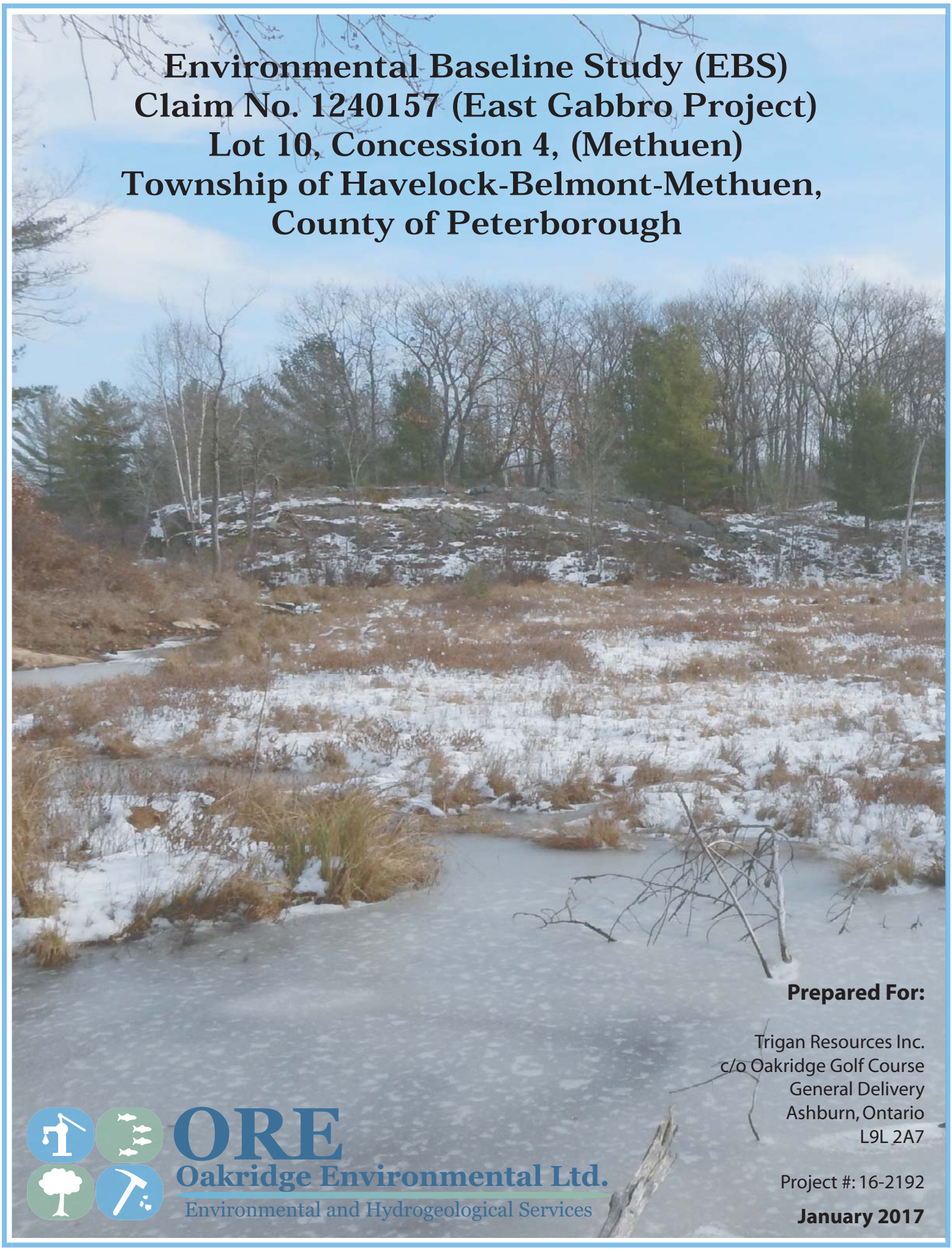
Environmental Baseline Study (EBS)
Claim No. 1240157 (East Gabbro Project)
Lot 10, Concession 4, (Methuen)
Township of Havelock-Belmont-Methuen,
County of Peterborough



Prepared For:

Trigan Resources Inc.
c/o Oakridge Golf Course
General Delivery
Ashburn, Ontario
L9L 2A7

Project #: 16-2192

January 2017

ORE
Oakridge Environmental Ltd.
Environmental and Hydrogeological Services

ORE
Oakridge Environmental Limited
Environmental and Hydrogeological Services

January 6, 2017

Trigan Resources Inc.
c/o Oakridge Golf Course
General Delivery
Ashburn, Ontario
L9L 2A7

Attention: Mr. Matt Anderson

Re: Environmental Baseline Study (EBS)
Claim No. 1240157 (East Gabbro Project)
Lot 10, Concession 4, (Methuen)
Township of Havelock-Belmont-Methuen, County of Peterborough
ORE File No. 16-2192

Dear Mr. Anderson:

Oakridge Environmental Ltd. is pleased to present this Environmental Baseline Study (EBS) covering conditions on the above referenced mining claim. This report is intended to be submitted as part of the annual assessment requirements for the claim.

Our report presents information pertaining to the natural environment features located within the claim and provides general recommendations with respect to future investigations and constraints that may affect mining activities. As such, the information provided herein should be considered in association with any future development plans for the site.

Should you have any questions, please contact our office at any time.

Yours truly,
Oakridge Environmental Limited

Rob West, HBSc. CSEB
Senior Environmental Scientist

Table of Contents

Page No.

1.0 Introduction . . . 1
- 1.1 General . . . 1
- 1.2 Site Description and Access . . . 2

2.0 Scope of Work . . . 2

3.0 Previous Work . . . 3

4.0 Physical Setting . . . 3
- 4.1 Topography and Drainage . . . 3
- 4.2 Geological Setting . . . 4

5.0 Information Resources . . . 5
- 5.1 Ontario Breeding Bird Atlas . . . 5
- 5.2 Natural Heritage Information Centre (NHIC) . . . 8
- 5.3 Land Information Ontario (LIO) Database . . . 9
- 5.4 Ontario Flow Assessment Tool (OFAT) . . . 10

6.0 Bio-physical Findings . . . 11
- 6.1 Methodologies . . . 11
  - 6.1.1 General . . . 11
  - 6.1.2 Vegetation . . . 11
  - 6.1.3 Wetland Delineation . . . 12
  - 6.1.4 Watercourse Assessment . . . 12
  - 6.1.5 Species at Risk . . . 13
- 6.2 Ecological Land Classification (ELC) . . . 13
- 6.3 Wetland Delineation . . . 17
- 6.4 Wildlife Assessment / SAR Presence . . . 18
  - 6.4.1 Mammals . . . 18
  - 6.4.2 Herpetiles . . . 18
  - 6.4.3 Fish and Mussels . . . 19
  - 6.4.4 Plants and Lichens . . . 19
  - 6.4.5 Avifauna . . . 19

7.0 Conclusions & Recommendations . . . 21

Statement of Qualifications
Selected References

Figures

Figure 1 General Location
Figure 2 Topography and Drainage
Figure 3 Physiography
Figure 4 Surficial Geology
Figure 5 Ontario Flow Assessment Watershed Mapping
Figure 6 Vegetation Communities
Figure 7 Site Photos
Figure 8 Sensitive Areas

Appendices

Appendix A Species List

Environmental Baseline Study (EBS)
Claim No. 1240157 (East Gabbro Project)
Lot 10, Concession 4 (Methuen)
Township of Havelock-Belmont-Methuen
County of Peterborough

1.0 Introduction

1.1 General

Oakridge Environmental Ltd. is pleased to present this Environmental Baseline Study (EBS) covering conditions within Claim No. 1240157. The Claim is situated in the Township of Havelock-Belmont-Methuen (Methuen), County of Peterborough and is held by:

Trigan Resources Inc.
35 Lauren Rd
Port Perry, ON, L9L 2A7
Attn. Mr. Matt Anderson

This report provides the results and analysis of our background data collection and detailed site inspections completed in 2016. It is intended that this EBS be submitted for assessment credit purposes.

Trigan Resources Inc. owns a block of Mining Leases in Methuen Township to which the subject claim has been added to cover a large gabbro body. A portion of the gabbro body is currently being extracted (traprock) under an Aggregate Resources Act (ARA) Licence. Recent geological work (Phipps, 2008) has identified a continuation of the prospective high quality bedrock aggregate resource within the gabbro of the subject claim and adjoining leases. As such, a variety of studies (including this EBS), will need to be commissioned to investigate conditions associated with the site before any development can be planned or undertaken.

Given the above, the objective of this EBS is to define the base environmental conditions within the Claim and assess which areas, if any, contain sensitive ecological features. Ultimately, any future development of the Claim will need to accommodate these environmental features. The EBS includes preliminary vegetation mapping and an assessment of associated hydrological features. As an initial study, it is also our objective to identify data gaps and to provide recommendations to guide more detailed, future studies (especially of the more “sensitive” areas).

The work outlined herein was completed by the following individuals:

Mr. Rob West, Senior Environmental Scientist, Peterborough, Ontario,

assisted by,

Mr. Stewart Gibson, Environmental Technician, Peterborough, Ontario.

1.2 Site Description and Access

The subject claim is situated approximately 25 km north of Havelock, Ontario (Figure 1). The site is easily accessed from Havelock via Highway 46, then west on Fire Route 68. The claim can be accessed via a series of all-terrain vehicle (ATV) trails off Fire Route 68 which cross other lands. The trails appear to have been maintained by local cottagers and hunters for recreational use and/or minor tree harvesting. There are no roadways that access the claim and the ATV trails do not access the Claim directly. It takes approximately 5 minutes to walk from Fire Route 68 to the northern boundary of the subject Claim.

Claim 1240157 consists of four units covering an area of approximately 84 ha (209 acres), comprised of upland wooded areas, wetlands, small lakes, and drainage features. The site is relatively undeveloped with the exception of the ATV trails. Wetlands, varying in size and composition, are scattered throughout the site among the undulating rock ridge outcrops. The upland areas of the site are dominated by a relatively mature deciduous forest with an open airy forest floor and extensive canopy. The majority of the land within the claim has remained untouched, other than some tree harvesting as suggested by the secondary succession forest that is present.

2.0 Scope of Work

In conducting this EBS, the following tasks have been completed:

- Available background data regarding the subject site have been compiled and reviewed.

- The property was attended for the purpose of conducting detailed inspections. These included delineation and mapping of various features utilizing a mapping-grade differential Global Positioning System (dGPS) and air photo interpretation.

- Lists of floral and faunal species have been prepared for the property. The on-site vegetation communities have been classified under the Ecological Land Classification (ELC) for Southern Ontario. On-site soils data were collected within each ELC community via hand auger and classified under the Field Manual for Describing Soils in Ontario (2009).

- Wetlands and other aquatic environments were mapped and delineated using the industry standard Ontario Wetland Evaluation System (OWES) protocol.

- Species at Risk (SAR) surveys were completed to identify individual species, with emphasis on potential SAR habitat. Surveys were conducted to identify potential habitat and presence of individuals. However, given the timing of the study,

certain SAR (eg., avifauna) were undetectable due to migration and overwintering.

- Key Natural Heritage Features (KNHF) and Hydrologically Sensitive Features (HSF) identified on the site (and as indicated by available mapping) were examined and their boundaries defined.

- This report was prepared outlining our findings, conclusions and recommendations with respect to potential constraints and data gaps.

3.0 Previous Work

Previous work on the subject Claim has focussed on geological mapping, specifically with respect to the determination of the northern limit of the gabbro, and confirmation of the continuity of favourable gabbro south of the northern contact (Phipps, 2008). We are not aware of any previous ecological work having been completed on the Claim.

4.0 Physical Setting

4.1 Topography and Drainage

The site lies within Ecoregion 5e in the southern portion of the Canadian Shield. The site consists of typical Canadian Shield terrain, comprised of undulating rock outcrops and pockets of predominantly granular soils. Small vernal ponds/pools and isolated pocket wetlands occur between the elevated rock ridges.

According to available mapping from Land Information Ontario (LIO), the Claim contains a local drainage divide separating north and south flows. To the north, flows will presumably be conveyed to either Blue Lake or West Twin Lake (and/or their contributing watercourses). To the south, flows will presumably be conveyed to Sam's Lake (west of the Claim) and/or the network of watercourses situated south of the Claim that ultimately drain into Round Lake, a lower part of the Crowe River system.

It should be recognized that LIO mapping tends to provide coarse elevation data, therefore, does not account for the undulating rock outcrops and variability of the Shield topography. Our site inspections have revealed that the actual drainage patterns observed on-site differ slightly from those interpreted from the LIO data. The western and eastern portions of the property appear to drain generally from north to south. A large wetland in the centre of the property appears to drain northward, toward West Twin Lake (located north of the subject property).

Across the property, the maximum natural relief is approximately 10 m, as measured

from northwest to southeast (Figure 2).

4.2 Geological Setting

The site is situated within the southern part of the Canadian Shield, within the Grenville structural province. In the site area, the bedrock is dominated by two large metamorphosed anorthositic gabbro and dioritic bodies referred to locally as the "East and West Gabbros". The subject claim is situated largely within the "East Gabbro" body. Figure 3 presents a map of the regional bedrock features.

Bedrock exposures on the site are numerous especially along the edge and in the middle of the water bodies on-site. These rocks are typically competent, non-porous, and exhibit fairly wide spacing of joint sets and fractures. Most outcrop surfaces are quite undulatory although relatively smooth, presumably the result of glacial erosion.

As outlined by Phipps (2008) Claim 1240157 covers a portion of the northern part of the East Gabbro (Figure 3) where it is in contact with mainly gneissic arenaceous metasediments (paragneisses). The gabbro is typically a medium grained, grey, mesocratic rock consisting mainly of plagioclase with lesser amounts of mafic minerals (augite and/or hornblende). Near the surface, weathering of this rock imparts a pinkish hue to the plagioclase, misleadingly giving it the appearance of a more leucocratic acidic rock.

The contact between the gabbro and the country rock metasediments is diffuse. In the contact area, inclusions of metasediments become common and the gabbro is notably finer grained. Compositional differences in the gabbro, especially in the contact zone, are present due to contamination of the gabbroic magma by absorbed metasediments.

The northern contact of the East Gabbro was traced southwesterly from the northeast corner of the west half of the claim. Gneissic metasediments with conformable granitic and gabbroic zones occur northwest of the contact, and gabbro occurs southeast of the contact. Approximately two thirds of the western half of Claim 1240157 is underlain by the East Gabbro intrusion.

The surficial geology and physiography of the site area is dominated by areas of outcrop and thin deposits of till and granular outwash (Figure 4). There are no significant granular landforms or valley type features of note in the area.

The site lies close to the northernmost boundary of the area inundated by glacial Lake Iroquois, as defined by Muller and Prest (1985). As such, a thin and discontinuous mantle of granular sediments is expected to be ubiquitous in the area.

The dominant surficial sediment type consists of oxidized, fine, silty sand and minor gravel deposits derived from ancient outwash or perhaps from a brief period of

inundation and settling. The deeper troughs between ridges typically host wetland deposits consisting of peat and muck.

5.0 Information Resources

5.1 Ontario Breeding Bird Atlas

The Ontario Breeding Bird Atlas (OBBA) is an organization comprised mainly of volunteers who monitor birds across selected regions of Ontario. Birds are recorded to occur within defined 10 km^2 areas denoted as "regional squares". Two versions of the Atlas have been published, with the 2nd edition comprising the most recent data from 2001-2005.

Data from the OBBA are used as an indicator or tool to assist in identifying important species and/or habitats that may occur in the area of the subject site, prior to conducting site surveys. The atlas also helps to define the timing necessary for the bird surveys (e.g., morning or evening) and the season in which to detect them.

The majority of our inspections were completed between September and November 2016, outside of the breeding bird period. Therefore, the site was reviewed primarily to determine if suitable habitat is present for any of the birds species listed below.

The subject site occurs within the 10 km^2 area mapped as Squares 18TQ74 and 18TQ64 - Region #16, Peterborough. According to the OBBA website, significant breeding species that could potentially be associated with habitats in the site area include the following:

Common Name	**Scientific Name**	**Status**
Barn Swallow	*Hirundo Rustica*	Threatened
Bank Swallow	*Riparia riparia*	Threatened
Black Tern	*Chlidonias niger*	Special Concern
Bobolink	*Dolichonyx oryzivorus*	Threatened
Canada Warbler	*Cardellina canadensis*	Special Concern
Chimney Swift	*Chaetura pelagica*	Threatened
Common Nighthawk	*Chordeiles minor*	Special Concern
Eastern Meadowlark	*Sturnella magna*	Threatened
Eastern Whip-poor-will	*Antrostomus vociferus*	Threatened
Eastern Wood-pewee	*Contopus virens*	Special Concern
Golden-winged Warbler	*Vermivora chrysoptera*	Special Concern
Grasshopper Sparrow	*Ammodramus savannarum*	Special Concern
Least Bittern	*Ixobrychus exilis*	Threatened
Red-headed Woodpecker	*Melanerpes erythrocephalus*	Threatened
Red-Shouldered Hawk	*Buteo lineatus*	Not at Risk
Wood Thrush	*Hylocichla mustelina*	Special Concern

Barn Swallow is listed as "Threatened" by *Species at Risk Ontario* (SARO) and is protected under the *Endangered Species Act* (ESA). The Barn Swallow inhabits open-rural and urban sites where buildings are situated near watercourses. Nesting is typically within loose colonies on building structures, bridges and other suitable overhanging structures. Structures are chosen because they keep the half "cup-like" mud nest dry and have edges that the nest can adhere to. The Barn Swallow feeds on insects by catching them on its wing.

Bank Swallow is listed as "Threatened" by SARO and is protected under the ESA. The Bank Swallow inhabits embankments near waterways and within pits and quarries. Nesting is typically within loose colonies in the sides of sandy silty embankments overlooking waterways or within pit operations in Ontario. The bank swallow will mine out a hole within a near vertical stable embankment area. Common risks for this species include destabilizing of the embankment during flooding of waterways and/or from property owners clearing the vegetation overtop of the embankment. Hardening of shorelines (by introducing stone) can prevent Bank Swallows from constructing their nesting sites. It will often construct its nests near residences and take advantage of the artificial lighting in the early evenings which attracts an abundance of insects to the area.

Black Tern is listed as "Special Concern" by SARO and is protected under the ESA. The Black Tern prefers shallow, freshwater cattail marshes, wetlands, lake edges and sewage ponds with emergent vegetation. Nesting occurs on dead plant material piled upon aquatic floating vegetation. The Black Tern hunts small insects and minnows along the surface of lakes or ponds.

Bobolink is listed as "Threatened" by SARO and is protected under the ESA. The Bobolink prefers large tracts of tallgrass areas, either true prairies or hay fields, as it forages low to the ground in search of larvae and seeds.

Canada Warbler is listed as "Special Concern" by SARO and is protected under the ESA. It prefers large tracts of mixed forests on bottomlands within wetlands or drainage courses. The species nests within the upper extremities of the canopy in deciduous and coniferous trees. The Canada Warbler feeds on beetles, caterpillars and common insects. Typically, this species prefers creeks and mixed forests with a coniferous edge along a moving creek, tributary or river system.

Chimney Swift is listed as "Threatened" by SARO and is protected under the ESA. The Chimney Swift is a somewhat generalist species. It will utilize empty cavity nests found in dead trees within fencerows or may utilize unused chimneys as suggested by its common name. This species is most active in early morning and early evening (i.e., dawn and dusk). It will venture outside of the nesting area and feast on insects during those times. It then flies back to the nesting site, entering the nest one after another in an orderly funnel-shaped sequence.

Common Nighthawk is listed as "Special Concern" by SARO and is protected under the ESA. The Common Nighthawk is part of the Nightjar family and prefers forest openings, bogs and sometimes open field/meadow areas. Nesting is on bare ground where both adults feed the young. Feeding can take place during day or night, while the species constantly forages for all types of insects.

Eastern Meadowlark is listed as "Threatened" by SARO and is protected under the ESA. The Eastern Meadowlark is similar to Bobolink, as this species also prefers large tracts of agricultural fields or tall grass prairies to nest within. Eastern Meadowlark is a ground nester, and utilizes the tall grass to conceal its nest and eggs. Feeding includes beetles, crickets, and spiders.

Eastern Whip-poor-will is listed as "Threatened" by SARO and is protected under the ESA. The Whip-poor-will prefers a combination of large natural tracts of forest, watercourses and edge habitat consisting of meadow areas with open, deciduous and pine woodlands. The Whip-poor-will does not construct a nest, but rather utilizes the soft leaf litter on the ground to form a nest and lay the eggs directly on the ground. The Whip-poor-will is a nighttime hunter, calling it's own name while searching for large flying insects, beetles, moths, mosquitos and sometimes grasshoppers. The Whip-poor-will often choose pine species adjacent to waterways from which to call.

Eastern Wood-pewee is listed as "Special Concern" by SARO and is protected under the ESA. This species prefers mixed deciduous and coniferous woodlands which are open or considered edge-habitat. Nesting occurs on a tree branch as the species catches insects from a perch.

Golden-winged Warbler is listed as "Special Concern" by SARO and is protected under the ESA. The Golden-winged Warbler prefers woodland edge habitat with young secessional tree species and moist shrubby fields. This species gleans insects on shrubs and the forest floor and nesting occurs on the ground.

Grasshopper Sparrow is listed as "Special Concern" by SARO and is protected under the ESA. The Grasshopper Sparrow prefers large (greater than 5 ha) grassland habitats where it breeds. Grassland habitats include pastures, hayfields, natural prairies, alvars. Nests are typically hidden within the grassland and its preferred diet in the summer is large insects (i.e., Grasshoppers).

Least Bittern is listed as "Threatened" by SARO and is protected under the ESA. The Least Bittern inhabits freshwater marshes where tall, impenetrable stands of emergent vegetation are utilized for coverage. The Least Bittern may build up a hunting platform in search of small fish, insects, and amphibians.

Red-headed Woodpecker is listed as "Special Concern" by SARO and is protected under the ESA. It prefers a combination of deciduous forests and rural development areas, similar to a park-like setting. The deciduous species can be oak or maple, however, the

understoreys must be meadow-like or a maintained lawn space. The species will nest within cavities that it constructs or it will take over cavity nests that other woodpeckers have constructed. The Red-headed Woodpecker feeds on beetles, caterpillars and common insects that are found within the bark of trees.

Red-shouldered Hawk no longer possesses a status in Ontario, although is still considered to be a "sensitive" species with respect to development. It prefers mature deciduous dominated forests, often nesting within hundreds of metres of the edge of wetlands or waterways. The nest will often occur in the crotch of deciduous trees. It prefers slopes where it can easily fly to the tree-tops and overlook the waterway for foraging purposes, hunting for small mammals, birds, reptiles and amphibians.

Wood Thrush is listed as "Special Concern" by SARO and is protected under the ESA. The Wood Thrush enjoys relatively undisturbed, mature woodlands. Nesting occurs low in the fork of a tree, as this species forages for berries and insects at ground level. Similar to the Eastern Wood-Pewee, this species prefers large tracts of woodland.

5.2 Natural Heritage Information Centre (NHIC)

The NHIC is an online database managed by the MNRF. Within the database, Ontario has been divided into a grid consisting of a series of 1 km^2 areas or *regional squares,* each given a unique identifier (similar to the OBBA, described above). The squares can be searched for historical *Species at Risk* (SAR) occurrences and for *Areas of Natural and Scientific Interest* (ANSI).

The 1 km square areas containing the subject site are referred to as 18TQ6946, 18TQ7046, 18TQ7146 and 18TQ6945. Within these 1 km square areas, no significant species were detected by the NHIC search. However, surrounding squares were queried to account for species migration. The adjacent 1 km square areas that were queried are referred to as 18TQ7045, 18TQ7145, 18TQ6947, 18TQ7047, and 18TQ7147. The species found in the adjacent 1km square areas are briefly discussed below.

Common Name	**Scientific Name/ANSI Type**	**Status / Occurrence Date**
Blanding's Turtle	*Emydoidea blandingii*	Threatened
Five-lined Skink	*Plestiodon fasciatus*	Endangered/Special Concern
Houghton's Flatsedge	*Plestiodon fasciatus*	S3 - Rare to Uncommon in Ontario

Blanding's Turtle is listed as "Threatened" by SARO and is protected under the ESA. It tends to inhabit shallow waters within large wetlands or shallow lakes that have lots of aquatic plants. However, they have been known to travel hundreds of meters from a body of water for nesting or mating. This species is most easily identified by its bright yellow throat and chin.

Five-lined Skink is listed as both "Endangered" and "Special Concern" by SARO and is protected under the ESA. The designation is dependant upon the population of species. The Carolinian population (Endangered) is defined as the population within a small area in southwestern Ontario along the shorelines of Lake Erie, Lake St. Clair, and Lake Huron. The Southern Shield population (Special Concern) generally occurs along the southern edge of the Canadian Shield. The Five-lined Skink is Ontario's only native lizard and can be found in rocky outcrops, sand dunes, riparian forests, open deciduous forests, and forest clearings.

Houghton's Flatsedge possesses an S3 status under the NHIC database. It is typically found in dry, sandy soil which is unlike most flatsedge species. It is commonly found growing with Jack Pine (*Pinus banksiana*).

Oak Lake Wetland is a Provincially Significant Wetland Complex identified during the NHIC Query. This wetland is situated approximately 0.5 km south of the subject property.

The majority of the site inspections were completed too late in the year to detect some of the species listed above. As such, future confirmatory surveys should be completed as per the Ministry of Natural Resources (MNRF) protocols during the optimum time period to detect these species.

5.3 Land Information Ontario (LIO) Database

The MNRF's Land Information Ontario (LIO) database was referenced to provide background information on the site. LIO data provide geographic information on Ontario's road network, wetlands, water bodies, wooded areas, parks, and protected areas, among other features. A summary of LIO data available for the features within the subject property is presented below.

The LIO database recognizes 32 Unevaluated Wetlands within the subject Claim (Figure 2). The wetlands are designated as "Swamp", "Marsh", and "Unknown". These features have a combined total area of 34.7 ha, equivalent to approximately 41% of the total Claim area. Wetlands identified by LIO range from 0.01 ha to 10.2 ha. LIO data suggests there are two (2) Provincially Significant Wetlands (PSW) located proximal to the subject property consisting of the Oak Lake Wetland Complex and the Sandy Lake Wetland Complex, located approximately 0.5 km south and 1.7 km north of the Claim, respectively.

One tract of woodland was identified on-site, covering 45.4 ha of the Claim (~54% of the total area). The woodland on-site is classified by the MNRF as *Non-sensitive*.

Six (6) water bodies were delineated on-site from the LIO data. The open bodies of water were classified as Permanent Lakes with a combined area of 5.3 ha (~6.25% of the total

Claim area). Ten (10) sections of Permanent Stream were identified on-site, comprising four (4) main stream systems. All streams were classified as Primary Streams, with a total length of 750 m.

Site inspections were conducted to confirm and update (where necessary) the above information. Results from the site inspections are presented in the following sections.

5.4 Ontario Flow Assessment Tool (OFAT)

The Ontario Flow Assessment Tool (OFAT) is an online tool developed by the MNRF to calculate information about Ontario's watersheds. OFAT uses data from the LIO database to interpret watershed and watershed characteristics. The tool can be used to develop a map of watersheds, characterize the watershed, and to estimate stream flows.

From the data provided by the OFAT, assumptions can be made as to drainage patterns and stream flow direction. Figure 5 shows the general drainage patterns and the five (5) main sub-watersheds (within the Trent-Crowe tertiary watershed) in which the subject property occurs within. A brief discussion of each subwatershed is presented below.

The OFAT data suggest that Subwatershed 6 drains north into West Twin Lake. Alterations to wetlands within this subwatershed could result in changes to the drainage regime of the subwatershed, ultimately affecting West Twin Lake. Any future plans to develop the Claim will need to account for any potential impacts to West Twin Lake as a result of wetland alteration within Watershed 6.

With reference to Figure 5, we note that the OFAT data do not assign a subwatershed to the lands situated immediately northeast of Subwatershed 6. Those lands appear to drain directly into West Twin Lake, however, that should be confirmed. If confirmed, that area should be included as part of Subwatershed 6.

OFAT data suggest that Subwatershed 1 drains southward. This sub-watershed, according to OFAT, is not hydrologically connected to either Blue Lake or Sams Lake. However, the topographic mapping (Figure 2) suggests there are connecting streams. Further investigations will be required to clarify the conditions in this area. However, to allow for inaccuracies in the OFAT tool, any proposed alterations to wetlands within Watershed 1 should account for potential impacts to Sams Lake, in the interim.

Subwatersheds 2, 3, and 4 all generally drain southward and are connected to off-site wetlands. These subwatersheds are not connected to West Twin Lake, Blue Lake, or Sams Lake according to the OFAT tool.

The OFAT was used to determine if any of the watersheds on the subject property are hydrologically connected to the PSW's proximal to the site. Although the mapping tool provides coarse watershed mapping and is subject to various limitations, it has been

determined that the subwatersheds within the subject Claim are not hydrologically connected to either the Oak Lake PSW or the Sandy Lake PSW.

6.0 Bio-physical Findings

6.1 Methodologies

6.1.1 General

For this study, ORE staff conducted site inspections on the following dates:

Date of Inspection	Survey Time	Temp. ^{O}C	Beaufort (Wind) Scale	Conditions
September 27, 2016	10 AM to 4 PM	20	4 - Moderate Breeze	Sunny
September 29, 2016	10 AM to 4 PM	16	2 - Light Breeze	Sunny with minor cloud cover
November 8, 2016	10 AM to 4 PM	12	2 - Light Breeze	Sunny
November 28, 2016	10 AM to 4 PM	1	2 - Light Breeze	Sunny with minor cloud cover

Flora and fauna were recorded and site features were mapped with the use of a differential GPS and recent aerial photography. Where possible, adjacent site features were also taken into consideration.

6.1.2 Vegetation

A preliminary characterization of the various vegetation communities has been completed (at a reconnaissance level) generally based on the methodologies included in the *Ecological Land Classification (ELC) - First Approximation and It's Applications* (1998) as part of a preliminary mapping exercise. The classification of each vegetation community has been determined in accordance with the second approximation catalogue issued in 2008 (which provides a more detailed classification system than the 1998 version). The 2008 guide also provides the classification coding included in the 1998 ELC manual for cross-reference purposes.

Prior to conducting the site inspections, aerial photography of the subject Claim was analysed to roughly delineate communities based on recognizable vegetation differences. Dominant vegetation types were recorded and boundaries of the various communities were mapped onto the aerial photograph. A dGPS was utilized to approximate the changeover between vegetation communities in certain areas to further validate the mapping on the air photo. Soil characteristics were defined using the methods outlined in the *Field Manual for Describing Soils in Ontario* (2009).

In addition to identifying and mapping the ELC communities, ORE staff assessed each vegetation community from the perspective of whether they are provincially rare, are hydrologically sensitive, and/or whether they may contain a Species at Risk under the current conditions.

6.1.3 Wetland Delineation

The on-site wetlands were identified and delineated using criteria from the MNRF's Ontario Wetland Evaluation System (OWES), 2013. The OWES provides protocols for evaluators to delineate wetland boundaries, determine vegetation communities, determine location for seeps and springs, and ascertain drainage patterns.

The classification and delineation of wetlands must include consideration of various factors:

- Area of ground covered by vegetation;
- Proportion of hydrophytic vegetation (determined using the 50/50 Upland to Wetland Vegetation Rule);
- Presence of hydric mineral and organic substrates (determined using the protocols from the Ontario Ecological Land Classification (1998), and
- Topography.

Considering the above factors, the wetland boundaries were determined and mapped using a combination of orthophoto interpretation and a mapping grade dGPS unit. In addition, Land Information Ontario's (LIO) database was queried to establish historical wetland boundaries within and surrounding the subject Claim. Those boundaries were confirmed and updated using protocols described in the OWES, 2013.

ORE staff did not fully evaluate the wetlands according to the OWES, but rather mapped the wetland boundaries and made note of the general wetland vegetation types that were present in the newly expanded wetland areas.

6.1.4 Watercourse Assessment

LIO data suggests that there are four (4) main watercourses associated with the subject Claim. ORE staff attended each watercourse (where feasible) to characterize the general conditions and to confirm their locations using a mapping grade dGPS unit. Inspections were completed to identify whether the watercourse was dry or wet, establish a flow direction and determine whether the flows are permanent or intermittent. Drainage channels and streams between wetlands were also mapped using a mapping grade dGPS

unit.

6.1.5 Species at Risk

Inspections were completed to determine the presence of any Species at Risk (SAR) as well as potential SAR habitat. Depending on the species' federal or provincial status, required protection/mitigation measures vary. Background information was gathered from the NHIC database to determine the historical presence of any SAR proximal to the Claim. Wandering transects were completed to search for the species identified during the NHIC query as well as any other SAR observed during the site inspections. Wetlands were also scanned using binoculars for avifauna, mammals and basking amphibians.

It should be noted that SAR surveys were not completed under ideal conditions given the lateness in the year.

6.2 Ecological Land Classification (ELC)

The following is a list of the vegetation communities detected during our site inspections.

Upland System

1. Dry-Fresh Red Oak Deciduous Forest (FODM1-1)
2. Dry-Fresh White Pine-Hardwood Mixed Forest (FOMM2)

Wetland System

3. Thicket Swamp (SWT)
4. Graminoid Open Bog (BOOG1)
5. Black Spruce Treed Bog (BOTC1-1)
6. Open Aquatic

Figure 6 illustrates the distribution of vegetation communities within the Claim. Appendix A presents a list of floral species identified during the inspections. Representative photos of the various vegetative communities are provided in Figure 7.

These habitats and their associated vegetation and environmental characteristics are discussed below.

1. Dry-Fresh Red Oak Deciduous Forest (FODM1-1)

The Dry-Fresh Red Oak Deciduous Forest possesses a moderately dry (0) to fresh (1, 2, 3) moisture regime and is dominated by Red Oak (*Quercus rubra*) and has a number of associate species that include Red Maple (*Acer rubrum*), White Pine (*Pinus strobus*) and Black Cherry (*Prunus serotina*) among others. Typical ground species in this ecosite include Bracken Fern (*Pteridium aquilinum*), Wintergreen (*Gaultheria procumbens*), and Starflower (*Trientalis borealis*). The ELC characterizes the community as possessing 75% or more canopy cover.

This tract of forest is approximately (39.9 ha) and comprises a large portion of the subject site (47%). It is dominated by Red Oak with minor patches of other deciduous species. This forest tract is relatively mature with a closed canopy and is almost exclusively dominated by deciduous species. Other tree species include Ironwood (*Ostrya virginiana*), Red Maple, Sugar Maple (*Acer saccharum*) and Trembling Aspen (*Populus tremuloides*). In areas where the canopy has opened, young deciduous saplings are growing in thicket-like conditions beneath the overstorey.

The understorey throughout the ecosite is dominated by young Oak species, European Buckthorn (*Rhamnus cathartica*), various Fern species, Wintergreen and White Grained Mountain Rice Grass (*Oryzopsis asperifolia*). Open Bedrock Outcrops are exposed throughout this ecosite. Vegetation in the outcrops is minimal given the lack of available substrate, however some species persist within the crevasses of the rock.

The soils were penetrated to a total depth of 75 cm utilizing a hand auger where it was refused, presumably on bedrock. An initial organic soil horizon was observed to a depth of 5 cm. The rest of the sample was comprised of a silty sand with sand content increasing with depth. A small (<5 cm) gravel seam was observed at 30 cm deep. An oxidized reddish brown sandy silt was observed near the surface. A representative sample (Sample #7) was collected in the southwestern area of the FODM1-1 ecosite (Figure 6).

2. Dry-Fresh White Pine-Hardwood Mixed Forest (FOMM2)

The ELC describes a Dry-Fresh White Pine-Hardwood Mixed Forest (FOMM2) as having greater than 25% coniferous species and greater than 25% deciduous species. This ecosite can contain both White Ash (*Fraxinus americana*) and Yellow Birch (*Betula alleghaniensis*) species, but is primarily comprised of Eastern White Pine and a combination of deciduous species. The deciduous species include American Basswood (*Tilia americana*), Ironwood (*Ostrya virginiana*), and Red Maple. This ecosite will likely possess dry-fresh shallow soils over bedrock.

This ecosite is generally contained within the northwestern portion of the site. Although two (2) separate ecosites are shown, they are part of one continuous tract that extends

beyond the Claim boundary and circles back onto the Claim. This mature ecosite is dominated by Eastern White Pine with a secondary presence of Ironwood and Red Oak. Yellow and White Birch can be found in minor amounts throughout this ecosite. Ground cover is moderately vegetated and is comprised of Bracken Fern, European Buckthorn and young tree species that are reflective of the overall composition of the treed community. Bedrock outcrops are also exposed throughout the ecosite. Vegetation in the outcrops is minimal given the lack of available substrate materials.

A hand auger was sunk into the soils to a total depth of 35 cm where presumably bedrock refused further sampling. An initial organic soil horizon was observed to a depth of 3 cm. The 35 cm sample was comprised of a highly oxidized, reddish brown sandy silt with minor presence of fine gravel. The sample was determined to be damp at 34 cm, immediately prior to presumed bedrock. A representative sample (Sample #8) was collected in the southern area of the north eastern FOMM2 ecosite (Figure 6).

3. Thicket Swamp (SWT)

The Thicket Swamp (SWT) ecosite typically occurs in wet areas possessing variable flooding regimes with standing water typically less than 2 m in depth. Vegetation can vary in this ecosite but will be dominated by dense trees and/or shrubs. To be considered a wetland community, the substrate has to possess a 20 cm to 40 cm deep organic layer.

A number of isolated and/or connected Thicket Swamps were identified on-site. Dense deciduous shrubs and young trees dominate these ecosites. Although a variety of species are found throughout these ecosites, the dominant shrub and tree species were revealed to be Speckled Alder (*Alnus incana*), Winterberry (*llex verticillata*), and Red-osier Dogwood (*Cornus sericea*).

The dominant species varied throughout each wetland. Vegetation rarely exceeded 2.5 m with the exception of infrequent tall (>2.5 m) trees. Ground vegetation was dominated by young thicket species and various fern and sedge species. The small isolated pockets of Thicket Swamp are typically “bowl-type” depression features in the bedrock where periodic pooling occurs. These bedrock depressions support a variety of hydrophytic thicket species. Pockets of standing water and saturated soil conditions are apparent throughout these Thicket Swamps.

A hand auger was utilized to sample the soils to a maximum depth of 110 cm (i.e., limit of capability). An initial organic horizon was observed to a depth of 25 cm. Heavy mottling and gleys were observed from 35 cm to 110 cm. The sample was determined to be a silty sand with increasing sand content and particle size with depth. A representative sample (Sample #9) was collected at the northern shoreline of the northeastern most SWT ecosite (Figure 6).

4. Graminoid Open Bog (BOOG1)

The ELC describes a Graminoid Open Bog as having less than 25% tree cover as well as an organic layer exceeding depths of 40 cm. Precipitation and snowmelt are the primary water sources for the vegetation within a bog as they are typically characterized by a vegetation community that lies above groundwater level. Bogs also tend to be quite acidic and therefore can only support vegetation that can survive in acidic environments. This ecosite will likely be dominated by sphagnum species and/or a variety of sedge species.

Three (3) main Graminoid Open Bog ecosites were observed on-site. These ecosites were dominated by sedge species, primarily Cotton-grass (*Eriophorum*), and Few-seeded Sedge (*Carex oligosperma*). A ring of open water (<1 m depth) that separates the bedrock outcrops from the floating mat was a common characteristic of the on-site BOOG1 communities. Scattered bushes and young thicket species (e.g., Red-osier Dogwood) are found along the edge and atop some of the tufts in the floating matts in middle of the bog, although all three (3) BOOG1 ecosites contain less than 25% tree over.

A soil probe was completed to a depth of 15 cm where presumed bedrock refused any further sampling. The 15 cm sample was comprised of a highly fibrous, root matt with a dark mucky organic substrate. Saturated conditions were met at 8 cm depth, although the rest of the sample was noted as being moist. A representative sample (Sample #3) of the materials was collected at the south eastern shoreline of northern most BOOG1 ecosite (Figure 6).

5. Black Spruce Treed Bog (BOTC1-1)

The Black Spruce Treed Bog is described by the ELC manual as having between 10% and 25% tree cover. A thick layer of Sphagnum species are typical in this ecosite. The dominant tree species is Black Spruce (*Picea mariana*), also known as Bog Spruce, and can contain other hydrophytic coniferous species. This ecosite is commonly found throughout the Canadian Shield.

One (1) large (12.4 ha) BOTC1-1 ecosite was identified in the northwest area of the property and continues west beyond the property boundary. The ecosite is dominated by Black Spruce, which is commonly found in wet, poorly drained sites. Black Spruce is an adaptable species that can live in a variety of habitats, including acidic bogs. Associate tree species included Tamarack (*Larix laricina*) and Balsam Fir (*Abies balsamea*). Trees within the community ranged from 0.5 m - 10 m in height.

The BOTC1-1 on-site community grows on a thick mat of sphagnum species. Similar to the BOOG1 ecosite, a ring of open water (<1 m depth) that separates the bedrock outcrops from the sphagnum species was apparent throughout the ecosite. Aerial photographs illustrate some small, lightly vegetated bedrock outcrops occurring within

these bog communities. The outcrops are not large enough (>0.5 ha) to be included as their own ecosite and have thus been included within the BOTC1-1 community. An Open Aquatic habitat is also located within the BOTC1-1 ecosite. This community is described in the following section.

A soil analysis was not completed at this ecosite. However, the presence of a peaty organic matt was confirmed.

6. Open Aquatic

Two (2) Open Aquatic ecosites were delineated on the subject property. The larger (1.6 ha, as measured within the Claim) is situated along the western boundary, while the other (0.9 ha as measured within the Claim) is located along the southern boundary, near the southwest corner. These water bodies are hydrologically connected to each other and provide extensive habitat for wildlife.

The body of water along the western property boundary is surrounded by a floating Black Spruce Treed Bog described above. OFAT data suggests this feature drains into the smaller southern body of water. However, field investigations have determined that the smaller southern body of water is blocked by a beaver dam at the north end of the lake, ultimately draining northward through the BOTC1-1 ecosite and into the western Open Aquatic ecosite. The maximum length of the larger body of water (including any off-site portion) is approximately 286 m, while its maximum width is approximately 100 m. The depth of the water body is unknown. Minor floating vegetation occurs within this Open aquatic habitat. Specific species could not be identified as ORE staff were unable to access the floating bog due to the natural moat around the edge.

The southern Open Aquatic ecosite is surrounded by a deciduous Red Oak forest and exposed bedrock outcrops. The lake bottom was dominated by Common Bladderwort (*Ultriculaire vulgaris*). Pockets of floating vegetation are seen throughout the open water and are typically dominated by Floating-leaved Pondweed (*Potamogeton natans*). An outcrop in the middle of the open area contains minor vegetation. Basking logs are also present along the shoreline suggesting good habitat for herpetiles. Contradictory to data obtained using the MNRF's OFAT, this body of water drains northward into the larger body of water via a stream. Two (2) beaver dams were observed along this drainage channel.

6.3 Wetland Delineation

Three (3) types of different wetlands were observed on-site and are described above. LIO mapping identifies all wetlands on-site as "unevaluated", comprising a total of 34.73 ha. ORE staff confirmed and updated the wetland boundaries for some of these features, which are illustrated on Figure 6. Based on those updated boundaries, approximately

34.9 ha of wetland occur within the Claim. This represents 41.2% of the total area. The on-site wetlands are generally connected either through overland flows or via connected watercourses. The general location of on-site watercourses and overland flow drainage areas are shown on Figure 6.

It is important to note that our delineations did not continue beyond the Claim boundaries. As such, connectivity of on-site wetlands to off-site wetlands was not assessed. Further assessments should be completed to determine connectivity between the wetlands. A complete wetland evaluation should also be completed by a qualified person to determine the wetland's significance as per the OWES.

6.4 Wildlife Assessment / SAR Presence

6.4.1 Mammals

Nine (9) mammal species were identified during the site inspections, none are considered rare or significant. There are no records of any SAR mammals identified on-site as per the information provided in the NHIC query. However, there are habitats on-site that would be appealing to other mammal SAR (e.g., Little Brown Bat). Additional surveys are recommended to confirm presence or absence of any SAR mammals.

A full list of the mammals identified on-site are presented in Appendix A.

6.4.2 Herpetiles

No significant species of herpetile were identified on-site. Only two (2) species of amphibian were detected. Both species are considered common throughout Ontario. These herpetiles are the Eastern Red-backed Salamander (*Plethodon cinereus*) and the Blue-spotted Salamander (*Ambystoma laterale*). It would be beneficial to include amphibian surveys in the spring season for a more accurate herpetile inventory.

Surveys were conducted for basking turtles, although none were observed. Given the time of year the surveys were conducted, this was to be expected. The NHIC query identified the Blanding's Turtle within the 1 km square containing the Claim. Although this species was not detected, habitat for this species is present and occurs within any one of these communities: BOOG1, BOTC1-1, and Open Aquatic. The locations of these ecosites are provided on Figure 6. Given the wetland and beaver pond conditions on-site, there is a high probability that this species could occur within the Claim boundary.

The Five Lined Skink has also been identified to occur within the NHIC 1 km square that contains the subject claim. Surveys were conducted but no Five Lined Skink were observed. Habitat is ideal for this species on the Claim as there are plenty of bedrock outcrops, woodlands and wetlands that provide food, shelter and hibernaculum for this

lizard. There is a high probability that this species is present within the Claim area.

Although there were no SAR herpetile sightings, additional surveys during spring emergence and nesting periods are recommended to confirm the presence or absence of any/all SAR.

A complete list of the herpetiles identified on-site are presented in Appendix A.

6.4.3 Fish and Mussels

The Open Aquatic ecosites provide the best habitat for fish and mussels. Some areas of wetland and streams will also provide marginal habitat. Many of the watercourses and drainage areas on-site did not possess any flows during our inspections, therefore, should not be considered significant habitat for aquatic wildlife. During the spring freshet melt, it is possible that the streams and drainage areas would flow sufficiently to allow fish to migrate between wetlands and open water areas, although this will vary annually.

Given the above, it is unlikely that significant fish migration between wet features would occur, due to the very short-lived flows that would occur in these watercourses. As such, they likely have minimal importance with regard to fisheries.

A survey was not completed by ORE to assess for the presence of SAR fish and mussels. However, it is unlikely that any SAR fish or mussels are present as they have not been detected in the past by agencies. Regardless, further studies should be completed to determine any constraints associated with potential fisheries.

6.4.4 Plants and Lichens

The Houghton's Flatsedge was observed off-site in 1999 within NHIC Square 18TQ6947. The dry, sandy soil conditions for this species' habitat is present on-site, however, this species was not observed during ORE's site inspections. As such, it is unlikely that this species is inhabiting the subject Claim. Surveys were also conducted for lichen SAR, of which none were observed. A complete list of plant and lichen species identified on-site is provided in Appendix A.

More detailed studies should be completed to confirm presence or absence of any plant and lichen SAR.

6.4.5 Avifauna

During our inspections, a total of twenty-six (26) bird species were identified on-site,

none of which were significant. Among the birds listed within the OBBA square for this site, the following species could find adequate habitat:

- **Barn Swallow** (*Threatened*) - Adjacent properties contain structures that would be appealing for this species to nest within. However, there are currently no man-made structures on-site that would provide sufficient habitat, although the property could be utilized for foraging purposes. The probability of Barn Swallow being present on-site is low.

- **Black Tern** (*Special Concern*) - There is plenty of wetland available on-site that would provide adequate habitat and nesting areas. The open areas on-site would also provide sufficient feeding grounds. This species' potential habitat is identified as the wetland communities in Figure 6. The probability of Black Tern being present on-site is considered moderate.

- **Canada Warbler** (*Special Concern*) - The subject property provides both mixed and deciduous forests for this species to breed within. Some parts of the Claim contain dense shrub and understory vegetation along wetland borders, representing adequate nesting and foraging habitat. This species' potential habitat is identified as the parts of the FOMM2 and FODM1-1 ecosites containing a thick understory. The probability of Canada Warbler being present on-site is considered moderate.

- **Chimney Swift** (*Threatened*) - Historically this species would inhabit open cavities in standing trees. However, today this species prefers urban settlements and man-made structures to adhere its nest to. There are trees with cavities available on-site, although it is unlikely that this species is inhabiting them, as nearby cottages would likely be more appealing. The probability of Chiminey Swift being present on-site is considered low.

- **Eastern Whip-poor-will** (*Threatened*) - The mixed forest is excellent habitat for this species to nest within. It would utilize the forest edge to call from during the breeding bird period. The Claim also provides sufficient wetlands for foraging. This species' potential habitat is identified as the FOMM2 ecosite on Figure 6. The probability of Whip-poor-will being present on-site is considered high.

- **Eastern Wood-pewee** (*Special Concern*) - The subject Claim provides a large tract of deciduous forest for this species to breed within. This species' potential habitat is identified as the FODM1-1 ecosite on Figure 6. Similar to the above, the probability of Eastern Wood-pewee being present on-site is considered high.

- **Golden Winged Warbler** (*Special Concern*) - Although the majority of the deciduous forest's understory is relatively unvegetated, the subject Claim

provides a few areas with dense shrub and understory vegetation along wetland borders representing adequate nesting and foraging habitat. This species' potential habitat is identified as the parts of the FOMM2 and FODM1-1 ecosites that contain a thick understory. The probability of Golden-winged Warbler being present on-site is believed to be marginal.

- **Wood Thrush** (*Special Concern*)- The subject Claim provides mixed and deciduous forests for this species to breed within. Some areas contain dense shrub and understory vegetation along wetland borders which could represent adequate nesting and foraging habitat. This species' potential habitat is identified as the parts of the FOMM2 and FODM1-1 ecosites that contain a thick understory. The probability of Wood Thrush being present on-site is considered high.

Species that have been awarded a Special Concern designation under the ESA are protected as an individual. There is no *habitat* protection under the ESA for these species. The delineated habitat does not represent a potential constraint, although consideration should be given to mitigating any potential habitat loss resulting from future development. However, if the habitat of a Special Concern species is determined to be significant under the "Significant Wildlife Habitat Technical Guide", the habitat can be afforded protection. A Permit may be required for any alteration within a Significant Wildlife Habitat.

Species that have been awarded a Threatened or Endangered designation under the ESA are protected as an individual <u>and</u> at the habitat level. The delineated habitat, if its presence is confirmed on-site, would therefore represent a potential constraint and a SAR permit from the MNRF would be required to harm, harass or alter/destruct the habitat of the affected species.

Additional assessments conducted within the breeding fauna period would be necessary to confirm or exclude the presence of any potential SAR identified within the background information.

7.0 Conclusions & Recommendations

7.1 Generally speaking, we concur with the LIO database with respect to the landscape illustrated by Figure 2. As a result of our field inspections, minor adjustments to the boundaries of wetlands were completed, as shown on Figure 6. The adjustments have resulted in a 0.17 ha increase in wetland area, in comparison to the LIO delineations.

7.2 Although ORE staff did not complete comprehensive wetland evaluations to determine their relative significance, we were able to verify the general wetland-types and provide more information as to their composition and connectivity to surrounding features. All

wetlands on-site provide ecological and hydrological value, both within and outside of the Claim.

However, we have delineated an area on Figure 8, that in our opinion, segregates the most sensitive of the waterways on-site. It is also our opinion that the segregated waterway zone represents features that would be the most difficult with respect to applying effective impact mitigation, should development be planned. However, the line should be considered preliminary until such time as more detailed verification studies are completed.

The segregated area outlined on Figure 8 was delineated giving consideration to drainage patterns from OFAT data, wetland connectivity from LIO, our (field) wetland boundary data and potential SAR habitat.

7.3 It is generally recommended that the design of any future development maintain the current drainage regime within Subwatersheds 1 and 6. Given the potential local significance of the wetlands within these subwatersheds, detailed studies would need to be completed to determine the potential hydrological and ecological impacts (on-site and off-site) should development in those areas be contemplated. This is relevant considering that the gabbro contact may run through these subwatersheds.

7.4 Watersheds 2, 3 and 4 are not directly connected to any significant bodies of water. As such, any alteration to the drainage regime within these three (3) watersheds would represent a lower potential for impact.

Future ecological and hydrological studies should be conducted on the wetlands within the areas underlain by the gabbro body.

7.5 If it can be demonstrated that the watercourses on-site are intermittent systems, protection of these features may not be required. Future studies are recommended to determine flows and hydrologic connectivity between the lakes and wetlands on-site. Each wetland and watercourse should be assessed according to their relevance in the landscape. This would include evaluation and a detailed inventory of the species within these systems.

7.6 Two (2) upland forest communities were delineated on the Claim, both of which are part of a larger continuous tract of forest in the region. The upland forest communities are valuable with respect to their ecological and hydrological roles. Therefore, it is recommended that a 30 m environmental protection buffer of upland woodland habitats be applied to any significant hydrologic features that are being retained. Although the upland woodland habitats are not classified by MNRF as Significant, it is recommended

that an evaluation be completed to determine the forests' significance.

7.7 While future development will necessarily result in the removal of some trees and other vegetation, it should be possible to mitigate those removals by restoring the forest and waterways elsewhere to produce an *"overall net benefit"* with respect to the lands and species. This type of mitigation should be considered at the development design stage.

7.8 No Species at Risk (SAR) were observed within the Claim during the site inspections, however, it was not the ideal time of year to detect these species. Most of the species detected within the background information searches were already in overwintering mode or had migrated. However, our assessment concluded that there appears to be an abundance of suitable habitat for SAR on-site that could potentially contain SAR. Therefore, further assessments in the appropriate survey seasons are recommended.

End of Environmental Baseline Report

Respectfully Submitted,
Oakridge Environmental Limited

Rob D. West, HBSc. CSEB
Senior Environmental Scientist

Statement of Qualifications

I, Rob D. West have been practising in the fields of Environmental Sciences and Earth Sciences for more than 15 years. I have supervised the design of, collection of data for, and interpretive work involved in this study.

My educational background includes completion of an Honours Bachelor of Science degree from Laurentian University, Sudbury, Ontario, specializing in Ecology, Biology, Vertebrates/ Invertebrates, Vascular/Non Vascular Plants Taxonomy, Environmental Chemistry and Environmental Geology. My expertise also includes:

2012	-	MTO/DFO/OMNR Protocol for Protecting Fish & Fish Habitat
2011	-	Fish Identification, Royal Ontario Museum
2008	-	Electrofishing Techniques, Central Lake Ontario Conservation
2008	-	Mussel Identification, Environment Canada
2007	-	Ministry of Natural Resources - Data Sensitivity Training (NHIC)
2002	-	Ministry of Environment - Well Technician Certification
2001	-	Ministry of Natural Resources - Wetland Evaluation Course

I hold memberships or participate in the following:

ESA	-	Member, Ecological Society of America
CSEB		Member, Canadian Society of Environmental Biologists
OBBA	-	Ontario Breeding Bird Atlasser
PFN	-	Member, Peterborough Field Naturalists
PADI	-	Certified Open Water Diver

It is further stated that neither Oakridge Environmental Ltd. nor its employees have any ownership interest in the subject property and that the only remuneration to be received is monetary and that the remuneration is solely related to the work completed as outlined in this report.

Rob West

Oakridge Environmental Ltd.
380 Armour Road, Suite 127
P.O. Box 431
Peterborough, Ontario
K9J 6Z3
(705) 745-1181 voice
(705) 745-4163 fax

rob@oakridgeenvironmental.com email

Selected References

Argus, G.W. and K.M. Pryer. 1982-1987, *"Atlas of the Rare Vascular Plants of Ontario*". Four Parts. National Museum of Natural Sciences, Ottawa, Ontario.

Austen, M.J. et. al. 1995. "*Ontario Birds at Risk Program*". Federation of Ontario Naturalists and Long Point Observatory. 165 pp. OBAR website contacted June 2013.

Bezener.A. 2000. "*Birds of Ontario*".Lone Pine Publishing.. 376 pp.

Bakowsky, W., 1995. *"S-ranks for Southern Ontario Vegetation Communities".* OMNR, Natural Heritage Information Centre, Peterborough, ON. 11 pp.

Bellrose F.C. 1976. *"Ducks, Geese and Swans of North America".* Stackpole Books

Cadman, M.D. et. al., 1987**.** *"Atlas of Breeding Birds of Ontario"***,** OBBA website contacted May 2013.

Cheskey, E.D. 1995. *"Towards Conserving Birds of Ontario*". Federation of Ontario Naturalists. 48 pp.

Gill F.B. 2007. "Ornithology - Third Edition". National Audobon Society, W.H. Freeman and Company.

Habib, L., Bayne, E. M. & Boutin, S. *"Chronic Industrial Noise Affects Pairing Success and Age Structure of Ovenbirds Seiurus Aurocapilla*." Journal of Applied Ecology 44 (2007): 176-84.

Holmgren, Noel H., "*Manual of Vascular Plants of Northeastern United States and Adjacent Canada - Second Edition* ", The New York Botanical Garden, 1998.

Jones et. al. 2008. "*The Dragonflies and Damselfies of Algonquin Park and the Surrounding Area.*" The Friends of Algonquin Park. 263 pp.

Konze, Karl and McLaren, Margaret. 1998. *Wildlife Monitoring Programs and Inventory Techniques for Ontario*. Ontario Ministry of Natural Resources. Northeast Science and Technology Manual TM-009. 139 pp

Lee, H.D. et. al.. 1998. *Ecological Land Classification for Southern Ontario -First Approximation and it's Application - SCSS FieldGuide; FG-02*. OMNR, North Bay, Ontario.

Muller, E. H., and V. K. Prest. 1985. Glacial Lakes in the Ontario Basin. Quaternary Evolution of the Greak Lakes, GAC Special Paper 30.

Newcomb, L., 1977. "Nerwcomb's Wildflower Guide". Little Brown and Company(Canada) Limited.

Oldham, M.J., "*Natural Heritage Resources of Ontario, Amphibians and Reptiles"* **,**Ontario Herpetofaunal Survey (OHS)., 1996, OHS website contacted August 2013.

Peck G.K. & James R.D., 1983. "*Breeding Birds of Ontario Nidiology and Distribution Volume 1 : Nonpasserines and Volume 2: Passerines".* Royal Ontario Museum, Toronto.

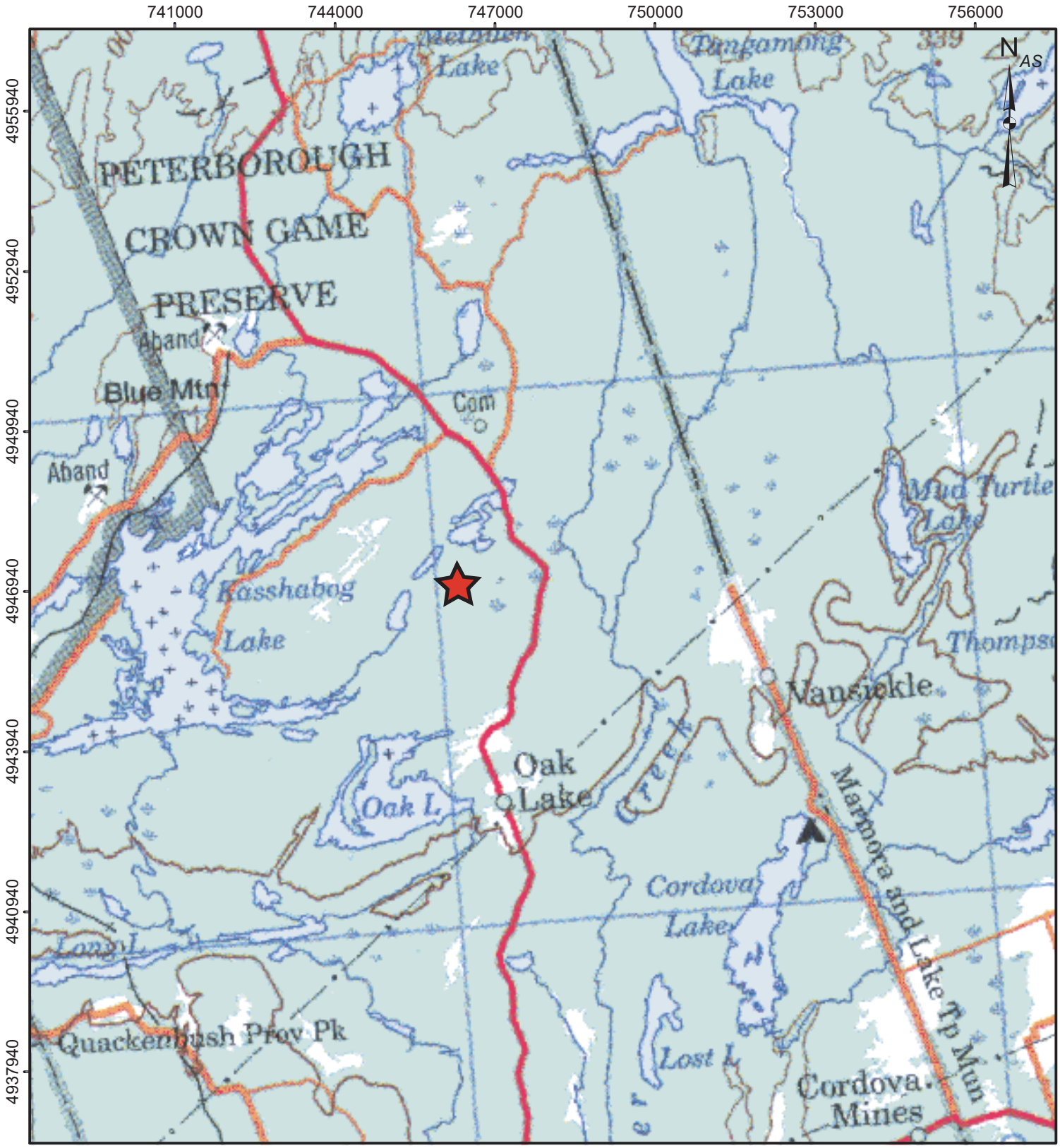
Phipps, Don. 2008. *Trigan Resources Inc., Assessment Report for Claim 1240157, East Gabbro Property*. February 04,

"**Species at Risk in Ontario List**." Ontario.ca. N.p., 16 June 2015. <http://www.ontario.ca/environment-and-energy/species-risk-ontario-list>.

Sibley, D.A. 2003. "*The Sibley Field Guide to Birds of Eastern North America*". New York: Alfred A. Knopf.

Voss, Edward G., 1972. "*Michigan Flora - Part I to Part III*"; Cranbrook Institute of Science Bulletin 55 and The University of Michigan Herbarium.

Figures



Scale: 1:100,000

North American Datum 1983 UTM Zone 18

Approximate Site Location

Environmental Baseline Study (EBS)
Claim No. 1240157 (East Gabbro Project)
Lot 10, Concession 4, (Methuen)
Township of Havelock-Belmont-Methuen,
County of Peterborough

0 1.25 2.5 5 km

TITLE
General Location

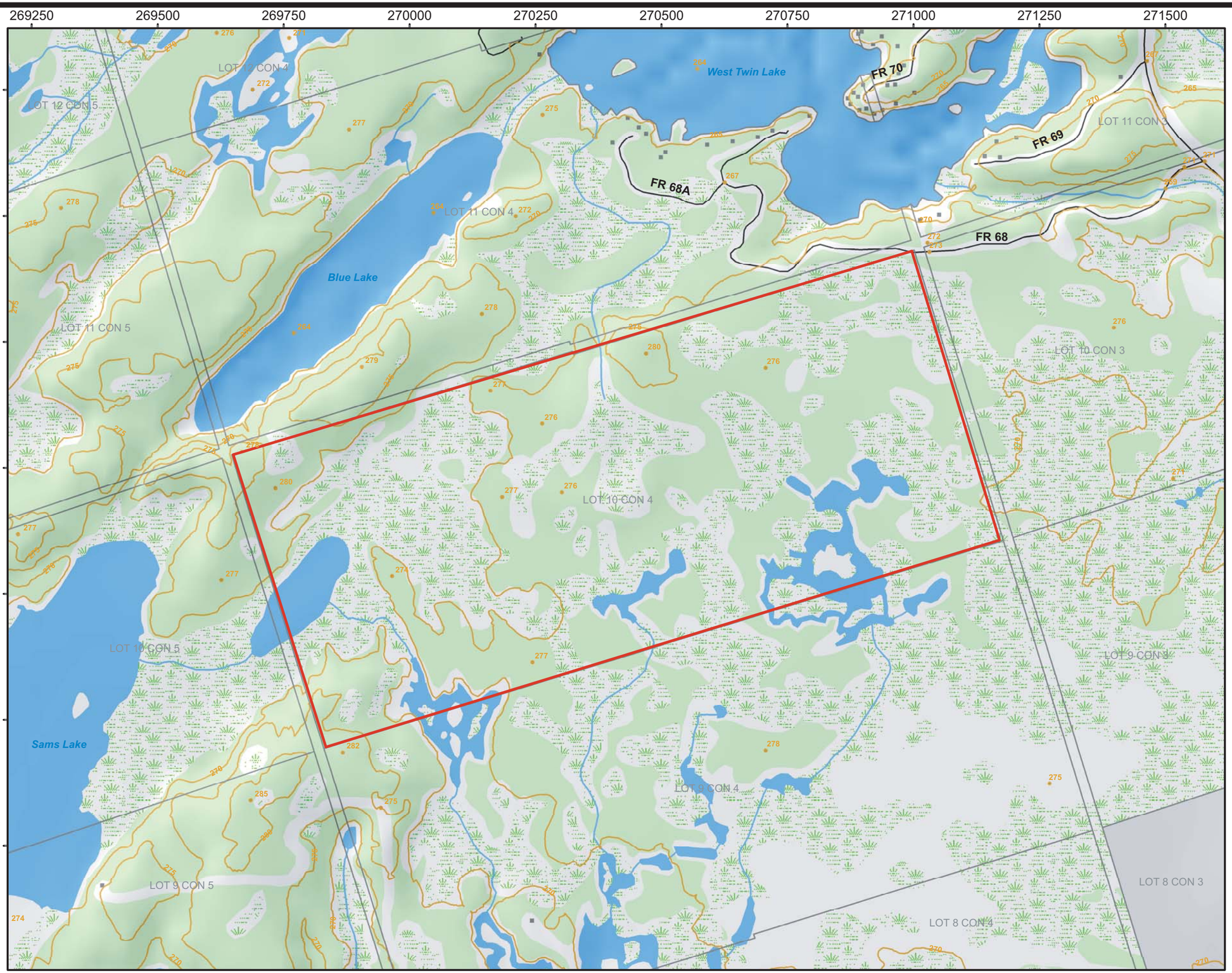
ORE
Oakridge Environmental Ltd.
Environmental and Hydrogeological Services

PROJECT #
16-2192

DATE
January 2017

FIGURE NO.
1

Note: Base map provided by Natural Resources Canada, NTS map 31/C (2005).



North American Datum 1983 UTM Zone 18

Environmental Baseline Study (EBS)
Claim No. 1240157 (East Gabbro Project)
Lot 10, Concession 4, (Methuen)
Township of Havelock-Belmont-Methuen,
County of Peterborough

Legend

- Approximate Claim Boundary
- Unevaluated Wetland
- Evaluated Wetland
- Watercourse
- Waterbody
- Wooded Area
- Contour Line (5 m interval)
- Spot Height
- Building
- Railway
- Road
- Lot Fabric

N AS

Scale: 1:7,500

0 125 250 500 m

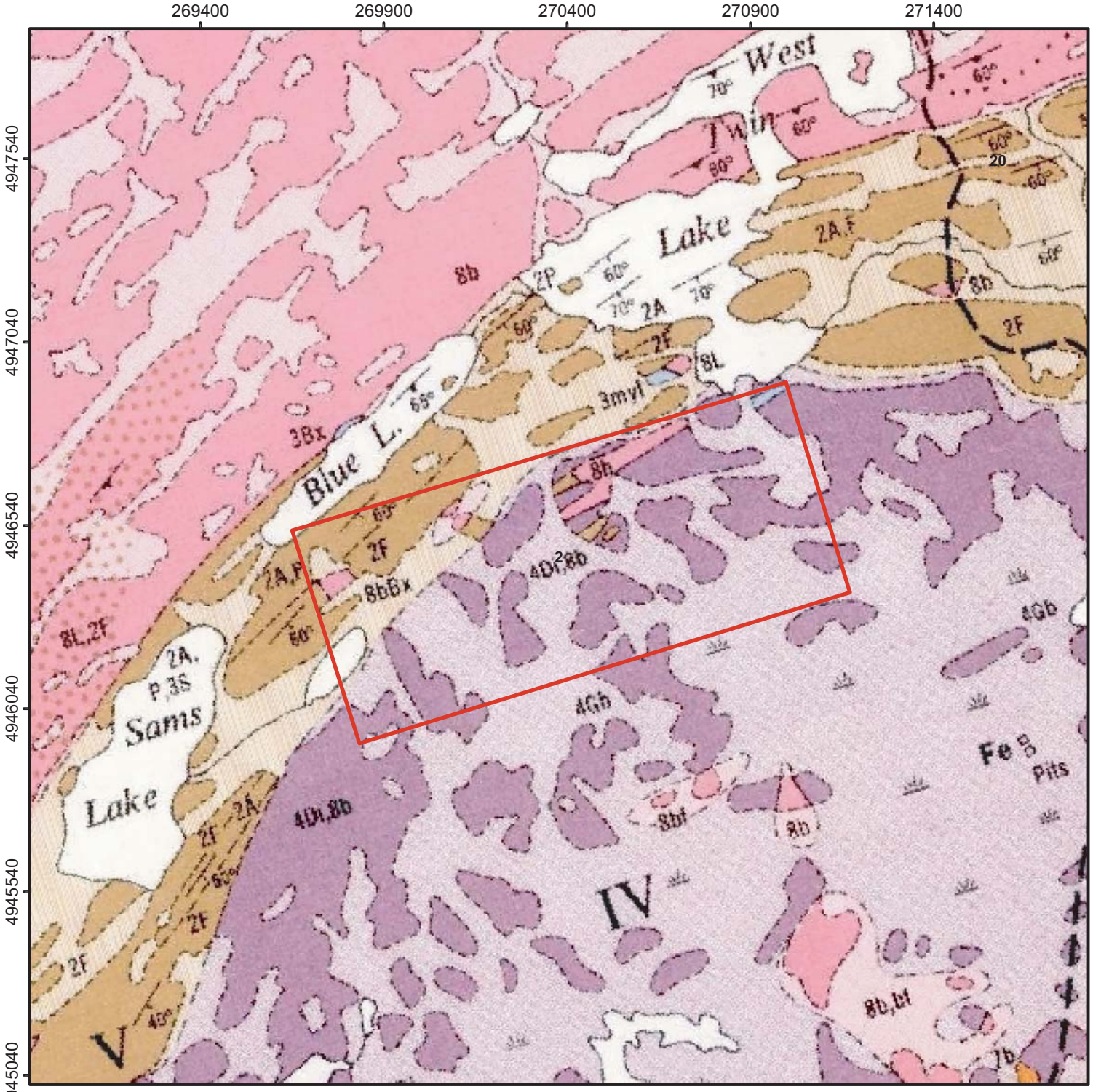
Note: Base map provided by the Ministry of Natural Resources Land Information Database, copyright the Queen's Printer (2015).

TITLE

Topography and Drainage

ORE
Oakridge Environmental Ltd.
Environmental and Hydrogeological Services

PROJECT #	FIGURE NO.
16-2192	**2**
DATE January 2017	



North American Datum 1983 UTM Zone 18

Environmental Baseline Study (EBS)
Claim No. 1240157 (East Gabbro Project)
Lot 10, Concession 4, (Methuen)
Township of Havelock-Belmont-Methuen,
County of Peterborough

LEGEND

- Approximate Claim Boundary
- 8 Granitic Rocks
- 4 Basic Intrusives
- 2 Non-Calcareous Sediments

N AS

Scale: 1:15,000

0 0.25 0.5 km

Notes: Basemap derived from maps of the Forest Resources Inventory, Ontario Department of Lands and Forests, with additional information by D.F. Hewitt.

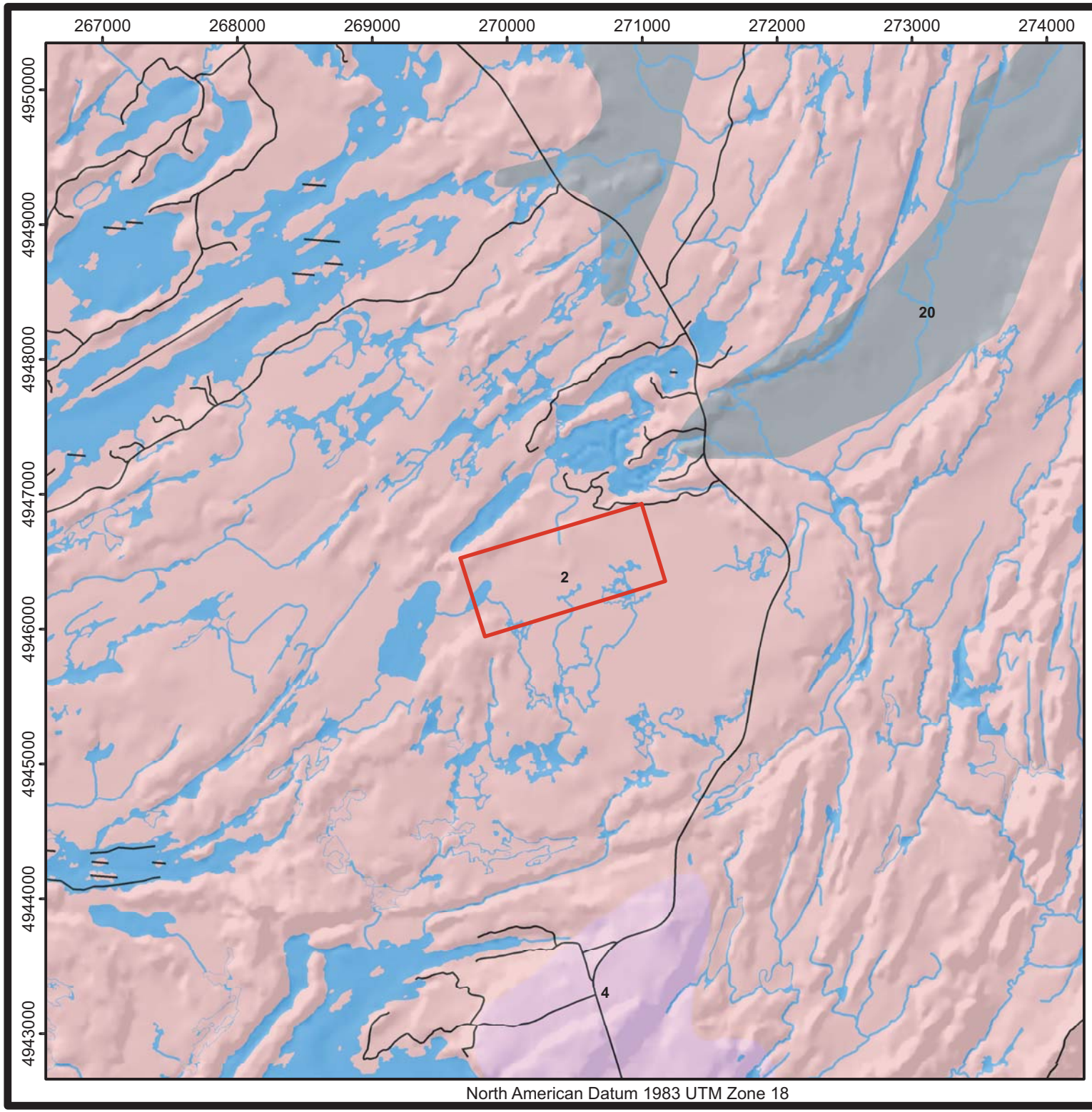
Geology by D.F. Hewitt and assistants, 1956 and 1957

TITLE

Bedrock Geology

ORE Oakridge Environmental Ltd.
Environmental and Hydrogeological Services

PROJECT #	FIGURE NO.
16-2192	3
DATE January 2017	



Environmental Baseline Study (EBS)
Claim No. 1240157 (East Gabbro Project)
Lot 10, Concession 4, (Methuen)
Township of Havelock-Belmont-Methuen,
County of Peterborough

LEGEND

- Approximate Claim Boundary
- 2: Precambrian bedrock-drift complex
- 4: Paleozoic bedrock-drift complex
- 20: Organic deposits

N AS

Scale: 1:40,000

0 0.5 1 2 km

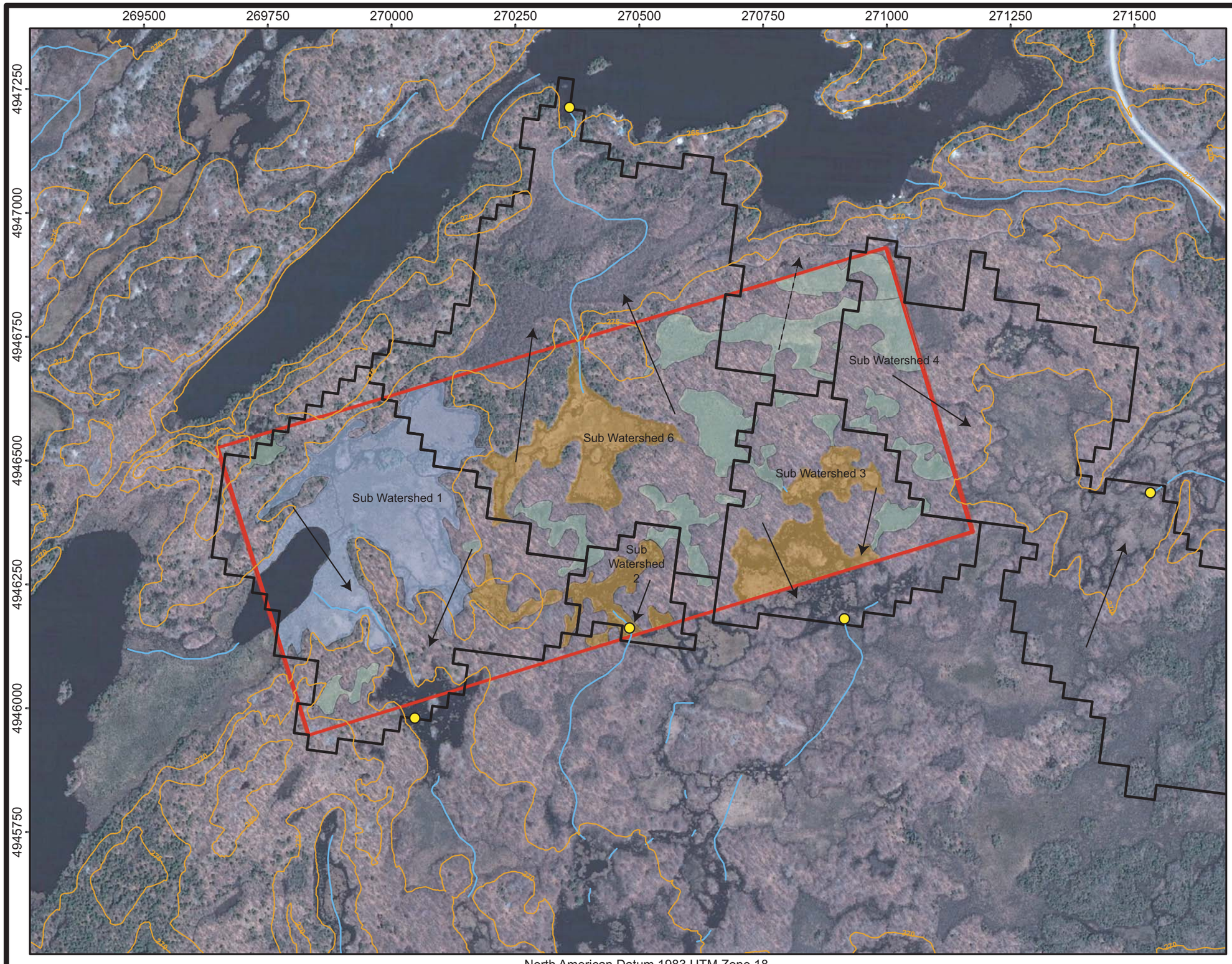
Note: Base map provided by Ontario Geological Survey, copyright the Queen's Printer (2010).

TITLE

Surficial Geology

ORE Oakridge Environmental Ltd.
Environmental and Hydrogeological Services

PROJECT #	FIGURE NO.
16-2192	4
DATE	
January 2017	



North American Datum 1983 UTM Zone 18

Environmental Baseline Study (EBS)
Claim No. 1240157 (East Gabbro Project)
Lot 10, Concession 4, (Methuen)
Township of Havelock-Belmont-Methuen,
County of Peterborough

Legend

- Approximate Claim Boundary
- BOOG1: Graminoid Open Bog
- BOT1_1: Black Spruce Bog
- SWT: Thicket Swamp-Speckled Alder Winterberry
- Watershed Pour Point
  Indicating each watersheds final pour point
- OFAT Sub Watershed Boundary
- General Drainage Direction
- ORE Interpreted GeneralDrainage Direction
- LIO Interpreted Watercourse
- LIO Contour Interval

N AS

Scale: 1:7,500

0 125 250 500 m

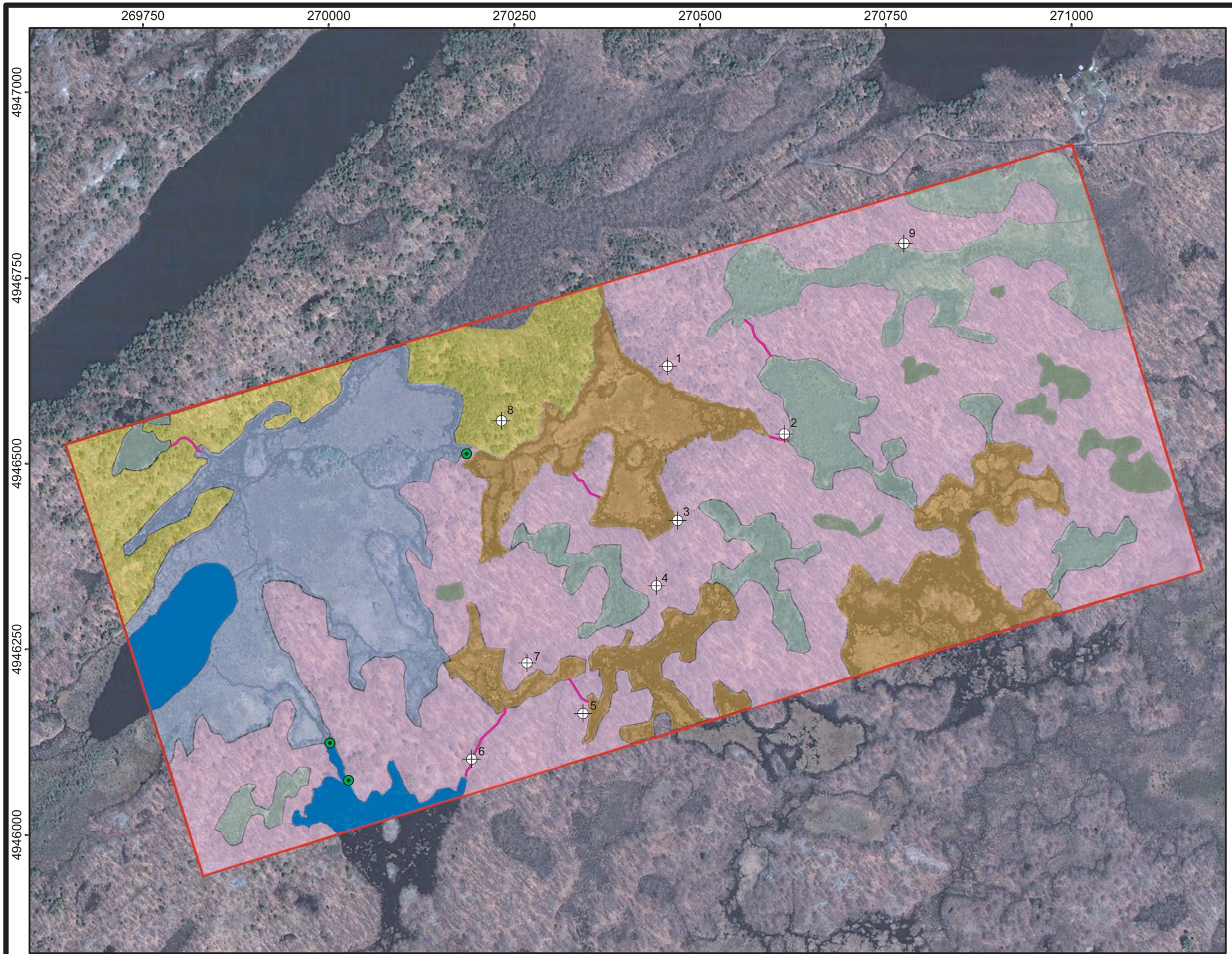
Note: Aerial photographs provided by ESRI, DigitalGlobe (2011).

TITLE

OFAT Watershed Mapping

ORE
Oakridge Environmental Ltd.
Environmental and Hydrogeological Services

PROJECT #	FIGURE NO.
16-2192	**5**
DATE January 2017	



North American Datum 1983 UTM Zone 18

Environmental Baseline Study (EBS)
Claim No. 1240157 (East Gabbro Project)
Lot 10, Concession 4, (Methuen)
Township of Havelock-Belmont-Methuen,
County of Peterborough

Legend

- Approximate Claim Boundary
- Beaver Dam
- Hand Auger Location
- Drainage Feature
- FOMM2 White Pine-Hardwood Mixed Forest
- BOOG1 Graminoid Open Bog
- BOT1_1 Black Spruce Bog
- SWT Thicket Swamp-Speckled Alder Winterberry
- Open Water
- FODM1-1 Red Oak Deciduous Forest

N AS

Scale: 1:5,000

0 75 150 300 m

Note: Aerial photograph provided by ESRI, Digital Globe (2010).

TITLE

Vegetation Mapping

ORE Oakridge Environmental Ltd.
Environmental and Hydrogeological Services

PROJECT #	FIGURE NO.
16-2192	6
DATE January 2017	

Photo A (Left) shows the current conditions of the Mixed Forest ecosite. This photo was taken slong the northern property boundary.

Photo B (Right) illustrates the conditions of the SWT ecosites. This photo was taken during leaf-off conditions.

Photo C (Left) shows the southern beaver dam in the southwestern Open Aquatic habitat.

Notes: Site photos were taken during the September 29th and November 8th site visits	Environmental Baseline Study (EBS) Claim No. 1240157 (East Gabbro Project) Lot 10, Concession 4, (Methuen) Township of Havelock-Belmont-Methuen, County of Peterborough	TITLE Site Photos 1
	ORE Oakridge Environmental Ltd. Environmental and Hydrogeological Services	PROJECT # 16-2192 DATE January 2017 FIGURE NO. 7

Photo D (Left) shows the conditions of the Graminoid Open Bog ecosite. This photo was taken along the northeast side of the most northern BOOG1 ecosite.

Photo E (Right) shows the conditions of the FODM1-1 ecosite. An open canopy allows for ground vegetation to thrive providing a substantial understory. This photo was taken adjacent to a BOOG1 ecosite.

Photo F (Left) shows conditions of the Black Spruce Bog. Beyond the treeline is the Open Aquatic ecosite. This photo was taken on the southern boundary of the BOT1_1 ecosite facing north.

Notes: Site photos were taken during the September 29th site visit.

Environmental Baseline Study (EBS)
Claim No. 1240157 (East Gabbro Project)
Lot 10, Concession 4, (Methuen)
Township of Havelock-Belmont-Methuen,
County of Peterborough

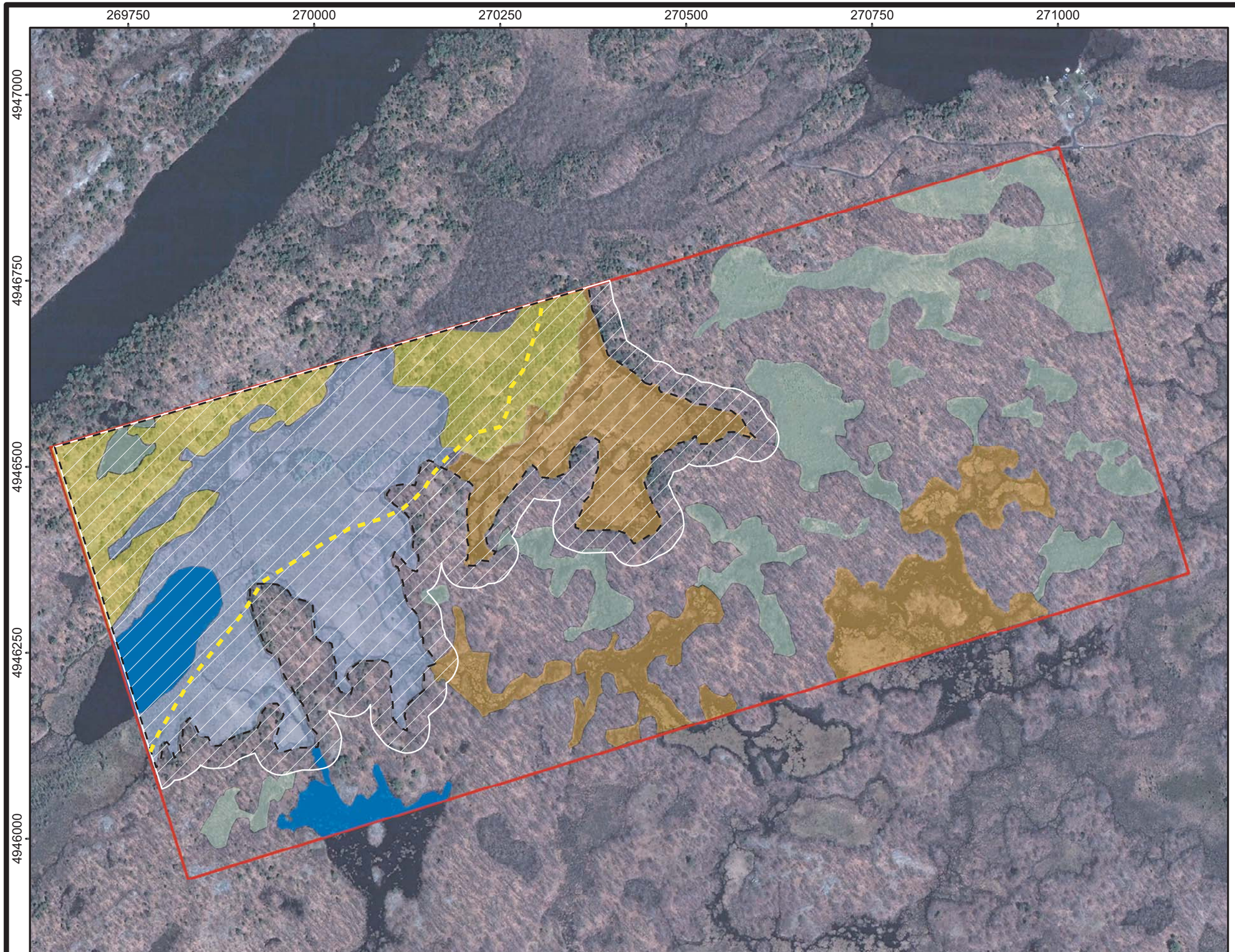
TITLE
Site Photos 2

ORE
Oakridge Environmental Ltd.
Environmental and Hydrogeological Services

PROJECT # 16-2192

DATE January 2017

FIGURE NO. 7



North American Datum 1983 UTM Zone 18

Environmental Baseline Study (EBS)
Claim No. 1240157 (East Gabbro Project)
Lot 10, Concession 4, (Methuen)
Township of Havelock-Belmont-Methuen,
County of Peterborough

Legend

- Approximate Claim Boundary
- Gabbro Contact Zone (Phipps, 2008)
- Sensitive Feature Delineation
- Sensitive Features with 30 m Vegetative Buffer
- FOMM2 White Pine-Hardwood Mixed Forest
- BOOG1 Graminoid Open Bog
- BOT1_1 Black Spruce Bog
- SWT Thicket Swamp-Speckled Alder Winterberry
- Open Water

N AS

Scale: 1:5,000

0 75 150 300 m

Note: Aerial photographs provided by ESRI, DigitalGlobe (2011).

TITLE

Sensitive Areas

ORE Oakridge Environmental Ltd.
Environmental and Hydrogeological Services

PROJECT #	FIGURE NO.
16-2192	**8**
DATE January 2017	

Appendix A

Species List

Species Occurrences

Amphibians

COMMON NAME	SCIENTIFIC NAME	RANK
Blue-spotted Salamander	Ambystoma laterale	S4
Eastern Red-backed Salamander	Plethodon cinereus	S5

Birds

COMMON NAME	SCIENTIFIC NAME	RANK
Blue-winged Teal	Anas discors	S4
Ruffed Grouse	Bonasa umbellus	S4
Purple Finch	Carpodacus purpureus	S4B
Northern Flicker	Colaptes auratus	S4B
Ovenbird	Seiurus aurocapilla	S4B
Wood Duck	Aix sponsa	S5
Blue Jay	Cyanocitta cristata	S5
Common Raven	Corvus corax	S5
Downy Woodpecker	Picoides pubescens	S5
Canada Goose	Branta canadensis	S5
White-breasted Nuthatch	Sitta carolinensis	S5
Red-breasted Nuthatch	Sitta canadensis	S5
Black-capped Chickadee	Poecile atricapillus	S5
Wild Turkey	Meleagris gallopavo	S5
Ring-necked Duck	Aythya collaris	S5
Mallard	Anas platyrhynchos	S5
Pileated Woodpecker	Dryocopus pileatus	S5
American Goldfinch	Carduelis tristis	S5B
White-throated Sparrow	Zonotrichia albicollis	S5B
Dark-eyed Junco	Junco hyemalis	S5B
Common Grackle	Quiscalus quiscula	S5B
Song Sparrow	Melospiza melodia	S5B
Hooded Merganser	Lophodytes cucullatus	S5B,S5N
Common Loon	Gavia immer	S5B,S5N
European Starling	Sturnus vulgaris	SNA
Snow Bunting	Plectrophenax nivalis	SNA

Mammals

COMMON NAME	SCIENTIFIC NAME	RANK
American Mink	Mustela vison	S4
Northern Raccoon	Procyon lotor	S5
Red Squirrel	Tamiasciurus hudsonicus	S5
Muskrat	Ondatra zibethicus	S5
Meadow Vole	Microtus pennsylvanicus	S5
Beaver	Castor canadensis	S5
Red Fox	Vulpes vulpes	S5

Coyote	Canis latrans	S5
Eastern Chipmunk	Tamias striatus	S5
Eastern Cottontail	Sylvilagus floridanus	S5
White-tailed Deer	Odocoileus virginianus	S5

Vascular Plants

COMMON NAME	SCIENTIFIC NAME	RANK
Smooth Scouring-rush	Equisetum laevigatum	S4
New Jersey Tea	Ceanothus americanus	S4
American Beech	Fagus grandifolia	S4
Beach Pea	Lathyrus japonicus	S4
Few-seeded Sedge	Carex oligosperma	S4
Virginia Creeper	Parthenocissus quinquefolia	S4?
Squaw-root	Conopholis americana	S4?
White Ash	Fraxinus americana	S4?
Eastern Hop-hornbeam	Ostrya virginiana	S5
Paper Birch	Betula papyrifera	S5
Dudley's Rush	Juncus dudleyi	S5
Mossy-cup Oak	Quercus macrocarpa	S5
Jack-in-the-pulpit	Arisaema triphyllum	S5
Peach-leaved Willow	Salix amygdaloides	S5
Tussock Sedge	Carex stricta	S5
Speckled Alder	Alnus incana	S5
White Oak	Quercus alba	S5
Wild Columbine	Aquilegia canadensis	S5
Trembling Aspen	Populus tremuloides	S5
White-grained Mountain-ricegrass	Oryzopsis asperifolia	S5
Pussy Willow	Salix discolor	S5
Yellow Trout-lily	Erythronium americanum	S5
White Trillium	Trillium grandiflorum	S5
Balsam Poplar	Populus balsamifera	S5
Sweet Fern	Comptonia peregrina	S5
Sweet Bayberry	Myrica gale	S5
American Elm	Ulmus americana	S5
Partridge-berry	Mitchella repens	S5
False Solomon's-seal	Maianthemum racemosum	S5
Creeping Juniper	Juniperus horizontalis	S5
Ostrich Fern	Matteuccia struthiopteris	S5
Sensitive Fern	Onoclea sensibilis	S5
Field Horsetail	Equisetum arvense	S5
Floating Pondweed	Potamogeton natans	S5
White Baneberry	Actaea pachypoda	S5
Bracken Fern	Pteridium aquilinum	S5
Red Baneberry	Actaea rubra	S5
Balsam Fir	Abies balsamea	S5

Black Spruce	Picea mariana	S5
Rock Polypody	Polypodium virginianum	S5
Eastern Hemlock	Tsuga canadensis	S5
Common Hornwort	Ceratophyllum demersum	S5
Eastern White Cedar	Thuja occidentalis	S5
Broad-leaf Cattail	Typha latifolia	S5
Porcupine Sedge	Carex hystericina	S5
Bladder Sedge	Carex intumescens	S5
Lake-bank Sedge	Carex lacustris	S5
Longstalk Sedge	Carex pedunculata	S5
Slender Cotton-grass	Eriophorum gracile	S5
Dark-green Bulrush	Scirpus atrovirens	S5
Rufous Bulrush	Scirpus pendulus	S5
Pointed Broom Sedge	Carex scoparia	S5
Eastern White Pine	Pinus strobus	S5
New England Aster	Symphyotrichum novae-angliae	S5
Fringed Loosestrife	Lysimachia ciliata	S5
Spotted Joe-pye Weed	Eutrochium maculatum var. maculatum	S5
Canada Goldenrod	Solidago canadensis var. canadensis	S5
Yarrow	Achillea millefolium	S5
Starved Aster	Symphyotrichum lateriflorum	S5
Northern Bush-honeysuckle	Diervilla lonicera	S5
Small Bedstraw	Galium trifidum	S5
Fleabane	Conyza canadensis	S5
White Heath Aster	Symphyotrichum pilosum var. pilosum	S5
Virginia Saxifrage	Micranthes virginiensis	S5
Tall Rattlesnake-root	Nabalus altissimus	S5
Wild Mock-cucumber	Echinocystis lobata	S5
Northern Red Oak	Quercus rubra	S5
Downy Arrowwood	Viburnum rafinesquianum	S5
Maple-leaf Viburnum	Viburnum acerifolium	S5
Mountain Fly-honeysuckle	Lonicera villosa	S5
Spreading Dogbane	Apocynum androsaemifolium	S5
Flat-top White Aster	Doellingeria umbellata var. pubens	S5
Bulb-bearing Water-hemlock	Cicuta bulbifera	S5
Pearly Everlasting	Anaphalis margaritacea	S5
Nannyberry	Viburnum lentago	S5
Yellow Birch	Betula alleghaniensis	S5
Downy Yellow Violet	Viola pubescens var. pubescens	S5
Flat-top White Aster	Doellingeria umbellata var. umbellata	S5
Woolly Blue Violet	Viola sororia	S5
American Larch	Larix laricina	S5
Narrow-leaved Cotton-grass	Eriophorum angustifolium	S5
Reed Canary Grass	Phalaris arundinacea	S5

Greater Bladderwort	Utricularia vulgaris	S5
Striped Maple	Acer pensylvanicum	S5
Large-tooth Aspen	Populus grandidentata	S5
Panicled Aster	Symphyotrichum lanceolatum ssp. lanceolatum	S5
Teaberry	Gaultheria procumbens	S5
Narrow-leaved Meadow-sweet	Spiraea alba	S5
Pickerel Weed	Pontederia cordata	S5
Common St. John's-wort	Hypericum punctatum	S5
Northern Wild-raisin	Viburnum nudum var. cassinoides	S5
Northern Bedstraw	Galium boreale	S5
American Mountain-ash	Sorbus americana	S5
Sugar Maple	Acer saccharum var. saccharum	S5
Red Maple	Acer rubrum	S5
Blue Vervain	Verbena hastata	S5
Staghorn Sumac	Rhus typhina	S5
Choke Cherry	Prunus virginiana	S5
Riverbank Grape	Vitis riparia	S5
Northern Prickley Ash	Zanthoxylum americanum	S5
Mountain Holly	Ilex mucronata	S5
Black Raspberry	Rubus occidentalis	S5
White Avens	Geum canadense	S5
Northern Starflower	Trientalis borealis	S5
May Apple	Podophyllum peltatum	S5
Canada Anemone	Anemone canadensis	S5
American Witch-hazel	Hamamelis virginiana	S5
Wild Black Cherry	Prunus serotina	S5
Bunchberry	Cornus canadensis	S5
Wild Sarsaparilla	Aralia nudicaulis	S5
Common Water-milfoil	Myriophyllum sibiricum	S5
Red-osier Dogwood	Cornus sericea	S5
American Basswood	Tilia americana	S5
White Water-lily	Nymphaea odorata ssp. odorata	S5?
Black Ash	Fraxinus nigra	S5?
Butter-and-eggs	Linaria vulgaris	SNA
Creeping Cinquefoil	Potentilla reptans	SNA
White Sweet Clover	Melilotus albus	SNA
Canada Bluegrass	Poa compressa	SNA
Garden Asparagus-fern	Asparagus officinalis	SNA
Scotch Pine	Pinus sylvestris	SNA
Common Red Raspberry	Rubus idaeus ssp. idaeus	SNA
Lady's Thumb	Persicaria maculosa	SNA
Hard Fescue	Festuca trachyphylla	SNA
Colt's Foot	Tussilago farfara	SNA
Yellow Evening Primrose	Oenothera serrulata	SNA

Narrow-leaved Cattail	Typha angustifolia	SNA
Sheep Sorrel	Rumex acetosella	SNA
Tall Butter-cup	Ranunculus acris	SNA
Common Mother-wort	Leonurus cardiaca	SNA
Smooth Crabgrass	Digitaria ischaemum	SNA
Chicory	Cichorium intybus	SNA
A St. John's-wort	Hypericum perforatum	SNA
Tartarian Honeysuckle	Lonicera tatarica	SNA
Mayweed	Anthemis cotula	SNA
Common Canary Grass	Phalaris canariensis	SNA
Creeping Bellflower	Campanula rapunculoides	SNA
Meadow Timothy	Phleum pratense	SNA
Mouseear	Pilosella officinarum	SNA
Brown-seed Dandelion	Taraxacum officinale	SNA
Herb-robert	Geranium robertianum	SNA
English Plantain	Plantago lanceolata	SNA
Buckthorn	Rhamnus cathartica	SNA
Field Brome	Bromus arvensis	SNA
Thyme-leaved Speedwell	Veronica serpyllifolia	SNA
Red Clover	Trifolium pratense	SNA
Low Hop Clover	Trifolium campestre	SNA
Creeping Jennie	Lysimachia nummularia	SNA
Wild Carrot	Daucus carota	SNA
Brown-eyed Susan	Rudbeckia triloba	SNA
Lesser Chickweed	Stellaria pallida	SNA
Duckweed	Lemna turionifera	SNR