.

Yours truly,

MICHALSKI NIELSEN ASSOCIATES LIMITED
Per:

Gord Nielsen, M.Sc.
Ecologist
President

GN/be

Enc.

16 Robert Boyer Lane, Bracebridge, Ontario P1L 1R9
(705) 645-1413 Facsimile: (705) 645-1904 www.mnal.ca e-mail: info@mnal.ca

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1 INTRODUCTION

1.1 Background

In September, 2017, Michalski Nielsen Associates Limited was retained by Muskoka Royale Developments Inc. to update our previous natural environment work on the westerly half of the Muskoka Royale property, in support of the development of a senior school and future elementary school campus. Our office had previously undertaken extensive work on this property, beginning in 1999 when this portion of the subject property was being considered for a golf course by a different proponent. In subsequent years we had updated some of that earlier work for previous applicants and Muskoka Royale Developments Inc.

Separate from that work, other consultants were involved in the completion of a Class Environmental Assessment (Class EA) for the Bracebridge West Bypass, which has identified a future municipal road corridor that traverses this property.

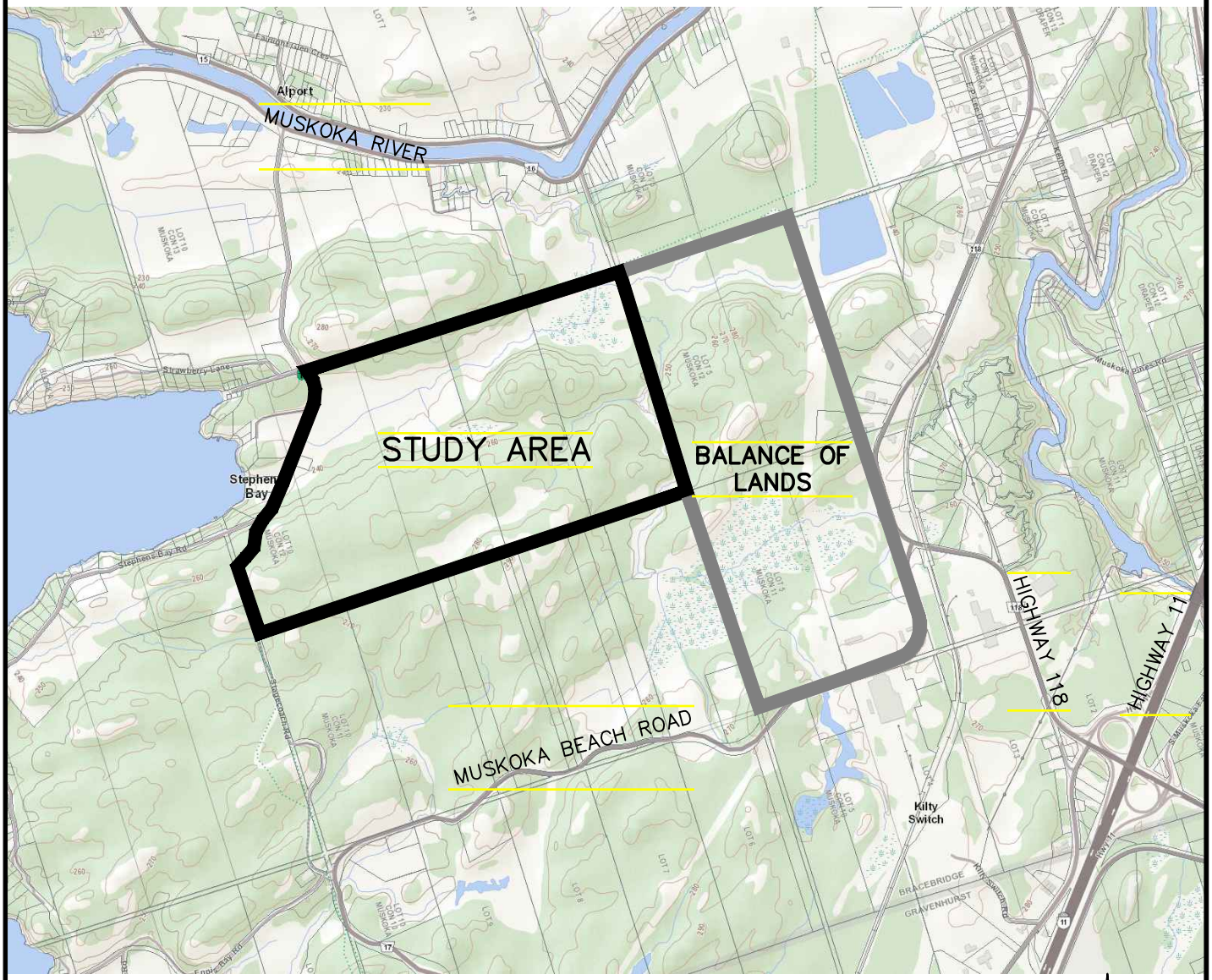
The purpose of our present retainer has been to pull together the relevant portions of the earlier work we have completed, and to update this in a targeted fashion in order to be able to:

- describe the physical characteristics, vegetation conditions, wildlife habitat values and fisheries characteristics of the westerly half of the Muskoka Royale property, with an emphasis on those portions of these lands being considered for development;
- provide an updated review of Species at Risk, and in particular those species which receive species and habitat protection under the *Endangered Species Act*;
- provide an updated review of potential significant wildlife habitat;
- provide environmental policy context for development on this property;
- determine those areas of the property that are most important for protection; and
- provide comments and recommendations on development, including suitability of the site for a development of this nature and scale, environmental input to the overall development plans, and specific commentary on each of the individual school precincts.

1.2 Lands to be Developed

The Muskoka Royale property is located in the Town of Bracebridge. While the entire property is 345 ha in size, it is the western approximately half of these lands which is to be developed as a school campus, consisting of Lots 6, 7 and 8, and part Lots 9 and 10, Concession 12 (**Figure 1**). The site is located to the

BRACEBRIDGE



Michalski Nielsen ASSOCIATES LIMITED

MUSKOKA ROYALE COLLEGE

LOCATION PLAN

DATE:	SCALE:	PROJECT No.	FIGURE No.
SEPT, 2018	N.T.S.	3517	FIGURE 1

east of Stephens Bay Road, south of the Muskoka River. It is contiguous with the eastern portion of the property, which extends to District Road 118. That road is to serve as the access point for an internal roadway and water and sewer services to the school, with the majority of that internal roadway to follow the alignment of the approved but future Bracebridge West Bypass.

The subject lands are within the urban centre boundary for the Town of Bracebridge, an area that is identified as a nucleus for a full range of residential, industrial, commercial and community facilities with a density that will make the most efficient use of municipal services and facilities. Under the Urban Centre Land Use Schedule (Schedule B) of the Official Plan, the lands to be developed are identified as Open Space.

1.3 Vision for the School

The school is to include a senior school, a student/staff residence complex for that senior school, and a sports complex in its first stage of development. Each of those portions of the school are to occupy separate precincts, and are to be phased to allow for growth. Additional precincts are planned for a future elementary school and a future student/staff residence complex for those elementary students.

On full build-out, all aspects of this development will only occupy about 15% of the western portion of the Muskoka Royale property. This recognizes that there are considerable constraints within this landscape, including substantial areas of wetland and steep slopes. However, it is also purposeful in that it has been designed with this natural setting in mind; it is the intent to build a school campus which is built around the physical and natural beauty of these lands, and its Muskoka setting. In this regard, as the ecological consulting firm with considerable previous experience on this property, our office was invited to provide initial input on how a school campus could be designed to best fit within the landscape, in a manner that avoids more ecologically significant areas, which minimizes the extent of disturbance elsewhere, and which captures all of the diversity and beauty of this landscape. That input contributed to decisions on developing the various aspects of the school within smaller precincts that are distributed over the property, with an opportunity to refine the boundaries of those precincts as we completed our additional work.

1.4 Acknowledgements

Michalski Nielsen Associates Limited has been assisted on this project by Palmer Environmental Consulting Group Inc., who have been responsible for updating much of the information on terrestrial resources, including vegetation surveys, targeted wildlife surveys, a Species at Risk review and snag surveys to assess bat habitat opportunities.

2 METHODS

2.1 Previous Works Completed

2.1.1 Initial Background Review

Our initial work on this property in 1999 included extensive consultation with resource management agencies, including the Ministry of Natural Resources and Forestry (MNRF), for background information on:

- general natural resource information and previous MNRF inventory data or correspondence specific to the property;
- forest resource inventory stand mapping and forestry management data;
- mapping of deer wintering yards;
- data from the Ontario Breeding bird Atlas, as well as other data for mammals, reptiles, amphibians and fish for the subject lands and surrounding area;
- information on ecological land classification systems and ecosite interpretation; and
- information on plant monitoring status for the region.

Existing published information pertaining to the natural environment features of the subject property was reviewed, which included **The Birds of Muskoka and Parry Sound** (Mills 1981), **Atlas of the Mammals of Ontario** (Dobbyn 1994), the **Natural Heritage Evaluation of Muskoka** (Bowles *et al.* 1994), **Royal Muskoka Property Forest Cover Evaluation** (King's Forestry Service 1998) and **Royal Muskoka Development Phase One Forest Inventory** (Muskoka Resource Management Service 1998). Westwind Forest Stewardship Inc. and Mitig Forestry Consulting & GIS Services provided coloured forest stand inventory mapping (scale 1:15840). The NHIC Internet query database was also consulted for information on significant natural areas and vulnerable, threatened or endangered species (VTEs) in the area (NHIC 1999).

Aerial photography used in this initial assessment was flown in 1987.

2.1.2 Initial Field Inventories

Terrestrial Habitats

The earlier site visits were undertaken by an Ecologist on February 15 – 16, July 13, 16, 21, 22, 23, and November 9, 1999. Timing of the field work coincided with the summer, late fall and winter seasons. Early spring ephemerals, early breeding birds and migrant bird species were not inventoried. The inventory was based solely on qualitative survey techniques, and consisted of:

- identifying the boundaries of plant community types on the subject property according to species composition, physiognomy, and site characteristics utilizing the Ecological Land Classification system (Lee *et al.* 1998);
- recording the occurrence of overstorey and understorey vascular plant species within each plant community;
- noting wildlife habitat characteristics and overall habitat quality, based on qualitative observations, including specific wildlife sightings and/or indirect evidence of presence such as scats, calls, browse, nests, burrows and tracks;
- noting other features of interest, such as areas of disturbance, past logging activity, etc.; and
- compiling a photographic record of terrestrial conditions across the subject property.

The significance or rarity of the vegetation communities and plant species on a national, provincial and regional level was determined from standard status lists and published literature. Standard sources included but were not limited to Argus and Pryer (1990), Province of Ontario (1990), NHIC (1998a), Argus *et al.* (1982-1987), COSSARO (1999), and Bowles *et al.* (1994). The analysis essentially consisted of a straightforward comparison the species list for the study area with those in the preceding references.

In addition to the identification of any nationally, provincially or regionally rare vegetation communities, features of more local natural interest were also identified, on the basis of field investigations and ecological unit status, as listed in Bakoksky (1997).

All faunal sightings were recorded according to species. Species included birds, mammals, amphibians and reptiles. Habitat was evaluated based on its function such as cover, nesting, resting, and food sources. Where applicable, wildlife data was supplemented from published sources including Cadman *et al.* (1987), Dobbyn (1994), Austen *et al.* (1994), and NHIC (1999).

The significance or rarity of the wildlife resources on a national, provincial or regional level was determined from standard status lists and published literature. Standard sources included but were not limited to the Province of Ontario (1990), NHIC (1998b), MNRF (1993), Austen *et al.* (1994), Dobbyn (1994), Weller and Oldham (1984 –1988), and Bowles *et al.* (1994).

In addition to an evaluation of wildlife resources, potential development opportunity and constraint areas and areas of key importance from a wildlife perspective were determined. Development constraint and opportunities were based on an assessment of specific development related characteristics having potential for directly or indirectly affecting the subject property's wildlife resources. Areas of key importance from a wildlife perspective were determined through field investigations published literature.

Aquatic Habitats

Site visits in association with our original work on this property were undertaken by an Aquatic Biologist on February 4 and 23, July 7, 10, 13 and 22, and November 9, 1999. Timing of these visits allowed for observation of aquatic habitat under a variety of seasonal periods affecting stream conditions. The inventory was based solely on qualitative techniques, and consisted of:

- the collection of basic information on water chemistry, and on stream temperature;
- the documentation of physical habitat conditions in surface drainage channels or watercourses from upstream to downstream of the subject property, including information on stream size, morphology, substrates, in-stream cover characteristics, bank conditions, and specific attributes such as the presence of seepage, or the presence of barriers to fish passage;
- the collection of fisheries inventory information, using a backpack electrofisher (Dirigo Electronics Engineering, Model #850), supplementing data previously collected by the MNRF;
- assessing the potential of each surface drainage channel or watercourse reach as seasonal or permanent fish habitats; and

- compiling a photographic record of aquatic conditions through the subject property.

2.2 Additional Environmental Work Completed in Intervening Years

Subsequent to that initial work, but prior to our most recent inventories, our office did complete various work in relation to these lands. This included updating our earlier mapping on more recent aerial photography, completing field work to investigate potential Species at Risk concerns after the introduction of the *Endangered Species Act*, and preparing constraints mapping.

2.3 Most Recent Work Completed

2.3.1 Updated Background Review

An updated review of relevant background material was undertaken to provide context for the additional field investigations and to ensure compliance with any new regulations and policy, including those relating to the 2014 Provincial Policy Statement and the *Endangered Species Act*. The review included the following sources of information:

- Natural Heritage Information Centre (NHIC) Make-A-Map application, which includes the NHIC's species records database and Land Information Ontario (LIO) features;
- Town of Bracebridge Official Plan (Adopted October 24 2006);
- District of Muskoka Official Plan (2014 Consolidation); and,
- Existing mapping and data.

A request for background natural heritage and Species at Risk information was sent to MNRF Parry Sound, with their response considered in the subsequent scoping of field investigations.

2.3.2 Vegetation

For the current study, an initial field survey was conducted on November 15, 2017 to review vegetation communities, natural features, and general site conditions in each of the school precinct areas. The site survey was completed to assess the viability of the proposed roadways and building envelopes, as initial

input to the proposed development concept. A further vegetation survey was conducted on June 6, 2018 to confirm, and refine as required, the earlier defined vegetation community boundaries.

2.3.3 Species At Risk (SAR)

A screening for potential Species at Risk (SAR) habitat was completed for the subject property through review of aerial photos and the field investigations. The Parry Sound District office of MNRF was consulted for local records and their interpretation of habitat protection requirements. The NHIC database was queried for any known SAR records in the vicinity of the site, to determine possible SAR in the area. Habitat opportunities for SAR on the site were then assessed by comparing habitat preferences of species deemed to have potential to occur against current site conditions. Targeted field surveys were completed for SAR birds.

2.3.4 Amphibian Surveys

A breeding amphibian survey was conducted on May 29, 2018, following Gartshore *et al*. (2004). This survey was carried out during the appropriate time frame of at least one half hour after sunset and no later than midnight. Weather conditions were recorded, including air temperature, wind, and precipitation.

Species were identified by call, and an abundance code for each species heard calling was assessed by the following the Amphibian Monitoring protocol:

- Code 0 No calls heard.
- Code 1 Calls not overlapping or simultaneous, number of individual frogs can be counted
- Code 2 Calls overlapping or simultaneous, number of individuals can still be distinguished, number of individual frogs cannot be counted, but a reliable estimate of numbers can be made based on location and call voices
- Code 3 Full chorus, calls simultaneous and overlapping, numbers of calling males cannot be reasonably counted or estimated

2.3.5 Breeding Birds

Breeding bird surveys were conducted on the subject property on June 6 and June 21, 2018 to document the bird communities in the following habitats and locations: (i) forest, (ii) meadow and (iii) flyovers and adjacent areas. Surveys were carried out between 5:45 a.m. and 10:00 a.m., to coincide with the dawn chorus. Weather conditions during the surveys were 50-100% overcast, with light breezes, no precipitation and temperatures of between 9°C and 13°C.

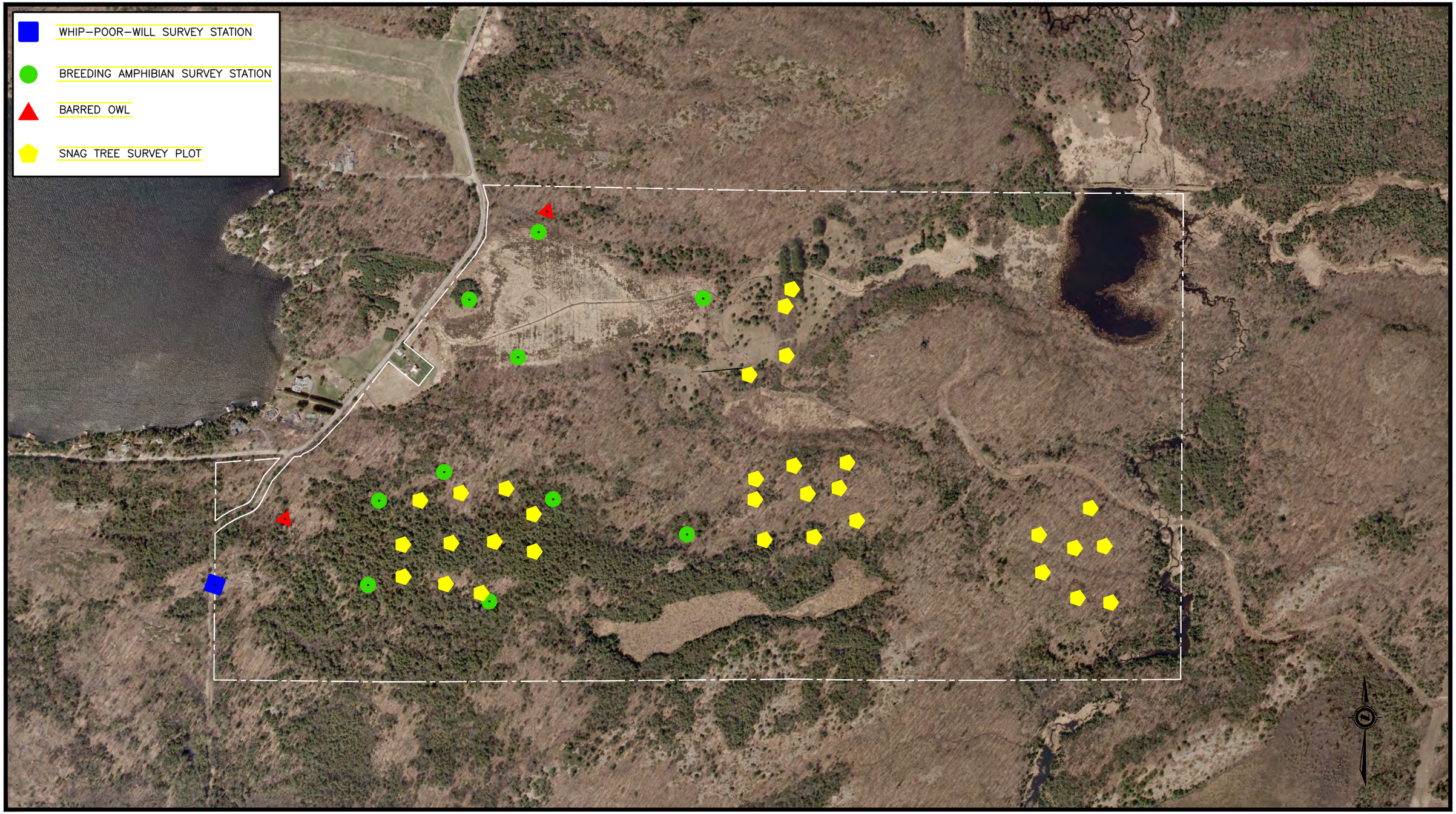
Whip-poor-will surveys were conducted in general accordance with the *Guidelines for Conducting Eastern Whip-poor-will Roadside Surveys in Ontario* (Bird Studies Canada, 2014) on June 26, June 28 and July 3, 2018. The survey station was located adjacent to Stagecoach Road to survey rock barren habitat at RB1 (**Figure 2**), which was deemed to have potential suitable habitat. The surveys were conducted on three nights over a one-week period during peak full moon period (June full moon window). The conditions on the survey nights were clear with low cloud cover and low winds, with the survey completed within the identified timeframe (i.e., start half hour after sunset). Surveys were based on auditory observations and were undertaken for between 15 and 30 minutes on each occasion.

2.3.6 Bat Maternity Roost Survey

A bat maternity roost survey was undertaken based on assessing tree cavities following an approach using methods outlined in the *Survey Protocol for Species at Risk Bats within Treed Habitats* (MNRF, 2017). Given the dominance of forest cover on the subject property it can be assumed that habitat opportunities are available and therefore the objective of the assessment was to identify the extent and quality of potential habitat opportunities for Little Brown Myotis, Northern Myotis and Tri-Colored Bat within each of the proposed development areas.

The specific survey methods based on the 2017 MNRF protocol consisted of:

- Phase I: Bat Habitat Suitability Assessment
- Phase II: Identification of Suitable Maternity Roost Trees
- Phase IV: Snag Density Survey



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MUSKOKA ROYALE COLLEGE

LOCATIONS OF TARGETED WILDIFE SURVEYS CONDUCTED IN 2018

PROJECT NO. 3517

SCALE: 1:7500 DATE: SEPT 2018

FIGURE 2

Surveys were undertaken on April 11 and 12, 2018. The field survey was completed during leaf off conditions. Based on the size of the subject property being >10 ha, survey plots were randomly place within forest communities associated with each development area. The subject property was surveyed at 31 designated plots on the property for the assessment of tree "snags" within a 12.6 m radius circular plot (**Figure 2**). Plots were randomly chosen in representative vegetation communities for the property. All potential roost trees were recorded that follow the MNRF protocol in the 31 plots. The tree species, diameter at breast height (dbh), snag attributes, snag location, height class, and decay class were recorded for each tree. Estimated snag density per hectare (ha) was based on the recommended calculation using πr^2 with r = 12.6 m.

2.3.7 Deer Wintering Habitat

A winter deer survey was completed on March 4, 2018, corresponding with the late winter period when the snow pack begins to melt down and when the density of tracks and scat is most pronounced. A roaming transect was carried out through the portion of the property which has been mapped by MNRF as Stratum 2 deer wintering yard, and continuing through into additional portions of the property that also contained moderately dense to dense conifer cover which could support deer overwintering. Information was collected along 14 transects on:

- tree composition and cover provided;
- the presence and extent of tracks;
- the presence and extent of scat;
- the availability of suitable browse; and
- evidence of browse utilization.

The subsequent bat roost surveys on April 11 and 12, 2018 provided an opportunity to supplement this information.

2.3.8 Aquatic Habitat Surveys

Site visits were completed on November 15, 2017 and July 28, 2018 to examine the various watercourse features within proximity of the proposed school precincts and access roadways. Information was collected on width, depth, general flow conditions, substrates, channel slopes, barriers to fish access,

instream cover and habitat complexity. This information was compared to that earlier collected to confirm, and refine as required, the previous habitat classifications.

3 BIOPHYSICAL RESOURCES

3.1 Physical Setting

3.1.1 Bedrock Geology

The subject property is located on the Canadian Shield. Bedrock throughout the property and environs consists of granitic rocks (Freeman 1979), which were formed during the late Precambrian era some 1,600 million years ago (Ontario Geological Survey 1980). This bedrock formation is included in that portion of the Canadian Shield known as the Grenville Province, which extends throughout central Ontario from the contact zone south of Gravenhurst to well north of Lake Nipissing, and from Georgian Bay to the Ottawa River valley (Hewitt and Freeman 1972). Bedrock outcrops are frequent throughout this province, forming local to prominent rocky knobs and ridges with shallow, discontinuous soil mantles. The subject property is typical of these regional characteristics.

3.1.2 Physiography and Topography

Most of the subject property is included within a long, narrow physiographic region known for practical purposes as the Number 11 Strip (Highway 11 spans the entire length). In essence, this region, which extends from North Bay south to Gravenhurst, consists of an irregularly distributed, but more or less continuous, line of relatively deep deposits of sand (which form local sand plains throughout this region), silt, and clay. These deposits occupy broad troughs and hollows between rocky, till-veneered highlands. A long esker also occurs through part of this region (Chapman and Putnam 1984; Barnett, Cowan and Henry 1991). These various deposits form the base for local agricultural activities that occur sporadically along Highway 11.

The site borders the Algonquin Highlands physiographic region. This area has shallow soils, over a rough surface relief of rounded bedrock knobs and ridges. These soils are stony, sandy and acidic, and generally sub-marginal for agriculture (Chapman and Putnam 1984). Outwash sands and gravel are found along many of the valley floors.

The site ranges from an elevation of approximately 287 metres above sea level (masl) down to 230 masl. While relief is generally moderate, there are localized areas of very steep slope.

3.1.3 Soils

Hoffman, Matthews and Wicklund (1964) identify two broad soil series for this locale, which are of relevance to the subject property:

- Rock-Wendigo sandy loam is a complex in which the Wendigo series (medium to fine sandy loam derived from outwash sand) is interspersed with areas of bedrock exposure. This complex covers all of the upland portions of the subject property.

- Muck, which is an organic soil series that has developed on poorly drained sites, covers all of the lowlands along the drainage course that traverses the subject property.

3.1.4 Surface Water Resources

Figure 3 shows the distribution of watercourses on the subject property. These drain localized areas of the property, being fed primarily by surface water runoff, but in cases, also by diffuse groundwater discharge (which is generally pinched off during drier periods, when the shallow groundwater table is depressed). All of these drainage courses are small, and many are clearly intermittent in nature. The vast majority of this drainage feeds a small watercourse which flows out of Henry Marsh within the property, emptying into the Muskoka River at Hooey Lane, which flows into Lake Muskoka a few kilometres downstream. A small portion of the property in the southwest corner drains to Lake Muskoka directly, via an intermittent channel.

Consistent with the site's varied topography, most reaches of the property's drainage courses are of low gradient, with broad, shallow valleys; in some instances, the watercourses are poorly channelized through these reaches. However, there are also a number of areas of steep grade drops along these watercourses.

Virtually all of the small watercourses on the property are affected by past and present beaver activity. Beaver dams have resulted in a number of areas of flooded swamp or marsh along their borders. Additionally, areas of wet meadow and swamp thicket occur within many of the low-lying areas affected by past flooding. The resultant areas of flooding contribute to the diversity of wetland conditions through the property, but also act to warm the watercourse and decrease stream flow, by losses to evapotranspiration. As a result, under hot, dry, mid-summer conditions in July of both 1999 and 2018, stream flow in the main tributary branch at the north end (exiting the property) was reduced to a trickle (visually estimated to be less than 0.5 L/s). Water temperatures during the 1999 survey were 30.5^{o}C,

Permanent tributary, with some forage fish habitat value

Intermittent tributary, with some forage fish habitat value

Ditched drainage, accessible to forage fish

Intermittent drainage, with no fish access or habitat value

Lake Muskoka

OF/RESIDENCE

VEGETATION COMMUNITIES	
CF1	FRESH-MOIST HEMLOCK CONIERFOUS FOREST
CF3	DRY-FRESH PINE CONIFEROUS FOREST
CP	CONIFEROUS PLANTATION
DF2	DRY-FRESH SUGAR MAPLE DECIDUOUS FOREST
DS1	BIRCH-POPLAR ORGANIC DECIDUOUS SWAMP
ES28	
MF1	FRESH -MOIST HEMLOCK MIXED FOREST
MM1	MINERAL MEADOW MARSH
MM2	ORGANIC MEADOW MARSH
MS1	WHITE CEDAR ORGANIC MIXED SWAMP
MS2	MAPLE ORGANIC MIXED SWAMP
MS3	WHITE CEDAR MINERAL MIXED SWAMP
OF	CULTURAL MEADOW
RB1	BASIC OPEN ROCK BARREN
RB2	BASIC SHRUB ROCK BARREN
RB3	BASIC TREE ROCK BARREN
SM1	ORGANIC SHALLOW MARSH
TS1	MINERAL THICKET SWAMP

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1999 ELC MAPPING UPDATED TO 2012

PROJECT NO. 3517

SCALE: 1:7500

DATE: SEPT 2018

FIGURE 3

matching ambient air temperatures. Similarly, minimal flows and very high water temperatures were seen at several other locations along the main tributary and its various branches.

3.2 Vegetation Characteristics

3.2.1 Regional Vegetation Characteristics

Rowe (1972) classified the vegetation of Canada into eight major forest regions, or vegetation formations, based on the presence and distribution of dominant tree species. These formations are considered to reflect direct responses to broad climatic regimes. Within each region, a number of distinct sections were delineated according to local patterns in tree composition associated with variations in physiographic and geological features. On this basis, the subject property falls within the Great Lakes-St. Lawrence forest region. This region covers essentially the same geographical limits as the Georgian Bay region of Ontario (Hills 1960 and Burger 1993).

Rowe (1972) notes that the natural forest cover constituting this region consists of a relatively rich mixture of hardwood and conifer tree species, including elements more typical of the boreal forest region to the north. Natural forest stands on well-drained sites are typically dominated by species such as Sugar Maple (*Acer saccharum*), Beech (*Fagus grandifolia*), Basswood (*Tilia americana*), White Birch (*Betula papyrifera*), White Ash (*Fraxinus americana*), Red Oak (*Quercus rubra*), and White Pine (*Pinus strobus*). Species that generally occur on slightly moister, cooler sites, notably in deep river valley systems or wetland margins include Eastern Hemlock (*Tsuga canadensis*), Yellow Birch (*Betula alleghaniensis*), White Spruce (*Picea glauca*), and Balsam Fir (*Abies balsamea*). Black Cherry (*Prunus serotina*) and Hop Hornbeam (*Ostrya virginiana*) also occur frequently on drier upland sites, but are rarely abundant. Plantations are also found throughout the region, and are comprised of various combinations of White Pine, Red Pine (*Pinus resinosa*), Scots Pine (*Pinus sylvestris*), and White Spruce.

Wet areas throughout the region support a variety of tree species such as red maple (*Acer rubrum*), Silver Maple (*Acer saccharinum*), Green Ash (*Fraxinus pennsylvanica*), Black Ash (*Fraxinus nigra*), White Elm (*Ulmus americana*), Eastern White Cedar (*Thuja occidentalis*), and less frequently, Tamarack (*Larix laricina*).

Widespread species that occur in young, successional forests, and commonly at the ecotones between fields and more mature phases of forest growth include Trembling Aspen (*Populus tremuloides*), Large-toothed Aspen (*Populus grandidentata*), and Balsam Poplar (*Populus balsamifera*).

Separate and apart from the forest cover types in this region, are a wide range of minor plant communities, such as shrub thicket swamps, treed swamps, submergent and emergent marshes, and rock barrens. Other plant communities include areas that may have been farmed or affected by Beaver (*Castor canadensis*) activity, which contain secondary successional habitats that are reverting to wet meadow, shrub thicket and old field.

3.2.2 Site Characteristics

The pattern of vegetation communities on the subject property is consistent with the regional characteristics described above. Natural plant communities are primarily associated with slopes and valleylands, and on high, undulating terrain dotted with scattered rock barrens. Relatively moist, flat areas consist primarily of cleared, previously cultivated fields, with edge habitats of early seral stages of secondary succession. Low-lying and poorly drained areas containing mineral or muck/organic soils support various types of wetland habitats, ranging from wet meadow, shrub thicket swamp, to open water and emergent shallow marsh. The majority of these habitats have been affected by historical and on-going beaver activity.

In the original mapping of plant communities for those lands, vegetation communities were grouped into 14 vegetation categories such as deciduous forest, mixed forest, meadow marsh, etc. Those categories were further broken down according to their **Ecosite** landscape unit community type, following the format outlined in Lee *et al.* (1998) **Ecological Land Classification for Southern Ontario - First Approximation and Its Application**. The **Natural Heritage Resources of Ontario: Vegetation Communities of Southern Ontario** by Bakowsky (1997) was also reviewed in classifying the vegetation cover on the subject property. An ecosite, *" is a mappable landscape unit defined by a relatively uniform parent material, soil and hydrology, and consequently supports a consistently recurring formation of plant species which develop over time (vegetation chronosequence)."* Within each ecosite landscape unit, there are a variety of vegetation types. A vegetation type, *"is a part of an ecosite, and represents a specific assemblage of species which generally occur in a site with a more uniform parent material, soils and hydrology, and a more specific stage within a chronosequence."* Although the subject property lies within Site Region 5E, most of the ecosites and vegetation types in Lee et al. (1998) and Bakowsky

(1997) are applicable to the Bracebridge area (Bakowsky 1999). **Figure 3** shows that earlier vegetation mapping.

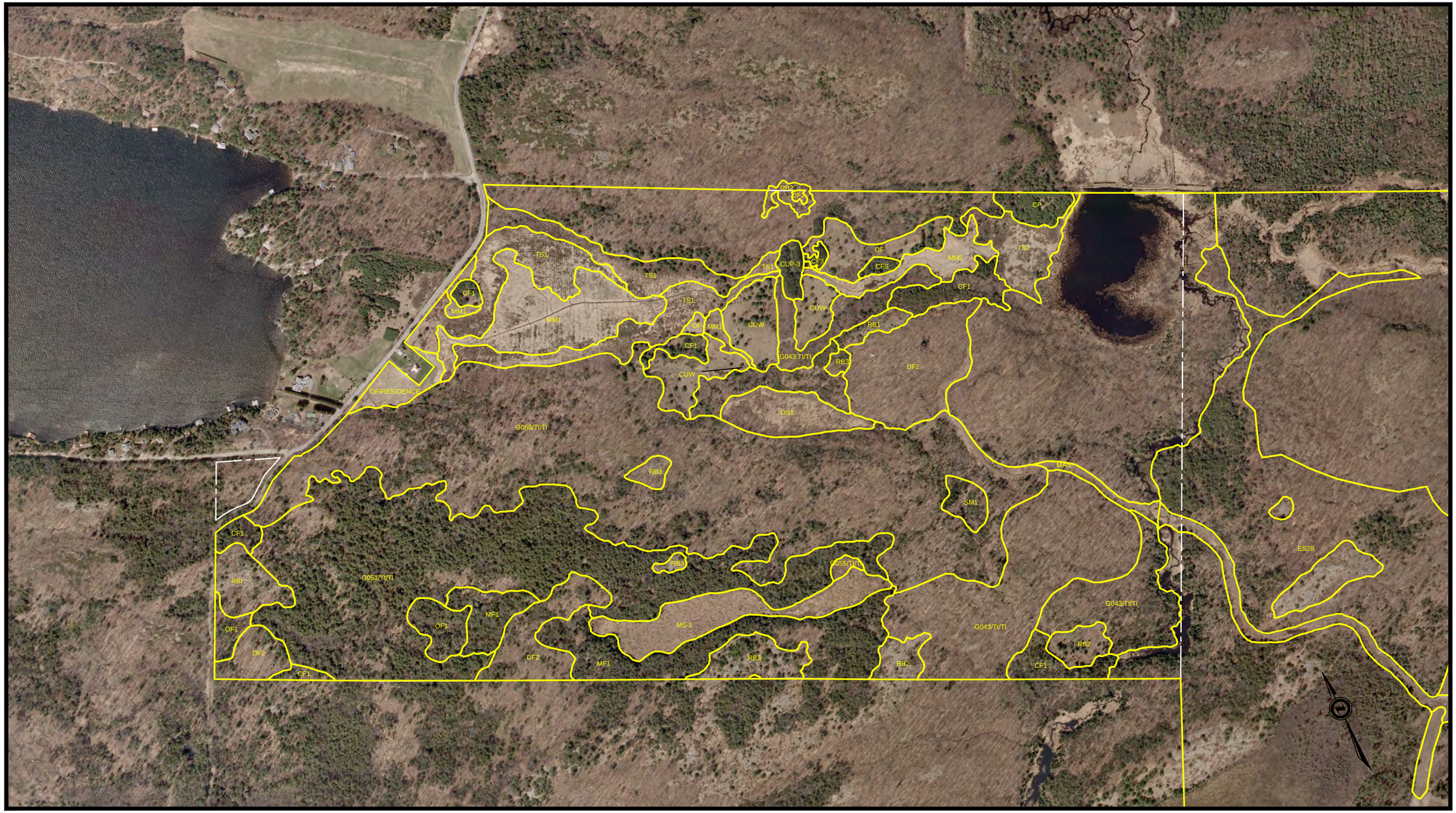
In the current update of this information, the vegetation communities in the proposed development areas were further refined following the *Ecosite of Ontario* (2009) for Great Lakes to St. Lawrence. There were several anthropogenic communities on the property that are more suited to the *Ecological Land Classification for Southern Ontario* (Lee *et al.*, 1998) and this manual was used to define these vegetation communities. These communities are shown on **Figure 4** and described in the paragraphs following. Refer to **Appendix A** for the list of plant species that have been recorded in both previous and more recent surveys of these communities. In the paragraphs which follow, vegetation communities are first more broadly characterized by general community series. Individual communities within areas proposed to be developed are then described in additional detail.

Community Series Descriptions

Coniferous Forest

This ecological unit is more or less restricted to areas along the edges of permanent tributaries, intermittent drainage channels or on sand-plain flats. Ecosites include fresh-moist hemlock coniferous forest (**CF1**), fresh-moist white cedar coniferous forest (**CF2**), and dry-fresh pine coniferous forest (**CF3**). Eastern hemlock, eastern white cedar and white pine are the dominant canopy tree species. Other associated species include balsam fir, red maple, white birch, and yellow birch. Most of the ground flora is sparse and clumped, comprised mainly of ferns and species tolerant of low light conditions. These include:

Epipactis helleborine	helleborine
Drypoteris cristata	crested woodfern
Gymnocarpium dryopteris	oak fern
Carex laxiflora	distant-flowered sedge
Clinopodium vulgare	wild basil
Geranium robertianum	herb-robert
Mitchella repens	partridgeberry
Ranunculus abortivus	kidney-leaved buttercup
Veronica officinalis	common speedwell



Michalski Nielsen ASSOCIATES LIMITED	MUSKOKA ROYALE COLLEGE	PROJECT NO. 3517
		SCALE: 1:7500 / DATE: SEPT 2018
	2018 ELC SURVEY	FIGURE 4

Mixed Forest

This vegetation type covers a large percentage of the subject property, comparable in coverage to that of the deciduous forest type. One ecosite was identified, the fresh-moist hemlock mixed forest. This unit is dominated by eastern hemlock, with lesser percentages of sugar maple, white birch, white ash, beech, red maple, and red oak. Other conifers include eastern white cedar and white spruce. Typical shrub species include those found in the deciduous forest type, as well as American yew (*Taxus canadensis*), fly honeysuckle (*Lonicera canadensis*), and hobblebush (*Viburnum lantanoides*).

The typical species found in the groundcover includes:

Actaea rubra	red baneberry
Caulophyllum thalictroides	blue cohosh
Clintonia borealis	bluebead lily
Dryopteris marginalis	marginal woodfern
Epipactis helleborine	helleborine
Gaultheria procumbens	wintergreen
Maianthemum canadense	wild lily-of-the-valley
Maianthemum racemosum	false Solomon's-seal
Steptopus roseus	rose-twisted stalk
Trientalis borealis	star flower

Deciduous Forest

This vegetation type covers a relatively large percentage of the property. It lies on the flat to steep-sided bedrock hills. Four ecosite landscape units characterizing this feature include, dry-fresh oak-maple-hickory deciduous forest (DF1); dry-fresh sugar maple deciduous forest (DF2); fresh-moist sugar maple deciduous forest (DF3); and dry-fresh poplar-white birch deciduous forest (DF4). Trees noted in the canopy and understorey of these ecological units include:

Acer saccharum	sugar maple
Fagus grandifolia	beech
Quercus rubra	red oak
Quercus alba	white oak
Prunus serotina	black cherry

Ostrya virginiana	ironwood
Tilia americana	basswood
Fraxinus amerciana	white ash
Betula papyrifera	white birch
Populus tremuloides	trembling aspen
Populus grandidentata	large-toothed aspen

The shrub layer stratum is well-defined, and includes:

Prunus virginiana	choke cherry
Corylus cornuta	beaked hazel
Viburnum lentago	nannyberry
Rhus typhina	staghorn sumac
Ribes cynosbati	prickly gooseberry
Rubus strigosus	red raspberry
Sambucus canadensis	common elderberry

The herbaceous stratum consists mainly of species consistent with woodlands, and includes:

Aralia nudicaulis	wild sarsaparilla
Medeola virginiana	Indian cucumber-root
Trillium grandiflorum	white trillium
Uvularia grandiflora	bellwort
Polygonatum pubescens	hairy Solomon's-seal
Allium tricoccum	wild leek
Polystichum acrostichoides	Christmas fern
Dryopteris intermedia	intermediate woodfern
Dryopteris spinulosa	spinulose woodfern
Carex arctata	drooping wood sedge
Carex laxiflora	distant-flowered sedge

Rock Barrens

Scattered throughout the forested highlands (bedrock shield) are numerous rock barrens that are sparsely treed, with little to no groundcover vegetation. Three ecological units of this type were identified on the subject property. They are a basic open rock barren (**RB1**), basic shrub rock barren (**RB2**), and a basic treed rock barren (**RB3**). Trees and shrub species typically consist of white pine, red oak, white oak, white ash, hop hornbeam, honeysuckle, common juniper, pin cherry (*Prunus pennsylvanica*), and staghorn sumac. The ground flora contains species typical of basic to acidic rock habitats, with thin soil layers and include the following:

	spikemoss
	lichens
Corydalis sempevirens	pale corydalis
Geranium bicknellii	Bicknell's cranesbill
Danthonia spicata	poverty grass
Deschampsia flexuosa	crinkled hair grass
Pteridium aquilinum	bracken fern
Elymus hystrix	bottlebrush grass
Polypodium virginianum	common polypody
Rumex acetosella	sheep sorrel
Vaccinium angustifolium	low sweet blueberry

Development Block Vegetation Communities

Coniferous Forest (CF1)- Dry to Fresh, Coarse: Hemlock - Cedar Conifer (G051Tt/TI)

The canopy in this community is dominated by Eastern Hemlock, providing greater than 80% cover at a height of 10 m to 25 m (**Photograph 1**). The subcanopy is composed of scattered Eastern Hemlock, providing 10% cover at a height of 5 m to 10 m. The understorey is composed of Striped Maple (*Acer pensylvanicum*) and Hobblebush (*Viburnum lantanoides*) providing 25% to 60% cover at a height of 1 m to 2 m. The ground layer is dominated by Wild Sarsaparilla (*Aralia nudicaulis*), Intermediate Wood Fern (*Dryopteris intermedia*) and Canada Mayflower (*Maianthemum canadense*), providing 40% to 50% cover at a height of 0.2 m to 0.5 m. The spring ephemerals in this community consist of Yellow Trout Lily (*Erythronium americanum*) and White Trillium (*Trillium grandiflorum*). There were abundant fallen logs in this community and scattered vernal pools.

Photograph 1. **Coniferous Forest (CF1)-Dry to Fresh, Coarse: Hemlock – Cedar conifer (G051Tt/T1).**

Photograph 2. **Mixed Forest (MF1)-Dry to fresh, coarse: Maple Hardwood (G058Tt/T1).**

Mixed Forest (MF1)- Development Precincts A and B- Dry to Fresh, Coarse: Maple Hardwood (G058Tt/TI)

The canopy of this community is dominated by Sugar Maple, Eastern Hemlock and Red Oak, providing 80% cover at a height of 10 m to 25 m (**Photograph 2**). The subcanopy is composed of Sugar Maple, White Ash and Ironwood, providing 25% to 60% cover at a height of 5 m to 10 m. The understorey is composed of Striped Maple, Sugar Maple and White Ash, providing 25% to 60% cover at a height of 1 m to 2 m. The ground layer is dominated by Sugar Maple, Wild Sarsaparilla and Canada Mayflower, providing greater than 60% cover at a height of 0.2 m to 0.5 m. The spring ephemerals in this community consist of Yellow Trout Lily and trillium (*Trillium* sp.).

Mixed Forest (MF1)- Development Precincts C- Dry, Sandy: Mixedwood (G043Tt/TI)

The canopy of this community is dominated in equal proportions by White Birch, Eastern Hemlock and Sugar Maple, providing 80% cover at a height of 10 m to 25 m. The subcanopy is composed of Ironwood and Balsam Fir, providing 25% to 60% cover at a height of 5 m to 10 m. The understorey is composed of Balsam Fir and Ironwood, providing 25% to 60% cover at a height of 2 m to 5 m. The ground layer is composed of scattered American Ash and Sugar Maple, providing 10% cover at a height of 0.2 m to 0.5 m.

Coniferous Plantation (CP1)- Red Pine Coniferous Plantation Type (CUP3-1)

The canopy of this plantation is dominated by Red Pine, providing 90% cover at a height of 10 m to 25 m (**Photograph 3**). The subcanopy is composed of White Ash, Red Maple (*Acer rubrum*) and Red Oak, providing 25% to 60% cover at a height of 4 m to 10 m. The understorey is composed of Ironwood and Green Alder (*Alnus viridis*), providing 25% to 60% cover at a height of 2 m to 10 m. The ground layer is dominated by plantain (*Plantago* sp.) and Trout Lily (*Erythronium americanum*), providing 40% to 50% cover at a height less than 0.2 m.

Open Field (OF)- Cultural Woodland (CUW)

This community was previously described as open field. Since the last classification the community has developed more tree and shrub cover, largely converting to a young woodland. The canopy cover in this community is dominated by scattered Eastern White Pine and Sugar Maple, providing 10% to 30% cover at a height of 10 m to 15 m (**Photograph 4**). The portion of the community east of the deciduous forest

Photograph 3. Coniferous Plantation (CP1) - Red Pine Coniferous Plantation Type (CUP3-1).

Photograph 4. West portion of Cultural woodland (CUW).

in development Precinct C does not contain a subcanopy. The subcanopy in the portion west of the deciduous forest in development Precinct C is composed of Sugar Maple, providing 10% cover at a height of 2 m to 10 m. The understorey is composed of Green Alder and Mountain Honeysuckle (*Lonicera villosa*), providing 20% cover at a height of 1 m to 2 m. The ground layer is composed of goldenrod (*Solidago* sp.), Graceful Sedge (*Carex gracillima*), horsetail (*Equisetum* sp.) and Roadside Agrimony (*Agrimonia striata*), providing 100% cover at a height of 0.2 m to 0.5 m.

Deciduous Forest (DF1 and DF2)- Dry, Sandy: Mixedwood (G043Tt/TI)

The canopy in this community is dominated by Sugar Maple, American Basswood and Red Oak, providing greater than 60% cover at a height of 10 m to 25 m. The subcanopy is composed of American Basswood and American Beech (*Fagus grandifolia*), providing 25% to 60% cover at a height of 2 m to 10 m. The understorey is composed of American Beech and Red Oak, providing 10% cover at a height of 1 m to 2 m. The ground layer is dominated by fescue grass (*Festuca* sp.), American Ash, sedge (*Carex* sp.) and gooseberry (*Ribes* sp.), providing greater than 60% cover at a height of 0.2 m to 0.5 m. The spring ephemerals in this community consist of trillium.

Rock Barren (RB1, RB2 and RB3)- Rock Barren (G164Tt/TI and G164S)

There were some discrepancies with the previously mapped rock barrens on the property. In this regard, several rock barrens are now smaller than originally mapped; the mapping has been updated accordingly. This is the result of more extensive vegetation growth into these areas since the last vegetation classification. The rock barrens on the property are a mix of treed (G164Tt/TI) and shrub rock barrens (G164S) (**Photograph 5**). The treed rock barrens are composed of scattered Red Oak and Eastern White Pine (<10% cover) with mosses, ferns and raspberry species (*Rubus* sp.). The shrub rock barrens are dominated by Common Juniper (*Juniperus communis*).

3.2.3 Flora

Appendix A provides a list of plant species identified from the subject lands during previous and recent surveys. A total of 293 species vascular plants were observed between these surveys. Of those identified to species, 243 (83%) are native to Ontario. At the study area level, a low percentage of non-native species is generally indicative of low levels of disturbance and often a high floristic quality. Non-native species were recorded as scattered occurrences in low densities along the disturbed edges such as the Cultural Woodland (CUW) and edges of the plantation community in the development blocks.

Photograph 5. Rock barren (G164S).

Almost all of the native species have S-Ranks of S5 or S4, indicating they are common and secure, or apparently secure, in the province. Open Woodland Bluegrass (*Poa saltuensis*) is listed as S3 for the province, a designation that, indicates that it is considered vulnerable due to a restricted range, relatively few occurrences, recent decline, threats or other factors.

The botanical survey resulted in the identification of four locally or regionally rare or uncommon species. These species and their associated rarity status and vegetation community locations are provided in **Table 1** below.

Table 1. Locally and Regionally Rare Plants Recorded from Subject Property

Species	Status	Location
Plantained- leaved Sedge (*Carex plantaginea*)	Ecoregion 5E-8 = locally rare	N/A
Wood Nettle (*Laportea canadensis*)	Ecoregion 5E-8 = locally rare	N/A
New England Sedge (*Carex novae-angliae*) (S4)	Ecoregion 5E = regionally rare	N/A
Star Duckweed (*Lemna trisulca*)	Ecoregion 5E = regionally rare	N/A

Note that plaintained-leaved sedge and New England sedge were only identified in a survey completed by King's Forestry Service 20 years ago (1998), and were not identified in detailed vegetation surveys later completed by Michalski Nielsen Associates Limited. None of these species were identified in the most recent surveys of areas proposed to be developed. No other provincially or nationally rare species were recorded. A review of the NHIC database indicated no additional significant records of flora within or directly adjacent to the subject property.

3.3 Wildlife Habitat

3.3.1 General Overview of Wildlife Habitat

Fauna recorded for the subject property during the field investigations completed in 1999 are listed in **Appendix B**. The species composition is reflective of the diversity of forested and non-forested habitat types.

The upland and lowland forests provide habitat for bird species such as Downy Woodpecker (*Picoides pubescens*), Hairy Woodpecker (*Picoides villosus*), Blue Jay (*Cyanocitta cristata*), Black And White Warbler (Mniotilta varia), Red-eyed Vireo (*Dendroica petechia*), Broad-winged Hawk (*Buteo platypterus*), Ruffed Grouse (*Bonasa umbellus*), Eastern Wood-pewee (*Contopus virens*), and Wood Thrush (*Hylocichla mustelina*). Mammal species include Red Squirrel (*Tamiasciurus hudsonicus*), American Porcupine (*Erethizon dorsatum*), Eastern Chipmunk (*Tamias striatus*), White-tailed Deer (*Odocoileus virginianus*), Black Bear (*Ursus americanus*) and Moose (*Alces alces*).

The meadow marsh, shallow marsh, thicket swamps, and treed swamp ecosites provide cover for bird species such as Mallard (*Anas platyrhynchos*), Wood Duck (*Aix sponsa*), Canada Goose (*Branta canadensis*), Great Blue Heron (*Ardea herodias*), Common Grackle (*Quiscalus quiscula*), Red-winged Blackbird (*Agelaius phoeniceus*), Swamp Sparrow (*Melospiza georgiana*), and Northern Flicker (*Colaptes auratus*). Mammals and herpetofauna include River Otter (*Lontra canadensis*), Beaver (*Castor canadensis*), Muskrat (*Ondatra zibethicus*), Raccoon (*Procyon lotor*), Painted Turtle (*Chrysemys picta*), Snapping Turtle (*Chelydra serpetina*), Northern Leopard Frog (*Rana pipiens*), and Green Frog (*Rana clamitans*).

Typical wildlife observed in the grassed field habitats, hedgerows and rock barrens included Black-capped Chickadee (Parus atricapillus), Brown-headed Cowbird (Molothrus ater), Song Sparrow (*Melospiza melodia*), American Goldfinch (*Carduelis tristis*), Red-tailed Hawk (*Buteo jamaicensis*), Garter Snake (*Thamnophis sirtalis*), Coyote (*Canis latrans*), and Woodchuck (*Marmota monax*).

The hedgerows and the previous access road into the property provide cover for American Goldfinch, Black-capped Chickadee (*Parus atricapillus*), American Crow (*Corvus brachyrhynchos*), Gray Catbird (*Dumetella carolinensis*), and Eastern Cottontail (*Sylvilagus floridanus*).

3.3.2 Breeding Birds

Breeding bird data for the two surveys completed in 2018 are provided in **Appendix C**. A total of 30 bird species were documented on the property during these most recent surveys, including two SAR. Eastern Wood-pewee (*Contopus virens*) were heard singing in the wooded upland area of the property on both site visits. This indicates that these birds were on established territories and probably breeding on the site. The species is listed as Special Concern provincially. One Wood Thrush (*Hylocichla mustelina*) was heard singing in the wooded upland area of the property on both site visits. This indicates that this bird

was on established territories and probably breeding on the site. The species is also listed as Special Concern provincially. Both of these species were also recorded on the site in previous surveys.

Most of the birds recorded on the property are considered common. The most frequently observed species found on the property included birds characteristic of woodland areas, such as Red-eyed Vireo (*Vireo olivaceus*) and Ovenbird (*Seiurus aurocapillus*).

Area-sensitive species require large areas of continuous habitat for breeding and foraging. The specific habitat requirements vary by species. Ten area-sensitive species were found on the property. These were Veery (*Catharus fuscescens*), Red-breasted Nuthatch (*Sitta canadensis*), White-breasted Nuthatch (*Sitta carolinensis*), Brown Creeper (*Certhia americana*), Black-and-white Warbler (*Mniotilta varia*), Black-throated Green Warbler (*Dendroica virens*), American Redstart (*Setophaga ruticilla*), Ovenbird, Pine Warbler (*Setophaga pinus*) and Scarlet Tanager (*Piranga olivacea*). Brown Creeper and Black-throated Green Warbler are reported to require at least 30 ha of forest. American Redstart and Black-and-white Warblers requires >100 ha of forest habitat. Ovenbird requires >70 ha of continuous forest. Scarlet Tanager requires at least 20 ha of forest. Veery, Red and White-breasted Nuthatches requiring at least 10 ha of forest.

Broad-winged Hawk and Barred Owl are two additional species which have been identified on the subject lands on other occasions, with locations where Barred Owl were observed shown on **Figure 2**.

The Ontario Breeding Bird Atlas recorded 119 bird species in the 10 km^2 square 17PK30 that includes the Muskoka Royale property. These species include one additional Species at Risk that the property has suitable habitat for, Canada Warbler (*Wilsonia canadensis*), which requires at least 30 ha of continuous forest. This species was not observed recorded during the field surveys.

No Whip-poor-wills were heard during the targeted field surveys for this species.

3.3.3 Amphibians

Amphibians are common and widespread across Muskoka. Several species were recorded on the subject property during the evening auditory surveys and other daytime surveys. Amphibians will congregate to breed in woodland pools and wetlands with standing water that persists into early summer or long enough for tadpoles to emerge.

Breeding amphibian surveys were conducted targeting potentially suitable locations in the study area. A total of 10 locations, which focused on the proposed development areas, vernal pools and meadow marsh areas in the southwestern portions of these lands, were selected for investigation. These are identified as Breeding Amphibian (BA) survey sites as shown on **Figure 2**. Three species of amphibians were

recorded during the May 29, 2018 survey, namely Northern Spring Peeper (*Pseudacris crucifer*), Gray Tree Frog (*Hyla versicolor*) and Green Frog (*Rana clamitans*). It is likely that other species such as Wood Frog (*Lithobates sylvaticus*) and American Toad (*Bufo americanus*) can be found breeding in the area. A summary of the survey data is provided in **Table 2** below.

Table 2. Breeding Amphibians Recorded from the Study Area (2018)

Breeding Amphibian (BA) Monitoring Station	May 29, 2018
BA-1	No calls
BA-2	No calls
BA-3	No calls
BA-4	No calls
BA-5	No calls
BA-6	No calls
BA-7	Gray Tree Frog: code 3 Green Frog: code 2-5
BA-8	Gray Tree Frog: code 3 Spring Peeper: code 3 Green Frog: code 2-8
BA-9	Gray Tree Frog: code 3 Green Frog: code 3
BA-10	Gray Tree Frog: code 3 Spring Peeper: code 3 Green Frog: code 2-8

***Note:** Weather conditions: 11°C, 20% cloud cover, calm, no rain.
The calling codes are designated according to the Amphibian Road Call Counts (Gartshore *et al.* 2004). They are as follows:

1 - Individuals of one species can be counted, calls are not overlapping; second number denotes number of individuals.
2 - Calls of one species are overlapping; second number denotes estimated number of individuals.
3 - Full chorus of one species, calls continuous and overlapping, individuals not distinguishable.

Due to the undulating bedrock controlled topography, particularly in development Precinct A, there are several vernal pools that were observed to support water to varying degrees through the field season. Many were seen to be dry during the June survey but then held some water again following heavy rains in late July. Many of the vernal pools and small wetland inclusion areas in development Precinct A were surveyed and no calling amphibians were recorded.

The most productive breeding amphibian locations were BA-7, BA-8, BA-9 and BA-10, which supported large numbers of Gray Tree Frogs, Spring Peepers and many Green Frogs. These locations are associated

with areas of prolonged or persistent standing water within the low-lying wetlands in the west part of the property, generally east of Stephens Bay Road and west of development Precinct C. All species of amphibians recorded from the property are considered common in Muskoka and have no provincial rarity status.

3.3.4 Species At Risk

The targeted surveys for SAR completed for the subject property included early morning breeding bird surveys for song birds, nocturnal surveys for screening for Whip-poor-will, and snag tree surveys for bats. **Table 3** provides a review and screening of potential habitat opportunities for 14 species that have been identified by the MNRF as occurring in the general area. A habitat screening and assessment was completed for each of those 14 species, including through vegetation community classification and field investigations for micro-habitat and related features. This included a review of the habitat requirements and current status of each species and whether general habitat or regulated habitat protection applies under Section 10 of the provincial ESA. NHIC records indicate Snapping Turtle and a restricted species have been recorded in the vicinity of the site; although MNRF has not provided any specific information on that restricted record, they have provided information on species known to this locale, as further described in **Table 3**.

Species which are known to occur in the general area include:

Birds

- Barn Swallow (*Hirundo rustica*) – Threatened
- Bank Swallow (*Riparia riparia*) – Threatened
- Eastern Wood Pewee (*Contopus virens*) – Special Concern
- Wood Thrush (*Hylocichla mustelina*) – Special Concern
- Horned Grebe (*Podiceps auritus*) – Special Concern
- Least Bittern (*Ixobrychus exilis*) – Threatened

Reptiles

- Blanding's Turtle (*Emydoidea blandingii*) – Threatened
- Snapping Turtle (*Chelydra serpentina*) – Special Concern
- Massasauga Rattlesnake (*Sistrurus catenatus*) – Threatened

Table 3. Species at Risk Habitat Asse					
Common and Scientific Name	**MNRF Ontario Status (COSSARO)**	**National (COSEWIC) status**	**Provincial ESA General or Regulated Habitat**	**Habitat requirements/description**	**Habitat Assessment for Subject Property and Mitigation Recommendations**
Barn Swallow (*Hirundo rustica*)	Threatened	Threatened	General habitat protection applies.	Before European colonization, Barn Swallows nested mostly in holes, crevices, caves and ledges in cliff faces. Following European settlement, they shifted to nesting on and in artificial structures, including houses, barns and other outbuildings, garages, road culverts and bridges. Barn Swallows favour various types of open habitats for foraging, including agricultural crops, grassy fields, pastures, cottage areas, lake and river shorelines, cleared rights-of-way, wetlands, farmyards and subarctic tundra (COSEWIC, 2011).	MNRF has identified observations of this species in the vicinity of the property. This property lacks artificial structure such as houses, barns ad other outbuidlings for nesting. There is potential open habitat for foraging at the Open Field (OF) and Meadow Marsh (MM). No Barn Swallows were recorded during the breeding bird surveys. ***Mitigation:*** *None required.*
Bank Swallow (*Riparia riparia*)	Threatened	Threatened	General habitat protection applies.	The bank swallow breeds in a wide diversity of artificial and natural sites with vertical banks, including lake and ocean bluffs, riverbanks, road cuts, aggregate pits, and stock piles of soil. Bank Swallow prefer sand-silt substrates for excavating nest burrows. Due to the dynamic nature of bank erosion, breeding sites tend to be somewhat ephemeral. Breeding sites are located near open terrestrial habitat for foraging such as meadows, agricultural cropland, grasslands and pastures. Bank Swallow uses large wetlands as communal nocturnal roost sites during migration, post-breedings and wintering periods (COSEWIC, 2013).	MNRF has identified observations of this species in the vicinity of the property. The only potential habitat for this species is the stream on the property. This stream is small with low flow. There were no oberved riparian banks or suitable habitat for Bank Swallow such as the banks with the appropriate soils subtrate and vertical height. This property lacks agricultural cropland and grasslands for foraging. No Bank Swallows were recorded during the breeding bird surveys. ***Mitigation:*** *None required.*
Eastern Wood-Pewee (*Contopus virens*)	Special Concern	Special Concern	Habitat protection does not apply to Special Concern Species.	In Canada, the Eastern Wood-pewee is mostly associated with the mid-canopy layer of forest clearings and edges of deciduous and mixed forests. It is most abundant in forest stands of intermediate age and in mature stands with little understory vegetation. During migration, a variety of habitats are used, including forest edges, and early successional clearings. (http://www.registrelep-sararegistry.gc.ca/virtual_sara/files/cosewic/sr_Eastern%20Wood-pewee_2013_e.pdf)	MNRF has records in the vicinity of the study area. Eastern Wood-Pewees were heard singing in the wooded upland area of the property on both site visits. This indicates that these birds were on established territories and probably breeding on the site. There is suitable habitat throughout due to the extensive forest. ***Mitigation*** *: Habitat for this species is well represented locally and in the surrounding area and therefore the primary mitigation is for the protection of nesting birds. Vegetation clearing in suitable habitat areas of the development (ELC communities – MF1, DF1 and DF2; G058Tt/Tl, G043Tt/Tl) shall occur between late August and late April, which is outside of the breeding and nesting season (note: restrictive windows for other species apply, e.g., SAR bats).*
Wood Thrush (*Hylocichla mustelina*)	Special Concern	Threatened	Habitat protection does not apply to Special Concern Species.	During the breeding season, the Wood Thrush is found in moist, deciduous hardwood or mixed stands, often previously disturbed (e.g., small-scale logging and ice storm damage), with a dense deciduous undergrowth and with tall trees for singing perches (Gauthier and Aubry 1995; Friesen et al. 1999; Holmes and Sherry 2001; Friesen 2007; Evans et al. 2011; Suarez-Rubio et al. 2011). Peck and James (1987) found that in Ontario, the Wood Thrush prefers second-growth over mature forests. (http://www.registrelep-sararegistry.gc.ca/default.asp?lang=En&n=D62E83CD-1#_Toc350244571)	MNRF has records in the vicinity of the study area. Wood Thrush was recorded during the most recent field work. One Wood Thrush was heard singing in the wooded upland area of the property on both site visits. This indicates that this bird was on established territories and probably breeding on the site. ***Mitigation*** *: Habitat for this species is well represented locally and in the surrounding area and therefore the primary mitigation is for the protection of nesting birds. Vegetation clearing in suitable habitat areas of the development (ELC communities – MF1, DF1 and DF2; G058Tt/Tl, G043Tt/Tl) shall occur between late August and late April, which is outside of the breeding and nesting season (note: restrictive windows for other species apply, e.g., SAR bats).*

Horned Grebe (*Podiceps auritus*)	Special Concern	Special Concern	Habitat protection does not apply to Special Concern Species.	The Horned Grebe breeds predominately in temperate zones such as Parkland Canada and Prairies, but can be found in more subarctic and boreal zones. This bird breeds in freshwater and sometimes in brackish water on permanent or semi-permanent ponds, but also uses shallow bays and marshes on lake borders. Open water rich in emerging vegetation is required for breeding areas, which provides concealment and anchorage, nest materials, and protection for the young (COSEWIC, 2009).	MNRF has identified observations of this species in the vicinity of the property. Given that the summer habitat for this species in Northwestern Ontario and praire provinces and that the winter habitat is in the southern US, this record is likely during migration. The Shallow Marsh (MS) and Meadow Marsh (MM) on the property may provide migration habitat opportunities. There is no development proposed in areas of meadow marsh or shallow marsh, and all such communities are to be buffered. ***Mitigation:*** *None required.*
Least Bittern (*Ixobrychus exilis*)	Threatened	Threatened	General habitat protection applies.	In Ontario, the Least Bittern is found in a diversity of wetland habitats, but highly favours cattail marshes with a mix of channels and open pools. The bird builds its nest in dense stands of vegetation above the marsh water, hidden among the cattails. Least Bittern builds nest near open water for easy access to foraging on small fish, aquatic insects and frogs (MNRF, 2018).	MNRF has identified observations of this species in the vicinity of the property. The Shallow Marsh (MS) on the property provides potential nesting habitat on the property although the form and function of the shallow marsh is not ideally suited to the typical habitat requirement of this species. This species was not recorded during the breeding bird surveys and there is no development proposed within the shallow marsh. A substantial buffer will be maintained around the marsh. ***Mitigation:*** *None Required.*
Blanding's Turtle (*Emydoidea blandingii*)	Threatened	Endangered	General Habitat protection applies. General habitat description on MNR website.	This medium sized turtle inhabits a network of lakes, streams and wetlands, preferring shallow wetland areas with abundant vegetation. It can also spend significant portions of time in upland areas moving between wetlands, In a single season this highly mobile turtle has been known to travel up to seven km in search of food or a mates.	MNRF has indicated that Blanding's Turtle have been identified in some vicinity of the property. A request for the habitat mapping has been made. There have been no observations of this species on site during work completed in 2018, or in previous site investigations dating back to 1999. however detailed, targeted surveys have not been conducted. There are some aquatic environments on the property that may provide habitat opportunities. This includes the large area of shallow marsh, eadow marsh and adjacent thicket swamp to the east of development area C (Henry Marsh). The watercourse feature draining into Henry Marsh could be used as a movement corridor. There were no open, sandy areas or gravelly rock crevices with good thermal exposure that would provide nesting habitat opportunities. ***Mitigation:*** *Areas of wetlands with potential habitat opportunities will be protected and are removed from proposed development. Any work in proximity to wetlands or crossings of watercourses must include mitigation measures such as barrier fencing to prevent inadvertent encroachment and turtles from accessing the work areas. Information pertaining to Species at Risk that may be encountered will be provided to contractors to provide direction on the appropriate responses if such species are encountered.*

Snapping Turtle (*Chelydra serpentina*)	Special Concern	Special Concern	Habitat protection does not apply to Special Concern Species.	Snapping turtles spend most of their lives in water. They prefer shallow waters so they can hide under the soft mud and leaf litter, with only their noses exposed to the surface to breathe. During the nesting season, from early to mid summer, females travel overland in search of a suitable nesting site, usually gravelly or sandy areas along streams. Snapping turtles often take advantage of man-made structures for nest sites, including roads (especially gravel shoulders), dams and aggregate pits. (https://www.ontario.ca/page/snapping-turtle)	MNRF have identified records in the vicinity of the study area. There are some aquatic environments on the property that may provide habitat opportunities. This includes a large area of the meadow marsh and adjacent thicket swamp to the east of Development Area C. The watercourse through the study area could be used as a movement corridor. There were no open, sandy areas or gravelly rock crevices with good thermal exposure that would provide nesting habitat opportunities. ***Mitigation*** *: Areas of wetlands with potential habitat opportunities will be protected and are removed from proposed development. Any work in proximity to wetlands or crossings of watercourses must include mitigation measures such as barrier fencing to prevent inadvertent encroachment and turtles from accessing the work areas. Information pertaining to Species at Risk that may be encountered will be provided to contractors to provide direction on the appropriate responses if such species are encountered.*
Massasauga (Great Lakes- St. Lawrence population) (*Sistrurus catenatus*)	Threatened	Threatened	General habitat protection as ofJune 30, 2013.	Massasaugas live in different types of habitats throughout Ontario, including tall grass prairie, bogs, marshes, shorelines, forests and alvars. Within all of these habitats, Massasaugas require open areas to warm themselves in the sun. Pregnant females are most often found in open, dry habitats such as rock barrens or forest clearings where they can more easily maintain the body temperature required for the development of their offspring. Non-pregnant females and males forage and mate in lowland habitats such as grasslands, wetlands, bogs and the shorelines of lakes and rivers. Massasaugas hibernate underground in crevices in bedrock, sphagnum swamps, tree root cavities and animal burrows where they can get below the frost line but stay above the water table. (https://www.ontario.ca/page/massasauga-rattlesnake)	MNRF have identified historical records adjacent to the property. There are rock barrens scattered across the property, they are dominantly treed or shrub covered with some areas supporting dense Common Juniper (RB1-3 communities). Representation of table rocks, crevices and suitable micro habitat features including thermoregulation areas was limited and these areas generally have high shade cover minimizing thermoregulation opportunities. ***Mitigation:*** *Although unlikely to be present, information pertaining to Species at Risk that may be encountered will be provided to contractors to provide direction on the appropriate responses if such species are encountered.*
Eastern Hog-nosed Snake (*Heterodon platirhinos*)	Threatened	Threatened	General habitat protection as of June 30, 2013.	The Ontario Herpetofaunal Atlas (2006) records for the Eastern Hog-nosed Snake are widespread in Muskoka and Parry Sound Districts, however, they typically occur in low densities. This species is not habitat specific and can be found in dry sandy areas, dry woods, edges of wetlands and fields, wherever it's favourite food (toads) can be found. This species is know to move long distances without showing strong habitat affinity. Snakes have been found to hibernate in a variety of sites including treed slopes in upland-wetland transition areas.	MNRF have identified records in the vicinity of the study area and there are a range of habitat opportunities within the property including forested slopes, rock barrens and wetland edges. The lack of habitat specificity of this species makes it difficult to determine the exact habitat requirements. No specific area on the subject property could conclusive be confirmed as habitat for this species and Hog-nosed Snake was not observed from the property. ***Mitigation*** *: Species is active from May to October, hibernating from October to April, mating in August and early September and nesting in late June to mid-July. The initial stages of site preparation consisting of tree removal, grubbing and rough grading for roadways and building envelopes should generally be completed between October and April to avoid this species.*

Little Brown Myotis (*Myotis lucifugus*)	Endangered	Endangered	General Habitat Protection as of January 24, 2013.	Bats are nocturnal. During the day they roost in trees and buildings. They often select attics, abandoned buildings and barns for summer colonies where they can raise their young. Little brown bats hibernate from October or November to March or April, most often in caves or abandoned mines that are humid and remain above freezing. (https://www.ontario.ca/page/little-brown-myotis)	MNRF stated there is a high probability for this species on the property. Given the high forest cover of the subject property and representation of cavity trees, it can be assumed that there are habitat opportunities for this species within the subject property. Proximity to wetlands would provide productive insect feeding areas. While these habitats are present, they are very well represented locally and in the surrounding area and therefore the habitat is not limiting to the successful use of the area. ***Mitigation*** *: As SAR bats hibernate in caves, generally from October to early April, tree removal must occur within this period to avoid harm or impacts to individuals. Specialized bat roosting boxes will be installed to offset localized removal of trees. The methods and approach for bat box installation will be completed in consulation with MNRF.*
Northern Myotis (*Myotis septentrionalis*)	Endangered	Endangered	General Habitat Protection as of January 24, 2013.	Northern long-eared bats are associated with boreal forests, choosing to roost under loose bark and in the cavities of trees. These bats hibernate from October or November to March or April, most often in caves or abandoned mines. (https://www.ontario.ca/page/northern-myotis)	MNRF stated there is a high probability for this species on the property. Given the high forest cover of the subject property and representation of cavity trees, it can be assumed that there are habitat opportunities for this species within the subject property. Proximity to wetlands would provide productive insect feeding areas. While these habitats are present, they are very well represented locally and in the surrounding area and therefore the habitat is not limiting to the successful use of the area. ***Mitigation*** *: As SAR bats hibernate in caves, generally from October to early April, tree removal must occur within this period to avoid harm or impacts to individuals. Specialized bat roosting boxes will be installed to offset localized removal of trees. The methods and approach for bat box installation will be completed in consulation with MNRF.*
Eastern Small-footed Myotis (*Myotis leibii)*	Endangered	Not listed on COSEWIC website.	General Habitat protection applies. General habitat description on MNR website.	In the spring and summer, eastern small-footed bats will roost in a variety of habitats, including in or under rocks, in rock outcrops, in buildings, under bridges, or in caves, mines, or hollow trees. These bats often change their roosting locations every day. At night, they hunt for insects to eat, including beetles, mosquitos, moths, and flies. In the winter, these bats hibernate, most often in caves and abandoned mines. They seem to choose colder and drier sites than similar bats and will return to the same spot each year. (https://www.ontario.ca/page/eastern-small-footed-myotis)	MNRF stated there is a high probability for this species on the property. Given the high forest cover of the subject property and representation of cavity trees, it can be assumed that there are habitat opportunities for this species within the subject property. Proximity to wetlands would provide productive insect feeding areas. While these habitats are present, they are very well represented locally and in the surrounding area and therefore the habitat is not limiting to the successful use of the area. ***Mitigation*** *: As SAR bats hibernate in caves, generally from October to early April, tree removal must occur within this period to avoid harm or impacts to individuals. Specialized bat roosting boxes will be installed to offset localized removal of trees. The methods and approach for bat box installation will be completed in consulation with MNRF.*

Tri-coloured bat (*Perimyotis subflavus*)	Endangered	Not listed on COSEWIC website.	General Habitat protection applies. General habitat description on MNR website.	Tri-colored Bat is found in a variety of forested habitats during the summer. It forms day roosts and maternity colonies in older forest and occasionally in barns or other structures. It forages over water and along streams in the forest (SARO website).	MNRF stated there is a high probability for this species on the property. Given the high forest cover of the subject property and representation of cavity trees, it can be assumed that there are habitat opportunities for this species within the subject property. Proximity to wetlands would provide productive insect feeding areas. While these habitats are present, they are very well represented locally and in the surrounding area and therefore the habitat is not limiting to the successful use of the area. ***Mitigation*** *: As SAR bats hibernate in caves, generally from October to early April, tree removal must occur within this period to avoid harm or impacts to individuals. Specialized bat roosting boxes will be installed to offset localized removal of trees. The methods and approach for bat box installation will be completed in consulation with MNRF.*

- Hog-nosed Snake (*Heterodon platirhinos*) – Threatened

Mammals

- Little Brown Myotis (*Myotis lucifugus*) – Endangered
- Northern Myotis (*Myotis septentrionalis*) – Endangered
- Eastern Small-footed Myotis (*Myotis leibii*) – Endangered

In accordance with the site-specific review that has been completed, those species receiving protection under the *Endangered Species Act* that could be encountered within portions of this property are Least Bittern, Blanding's Turtle, Eastern Hog-nosed Snake, and various protected bat species. The protection of all of these species can be appropriately addressed through:

- protection of wetland habitats and adjacent areas of natural buffer;
- protection of watercourses and adjacent areas of natural buffer;
- the maintenance of large portions of other representative habitat, for example woodlands;
- site-specific construction mitigation measures such as barrier fencing in vicinity of both wetlands and watercourses;
- timing of certain aspects of construction;
- the provision of SAR training to construction personnel; and
- the installation of bat boxes as an offsetting habitat measure for bats.

Please note that as a parallel process to this Environmental Impact Study, our Species at Risk work is being submitted to MNRF for review and comment; MNRF comments on the adequacy of our Species at Risk review, and on the appropriateness of our intended protection measures, will be forwarded to the municipality upon receipt.

3.3.5 Treed Habitat Surveys for Bat Maternity Roosts

Based on the MNRF habitat suitability assessment protocol, maternity roosts in treed areas include deciduous, coniferous and mixed forest communities. The ELC vegetation communities identified for the subject property include deciduous forest (DF1 and DF2), mixed forest (MF1) and coniferous forest (CF1), with the presence of larger trees at least 10 cm dbh. Therefore, the great majority of the study area provides potential habitat opportunities for bat maternity roosts.

The property was surveyed for suitable trees for bat maternity roosts based on 31 randomly place circular plots with a 12.6 m radius. The location of the 31 monitoring plots is shown on **Figure 2**. In addition to determining the tree snag density (discussed below), plot areas of low to high suitability for tree roosting habitat have been identified as a site-specific measure of the quality of potential roost trees for each plot (see **Tables 4** to **7**). This was based on a relative comparison of the recorded number of high quality trees in each plot using the following MNRF parameters provided in **Table 8**.

Table 4. Bat Maternity Roost Habitat Ranking Development Precinct A

Plot Number	Suitable Maternity Roost Relative Quality[1]	Number of Snag Trees Recorded
1	High	1
2	N/A	0
3	Medium	2
4	Low	1
5	N/A	0
6	Low	1
7	N/A	0
8	High	2
9	N/A	0
10	Low	1
11	N/A	0

Table 5. Bat Maternity Roost Habitat Ranking Development Precinct B

Plot Number	Suitable Maternity Roost Relative Quality[1]	Number of Snag Trees Recorded
12	High	1
13	N/A	0
14	N/A	0
15	High	1
16	Low	1
Plot Number	**Suitable Maternity Roost Relative Quality[1]**	**Number of Snag Trees Recorded**
17	High	3
18	N/A	0
19	N/A	0
20	N/A	0

Table 6. Bat Maternity Roost Habitat Ranking Development Precinct C

Plot Number	Suitable Maternity Roost Relative Quality[1]	Number of Snag Trees Recorded
21	Medium	2
22	Low	1
23	N/A	0
24	N/A	0

Table 7. Bat Maternity Roost Habitat Ranking Development Precinct D

Plot Number	Suitable Maternity Roost Relative Quality[1]	Number of Snag Trees Recorded
25	High	1
26	High	2
27	High	2
28	High	2
29	N/A	0
30	N/A	0
31	Medium	2

Note[1]: Relative quality based on Table 3 criteria.

Table 8. Criteria for Determining Best Suitable Maternity Roost Trees

- Tallest snag
- Snag exhibits cavities/crevices often originating as cracks, scars, knot holes or woodpecker cavities
- Snag has the largest dbh (>25 cm)
- Snag is within the highest density of snags (e.g., cluster of snags)
- Snag has a large amount of loose, peeling bark (naturally occurring or due to decay)
- Cavity or crevice is high on the tree (>10 m) or is "chimney like" with a low entrance
- Tree is a species known to be rot resistant (e.g., black cherry, black locust)
- Tree species provides good cavity habitat (e.g., white pine, maple, aspen, ash, oak)
- Snag is located within an area where the canopy is more open
- Snag exhibits early stages of decay (Decay Class 1-3)

The plots were ranked as low, medium, and high quality habitat. The plots considered high quality, potential maternity roost sites include Plot 1, 8, 12, 15, 17, 25, 26, 27 and 28. The habitat quality for potential maternity roost sites ranked as medium include Plot 3, 21 and 31. The habitat quality for potential maternity roost sites ranked as low include Plot 4, 6, 10, 16 and 22.

The number of trees recorded at each plot ranged from 1 to 3. Oak trees (*Quercus* sp.) are preferred trees for Tri-colored Bats for roosting. There were no dead leaf clusters observed in the Oak trees within the plots, so Oak trees with >25 cm dbh were recorded as prime habitat for Tri-colored Bat. Little Brown Myotis and Northern Myotis prefer loose, peeling bark and cavities to roost. These requirements were considered when selecting the habitat quality ranking for these species described in **Table 8**. This site had abundant trees with peeling bark and a moderate number of cavities observed. Trees with cavities were ranked higher than the peeling bark for roosting habitat according to the MNRF protocol.

The results generally indicate that the medium to higher quality plots were found in deciduous (DF1), mixed forest (MF1) and coniferous forest (CF1), while the lower quality plots were evenly distributed in the forest communities. Development Precinct D has the most abundant snags due to the abundant Sugar Maple and Red Oak trees which often exhibit knot holes and snags. Development Precinct A also exhibited abundant snags due to the old age of the Eastern Hemlock and American Beech trees. Older trees most often have large diameters, and as they age produce cavities for roosting habitat.

Snag Density

The density of trees with snags based on the MNRF protocol is considered a qualitative assessment for identifying potential impacts from proposed activities to SAR bats. Surveys were completed during leaf off conditions, allowing for the best opportunities to observe cavities, cracks and loose bark. Based on the recommended calculation using πr^2 with r = 12.6 m, the snag density was determined the number of plots in each development Precincts A to D, as shown in **Table 9**. The results are provided below with 1.3 snags/ha in Area A, 1.5 snags/ha in Area B, 3.8 snags/ha in Area C, and 3.7 snags/ha in Area D. The MNRF considers 10.0 snags per hectare high quality potential maternity roosting habitat.

Table 9. Snag Tree Densities for each Development Precinct

Development Precinct A								
Assessment Area (ha)	**# of plots**	**# of snags**	**Average # of snags/plot**	**Average radius (m)**	**Each plot area (m^2)**	**Total plot area (m^2)**	**Total plot area (ha)**	**Snag density (snag/ha)**
Approximate Area (7.57 ha)	11.0	8.0	0.7	12.6	498.8	5,486.3	0.5	1.3
Development Precinct B								
Assessment Area (ha)	**# of plots**	**# of snags**	**Average # of snags/plot**	**Average radius (m)**	**Each plot area (m^2)**	**Total plot area (m^2)**	**Total plot area (ha)**	**Snag density (snag/ha)**
Approximate Area (5.56 ha)	9.0	6.0	0.7	12.6	498.8	4,488.8	0.4	1.5
Development Precinct C								
Assessment Area (ha)	**# of plots**	**# of snags**	**Average # of snags/plot**	**Average radius (m)**	**Each plot area (m^2)**	**Total plot area (m^2)**	**Total plot area (ha)**	**Snag density (snag/ha)**
Approximate Area (2.4 ha)	4.0	3.0	0.8	12.6	498.8	1,995.0	0.2	3.8
Development Precinct D								
Assessment Area (ha)	**# of plots**	**# of snags**	**Average # of snags/plot**	**Average radius (m)**	**Each plot area (m^2)**	**Total plot area (m^2)**	**Total plot area (ha)**	**Snag density (snag/ha)**
Approximate Area (4.22 ha)	7.0	9.0	1.3	12.6	498.8	3,491.3	0.3	3.7

It is noted that snag density surveys were not undertaken within development Precinct E, which was only identified as a development precinct following that initial work. The tree composition in this area is very similar to that within development Precinct C, and a snag density of 3.8 snag/ha is reasonably assumed.

Although the density of snags in the areas to be developed is quite low, the total acreage of required clearing will still result in the loss of opportunities for bat roosting. While surrounding areas of forest will continue to provide such habitat opportunities, it remains prudent to offset these losses with the installation of bat boxes. Timing of tree removals outside of the period of bat use is also critical. Specific prescriptions for both bat box installation and the timing of tree removals are recommended in this report, and will be finalized on the basis of the parallel consultation process with MNRF.

3.3.6 Significant Wildlife Habitat

Significant Wildlife Habitat (SWH) can be difficult to appropriately determine at the site-specific level, as the assessment must incorporate information from a wide geographic area and consider other factors such as regional resource patterns and landscape effects. To help in more site level assessments, the MNRF

has developed the *Significant Wildlife Habitat Criteria Schedules For Ecoregion 5E* (MNRF 2015). The planning authorities have the responsibility to identify SWH; through an EIS, we can only identify candidate SWH, and provide context on its local abundance, the scale of loss that will occur as a consequence of development, and opportunities to mitigate and, in some cases, offset that loss. With the exception of wintering deer yards, which could be, and often are, considered SWH, the detailed identification and designation of SWH has not been completed in the District Municipality of Muskoka or the Town of Bracebridge. The District has recently released mapping information under the draft Official Plan, which is provided on Schedule C2 - *Natural Heritage Features and Areas, Significant Wildlife and Regulated Habitats.* The following SWH features are provided on Schedule C2: Deer Yard (Stratum 1), Deer Wintering Areas (Stratum 2) and Moose Aquatic Feeding Areas. A deer wintering area (Stratum 2) is identified as being partially located in the southwest corner of the subject property (see **Map A**).

The Natural Heritage Policies of the Provincial Policy Statement [Subsection 2.1.4 d)] identify four principal components of SWH as described in the *Significant Wildlife Habitat Technical Guide* (MNRF 2000). These are:

a) Seasonal Concentration Areas of Animals;

b) Rare Vegetation Communities or Specialized Habitat for Wildlife;

c) Animal Movement Corridors; and,

d) Habitats for Species of Conservation Concern.

The following paragraphs provide an assessment of existing natural features against the four component parts of SWH. As discussed further under Section 5.1 of this report, areas meeting any of these criteria are, in the absence of a municipal-wide exercise to identify such areas on a broader landscape level, appropriately considered to be candidate significant wildlife habitat.

Seasonal Concentration Areas of Animals

Some species of animals gather together from geographically wide areas at certain times of year. This could be to hibernate or to bask (e.g., some reptiles), over-winter (e.g., deer yards) or to breed (e.g., amphibians). Maintenance of the habitat features that result in these concentrations can be critical in sustaining local or sometimes even regional populations of wildlife.

Based on the District of Muskoka's Schedule C2, background mapping provided by the District of Muskoka and the MNRF, a portion of Deer Wintering Area (Stratum 2) is located in the western part of the property. The overall wintering area that has been identified is large and predominantly outside of the property, extending west and southwest (see **Figure 5**). As the planning authority (District of Muskoka) has identified a seasonal concentration area for deer wintering as part of the Official Plan, this would qualify as candidate SWH. This is also consistent with the *Significant Wildlife Habitat Criteria Schedule for Ecoregion 5E* (MNRF 2015). The proportional extent of the overall block of Stratum 2 habitat is relatively limited within the subject property.

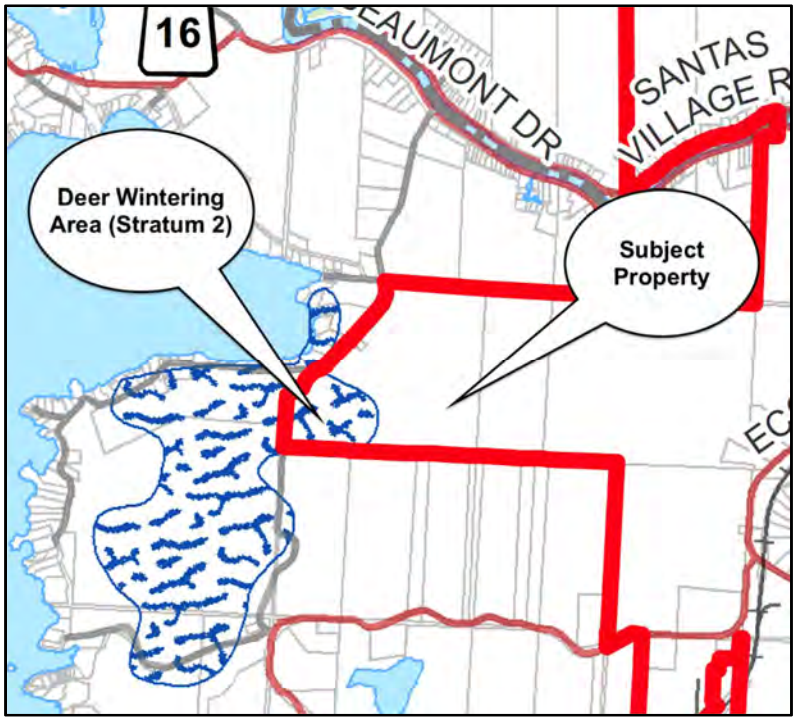


Figure 5: Deering Wintering Area – Stratum 2 along west side of subject property (Schedule C2, District of Muskoka)

In Central Ontario, white-tailed deer are at the northern fringe of their continental range. In largest part, this relates to deer being poorly adapted to our winters, and in particular heavy snow. One of the adaptions deer have made to survive winter is to "yard up" in areas where there is an abundance of conifers, including hemlock, cedar, pine and spruce. Within such areas, conifer trees catch snow in their branches, reducing the depth of snow beneath. Deer can then pack accumulated snow into a network of trails, allowing them to move easily between food and cover. The shelter provided in areas of heavy conifer cover also reduces winds and moderate temperatures. MNRF divides deer yards into Stratum 2

and Stratum 1 areas. Stratum 2 yards are those where deer move to as snow depth begins to build, but typically don't provide the same quality of cover as Stratum 1, or core winter habitat, where deer will congregate once snow depths exceed about 0.5 m.

The deer yard was assessed in the late winter and spring of 2018, under conditions appropriate for this purpose. There is good cover within this portion of the property in the form of a mature hemlock stand, with cover opportunities actually extending further into these lands than the MNRF mapping would indicate. That being said, there was very limited evidence of use over the winter of 2017 and 2018, with only limited track and scat, and little evidence of browse. Two deer were, however, observed moving through the most westerly portion of this area. It is recognized that the extent and location of deer yarding can vary from one year to the next, because of such factors as the extent of snow cover and the timing of snow falls. That there was very limited evidence of track and scat for the winter of 2017/2018 does not guarantee that areas of suitable habitat are not better used in other years, although the limited evidence of browse in and adjacent to these areas provides a better sense that use is generally quite limited.

Stratum 2 deer yards are very abundant features within the Muskoka landscape, including within Bracebridge, owing to there still being large tracts of relatively undisturbed and suitable forest cover. While it is important that the protection of such habitat be considered with development applications, it must be considered in that context. Adding further context to this consideration are the following factors:

- the subject lands have been designated as being within the Bracebridge Urban Centre, which of course is not the case for the majority of lands within this municipality that have been identified as Stratum 2 deer yard;

- the deer yard is largely outside of the subject property, and therefore any losses to this deer yard in association with this project would occur on its very periphery;

- there is an opportunity to develop the subject lands such that: a good portion of the identified deer yard within the most westerly portion of these lands remains undisturbed; portions of remaining suitable cover are preserved; and any deer that might utilize suitable lands which are retained still have the opportunity to access those areas; and

- deer are animals which easily habituate to human presence. While the proposed development may have some influence on the specific locations where deer congregate the most, any deer that

utilize lands adjacent to an area of proposed development will not be deterred from using those areas in the future.

On the basis of the above, we are very confident that Precinct A of the school can be developed in a manner which maintains the most southwesterly portion of the property's contribution to deer wintering habitat.

In addition to Deer Yarding Areas, the *Significant Wildlife Habitat Criteria Schedules For Ecoregion 5E* identifies several categories of seasonal concentration areas such as stopover and staging for waterfowl, migratory stopover areas for shorebirds, raptor and turtle wintering areas, habitat types for bats, snake hibernaculum, and colonially nesting. The evaluation criteria for each of these categories has been assessed based on background information, field investigations, ELC mapping and an assessment of habitat features and functions. The following has been identified.

- **Bat Maternity Colonies**: Based on the bat snag tree surveys and the abundance of forest cover on the subject property, potential habitat opportunities for Big Brown Bat and Silver-haired Bat is present.
- **Turtle Wintering Areas**: Henry's Marsh in the northeast portion of the property supports open water and shallow marsh habitat with organic and muck substrate. Based on water depth and soft substrate this area would be suitable for turtle overwintering and could qualify as SWH.
- **Reptile Hibernaculum**: The large size of the subject property provides a diverse range of vegetation community types and micro-habitat representation. It can be expected that snake species such as Eastern Gartersnake and Northern Brownsnake are present and habitat requirements including hibernaculum are available. No confirmed hibernaculum have been identified from the study area.

Rare Vegetation Communities or Specialized Habitat for Wildlife

Rare vegetation communities apply to the maintenance of biodiversity and of rare plant communities (rather than individual rare species). Specialized habitat conditions can include species of breeding birds that are associated with large blocks of wetland (generally >25 ha) that also include area sensitive habitat (i.e., that which is more than 100 m from an edge).

The *Significant Wildlife Habitat Criteria Schedules For Ecoregion 5E* identifies several vegetation community types that may qualify as rare vegetation communities for SWH designation. Examples of these include beach, sand dunes, Atlantic Coastal marsh, cliffs, talus slopes, sand or rock barrens and savannah. Many of the identified rare communities are not represented in the Muskoka area, such as alvars and tall grass prairies. While the subject property is dominated by forest including deciduous, mixed and coniferous stands, the areas of proposed development do not support old growth forests. There are also no rare forest types such as naturalized White Oak or Red Spruce dominated forests.

Precambrian rock barrens are identified as uncommon to rare in Ecoregion 5E, which is the rationale provided for the communities to potentially qualify as SWH. Many of the rock barren illustrated on **Figure 2** have a high tree cover (i.e., > 60%) and in some cases can be considered as inclusion areas of forested vegetation communities. For consideration as SWH, rock barrens must have greater than four indicator plant species of rock barrens and be greater than 1.0 ha in size. Based on field surveys and aerial photo interpretation, there are no rock barrens greater than 1.0 ha found within the proposed development Precincts A, B, C, D or E.

As some wildlife species require larger areas of suitable habitat for longer term survival, Specialized Habitat for Wildlife categories include waterfowl, raptor and reptile nesting areas, seeps and springs, mineral licks and denning sites for small and large mammals. The evaluation criteria for each of these categories has been reviewed based on background information, field investigations, ELC mapping and an assessment of habitat features and functions. The following has been identified.

- **Waterfowl Nesting Area**: Potential habitat qualification for this category requires factors such as presence of multiple nesting pairs of the listed species (which varies based on including or excluding numbers of Mallard pairs). Henry's Marsh and the large meadow marsh and swamp thicket west of development Precinct C have the potential to support multiple nesting pairs of waterfowl and therefore suitable upland areas within 120 m of these wetland may qualify as SWH.

- **Woodland Raptor Nesting**: The study area is dominated by suitable forest Ecosite communities that provide nesting habitat opportunities for raptors. Broad-winged Hawk and Barred Owls were recorded during daytime and nocturnal field surveys. No stick nests or territorial raptor behavior was recorded during field surveys, including during early morning breeding bird surveys. Nesting sites could be expected in the subject property and large surrounding forest areas.

- **Turtle and Lizard Nesting Areas**: Henry's Marsh supports suitable open water and shallow marsh turtle habitat. There is evidence of nesting turtles along the northern limit of the marsh. No nesting sites have been identified within the proposed development areas. The study area is outside of the expected range of the Five-lined Skink, and generally does not provide good habitat opportunities for that species.

- **Amphibian Breeding Habitat (Wetlands)**: The wetlands located to the west of development Precinct C support productive breeding amphibian habitat. Four species were recorded calling from these areas (Spring Peeper, Gray Tree Frog, Green Frog, American Toad), with species recorded as having more than 20 individuals calling. Those wetlands would qualify as SWH.

Animal Movement Corridors

Landscape connectivity (often referred to as "wildlife corridors") is recognized as an important part of natural heritage planning and a wide range of benefits have been attributed to the maintenance or re-connection of the natural landscape. Corridors allow animals to move between areas of high habitat importance. Conservation of distinct habitat types to protect species is not effective unless the corridors between them are also protected. In general, the Muskoka landscape supports large areas of contiguous forest and wetland habitat and is largely conducive to movement of wildlife. Areas of habitat fragmentation that effect wildlife movement are found in association with local and provincial roadways, cottage developments, and settlement areas such as in Bracebridge.

The subject property is located within a large contiguous block of forest and wetland areas that extend well north of the site to Muskoka River, west to Lake Muskoka, south of Muskoka Beach Road, and east to Ecclestone Drive. In a largely intact ecosystem such as this, landscape connectivity is functional and the permeability for wildlife movement is high.

A movement corridor of local value associated with the Deer Wintering Area may occur on the west side of the property, connecting this area to the remaining block of Stratum 2 habitat. At the local level within the proposed areas of development, wildlife movement could occur through movement to and from the shoreline of Lake Muskoka, along watercourses and to and from the Henry's Marsh wetland. Movement corridors are associated with the amphibians in areas of confirmed breeding habitat and adjacent summer and/or winter habitat. For example, the wetland areas west of development Precinct C were confirmed to support several species of breeding amphibians (Spring Peepers, Gray Treefrog, Green Frog), see

Figure 2. Vegetated areas between the wetland breeding areas and adjacent summer/winter habitat provide movement functions for these species. Animal movement corridors of provincial or regional importance are not found on the subject property.

Species of Conservation Concern

This category includes species that may be locally rare or in decline, but that have not reached the level of rarity that is normally associated with Endangered or Threatened designations. As such, it can be a more complex category to evaluate. The Significant Wildlife Habitat Technical Guide (MNRF 2000) suggests that the highest priority for protection be provided to habitats of the rarest species (on a scale of global through to local municipality), and that habitats that support large populations of a species of concern should be considered significant. An additional eight criteria under the Species of Concern category are found in Appendix Q (MNRF 2000), with 28 guidelines within these criteria. The determination of SWH under this category (and under other categories) is a comparative process that must extend across the entire jurisdiction of the planning authority to be considered definitive (i.e., it really should be addressed at a municipal-wide level, as part of broader planning processes).

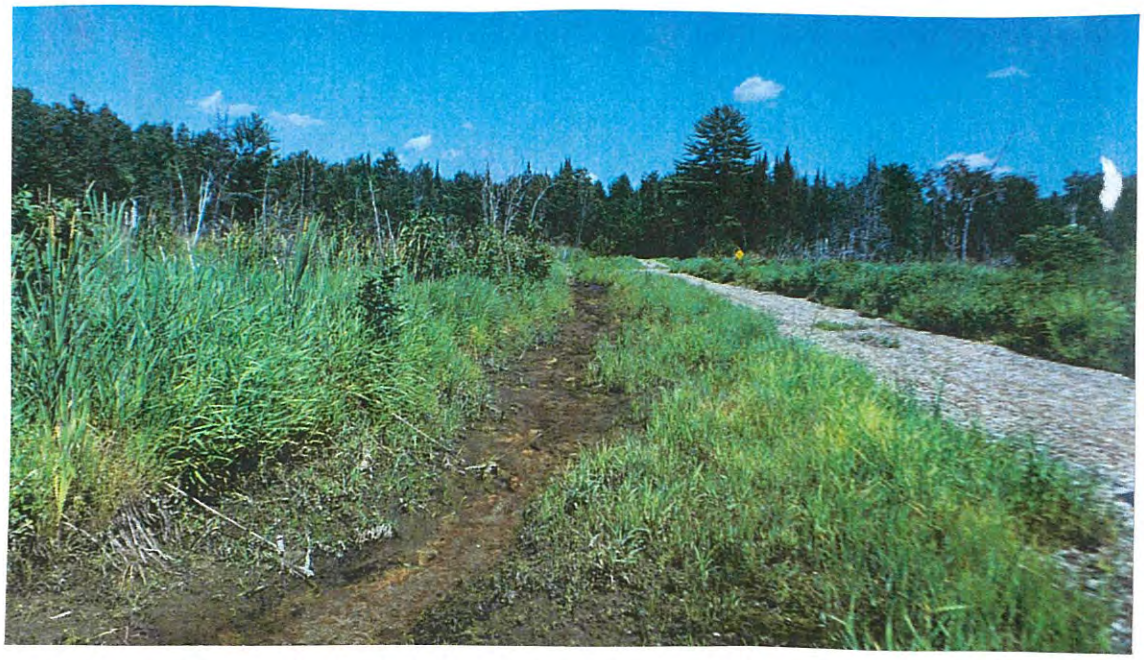
The *Significant Wildlife Habitat Criteria Schedules For Ecoregion 5E* identifies four categories consisting of Marsh Bird Breeding Habitat, Open Country Bird Breeding Habitat, Shrub/Early Successional Bird Breeding Habitat, and Special Concern and Rare Wildlife Species. There were no areas where breeding bird surveys resulted in the identification of five or more of the species listed in the guidelines, although a more detailed examination of Henry Marsh and adjacent shrub thicket wetlands might provide such a result, and is one of many reasons this particular area of the property is deemed so important for protection. There is no open country habitat found within the property or shrub/early successional bird habitats with the species representation listed in the guidelines.

3.4 Fisheries and Aquatic Habitat

Figure 2 shows the distribution of the surface water features on the subject property. For mapping purposes, they have been grouped into four general types, based on our field assessment: permanent tributary, with some fish habitat value (**Photograph 6**); intermittent tributary, with some fish habitat value; ditched drainage, accessible to forage fish (**Photographs 7** and **8**); and intermittent drainage, with no fish access or habitat value (**Photograph 9**).

Photograph 6. **Mineral meadow marsh ecosite (MAM2) and beaver pond, comprised of open water with grass/sedge edge, and permanent tributary with some forage fish habitat value (July 16, 1999).**

Photograph 7. **Mineral meadow marsh ecosite (MAM2), with west-to-east flowing ditch drainage and accessible to forage fish (July 16, 1999).**



Photograph 8. **Ditched drainage channel, accessible to forage fish, situated along northern edge of property, adjacent to Strawberry Trail (July 16, 1999).**

Photograph 9. **Intermittent drainage, with no fish access or habitat value, situated along southwestern edge of property, and meanders through fresh-moist hemlock coniferous forest ecosite (FOC3) (July 16, 1999).**

All of these watercourses are of small size, typically less than 0.5 m in width, and 0.1 m in depth, in areas which have not been impounded by beaver activity. At the downgradient end of the property below Henry Marsh, the main tributary is slightly larger, but still generally less than 0.8 m wide and 0.2 m deep. Substrates are varied, but generally sandy, with some localized areas of gravel. Low gradient areas, where impoundment has occurred due to beaver activity, often have considerable quantities of muck, silt and organic detritus on the bottom. Steeper reaches are generally characterized by exposed bedrock and boulder. Instream cover is generally poor, as is pool development.

As has been previously noted, these watercourses have been substantially impounded by beaver activity. The resultant series of open ponds, marshes, wet meadows and swamps have both positive and negative impacts on their quality as fish habitat. On the one hand, these create a number of obstacles to fish passage, reduce flows by increasing evapotranspirative losses, and warm stream temperatures. With regard to the latter, observed summer water temperature of 30.5ºC exceed the thermal tolerance of many species. On the other hand, some of the more open ponds create areas of seasonal refugia, where fish may be better able to survive summer or winter extremes. In general, on-line ponds created by either beaver or by man's activities have a negative impact on the quality of a fishery.

Despite the above-noted limitations, a variety of fish have been identified in the main watercourse within and downgradient of the property. Species that have been identified by MNRF during a 1992 fisheries inventory of the property, and through summer field inventories undertaken by Michalski Nielsen Associates Limited in 1999, include:

Fish species		**1992**	**1999**
Semotilus atromaculatus	creek chub	√	√
Semotilus margarita	pearl dace	√	√
Chrosomus eos	northern redbelly dace	√	√
Notropis cornutus	common shiner	√	√
Hyognathus hankinsoni	brassy minnow		√
Pimephales notatus	bluntnose minnow		√
Notemigonus crysoleucas	central mudminnow	√	√
Culea inconstans	brook stickleback	√	√
Lepomis gibbosus	pumpkinseed sunfish	√	
Catostomus commersoni	white sucker	√	
Ictalurus nebulosus	brown bullhead	√	√
Etheostoma nigrum	Johnny darter		√

All of these species are common forage fish in small streams and ponds. It is noted that their distribution within these streams is affected by water levels, flows, the presence or absence of areas of ponded water, which provide seasonal refugia, and the presence and extent of barriers to fish passage (including beaver dams and areas of poorly defined or heavily vegetated channel). Hence, opportunities for fish habitat vary from season to season, and from year to year, based on both flow characteristics and beaver activity; in classifying the watercourse into its various reaches, we have attempted to be very conservative, assuming that access is not restricted by beaver activity.

4 CONSTRAINT ANALYSIS

As is clear from Section 3, the lands making up the westerly half of the Muskoka Royale property are physically diverse, with that diversity resulting in a broad mosaic of vegetation communities and wildlife habitat. It is very important that the natural area qualities of this property be protected, not only because of their intrinsic values, but also because they are precisely why this property has been chosen as the location for this school campus.

While development always represents a balance between the protection of natural features and allowing some areas to be permanently altered in favour of a land use change, the present application, being one which is not that land consumptive (on full build out it will occupy only approximately 15% of this landscape) creates some fairly unique opportunities to preserve much more of the site than would be the case for many other forms of development. The constraints analysis which has been completed for this property, as described herein, allows for a determination of those portions of the site which are best-suited to development.

The constraints which have been identified include areas of potential importance to Species at Risk, areas potentially contributing to significant wildlife habitat and areas of considerable physical constraint.

The primary constraint associated with this landscape are the numerous wetlands, including some marshy stream corridors which connect such features. Some of these wetlands can contribute to habitat opportunities for Blanding's Turtle, a threatened species which has not been identified on the property but which is known to the broader locale. They are also important habitat features for a variety of other wildlife, including Least Bittern (potentially present in Henry Marsh only), a variety of waterfowl and shorebirds, various reptiles, amphibians and various mammals. Portions of these wetlands meet the criteria as candidate significant wildlife habitat under the categories of: Seasonal Concentration Areas of Animals – turtle wintering habitat; Rare Vegetation Communities or Specialized Habitat for Wildlife – waterfowl nesting area (with lands adjacent to some wetlands potentially also qualifying as turtle nesting areas) and Animal Movement Corridors. As illustrated in **Figure 6**, these are quite prominent components of this landscape. The large area of open marsh along the north boundary of the property (Henry Marsh), and areas of adjacent wetland that are well connected to this marsh, are particularly important.

It is additionally important to ensure connectivity between these wetlands and adjacent terrestrial habitat, as many species of wildlife using such wetlands are also dependent on the surrounding mosaic of habitat. In addition to the protection of stream corridors, this can be achieved in two fundamental ways:

1) By leaving large portions of the landscape, including large portions of lands adjacent to wetlands, intact, so that wildlife using wetlands can disperse into those areas; and

2) By ensuring a minimum buffer zone around all areas of wetland.

The second mechanism, while important, is not as important in a setting where development is less intensive than one where all lands outside of a wetland and buffer are to be developed, as is the case for most urban development.

In the present instance, we have determined that a 30 m minimum buffer is appropriate to one area of wetland on this property, Henry Marsh. This large area of wetland, which is predominantly open marsh, is used by a variety of wildlife, including many shorebirds and waterfowl. Located just off the Trans Canada Trail, it is locally important as a birding area (and, in combination with some nearby municipal sewage lagoons, has been well-documented for use as a stopover area by waterfowl). Although he composition of wetlands within this property is always changing as a consequence of beaver activity, this wetland has persistently included a large open water component, in combination with adjacent areas of swamp thicket and cedar-dominated mixed swamp. Recognizing that MNRF have documented Blanding's Turtle within this general area, it is the only wetland within the westerly portion of the Muskoka Royale property that would consistently provide for overwintering opportunities for this species.

The remainder of the wetlands on the property can be appropriately protected, in the context of the limited development that is proposed, with a minimum buffer of 15 m.

The proposed wetland buffers are appropriate in addressing the habitat protection requirements of Blanding's Turtle. In this regard, Blanding's Turtle have been previously identified at two locations within 2 km of this property. The first such record is approximately 1 km to the north of the property limits, which is on the north side of the Muskoka River so is likely not that relevant. The second record is nearly 1 km southeast of the Muskoka Royale property as a whole, which would appear to bring it more than 2 km north of the portion of the property under consideration for development, and therefore also of potentially questionable relevance. Regardless, given that Blanding's Turtle are known to this area, and that some of the wetlands within the subject property could provide overwintering and/or seasonal opportunities for this species, it is important to address this potential. Further, although many visits have been made to this property at times of the year appropriate for visual encounter surveys (warmer spring

periods, prior to June 15, which is when this species is most likely to be found on shore basking), the large size of Henry Marsh, difficulties in observing peripheral areas of Henry Marsh where basking may occur due to water levels (which are neither wadable or navigable by canoe), and extensive shrub thicket around it, similarly difficult opportunities for observation elsewhere, and the habits of Blanding's Turtle (which will wander extensively from one area of suitable habitat to another) makes it impossible to rule out the potential for this species to occur within the property. The appropriate conclusion is that if this species is not presently using this property, it may and hopefully will in the future.

MNRF's General Habitat Designation for Blanding's Turtle categorizes the habitat of this species into three categories as follows:

Category 1 – known nesting sites or overwintering sites, plus lands within 30 m of such areas.

Category 2 – all suitable wetlands on waterbodies within up to 2 km of a known occurrence, provided these are connected by other suitable wetlands or watercourses no more than 500 m apart, plus lands within 30 m of such areas.

Category 3 – areas of between 30 m and 250 m around suitable wetlands identified in Category 2, within 2 km of an occurrence.

No Category 1 habitat has been identified on the subject property. Being conservative, we believe Henry Marsh, and the lands within 30 m of it, qualify as Category 2 habitat.

While we acknowledge that some other wetlands or watercourses within the portion of the Muskoka Royale property under consideration for development could potentially be used as stopover areas by Blanding's Turtle under certain seasonal conditions, none of those other areas would appear to provide overwintering opportunities, and their potential habitat contributions to this species appear much more limited. Our proposed strategy of allowing very limited development activities between 15 m and 30 m of some of those other wetlands and watercourses is fully consistent with the need to protect opportunities for Blanding's Turtle within his landscape. So too is the limited scale of overall development within this landscape (i.e., with approximately 85% of the subject lands to be protected over the long-term). In this regard, the General Habitat Description for Blanding's Turtle provides the following advice with respect to activities in Blanding's Turtle habitat:

Activities in general habitat can continue as long as the *function of these areas for the species is maintained and individuals of the species are not killed, harmed, or harassed.*

Generally compatible:

- Recreational use of the water such as swimming, boating, and fishing.
- Small-scale alterations to land cover that do not impede overland movements or impair nesting sites.

Generally not compatible:

- Significant draining, infilling, dredging, or other significant alteration of wetlands or other suitable waterbodies.
- Significant alteration of shorelines, especially hardening (e.g., the use of gabion baskets, rip-rap, and rock amour).

The development strategy being proposed, including the manner in which wetlands and watercourses are being protected and buffered, and which maintains large areas of adjacent upland in a natural condition, is fully responsive to this advice. As previously noted, a parallel process is underway to obtain MNRF comment on this proposal.

While wetlands and their buffers should be viewed as a primary constraint, where no development other than essential roadways and services should encroach, there are also secondary constraints within this landscape. These included areas that also contribute to the previously discussed significant wildlife habitat opportunities on the property. They are as follows:

- **Rock barrens** contribute to the diversity of habitats within this property, and can provide specialized habitat for various wildlife. That said, the most recent surveys completed on this property indicate that most areas of rock barrens within the lands being considered for the various school precincts are fairly well-vegetated, not providing the size of clearings or open areas of broken rock common to rock barrens in many parts of Muskoka. No whip-poor-will have been documented calling from those areas, nor do these areas provide good basking opportunities for herpetofauna. Accordingly, these areas are considered secondary constraints: while it is important to ensure such features continue to exist and contribute to the diversity of site conditions, it is not necessary to retain every one of these features;

- Additional **drainage features**, beyond those which have been identified as wetland corridors, occur throughout this portion of the property. While all of these have been classified as intermittent, with limited to no fisheries values, they are nevertheless important to protect. Such

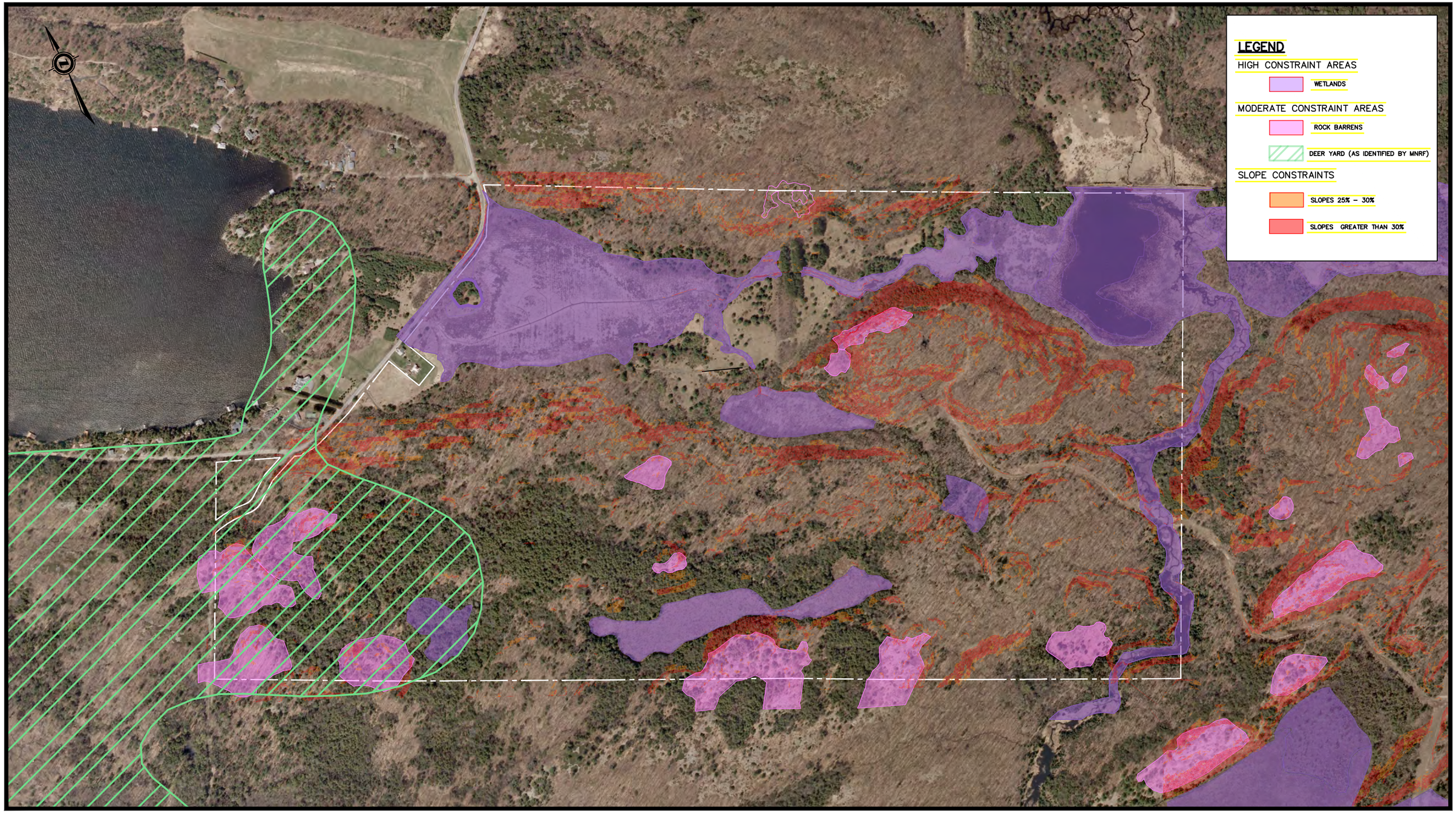
protection should typically include 15 m natural buffers, and minimal roadways or service crossings;

- Areas of **very steep slopes** occur throughout the property. These areas pose physical challenges to development. Any development within such areas would usually require blasting and considerable grading, increasing the overall extent of disturbance. These areas should therefore be avoided, except for necessary components of roadways and services, or where the form of development is compatible with the maintenance of existing slopes;

- **Deer wintering yards** are broadly identified features on the landscape. One such large area extends into the southwest portion of the property, with approximately 90% of that feature being on adjacent lands. Surveys of that portion of this identified area on the property in the late winter and early spring of 2018 indicated that, while appropriate conditions exist for yarding, and extend even further into the property than suggested by MNRF mapping, there was minimal evidence of use (few deer tracks, and even less evidence of scat and browse). Nevertheless, we believe it is important to preserve large portions of the lands providing such habitat potential, and in particular that portion within the most southwesterly portion of these lands, intact.

Each of the above-noted additional types of constraint are shown on **Figure 6**. **Figure 7** shows the primary wetland constraints and associated buffering. This constraint analysis process has led to the identification of the various school precincts shown in **Figure 8**. The preservation of large tracts of existing forest has also been considered in that layout. The resultant development proposal: limits the overall footprint of disturbance; minimizes blasting and grading requirements; avoids all areas of wetland; ensures proper buffering of wetlands; ensures proper protection and buffering of stream corridors; ensures the protection of a broad mosaic of natural areas, with a particular emphasis on doing so around wetland areas; and locates development to those areas best suited for such uses. We note that the main entrance roadway location is largely fixed, generally following the corridor of the already approved future Bracebridge West Bypass.

The locations and forms of development being considered additionally help to preserve other functions associated with this broader landscape, including by maintaining large tracts of forest habitat for area-sensitive birds, a considerable acreage of forest with snag trees providing summer roosting and maternity habitat opportunities for bats, and many seasonally wet depressions (vernal pools) which, in addition to the wetlands being protected, contribute to the breeding success of some amphibians. This development



Michalski Nielsen
ASSOCIATES LIMITED

MUSKOKA ROYALE COLLEGE

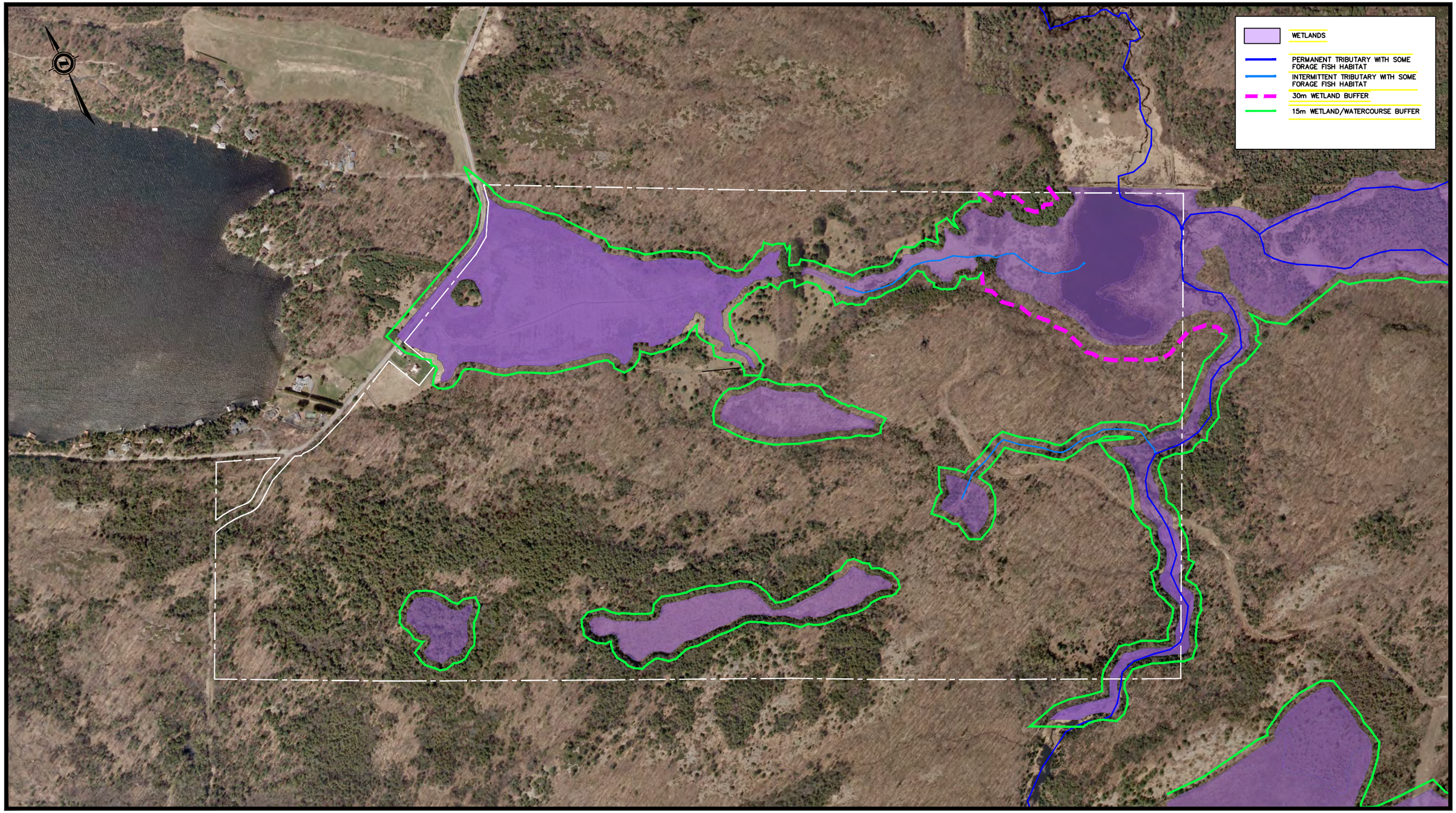
INITIAL CONSTRAINT MAPPING

PROJECT NO. 3517

SCALE: 1:7500

DATE: SEPT 2018

FIGURE 6



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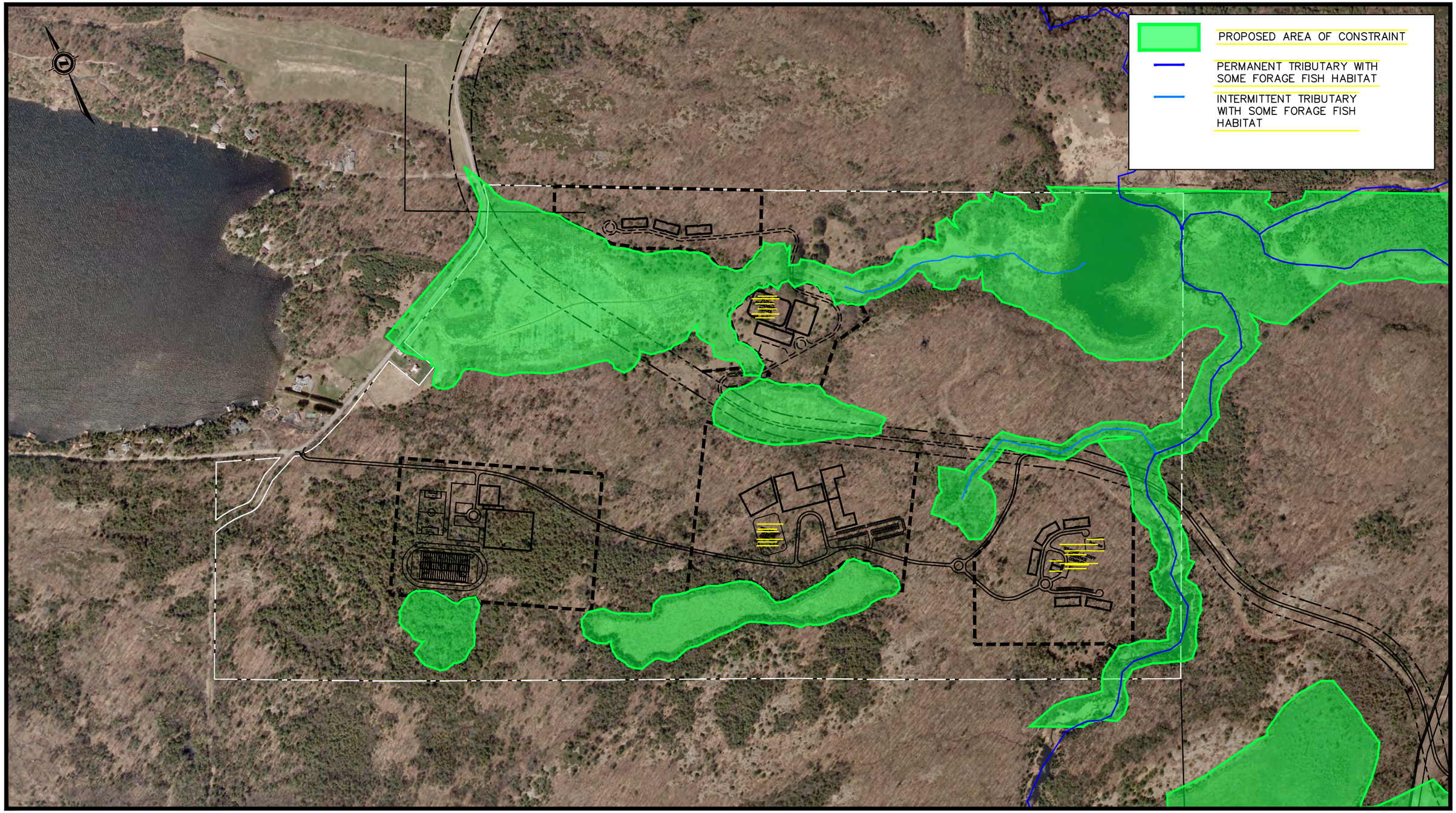
RECOMMENDED ENVIRONMENTAL PROTECTION AREAS

PROJECT NO. 3517

SCALE: 1:7500

DATE: SEPT 2018

FIGURE 7



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PROPOSED CONSTRAINT AREAS OVERLAIN WITH PROPOSED DEVELOPMENT PRECINCTS

PROJECT NO. 3517

SCALE: 1:7500

DATE: SEPT 2018

FIGURE 8

strategy appropriately responds to the goal of protecting the habitats of threatened and endangered species, as well as the need to protect candidate significant wildlife habitat.

5 ENVIRONMENTAL POLICY CONTEXT

5.1 Overview

Decisions on land use planning within this property, as it relates to the protection of the natural environment, are governed by Ontario's Provincial Policy Statement (PPS), the District of Muskoka Official Plan and the Town of Bracebridge Official Plan. A planning analysis of the proposed development has been prepared under separate cover by The Jones Consulting Group Ltd., and it is not the intent of the present document to duplicate that information. However, it is important that this document speaks to the Natural Heritage policies of the Provincial Policy Statement, and in particular those relating to the potential for Significant Wildlife Habitat. Additionally, it is important that this document speaks to the habitat of endangered and threatened species, as described under the Provincial Policy Statement but also more specifically under the *Endangered Species Act*. Our environmental policy discussion is therefore substantially focused on these two matters.

5.2 Provincial Policy Statement

Section 2.1 of the Provincial Policy Statement (PPS) speaks to the protection of natural heritage features. It reads as follows:

> **2.1 Natural Heritage**
>
> 2.1.1 Natural features and areas shall be protected for the long term.
>
> 2.1.2 The diversity and connectivity of natural features in an area, and the long-term *ecological function* and biodiversity of *natural heritage systems*, should be maintained, restored or, where possible, improved, recognizing linkages between and among *natural heritage features and areas, surface water features* and *ground water features*.
>
> 2.1.3 *Natural heritage systems* shall be identified in Ecoregions 6E & 7E1, recognizing that *natural heritage systems* will vary in size and form in *settlement areas*, *rural areas*, and *prime agricultural areas.*
>
> 2.1.4 *Development* and *site alteration* shall not be permitted in:
>
> a) *significant wetlands* in Ecoregions 5E, 6E and 7E1; and
> b) *significant coastal wetlands.*
>
> 2.1.5 *Development* and *site alteration* shall not be permitted in:
>
> a) *significant wetlands* in the Canadian Shield north of Ecoregions 5E, 6E and 7E1;

b) *significant woodlands* in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River)1;
c) *significant valleylands* in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River)1;
d) *significant wildlife habitat*;
e) *significant areas of natural and scientific interest*; and
f) *coastal wetlands* in Ecoregions 5E, 6E and 7E1 that are not subject to policy 2.1.4(b)

unless it has been demonstrated that there will be no *negative impacts* on the natural features or their *ecological functions*.

2.1.6 *Development* and *site alteration* shall not be permitted in *fish habitat* except in accordance with *provincial and federal requirements*.

2.1.7 *Development* and *site alteration* shall not be permitted in *habitat of endangered species and threatened species*, except in accordance with *provincial and federal requirements*.

2.1.8 *Development* and *site alteration* shall not be permitted on *adjacent lands* to the *natural heritage features and areas* identified in policies 2.1.4, 2.1.5, and 2.1.6 unless the *ecological function* of the *adjacent lands* has been evaluated and it has been demonstrated that there will be no *negative impacts* on the natural features or on their *ecological functions*.

2.1.9 Nothing in policy 2.1 is intended to limit the ability of *agricultural uses* to continue.

There are no Provincially Significant wetlands within the property. That said, there are various other wetlands within this property that require protection, with one of these, Henry Marsh, being a feature of local/regional importance. It is noted that coastal wetlands are wetlands on the shoreline of Great Lakes and its connecting channels, and are therefore not relevant to the Town of Bracebridge.

The subject property is in Ecoregion 5E, and is therefore not subject to provisions in the PPS regarding significant woodlands or valleylands. It does not contain any identified Areas of Natural and Scientific Interest.

Significant Wildlife Habitat is one aspect of the PPS which is less straightforward to define. In this regard, the Province has provided technical guidance on what might constitute significant wildlife habitat, but has left decisions on what constitutes such habitat to the discretion of individual municipalities. What is clear from the definition of significant wildlife habitat in the PPS is that it is something that is best defined over an entire municipality, not on individual blocks of land. Unfortunately, it is not the common practice of municipalities, particularly those outside of large urban areas, to define such areas. Within

more urbanized areas in the southern portion of the Province, it is becoming more common to identify and protect a Natural Heritage System, which at least indirectly captures much of the land that would contribute to significant wildlife habitat, however that is generally not the case in Central Ontario, including within the District of Muskoka. In the absence of such a municipal-wide approach, it is our belief that EIS reports such as this can simply identify candidate significant wildlife habitat, make efforts to protect such areas, and provide context around what the loss of any such habitat might mean at a broader municipal level, to help guide good planning decisions; this report has been structured to do just that.

As a further comment on municipal decisions regarding significant wildlife habitat, even in a case where a municipality deems that a property contains significant wildlife habitat, the policy direction of the PPS is permissive. In this regard, in accordance with Policy 2.1.5, it allows development both within and adjacent to areas of significant wildlife habitat providing that "there will be no negative impacts on the natural features or ecological functions". For significant wildlife habitat, this must be considered in the context of the PPS definition of "ecologically important in terms of features, functions, representation or amount, and contributing to the quality and diversity of an identifiable geographic area or natural system". So, as an example, if development is proposed to encroach into the edge of an identified area of winter deer yard, one must consider the impacts of such an encroachment in the context of the size and configuration of that particular deer yard, as well as the magnitude of such an impact on deer wintering habitat within the municipality as a whole; this report is intended to provide this context.

The preceding discussion on SWH has identified a variety of features/values associated with this property that should be considered Candidate SWH. In each instance, the locations and form of proposed development can ensure the protection of such features and values within the subject property as a whole. The constraints analysis completed as part of this project has been integral to the protection of such values, which include/potentially include:

- Seasonal Conservation Areas of Animals
  - deer wintering area
  - bat maternity colonies
  - turtle wintering areas
  - reptile hibernacula

- Rare Vegetation Communities or Specialized Habitat for Wildlife
  - waterfowl nesting area
  - woodland raptor nesting
  - turtle and lizard nesting areas
  - amphibian breeding habitat (wetlands)
- Animal Movement Corridor
- Habitats for Species of Conservation Concern – marsh bird breeding habitat

All such values/potential values have been appropriately considered in the development plans.

Fish habitat, albeit that limited to forage fish and which in many cases is only seasonal in nature, has been identified within the subject property. Watercourses and wetlands providing potential fish habitat are being protected.

The habitat of endangered and threatened species is being protected, as further discussed in Section 5.3 below.

5.3 ***Endangered Species Act***

The *Endangered Species Act (ESA*) came into effect in Ontario in 2007, and provided for immediate protection of all species on the Species at Risk in Ontario (SARO) list. This protection is afforded under Section 9(1) of the *Act*, which reads:

> **Prohibition on killing, etc.**
>
> 9.(1) No person shall,
>
> a) kill, harm, harass, capture or take a living member of a species that is listed on the Species at Risk in Ontario List as an extirpated, endangered or threatened species;
> b) possess, transport, collect, buy, sell, lease, trade or offer to buy, sell, lease or trade,
>
> (i) a living or dead member of a species that is listed on the Species at Risk in Ontario List as an extirpated, endangered or threatened species;
> (ii) any part of a living or dead member of a specie as referred to in subclause (i),
> (iii) anything derived from a living or dead member of a species referred to in subclause (i); or

c) sell, lease, trade or offer to sell, lease or trade anything that the person represents to be a thing described in subclause (b)(i), (ii) or (iii). 2007, c.6, s.9(1).

The *ESA* additionally affords habitat protection to species on the SARO list. The relevant portions of the *Act* are found under Sections 10(1) through 10(3) and are repeated as follows:

Prohibition on damage to habitat, etc.

10(1) No person shall damage or destroy the habitat of,

(a) a species that is listed on the Species at Risk in Ontario List as an endangered or threatened species; or

(b) a species that is listed on the Species at Risk in Ontario List as an extirpated species, if the species is prescribed by the regulations for the purpose of this clause. 2007, c.6, s. 10(1).

Also important to this discussion is the definition of habitat under the *Endangered Species Act*, which is described under Section 2(1) as follows:

• "Habitat" means,

(a) With respect to a species of animal, plant or other organism for which a regulation made under clause 55 (1) (a) is in force, the area prescribed by that regulation as the habitat of the species, or

(b) With respect to any other species of animal, plant or other organism, an area on which the species depends, directly or indirectly, to carry on its life processes, including life processes such as reproduction, rearing, hibernation, migration or feeding, and includes places in the area described in clause (a) or (b), whichever is applicable, that are used by members of the species as dens, nets, hibernacula or other residence; (habitat)

• Definition of "habitat", cl. (b)

(2) For greater certainty, clause (b) of the definition of "habitat" in subsection (1) does not include an area where the species formerly occurred or has the potential to be reintroduced unless existing members of the species depend on that area to carry on their life processes. 2007, c. 6, s. 2 (2).

The MNRF has prepared a document entitled Categorizing and Protecting Habitat under the *ESA* that outlines the overall approach and considerations that the MNRF uses in determining whether a proposed

activity is likely to damage or destroy habitat protected under subsection 10(1) of the *ESA.* For clarity, the following is provided directly from that document:

> *Not every activity that occurs within or near habitat will damage or destroy that habitat. Determining whether a proposed activity is likely to damage or destroy the habitat of an endangered or threatened species requires the consideration of the activity details, which parts of habitat are likely to be altered by the activity, and how the alteration may affect the species' ability to carry out its life processes.*
>
> *3.1.1 Damaging Habitat*
>
> *An activity that damages the habitat of a species is one that alters the habitat in ways that impair the function (usefulness) of the habitat for supporting one or more of the species' life processes.*
>
> *3.1.2 Destroying Habitat*
>
> *An activity that destroys the habitat of a species is one that alters the habitat in ways that eliminate the function (usefulness) of the habitat for supporting one or more of the species' life processes.*
>
> *In some cases, the anticipated alteration that a proposed activity will have on habitat may be so minor that the function of the habitat for supporting the species' life processes will not become impaired or eliminated. In such cases the activity would not contravene subsection 10(1) of the ESA and would not require authorization under the Act with respect to this provision. In other cases, the alteration may be more significant such that the function of the habitat for supporting one or more of the species' life processes may become impaired or eliminated. Such activities would contravene subsection 10(1) of the ESA and would require authorization under the Act prior to proceeding.*

Ensuring compliance with the *Endangered Species Act* is a proponent's responsibility. On a development of this scale, it requires an understanding of what species are known to the broader area, than an assessment of their potential to use the lands to be developed, based on habitat attributes. For some species, this analysis may benefit from targeted field surveys to determine whether a species is using habitat that may be suitable for it; however, as endangered and threatened species are generally difficult to find, and as the mobility of wildlife means that their absence on any given occasion does not discount their potential use, the assessment of habitat potential is always key. MNRF is a resource which can be utilized to obtain information on species known to a certain locale, to assist in scoping investigations, to assist in interpreting results, and to provide guidance on mitigation or avoidance alternatives.

MNRF has a permitting process which allows activities which would otherwise be prohibited under Section 9 or 10 of the *Endangered Species Act*, which is described under Section 17 of the *Act*.

As described earlier in this report, a detailed assessment of Species at Risk potential has been completed for the lands to be developed, and adjacent lands. MNRF has been consulted as part of this process. Potential habitat does exist within or adjacent to areas to be developed for a few animals which receive species and habitat protection under the *Endangered Species Act*. A summary of these species and how they will be protected, is provided as follows:

Blanding's Turtle
- protection of suitable overwintering habitat and adjacent wetlands and uplands;
- protection of other wetland habitats which might be utilized by this species as part of its summer range, as well as movement opportunities within this landscape;
- construction timing for tree removal, grubbing and rough grading outside of periods when this species is active;
- site specific mitigation measures, such as barrier fencing where work areas are adjacent to lands potentially being used by this species; and
- species-specific SAR training for construction personnel.

Eastern Hog-nosed Snake
- protection of much of the habitat that could be utilized by this species, including all wetlands and stream corridors, lands adjacent to those features, and large connected areas of forest habitat and rock barrens;
- construction timing for tree removal, grubbing and rough grading outside of periods when this species is active; and
- species-specific SAR training for construction personnel.

Protected Bat Species
- protection of much of the habitat that could be used by these species;
- timing of tree removal activities to period outside of when this species is using protected roosting and maternity trees; and
- offsetting loss of snag trees through the installation of bat boxes.

Follow-up correspondence specific to Species at Risk concerns and the intended mitigation and offsetting measures is being forwarded to MNRF under separate cover; their response will be provided to both the Town of Bracebridge and District of Muskoka upon receipt.

6 COMMENTS AND RECOMMENDATIONS ON DEVELOPMENT

6.1 Overall Development Plan

6.1.1 Site Suitability

The western portion of the Muskoka Royale property is, despite once containing a farm, a largely natural/naturalized landscape, with considerable physical and natural area diversity. The majority of this area is forested. It contains abundant wetlands and watercourses, areas of steep slope and some rock barren features. It provides considerable wildlife opportunities, including having some potential to support Species at Risk and containing candidate significant wildlife habitat.

A school development, broken into smaller precincts within some of the least constrained portions of these lands, and which on full build-out will only occupy about 15% of these lands, is an excellent way to ensure the natural area values of this landscape are preserved for the long-term. Construction of an internal roadway, a large portion of which follows the corridor established and approved through a Class EA process for the future Bracebridge West Bypass, provides another good opportunity to minimize impacts on this landscape.

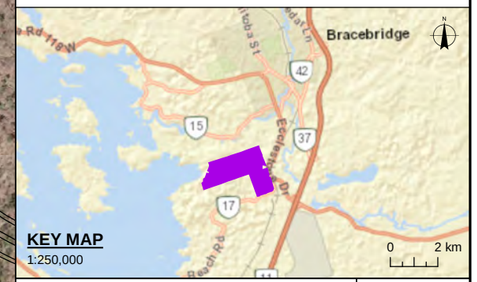
Michalski Nielsen Associates Limited has provided early input to the location and layout of school precincts, and have helped to refine those development footprints in order to ensure these avoid areas of higher natural environment constraint and minimize impacts on areas of secondary constraint. The resultant development concept plan is shown on **Figure 8**, and as an overlay with vegetation conditions on **Figure 9**. Subject to the incorporation of a series of additional best management measures and other mitigation in the build-out of those various precincts, Michalski Nielsen Associates Limited is of the opinion that the proposed development is of an intensity and scale that is appropriate to this setting and will allow for the long-term protection of natural features and functions, including the habitat of endangered and threatened species and candidate significant wildlife habitat. Our more specific comments and recommendations are provided in the sections that follow.

6.1.2 Internal Road Construction

There will be an internal roadway into the property off of District Road 118 (Ecclestone Drive). The main spine of that internal roadway will substantially follow the alignment of the future Bracebridge West Bypass, a road that has been approved through a Class EA Process. The only deviation to this is just off District Road 118, where the alignment of the internal road has been shifted a short distance to the north,

LEGEND

- Site Plan
- ELC Community
- Development Area
- Study Area



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CLIENT: Gord Nielsen

PROJECT: Muskoka Royale

PROJECT NO.	160337	REVISION:	5
DATE:	Sep 25/18	SCALE:	1:7000
DRAWN:	BE	DATUM:	NAD83
CHECKED:	DJ	PROJECTION:	UTM 17

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Existing Environmental Conditions

Figure 9

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(on the north versus south side of the District pumping station). This shift is for traffic safety purposes, moving it further away from the Muskoka Beach Road intersection to the south. From a natural environment perspective, we note this alignment change is largely over previously cleared and filled lands. Where it enters a forested setting, the shift allows avoidance of a wetland, whereas the Bracebridge West Bypass route was proposed to cut across a corner of that feature.

The portion of the internal road network that follows the future Bracebridge West Bypass route generally avoids areas of wetland constraint, except where it occurs within the edge of an area of deciduous swamp (see the area just north of the future elementary school [Precinct D], as shown on **Figures 8** and **9**). That particular section of road was selected through the Class EA process to cut across that small wetland because of adjacent steep slope constraints to either side. However, it is noted that the elementary school campus is not planned to be built in the short-term, with the initial length of this main internal roadway to terminate west of that wetland, with a second internal roadway to the secondary school and sports complex to veer south from it. For this future area of wetland encroachment, Michalski Nielsen Associates Limited recommends that:

- **the project biologist and engineer work together on a design which minimizes the extent of encroachment into the area of deciduous swamp, and a sensitive design through this area.**

A gated emergency exit onto Stagecoach Road is to be constructed at the west end of the second internal roadway, beyond the Sports Complex. There is no intention to construct an internal roadway to follow the west end of the future Bracebridge West Bypass out to Stephenson's Bay Road.

All other areas of the proposed internal roadway avoid areas of wetland constraint and our identified buffers around same.

Although a road design has not yet been advanced by Pinestone Engineering for the internal road, it will be typical of a small private roadway, with a paved surface width of likely 6.5 m, shoulders, and ditching where required. This internal road does cross several small intermittent streams, all of which have been deemed to be inaccessible to fish. There is a dingle crossing of a permanent tributary, with some forage fish habitat. For this particular crossing, Michalski Nielsen Associates Limited recommends that:

- **the crossing of the permanent tributary be designed by the project engineer, with input from the project biologist, to avoid interference with fish passage, and to minimize impacts on fish habitat.**

For this and other watercourse crossings, Michalski Nielsen Associates Limited recommends that:

- **all watercourse crossings be designed and implemented to avoid any short-term or longer-term impacts on water quality**.

6.1.3 Construction Phasing and Management

The project is to be implemented in various phases, beginning with a first phase of facilities in three precincts, the secondary school (Precinct A), sports complex (Precinct B) and secondary school residence (Precinct C). The internal roadway to these facilities from District Road 118, together with the gated emergency exit to the junction of Stagecoach Road and Stephen's Bay Road, will also be constructed at that time. Within each of these precincts, construction will be phased in accordance with projected student populations. The development of the elementary school (Precinct D) and associated residence (Precinct E) will follow at a later time.

Each precinct has been sized to be able to allow some potential for future growth. However, each precinct has also been sized such that facilities are not crowded within it, and that the presently forested character of these areas can be maintained.

It is important that construction activities be timed and managed in a manner which avoids potential harm to local wildlife, and which minimizes the potential for adverse physical or water quality impacts on surrounding areas. To this end, Michalski Nielsen Associates Limited recommends that:

- **Species at Risk sensitivity training is to be provided to all contractors before they commence any clearing, grubbing, grading, servicing and other heavy construction activities on this property. That training will focus on those species which they might potentially encounter, dependent on the nature and seasonality of work they are undertaking;**

- **all tree cutting, including that associated with internal roadways, be undertaken between September 30 and April 15, so as to avoid impacts on breeding birds and potential bat roosting and maternity habitat. Tree clearing is also to be phased, to avoid clearing more area than will be worked on during the subsequent construction season**;

- **within Precinct B, which encroaches into an area of identified Stratum 2 deer winter yard, an effort is to be made to complete tree cutting during the October – November period, before deer are yarding. This additional precaution will minimize the influence of heavy construction activity on any deer yarding in the broader area;**

- **prior to any phase of tree-cutting, a site meeting is to be held with the tree removal contractor, architect, project engineer and project biologist to determine the specific**

limits of these works, and any associated requirements for staging and tree harvesting. A visible barrier, consisting of sediment fence, flagging or snow fencing, is to be used to delineate the specific limits of these works and avoid accidental encroachment into adjacent lands;

- **in clearing along the permanent boundaries of new forest edges, efforts are to be made to stagger the edges, through the selective removal of larger trees, and by maintaining saplings/young trees along these new edges. This is intended to make such new edges more resistant to windthrow and sun-scalding;**

- **at the time of determining tree removal requirements, the biologist must calculate, on the basis of the acreage of land to be impacted, the forest community types impacted, and the results of the previous inventories completed on snag tree density, the approximate number of snag trees that will be removed. One bat box is to be installed at a suitable location within/adjacent to this precinct for every four snag trees that will be removed. Bat boxes are to be constructed or purchased and are to be a minimum two chamber, 10" x 10" x 36" sized (or equivalent capacity). Literature on commercial bat boxes indicates that this size of bat box should accommodate up to 300 individuals. There is to be some effort to ensure some variations in the size and design of the bat boxes, while respecting this minimum size standard. Bat boxes are to be installed on either the trunks of mature trees or on poles, all at a height of 15' or higher (at top of box). Bat boxes are to generally be oriented to have some exposure to sun from the south. A biologist will oversee the implementation of these bat boxes, with every effort made to install all or a majority of bat boxes prior to April 15 of the season immediately following tree removals, such that an alternate habitat is available for any bats returning to the site that spring**;

- **at the onset of grubbing, and prior to any other earthworks, a heavy-duty silt fence is to be properly installed around the downgradient perimeter of all such works. Sediment fence is to consist of a minimum 4' high heavy duty filter fabric cloth, supported by paige wire affixed to t-bars. The sediment fence is to be properly trenched into the ground, with clear stone used to bury the bottom of the fencing where rock does not allow for such trenching. A qualified individual is to provide certification that the silt fencing has been properly installed. It is noted that by installing sediment fence in this manner, it will also serve as at least a partial barrier against the entry of species such as snakes and turtles into the work area**;

- **additional sediment and erosion controls are to be installed, as deemed appropriate by the project engineer, as may be required, including temporary or permanent check dams at appropriate locations on any ditching associated with new roadways, and in areas adjacent to any watercourse crossings;**

- **sediment and erosion controls are to be inspected daily by the contractor, and at least monthly by qualified members of the project team. Any deficiencies in these controls are to be remedied immediately;**

- **once an area has been grubbed, works are to progress as quickly as possible, with all disturbed areas to be stabilized by grading, then by seeding or sodding, as soon as can be practically achieved;** and

- **sediment and erosion controls are to be left in place and regularly monitored and repaired until such time as the lands which have been disturbed are certified by a qualified individual as being stable**.

6.1.4 Stormwater Management

The preliminary servicing report prepared by Pinestone Engineering indicates that a detailed stormwater management plan will be completed for each development precinct. It is anticipated that each precinct will contain a wetland-type stormwater management pond, providing both quality and quantity control, and discharging to existing drainage courses. These facilities will include a forebay for maintenance purposes. A treatment train approach is also proposed, involving lot level and conveyance controls. This generalized strategy is appropriate to the site. Although the overall extent of development on this landscape will be low, there will be substantial changes in landscape permeability within each fully built-out school precinct, and care needs to be taken to provide adequate quantity control to ensure that the small drainage courses which will be receiving flows from these areas are not eroded during larger storm events. To this end, Michalski Nielsen Associates Limited recommends that:

- **the project biologist and engineer work together in the final design of stormwater management controls for each precinct, taking maximum advantage of the physical setting, which includes areas of gentle slope, retained forested lands, retained wetlands and retained stream buffers, all of which can be used to compliment and enhance other stormwater controls.**

- **consideration be given to the components of a treatment train approach that provide quantity control benefits, which could include such measures as roof leaders draining to soakaway pits, additional topsoil depth in all yard areas; conveyance of flows through shallow ditching and bioswales which promote infiltration wherever possible, and discharging the stormwater management pond/wetland via level spreaders or rock fans, into either wetland areas or riparian buffers, both of which will provide detention;**

- **these same techniques are to be used to ensure that an equivalent of Enhanced (Level 1) water quality treatment is achieved through the treatment train approach.**

6.1.5 Water and Sewers

The property will be on full municipal services. A municipal sewer connection is available at District Road 118, where the District of Muskoka has an operating sewage pumping station. Each school precinct will be serviced by private gravity sanitary sewers and forcemains, which will generally be installed

within the private roadway corridors. Several private sewage pumping stations will be required as part of this system in order to direct site sewage to the municipal station at District Road 118.

Water supply can be provided by watermains on Stephens Bay Road or District Road 118; the District of Muskoka has indicated a preference to service the development via a connection to the watermain on Stephens Bay Road. Water services internal to the property will be private and, like the sanitary sewers, will generally be installed within the private roadway corridors.

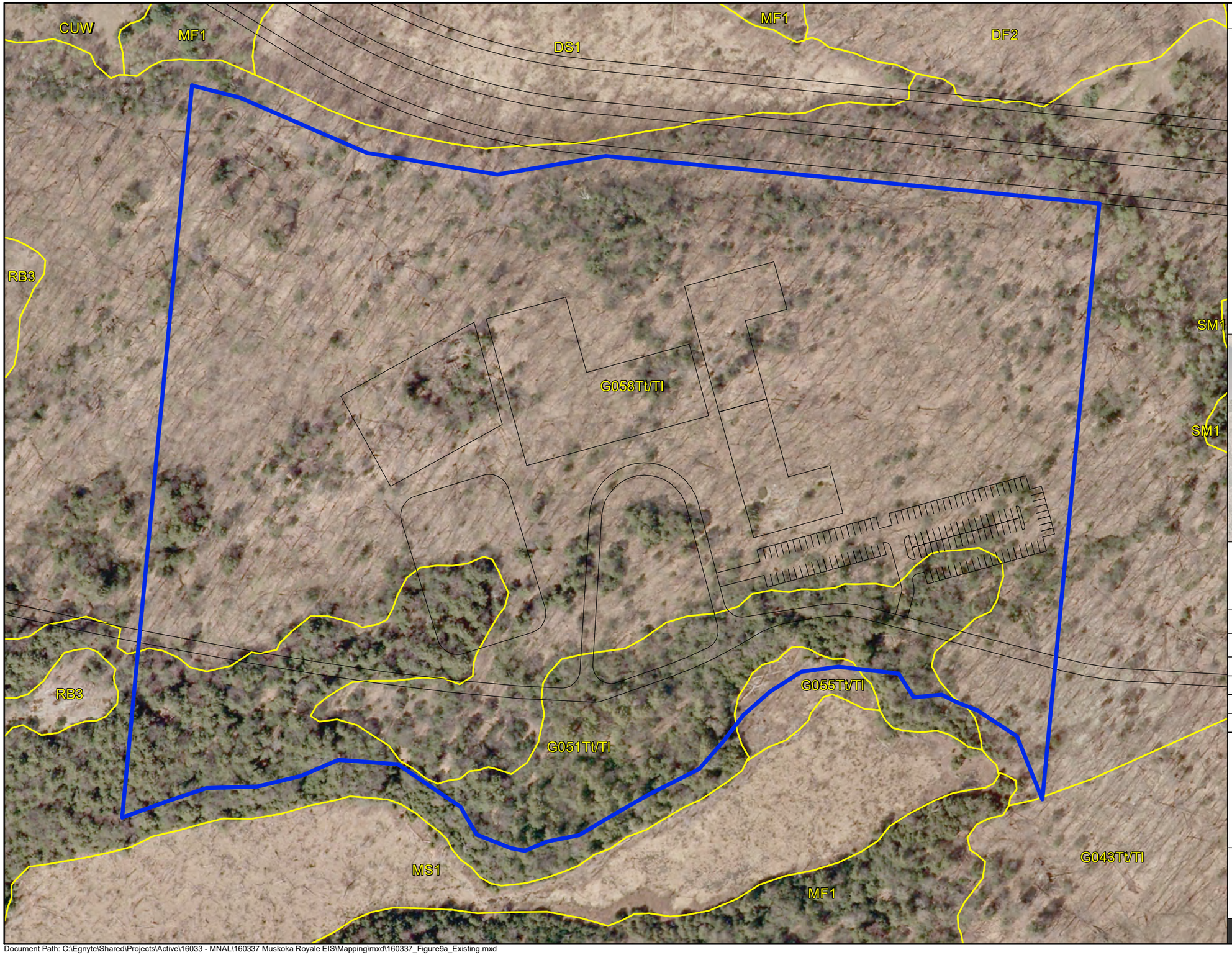
6.2 School Precincts

6.2.1 Precinct A – Secondary School

Figure 9A provides an expanded view of the Secondary School complex. This precinct is located primarily within an area of moderate grades, with mixed forest being the dominant cover. The northern-most portion of the precinct contains steep slopes, grading to the north, which are avoided. The central portion of this precinct contains some north sloping ridge lines, however these are not that high and the building layout has been designed to take advantage of the landscape terracing these provide. The southern-most portion of this precinct contains conifer forest which, although outside of the area of MNRF-identified Stratum 2 deer yard, has characteristics which are suitable for winter deer cover; areas of this precinct providing any such cover opportunities are largely avoided in the layout of facilities and the internal roadway. South of this precinct is a large wetland, consisting of a mixed swamp. Although this wetland area has a high water table, the lack of standing water and very dense rooting of vegetation throughout this feature combines to make it unsuitable for Blanding's Turtle. A 15 m setback from this feature has been used to establish the setback between this wetland and the school precinct boundary, however as all proposed works are further north within this precinct, there are no uses proposed within 30 m of this wetland.

There are no other wetland features within or immediately adjacent to this precinct. There are no rock barrens within this precinct. There are no drainage features apart from two small and intermittent drainages from the wetland within the southeast portion of this precinct; the proposed development layout has been sensitive to these features.

In summary, the setting for this secondary school precinct has been carefully selected to avoid areas of substantial biophysical constraint. Internally, the layout has been properly designed to take advantage of



LEGEND

- Site Plan
- ELC Community
- Development Area
- Study Area

Terrestrial System

Forest

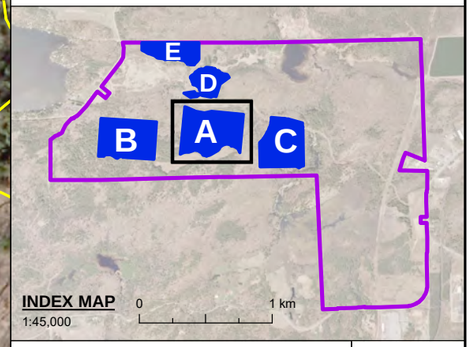
CF1 – Coniferous Forest, Dry to Fresh, Coarse: Hemlock – Cedar Conifer (G051Tt/Tl)
MF1 – Mixed Forest, Dry to Fresh, Coarse: Maple Hardwood (G058Tt/Tl)
MF1 – Mixed Forest, Dry, Sandy: Mixedwood (G043Tt/Tl)
DF1 and DF2 – Deciduous Forest, Dry, Sandy: Mixedwood (G043Tt/Tl)

Cultural (CU)

CP1 - Coniferous Plantation, Red Pine Coniferous Plantation Type (CUP3-1)
OF – Open Field, Cultural Woodland (CUW)

Rock Barren

RB1, RB2 and RB3 – Rock Barren (G164Tt/Tl and G164S)



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CLIENT: Gord Nielsen

PROJECT: Muskoka Royale

PROJECT NO.	160337	REVISION:	2
DATE:	Sep 21/18	SCALE:	1:1800
DRAWN:	BE	DATUM:	NAD83
CHECKED:	DJ	PROJECTION:	UTM 17

Michalski Nielsen Associates Limited

Palmer Environmental Consulting Group Inc.

Development Area A - Existing Environmental Conditions

Figure 9a

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site topography and avoid/buffer more sensitive features. Michalski Nielsen Associates Limited supports the location and layout of this precinct.

6.2.2 Precinct B – Sports Complex

Figure 9B provides an expanded view of the sports complex precinct. Although this precinct is located on the very edge of the MNRF-identified Stratum 2 deer yard (approximately the western third of this precinct is within the area identified by MNRF), conifer forest is the dominant forest cover. Much of this area does have characteristics which are suitable for winter deer cover. That being said, there was very little evidence of deer use of this area during the winter of 2017/2018, nor any indications of extensive browse which would suggest it was heavily used in the winters immediately prior to this. Further, it is on the periphery of a deer yard, so does not interfere with deer use of that yard as a whole. Finally, it retains broad areas of conifer cover both within the precinct and to its south, and would not interfere with the movement of deer to the large area of good conifer cover that will be retained.

Apart from this one constraint, this precinct is characterized by gentle to moderate grades, and contains no wetlands, rock barrens or watercourses. There is a modest-sized wetland to the south of the precinct, consisting of mixed swamp. Although this wetland has a high water table, the lack of standing water and a very dense rooting of vegetation throughout this feature combine to make it unsuitable for Blanding's Turtle. A 15 m setback from this location has been used to define the school precinct boundary, however as all proposed works are somewhat further north within this precinct, an average buffer of at least 30 m will be retained along this wetland (with the buffer perhaps being as little as 20 m through one small section).

In summary, the setting for the sports complex precinct has been carefully selected to avoid areas of substantial biophysical constraint. Deer overwintering opportunities will not be substantially diminished within this portion of the property, and will be quite negligibly impacted within the MNRF-identified deer yard as a whole. Other more sensitive uses have been avoided/buffered. Michalski Nielsen Associates Limited supports the location and layout of this precinct.

6.2.3 Precinct C – Secondary School Student/Staff Residence

Figure 9C provides an expanded view of the secondary school residence complex. This precinct is located largely within an area of deciduous forest, with some mixed forest in the southeast and northwest.

LEGEND

- Site Plan
- ELC Community
- Development Area
- Study Area

Terrestrial System

Forest

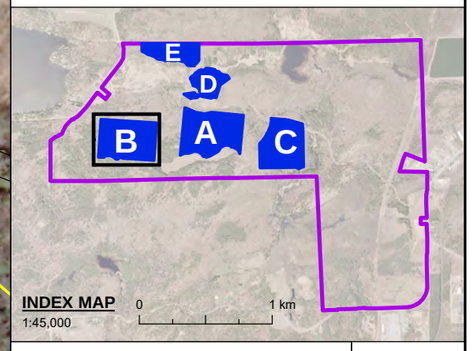
CF1 – Coniferous Forest, Dry to Fresh, Coarse: Hemlock – Cedar Conifer (G051Tt/Tl)
MF1 – Mixed Forest, Dry to Fresh, Coarse: Maple Hardwood (G058Tt/Tl)
MF1 – Mixed Forest, Dry, Sandy: Mixedwood (G043Tt/Tl)
DF1 and DF2 – Deciduous Forest, Dry, Sandy: Mixedwood (G043Tt/Tl)

Cultural (CU)

CP1 - Coniferous Plantation, Red Pine Coniferous Plantation Type (CUP3-1)
OF – Open Field, Cultural Woodland (CUW)

Rock Barren

RB1, RB2 and RB3 – Rock Barren (G164Tt/Tl and G164S)



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CLIENT: Gord Nielsen

PROJECT: Muskoka Royale

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Development Area B - Existing Environmental Conditions

Figure 9b

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LEGEND

- Site Plan
- ELC Community
- Development Area
- Study Area

Terrestrial System

Forest

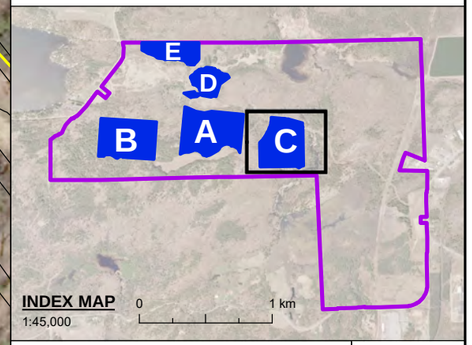
CF1 – Coniferous Forest, Dry to Fresh, Coarse: Hemlock – Cedar Conifer (G051Tt/Tl)
MF1 – Mixed Forest, Dry to Fresh, Coarse: Maple Hardwood (G058Tt/Tl)
MF1 – Mixed Forest, Dry, Sandy: Mixedwood (G043Tt/Tl)
DF1 and DF2 – Deciduous Forest, Dry, Sandy: Mixedwood (G043Tt/Tl)

Cultural (CU)

CP1 - Coniferous Plantation, Red Pine Coniferous Plantation Type (CUP3-1)
OF – Open Field, Cultural Woodland (CUW)

Rock Barren

RB1, RB2 and RB3 – Rock Barren (G164Tt/Tl and G164S)



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CLIENT: Gord Nielsen

PROJECT: Muskoka Royale

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Development Area C - Existing Environmental Conditions

Figure 9c

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Slopes are typically moderate, with the building layout designed around some relatively short ridge lines. The southern-most portion of this precinct contains approximately 40% of a rock barren, which has been avoided in the layout of facilities. The precinct has also been laid out to avoid an intermittent drainage on its northwest edge, and to avoid and provide ample buffering of a permanent tributary at its southeast corner. There are no wetland features within this zone.

In summary, the setting for the secondary school residence precinct has been carefully selected to avoid areas of substantial biophysical constraint. Internally, the layout has been properly designed to take advantage of site topography and avoid/buffer more sensitive features. Michalski Nielsen Associates Limited supports the location and layout of this precinct.

6.2.4 Precinct D – Elementary School

Figure 9D provides an expanded view of the elementary school complex, a future component of this development. This development area takes advantage of young successional cultural woodland, in areas that were once farmed, and additionally includes some mixed forest and some pine plantation. However, this area is constrained in size by adjacent wetlands and a stream corridor to the west and north, and by some very steep slopes to the east and southeast. Given these constraints, and as part of the iterative process the project team undertook to ensure natural features within this property were being properly protected, it was decided that the future elementary school residence complex was more appropriately separated from the elementary school itself. That residence was shifted north of the stream and wetland constraints into a new development zone, Precinct E. This ensures that Precinct D is able to maintain substantial buffers from all adjacent wetlands and streams. In this regard, while a setback of 15 m from the adjacent stream corridor and wetlands has been used to establish the precinct boundary, facilities are set further back, providing for an average buffer of at least 30 m. There are no wetlands or watercourses internal to this precinct, nor any rock barrens. Topography is quite gentle throughout.

The adjacent wetland areas to Precinct D consist of meadow marsh and shrub thicket swamp. They generally contain too little standing water and are too densely vegetated to support Blanding's Turtle habitat. However, that being said, there is a west to east flowing watercourse on the north side of this zone which drains into Henry Marsh, and which has been subject to beaver damming and some corresponding flooding of reaches in the past. There is a potential for Blanding's Turtle to be able to move along this stream corridor from areas of potential overwintering habitat in Henry Marsh and, depending on the extent of beaver flooding within this stream/wetland system in any given year,

LEGEND

- Site Plan
- ELC Community
- Development Area
- Study Area

Terrestrial System

Forest

CF1 – Coniferous Forest, Dry to Fresh, Coarse: Hemlock – Cedar Conifer (G051Tt/Tl)
MF1 – Mixed Forest, Dry to Fresh, Coarse: Maple Hardwood (G058Tt/Tl)
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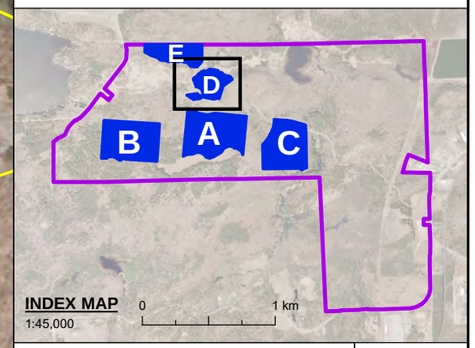

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Development Area D - Existing Environmental Conditions

Figure 9d

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potentially an opportunity to use locally flooded areas of wetland along this system, at least seasonally. While is it our opinion that far better conditions for Blanding's Turtle are available within Henry Marsh than within this stream and wetland complex, we are also confident that the care that has been taken in avoiding and buffering the watercourse and associated wetlands is fully appropriate in protecting for the potential use of these areas by Blanding's Turtle.

A driveway crossing of the small watercourse north of this precinct is required to connect this future elementary school to the future residence complex (Precinct E). A crossing location has been identified within the area of conifer plantation, where the valleyland is very narrow and there are no opportunities for flooding by beaver. While both Precincts D and E are not to be developed in the immediate future, Michalski Nielsen Associates Limited recommends that at such time as they are to be developed:

- **the project biologist work with the project engineer and architect in designing a crossing of this stream corridor which addresses the function of this stream as a wildlife corridor, including potentially for Blanding's Turtle. A small bridge structure would generally be preferable to a culvert at this location.**

In summary, the setting for this elementary school precinct has been carefully selected to avoid areas of substantial biophysical constraint. Internally, the layout has been properly designed to take advantage of this area's gentle topography and avoid/buffer more sensitive features. There are no concerns that its layout or design will negatively impact on the potential for Blanding's Turtle to use the adjacent stream/wetland corridor for movement and, depending on conditions from one year to the next, possible seasonal use. Michalski Nielsen Associates Limited supports the location and layout of this precinct.

6.2.5 Precinct E – Future Elementary School Student/Staff Residence

Figure 9E provides an expanded view of the Elementary School Student/Staff Residence complex, a future component of this development. This precinct is located entirely along a south-sloping area of deciduous forest, with some mixed forest inclusion. Slopes are generally moderate, with areas of steeper slopes having been avoided in the layout. It occurs to the north of an area of shrub thicket, with a 15 m setback between the edge of the precinct at that wetland boundary. However, as is evident from the extent of white pine within the adjacent edge of shrub thicket, that wetland boundary is itself quite transitional, with the precinct located more than 30 m away from areas where there is potential for flooding activity by beaver (note from **Figure 9E** the manner in which the stream channel moves away from this precinct the further west one goes). There are absolutely no concerns with development in this

LEGEND

- Site Plan
- ELC Community
- Development Area
- Study Area

Terrestrial System

Forest

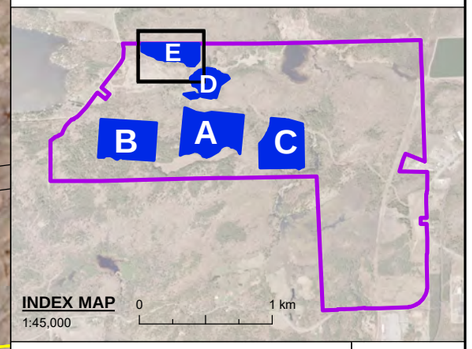
CF1 – Coniferous Forest, Dry to Fresh, Coarse: Hemlock – Cedar Conifer (G051Tt/Tl)
MF1 – Mixed Forest, Dry to Fresh, Coarse: Maple Hardwood (G058Tt/Tl)
MF1 – Mixed Forest, Dry, Sandy: Mixedwood (G043Tt/Tl)
DF1 and DF2 – Deciduous Forest, Dry, Sandy: Mixedwood (G043Tt/Tl)

Cultural (CU)

CP1 - Coniferous Plantation, Red Pine Coniferous Plantation Type (CUP3-1)
OF – Open Field, Cultural Woodland (CUW)

Rock Barren

RB1, RB2 and RB3 – Rock Barren (G164Tt/Tl and G164S)



0 25 50 75
metres

N

CLIENT: Gord Nielsen

PROJECT: Muskoka Royale

PROJECT NO.	160337	REVISION:	2
DATE:	Sep 21/18	SCALE:	1:1500
DRAWN:	BE	DATUM:	NAD83
CHECKED:	DJ	PROJECTION:	UTM 17

Michalski Nielsen Associates Limited

PALMER ENVIRONMENTAL CONSULTING GROUP INC.

Development Area E - Existing Environmental Conditions

Figure 9e

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precinct and its separation from stream corridor/wetland areas which have limited potential to be used by Blanding's Turtle.

In summary, the setting for this primary school residence precinct has been carefully selected to avoid areas of substantial biophysical constraint. Internally, the layout has been properly designed to take advantage of site topography and avoid/buffer more sensitive features. Michalski Nielsen Associates Limited supports the location and layout of this precinct.

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APPENDIX A – UPDATED VASCULAR PLANT LIST

Plant List

2018	1999	ScientificName	OLDScientificName	CommonName	GRank	SRANK	cc	cw
X	X	Osmunda claytoniana	Osmunda claytoniana	Interrupted Fern	G5	S5	7	-1
X	X	Pteridium aquilinum var. latiusculum	Pteridium aquilinum var. latiusculum	eastern Bracken Fern	G5T	S5	2	3
X	X	Thelypteris noveboracensis	Thelypteris noveboracensis	New York Fern	G5	S4S5	7	-1
X	X	Dryopteris intermedia	Dryopteris intermedia	Evergreen Wood Fern	G5	S5	5	0
X	X	Dryopteris marginalis	Dryopteris marginalis	Marginal Wood Fern	G5	S5	5	3
X	X	Onoclea sensibilis	Onoclea sensibilis	Sensitive Fern	G5	S5	4	-3
X	X	Abies balsamea	Abies balsamea	Balsam Fir	G5	S5	5	-3
X	X	Pinus resinosa	Pinus resinosa	Red Pine	G5	S5	8	3
X	X	Pinus strobus	Pinus strobus	Eastern White Pine	G5	S5	4	3
X	X	Tsuga canadensis	Tsuga canadensis	Eastern Hemlock	G5	S5	7	3
X	X	Juniperus communis	Juniperus communis	common juniper	G5	S5	4	3
X	X	Aquilegia canadensis	Aquilegia canadensis	Red Columbine	G5	S5	5	1
X	X	Ranunculus acris	Ranunculus acris	common Buttercup	G5	SE5	0	-2
X	X	Fagus grandifolia	Fagus grandifolia	American Beech	G5	S5	6	3
X	X	Quercus rubra	Quercus rubra	Northern Red Oak	G5	S5	6	3
X	X	Betula alleghaniensis	Betula alleghaniensis	Yellow Birch	G5	S5	6	0
X	X	Betula papyrifera	Betula papyrifera	Paper Birch	G5	S5	2	2
X	X	Ostrya virginiana	Ostrya virginiana	Eastern Hop-hornbeam	G5	S5	4	4
X	X	Polypodium virginianum	Polypodium virginianum	Rock Polypody	G5	S5	6	5
X	X	Tilia americana	Tilia americana	Basswood	G5	S5	4	3
X	X	Populus tremuloides	Populus tremuloides	Trembling Aspen	G5	S5	2	0
X	X	Lysimachia borealis	Trientalis borealis ssp. borealis	Northern Starflower	G5T?	S5	6	-1
X	X	Prunus serotina	Prunus serotina	Black Cherry	G5	S5	3	3
X	X	Prunus virginiana var. virginiana	Prunus virginiana ssp. virginiana	Choke Cherry	G5T?	S5	2	1
X	X	Rubus idaeus ssp. strigosus	Rubus idaeus ssp. melanolasius	North American Red Raspberry	G5T	S5	0	-2
X	X	Acer pensylvanicum	Acer pensylvanicum	Striped Maple	G5	S5	7	3
X	X	Acer rubrum	Acer rubrum	Red Maple	G5	S5	4	0
X	X	Acer saccharum var. saccharum	Acer saccharum ssp. saccharum	Sugar Maple	G5T?	S5	4	3
X	X	Aralia nudicaulis	Aralia nudicaulis	Wild Sarsaparilla	G5	S5	4	3
X	X	Fraxinus americana	Fraxinus americana	White Ash	G5	S5	4	3
X	X	Mitchella repens	Mitchella repens	Partridgeberry	G5	S5	6	2
X	X	Viburnum lentago	Viburnum lentago	Nannyberry	G5	S5	4	-1
X	X	Solidago sp	Solidago sp	Goldenrod Species			0	0
X	X	Carex gracillima	Carex gracillima	Graceful Sedge	G5	S5	4	3
X	X	Carex intumescens	Carex intumescens	Bladder Sedge	G5	S5	6	-4
X	X	Dactylis glomerata	Dactylis glomerata	Orchard Grass	G?	SE5	0	3
X	X	Maianthemum canadense	Maianthemum canadense	Wild-lily-of-the-valley	G5	S5	5	0
X	X	Medeola virginiana	Medeola virginiana	Indian Cucumber-root	G5	S5	7	5
X	X	Polygonatum pubescens	Polygonatum pubescens	hairy Solomon's Seal	G5	S5	5	5
X	X	Geranium robertianum	Geranium robertianum	Herb-robert	G5	SE5	0	5
X		Equisetum sp	Equisetum sp	Horsetail Species			0	0
X		Thalictrum dioicum	Thalictrum dioicum	Early Meadow-rue	G5	S5	5	2
X		Alnus alnobetula spp. crispa	Alnus viridis spp. crispa	American green Alder	G5T5	S5		
X		Fagopyrum esculentum	Fagopyrum esculentum	common buckwheat	G?	SE3	0	5
X		Fallopia convolvulus	Polygonum convolvulus	Eurasian Black Bindweed	G?	SE5	0	1
X		Agrimonia striata	Agrimonia striata	Woodland Agrimony	G5	S4?		
X		Fragaria sp	Fragaria sp	Strawberry Species			0	0
X		Potentilla sp	Potentilla sp	Cinquefoil Species			0	0
X		Plantago sp	Plantago sp	Plantain Species			0	0
X		Lonicera sp	Lonicera sp	Honeysuckle Species			0	0
X		Lonicera villosa	Lonicera villosa	Mountain Fly-honeysuckle	G5	S5	10	-3
X		Carex sp	Carex sp	Sedge Species			0	0
X		Rhynchospora fusca	Rhynchospora fusca	Brown Beakrush	G4G5	S4?	10	-5
X		Festuca sp	Festuca sp	Fescue Species			0	0

Plant List

X		Erythronium americanum ssp. americanum	Erythronium americanum ssp. americanum	Yellow Trout lily	G5T5	S5	5	5
X		Trillium sp	Trillium sp	Trillium Species			0	0
X		Cypripedium acaule	Cypripedium acaule	Pink Lady's-slipper	G5	S5	7	-3
	X	Equisetum arvense	Equisetum arvense	Field Horsetail	G5	S5	0	0
	X	Equisetum fluviatile	Equisetum fluviatile	Water Horsetail	G5	S5	7	-5
	X	Equisetum hyemale ssp. affine	Equisetum hyemale ssp. affine	common scouring-rush	G5T5	S5	2	-2
	X	Equisetum sylvaticum	Equisetum sylvaticum	Woodland Horsetail	G5	S5	7	-3
	X	Botrypus virginianus	Botrychium virginianum	Rattlesnake Fern	G5	S5	5	3
	X	Osmunda regalis var. spectabilis	Osmunda regalis var. spectabilis	Royal Fern	G5T	S5	7	-5
	X	Osmundastrum cinnamomeum	Osmunda cinnamomea	Cinnamon Fern	G5	S5	7	-3
	X*	Adiantum pedatum	Adiantum pedatum	Northern Maidenhair fern	G5	S5	7	1
	X	Thelypteris palustris var. pubescens	Thelypteris palustris var. pubescens	eastern Marsh Fern	G5T?	S5	5	-4
	X	Athyrium filix-femina var. angustum	Athyrium filix-femina var. angustum	Northeastern Lady fern	G5T5	S5	4	0
	X	Cystopteris bulbifera	Cystopteris bulbifera	Bulblet bladder Fern	G5	S5	5	-2
	X	Cystopteris tenuis	Cystopteris tenuis	Mackay's brittle Fern	G4G5	S5	6	5
	X	Deparia acrostichoides	Deparia acrostichoides	Silvery Spleenwort	G5	S4	8	0
	X	Dryopteris carthusiana	Dryopteris carthusiana	Spinulose Wood Fern	G5	S5	5	-2
	X	Dryopteris cristata	Dryopteris cristata	Crested Wood Fern	G5	S5	7	-5
	X	Gymnocarpium dryopteris	Gymnocarpium dryopteris	Common Oak Fern	G5	S5	7	0
	X*	Matteuccia struthiopteris var. pensylvanica	Matteuccia struthiopteris var. pensylvanica	Ostrich Fern	G5	S5	5	-3
	X	Polystichum acrostichoides	Polystichum acrostichoides	Christmas Fern	G5	S5	5	5
	X	Larix decidua	Larix decidua	European Larch	G?	SE2	0	5
	X	Larix laricina	Larix laricina	Tamarack	G5	S5	7	-3
	X	Picea glauca	Picea glauca	White Spruce	G5	S5	6	3
	X	Pinus sylvestris	Pinus sylvestris	Scots Pine	G?	SE5	0	5
	X	Thuja occidentalis	Thuja occidentalis	eastern White Cedar	G5	S5	4	-3
	X	Taxus canadensis	Taxus canadensis	Canada Yew	G5	S5	7	3
	X	Nuphar variegata	Nuphar variegata	variegated pond-lily	G5	S5	4	-5
	X	Nymphaea odorata	Nymphaea odorata	Fragrant Water-lily	G5	S5	5	-5
	X	Actaea pachypoda	Actaea pachypoda	White Baneberry	G5	S5	6	5
	X	Actaea rubra	Actaea rubra	Red Baneberry	G5	S5	5	5
	X*	Anemone acutiloba	Anemone acutiloba	Sharp-lobed Hepatica	G5	S5	6	5
	X	Clematis virginiana	Clematis virginiana	Virginia clematis	G5	S5	3	0
	X	Coptis trifolia	Coptis trifolia ssp. groenlandica	Goldthread	G5T5	S5	7	-3
	X	Ranunculus abortivus	Ranunculus abortivus	Kidney-leaved Buttercup	G5	S5	2	-2
	X	Thalictrum pubescens	Thalictrum pubescens	Tall Meadow-rue	G5	S5	5	-2
	X	Caulophyllum thalictroides	Caulophyllum thalictroides	Blue Cohosh	G5	S5	6	5
	X	Capnoides sempervirens	Corydalis sempervirens	Pink Corydalis	G5	S5	7	5
	X	Ulmus americana	Ulmus americana	White Elm	G5?	S5	3	-2
	X	Laportea canadensis	Laportea canadensis	Canada Wood Nettle	G5	S5	6	-3
	X	Urtica dioica ssp. gracilis	Urtica dioica ssp. gracilis	Slender Stinging Nettle	G5T?	S5	2	-1
	X	Myrica gale	Myrica gale	Sweet Gale	G5	S5	6	-5
	X	Quercus alba	Quercus alba	White Oak	G5	S5	6	3
	X	Alnus incana spp. rugosa	Alnus incana ssp. rugosa	Speckled Alder	G5T5	S5	6	-5
	X	Corylus cornuta ssp. cornuta	Corylus cornuta ssp. cornuta	Beaked Hazelnut	G5T	S5	5	5
	X	Chenopodium album	Chenopodium album var. album	common lamb's-quarters	G5T5	SE5	0	1
	X	Saponaria officinalis	Saponaria officinalis	Bouncing-bet	G?	SE5	0	3
	X	Fallopia cilinodis	Polygonum cilinode	Fringed Black Bindweed	G5	S5	2	5
	X	Persicaria hydropiper	Polygonum hydropiper	marshpepper smartweek	G5	SE5	4	-5
	X	Persicaria maculosa	Polygonum persicaria	spotted Lady's-thumb	G?	SE5	0	-3
	X	Persicaria sagittata	Polygonum sagittatum	Arrow-leaved Tearthumb	G5	S4	5	-5
	X	Polygonum amphibium	Polygonum amphibium	Water Smartweed	G5	S5	5	-5
	X	Polygonum aviculare	Polygonum aviculare	Prostrate Knotweed	G?	SE5	0	1
	X	Rumex crispus	Rumex crispus	Curled Dock	G?	SE5	0	-1
	X	Rumex obtusifolius	Rumex obtusifolius ssp. obtusifolius	Bitter Dock	G?	SE5	0	-3

Plant List

	X	Hypericum fraseri	Triadenum fraseri	Fraser's St. John's-wort	G4G5	S5	7	-5
	X	Hypericum perforatum	Hypericum perforatum	Common St. John's-wort	G?	SE5	0	5
	X	Viola canadensis	Viola canadensis	Canada Violet	G5	S5	6	5
	X	Viola pubescens	Viola pubescens	Downy Yellow Violet	G5	S5	5	4
	X	Populus balsamifera	Populus balsamifera ssp. balsamifera	Balsam Poplar	G5T?	S5	4	-3
	X	Populus grandidentata	Populus grandidentata	Large-toothed Aspen	G5	S5	5	3
	X	Salix bebbiana	Salix bebbiana	Bebb's Willow	G5	S5	4	-4
	X	Salix discolor	Salix discolor	Pussy Willow	G5	S5	3	-3
	X	Salix fragilis	Salix fragilis	Crack Willow	G?	SE5	0	-1
	X	Salix lucida	Salix lucida	Shining Willow	G5	S5	5	-4
	X	Salix petiolaris	Salix petiolaris	Meadow Willow	G5	S5	3	-4
	X	Barbarea vulgaris	Barbarea vulgaris	bitter wintercress	G?	SE5	0	0
	X	Cardamine pensylvanica	Cardamine pensylvanica	Pennsylvania Bittercress	G5	S5	6	-4
	X	Gaultheria procumbens	Gaultheria procumbens	eastern teaberry	G5	S5	6	3
	X	Vaccinium angustifolium	Vaccinium angustifolium	early lowbush blueberry	G5	S5	6	3
	X	Vaccinium myrtilloides	Vaccinium myrtilloides	Velvet-leaved Blueberry	G5	S5	7	-2
	X	Pyrola elliptica	Pyrola elliptica	Shinleaf	G5	S5	5	5
	X	Lysimachia terrestris	Lysimachia terrestris	Swamp yellow Loosestrife	G5	S5	6	-5
	X	Ribes cynosbati	Ribes cynosbati	eastern Prickly Gooseberry	G5	S5	4	5
	X	Ribes glandulosum	Ribes glandulosum	Skunk Currant	G5	S5	6	-3
	X	Tiarella cordifolia	Tiarella cordifolia	Heart-leaved Foam-flower	G5	S5	6	1
	X	Amelanchier arborea	Amelanchier arborea	Downy Serviceberry	G5	S5	5	3
	X	Crataegus sp	Crataegus sp	Hawthorn Species			0	0
	X	Fragaria virginiana ssp. virginiana	Fragaria virginiana ssp. virginiana	wild Strawberry	G5?	SU	2	1
	X	Geum aleppicum	Geum aleppicum	Yellow Avens	G5	S5	2	-1
	X	Potentilla norvegica	Potentilla norvegica ssp. monspeliensis	rough Cinquefoil	G5	S5	0	0
	X	Potentilla recta	Potentilla recta	Sulphur Cinquefoil	G?	SE5	0	5
	X	Rosa sp	Rosa sp	Rose Species			0	0
	X	Rubus pubescens	Rubus pubescens	Dwarf Raspberry	G5	S5	4	-4
	X	Spiraea alba	Spiraea alba	white meadowsweet	G5	S5	3	-4
	X	Spiraea tomentosa	Spiraea tomentosa	steeplebush	G5	S4S5	5	-3
	X	Melilotus alba	Melilotus alba	White Sweet Clover	G5	SE5	0	3
	X	Trifolium aureum	Trifolium aureum	Yellow Clover	G?	SE5	0	5
	X	Trifolium hybridum	Trifolium hybridum ssp. elegans	Alsike Clover	G?	SE5	0	1
	X	Trifolium pratense	Trifolium pratense	Red Clover	G?	SE5	0	2
	X	Trifolium repens	Trifolium repens	White Clover	G?	SE5	0	2
	X	Vicia cracca	Vicia cracca	Tufted Vetch	G?	SE5	0	5
	X	Myriophyllum alterniflorum	Myriophyllum alterniflorum	Alternate-flowered Water-milfoil	G5	S4	8	-5
	X	Chamaenerion angustifolium ssp. Angustifolium	Chamerion angustifolium ssp. Angustifolium, Epilobium angustifolium	Fireweed	G5	S5	3	0
	X	Circaea alpina	Circaea alpina	Small Enchanter's Nightshade	G5	S5	6	-3
	X	Epilobium ciliatum ssp. ciliatum	Epilobium ciliatum ssp. ciliatum	northern Willowherb	G5	S5	3	3
	X	Epilobium hirsutum	Epilobium hirsutum	hairy Willowherb	G?	SE5	0	-4
	X	Oenothera parviflora	Oenothera parviflora	small-flowered Evening primrose	G?	S5?	1	3
	X	Cornus alternifolia	Cornus alternifolia	Alternate-leaved Dogwood	G5	S5	6	5
	X	Cornus canadensis	Cornus canadensis	Bunchberry	G5	S5	7	0
	X	Cornus rugosa	Cornus rugosa	Round-leaved Dogwood	G5	S5	6	5
	X	Cornus sericea	Cornus stolonifera	Red-osier Dogwood	G5	S5	2	-3
	X	Ilex mucronata	Nemopanthus mucronatus	Mountain Holly	G5	S5	8	-5
	X	Ilex verticillata	Ilex verticillata	Common Winterberry	G5	S5	5	-4
	X	Parthenocissus vitacea	Parthenocissus inserta	Thicket Creeper	G5	S5	3	3
	X	Vitis riparia	Vitis riparia	Riverbank Grape	G5	S5	0	-2
	X	Acer negundo	Acer negundo	Manitoba Maple	G5	S5	0	-2
	X	Acer saccharinum	Acer saccharinum	Silver Maple	G5	S5	5	-3
	X	Acer spicatum	Acer spicatum	Mountain Maple	G5	S5	6	3
	X	Rhus typhina	Rhus hirta	Staghorn Sumac	G5	S5	1	5

Plant List

	X	Impatiens capensis	Impatiens capensis	Spotted Jewelweed	G5	S5	4	-3
	X	Cicuta bulbifera	Cicuta bulbifera	Bulbous water-hemlock	G5	S5	5	-5
	X	Daucus carota	Daucus carota	wild carrot	G?	SE5	0	5
	X	Sium suave	Sium suave	common Water-parsnip	G5	S5	4	-5
	X	Apocynum androsaemifolium ssp. androsaemifolium	Apocynum androsaemifolium ssp. androsaemifolium	Spreading Dogbane	G5T?	S5	3	5
	X	Asclepias incarnata ssp. incarnata	Asclepias incarnata ssp. incarnata	Swamp Milkweed	G5T5	S5	6	-5
	X	Asclepias syriaca	Asclepias syriaca	Common Milkweed	G5	S5	0	5
	X	Verbena hastata	Verbena hastata	Blue Vervain	G5	S5	4	-4
	X	Clinopodium vulgare	Clinopodium vulgare	wild Basil	G?	S5	4	5
	X	Galeopsis tetrahit	Galeopsis tetrahit	common hemp-nettle	G?	SE5	0	5
	X	Lycopus americanus	Lycopus americanus	American water-horehound	G5	S5	4	-5
	X	Mentha arvensis	Mentha arvensis ssp. borealis	field mint		S5	3	-3
	X	Scutellaria galericulata	Scutellaria galericulata	marsh skullcap	G5	S5	6	-5
	X	Plantago lanceolata	Plantago lanceolata	English Plantain	G5	SE5	0	0
	X	Plantago major	Plantago major	common Plantain	G5	SE5	0	-1
	X	Fraxinus nigra	Fraxinus nigra	Black Ash	G5	S5	7	-4
	X	Fraxinus pennsylvanica	Fraxinus pennsylvanica	Green Ash	G5	S5	3	-3
	X	Agalinis paupercula var. paupercula	Agalinis paupercula var. borealis	Small-flowered Purple False Foxglove	G5T?	S4S5	8	-5
	X	Chelone glabra	Chelone glabra	white Turtlehead	G5	S5	7	-5
	X	Verbascum thapsus	Verbascum thapsus	Common Mullein	G?	SE5	0	5
	X	Veronica officinalis	Veronica officinalis	Common Speedwell	G5	SE5	0	5
	X	Lobelia inflata	Lobelia inflata	Indian tobacco	G5	S5	3	4
	X	Galium aparine	Galium aparine	common bedstraw	G5	S5	4	3
	X	Galium triflorum	Galium triflorum	three-flowered bedstraw	G5	S5	4	2
	X	Diervilla lonicera	Diervilla lonicera	Northern Bush-honeysuckle	G5	S5	5	5
	X	Lonicera canadensis	Lonicera canadensis	Canada Fly-honeysuckle	G5	S5	6	3
	X	Lonicera tatarica	Lonicera tatarica	Tatarian Honeysuckle	G?	SE5	0	3
	X	Sambucus canadensis	Sambucus nigra ssp. canadensis	Common Elderberry	G5	S5	5	-2
	X	Sambucus racemosa	Sambucus racemosa ssp. pubens	Red Elderberry	G5T4T5	S5	5	2
	X	Viburnum lantanoides	Viburnum lantanoides	hobblebush	G5	S5	8	0
	X	Viburnum nudum var. cassinoides	Viburnum cassinoides	wild raisin	G5	S5	7	-3
	X	Viburnum opulus ssp. trilobum var. americanum	Viburnum opulus var. americanum, Viburnum trilobum	Highbush Cranberry	G5T5	S5	5	-3
	X	Achillea millefolium	Achillea millefolium ssp. millefolium	Common Yarrow	G5T?	SE?	0	3
	X	Ambrosia artemisiifolia	Ambrosia artemisiifolia	Common Ragweed	G5	S5	0	3
	X	Anaphalis margaritacea	Anaphalis margaritacea	Pearly Everlasting	G5	S5	3	5
	X	Antennaria neglecta	Antennaria neglecta	Field Pussytoes	G5	S5	3	5
	X	Arctium minus	Arctium minus ssp. minus	Common Burdock	G?T?	SE5	0	5
	X	Bidens frondosa	Bidens frondosa	Devil's Beggar's Ticks	G5	S5	3	-3
	X	Cichorium intybus	Cichorium intybus	wild chicory	G?	SE5	0	5
	X	Cirsium arvense	Cirsium arvense	Canada Thistle	G?	SE5	0	3
	X	Cirsium vulgare	Cirsium vulgare	Bull Thistle	G5	SE5	0	4
	X	Erigeron annuus	Erigeron annuus	annual Fleabane	G5	S5	0	1
	X	Erigeron canadensis	Conyza canadensis	Canada horseweed	G5	S5	0	1
	X	Eupatorium perfoliatum	Eupatorium perfoliatum	Common Boneset	G5	S5	2	-4
	X	Eurybia macrophylla	Aster macrophyllus	Large-leaved Aster	G5	S5	5	5
	X	Euthamia graminifolia	Euthamia graminifolia	Grass-leaved Goldenrod	G5	S5	2	-2
	X	Eutrochium maculatum var. maculatum	Eupatorium maculatum ssp. maculatum	Spotted Joe-pye Weed	G5T5	S5	3	-5
	X	Lactuca biennis	Lactuca biennis	Tall Blue Lettuce	G5	S5	6	0
	X	Leucanthemum vulgare	Chrysanthemum leucanthemum	Oxeye Daisy	G?	SE5	0	5
	X	Matricaria discoidea	Matricaria matricarioides	Pineappleweed	G5	SE5		
	X	Nabalus altissimus	Prenanthes altissima	Tall Rattlesnakeroot	G5?	S5	5	3
	X	Pilosella aurantiaca	Hieracium aurantiacum	Orange Hawkweed	G?	SE5	0	5
	X	Rudbeckia hirta	Rudbeckia hirta	Black-eyed Susan	G5	S5	0	3
	X	Solidago canadensis	Solidago canadensis	Canada Goldenrod	G5	S5	1	3
	X	Solidago rugosa ssp. rugosa	Solidago rugosa ssp. rugosa	Rough Goldenrod	G5T?	S5	4	-1

Plant List

	X	Sonchus arvensis ssp. arvensis	Sonchus arvensis ssp. arvensis	Field Sow-thistle	G?T?	SE5	0	1
	X	Symphyotrichum cordifolium	Aster cordifolius	Heart-leaved Aster	G5	S5	5	5
	X	Symphyotrichum novae-angliae	Aster novae-angliae	New England Aster	G5	S5	2	-3
	X	Symphyotrichum puniceum var. puniceum	Aster puniceus var. puniceus	Purple-stemmed Aster	G5T?	S5	6	-5
	X	Taraxacum officinale	Taraxacum officinale	Common Dandelion	G5	SE5	0	3
	X	Alisma plantago-aquatica	Alisma plantago-aquatica	European Water-plantain	G5	S5	3	-5
	X	Sagittaria latifolia	Sagittaria latifolia	Broad-leaved Arrowhead	G5	S5	4	-5
	X	Elodea canadensis	Elodea canadensis	Canada Waterweed	G5	S5	4	-5
	X	Potamogeton amplifolius	Potamogeton amplifolius	Large-leaved Pondweed	G5	S5	5	-5
	X	Potamogeton gramineus	Potamogeton gramineus	Grass-leaved Pondweed	G5	S5	4	-5
	X	Potamogeton natans	Potamogeton natans	Floating-leaved Pondweed	G5	S5	5	-5
	X	Arisaema triphyllum ssp. triphyllum	Arisaema triphyllum ssp. triphyllum	Jack-in-the-pulpit	G5T5	S5	5	-2
	X	Lemna minor	Lemna minor	small duckweed	G5	S5	2	-5
	X	Lemna trisulca	Lemna trisulca	Star Duckweed	G5	S5	4	-5
	X	Juncus effusus ssp. solutus	Juncus effusus ssp. solutus	Soft Rush	G5T?	S5	4	-5
	X	Juncus nodosus	Juncus nodosus	Knotted Rush	G5	S5	5	-5
	X	Juncus tenuis	Juncus tenuis	path rush	G5	S5	0	0
	X	Carex aquatilis	Carex aquatilis	Water Sedge	G5	S5	7	-5
	X	Carex arctata	Carex arctata	Drooping woodland Sedge	G5?	S5	5	5
	X	Carex bebbii	Carex bebbii	Bebb's Sedge	G5	S5	3	-5
	X	Carex crinita	Carex crinita	Fringed Sedge	G5	S5	6	-4
	X	Carex disperma	Carex disperma	two-seeded Sedge	G5	S5	8	-5
	X	Carex laxiflora	Carex laxiflora	Loose-flowered Sedge	G5	S5	5	0
	X	Carex lurida	Carex lurida	Shallow Sedge	G5	S5	6	-5
	X*	Carex novae-angliae	Carex novae-angliae	New England Sedge	G5	S3	10	5
	X*	Carex plantaginea	Carex plantaginea	Plantain-leaved Sedge	G5	S5	7	5
	X	Carex retrorsa	Carex retrorsa	Retrorse Sedge	G5	S5	5	-5
	X	Carex rosea	Carex rosea	Rosy Sedge	G5	S5	5	5
	X	Carex stipata	Carex stipata	awl-fruited sedge	G5	S5	3	-5
	X	Carex stricta	Carex stricta	Tussock Sedge	G5	S5	4	-5
	X	Carex trisperma	Carex trisperma var. trisperma	Three-seeded Sedge	G5T	S5	9	-5
	X	Carex vulpinoidea	Carex vulpinoidea	Fox Sedge	G5	S5	3	-5
	X	Eleocharis acicularis	Eleocharis acicularis	needle Spikerush	G5	S5	5	-5
	X	Eleocharis obtusa	Eleocharis obtusa	Blunt Spikerush	G5	S5	5	-5
	X	Schoenoplectus tabernaemontani	Scirpus validus	Soft-stemmed Bulrush	G?	S5	5	-5
	X	Scirpus atrovirens	Scirpus atrovirens	dark-green bulrush	G5?	S5	3	-5
	X	Scirpus cyperinus	Scirpus cyperinus	common woolly bulrush	G5	S5	4	-5
	X	Agrostis gigantea	Agrostis gigantea	Redtop	G4G5	SE5	0	0
	X	Alopecurus pratensis	Alopecurus pratensis	Meadow Foxtail	G?	SE5	0	-3
	X	Avenella flexuosa	Deschampsia flexuosa	wavy Hairgrass	G5	S5	8	5
	X	Brachyelytrum erectum	Brachyelytrum erectum	Southern shorthusk	G5	S4S5	7	5
	X	Bromus ciliatus	Bromus ciliatus	Fringed Brome	G5	S5	6	-3
	X	Bromus inermis	Bromus inermis ssp. inermis	Smooth Brome	G4G5T?	SE5	0	5
	X	Calamagrostis canadensis	Calamagrostis canadensis	Bluejoint Reedgrass	G5	S5	4	-5
	X	Danthonia spicata	Danthonia spicata	Poverty Oatgrass	G5	S5	5	5
	X	Elymus repens	Elymus repens	Quackgrass	G?	SE5	0	3
	X	Glyceria canadensis	Glyceria canadensis	Canada Mannagrass	G5	S4S5	7	-5
	X	Glyceria striata	Glyceria striata	Fowl Manna Grass	G5	S5	3	-5
	X	Hordeum jubatum ssp. jubatum	Hordeum jubatum ssp. jubatum	Fox-tail Barley	G5T?	SE5	0	-1
	X	Leersia oryzoides	Leersia oryzoides	Rice Cutgrass	G5	S5	3	-5
	X	Muhlenbergia mexicana var. mexicana	Muhlenbergia mexicana var. mexicana	Mexican muhly	G5T?	S5	1	-3
	X	Panicum capillare	Panicum capillare	Common Panicgrass	G5	S5	0	0
	X	Phalaris arundinacea	Phalaris arundinacea	Reed Canarygrass	G5	S5	0	-4
	X	Phleum pratense	Phleum pratense	Common Timothy	G?	SE5	0	3
	X	Poa compressa	Poa compressa	Canada Bluegrass	G?	S5	0	2

Plant List

	X	Poa palustris	Poa palustris	Fowl Bluegrass	G5	S5	5	-4
	X	Poa pratensis ssp. pratensis	Poa pratensis ssp. pratensis	Kentucky Bluegrass	G5T	S5	0	1
	X	Poa saltuensis	Poa saltuensis	open woodland Bluegrass	G5?	S3	7	5
	X	Setaria viridis	Setaria viridis	Green foxtail	G?	SE5	0	5
	X	Sparganium americanum	Sparganium americanum	American Burreed	G5	S4?	6	-5
	X	Sparganium emersum ssp. emersum	Sparganium emersum ssp. emersum	Greenfruit Bur-reed	G5	S5	5	-5
	X	Typha angustifolia	Typha angustifolia	Narrow-leaved Cattail	G5	S5	3	-5
	X	Typha latifolia	Typha latifolia	Broad-leaved Cattail	G5	S5	3	-5
	X	Pontederia cordata	Pontederia cordata	Pickerelweed	G5	S5	7	-5
	X	Allium tricoccum	Allium tricoccum	Wild Leek	G5	S5	7	2
	X	Clintonia borealis	Clintonia borealis	yellow clintonia	G5	S5	7	-1
	X	Maianthemum racemosum	Maianthemum racemosum ssp. racemosum	Large False Solomon's Seal	G5T	S5	4	3
	X	Streptopus lanceolatus var. lanceolatus	Streptopus lanceolatus var. roseus, Streptopus roseus	eastern rose twisted-stalk	G5	S5	7	0
	X	Trillium grandiflorum	Trillium grandiflorum	White Trillium	G5	S5	5	5
	X	Uvularia grandiflora	Uvularia grandiflora	large-flowered bellwort	G5	S5	6	5
	X	Iris versicolor	Iris versicolor	harlequin blue flag	G5	S5	5	-5
	X	Sisyrinchium montanum	Sisyrinchium montanum	Strict Blue-eyed-grass	G5	S5	4	-1
	X	Epipactis helleborine	Epipactis helleborine	broad-leaved Helleborine	G?	SE5	0	5
	X	Geranium bicknellii	Geranium bicknellii	Bicknell's geranium	G5	S4	5	5

* Reported on Royale Muskoka Property Forect Cover Evaluation (Kings Forestry Series 1998), but not subsequently identified in MNAL surveys.

APPENDIX B – 1999 WILDLIFE LIST

List of wildlife species sighted or evidence of presence recorded on the Royal Muskoka Resort property, between February 15, 1998 and November 9, 1999 by Michael Michalski Associates

Common Name	Scientific Name
Birds	
great blue heron	*Ardea herodias*
green-backed heron	*Butorides striatus*
Canada goose	*Branta canadensis*
mallard	*Anas platyrhynchos*
wood duck	*Aix sponsa*
turkey vulture	*Cathartes aura*
red-tailed hawk	*Buteo jamaicensis*
broad-winged hawk	*Buteo platypterus*
killdeer	*Charadrius vociferus*
spotted sandpiper	*Actitis macularia*
ring-billed gull	*Larus delawarensis*
mourning dove	*Zenaida macroura*
great horned owl	*Bubo virginianus*
belted kingfisher	*Ceryle alcyon*
downy woodpecker	*Picoides pubescens*
hairy woodpecker	*Picoides villosus*
pileated woodpecker	*Dryocopus pileatus*
northern flicker	*Colaptes auratus*
eastern wood-pewee	*Contopus virens*
least flycatcher	*Empidonax minimus*
eastern phoebe	*Sayornis phoebe*
great-crested flycatcher	*Myiarchus crinitus*
eastern kingbird	*Tyrannus tyrannus*
purple martin	*Progne subis*
tree swallow	*Tachycineta bicolor*
barn swallow	*Hirundo rustica*
blue jay	*Cyanocitta cristata*
common crow	*Corvus brachyrhynchos*
black-capped chickadee	*Parus atricapillus*
red-breasted nuthatch	*Sitta carolinensis*
brown creeper	*Certhia americana*
house wren	*Troglodytes aedon*
veery	*Catharus fuscescens*
wood thrush	*Hylocichla mustelina*
American robin	*Turdus migratorius*
gray catbird	*Dumetella carolinensis*
cedar waxwing	*Bombycilla cedrorum*
European starling	*Sturnus vulgaris*
warbling vireo	*Vireo gilvus*

Scientific Name	Common Name
Birds (cont'd)	
red-eyed vireo	*Vireo olivaceus*
yellow warbler	*Dendroica petechia*
black and white warbler	*Mniotilta varia*
common yellowthroat	*Geothlypis trichas*
northern cardinal	*Cardinalis cardinalis*
American tree sparrow	*Spizella arborea*
chipping sparrow	*Spizella passerina*
song sparrow	*Melospiza melodia*
swamp sparrow	*Melospiza georgiana*
white-throated sparrow	*Zonotrichia albicollis*
red-winged blackbird	*Agelaius phoeniceus*
common grackle	*Quiscalus quiscula*
brown-headed cowbird	*Molothrus ater*
northern oriole	*Icterus galbula*
American goldfinch	*Carduelis tristis*
Mammals	
eastern cottontail	*Sylvilagus floridanus*
snowshoe hare	*Lepus americanus*
eastern chipmunk	*Tamias striatus*
woodchuck	*Marmota monax*
eastern gray squirrel	*Sciurus carolinensis*
red squirrel	*Tamiasciurus hudsonicus*
beaver	*Castor canadensis*
meadow vole	*Microtus pennsylvanicus*
muskrat	*Ondatra zibethicus*
porcupine	*Erethizon dorsatum*
coyote	*Canis latrans*
red fox	*Vulpes vulpes*
black bear	*Ursus americanus*
raccoon	*Procyon lotor*
mink	*Mustela vison*
river otter	*Lontra canadensis*
white-tailed deer	*Odocoileus virginianus*
moose	*Alces alces*

Scientific Name	Common Name
Amphibians and Reptiles	
American toad	*Bufo americanus*
wood frog	*Rana sylvatica*
northern leopard frog	*Rana pipiens*
green frog	*Rana clamitans*
snapping turtle	*Chelydra serpentina*
painted turtle	*Chrysemys picta*
common garter snake	*Thamnophis sirtalis*

APPENDIX C – 2018 BREEDING BIRD SURVEY RESULTS

Breeding Birds of Muskoka Royale - 2018

Common Name	Scientific Name	Status						Locations			Observed on site visit	
		National Species at Risk COSEWICa	Species at Risk in Ontario Listing a	Provincial breeding season SRANK [b]	Regional Status	Area-sensitive (OMNR)c	Breeding Code	1	2	3	1	2
Canada Goose	*Branta canadensis*			S5			X			1	1	
Ruffed Grouse	*Bonasa umbellus*			S4			S	1			1	
Eastern Wood-Pewee	*Contopus virens*	SC	SC	S4			S	1			1	1
Alder Flycatcher	*Empidonax alnorum*			S5			S	1				1
Great Crested Flycatcher	*Myiarchus crinitus*			S4			S	1			4	2
Blue Jay	*Cyanocitta cristata*			S5			S	1			3	1
American Crow	*Corvus brachyrhynchos*			S5			X	1		1	1	
Black-capped Chickadee	*Poecile atricapillus*			S5			S	1			2	5
Red-breasted Nuthatch	*Sitta canadensis*			S5		A	S	1			1	1
White-breasted Nuthatch	*Sitta carolinensis*			S5		A	S	1				1
Brown Creeper	*Certhia americana*			S5		A	S	1				1
Golden-crowned Kinglet	*Regulus satrapa*			S5			S	1			1	
Veery	*Catharus fuscescens*			S4		A	S	1			5	3
Wood Thrush	*Hylocichla mustelina*	THR	SC	S4			S	1			1	2
Red-eyed Vireo	*Vireo olivaceus*			S5			S	1			4	7
Yellow Warbler	*Dendroica petechia*			S5			S	1			1	2
Chestnut-sided Warbler	*Dendroica pensylvanica*			S5			S		1			1
Black-throated Green Warbler	*Dendroica virens*			S5		A	S	1				2
Pine Warbler	*Dendroica pinus*			S5		A	S	1				1
Black-and-white Warbler	*Mniotilta varia*			S5		A	S	1				1
American Redstart	*Setophaga ruticilla*			S5		A	S	1			1	
Ovenbird	*Seiurus aurocapillus*			S4		A	S	1			3	3
Common Yellowthroat	*Geothlyphis trichas*			S5			S		1			2
Scarlet Tanager	*Piranga olivacea*			S4		A	S	1			2	3
Rose-breasted Grosbeak	*Pheucticus ludovicianus*			S4			S	1			1	
Indigo Bunting	*Passerina cyanea*			S4			S		1		2	1
Song Sparrow	*Melospiza melodia*			S5			S		1		2	3
White-throated Sparrow	*Zonotrichia albicollis*			S5			S		1		2	2
Red-winged Blackbird	*Agelaius phoeniceus*			S4			S		1		1	1
American Goldfinch	*Cardeulis tristis*			S5			S	1	1		1	3

Field Work Conducted On:	*Date*	Temp (C)	Wind speed (km/h)	Cloud cover (%)	Start time	End time	Level of effort (h:min)	Number of species observed
Site visit 1	*06-Jun-18*	9	11	100	5:40	9:45	4:05	22
Site visit 2	*21-Jun-18*	13	15	50	5:45	9:00	3:15	24

USE/DELETE SECTIONS/CITATIONS BELOW AS DESIRED/NEEDED

Location 1 -	*Wooded upland*	
Location 2 -	*Meadow*	
Location 3 -	*Flyovers and adjacent areas*	

Number of Species:		30											
Number of (provincial and national) Species at Risk:		2											
Number of S1 to S3 (provincially rare) Species:		0											
Number of Regionally Rare Species:		0											
Number of Area-sensitive Species:		10											
Location 1		**Wooded upland**											
Number of Species:		23											
Number of (provincial and national) Species at Risk:		2											
Number of S1 to S3 (provincially rare) Species:		0											
Number of Regionally Rare Species:		0											
Number of Area-sensitive Species:		10											
Location 2		**Meadow**											
Number of Species:		7											
Number of (provincial and national) Species at Risk:		0											
Number of S1 to S3 (provincially rare) Species:		0											
Number of Regionally Rare Species:		0											
Number of Area-sensitive Species:		0											
Location 3		**Flyovers and adjacent areas**											
Number of Species:		2											
Number of (provincial and national) Species at Risk:		0											
Number of S1 to S3 (provincially rare) Species:		0											
Number of Regionally Rare Species:		0											
Number of S1 to S3 (provincially rare) Species:		0											
Number of Regionally Rare Species:		0											
Number of Area-sensitive Species:		0											