

NATURAL ENVIRONMENT LEVEL 1 AND 2 TECHNICAL REPORT

**VIOLET HILL PIT
TOWN OF MONO
DUFFERIN COUNTY**

June 2016

**Prepared for:
Greenwood Aggregates Company Limited**

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1.0 INTRODUCTION

This report will provide natural environment technical information (Levels 1 and 2) for applications as required by the Aggregate Resources Act of Ontario (ARA), Official Plan and Zoning By-law Amendment. The report was commissioned by Greenwood Aggregates Company Limited who will be referred to throughout this report as “the proponent”.

The property is located in Lots 30, 31 and 32 Concession 4, Town of Mono, County of Dufferin (Figure 1).

The property lies within the jurisdictions of the Town of Mono, County of Dufferin, the Midhurst District of the Ontario Ministry of Natural Resources and Forestry (OMNRF) and the Nottawasaga Valley Conservation Authority (NVCA).

The information provided in this report will be as described in OMNR Policy A. R. 2.01.07 License Applications: Natural Environment Report Standards March 15, 2006. The purpose of the Level 1 component of this natural environment report is to document the presence of significant natural heritage features and fish habitat on the study area and on the adjacent lands within 120m. The Level 2 component is to assess the negative impacts of an aggregate operation on all documented natural features and will propose preventative, mitigative or remedial measures.

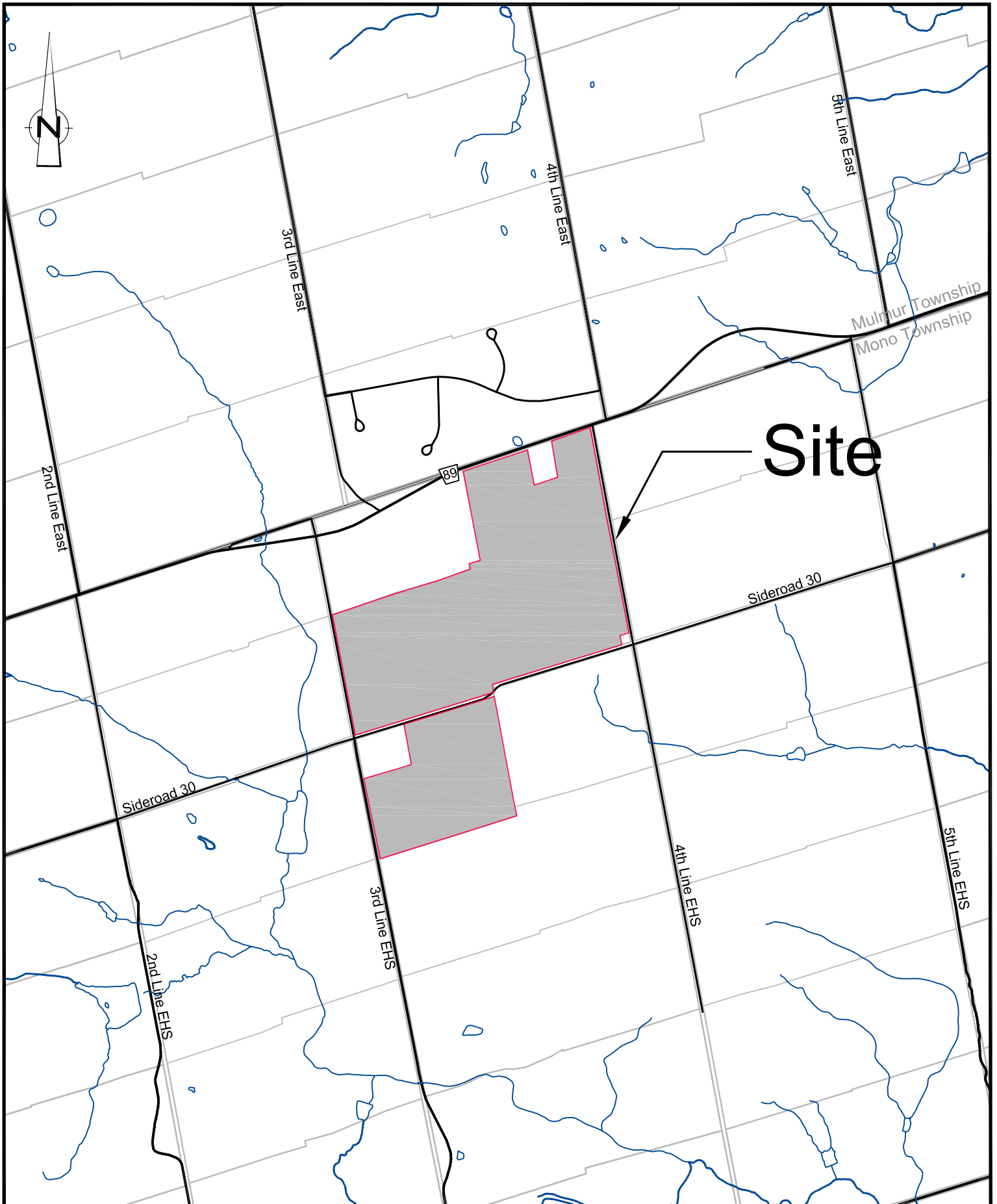
The natural heritage features that will be discussed include the following:

- a) significant wetlands
- b) significant portions of the habitat of endangered and threatened species
- c) significant Areas of Natural and Scientific Interest (ANSIs)
- d) significant woodlands (south and east of the Canadian Shield)
- e) significant valley lands (south and east of the Canadian Shield)
- f) significant wildlife habitat and
- g) fish habitat

2.0 METHODS

2.1 Review of Existing Information

All accessible, natural heritage information was reviewed prior to on site surveys. An up to date species at risk list was consulted prior to field work beginning in May 2014 and again in September 2015 during field data analysis and from January to June 2016 while the report was being prepared. The OMNRF Natural Heritage Information Centre (NHIC) web site and “Make-a-Map” feature were consulted to determine Species at Risk in Ontario (SARO) and significant natural features that have been previously reported on and near the site. The Ontario Breeding Bird Atlas (OBBA) web data summaries (2001 – 2005), the Ontario Reptile and Amphibian Atlas (ORAA) through the Ontario Nature website and the Ontario Butterfly Atlas (OBA) through the Toronto Entomologists’ Association web site were consulted to determine species at risk butterflies that have been reported on or near the property and those that have the potential to be found on the property.



Site Location - Greenwood, Violet Hill Property
Lots 30-32 Concession 4
Township of Mono
County of Dufferin
Figure 1

Scale 1:25,000

A review of SARO dragonfly species was completed to determine if the property or surrounding area would offer potential SARO dragonfly habitat.

The 2014 Provincial Policy Statement including the Natural Heritage policies was consulted. The County of Dufferin Official Plan (March 27, 2015) was reviewed especially natural heritage policies. Schedule E, Natural Heritage Features was also consulted. The natural heritage policies of the Town of Mono Official Plan (2004/2005) (OP) were reviewed. Schedules A (June 2014) and B plan were consulted to determine existing environmental zoning and designations.

The NVCA web sites were consulted to determine the extent to which an Ontario Regulation for Development, Interference with Wetlands and Alterations to Shorelines and Watercourses may affect the site. The NVCA was also consulted regarding natural heritage features on and within 120 m of the site.

Other information reviewed included;

- Site plans prepared by Rollings Hyland Consulting.
- Natural Heritage Reference Manual, 1999.
- Natural Heritage Reference Manual for Natural Heritage Policies of the Provincial Policy Statement, 2005. Second Edition 2010.
- Significant Wildlife Habitat Technical Guide, 2000.
- Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E, 2015.
- Significant Wildlife Habitat Mitigation Support Tool, Version 2014.
- Natural Heritage Assessment Guide for Renewable Energy Projects, Second Edition. OMNR, 2012.
- OMNR Policy A. R. 2.01.07 Licence Applications: Natural Environment Report Standards, March 15, 2006.
- “Proposed Violet Hill Pit Combined Level 1 and Level 2 Hydrogeological Assessment”, prepared by Whitewater Hydrogeology Ltd., 2016.

2.2 OMNRF Species at Risk List Information

The Ontario Species at Risk list (SARO) was reviewed prior to the initial surveys. The list has been regularly updated since and has been consulted throughout the information gathering period. It was most recently consulted in June 2016. The following species are listed and were considered to have potential to be found on the site.

Vascular Plants

- Butternut (*Juglans cinerea*) - tree – endangered
- American Ginseng (*Panax quinquefolius*) – forb – endangered
- Hart’s Tongue Fern – (*Asplenium scolopendrium*) - forb – species of concern

Mammals

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

Birds

- Short-eared Owl (*Asio flammeus*) – special concern
- Redheaded Woodpecker (*Melanerpes erythrocephalus*) – special concern
- Eastern Whip-poor-will (*Anstrostomus vociferous*) – threatened
- Common Nighthawk (*Chordiles minor*) – special concern
- Eastern Wood-Pewee (*Contopus virens*) – special concern
- Barn Swallow (*Hirundo rustica*) – threatened
- Bank Swallow (*Riparia riparia*) – threatened
- Wood Thrush (*Hylocichla mustelina*) – special concern
- Louisiana Waterthrush (*Parkesia motacilla*) - special concern
- Canada Warbler (*Cardellina canadensis*) – special concern
- Henslow’s Sparrow (*Ammodramus henslowii*) – endangered
- Bobolink (*Dolichonyx oryzivorus*) – threatened
- Eastern Meadowlark (*Sturnella magna*) – threatened

Amphibians

- Jefferson Salamander (*Ambystoma jeffersonianum*) - salamander – endangered

Reptiles

- Butler’s Gartersnake (*Thamnophis butleri*) – snake - endangered
- Eastern Ribbonsnake (*Thamnophis sauritus*) – snake – special concern
- Eastern Milksnake (*Lampropeltis triangulum*) – snake – species of concern

- Snapping Turtle (*Chelydra serpentina*) – turtle – species of concern

Insects

- Monarch (*Danaus plexippus*) – butterfly - species of concern

Although not on the list, Puttyroot (*Aplectrum hyemale*), a deciduous woodland species with a Provincial rank of S2 (a rare species) was also considered.

2.3 OMNRF NHIC Web Information

To catalogue natural heritage information OMNRF has divided the provincial land base into 1 sq. km units identified by a specific NAD 83 number. A 2015 review of the OMNRF Make-a-Map: Natural Heritage Areas web site indicated that the property is located in parts of five adjacent 1 sq km quadrants, 17NJ7482, 17NJ7483, 17NJ7484, 17NJ7583 and 17NJ7584. Species at risk and rare species listed for the quadrants are as follows:

17NJ7482

- Schweintz’s Sedge (*Carex schweintzii*) – plant – S3 – rare species

17NJ7483

- Schweintz’s Sedge (*Carex schweintzii*) – plant – S3 – rare species

17NJ7484

- Schweintz’s Sedge (*Carex schweintzii*) – plant – S3 – rare species

17NJ7583

- Schweintz’s Sedge (*Carex schweintzii*) – plant – S3 – rare species
- Bobolink (*Dolichonyx oryzivorus*) – bird - threatened

17NJ7584

- Schweintz’s Sedge (*Carex schweintzii*) – plant – S3 – rare species

OMNRF web mapping also indicated that the Earth Science Primrose/Boyne Valley Area of Natural and Scientific Interest (ANSI) is located north-west of the site and the Provincially Significant Wetland, Violet Hill Wetland Complex, is found within 120 m west of the site. Woodland areas are also identified, one in the south area and in the north area of the site.

2.4 The Atlas of Ontario Breeding Birds (OBBA)

To survey breeding birds across all of Ontario the provincial land base was divided by OBBA into 10 sq. km units identified by a specific NAD83 number. The property is located within the NAD 83 10 sq km survey square 17NJ78. The data summary from the atlas survey was

compared with the current SARO list to determine the potential for at risk birds to be found on the site. These included;

- Common Nighthawk (*Chordeiles minor*) – special concern
- Eastern Wood-Pewee (*Contopus virens*) – species of concern
- Barn Swallow (*Hirundo rustica*) – threatened
- Bank Swallow (*Riparia riparia*) – threatened
- Wood Thrush (*Hylocichla mustelina*) – special concern
- Bobolink (*Dolichonyx oryzivorus*) – threatened
- Eastern Meadowlark (*Sturnella magna*) – threatened

2.5 Ontario Reptile and Amphibian Atlas (ORAA)

The ORAA was reviewed to determine species at risk that had potential to be present on or within 120 m of the site. The following species were found in the general area and had potential to be found on the property;

- Jefferson Salamander (*Ambystoma jeffersonianum*) - salamander – endangered
- Butler’s Gartersnake (*Thamnophis butleri*) – snake - endangered
- Eastern Ribbonsnake (*Thamnophis sauritus*) – snake – special concern
- Eastern Milksnake (*Lampropeltis triangulum*) – snake – species of concern
- Snapping Turtle (*Chelydra serpentina*) – turtle – species of concern

2.6 Ontario Butterfly Atlas (OBA)

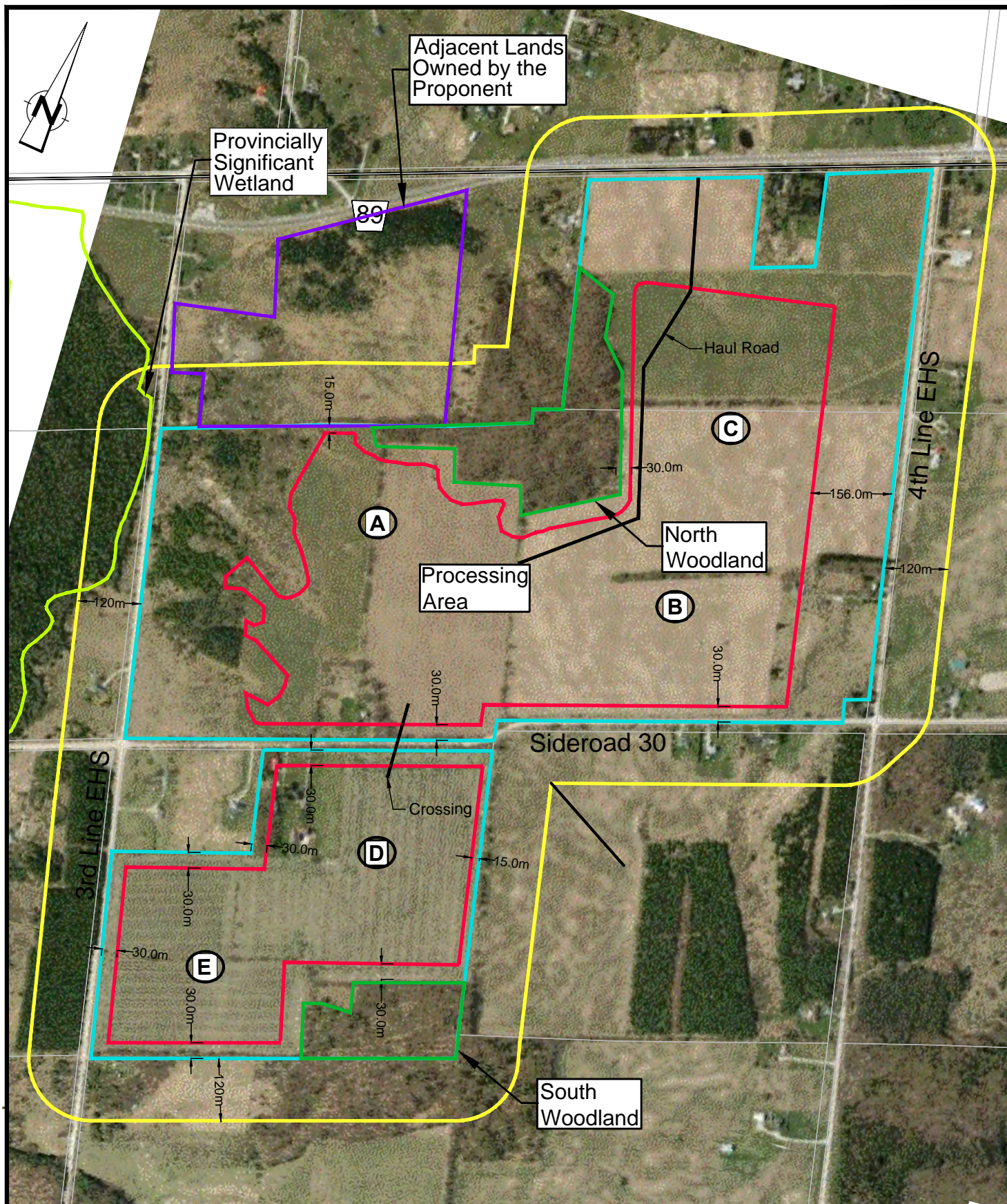
No at risk butterflies have been reported from the 10 sq km area in which the property is located. Monarch, however, was listed as occurring within the Town of Mono.

2.7 Dragonflies

At risk Dragonfly species have been reported from very few and only isolated locations in Ontario. No SARO dragonfly species have been reported from the area of the property or anywhere in the Town of Mono.

2.8 Town of Mono Environmental Designations

The property is designated “Rural” in Schedule A of the Town of Mono Official Plan (2014). Figure 3 of the plan entitled Environmental Resource Map indicates Sheldon Creek and a significant wetland west of the site. Cold water streams are identified south-west and south-east of the site, beyond 120 m.



**Proposed Boundaries And Pit Operations
Greenwood, Violet Hill Property**


Lots 30-32 Concession 4


Town of Mono

County of Dufferin

Figure 2

Legend

 Proposed Licensed Boundary

 Proposed Extraction Limit

  Phasing

Scale 1:10,000

2.9 Nottawasaga Valley Conservation Authority (NVCA) Resource Information

The NVCA provided mapping of resource features on and near the site and it is similar to that provided by the township. From their information NVCA has identified woodlands on and within 120 m of the site, an unevaluated wetland along Sheldon Creek west of the site, and water courses within 120 m of the property boundary south-west and south-east of the site. Within the site an area 200 to 325 m from the west property boundary and a second area offsite about 20 m from the south-east property boundary are within the NVCA regulated areas.

3.0 EXISTING SITE CONDITIONS

3.1 Property Description

The proposed area to be licenced under the ARA is about 147.2 ha in area and is located in the Lots 30, 31 and 32 Concession 4, E.H.S. Town of Mono, County of Dufferin (Figure 2). The area owned by the proponent and for which detailed natural heritage information was collected is 165.1 ha and included the proposed licence area and lands north-west and adjacent to the proposed licence area. The property is bounded on the north by Provincial Highway 89. It is bounded on the west by the 3rd Line EHS and on the east by the 4th Line EHS. It is bounded on the south by private lands. The 30 Sideroad is the boundary along the south-east area of the site and it also crosses through the south-west area of the site.

The topography of the property is flat to rolling with elevations ranging from about 442 masl on the north boundary to 405 masl on the west boundary (Whitewater, 2016). There are no exposed bedrock or limestone escarpments, caves, cliffs or mines on the site or within 120 m of the site.

There are 3 houses on the site. One is located along the 4th Line and two are located along 30 Sideroad. There are barns and other small out buildings associated with each house.

3.2 Land Use

About ½ the land is intensively cultivated and produced a mix of soya beans, canola and corn in 2014 and 2015 which was during the two years of the natural heritage field surveys. There are woodlots in both the central area of the north section and south area of the south section. The west area of the site is a mix of grasslands, conifer plantations and shrub thicket lands.

3.3 Adjacent Land Use

The lands to the north, east and south are mostly intensively cultivated with a few residences. The lands to the west are part of the wetland complex with one residence along the 3rd Line.

3.4 Watersheds and Surface Water

The drainage characteristics of the site are described in “Proposed Violet Hill Pit Combined Level 1 and Level 2 Hydrogeological Assessment” (Whitewater Hydrogeology Ltd., 2016). The following is a summary plus additional observations. The property is within the Nottawasaga River watershed. Sheldon Creek, a tributary of the Nottawasaga, flows west of the site. There are no streams, permanent watercourses, seeps or springs on the site. There is a 0.5 ha swamp thicket wetland near the 3rd Line on the west side of the site but there is no standing water. OMNRF Make-a-Map information indicates that there are 2 unevaluated

wetlands on the site one associated with the north woodland and the other with the south woodland. Site inspections found no evidence of wetlands or wetland vegetation associated with either woodland. The soil conditions on the site may promote groundwater infiltration thus limiting surface water accumulation and runoff. About 60% of the proposed extraction area is defined by 4 closed drainage basins (see Figure 3, Whitewater, 2016). Outside of these closed basins, surface water drainage is primarily to the west side of the site. There is evidence of periodic surface water flow beyond the 3rd Line through a box culvert. There, however, is no defined channel from the culvert to Sheldon Creek or into the wetland complex, indicating that the surface water flow from the site is minimal.

Background data indicate that there is a water course immediately south-east at the 4th Line and another flowing from the woodland to the south-west of the site toward the 3rd Line. Site inspections revealed that there are no defined channels or streams at either location. Furthermore, there is no culvert anywhere along 30 Sideroad, suggesting that surface water flow from the site does not occur past this road.

3.5 Groundwater

Details about the groundwater of the site are contained in “Proposed Violet Hill Pit Combined Level 1 and Level 2 Hydrogeological Assessment” (Whitewater Hydrogeology Ltd., 2016). The following is a summary. Water table elevations vary between 406.1 masl in the south to 413.5 masl in the north. Seasonal fluctuations are less than 1 m. Ground water flow is influenced by surface topography and is toward the south-east beneath most of the site (phases A – C). There is also some ground water flow to the south from phases D and E. Water quality is typical of the area with higher levels of chloride near Highway 89 and higher levels of nitrates across the site. Both are likely the result of human related activities of salting the highway and fertilizing the cultivated areas.

4.0 FIELD STUDY METHODS

All surveys were completed during the 2014 and 2015 field seasons. A reconnaissance visit was made with the owner to view the property in May 2014. Later a review of available background information was completed. After considering all the information, appropriate survey protocols were determined for site specific natural heritage information gathering.

Data were collected using the following protocols and guidelines.

- Ontario Breeding Bird Atlas survey protocol (BBA) (Anon., 2001, 2003),
- Bobolink survey methodology (OMNRF, 2014)
- Ecological Land Classification for Southern Ontario (ELC) (Lee et al., 1998)
- Butternut Health Assessment Protocol (BHA) (OMNRF, 2014)

Field surveys were conducted on the east and south portions (105.5 ha) during 2014 and on the west portion (59.6 ha) in 2015. Data gathering was undertaken by qualified professionals Robin E. Craig, Environmental Consultant, Judith Jones, Winter Spider Eco-Consulting and R. Bowles, Bowles Environmental Consulting. The author (R. Craig) conducted wildlife and

Butternut surveys in 2014 and was assisted by C. Craig with the night avian survey. In 2014, J. Jones of Winter Spider Eco-Consulting conducted the vegetation and ELC community surveys plus provided observations regarding wildlife on the east and south areas of the site. In 2015 R. Craig conducted night avian, incidental wildlife and Butternut surveys while J. Jones conducted vegetation, breeding bird surveys and incidental wildlife observations. R. Bowles of Bowles Environmental Consulting, assisted with avian night surveys, reptile hibernacula searches and other wildlife surveys in 2015. Wildlife searched for included birds, mammals, reptiles, amphibians, butterflies and dragonflies. Direct and indirect observations were documented. Indirect observations of wildlife included tracks, burrows, food caches, feeding activity, shed skins, scats, songs, calls, feathers, nests and eggs, insect larvae and other non-adult life stages. Several current and other field guides/keys were consulted to assist in identifying and classifying the wildlife species encountered during the field surveys. All field trips were timed to coincide seasonally and temporally with maximum wildlife activity and vegetation presence on the site.

These consultants visited the property on 9 dates from May to August in 2014 and 10 dates from June to October in 2015 to collect natural heritage information for this report (Table 1).

Table 1; Field Study Details

Dates - 2014	Observer	Purpose of visit	Times	Time spent	Weather
May 21	R. Craig	Reconnaissance	11:00 am – 1:00 pm	2 hrs	Sunny, calm, 12 °C
June 6	R. Craig	Early season breeding birds, mammals and other wildlife	9:00 am – 10:30 am	1.5 hrs	Sunny, light breeze, 16 °C
June 9	R. Craig/ J. Jones	Early season vegetation survey, wildlife and Butternut search	12:00 pm – 2:30 pm	2.5 hrs	Sunny, calm, 17 °C
June 13	R. Craig/ C. Craig	Night survey breeding birds	10:00 pm - 11:30 am	1.5 hr	Overcast, clear, light breeze, 10 °C
June 15	R. Craig	Breeding birds, and other wildlife	8:30 am - 10:30 am 10:30 am – 11:30 am	2 hr 1.0 hr	Sunny, light breeze, 12 °C
June 21	J. Jones	Main season vegetation survey, ELC, and other wildlife	8:30 am – 12:00 pm	3.5 hrs	Sunny, light breeze, 16 °C
June 26	R. Craig	Breeding birds and other wildlife	7:00 am – 10:00 am	3 hr	Sunny, calm, 10 °C
August 18	R. Craig	Butternut Health Assessment, incidental Wildlife	10:00 am – 5:30 pm	7.5 hr	Sunny, calm, 19 °C
August 25	J. Jones	Late season vegetation, ELC	1:30 pm – 4:00 pm	2.5 hr	Sunny, calm, 23 °C
Dates - 2015					
May 31	J. Jones	Breeding birds	6:00 am – 10:30 am	4.5 hr	Sunny, calm, 6.0 °C

June 1	R. Craig/ R. Bowles	Night birds	9:30 pm – 11:00 pm	1.5 hr	Clear, calm, 10 °C
June 13	J. Jones	Vegetation and incidental wildlife	2:00 pm – 5:30 pm	3.5 hr	Sunny, calm, 12.0 °C
June 14	J. Jones	Breeding birds	6:00 am – 10:00 am	4.0 hr	Sunny, calm, 14.0 °C
June 20	J. Jones	Breeding birds	6:00 am – 10:30 am	4.5 hr	Sunny, calm, 8.0 °C
June 24	R. Craig/ R. Bowles	Breeding birds, incidental wildlife	10:00 am – 10:30 am 10:30 am – 11:30 am	0.5 hr 1.0 hr	Sunny. Clear, calm, 10 °C
June 29	R. Craig/ R. Bowles	Night birds	9:30 pm – 11:00 pm	1.5 hr	Overcast with breaks that the moon shone through, light breeze, 14 °C
August 22	J. Jones	Vegetation and incidental wildlife	8:00 am – 4:00 pm	8.0 hr	Sunny, calm, 13.0 °C
August 25	R. Craig	Butternut search	12:45 pm – 4:45 pm	4.0 hrs	Sunny, light breeze, 16.0 °C
October 23	R. Craig/ R. Bowles	Snake hibernacula search	12:00 pm – 2:00 pm	2.0 hr	Sunny, calm, 6 °C

4.1 Vegetation

To survey vegetation, initial habitat scoping was done from satellite imagery to give an idea of the habitats to be studied and to determine species that could potentially be present and their locations. All signatures (colours, shading, textures) on satellite imagery were visited on the ground, as was anything that appeared different, e.g. lower or wetter spots within fields, sparser areas of tree canopy, etc. Complete lists of vascular plants were compiled in all habitats. Three field trips, June 9, 21 and August 25, to cover early, mid and late season were completed in 2014 and two trips, June 20 and August 22, were completed in 2015 to cover the entire flowering season. Each habitat was surveyed along random transects until no new species were encountered.

4.1.1 Species at Risk

Species at risk vegetation and rare floral species (as determined by SARO 2014 and 2015, NHIC 2014 and 2015 and Riley 1989) known to occur in the general region were searched for during all site visits and targeted searches were conducted within appropriate habitats (such as the woodlands).

Butternut, an endangered species was found during vegetation surveys in 2014. As a result more intensive surveys were conducted by R. Craig, a certified Butternut Health Assessor (#180) following the current Butternut Assessment Guidelines (2014). The survey protocol recommends that Butternut surveys be completed between May 15 and August 31. In 2014 surveys were conducted on June 9 and August 18 on the east side of the site and on August 25 on the west side in 2015. The weather of the survey days was sunny and there had not been any recent rain. All areas of the site except actively cultivated lands were searched for seedlings, saplings and older trees. The search areas included fence rows, woodlands and other naturally growing habitats where Butternut could be expected to be found.

All Butternut found were geo-referenced using hand-held GPS units with accuracy of 10 m or less and health assessed using the BHA protocol if located within the proposed extraction limit.

For other rare or at-risk floral species encountered, locations would be geo-referenced and abundance would be estimated or counted where feasible. If population size permitted, a voucher specimen would be collected. Vegetation communities of more than 0.5 ha were assessed in layers as percent cover of trees, saplings, tall and low shrubs, herbs, and non-vascular plants. Classification follows the Ecological Land Classification for Southern Ontario (ELC) (Lee et al 1998). Where required for ELC documentation of wetlands, soils were sampled using a 40 cm soil tube.

4.2 Birds Including Species at Risk

In 2014 early morning breeding bird surveys were conducted on the east and south portions of the property using the OBBA Protocols. The area search and stop and listen method was followed. The dates of the surveys were between June 6 and June 26 (Table 1). A single evening survey using the Two Person Eastern Whip-poor-will (EWPW) survey protocol was conducted on June 13. In 2015 the grassland, shrub and thicket habitats of the west section of the property and the adjacent lands were surveyed using the point count method. Fourteen points were selected evenly spaced over the survey area to ensure all habitats were included. Six of the points located in grassland habitats with the potential for Bobolink and Eastern Meadowlark nesting were surveyed on 3 dates as prescribed in the protocol (Appendix 5). In addition 2 avian evening surveys, June 1 and June 29, were completed in 2015 using the Eastern Whip-poor-will survey protocol (Appendix 6)

Morning surveys were conducted within the first 5 hours after sunrise which on average was approximately 5:30 – 10:30 am. The evening surveys were from 7:30 – 11:00 pm. These survey dates and times are in accordance with the protocols for Southern Ontario.

4.3 Reptiles

In 2014 and 2015 during June both survey years, roadsides and sandy areas on the property were searched for evidence of turtle nesting such as laying turtles, carapace drag marks and predated eggs, Snakes and evidence of snakes were searched for while on the property and, in addition, all building foundations, rock piles and brush piles encountered were specifically searched. The foundations around farm buildings were searched for potential snake hibernacula in October 2015. A renter in the farm house adjacent to the barn was also interviewed regarding the sighting of snakes.

4.4 Other Wildlife

Mammals and evidence of mammal presence were searched for on all site visits. Butterflies and dragonflies were captured and or identified on the wing on all dates whenever they were encountered.

4.5 Adjacent Lands

Information about adjacent lands within 120 m of the study area was determined from a review of background information, air photo interpretation and site visits if the adjacent lands

were owned by the proponent or by visual and aural observations from property boundaries when adjacent lands were not owned by the proponent.

5.0 FIELD STUDY RESULTS

5.1 Nomenclature

The generally accepted common names of all plant and animal species are used throughout this report. Corresponding scientific names of species encountered are listed in appendices at the end of the report. All vegetation naming is from Flora Ontario (Newmaster, S.G. and S. Ragupathy. (2012)). Avian common and scientific naming follows the 7th edition (1998) of the American Ornithological Union (AOU) “Check-list of North American Birds”, and the 56th supplement (2015). Mammal naming is from Dobbyn, “Atlas of the Mammals of Ontario” (1994). Amphibians and reptile naming is from Harding, “Amphibians and Reptiles of the Great Lakes Region (1997).” Dragonfly naming is from Jones et. al. “Field Guide to The Dragonflies and Damselflies of Algonquin Park and Surrounding Area” (2008). Butterfly naming is from the Ontario Butterfly Atlas.

5.2 Vegetation

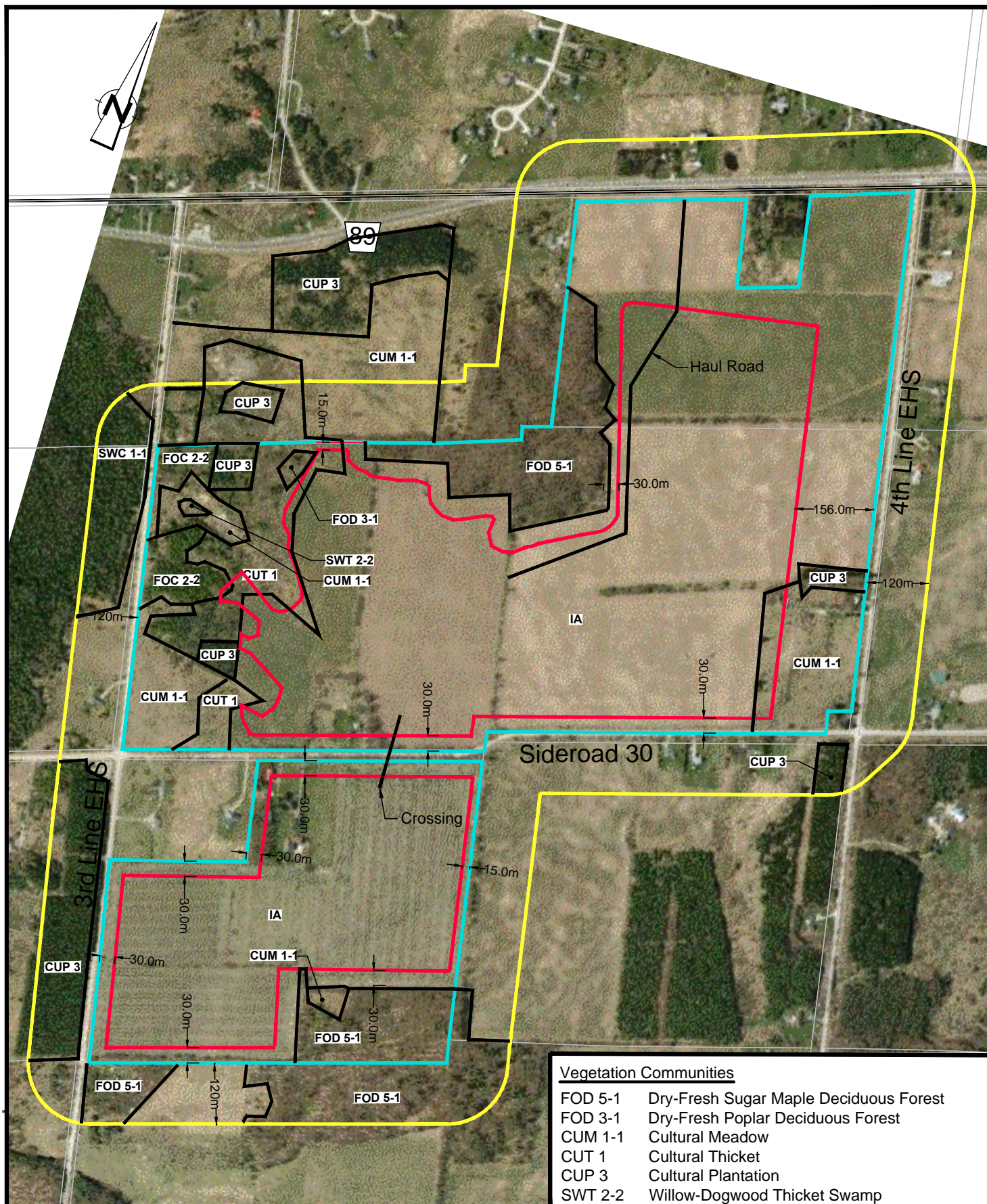
Vegetation surveys were completed during three seasons in 2014 and 2015. All species encountered on the property are listed in Appendix 1.

A total of 234 vascular plant species were found on the site including 38 trees, 21 shrubs and vines and 175 other vascular plants. A total of 152 (65%) were native species while 82 (35%) were non-native or species considered by OMNR “as not suitable targets for conservation activities” (SNA). These SNA species are essentially introduced species associated with agriculture.

Targeted searches were undertaken to find species at risk. The ground flora in the woods within the study site is highly degraded from past disturbance. There is no exposed bedrock or escarpment face present. None of the following were found on the property; American Ginseng (*Panax quinquefolia*), American Hart's Tongue Fern (*Asplenium scolopendrium*) or Putty Root (*Aplectrum hyemale*).

Two species of interest were encountered including White Heath Aster and Prairie Cinquefoil. They have both been reported as rare in Dufferin County (Riley, 1989). A voucher specimen was collected of the White Heath Aster and deposited with the National Collection of Vascular Plants (the herbarium of Agriculture Canada—DAO). Neither is listed as a species at risk and both species have a S5 ranking, meaning that they are secure in Ontario.

Butternut, which is endangered, was the only species at risk found. A total of 30 Butternut were found along the edges and within the north woodland and along the fence rows on the east side of the site (Figure 3). All trees were geo referenced (Appendix 2). Four were found to be within the proposed extraction area and preliminary health assessments were completed on these Butternut (Appendix 3). Two were found to be retainable and 2 were non-retainable. The 4 Butternut, however, will need to be re-assessed and the health status confirmed by OMNRF prior to the land clearing on the site.



Vegetation Communities - Greenwood, Violet Hill Property
Lots 30-32 Concession 4
Town of Mono
County of Dufferin
Figure 3

Vegetation Communities	
FOD 5-1	Dry-Fresh Sugar Maple Deciduous Forest
FOD 3-1	Dry-Fresh Poplar Deciduous Forest
CUM 1-1	Cultural Meadow
CUT 1	Cultural Thicket
CUP 3	Cultural Plantation
SWT 2-2	Willow-Dogwood Thicket Swamp
SWC 1-1	White Cedar Mineral Swamp
IA	Intensive Agriculture

Legend	
	Proposed Licensed Boundary
	Proposed Extraction Limit

Scale 1:10,000

5.3 Vegetation Communities – On Site

The majority (83.3 ha) of the site is intensively cultivated fields. There were 7 natural vegetation communities documented using the ELC criteria of Lee et.al. (1998) (Figure 4). There were 3 cultural, 3 forest and 1 swamp wetland communities plus fence rows between the agricultural fields. Areas given for each community are approximate and estimated from aerial photo interpretation.

No at risk communities were found.

5.3.1 Cultural Communities

Cultural vegetation communities result from or are maintained by human disturbance. Cultural plantations have greater than 60 % planted tree cover. Cultural meadows have less than 60 % tree cover and the vegetation present is often made up of a large proportion of non-native species. Cultural thickets are made up of less than 25 % tree cover and more than 25 % shrub cover and are often the result of natural succession following some form of intensive land use such as pasturing.

5.3.1.1 Cultural Plantation (CUP 3)

There are 5 conifer plantations within the study area totaling 3.1 ha. Three are Scotch Pine plantations, 1 is a Scotch Pine - Jack Pine mixed plantation and 1 is a White Spruce plantation.

5.3.1.2 Dry-Fresh Mixed Meadow (CUM 1-1)

This is the largest natural vegetation community on the site at 18.8 ha and is found in 7 locations on the property. These areas have all been disturbed by past agricultural activities. The dominant cover is Awnless Brome and goldenrod species in the former agricultural areas and Spotted Knotweed in an exposed gravel area. Most of the plant cover is non-native or common species that occur in open disturbed habitats.

5.3.1.3 Mineral Cultural Thicket (CUT 1)

This community is a complex vegetation mix that ranges in cover density and height and represents a successional series from grassland to woodland. It is found on the west side of the site and occupies about 9.8 ha. It varies from dense thickets of Scotch Pine less than 2 m high with scattered taller Crabapple trees to scattered trees of both species interspersed with common field and ground cover species. Eastern White Cedar is also found scattered about. Because the density and variety of species varies throughout the community boundaries were difficult to determine and are approximated on Figure 3.

5.3.2 Forest Communities

Forest communities have variable site conditions but they all have more than 60% tree cover. The canopies of conifer forests are dominated by more than 75 % conifer species while the canopies of deciduous forests are made up of more than 75 % deciduous species.

5.3.2.1 Dry – Fresh Cedar Coniferous Forest (FOC 2-2)

There are four polygons of this community along the west boundary of the site totaling 2.7 ha. These communities are the result of regeneration after past farming or clearing. Two of the polygons are completely dominated by Eastern White Cedar and are dry, dense and dark. As a

result there is no ground cover. Another polygon of this community consists of a mix of cedar and Common Crabapple. It may represent an earlier successional stage of the first two polygons because the cedars are smaller (younger) and the ground plants are predominantly field species. The last polygon consists of cedar and apple in the highest, driest areas and cedar – Tamarack in the lower “moister” areas. The Tamaracks were the only wetland species found and the understory was fairly dry. Possibly the Tamaracks were planted at some time.

5.3.2.2 Dry-fresh Sugar Maple Forest (FOD5-1)

This community exists in two polygons totaling 12.5 ha. One is located in the north area and the other at the south of the property. The canopies are dominated by Sugar Maple. American Beech, Ironwood and Yellow Birch are also present in the north woodlands but each makes up less than 5% of the canopy. The ground flora diversity is low and there are many patches of bare ground present. The entire area appears highly disturbed from past land management practices on the site. Dominant ground cover species are Blue Cohosh, Enchanter's Nightshade, Virginia Waterleaf, Pale Touch-me-not, and Sugar Maple seedlings. In the southern woodland, the ground flora is also extremely disturbed and diversity is low. Pale Touch-me-not makes up 80% of the ground cover, and small Sugar Maple seedlings make up another 10%.

5.3.2.3 Fresh Poplar Deciduous Forest (FOD 3-1)

This community is about 0.4 ha in area and is located in the west side of the property. It is on a slope beside a ravine. The majority of the ground flora consists of species common in open fields, indicating that this area has only recently become treed.

5.3.3 Swamp Communities

Swamp communities have variable flooding regimes with standing water or vernal pooling covering more than 20% of the area. Tree and/shrub cover is greater than 25% and is dominated by hydrophitic (water loving) species. In thicket swamp communities tree cover is less than 25 % while hydrophitic shrub cover is greater than 25 %.

5.3.3.1 Willow Mineral Swamp Thicket (SWT 2-2)

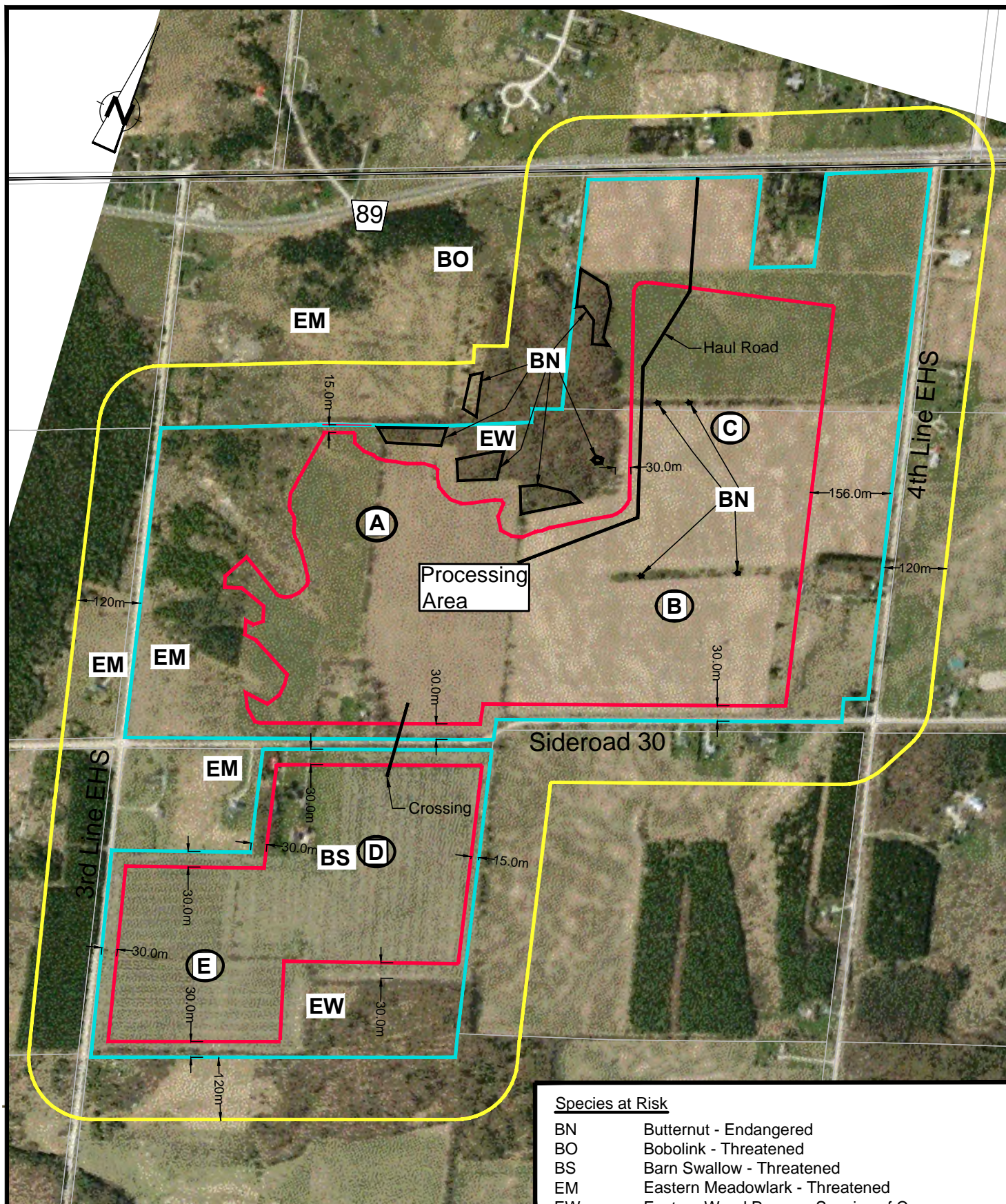
This community is located near the 3rd Line on the west boundary of the site. It has an area of about 0.5 ha with wetland vegetation present but there was no standing water at anytime between May and August of 2015. The wetland shrub species present included facultative species such as Bebb's Willow, Pussy Willow and Red-osier Dogwood.

5.3.4 Fencerows.

There are several fencerows either crossing the property or along its boundaries with a total area of 2.5 ha. These contain a mix of native and non-native species, with a fair diversity. Tree species include Sugar Maple, White Ash, Basswood, Manitoba Maple, Black Walnut, and Butternut. Ground flora is a patchy mix of non-native and native species, with Awnless Brome, Rough Fleabane, Virginia creeper and Common Buckthorn most common.

5.4 Vegetation Communities – Adjacent to the Site

The majority of the lands adjacent to north, east and south of the site are intensively cultivated and occupied by residences and other out buildings. On the south-east corner of the property there is the northern extension of a conifer plantation (CUP 3). To the south-central area is an



Species at Risk
Greenwood, Violet Hill Property
 Lots 30-32 Concession 4
 Town of Mono
 County of Dufferin
 Figure 4

Species at Risk

- BN Butternut - Endangered
- BO Bobolink - Threatened
- BS Barn Swallow - Threatened
- EM Eastern Meadowlark - Threatened
- EW Eastern Wood Pewee - Species of Concern

Legend

- Proposed Licensed Boundary
- Proposed Extraction Limit
- A - E Phasing

Scale 1:10,000

extension of the on site deciduous woodland (FOD 5-1). To the south-west there is a conifer plantation west of the 3rd Line and south of 30 Sideroad. To the west and north of 30 Sideroad there is a residence surrounded by a managed, grassland/meadow. North of this is a White Cedar Coniferous Swamp Community (SWC 3-1), which is the eastern edge of the Violet Hill PSW. To the north of the cedar swamp there is grassland. On the east side of the 3rd Line road there are 2 residences north-west of the site.

5.5 Wildlife – On Site

Wildlife surveys were completed during three seasons including both morning and evening hours. Wildlife species encountered on the property are listed in Appendix 4.

Sixty six bird, 5 mammal, 3 frog, 13 butterfly and 10 dragonfly species were observed. No snakes or turtles were observed.

5.5.1 Birds

Of the 66 bird species observed, 64 were potentially breeding on or within 120 m of the site. Two species including Great Blue Heron and Canada Goose were not breeding on the site because suitable habitat was not available. These birds were seen either flying over or foraging on the site.

Several species at risk were observed. There were no endangered species encountered but there were 3 threatened species and 1 species of concern observed as listed below (Figure 3);

Threatened Species

- Barn Swallow
- Bobolink
- Eastern Meadowlark

Species of Concern

- Eastern Wood-Pewee

There were also several species observed that could indicate the presence of significant wildlife habitats for shrub/early successional, open country and woodland area sensitive species. They were as follows;

Shrub/Early Successional Species

- Clay-colored Sparrow – indicator
- Brown Thrasher – indicator
- Eastern Towhee – common

- Field Sparrow – common

Open Country Species

- Grasshopper Sparrow
- Savannah Sparrow
- Vesper Sparrow

Woodland Area Sensitive Species

- Yellow-bellied Sapsucker
- Winter Wren
- Blackburnian Warbler
- Black-throated Green Warbler
- Black-throated Blue Warbler

5.5.1.1 Bobolink Survey Results 2015

Bobolink surveys were carried out as guided by the protocol and the details are presented in Appendix 4. The surveys were conducted on May 31, June 14 and 20, 2015. A total of 6 survey points were visited in cultural meadow areas on the west area and adjacent to the site. The total number of Bobolinks observed varied through the survey period and ranged from a low of 0 on June 14 to a high of 9 on May 31. On June 20 a pair of Bobolink were seen carrying food so this indicated that at least 1 pair nested in the north cultural meadow.

Eastern Meadowlarks were also observed during the survey. One pair was determined to be breeding in this same north cultural meadow. Another was observed in the south-west cultural meadow within the licence area. Two others were observed on adjacent lands, 1 south of 30 Sideroad and the other west of the 3rd Line.

5.5.1.2 Eastern Whip-poor-will Survey Results 2014/2015

Eastern Whip-poor-will surveys were carried out as guided by the protocol and details are presented in Appendix 5. Surveys were conducted on June 13 in 2014 and on June 1 and 29, 2015. No whip-poor-wills were encountered during either year on the site in or in the general area (Appendix 5).

5.5.2 Mammals

The 5 mammals documented were Eastern Chipmunk, Red Squirrel, Coyote, Red Fox and White-tail Deer.

No at risk species were encountered.

5.5.3 Amphibians

The 2 amphibians heard were Green Frogs and Eastern Gray Tree Frogs. There were no potential amphibian breeding ponds found on the site. Green Frogs were only heard along the west boundary of the site in the 3rd Line roadside ditch adjacent to the PSW. Eastern Gray Tree Frogs were heard in various treed locations around the site during evening surveys. Both species must breed off site and have moved onto the site where they were encountered. No salamanders were found.

No at risk species were found.

5.5.4 Reptiles

Reptiles including turtles and snakes were searched for on several site visits. In 2014 turtles were searched for, especially along boundary roads, on 4 dates in June including 1 early morning and one evening date. In 2015 turtles were searched for, along roads and in the area of the exposed sand/gravel on the west side of the site on 6 dates in June. Two of the searches were conducted in the evening and 2 in the early morning. Snakes were searched for on all survey dates whenever a rock pile, brush pile or building foundation was encountered. A specific search around the large old barn foundation south of 30 Sideroad and an interview of the renter was completed on October 23, 2015 to determine if snakes were congregating prior to entering a wintering hibernacula. No snakes were reported by the renter and none were seen around the barn.

No turtles or snakes were found on or within 120 of the site.

5.6 Wildlife – Species at Risk on Adjacent Lands

The lands within 120 m of the property were examined during the background and field surveys. A Bobolink and Eastern Meadowlark were presumed breeding in the grassland north-west of the licence boundary and two Eastern Meadowlarks were assumed to be breeding within 120 m south-west of the property (figure 4). No whip-poor-wills were found within 120 m of the property.

6.0 LEVEL 1 - NATURAL HERITAGE FEATURES

Natural features on and within 120 m of the site are displayed in Figures 3, 4 and 5.

6.1 Provincially Significant Wetlands (PSW)

A review of all background information and numerous site visits confirm that there is not a PSW on the site but that there is a PSW known as the Violet Hill Wetland Complex within 120 m west of the property.

6.2 Other Wetlands

OMNRF NHIC Make-a-map background information indicated that two unevaluated wetland areas, were located within each of the north and south woodland areas on the site. No other background information indicated the presence of these wetlands. No evidence of these wetlands or wetland vegetation was found during field investigations of the areas indicated as wetlands or anywhere within the woodlands.

Therefore, these unevaluated wetland references are likely artifacts of the remote mapping process used to generate the OMNRF maps and are not present on the site.

6.3 Endangered and Threatened Species

A number of background sources provided a comprehensive list of endangered and threatened species that potentially may be found on the property (See Sections 2.2 – 2.5). Field studies confirmed the presence of 1 endangered tree species, Butternut, and 2 threatened avian species Barn Swallow and Eastern Meadowlark, on the property and 2 threatened avian species, Bobolink and Eastern Meadowlark, on adjacent lands within 120 m. The Butternut were found in the north woodlands and along fence rows in the eastern areas of the site. The Eastern Meadowlark was found on the western grassland areas of the site and Barn Swallows were found nesting in an unused barn south of 30 Sideroad. Eastern Meadowlark were observed on an adjacent grasslands within 120 m west of the site. Bobolink and Eastern Meadowlark were observed on adjacent lands within 120 m north-west of the site.

Protected general habitats for endangered and threatened species are described in the Endangered Species Act or are listed under regulation. OMNRF has also developed a habitat categorization scheme to provide a framework for identifying areas of habitat able to withstand varying degrees of change (OMNR, 2012). Categorization for each species is different based on specific biological requirements. Where appropriate, up to three categories may be considered. Category 1 habitats are highly sensitive areas where a species is likely to have the lowest tolerance to alteration. Category 2 habitats are moderately sensitive areas where a species is likely to have a moderate tolerance to alteration. Category 3 habitats are the least sensitive areas where a species is likely to have the highest tolerance to alteration.

6.3.1 Discussion

Habitat descriptions for species at risk are from information provided by OMNRF on each species at <https://www.ontario.ca/vironemntandenergy/sepcies-risk-ontario-list> unless otherwise noted.

6.3.1.1 Butternut - Endangered

Butternut usually grows alone or in small groups in well drained soil often on gravel sites. It is often found along streams, near forest edges and along fencerows. Because some of these conditions are found on the site, there is potential for Butternut to be found along the forest edges and in the treed fence rows on the site.

Butternut were not reported in any background information reviewed. The potential Butternut habitats on the site were searched during site vegetation surveys and 30 Butternut were found. Twenty six Butternut were found in the north woodland and four were found within the proposed extraction limit. The four within the extraction limit were all health assessed. Two were found to be retainable (Appendix 3).

Regulated protected habitat for Butternut is 25 m from the base of a tree, therefore, Butternut were visually searched for around the perimeter of the property within 25 m. No Butternut were found adjacent to the site.

Therefore, Butternut and Butternut significant habitat are found on or within 25 m of the site.

6.3.1.2 American Ginseng - Endangered

Suitable habitat for American Ginseng is found in relatively undisturbed, mature Sugar Maple dominated deciduous forests under low light conditions. It is restricted to areas with moist but well drained conditions. Ground water sources such as seeps and intermittent streams are important. Because of its intolerance of excessive light it is found in interior forest habitats 100 m from a forest edge.

Ginseng was not reported in any background data reviewed including NHIC records. Although there are Sugar Maple dominated woodlands with mature trees in 2 woodlands on the property, there are no seeps or intermittent stream and no Ginseng were found during vegetation surveys.

Therefore, there isn't American Ginseng or any significant habitat for American Ginseng on or within 120 m of the site.

6.3.1.3 Bat Species – Endangered

The species considered were Eastern Small-footed Bat, Little Brown Bat and Northern Bat. Significant habitat for these species would consist of hibernation roosts or hibernacula and maternity roosts. Hibernation roosts for all species are found in caves or abandoned mines. These three bats usually choose maternity roosts in woodlands with appropriate tree cavities but also use caves, crevices and cracks in cliffs.

- **Hibernacula**

There are no caves, cliffs or mines present on or within 120 m of the study area.

Therefore, there are no hibernation habitats for bat species on or within 120 m of the property.

- **Maternity Roosts**

There aren't any caves or similar habitats on or near the property therefore the only potential maternity roosts would be within the 2 woodlands on site or the adjacent portions of these woodlands adjacent to the site. These woodlands were not searched for snags or cavity trees as described in the protocols for surveying bat maternity habitats outlined in "Bats and Bat Habitats: Guidelines of Wind Power Projects" thus significant habitats may be present.

Therefore, significant bat maternity habitats may be found within the on site woodlands or in woodlands within 120 m of the proposed extraction limit.

6.3.1.4 Barn Swallow – Threatened

Barn Swallows live in close association with humans, building their cup-shaped mud nests almost exclusively on or within man-made structures such as barns, garages, under bridges and in culverts. They often return and re-use a site year after year. OMNRF have described general habitat for Barn Swallow under the Endangered Species Act as Category 1 the nest, Category 2 within 5 m of the nest and Category 3 as 5 – 200 m from the nest.

Barn Swallows were reported in background information provided by the OBBA. On June 6, 2014 there were 5 active Barn Swallow nests found and up to 10 adults circling outside the barn on the south portion of the property. The area near the barn represents Category 1 and

2 habitats. The adults were seen foraging an adjacent soya bean field and this field up to 200 m from the nest site would be Category 3 habitat.

Therefore, significant habitats for Barn Swallows are found on the site.

6.3.1.5 Bank Swallow – Threatened

Bank Swallows nest in colonies in vertical banks along rivers, aggregate pits, and road cuts where burrows can be excavated (COSEWIC, 2013). They are opportunistic aerial insect feeders foraging over grasslands, pastures, croplands, wetlands and water bodies.

Bank Swallows were reported in background information provided by the OBBA. There is an abandoned gravel extraction area on the west side of the site but the banks have slumped over time and do not offer the vertical surfaces preferred for nesting habitat. This was the only potential nesting area on the site but no Bank Swallows or their nest burrows were observed. No Bank Swallows were observed anywhere on or adjacent to the site.

Therefore, there are no significant habitats for Bank Swallows on or within 120 m of the site.

6.3.1.6 Bobolink and Eastern Meadowlark – Threatened

Bobolink and Eastern Meadowlark are discussed together because of the similarities in their habitat needs. Bobolinks have been found to nest in a variety of open, tree and shrub free habitats but rarely in grain fields because of the lack of plant cover present at the start of the nesting season (COSEWIC, 2010). They are not found breeding in agricultural fields that support row crops such as corn or soybean or in heavily grazed pastures. Eastern Meadowlarks also utilize a variety of open habitats but will occasionally nest along roadsides, in golf courses and corn fields (COSEWIC, 2011). OMNRF have described general habitat for Bobolink under the Endangered Species Act as Category 1 the nest and 10 m around the nest, Category 2 from 10 - 60 m of the nest and Category 3 as 60 - 300 m from the nest. For Eastern Meadowlark Category 1 is the nest and 10 m from the nest, Category 2 from 10 - 100 m from the nest and Category 3 from 100 – 300 m from the nest.

Both Bobolink and Eastern Meadowlark were reported in background information provided by OBBA and Bobolink was reported in background information provided by NHIC. Potential habitat conditions for both species can be found in cultural meadows on the west area of the property and on the adjacent grasslands west of the site. The Bobolink survey results confirm nesting, territorial defense and foraging of Eastern Meadowlarks on the site and Bobolinks and Eastern Meadowlarks within 120 m of the site.

Therefore, for Bobolinks and Eastern Meadowlarks there are 3 categories of significant habitat from least to most sensitive in the cultural meadows on west side of the site and on lands within 120 m of the site.

6.3.1.7 Henslow's Sparrow - Endangered

Significant breeding habitat for the Henslow's Sparrow consists of large grasslands (50 ha or greater). In Ontario, colonies have been located in abandoned fields, ungrazed or lightly grazed pasture, fallow hayfields with high clover and alfalfa content, grassy swales in open rolling farmland, wet meadows, or, infrequently, mowed fields (COSEWIC, 2010). The key

Fig 4

feature of these habitats has been a high percentage of cover and a moderate to high density of grasses and sedges that is typically over 30 cm tall.

No Henslow's Sparrow were reported in any background data reviewed including NHIC records and OBBA. Although there are cultural meadows on the site there are only 18.8 ha and in scattered locations. No Henslow's Sparrows were found during wildlife surveys on the property or on adjacent lands.

Therefore, there isn't any significant habitat for the Henslow's Sparrow on or within 120 m of the site.

6.3.1.8 Eastern Whip-poor-will (EWPW) - Threatened

The EWPW is not found in either completely open spaces or dense forests but rather in rock or sand barrens with scattered trees, savannahs, disturbed areas in a state of early to mid-forest succession or conifer plantations. Areas with little ground cover are preferred for nesting. Breeding habitat depends upon forest structure and not tree species present. They will often feed over shrubby pastures, wetlands and power line and roadway corridors.

No EWPW were reported in any background data reviewed including NHIC records and OBBA for the area near the property. Although there are woodlands and conifer plantations on and adjacent to the property there were few open areas and ground cover was dense with raspberries and tree saplings. These areas would not seem to offer either potential nesting or territorial habitats for EWPW. The cultural meadow, however, could have provided potential foraging habitat if EWPW were nesting in the area adjacent to the site. No EWPW were observed during evening or other wildlife surveys on the property or on adjacent lands.

Therefore, there isn't any significant habitat for the Eastern Whip-poor-will on or within 120 m of the site.

6.3.1.9 Jefferson Salamander – Endangered

Jefferson Salamanders generally use intact upland well drained deciduous forests with an undisturbed forest floor and unpolluted breeding ponds. In Ontario they are usually found near Niagara Escarpment lands.

No Jefferson Salamanders were reported on or within 120 m in any background data reviewed including the Ontario Reptile and Amphibian Atlas (ORAA) or NHIC records. According to Atlas data, no Jefferson Salamanders have been reported in any township in Dufferin County since before 1993. Although there are upland deciduous woodlands on and adjacent to the site, there are no ponds. The woodlands on site are isolated and away from the Niagara Escarpment. There aren't any reasonable migration corridors to other potential salamander habitats. Migrating salamanders would need to travel over several hundred metres of cultural meadow or cultivated lands to access the woodlands on the site. Jefferson Salamanders were not encountered during wildlife surveys.

Therefore, Jefferson Salamander and their potential habitats are not found on or within 120 m of the site.

6.3.1.10 Butler's Gartersnake – Endangered

Butler's Gartersnake is found in moist grassland areas (Harding, 2006).

There are no reports of this species on or near the property in any background data reviewed including ORAA and NHIC records. There are no recent reports of this snake occurring in the Town of Mono. The only places the snake has been reported in Ontario are near Luther Marsh in East and West Luther Township, west of the property, and in south-western Ontario near the Detroit River. The cultural meadows on the site have potential as habitat but lack ponds and wetland areas. An extensive search of available rock and brush piles, and under debris around buildings, typical snake hiding places, was completed and no snakes of any species were encountered.

Therefore, there isn't any significant habitat for Butler's Gartersnake on or within 120 m of the site.

6.3.2 Endangered and Threatened Species Conclusion

The significant wildlife habitats for endangered and threatened species with potential to be found on or within 120 m of the site have been discussed in detail in the previous Sections. Some species were eliminated as not present and others were either present or have the potential to be present. The following could be considered possible significant endangered and threatened species habitats found on some areas of the property or adjacent to the site (Figure 4);

- Butternut – endangered
- Bat species - endangered
- Barn Swallow – threatened
- Bobolink – threatened
- Eastern Meadowlark - threatened

6.4 Significant Areas of Natural and Scientific Interest (A.N.S.I.'s)

A review of all available background information did not indicate the presence of an A.N.S.I on or within 120m of the site.

6.5 Significant Woodlands

Significant woodlands are either designated by the municipality or are determined using OMNRF criteria and standards listed in "Natural Heritage Assessment Guide for Renewable Energy Projects" (OMNR, 2011). Neither the Town of Mono nor Dufferin County have designated significant woodlands therefore significance was determined using OMNRF criteria. According to the criteria, to be considered significant a woodland must meet at least one of the following criteria;

- Size
- Ecological function or

- Uncommon characteristics.

Since the woodlands adjacent to the property are not owned by the proponent it was not possible to make site visits. Therefore, only remote aerial and “over the fence” methods could be used to evaluate them. As a result the only criterion that was evaluated for these adjacent woodlands was size.

6.5.1 Size

The on site forest communities total about 22.5 ha in scattered non contiguous locations (Figure 4). Although 6.7 ha are conifer plantations (CUP 3), they would appear to have been planted as reforestation projects therefore were included when considering significance. There are 2 deciduous woodlands (FOD 5-1) with a total on site area of 12.5 ha that are also contiguous with woodland areas north-west and south of the site. There is also a 2.7 ha cedar stand (FOC 2-2) and a 0.4 ha poplar stand (FOD 3-1) on the site.

There are conifer plantations (CUP 3) south-west and south-east of the site and cedar swamp (SWC 1-1) west of the site.

From air photo interpretation, an estimated 16 – 30 % of the land within the Town of Mono is forested, thus a 20 ha or larger contiguous woodland is considered significant.

There is no woodland area on the site larger than 20 ha, therefore, the on site woodlands would not meet the size criterion for significant woodlands. The cedar swamp woodland adjacent to and west of the site appears to be larger than 20 ha and therefore would meet the size criterion.

6.5.2 Ecological Functions

6.5.2.1 Woodland Interior

Woodland interior habitat is more than 100 m from the edge of the forest community. The on site woodlands are not large enough to contain interior habitat. The cedar woodland to the west is large enough and does contain interior habitat.

Therefore, “woodland interior” is not an ecological function of the on site woodland but would be an ecological function of the adjacent woodland west of the property.

6.5.2.2 Proximity to Other Woodlands and Other Habitats

A woodland would meet this criterion if it is 4 ha or larger, is located within 30 m of a significant natural area or natural feature and the area or feature is receiving ecological benefit from the woodland.

Butternut, an endangered species and its habitat are found within the north deciduous woodland which is more than 4 ha in area.

The cedar swamp to the west is within a PSW.

Therefore proximity to an endangered species that is receiving benefit from the north deciduous woodland area would be an ecological function of this woodland. The adjacent cedar woodland would also meet this criterion because it is within a PSW.

6.5.2.3 Linkages

A woodland must be located between 2 other significant features each of which is within 120 m and have a minimum area of 4ha to qualify as significant within municipalities that are 16 – 30 % forested.

The on site woodlands would not meet this criterion. The adjacent cedar swamp woodland (SWC 1-1) would meet this criterion because it borders Sheldon Creek connecting the significant features – wetlands and fish habitat.

Therefore, “linkages” would not be an ecological function of the study area woodlands but would be a function of the woodland to the west.

6.5.2.4 Water Protection

To be considered, a woodland must be located within 50 m of a sensitive groundwater discharge or headwater area, water course or fish habitat and have a minimum area of 2 ha within municipalities that are 16 – 30 % forested. There are none of these features within the woodlands on the property.

Therefore, “water protection” would not be an ecological function of the on site woodlands. The woodland to the west was not investigated therefore it is possible that it meets this criterion.

6.5.2.5 Woodland Diversity

A woodland must be dominated singly or in combination by naturally occurring Sugar Maple (and/or other species listed) and have a minimum area of 4 ha to qualify as significant within municipalities that are 16 – 30 % forested. The only component of the woodland that would partially meet this criterion is the dry-fresh Sugar Maple forests in the north and south areas of the site. The composition of the woodland adjacent to the west appears to be Eastern White Cedar. Eastern White Cedar is not a listed species.

Therefore, because the area of the Sugar Maple component of the on site woodland is naturally occurring and more than 4 ha, woodland diversity would be an ecological function. Woodland diversity is not likely an ecological function of the woodland adjacent to the west.

6.5.3 Uncommon Characteristics

To qualify as significant, a woodland must meet one of the following criteria and have a minimum area of 2 ha to qualify as significant within municipalities that are 16 – 30 % forested,

- contain a vegetation community ranked S1, 2 or 3 that covers an area more than 0.5 ha,
- contain habitat (with 10 individual stems or an area of 100 m²) of a rare, uncommon or restricted naturally occurring woodland species and cover an area more than 0.5 ha,

- contain older native trees species with larger size and age structure,
 - support 10 or more trees/ha that are greater than 100 years old,
 - support 10 or more trees/ha that have a diameter at breast height (dbh) larger than 50 cm,
 - support trees with a basal area of 8 or more m²/ha in trees that are at least 40 cm dbh

The on site woodlands have none of these features. The adjacent component of the on site woodland and the adjacent woodland east of the site do not appear over the fence to have these features either.

Therefore, the on site woodlands would not meet the uncommon characteristics criterion. The cedar woodland to the west was not visited therefore it is possible that these features are present.

6.5.4. Significant Woodlands Conclusion

The on site woodlands and the woodlands contiguous with the site woodlands meet several of the OMNRF described criteria for significance including;

- a. Ecological function
 - Proximity to endangered species habitats
- b. Woodland Diversity

The cedar swamp woodland adjacent to the west of the licence area meets or may meet the following criteria;

- a. Size
- b. Ecological Function
 - Interior habitat
 - Proximity to other significant habitats
 - Linkages
 - Water protection
- c. Uncommon Characteristics

OMNRF guidelines recommend that woodlands that meet 1 criterion should be considered significant. Since both the on site north and south deciduous woodlands and the adjacent

cedar swamp woodland to the west meet more than 1 criterion they would be considered significant woodlands.

6.6 Significant Valleylands

Significant valleylands are either designated by the municipality or determined using OMNR criteria and standards listed in “Natural Heritage Assessment Guide for Renewable Energy Projects” (OMNR, 2011).

The OMNR criteria define valleylands as “areas of water conveyance, attenuation, storage and release” and areas “characterized by shifting patterns of erosion and deposition that result in short and long-term cycles of change.” These characteristics are not present on the site or within 120 m.

Therefore, there are no significant valleylands on or within 120 m of the site.

6.7 Significant Wildlife Habitat (SWH)

SWH can be determined by two methods, either by municipal designation or by using OMNRF criteria. The Town of Mono has not designated any SWHs. Using OMNRF criteria contained in the Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E (OMNRF, 2015) (SWHCS) significant wildlife habitat may be determined on the site. The reference suggests that significant wildlife habitat can be divided into four broad categories.

- Seasonal concentration areas
- Rare vegetation communities or specialized habitats for wildlife
- Habitats of species of conservation concern, excluding the habitats of endangered and threatened species.
- Animal movement corridors.

All four categories have potential to be found on the site. Specifically they are:

- Seasonal concentration areas
 - Bat Maternity Colonies
 - Snake hibernaculum
 - Migratory butterfly stopover areas
 - Deer yarding and wintering habitats
- Specialized Habitat for wildlife
 - Woodland raptor nesting habitat

- Turtle Nesting Areas
- Amphibian Breeding Habitat - woodlands
- Habitats of species of conservation concern including;
 - Woodland area sensitive bird breeding habitat
 - Open country bird breeding habitat
 - Shrub/early successional bird breeding habitat
 - Special concern and rare wildlife species

The following are the species that are considered;

Plants

- Hart's Tongue Fern – species of concern
- Putty root – S2 – rare species
- Schweintz's Sedge – S3 rare species

Birds

- Eastern Wood-Pewee – species of concern
- Short Eared Owl – species of concern
- Redheaded Woodpecker – special concern
- Wood Thrush – special concern
- Louisiana Waterthrush - special concern
- Common Nighthawk – special concern
- Canada Warbler – special concern

Reptiles

- Eastern Ribbonsnake – special concern
- Eastern Milksnake – species of concern
- Snapping Turtle

Insects – butterflies

- Monarch – species of concern

Each of these categories listed above will be discussed in detail in the following sections.

6.7.1 Seasonal Concentration Areas

6.7.1.1 Bat Maternity Colonies

The species considered were the Big Brown Bat (*Eptesicus fuscus*) and Silver-haired Bat (*Lasionycteris noctivagans*). As discussed in Section 6.3.1.3 above, there are no caves, cliffs or mines present on or within 120 m of the study area and therefore no potential bat hibernacula. These bat species usually choose maternity roosts in woodlands with appropriate tree cavities but also use caves, crevices and cracks in cliffs. The only potential maternity roosts would be within the 2 woodlands on site or the adjacent portions of these woodlands adjacent to the site. These woodlands were not searched for snags or cavity trees as described in the protocols for surveying bat maternity habitats outlined in “Bats and Bat Habitats: Guidelines of Wind Power Projects” thus significant habitats may be present.

Therefore, significant bat maternity habitats may be found within the on site woodlands on in woodlands within 120 m.

6.7.1.2 Snake Hibernaculum

The SWHCS states that snake hibernacula may be found in any ecosite and that they occur below the frost line in burrows, rock and stone fences, rock slopes and crumbling foundations. It also suggests that local residents, naturalists and experts may be helpful in identifying hibernacula. Searches of a site during warm days in spring (April – May) or fall (September – October) are recommended. Five individuals of a single species, the presence of 2 or more species or the presence of a single species of concern must be confirmed to indicate a significant hibernaculum. The area within 30 m of a hibernaculum is also considered significant.

There is no background information available that indicates the presence of snake hibernacula on or within 120 m of the site. Mr. R. Bowles, a local reptile expert, was queried and he stated that he was not aware of any hibernacula on or within 120 m of the site. There were no snakes or congregations of snakes found at any time during wildlife surveys during 2014 and 2015. After 2 years of surveys, the only potential hibernaculum site, was thought to occur around the foundation of the barn in phase D. An adult resident who lives in the house in phase D was interviewed on October 23, 2015 and reported that no snakes had been seen around the house or near the adjacent barn. The barn site was visited during the 2 years of surveys and was searched for snakes and snake congregations on October 23, 2015, a warm sunny day, by R. Craig and R. Bowles. No snakes were found.

Therefore, there are no snake hibernacula in the barn foundation or on the site.

6.7.1.3 Migratory Butterfly Stopover Areas

The SWHCS states that during fall migration, migratory butterfly stopover areas greater than 10 ha located within 5 km of Lake Ontario are considered significant habitat. The location of the study area and the lands within 120 m are more than 5 km from the shores of Lake Ontario indicating that the site is not a significant stopover area.

There is, therefore, no significant wildlife habitat in the form of migratory stopover areas for butterflies on or within 120 m of the site.

6.7.1.4 Deer Yarding and Wintering Areas

Winter deer yarding areas occur in conifer or mixed species forest and swamp communities and must be identified by OMNRF. Although there is a conifer swamp community west of the property, background searches of the Town of Mono OP Figure 3 and OMNRF make-a-map indicated that no deer yarding or wintering areas have been identified by OMNRF on or within 120 m of the property. There was no evidence observed during field surveys of any deer wintering on the property.

Therefore, there are no significant deer yarding or wintering areas on or within 120 m of the property.

6.7.2 Specialized Habitat for Wildlife

6.7.2.1 Woodland Raptor Nesting

According to the SWHCS, any woodland or conifer plantation greater than 30 ha with 10 ha of interior habitat (more than 200 m from an edge) and at least one active nest of one of the 6 listed species would be significant. There are 2 deciduous woodlands on the site and several conifer plantations but all are less than 30 ha and none has interior habitat more than 200 m from an edge. None of the listed raptors nor any raptor nests were observed during avian surveys.

There is a cedar swamp community woodland area within 120 m west of the site but its canopy is dominated by Eastern White Cedar and thus very dense. It would not seem to offer any potential nesting habitat at least in the area adjacent to the 3rd Line road. No raptors were seen on these lands during surveys. The extraction limit will be at least 200 m from the edge of this cedar swamp woodland.

Therefore, there is no significant woodland raptor nesting habitat on the site and there will be no negative impact to raptor nesting habitat, if any is present, within 120 m of the site.

6.7.2.2 Turtle Nesting Areas

To be considered as significant a nesting area must meet several criteria as outlined in the SWHCS. A nesting area must consist of exposed mineral soil, be located less than 100 m from or within one of the ELC communities MAM 2-5, and have at least five Midland Painted Turtles or 1 Northern Map or 1 Snapping Turtle nest present. There are no ponds or MAM wetland areas on the site and there were no ponds seen in the wetland cedar swamp community west of the site. Although there is a former gravel pit area that offers exposed mineral soils there are no ponds or MAM communities within 100 m. No turtles or evidence of turtle nesting such as

predated eggs were observed during surveys of the property. No turtles were seen along roads surrounding the property during the spring nesting season or on adjacent lands.

Therefore, there is no turtle nesting areas on or within 120 m of the property.

6.7.2.3 Amphibian Breeding Habitat – woodlands

Although Gray Tree Frogs were heard on the property at various treed locations, to be considered as significant woodland breeding habitat there must be a pond or ponds present that meet several criteria as outlined in the SWHCS. There were no ponds found in the woodlands or anywhere on site. The Gray Tree Frogs observed on site must have travelled a considerable distance to the site from breeding ponds off site, however, no ponds were seen on adjacent properties within 120 m.

Therefore, there is no significant amphibian breeding woodland habitat on or known within 120 m of the site.

6.7.3 Habitats of Species of Conservation Concern

6.7.3.1 Woodland Area Sensitive Bird Breeding Habitat

The SWHCS describes significant woodland area sensitive bird breeding habitat as greater than 30 ha, mature (>60 yr), and 200 m or greater from a forest edge. This is confirmed by finding at least 3 of the 11 listed interior forest bird species or 1 of 2 special concern species nesting. Five woodland sensitive bird species were found during site surveys but there is no single woodland area on the site that is greater than 30 ha and there is no interior habitats more than 200 m from an edge.

None of the woodlands on site meet any of the criteria for woodland area sensitive bird breeding habitat.

The cedar swamp (SWC 2-2) west of the site may be larger than 30 ha and have areas more than 200 m from an edge but the canopy is dominated by Eastern White Cedar and thus this woodland provides low quality breeding habitat for woodland area sensitive species.

Therefore, there is no woodland area sensitive bird breeding significant wildlife habitat on the site. Woodland area sensitive habitat may exist in the cedar woodland west of the site within 120 m but is of low quality.

6.7.3.2 Open Country Bird Breeding Habitat

The SWHCS describes significant open county breeding bird habitat as grasslands greater than 30 ha or Class 3 or higher agricultural lands that are not being actively used for agriculture such as pasturing in the past 5 years. Also, studies must confirm nesting of a minimum of 2 of the 6 listed bird species or the listed species of concern. The cultural meadows on site total about 18.8 ha but are found in 7 different locations on the property. There are also 3 listed species including Grasshopper Sparrow, Savannah Sparrow and Vesper Sparrow nesting on the site.

None of the grassland/meadow areas on the site meets the minimum size criterion of 30 ha although there were 3 listed species nesting on the site.

Therefore there is no open country bird breeding significant wildlife habitat on or within 120 m of the site.

6.7.3.3 Shrub/Early Successional Bird Breeding Habitat

The SWHCS describes significant shrub/early successional breeding bird habitat as cultural thicket, cultural savannah or cultural woodland communities greater than 10 ha and Class 3 or higher agricultural lands that have not been actively used for agriculture including pasturing in the past 5 years. Also, studies must confirm nesting of a minimum of 1 of the 2 indicator species listed and 2 of the 4 common species listed or 1 of the 2 species of concern listed.

About 10 ha (estimated 9.8 ha) of cultural thicket is found on the west area of the site and 2 indicator species, Brown Thrasher and Clay-colored Sparrow, and 2 common species Eastern Towhee and Field Sparrow, were found.

Therefore, there is shrub/early successional bird breeding significant wildlife habitat on the site but not within 120 m of the site.

6.7.3.4 Special Concern and Rare Species

6.7.3.4.1 Hart's Tongue Fern – species of concern

Hart's-tongue Fern grows in exposed rocky crevices and on outcrops that are near moist, mossy areas that are essential for spore germination and early plant development. These crevices and outcrops must be within the deep shade of interior forest habitats (100 m from an edge) of deciduous forests, usually Sugar Maple, and away from drying winds.

Hart's Tongue Fern was not reported in any background information reviewed including that provided by NHIC. No exposed rock crevices or outcrops are found on the site. There are no interior habitats found on the site. No HTF were found during vegetation surveys.

Therefore, there is no Hart's Tongue Fern significant wildlife habitat on or within 120 m of the site.

6.7.3.4.2 Schweintz's Sedge – S3 – Rare Species

Schweintz's Sedge grows in strongly calcareous, perennially wet, seepy habitats often in association with rich fens and along shallow, cold streams, ponds and lake shores. It is commonly found on edges of fens. It also occurs in calcareous marshes, swamps, and shores. It frequently occurs in dense patches sometimes to the exclusion of other plants (New York Natural History Program web site, 2015).

Schweintz's Sedge was reported in NHIC background information for the 1 sq. km area in which the site is located. None of the habitat conditions, however, are found on the site or within 120 m of the site. No Schweintz's Sedge were found during field surveys.

Therefore, there is no Schweintz's Sedge significant wildlife habitat on or within 120 m of the site.

6.7.3.4.3 Puttyroot – S2 – Rare Species

Puttyroot is found on the forest floor of upland deciduous forests (the Bruce-Grey Plant Committee, 2002).

Puttyroot was not reported in any background information reviewed including that provided NHIC. Although there is a 12.5 ha area of upland deciduous forest community in 2 locations on the property, no Putty Root was found during vegetation surveys.

Therefore, there is no Puttyroot significant wildlife habitat on or within 120 m of the site.

6.7.3.4.4 Eastern Wood-Pewee – Species of Concern

The Eastern Wood-Pewee is found in the mid-canopy layer of forest clearings and edges of deciduous and mixed forests.

Eastern Wood-Pewees were reported in OBBA background information for the 10 sq km area in which the property is located. Eastern Wood Pewee were also documented during field surveys. There were presumed territories of this species in the both the north and south deciduous woodlands on the site.

Therefore the north and south deciduous woodlands on the property are Eastern Wood-Pewee significant wildlife habitat.

6.7.3.4.5 Short-eared Owl – Special Concern

The Short-eared Owl lives in open areas such as grasslands, marshes and tundra where it nests on the ground and hunts for small mammals, especially voles.

Short-eared Owls were not reported in background information reviewed including that provided by the BBA and NHIC. Although there is a 18.8 ha of grasslands on site no Short-eared Owls were encountered during avian surveys.

Therefore, there is no Short-eared Owl significant wildlife habitat on or within 120 of the site.

6.7.3.4.6 Red-headed Woodpecker – Special Concern

The Red-headed Woodpecker lives in open woodland and woodland edges. These areas typically have many dead trees, which the bird uses for nesting and perching.

Red-headed Woodpeckers were not reported in background information reviewed including that provided by the OBBA and NHIC. Although there is woodland edge on the property, there are few dead trees present and no Red-headed Woodpeckers were encountered during avian surveys.

Therefore, there is no Red-headed Woodpecker significant wildlife habitat on or within 120 m of the site.

6.7.3.4.7 Louisiana Waterthrush – Special Concern

The Louisiana Waterthrush is usually found in steep, forested ravines with fast-flowing streams. Although it prefers habitat near running water, especially clear, coldwater streams, it also less frequently inhabits heavily wooded, deciduous swamps having large pools of open water.

Louisiana Waterthrush were not reported in background information reviewed including that provided by the OBBA and NHIC. Although there are woodlands on the site there are no steep ravines, streams or deciduous swamps. No Louisiana Waterthrush were encountered during avian surveys,

Therefore, there is no Louisiana Waterthrush significant wildlife habitat on or within 120 m of the site.

6.7.3.4.8 Common Nighthawk – Special Concern

Traditional Common Nighthawk habitat consists of open areas with little to no ground vegetation, such as logged or burned-over areas, forest clearings, rock barrens, peat bogs, lakeshores, and mine tailings. Although the species also nests in cultivated fields, orchards, urban parks, mine tailings and along gravel roads and railways, they tend to occupy natural sites.

Common Nighthawks were reported in background information provided by the OBBA. Although there are woodlands on the property there are no open areas with little or no vegetation. No Common Nighthawks were encountered during either early morning or evening avian surveys on or within 120 m of the site.

Therefore, there is no Common Nighthawk significant wildlife habitat on or within 120 m of the site.

6.7.3.4.9 Canada Warbler– Special Concern

The Canada Warbler breeds in a range of deciduous and coniferous, usually wet forest types, all with a well developed, dense shrub layer. Dense shrub and understory vegetation help conceal Canada Warbler nests that are usually located on or near the ground on mossy logs or roots.

Canada Warblers were not reported in background information reviewed including that provided by the OBBA and NHIC. There are no wet forest habitats on the site and no Canada Warblers were encountered during avian surveys.

Therefore, there is no Canada Warbler significant wildlife habitat on or within 120 m of the site.

6.7.3.4.10 Eastern Ribbonsnake – Special Concern

The Eastern Ribbonsnake is usually found close to water, especially in marshes, where it hunts for frogs and small fish. A good swimmer, it will dive in shallow water, especially if it is fleeing from a potential predator. At the onset of cold weather, these snakes congregate in underground burrows or rock crevices to hibernate.

Eastern Ribbonsnakes were not reported in background information reviewed including that provided by the ORAA or NHIC. There are no wetland or water features on the site and no snakes were found during wildlife surveys.

Therefore, there is no Eastern Ribbonsnake significant wildlife habitat on or within 120 m of the site.

6.7.3.4.11 Eastern Milksnake – Special Concern

The Milksnake can be found in a range of habitats including rocky outcrops, fields and forest edges. In southern Ontario, it is often found in old farm fields and farm buildings where there is an abundance of mice. The Milksnake hibernates underground, in rotting logs or in the foundations of old buildings.

Eastern Milksnakes were not reported in background information reviewed including that provided by the ORAA and NHIC. Although there are old buildings and meadows on the site that could provide possible Milksnake habitat, searches of these areas did not reveal any Milksnakes or evidence of snakes of any species.

Therefore, there is no Eastern Milksnake significant wildlife habitat on or within 120 m of the site.

6.7.3.4.12 Snapping Turtle – Species of Concern

The snapping turtle occurs in almost any freshwater habitat, though it is most often found in slow-moving water with a soft mud or sand bottom and abundant vegetation. This species may inhabit surprisingly small wetlands, ponds and ditches. It hibernates in the mud or silt on the bottom of lakes and rivers, usually not too far from the shore.

Snapping Turtles were not reported in NHIC background information but were identified as present in the Town of Mono in ORAA information. Although there are no ponds or wetlands on the property or visible ponds within 120 m, there is a wetland (PSW) west of the site. There are also exposed sandy/gravel areas along the west areas of the site that could offer potential nesting habitat. No Snapping Turtles, however, were observed nesting and there wasn't any evidence of turtle nesting such as carapace drag marks or predated eggs seen during wildlife surveys. No turtles or evidence of turtles was seen along roads surrounding the property during the spring nesting season.

Therefore, there is no significant Snapping Turtle habitat on or within 120 of the site.

6.7.3.4.13 Monarch – Species of Concern

Throughout their life cycle, Monarchs use three different types of habitat. Only the caterpillars feed on milkweed plants and are confined to meadows and open areas where milkweed grows. Adult butterflies can be found in more diverse habitats where they feed on nectar from a variety of wildflowers.

Monarchs were not reported in background information reviewed including that provided by the OBA and NHIC. Although there was Common Milkweed found on the site in scattered locations throughout the meadows no Monarchs at any life stage were encountered during field surveys.

Therefore, there isn't any Monarch significant wildlife habitat on or within 120 m of the site.

6.7.4 Significant Wildlife Habitat Conclusion

The significant wildlife habitats with potential to be found on or within 120 m of the site have been discussed in detail in the previous Sections 6.7.1 to 6.7.3. Some were eliminated as not present and others were confirmed to be present. The following could be considered candidate significant wildlife habitats on some areas of the property;

- Shrub/Early Successional Bird Breeding Habitat
- Eastern Wood Pewee Habitat

6.8 Fish Habitat

The project site lies within the Sheldon Creek sub-watershed of the Nottawasaga River Watershed. Sheldon Creek is located more than 120 m west of the site. Closed drainage basins occupy about 60 % of the extraction area. There are no surface water streams and the only surface water flow leaving the site is to the west and this is minimal. Most of the surface water on the site infiltrates and enters the ground water system. The ground water beneath the site flows south-east as it follows the site topography.

Therefore, there isn't any fish habitat on or within 120 m of the site.

There is potential for activities associated with gravel extraction on the site to impact the quantity and quality of the ground water leaving the site and therefore impact fish and fish habitat off site, beyond 120 m, especially to the south-east.

7.0 PROPOSED DEVELOPMENT

The natural heritage information contained in this report was used in developing the proposed operational and site plans for this proposal. This section will provide a summary of the proposal to assist with natural environment impact assessment. For more specific details refer to the site plans that accompany this application that have been prepared by Rollings Hyland Consulting, 2016.

The applicant is seeking an aggregate licence to operate a Category 3 Class A "Pit Above Water" on about 146.5 ha within Lots 30 – 32, Concession 4, Town of Mono, County of Dufferin. The total proposed extraction area is 83.7 ha, however the active extraction area

will not exceed 25 ha at any one time. (Figure 2). The property boundaries will be fenced where required with a fence 1.2 m high as required by the ARA. The access to the operation will be from Highway 89 at the north of the site. The pit floor will vary from 411 masl in the south to 420 masl in the north. These proposed pit floor elevations will keep the pit floor 5 m or greater above the water tables in each area of the operation. Extraction will begin in Phase “A” located on the west side of the site. This is where a stationary crushing, screening and washing area will be located. Extraction will proceed to the east into Phase “B” and then north into “C” and then into “D” and “E”, south of 30 Sideroad. Concrete and asphalt will be imported to the stationary crushing area for recycling. There will be a crossing across 30 Sideroad to move material from D and E to the processing area in A north of 30 Sideroad. Extraction may occur in several phase areas at once.

All topsoil and subsoil will be removed prior to excavation and stored in berms along the property boundaries and other locations as noise protection. All berms and stockpiles will be seeded with grass/legume mixtures to create short term grassland wildlife habitat and prevent erosion and dust from leaving the site.

Setbacks of 30 m will separate the operation from public roads and private properties located around the site. Setbacks of minimum 30 m will also be established adjacent to the north and south woodlands that border the proposed extraction areas.

A water monitoring program is being recommended to ensure that the operation remains 5 m above the water table and that the quality of ground water leaving the site is not negatively impacted by the activities within the extraction areas. Endangered and threatened species and their habitats have been identified on and within 120 of the site including Butternut, Barn Swallows, Bobolinks and Eastern Meadowlarks. Negative impacts to these species will be addressed in accordance with the Endangered Species Act (2007) and its regulations where required.

Areas will be rehabilitated to farm land where feasible. Side slopes will be graded 3:1 or greater and may not create feasible farming opportunities. These side slopes will be treated with grass/legume mixtures to create grassland wildlife habitat. Rehabilitation will be progressive, where feasible, and subject to local conditions. Rehabilitated areas will be maximized and disturbed areas minimized during the life of the operation.

8.0 LEVEL 2 – IMPACT ASSESSMENT AND MITIGATION

All mitigation recommended in this section is listed in Appendix 7 and will be included on the site plans that accompany the application.

8.1 Provincially Significant Wetlands

A unit of the Violet Hills Wetland Complex PSW is located within 120 m west of the licence boundary. The wetland is separated from the west licence boundary by the 20 m wide 3rd Line EHS road allowance. The proposed extraction limit, however, is setback a minimum of 130 m from the west licence boundary and the road allowance. The wetland boundary is, therefore, 150 m (130 m + 20 m) or more from the proposed extraction limit. In addition, the setback lands between the west licence boundary and the west extraction limit are all naturally vegetated and will remain naturally vegetated during the life of the pit. This proposed

vegetated setback will ensure that ecological functions of the wetland, which currently occur within on the setback lands, will not be negatively impacted.

To ensure compliance with the Provincial Planning Policy the following is recommended:

- The extraction limit will be set back a minimum of 150 m from the wetland boundary.

Therefore there will be no negative impacts to the Provincially significant Wetland or the adjacent lands within 120 m of the wetland.

8.2 Endangered and Threatened Species

One endangered species, Butternut and 3 threatened avian species, Barn Swallow, Bobolink and Eastern Meadowlark were found on and/or adjacent to the site (Figure 4). Three endangered bat species have potential to be found in the woodland areas on the site and in the woodland adjacent to the site west of the property.

To ensure compliance with the Provincial Endangered Species Act and Planning Policy, the following general mitigations are recommended:

- The Species at Risk List for Ontario will be reviewed annually to determine if newly listed species are present or have the potential to be found within the extraction limit.
- Prior to striping, the area to be cleared will be surveyed during appropriate survey time periods by a qualified professional for the presence of endangered and threatened species.
- A report of the above described surveys will be kept on file at the pit site and will be provided to OMNRF if an endangered or threatened species is found.
- If required, approvals/authorizations will be obtained under the Endangered Species Act and/or amendments made to the site plan as necessary.

8.2.1 Butternut

Thirty Butternut were found on the site. Twenty six are within and adjacent to the north woodland which will be excluded from the extraction limit. Four are located along 2 fence rows within extraction phases B and C (Figure 4).

Negatively impacting a retainable or archivable Butternut or its habitat is contrary to Sections 9 (species protection) and 10 (habitat protection) of the Endangered Species Act (2007) (ESA).

Therefore, to ensure compliance with the Provincial Endangered Species Act and Planning Policy the following are recommended:

- Each of the 30 known Butternut will be clearly marked and numbered to assist with future identification and the establishment of appropriate setbacks.

- A minimum 25 m setback between the extraction limit and the drip line of the north woodland where 26 Butternut were found will be established and clearly marked.
- Prior to any operation occurring within the licenced area, the operator will demonstrate to the satisfaction of OMNRF, that the Endangered Species Act all requirements related to protecting Butternut and their habitats have been met.
- This will accomplished by;
 - Searching for new and previously identified Butternut both within and within 25 m of the proposed extraction limit by a qualified professional using OMNRF search protocols.
 - Numbering and clearly marking all Butternut found.
 - Completing a health assessment by a qualified Butternut health assessor on all Butternut found.
 - Submitting the results of the Butternut health assessments to OMNRF within 30 days of completing the assessments.
 - Seeking appropriate authorization under the Endangered Species Act prior to removing any Butternut.

8.2.2 Barn Swallow

The barn on the property in phase “D” provided Barn Swallow nesting and territorial habitats. These habitats are very sensitive and moderately sensitive to alteration respectively. Foraging habitat, the least sensitive to alteration was found from 5 to 200 m from the nests around the barn. All these 3 habitats are within the proposed extraction limit.

Harming Barn Swallows or altering any of these three categories of habitat is contrary to Sections 9 and 10 of the Endangered Species Act (2007).

To ensure compliance with the Provincial Endangered Species Act (ESA) and Planning Policy the following actions have been taken and will be taken prior to the issuance of an aggregate licence;

- Greenwood Aggregates Company Limited has registered with the OMNRF a Notice of Activity, to “Alter a Structure” that is Barn Swallow habitat, under Endangered Species Act exemption guidelines O. Reg. 242/08 23.3, certificate # X-102-0000000340.
- Prior to any land clearing within the licenced area and to removing the barn all the exemption guidelines to protect Barn Swallow habitat outlined in the Endangered Species Act O. Reg. 242/08 Section 23.5 will be adhered to.

8.2.3 Bobolink and Eastern Meadowlark

No Bobolinks were confirmed nesting, defending territories or foraging within the licence area. One pair of Eastern Meadowlarks was confirmed nesting, defending territories and foraging in the south-west cultural meadow within the proposed licence area in 2015.

Harming Eastern Meadowlarks or altering any of these three categories of habitat is contrary to Sections 9 and 10 of the Endangered Species Act (2007). To ensure compliance with the Provincial Endangered Species Act and Planning Policy the following are recommended:

- Exclude the natural vegetation communities including the cultural meadows along the north-west and west boundaries of the licenced area from the extraction limit.

This will protect existing nesting habitat for Eastern Meadowlarks within the proposed licence area that are currently in the south-west meadow. The proposed extraction limit will be potentially within category 2, territorial habitat (10 – 100 m) and category 3 foraging habitat (100 – 300 m). The land within the extraction limit adjacent to the cultural meadow habitat is currently under intensive cultivation and would provide minimal or very low quality category 2 and 3 habitats. There was no evidence during surveys that meadowlarks used this crop land area. The proposed noise berms on existing crop land that will be planted with a grass/legume seed mix will offer additional territorial and foraging habitats for meadowlarks.

Therefore, no negative impacts to Bobolinks or Eastern Meadowlarks or their habitats are expected on the site.

8.2.3.1 Bobolink and Eastern Meadowlark on Adjacent Lands

One Bobolink and one Eastern Meadowlark territory was found in the cultural meadow on the adjacent lands to the north-west of the licence area. About 240 m of the licence boundary will border the south edge of this meadow. Therefore for Bobolink there is the potential that the boundary is within category 2, territorial habitat (10 – 60 m) and category 3 foraging habitat (60 – 300 m). For Eastern Meadowlarks there is the potential for category 1 nesting habitat (0 - 10m) category 2 territorial habitat (10 – 100 m) and category 3 foraging habitat (100 – 300 m). For about 120 m of this length the meadow will border a woodland on the site and 120 m will border currently cultivated lands on the site. The extraction limit, however, will be separated from the meadow by the woodland area and a 30m setback for a total of 80 m. The closest the extraction will be to the meadow is in the area of the currently cultivated lands where there will be a setback of at least 15 m.

The activities of the pit operation will not limit the use of the meadow by these species.

Therefore, there will be no negative impact to Bobolink or Eastern Meadowlarks or their habitats in the north-west meadow within 120 m of the site.

There was an Eastern Meadowlark presumed territory on lands adjacent to the south-west of the licence area west of the 3rd Line. Although within 120 of the licence area the territory was 300 m or more from the proposed extraction limit.

Therefore there will be no negative impact to this Eastern Meadowlark or its habitats in the south-west area within 120 m of the site.

There was an Eastern Meadowlark presumed territory on lands south of 30 Sideroad and south-west of phase A and west of phase D of the licence boundary. There will be the 20 m wide 30 Sideroad and a 30 m setback from the extraction limit for a total separation of 50 m from phase A. There will be a 30 m setback from the extraction limit and about 30 m of landscaped property for a total separation of 60 m from phase D. Thus the pit is not expected to impact category 1 habitat. Category 2, defended territory habitat, is likely contained within the grassland in which the meadowlark was found. The 30 Sideroad and the landscaping features would not likely form part of a defended territory. The cultural meadow north of 30 Sideroad and within the licence area is within category 3 habitat but will not be altered and will remain available for foraging meadowlarks. Other lands 300 m out within the licence area currently support field crops in phases A and D and there are houses and landscaping adjacent to the meadowlark area, no category 3 foraging habitat is likely found within these areas.

Therefore, there will be no negative impact to this Eastern Meadowlark or its habitats in this area south of 30 Sideroad within 120 m of the site.

8.2.4 Bat Species

No surveys were completed for bat maternity habitats on or adjacent to the site. If present these habitats would occur within the woodlands on the property and/or within the adjacent woodland areas.

To ensure compliance with the Provincial Endangered Species Act and Planning Policy the following are recommended:

- Exclude the on site north and south woodlands and potential bat maternity habitats from the extraction limit.
- Ensure a minimum 30 m setback between the extraction limit and the drip lines of any woodland community on or adjacent to the site.

Therefore, there will be no negative impact to potential bat maternity habitats on the site.

8.2.4.1 Bat Species on Adjacent Lands

The cedar swamp woodland west of the site was not surveyed but could provide bat maternity habitat. Although the licence boundary is within 120 m of this woodland, the extraction limit is a minimum of 220 m from the woodland boundary.

Therefore, there will be no negative impact to potential bat maternity habitats in the adjacent cedar swamp woodland within 120 m of the site.

8.3 Significant Woodlands

Both the north and south woodlands on site and their adjacent components are considered significant.

To ensure compliance with Provincial Planning Policy the following mitigation are recommended;

- Exclude the north and south woodlands from the extraction limit.
- Ensure a minimum 30 m setback from the drip lines of all woodlands on the site and their adjacent components.
- Implement dust control measures as required to protect vegetation and wildlife within woodlands.

Therefore, there will no negative impacts to significant woodlands on the site.

8.3.1 Significant Woodlands on Adjacent Lands

The cedar swamp woodland west of the site is considered significant. Although the licence boundary is within 120 m of the cedar swamp woodland, the extraction limit is a minimum of 220 m from the woodland boundary.

Therefore, there will be no negative impacts to adjacent significant cedar swamp woodlands within 120 m of the site.

8.5 Significant Wildlife Habitat

The following potential significant wildlife habitats were found on or adjacent to the site;

- Bat maternity habitats
- Shrub/Early Successional Bird Breeding Habitat
- Eastern Wood Pewee - habitat

The impacts to these are discussed in the following sections.

8.5.1 Bat Maternity Habitats

No surveys were completed for bat maternity habitats on or adjacent to the site. If present these habitats would occur within the woodlands on the property and/or within the adjacent woodland areas.

To ensure compliance with the Provincial Endangered Species Act and Planning Policy the mitigation recommended in Section 8.2.4 to exclude the woodlands and separate the extraction limit from the woodlands by a 30 m setbacks will also protect other bat maternity habitats. Since maternity habitats in woodlands off site are further than 30 m from the extraction limit, they will be protected as well.

Therefore, there will be no negative impact to potential bat maternity habitats on site or within 120 m.

8.5.2 Shrub/Early Successional Bird Breeding Habitat

Shrub/early successional habitat is found within the licence area along the west boundary of the site and would be included in the 10 ha ELC vegetation community cultural thicket community (CUT 1).

To ensure compliance with Provincial Planning Policy the following mitigation is recommended;

- Exclude the natural vegetation communities including the cultural thickets along the west boundary of the licence area from the extraction limit.

Therefore, there will be no negative impact to shrub/early successional habitat on or within 120 m of the site.

8.5.3 Eastern Wood-Pewee Habitat

Eastern Wood-Pewee presumed territories are found in the woodland communities at the north and south areas of the site.

To ensure compliance with Provincial Planning Policy the following mitigation are recommended;

- Exclude the north and south woodlands from the extraction limit.
- Ensure a minimum 30 m setback from the drip lines of all woodlands on the site and their adjacent components.
- Implement dust control measures as required to protect vegetation and wildlife within woodlands.

Therefore, there will be no negative impacts to significant Eastern Wood-Pewee habitat on or within 120 m of the site.

8.6 Fish Habitat

Surface and groundwater flowing from the site could impact quality and quantity of water within the watershed and therefore could impact fish and their habitats. The only surface water leaving the site is to the west but this is minimal and there is no defined flow channel. The majority of this surface water flows from the naturalized lands within the licence boundary west of the proposed extraction limit. No surface water from the disturbed extraction area will enter the west flowing surface water.

Therefore, there will be no impact to the quantity and quality of surface flow leaving the site.

Groundwater beneath the site currently flows to the south-east. Because the pit floor will be 5 m above the water table the groundwater flow will not be interrupted. The development of the pit may increase groundwater flows.

Therefore, there will be no impact to the quantity of ground water flowing from the site to off site fish habitat.

To protect the quality of ground water leaving the site and to comply with the Provincial Planning Policy and the Fisheries Act the following mitigation are recommended:

- Store fuel and maintain equipment in a fuel and maintenance area in accordance with Provincial legislation.
- Prepare a Spills Response Plan that will be implemented and enforced to protect water quality.
- Monitor groundwater as described in the “Proposed Violet Hill Pit Combined Level 1 and Level 2 Hydrogeological Assessment” by Whitewater Hydrogeology Ltd., 2015.

Therefore, there will be no negative impacts to fish habitats within 120 m or beyond 120 m of the site.

9.0 REHABILITATION RECOMMENDATIONS

All rehabilitation will be described in detail on the site plans that accompany a license application for this property.

General

- Restoration will be progressive beginning in an area as soon as possible after extraction has been completed.
- Rehabilitated areas will be maximized and disturbed areas minimized during the life of the operation.
- All stored topsoil and subsoil will be used to rehabilitate depleted areas.
- Topsoil or other materials that will aid rehabilitation or the building of berms may be imported if on site supplies are inadequate, only with OMNRF approval.
- The site will be returned to agricultural production according to existing OMNRF guidelines where feasible.
- Side slopes of the final pit will be graded to a 3:1.
- Side slopes not suitable for agriculture will be seeded with grass/legume mixtures to create grassland wildlife habitat and prevent erosion.

10. CONCLUSION

This report provides Level 1 and 2 natural environment technical information and impact assessment to accompany an aggregate licence application being submitted by Greenwood

Aggregates Limited for a property located in the Lots 30, 31 and 32 Concession, Town of Mono, County of Dufferin.

There is a unit of the Provincially Significant Wetland Violet Hills Wetland Complex west of the property within 120 m. To protect the wetland there will be a minimum 150 setback from the extraction limit. Vegetation communities present along the west boundary of the licence adjacent to the wetland will be retained so that wetland ecological functions of these lands will continue. There will be no negative impacts to the wetland or its ecological functions.

Butternut, an endangered species and 2 threatened species, Barn Swallow and Eastern Meadowlark were found on the property. A total of 26 Butternut were found in the north woodland and all of these will be clearly marked, will be excluded from the extraction limit and will be protected by minimum 25 m setbacks. There will be no negative impact to these Butternut. Before any land clearing a Butternut survey and health assessments will be completed within the area to be cleared for extraction by a qualified professional. Prior to operations occurring it must be demonstrated to the satisfaction of OMNRF that the Endangered Species Act requirements related to protecting Butternut have been met. Certification of a Notice of Activity under the Endangered Species Act to alter (remove) Barn Swallow nesting habitat has been received from OMNRF. New habitat will be created for Barn Swallows and all other of the exemption guidelines set out in O. Reg. 242/08 Section 23.5 will be adhered to. Eastern Meadowlark habitat within the licence area will be excluded from the extraction limit. There will be no negative impacts to meadowlark habitat on the site. Endangered bat maternity habitats were not searched for but there is the potential for these habitats within the north and south woodlands of the site and within the components of these woodlands adjacent to and contiguous with the site. All woodland areas on the property will be excluded from the extraction limit and protected by minimum 30 m setbacks. There will be no negative impact to these potential bat maternity habitats. .

There were 2 threatened species, Bobolinks and Eastern Meadowlarks, observed on lands adjacent to the licence area. Setbacks and distance from the operation of the pit will ensure no negative impacts to these species.

Mitigation has been proposed to ensure that prior to land clearing for extraction appropriate surveys will be completed to search for other or newly listed endangered or threatened species. If found site plans may be changed or if possible exemptions and/or approvals will be sought under the Endangered Species Act or its regulations.

There were significant woodlands found on and adjacent to the site. All woodlands will be excluded from the extraction limit and protected by minimum 30 m setbacks. Dust control measures will also be implemented as required to protect vegetation and wildlife within the woodlands.

There are significant wildlife habitats found on the property including shrub/early successional habitat and Eastern Wood Pewee habitat. Neither will be negatively impacted by the proposal because they will be excluded from the extraction limits.

The quality and quantity of surface and groundwater leaving the site potentially impacts fish habitat off site. Surface water leaving the site is minimal and there will be no negative impact to quantity or quality. Proposed mitigation to protect ground water leaving the site includes storing fuel and maintaining equipment in the fuel and maintenance area in accordance with Provincial legislation, preparing, implementing and enforcing a Spills Response Plan, monitoring groundwater to ensure a pit floor 5 m above the water table and that the quality of groundwater leaving the site meets Provincial standards.

Rehabilitation will be progressive, maximize rehabilitated areas and minimize disturbed areas. The site will be restored to agricultural production where feasible. Side slopes will be graded to 3:1 and if agriculture is not feasible will be planted with a grass/legume seed mix to create grassland wildlife habitat and prevent erosion.

An aggregate application on this property would, therefore, meet the test of OMNR Policy A. R. 2.01.07 License Applications: Natural Environment Report Standards March 15, 2006 that no existing natural feature will be impacted by the proposal. The proposal will also meet the test and the intent of the Provincial Policy Statement (2014), Natural Heritage Policy 2.1.1 “Natural heritage features and areas shall be protected for the long term.” and Policy 2.1.2 “The diversity and connectivity of natural features in an area, and the long-term ecological function and biodiversity of natural 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.”

Respectfully submitted

Robin Craig

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APPENDIX 1: VEGETATION SPECIES LIST

<u>TREES</u>			
<u>Common Name</u>	<u>Scientific Name</u>	<u>G Rank</u>	<u>S Rank</u>
<u>CONIFEROUS</u>			
<u>CYPRESS FAMILY</u>			
	<u>PINOPSIDA</u>		
	<u>CUPRESSACEAE</u>		
Eastern Red Cedar	<i>Juniperus virginiana</i>	G5T	S5
Eastern White Cedar	<i>Thuja occidentalis</i>	G5	S5
<u>PINE FAMILY</u>			
	<u>PINACEAE</u>		
Balsam Fir	<i>Abies balsamea</i>	G5	S5
Tamarack	<i>Larix laricina</i>	G5	S5
White Spruce	<i>Picea glauca</i>	G5	S5
Jack Pine	<i>Pinus banksiana</i>	G5	S5
Red Pine	<i>Pinus resinosa</i>	G5	S5
Eastern White Pine	<i>Pinus strobus</i>	G5	S5
Scotch Pine	<i>Pinus sylvestris</i>	G?	SNA
Eastern Hemlock	<i>Tsuga canadensis</i>	G5	S5
<u>DECIDUOUS</u>			
<u>MAPLE FAMILY</u>			
	<u>MAGNOLIOPSIDA</u>		
	<u>ACERACEAE</u>		
Manitoba Maple	<i>Acer negundo</i>	G5	S5
Sugar Maple	<i>Acer saccharum</i>	G5T5	S5
<u>CASHEW FAMILY</u>			
	<u>ANACARDIACEAE</u>		
Staghorn Sumach	<i>Rhus typhina</i>	G5	S5
<u>BIRCH FAMILY</u>			
	<u>BETULACEAE</u>		
White Birch	<i>Betula papyrifera</i>	G5	S5
Beaked Hazelnut	<i>Corylus cornuta</i>	G5T5	S5
Ironwood	<i>Ostrya virginiana</i>	G5	S5
<u>BEECH FAMILY</u>			
	<u>FAGACEAE</u>		
American Beech	<i>Fagus grandifolia</i>	G5	S5
Red Oak	<i>Quercus rubra</i>	G5	S5
<u>WALNUT FAMILY</u>			
	<u>JUGLANDACEAE</u>		
Bitternut Hickory	<i>Carya cordiformis</i>	G5	S5
Butternut	<i>Juglans cinerea</i>	G3G4	S3
Black Walnut	<i>Juglans nigra</i>	G5	S5
<u>OLIVE FAMILY</u>			
	<u>OLEACEAE</u>		
White Ash	<i>Fraxinus americana</i>	G5	S5
Black Ash	<i>Fraxinus nigra</i>	G5	S5
Green Ash	<i>Fraxinus pennsylvanica</i>	G5	S5
<u>BUCKTHORN FAMILY</u>			
	<u>RHAMNACEAE</u>		
Common Buckthorn	<i>Rhamnus cathartica</i>	G5	SNA
<u>ROSE FAMILY</u>			
	<u>ROSACEAE</u>		
Scarlet Hawthorn	<i>Crataegus coccinea</i>	GNR	S4
Common Crabapple	<i>Malus pumila</i>	G5	SNA
Pin Cherry	<i>Prunus pensylvanica</i>	G5	S5

<u>TREES</u>			
<u>Common Name</u>	<u>Scientific Name</u>	<u>G Rank</u>	<u>S Rank</u>
Black Cherry	<i>Prunus serotina</i>	G5	S5
Choke Cherry	<i>Prunus virginiana</i>	G5	S5
European Mountain Ash	<i>Sorbus acuparia</i>	G5	SNA
<u>WILLOW FAMILY</u>	<u>SALICACEAE</u>		
White Poplar	<i>Populus alba</i>	G5	SNA
Balsam Poplar	<i>Populus balsamifera</i>	G5	S5
Large-tooth Aspen	<i>Populus grandidentata</i>	G5	S5
Trembling Aspen	<i>Populus tremuloides</i>	G5	S5
Crack Willow	<i>Salix fragilis</i>	G?	SNA
<u>LINDEN FAMILY</u>	<u>TILIACEAE</u>		
American Basswood	<i>Tilia americana</i>	G5	S5
<u>ELM FAMILY</u>	<u>ULMACEAE</u>		
American Elm	<i>Ulmus americana</i>	G5	S5

<u>SHRUBS AND VINES</u>			
<u>Common Name</u>	<u>Scientific Name</u>	<u>G Rank</u>	<u>S Rank</u>
<u>FLOWERING SHRUBS & VINES</u>	<u>MAGNOLIOPSIDA</u>		
<u>HONEYSUCKLE FAMILY</u>	<u>CAPRIFOLIACEAE</u>		
Morrow's Honeysuckle	<i>Lonicera morrowii</i>	G?0	SNA
Tartarian Honeysuckle	<i>Lonicera tatarica</i>	G?	SNA
Red Elderberry	<i>Sambucus racemosa</i>	G5T4T5	S5
High Bush Cranberry	<i>Viburnum opulus spp. trilobum</i>	G5T5	S5
<u>DOGWOOD FAMILY</u>	<u>CORNACEAE</u>		
Alternate-leaved Dogwood	<i>Cornus alternifolia</i>	G5	S5
Silky Dogwood	<i>Cornus amonum</i>	G5	S5
Red Osier Dogwood	<i>Cornus stolonifera</i>	G5	S5
Northern Swamp-dogwood	<i>Cornus racemosa</i>	G5?	S5
<u>GOOSEBERRY FAMILY</u>	<u>GROSSULARIACEAE</u>		
Prickly Gooseberry	<i>Ribes cynosbati</i>	G5	S5
Red Currant	<i>Ribes rubrum</i>	G4G5	SNA
<u>OLIVE FAMILY</u>	<u>OLEACEAE</u>		
Privet	<i>Ligustrum vulgare</i>	G?	SNA
<u>BUTTERCUP FAMILY</u>	<u>RANUNCULACEAE</u>		
Virgin's-bower	<i>Clematis virginiana</i>	G5	S5
<u>ROSE FAMILY</u>	<u>ROSACEAE</u>		
High-bush Blackberry	<i>Rubus alleghaniensis</i>	G5	S5
Red Raspberry	<i>Rubus idaeus</i>	G5T	S5
Black Raspberry	<i>Rubus occidentalis</i>	G5	S5
Narrow-leaved Meadow-sweet	<i>Spiraea alba</i>	G5	S5

<u>SHRUBS AND VINES</u>			
<u>Common Name</u>	<u>Scientific Name</u>	<u>G Rank</u>	<u>S Rank</u>
<u>WILLOW FAMILY</u>	<u>SALIACEAE</u>		
Bebb's Willow	<i>Salix bebbiana</i>	G5	S5
Pussy Willow	<i>Salix discolor</i>	G5	S5
Slender Willow	<i>Salix petiolaris</i>	G4	S5
<u>NIGHTSHADE FAMILY</u>	<u>SOLANACEAE</u>		
Climbing Nightshade	<i>Solanum dulcamara</i>	G?	SNA
<u>GRAPE FAMILY</u>	<u>VITACEAE</u>		
Inserted Virginia Creeper	<i>Parthenocissus inserta</i>	G5	S5
Riverbank Grape	<i>Vitis riparia</i>	G5	S5

<u>OTHER VASCULAR PLANTS</u>			
<u>Common Name</u>	<u>Scientific Name</u>	<u>G Rank</u>	<u>S Rank</u>
<u>FERNS & ALLIES</u>	<u>PTERIDOPHYTA</u>		
<u>WOOD FERN FAMILY</u>	<u>DRYOPTERIDACEAE</u>		
Northern Lady Fern	<i>Athyrium filix-femina</i>	G5T5	S5
Spinulose Wood Fern	<i>Dryopteris carthusiana</i>	G5	S5
Clinton's Fern	<i>Dryopteris clintoniana</i>	G5	S4
American Shield Fern	<i>Dryopteris intermedia</i>	G5	S5
Ostrich Fern	<i>Matteuccia struthiopteris</i>	G5	S5
Sensitive Fern	<i>Onoclea sensibilis</i>	G5	S5
<u>HORSETAIL</u>	<u>EQUISETACEAE</u>		
Field Horsetail	<i>Equisetum arvense</i>	G5	S5
<u>GRASSES, LILIES AND ORCHIDS</u>	<u>LILIOPSIDA</u>		
<u>WATER-PLANTAIN FAMILY</u>	<u>ALISMATACEAE</u>		
Common Water-plantain	<i>Alisma plantago-aquatica</i>	G5	S5
<u>ARUM FAMILY</u>	<u>ARACEAE</u>		
Small Jack-in-the-pulpit	<i>Arisaema triphyllum</i>	G5	S5
<u>SEDGE FAMILY</u>	<u>CYPERACEAE</u>		
Golden Sedge	<i>Carex aurea</i>	G5	S5
Drooping Wood Sedge	<i>Carex arctata</i>	G5	S5
Bebb's Sedge	<i>Carex bebbii</i>	G5	S5
Dewey's Sedge	<i>Carex Deweyana</i>	G5	S5
Ivory Sedge	<i>Carex eburea</i>	G5	S5
Graceful Sedge	<i>Carex gracillima</i>	G5	S5
Hitchcock's Sedge	<i>Carex hitchcockiana</i>	G5	S5
Inland Sedge	<i>Carex interior</i>	G5	S5
Bladder Sedge	<i>Carex intumescens</i>	G5	S5

OTHER VASCULAR PLANTS

<u>Common Name</u>	<u>Scientific Name</u>	<u>G Rank</u>	<u>S Rank</u>
Loose-flowered Sedge	<i>Carex laxiflora</i>	G5	S5
Finely-nerved Sedge	<i>Carex leptonevia</i>	G4	S4
Peck's Sedge	<i>Carex peckii</i>	G4G5	S5
Retorse Sedge	<i>Carex retrorsa</i>	G5	S5
Stellate Sedge	<i>Carex rosea</i>	G5	S5
Woodland Sedge	<i>Carex sylvatica</i>	G?	SNA
Small's Spike-rush	<i>Eleocharis palustris</i>	G5?	S5
Wool-grass	<i>Scirpus cyperinus</i>	G5	S5
<u>DUCKWEED FAMILY</u>	<u>LEMNACEAE</u>		
Lesser Duckweed	<i>Lemna minor</i>	G5	S5
<u>LILY FAMILY</u>	<u>LILIACEAE</u>		
Asparagus	<i>Asparagus officinalis</i>	G5?	S5
Small White Leek	<i>Alium tricoccum</i>	G5	S5
European Lily-of-the-valley	<i>Convallaria majalis</i>	G5T5	SNA
Yellow Adder's-tongue	<i>Erythronium americanum</i>	G5T5	S5
Wild Lily-of-the-valley	<i>Maianthemum canadense</i>	G5	S5
False Solomon's Seal	<i>Maianthemum racemosum</i>	G5	S5
Daffodil	<i>Narcissus pseudonarcissus</i>	G?	SNA
Hairy Solomon's Seal	<i>Polygonatum pubescens</i>	G5	S5
Purple Trillium	<i>Trillium erectum</i>	G5	S5
White Trillium	<i>Trillium grandiflorum</i>	G5	S5
<u>ORCHID FAMILY</u>	<u>ORCHIDACEAE</u>		
Common Helleborine	<i>Epipactis helleborine</i>	G?	SNA
Northern Green Orchid	<i>Platanthera hyperborea</i>	G5	S5
<u>GRASS FAMILY</u>	<u>POACEAE</u>		
Red-top	<i>Agrostis gigantea</i>	G4G5	SNA
Awnless Brome	<i>Bromus inermis</i>	G4G5T?	SNA
Orchard Grass	<i>Dactylis glomerata</i>	G?	SNA
Poverty Oat Grass	<i>Danthonia spicata</i>	G5	S5
Sheep Fescue	<i>Festuca trachyphylla</i>	G?	SNA
Fowl Manna Grass	<i>Glyceria striata</i>	G5	S5
Acuminate Panic Grass	<i>Panicum acuminatum</i>	G5T	S5
Reed Canary Grass	<i>Phalaris arundinacea</i>	G5	S5
Common Panic Grass	<i>Panicum capillare</i>	G5T5	S5
Common Timothy	<i>Phleum pratense</i>	G?	SNA
Annual Blue Grass	<i>Poa annua</i>	G?	SNA
Canada Blue Grass	<i>Poa compressa</i>	G?	S5
Kentucky Bluegrass	<i>Poa pratensis</i>	G5T	S5
Foxtail	<i>Setaria sp.</i>	G?	SNA
Purple Melic Grass	<i>Schizachne purpurascens</i>	G5	S5
<u>CATTAIL FAMILY</u>	<u>TYHACEAE</u>		
Common Cattail	<i>Typha latifolia</i>	G5	S5

OTHER VASCULAR PLANTS

<u>Common Name</u>	<u>Scientific Name</u>	<u>G Rank</u>	<u>S Rank</u>
<u>TYPICAL FLOWERING PLANTS</u>	<u>MAGNOLIOPSIDA</u>		
<u>AMARANTH FAMILY</u>	<u>AMARANTHACEAE</u>		
Redroot Pigweed	<i>Amaranthus retroflexus</i>	G?	SNA
<u>CASHEW FAMILY</u>	<u>ANACARDIACEAE</u>		
Rydberg's Poison Ivy	<i>Toxicodendron rydbergii</i>	G5	S5
<u>CARROT FAMILY</u>	<u>APIACEAE</u>		
Wild Carrot	<i>Daucus carota</i>	G?	SNA
<u>DOGBANE FAMILY</u>	<u>APOCYNACEAE</u>		
Spreading Dogbane	<i>Apocynum androsaemifolium</i>	G5T5	S5
<u>GINSENG FAMILY</u>	<u>ARALIACEAE</u>		
Wild Sarsaparilla	<i>Aralia nudicaulis</i>	G5	S5
<u>MILKWEED FAMILY</u>	<u>ASCLEPIADACEAE</u>		
Common Milkweed	<i>Asclepias syriaca</i>	G5	S5
<u>ASTER FAMILY</u>	<u>ASTERACEAE</u>		
Common Yarrow	<i>Achillea millefolium</i>	G5T?	SNA
Common Ragweed	<i>Ambrosia artemisiifolia</i>	G5	S5
Common Burdock	<i>Arctium minus</i>	G?T?	SNA
Nodding Beggar-ticks	<i>Bidens cernua</i>	G5	S5
Spotted Knapweed	<i>Centaurea stoebe</i>	GNR	SNA
Canada Thistle	<i>Cirsium arvense</i>	G?	SNA
Bull Thistle	<i>Cirsium vulgare</i>	G5	SNA
Daisy Fleabane	<i>Erigeron annuus</i>	G5	S5
Horseweed	<i>Erigeron canadensis</i>	G5	S5
Philadelphia Fleabane	<i>Erigeron philadelphicus</i>	G5T?	S5
Rough Fleabane	<i>Erigeron strigosus</i>	G5	S5
Spotted Joe-pye-weed	<i>Eupatorium maculatum</i>	G5T5	S5
Boneset	<i>Eupatorium perfoliatum</i>	G5	S5
Grass-leaved Goldenrod	<i>Euthamia graminifolia</i>	G5	S5
Orange Hawkweed	<i>Hieracium aurantiaca</i>	G?	SNA
Mouse-ear Hawkweed	<i>Hieracium pilosella</i>	G?	SNA
King Devil Hawkweed	<i>Hieracium piloselloides</i>	G?	SNA
Canada Lettuce	<i>Lactuca canadensis</i>	G5	S5
Ox-eye Daisy	<i>Leucanthemum vulgare</i>	G5	SNA
Tall Goldenrod	<i>Solidago altissima</i>	G5	S5
Canada Goldenrod	<i>Solidago canadensis</i>	G5	S5
Late Goldenrod	<i>Solidago gigantea</i>	G5	S5
Gray Goldenrod	<i>Solidago nemoralis</i>	G5T?	S5
Rough Goldenrod	<i>Solidago rugosa</i>	G5?	S5
Spiny-leaved Sow-thistle	<i>Sonchus asper</i>	G?T?	SNA

OTHER VASCULAR PLANTS

<u>Common Name</u>	<u>Scientific Name</u>	<u>G Rank</u>	<u>S Rank</u>
Lindley's Aster	<i>Symphyotrichum ciliolatum</i>	G5	S5
Heart-leaved Aster	<i>Symphyotrichum cordifolium</i>	G5	S5
Panicked Aster	<i>Symphyotrichum lanceolatum</i>	G5T?	S5
Starved Aster	<i>Symphyotrichum lateriflorum</i>	G5T5	S5
New England Aster	<i>Symphyotrichum novae-angliae</i>	G5	S5
Shining Aster	<i>Symphyotrichum puniceum</i>	G5T?	S5
White Heath Aster	<i>Symphyotrichum pilosum</i>	G5t?	S4
Common Dandelion	<i>Taraxacum officinale</i>	G5	SNA
Goat's-beard	<i>Tragopogon dubius</i>	G?	SNA
Meadow Goat's-beard	<i>Tragopogon pretensis</i>	G?T?	SNA
Coltsfoot	<i>Tussilago farfara</i>	G?	SNA
<u>TOUCH-ME-NOT FAMILY</u>	<u>BALSAMINACEAE</u>		
Spotted Touch-me-not	<i>Impatiens capensis</i>	G5	S5
Pale Touch-me-not	<i>Impatiens pallida</i>	G5	S5
<u>BARBERRY FAMILY</u>	<u>BERBERIDACEAE</u>		
Blue Cohosh	<i>Caulophyllum thalictroides</i>	G4G5	S5
<u>BORAGE FAMILY</u>	<u>BORAGINACEAE</u>		
Viper's Bugloss	<i>Echium vulgare</i>	G?	SNA
Common Gromwell	<i>Lithospermum officinale</i>	G?	SNA
<u>MUSTARD FAMILY</u>	<u>BRASSICACEAE</u>		
Broad-leaved Toothwort	<i>Cardamine dyphylla</i>	G5	S5
Shepherd's Purse	<i>Capsella bursa-pastorius</i>	G?	SNA
Dog Mustard	<i>Erucastrum gallicum</i>	G5	SNA
Cow-grass	<i>Lepidium campestre</i>	G?	SNA
Field Penny-cress	<i>Thlaspi arvense</i>	G?	SNA
<u>WATER-STARWORT FAMILY</u>	<u>CALLITRICHACEAE</u>		
<u>BELLFLOWER FAMILY</u>	<u>CAMPANULACEAE</u>		
Creeping Bellflower	<i>Campanula rapunculoides</i>	G?	SNA
<u>PINK FAMILY</u>	<u>CARYOPHYLLACEAE</u>		
Thyme-leaved Sandwort	<i>Arenaria serpyllifolia</i>	G?	SNA
Mouse-eared Chickweed	<i>Cerastium fontanum</i>	G?	SNA
Bouncing-bet	<i>Saponaria officinalis</i>	G?	SNA
Bladder Campion	<i>Silene vulgaris</i>	G?	SNA
Grass-leaved Stitchwort	<i>Stellaria graminea</i>	G?	SNA
<u>GOOSEFOOT FAMILY</u>	<u>CHEONPODIACEAE</u>		
Lamb's Quarters	<i>Chenopodium album</i>	G5T5	SNA
<u>MORNING GLORY FAMILY</u>	<u>CONVOLVULACEAE</u>		
Field Bindweed	<i>Convolvulus arvensis</i>	G?	SNA
<u>SPURGE FAMILY</u>	<u>EUPHORBIACEAE</u>		
Cypress Spurge	<i>Euphorbia cyparissias</i>	G5	SNA
<u>PEA FAMILY</u>	<u>FABACEAE</u>		
Everlasting Pea	<i>Lathyrus latifolius</i>	G?	SNA

OTHER VASCULAR PLANTS

<u>Common Name</u>	<u>Scientific Name</u>	<u>G Rank</u>	<u>S Rank</u>
Bird's-foot Trefoil	<i>Lotus corniculatus</i>	G?	SNA
Black Medick	<i>Medicago lupulina</i>	G?	SNA
Alfalfa	<i>Medicago sativa</i>	G?T?	SNA
Yellow Sweet-clover	<i>Melilotus officinalis</i>	G?	SNA
Red Clover	<i>Trifolium pratense</i>	G?	SNA
Cow Vetch	<i>Vicia cracca</i>	G?	SNA
Slender Vetch	<i>Vicia tetrasperma</i>	G?	SNA
<u>FUMITORY FAMILY</u>	<u>FUMARIACEAE</u>		
Squirrel-corn	<i>Dicentra canadensis</i>	G5	S5
<u>GERANIUM FAMILY</u>	<u>GERANIACEAE</u>		
Herb-robert	<i>Geranium robertianum</i>	G5	SNA
<u>WATERLEAF FAMILY</u>	<u>HYDROPHYLLACEAE</u>		
Virginia Water-leaf	<i>Hydrophyllum virginianum</i>	G5	S5
<u>ST. JOHN'S-WORT FAMILY</u>	<u>HYPERICAEAE</u>		
Common St. John's-wort	<i>Hypericum perforatum</i>	G?	SNA
<u>MINT FAMILY</u>	<u>LAMIACEAE</u>		
Wild Basil	<i>Clinopodium vulgare</i>	G?	S5
Common Hemp-nettle	<i>Galeopsis tetrahit</i>	G?	SNA
Ground Ivy	<i>Glechoma hederacea</i>	G?	SNA
Motherwort	<i>Leonurus cardiaca</i>	G?T?	SNA
American Water-horehound	<i>Lycopus americanus</i>	G5	S5
Field Mint	<i>Mentha arvensis</i>	-G5	S5
Catnip	<i>Nepeta cataria</i>	G5	SNA
Mad-dog Skullcap	<i>Scutellaria lateriflora</i>	G5	S5
<u>MALLOW FAMILY</u>	<u>MALVACEAE</u>		
Musk Mallow	<i>Malva moschata</i>	G?	SNA
Common Mallow	<i>Malva neglecta</i>	G?	SNA
<u>EVENING-PRIMROSE FAMILY</u>	<u>ONAGRACEAE</u>		
Canada Enchanter's Nightshade	<i>Ciracea canadensis</i>	GNR	S5
Hairy Willow-herb	<i>Epilobium hirsutum</i>	G?	SNA
Downy Willow-herb	<i>Epilobium parviflorum</i>	G?	SNA
Common Evening-primrose	<i>Oenothera biennis</i>	G5	S5
<u>WOOD-SORREL FAMILY</u>	<u>OXALIDACEAE</u>		
Upright Yellow Wood-sorrel	<i>Oxalis stricta</i>	G5	S5
<u>PLANTAIN FAMILY</u>	<u>PLANTAGINACEAE</u>		
Narrow-leaved Plantain	<i>Plantago lanceolata</i>	G5	SNA
Common Plantain	<i>Plantago major</i>	G5	SNA
<u>BUCKWHEAT FAMILY</u>	<u>POLYGONACEAE</u>		
Mild Water Pepper	<i>Persicaria hydropiperoides</i>	G5	S5
Sheep Sorrel	<i>Rumex acetosella</i>	GNRTNR	SNA
Curled Dock	<i>Rumex crispus</i>	G?	SNA

OTHER VASCULAR PLANTS

<u>Common Name</u>	<u>Scientific Name</u>	<u>G Rank</u>	<u>S Rank</u>
Broad-leaved Dock	<i>Rumex obtusifolia</i>	G5	SNA
<u>CROWFOOT FAMILY</u>	<u>RANUNCULACEAE</u>		
White Baneberry	<i>Actaea pachypoda</i>	G5	S5
Red Baneberry	<i>Actaea rubra</i>	G5	S5
Sharp-lobed Hepatica	<i>Anemone acutiloba</i>	G5	S5
Virginia Anemone	<i>Anemone virginiana</i>	G5T5	S5
Kidney-leaf Buttercup	<i>Ranunculus abortivus</i>	G5	S5
Tall Buttercup	<i>Ranunculus acris</i>	G5	SNA
Cursed Buttercup	<i>Ranunculus sceleratus</i>	G5T5	SNA
<u>ROSE FAMILY</u>	<u>ROSACEAE</u>		
Agrimony	<i>Agrimonia gryposepala</i>	G5	S5
Prairie Cinquefoil	<i>Drymocallis arguta</i>	G5	S4
Virginia Strawberry	<i>Fragaria virginiana</i>	G5	S5
Woodland Strawberry	<i>Fragaria vesca</i>		
Yellow Avens	<i>Geum aleppicum</i>	G5	S5
White Avens	<i>Geum canadense</i>	G5	S5
Norway Cinquefoil	<i>Potentilla norvegica</i>	G5T?	S5
Rough-fruited Cinquefoil	<i>Potentilla recta</i>	G?	SNA
Barren Strawberry	<i>Waldsteinia fragarioides</i>	G5	S5
<u>MADDER FAMILY</u>	<u>RUBIACEAE</u>		
White Bedstraw	<i>Galium mollugo</i>	G?	SNA
Marsh Bedstraw	<i>Galium palustre</i>	G5	S5
<u>SAXIFRAGE FAMILY</u>	<u>SAXIFRAGACEAE</u>		
<u>FIGWORT FAMILY</u>	<u>SCROPHULARIACEAE</u>		
Common Mullein	<i>Verbascum thapsus</i>	G5	S5
Common Speedwell	<i>Veronica officinalis</i>	G5	S5
<u>NIGHTSHADE FAMILY</u>	<u>SOLANACEAE</u>		
Clammy Ground-cherry	<i>Physalis heetrophylla</i>	G5	S4
<u>BUR-REED FAMILY</u>	<u>SPARGANIACEAE</u>		
Green-fruited Bur-reed	<i>Sparganium emersum</i>	G5	S5
<u>NETTLE FAMILY</u>	<u>URTICACEAE</u>		
False Nettle	<i>Boehmeria cylindrica</i>	G5	S5
Stinging Nettle	<i>Urtica dioica</i>	G5T?	S5
<u>VIOLET FAMILY</u>	<u>VIOLACEAE</u>		
Field Pansy	<i>Viola arvensis</i>	G?	SNA
Canada Violet	<i>Viola canadensis</i>	G5	S5
Dog Violet	<i>Viola conspersa</i>	G5	S5
Sweet Violet	<i>Viola odorata</i>	G?	SNA
Downy Yellow Violet	<i>Viola pubescens</i>	G5	S5

*** GRANK Definition**

G4 Common; usually more than 100 occurrences; usually not susceptible to immediate threats.

G5 Very common; demonstrably secure under present conditions.

T denotes that the rank applies to a subspecies or variety.

NA denotes not applicable.

NR denotes that a species is not ranked.

G? Unranked, or if following a ranking, rank is tentatively assigned (e.g. G5?).

***SRANK Definition**

S4 Apparently secure; uncommon but not rare; some cause for long-term concern due to declines or other factors.

S5 Secure; common, widespread, and abundant in the nation or state/province.

SNA Not Applicable: a conservation status is not applicable because the species is not a suitable target for conservation activities.

SU denotes unrankable.

APPENDIX 2: BUTTERNUT LOCATIONS

Tree Number	Coordinates		
	Zone	Easting	Northing
1	17T	574975	4883735
2	17T	574928	4883718
3	17T	574843	4883720
4	17T	574848	4883743
5	17T	574806	4883805
6	17T	574812	4883820
7	17T	574806	4883834
8	17T	574783	4883836
9	17T	574796	4883859
10	17T	574779	4883861
11	17T	574807	4883784
12	17T	574865	4883519
13	17T	574844	4883466
14	17T	574779	4883496
15	17T	574769	4883493
16	17T	574754	4883446
17	17T	574746	4883466
18	17T	574754	4883434
19	17T	575080	4883422
20	17T	575158	4883447
21	17T	574954	4883643
22	17T	574547	4883629
23	17T	574556	4883600
24	17T	574555	4883559
25	17T	574453	4883507
26	17T	574453	4883507
27	17T	574522	4883528
28	17T	574554	4883352
29	17T	574613	4883491
30	17T	574683	4883499

APPENDIX 4: WILDLIFE SPECIES LIST

<u>MAMMALS</u>				
<u>Common Name</u>	<u>Scientific Name</u>	<u>Wildlife Evidence</u> *	<u>G Ranking</u>	<u>S Ranking</u>
<u>RODENTS</u>		<u>RODENTIA</u>		
Eastern Chipmunk	<i>Tamias striatus</i>	OB	G5	S5
Red Squirrel	<i>Tamiasciurus hudsonicus</i>	OB	G5	S5
<u>CARNIVORES</u>		<u>CARNIVORA</u>		
Coyote	<i>Canis latrans</i>	OB	G5	S5
Red Fox	<i>Vulpes vulpes</i>	SI/den	G5	S5
<u>DEER AND BISON</u>		<u>ARTIODACTYLA</u>		
White-tailed Deer	<i>Odocoileus virginianus</i>	TK/OB	G5	S5

<u>HERPETILES</u>				
<u>Amphibians</u>				
<u>Common Name</u>	<u>Scientific Name</u>	<u>Wildlife Evidence</u>	<u>G Ranking</u>	<u>S Ranking</u>
<u>TREEFROGS</u>		<u>HYLIDAE</u>		
Eastern Gray Tree Frog	<i>Hyla versicolor</i>	VO/OB	G5	S5
<u>TRUE FROGS</u>		<u>RANIDAE</u>		
Green Frog	<i>Rana clamitans</i>	OB	G5	S5

<u>INSECTS</u>				
<u>Butterflies</u>				
<u>Common Name</u>	<u>Scientific Name</u>	<u>Wildlife Evidence</u>	<u>G Ranking</u>	<u>S Ranking</u>
<u>SKIPPERS</u>		<u>HESPERIIDAE</u>		
European Skipper	<i>Thymelicus lineola</i>	OB	G5	SNA
Hobomok Skipper	<i>Poanes hobomok</i>	OB	G5	S5
Long Dash Skipper	<i>Polites mystic</i>	OB	G5	S5
Little Glassywing	<i>Pompeius verna</i>	OB	G5	S5
Northern Cloudywing	<i>Thorybes pylades</i>	OB	G5	S5
Black Swallowtail	<i>Papilio polyxenes</i>	OB	G5	S5
Eastern Tiger Swallowtail	<i>Papilio glaucus</i>	OB	G5	S5

<u>INSECTS</u>				
<u>Butterflies</u>				
<u>Common Name</u>	<u>Scientific Name</u>	<u>Wildlife Evidence</u>	<u>G Ranking</u>	<u>S Ranking</u>
<u>WHITES AND SULPHURS</u>				
	<u>PIERIDAE</u>			
Clouded Sulphur	<i>Colias philodice</i>	OB	G5	S5
Orange Sulphur	<i>Colias phildice</i>	OB	G5	S5
Cabbage White	<i>Pieris rapae</i>	OB	G5	SNA
<u>GOSSAMER-WINGS</u>				
	<u>LYCAENIDAE</u>			
Silvery Blue	<i>Glaucopsyche lygdamus</i>	OB	G5	S5
<u>BRUSHFOOTS</u>				
	<u>NYMPHALIDAE</u>			
Common Ringlet	<i>Coenonympha tullia</i>	OB	G5	S5
Common Wood Nymph	<i>Cercyonis pegala</i>	OB	G5	S5
Red Admiral	<i>Vanessa atalanta</i>	OB	G5	S5
White Admiral	<i>Limenitis arthemis arthemis</i>	OB	G5	S5
Little Wood Satyr	<i>Megisto cymela</i>	OB	G5	S5
Pearl Crescent	<i>Phycoides tharos</i>	OB	G5	S5
Northern Crescent	<i>Phycoides selenis</i>	OB	G5	S5

<u>INSECTS</u>				
<u>Damselflies and Dragonflies</u>				
<u>Common Name</u>	<u>Scientific Name</u>	<u>Wildlife Evidence</u>	<u>G Ranking</u>	<u>S Ranking</u>
<u>DRAGONFLIES</u>				
<u>DARNERS</u>				
	<u>AESHNIDAE</u>			
Shadow Darner	<i>Aeshna umbrosa</i>	OB	G5	S5
Mottled Darner	<i>Aeshna clepsydra</i>	OB	G5	S5
Common Green Darner	<i>Anax junius</i>	OB	G5	S5
<u>SKIMMERS</u>				
	<u>LIBELLULIDAE</u>			
Common Whitetail	<i>Plathemis ltdia</i>	OB	G5	S5
Widow Skimmer	<i>Libellula luctuosa</i>	OB	G5	S5
Four-spotted Skimmer	<i>Libellula quadrimacullata</i>	OB	G5	S5

* Wildlife Evidence Codes from Lee et al., 1998.

OB – observed, TK – tracks, SI – other signs (specify), VO – vocalization,

<u>Birds</u>								
<u>Common Name</u>	<u>Scientific Name</u>	<u>Breeding Evidence</u>				<u>Area Sensitivity</u> **	<u>G Rank #</u>	<u>S Rank #</u>
		*						
		<u>Ob.</u>	<u>Po.</u>	<u>Pr.</u>	<u>Conf.</u>			
Great Blue Heron	<i>Ardea herodias</i>	X					G5	S4
Canada Goose	<i>Branta Canadensis</i>	X					G5	S5B
Turkey Vulture	<i>Cathartes aura</i>	X					G5	S5B
Red-tailed Hawk	<i>Buteo jamaicensis</i>	X					G5	S5B
Merlin	<i>Falco columbarius</i>		H				G5	S5B
Wild Turkey	<i>Meleagris gallopavo</i>			T			G5	S4
Killdeer	<i>Charadrius vociferus</i>			T			G5	S5B
Mourning Dove	<i>Zenaida macroura</i>			T			G5	S5
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>				NE	WA	G5	S5B
Downy Woodpecker	<i>Picoides pubescens</i>			T			G5	S5
Hairy Woodpecker	<i>Picoides villosus</i>			T			G5	S5
Northern Flicker	<i>Colaptes auratus</i>			T			G5	S4B
Pileated Woodpecker	<i>Dryocopus pileatus</i>			T			G5	S5
Eastern Phoebe	<i>Sayornis phoebe</i>		H				G5	S5
Great Crested Flycatcher	<i>Myiarchus crinitus</i>			T			G5	S4B
Eastern Kingbird	<i>Tyrannus tyrannua</i>			T			G5	S4B
Least Flycatcher	<i>Empidonax minimus</i>			T			G5	S4B
Eastern Wood-Pewee	<i>Contopus virens</i>			T		Species of concern	G5	S5B

<u>Birds</u>								
<u>Common Name</u>	<u>Scientific Name</u>	<u>Breeding Evidence</u>				<u>Area Sensitivity</u> **	<u>G Rank #</u>	<u>S Rank #</u>
		*						
		<u>Ob.</u>	<u>Po.</u>	<u>Pr.</u>	<u>Conf.</u>			
Red-eyed Vireo	<i>Vireo olivaceus</i>			T			G5	S5B
Warbling Vireo	<i>Vireo gilvus</i>			T			G5	S5B
Blue Jay	<i>Cyanocitta cristata</i>			T			G5	S5
Common Raven	<i>Corvus corax</i>			T			G5	S5
American Crow	<i>Corvus brachyrhynchos</i>		H				G5	S5B
Barn Swallow	<i>Hirundo rustica</i>				NE	Threatened	G5	S4B
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>				NE		G5	S4B
Black Capped Chickadee	<i>Poecile carolinensis</i>			T			G5	S5
Tree Swallow	<i>Tachycineta bicolor</i>		H				G5	S4B
White-breasted Nuthatch	<i>Sitta carolinensis</i>			T			G5	S5
Eastern Bluebird	<i>Sialia sialis</i>		H				G5	S5B
House Wren	<i>Troglodytes aedon</i>			T			G5	S5B
Winter Wren	<i>Troglodytes troglodytes</i>			T		WA	G5	S5B
American Robin	<i>Turdus migratorius</i>			T			G5	S5B
Verry	<i>Catharus fuscens</i>			T			G5	S4B
Hermit Thrush	<i>Catharus guttatus</i>			T			G5	S5B
Gray Catbird	<i>Dumetella carolinensis</i>			T			G5	S4B
Brown Thrasher	<i>Toxostoma longirostre</i>			T		SHi	G5	S5B

<u>Birds</u>								
<u>Common Name</u>	<u>Scientific Name</u>	<u>Breeding Evidence</u>				<u>Area Sensitivity</u> **	<u>G Rank #</u>	<u>S Rank #</u>
		*						
		<u>Ob.</u>	<u>Po.</u>	<u>Pr.</u>	<u>Conf.</u>			
European Starling	<i>Sturnus vulgaris</i>			T			G5	SNA
Cedar Waxwing	<i>Bombycilla cedrorum</i>			T			G5	S5B
Yellow Warbler	<i>Setophaga petechia</i>			T			G5	S5
Chestnut-sided Warbler	<i>Setophaga pensylvanica</i>			T			G5	S5B
Blackburian Warbler	<i>Setophaga fusca</i>		H			WA	G5	S5B
Black-throated Green Warbler	<i>Setophaga virens</i>		H			WA	G5	S5B
Black-throated Blue Warbler	<i>Setophaga caerulscens</i>			T		WA	G5	S5B
Pine Warbler	<i>Setophaga pinus</i>			T			G5	S5B
Black and White Warbler	<i>Mniotilta varia</i>		H				G5	S5B
American Redstart	<i>Septophaga ruticilla</i>			T			G5	S5B
Mourning Warbler	<i>Geothlypis philadelphia</i>			T			G5	S4B
Common Yellowthroat	<i>Geothlypis trichas</i>			T			G5	S5
Indigo Bunting	<i>Passerina cyanea</i>			T			G5	S5B
Northern Cardinal	<i>Cardinalis cardinalis</i>			T			G5	S5
Rose-breasted Grosbeak	<i>Guiraca caerulea</i>			T			G5	S5B
Eastern Towhee	<i>Piplo erythrophthalmus</i>			T		SHc	G5	S5B
Field Sparrow	<i>Spizella pusilla</i>			T		SHc	G5	S4B
Clay-colored Sparrow	<i>Spizella pallida</i>			T		SHi	G5	S4B

<u>Birds</u>								
<u>Common Name</u>	<u>Scientific Name</u>	<u>Breeding Evidence</u>				<u>Area Sensitivity</u> **	<u>G Rank #</u>	<u>S Rank #</u>
		*						
		<u>Ob.</u>	<u>Po.</u>	<u>Pr.</u>	<u>Conf.</u>			
Chipping Sparrow	<i>Spizella passerina</i>			T			G5	S5B
Grasshopper Sparrow	<i>Ammodramus savannarum</i>			T		OC	G5	S4B
Savannah Sparrow	<i>Passerculus sandwichensis</i>			T		OC	G5	S5B
Vesper Sparrow	<i>Pooecetes gramineus</i>			T		OC	G5	S4B
White-throated Sparrow	<i>Zonotrichia leucophrys</i>			T			G5	S5B
Song Sparrow	<i>Melospiza melodia</i>			T			G5	S5B
Eastern Meadowlark	<i>Sturnella magna</i>			T		Threatened	G5	S4B
Bobolink	<i>Dolichonyx oryzivorus</i>			T		Threatened	G5	S4B
Red-winged Blackbird	<i>Agelaius phoeniceus</i>			T			G5	S5B
Common Grackle	<i>Quiscalus quiscula</i>			T			G5	S5B
Baltimore Oriole	<i>Icterus galuba</i>			T			G5	S5B
American Goldfinch	<i>Carduelis tristis</i>			T			G5	S5B

* Breeding Codes from Ontario Breeding Bird Atlas, 2001, 2003.

Ob. = Observed, X = species observed in its breeding season (no evidence of breeding). Presumed migrants not recorded.

Po. = Possible Breeding, H = species observed in its breeding season in suitable nesting habitat.

S = singing male present, or breeding calls heard, in its breeding season in suitable nesting habitat.

Pr. = Probable Breeding, T = permanent territory presumed thorough registration of territorial song on a least 2 days, a week or more apart, at the same place.

DD = distraction display or injury feigning.

FY = recently fledged young or downy young, including young incapable of sustained flight.

CB = Confirmed Breeding, NE = nest containing egg(s)/young

** Area sensitivity

1. Threatened and Species of Concern – on the Species at Risk Ontario list (SARO) of the Endangered Species Act, 2007
2. Significant Wildlife Habitat Ecoregion Criteria Schedules, Addendum to the Significant Wildlife Habitat Technical Guide, OMNR, 2012

WA= woodland area sensitive species, OC = open country species, SHi= shrub/early successional indicator species, SHc= shrub/early successional common species

G RANK Definition

G4 Common; usually more than 100 occurrences; usually not susceptible to immediate threats.

G5 Very common; demonstrably secure under present conditions.

T denotes that the rank applies to a subspecies or variety.

G? Unranked, or if following a ranking, rank is tentatively assigned (e.g. G5?).

S RANK Definition

S4 Apparently secure; uncommon but not rare; some cause for long-term concern due to declines or other factors.

S5 Secure; common, widespread, and abundant in the nation or state/province.

B Breeding migrants/vagrants

N Non-breeding migrants/vagrants

SNA Not Applicable; A conservation status rank is not applicable because the species is not a suitable target for conservation activities.

APPENDIX 5: BOBOLINK/EASTERN MEADOWLARK SURVEY 2015

Location

The survey was conducted on part of the Greenwood Violet Hill property located in the Lots 31 and 32, Concession 4, Town of Mono, County of Dufferin.

Survey Methods

Since breeding bird surveys in 2014 determined that Bobolinks were present in grassland areas on the west side of the site, surveys were then planned and conducted in 2015 following the OMNRF Bobolink Survey Protocol.

A requirement of the survey protocol is that the surveyor should be familiar with identification of both male and female Bobolink by sight and sound and be capable of recognizing characteristic behaviors. The surveys were conducted by Judith Jones who is familiar with Bobolink identification and their behaviors. She has completed numerous breeding bird surveys in conducting her consulting business.

Six survey points were located in open grassland habitats (Figure 5). Survey points were concentrated in grassland areas in the north and south-east because these were large enough to offer potential nesting habitat for BOBO and EAML. GPS coordinates were also recorded for each survey point. These points were visited three times, May 31, June 14, and 20. All surveys were completed between sunrise and 9:00 am except for point 1 on May 31 which was not completed until 9:25. Ten minutes were spent at each point during which all Bobolinks, Eastern Meadowlarks and other species were documented, either by direct observation or call.

Table 1. Survey Point Coordinates (NAD 83)

Point	Coordinates	
	Easting	Northing
8	574145	4882956
7	574325	4883211
6	574282	4883522
2	574390	4883665
3	574498	4883819
1	574167	4882956

Table 2. Survey Dates, Times and Weather

Date, 2015	Time (am)	Weather Conditions
May 31	5:57 – 9:25	Overcast, light drizzle Temperature 12° C Wind – 0 – Beaufort Scale
June 14	5:57 – 8:48	Overcast Temperature 18° C Wind – 0 – Beaufort Scale
June 20	6:05 – 8:55	Sunny -clear Temperature 10° C Wind – 0 – Beaufort Scale

Habitat Descriptions of Point Count Locations

All 6 survey points were located in Dry-Fresh Mixed Meadow (CUM1-1). This vegetation community totals 18.8 ha on the site but is found in 7 different locations. These areas have all been disturbed by past agricultural activities. The dominant cover is Awnless Brome and goldenrod species in the former agricultural areas and is Spotted Knotweed in a single area of exposed gravel. Most of the plant cover is non-native or common native species that occur in open disturbed habitats.

The vegetation was about 25 – 30 cm high on May 31, the date of the first survey, and reached a height of about 1.5 m by the last survey on June 20.

Survey Observations

May 31, 2015

Point #	Time Period (am)	# of Bobolink	Comment	# of Eastern Meadowlark	Comments
8	6:25 – 6:35	0	-	3	-
7	7:20 – 7:30	0	-	0	-
6	7:55 – 8:05	4	3 males and 1 female	2	-
2	8:11 – 8:21	1	Not same bird as at # 6	1	Not same bird as at # 6
3	8:30 – 8:40	4	-	0	2 males and 2 females
1	9:15 – 9:25	0	-	1	Same bird as one at # 6
Totals		9	-	6	-

June 14, 2015

Point #	Time Period (am)	# of Bobolink	Comments	# of Eastern Meadowlark	Comments
8	5:57 – 6:07	0	-	2	1 on each side of 3 rd Line Road
7	6:30 – 6:40	0	-	0	-
6	7:01 – 7:11	0	-	3	-
2	7:24 – 7:34	0	-	0	-
3	7:55 – 8:05	0	-	0	-
1	8:25 – 8:35	0	-	0	-
Totals		0	-	4	-

June 20, 2015

Point #	Time Period (am)	# of Bobolink	Comments	# of Eastern Meadowlark	Comments
8	6:05 – 6:10	0	-	2	Same calling locations as previous dates
7	6:39 – 6:49	0	-	0	-
6	7:22 – 7:32	0	-	1	Present on all 3 dates
2	7:38 – 7:48	0	-	0	
3	8:29 – 8:39	3	-	0	2 males and 1 female
1	8:45 – 8:55	0	-	1	Present on all 3 dates
Totals		3	-	4	

Results

On May 31, 2015 in the large northern field, four Bobolinks (3 males, 1 female) were initially observed at Point 6, and an additional four (2 males, 2 females) were observed near the fence at Point 3. However, on June 14, 2015 none were observed anywhere in the field. The weather during the first observation was drizzling, yet the birds were quite active. Weather was unlikely the reason for the lack of Bobolink sightings on June 14 because the weather on that date was clearing with the sun coming out and 14 other bird species were active and noted. The Bobolink seen on May 31 may have simply not set up territories because of the small overall size of the field and moved on.

On June 20, 2015 three Bobolinks, 2 males and 1 female, were observed in the northeast corner of the field near the fence near Point 3. Further observation revealed that a pair flew

into the grass carrying food, confirming nesting in this part of the field. The second male may have been a bachelor.

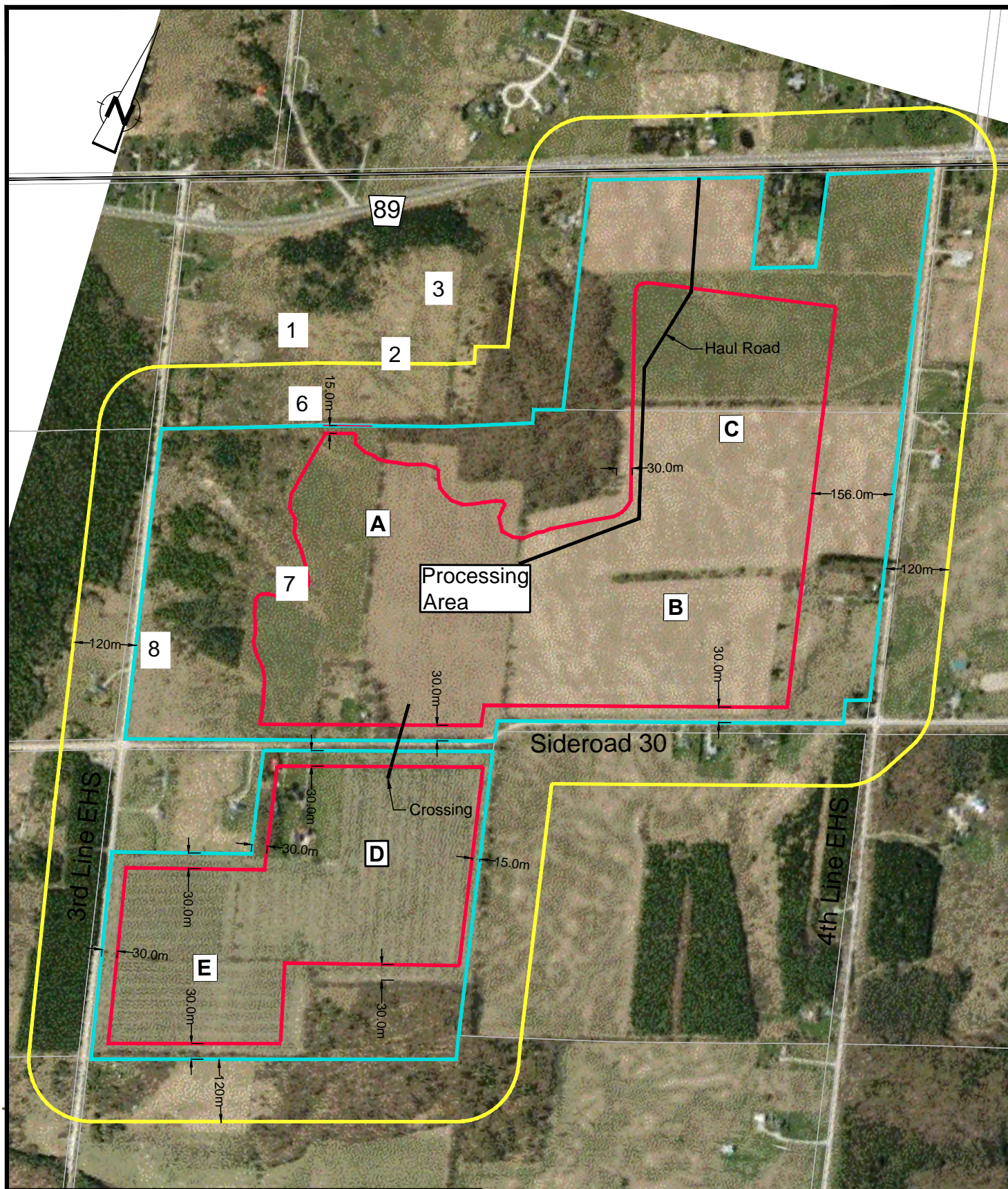
At least 1 Bobolink pair was confirmed breeding in this field (Figure 1b).

Again in the northern field an Eastern Meadowlark was calling from the same area near Point 1 on all 3 visits. No visual observations were ever made of the species in this area, but the repeated calling from the same location for more than 2 visits confirms a presumed territory. On May 31, there was also a meadowlark calling from the southeastern corner of the field, but none were heard in this part of the field on subsequent visits.

Three Eastern Meadowlarks were also present during all 3 survey dates and all on presumed territories in the south-west area of the property. One was present on the licence area and 2 were within 120 m, one was west of the 3rd Line and the other was south of 30 Sideroad.

Conclusion

Both the meadow areas, 1 at the north and the other at the south-west, provide suitable breeding habitat for Bobolinks and Eastern Meadowlarks. Grasslands within 120 m south-east of the site were also occupied by Eastern Meadowlarks and therefore suitable breeding habitat is also present at these locations.



Bobolink/Eastern Meadowlark Survey Points
 Greenwood, Violet Hill Property
 Lots 30 - 32 Concession 4
 Town of Mono, County of Dufferin
 Figure 5

Legend		Survey Points 1, 2, 3, 6, 7, 8
	Proposed Licensed Boundary	
	Proposed Extraction Limit	
	Phasing	

Scale 1:10,000

APPENDIX 6: EASTERN WHIP-POOR-WILL SURVEYS 2014/2015

Location

The surveys were conducted on the Greenwood Violet Hill property located in the Lots 30, 31 and 32, Concession 4, Town of Mono, County of Dufferin

Survey Methods

The surveys were conducted in 2014 and 2015 following the OMNRF protocol entitled “Whip-poor-will Two Person Auditory Survey Protocol”. The following addresses the requirements of the protocol.

a. Knowledge

Surveyors in 2014 were Robin Craig and Carol Craig. R. Craig is familiar with the identification of night calling birds such as Eastern Whip-poor-will (EWPW) and Common Nighthawk (CONH) by sight and sound. R. Craig has conducted EWPW surveys during previous field seasons at other sites. In 2015 the surveyors were R. Craig and Robert Bowles. R. Bowles is also experienced at conducting EWPW surveys.

b. Search Effort/Period

In 2014 one survey night was completed. The surveys were conducted as near as possible to the full moon period for June because EWPW are most likely to be vocally active during this time period when 50 % or more of the moon face is clearly visible. The full moon was on June 13 (from www.sunrisesunsetmap.com) and this was the date of the survey. In 2015 two night surveys more than 1 week apart were conducted. The full moons were on June 2 and July 1. The survey dates were June 1 and June 29, both prior to but within 3 nights of the date of the full moon.

c. Time of Day

Surveys were conducted at least 30 minutes after sunset when the moon was well above the horizon.

d. Weather Conditions

Surveys are to be conducted on clear nights with little or no wind, no rainfall and when the temperature is above 10 °C if possible. In 2014 the skies were overcast at the beginning of the survey but cleared by 10:30 pm. There was a light breeze, no rain and the temperature was 10 °C. On June 1 2015 the skies were clear with no rain or wind and the temperature was 10 °C. On June 29 the skies were partly cloudy with the moon appearing through breaks in the cloud cover with no rain but a light breeze and the temperature was 14 °C.

e. Station Location/Survey Technique

In 2014 three stations were surveyed, 1 to 3 and were adjacent to the deciduous forest areas where potential EWPW territories may have been located (Figure 6). Surveyors listened for a minimum of 6 minutes at each station and recorded any EWPW and/or CONH heard or seen. In 2015 five stations numbered 1, 2, 4, 5, 6 were surveyed. Additional stations were added because the natural heritage survey area had increased. Station 3 was dropped because the crop on the land prevented reasonable access.

Survey Observations

The following summarizes survey information.

2014 Observers - R. Craig and C. Craig

Date 2014	Station	GPS Location Zone 17T	Time (PM, DLT)	#EWPW and/or CONI heard	Direct./Dist. of each EWPW heard	Comment
June 13	1	Easting 574236 Northing 4882400	10:40-10:46	0	-	-
	2	Easting 574815 Northing 4883011	10:50-10:56	0	-	-
	3	Easting 574852 Northing 4883752	11:00-11:06	0	-	-

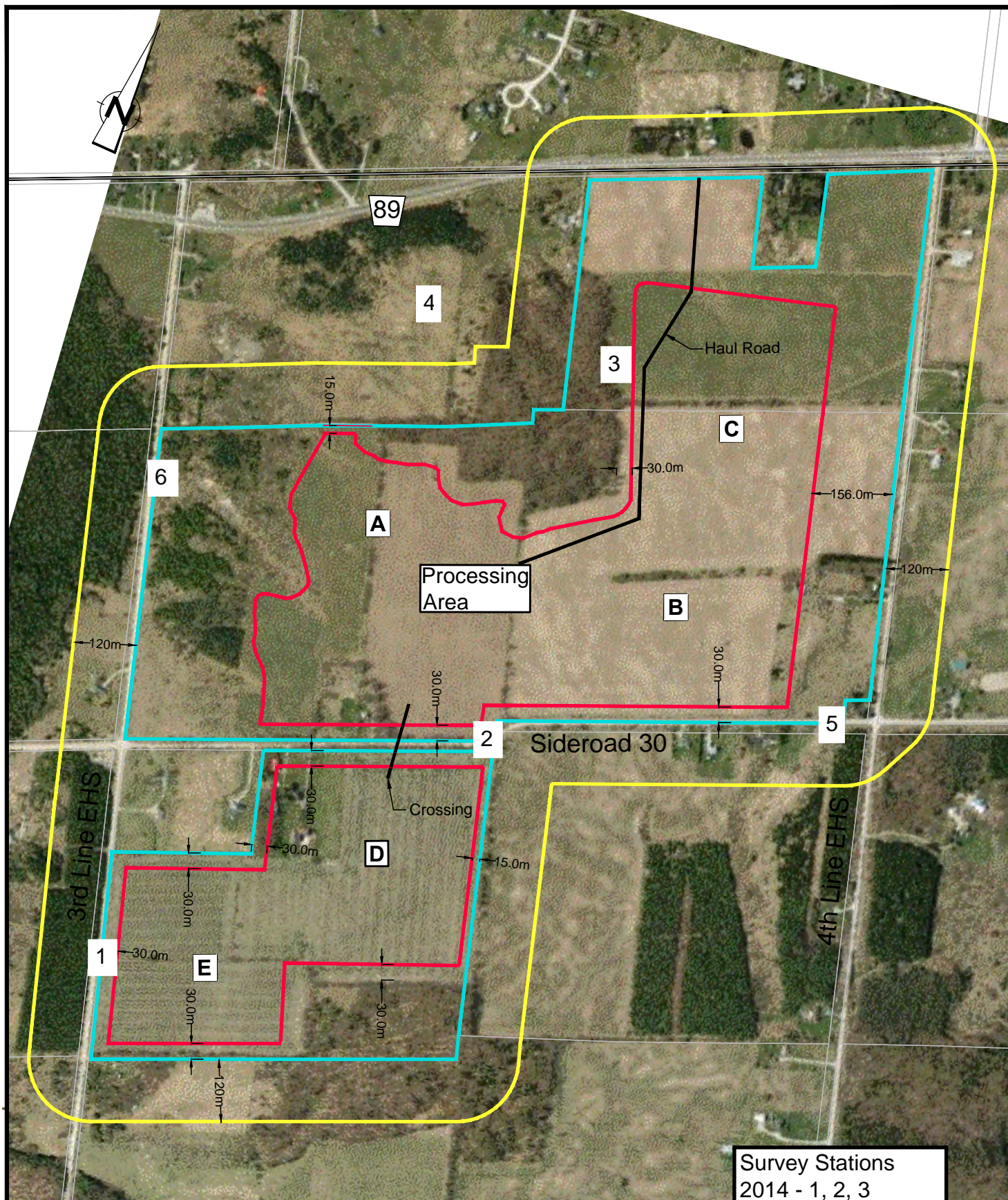
2015 Observers - Robin Craig and Robert Bowles

Date 2015	Station	GPS Location	Time (PM, DLT)	#EWPW and/or CONH heard	Direct./Dist. of each EWPW heard	Comment
June 1	4	Easting 574458 Northing 4883712	9:30-9:40	0	-	-
	5	Easting 575437 Northing 4883241	9:47-9:57	0	-	-
	2	Easting 574815 Northing 4883011	9:59-10:09	0	-	-
	1	Easting	10:15-10:25	0	-	-

		574236 Northing 4882400				
	6	Easting 574058 Northing 4883320	10:30-10:40	0	-	-

Conclusion

No Eastern Whip-poor-wills or Common Nighthawks were seen or heard during surveys conducted in 2014 and 2015.



Survey Stations
 2014 - 1, 2, 3
 2015 - 1, 2, 4, 5, 6

Eastern Whip-poor-will Surveys
 Greenwood, Violet Hill Property
 Lots 30 - 32 Town of Mono
 County of Dufferin
 Figure 6

Legend
 Proposed Licensed Boundary
 Proposed Extraction Limit
 A-E Phasing

Scale 1:10,000

APPENDIX 7: NATURAL HERITAGE MITIGATION

The following actions are recommended and will be included on the site plans to mitigate and protect natural features on and within 120m of the Greenwood Violet Hill Pit site.

Provincially Significant Wetlands

- The extraction limit will be set back a minimum of 150 m from the wetland boundary.

Endangered and Threatened Species

General

- The Species at Risk List for Ontario will be reviewed annually to determine if newly listed species are present or have the potential to be found within the extraction limit.
- Prior to striping, the area to be cleared will be surveyed during appropriate survey time periods by a qualified professional for the presence of endangered and threatened species.
- A report of the above described surveys will be kept on file at the pit site and will be provided to OMNRF if an endangered or threatened species is found.
- If required, approvals/authorizations will be obtained under the Endangered Species Act and/or amendments made to the site plan as necessary.

Butternut

- Each of the 30 known Butternut will be clearly marked and numbered to assist with future identification and the establishment of appropriate setbacks.
- A minimum 25 m setback between the extraction limit and the drip line of the north woodland where 26 Butternut were found will be established and clearly marked.
- Prior to any operation occurring within the licenced area, the operator w demonstrate to the satisfaction of OMNRF, that the Endangered Species Act all requirements related to protecting Butternut and their habitats have been met.
- This will accomplished by;
 - Searching for new and previously identified Butternut both within and within 25 m of the proposed extraction limit by a qualified professional using OMNRF search protocols.
 - Numbering and clearly marking all Butternut found.
 - Completing a health assessment by a qualified Butternut health assessor on all Butternut found.

- Submitting the results of the Butternut health assessments to OMNRF within 30 days of completing the assessments.
- Seeking appropriate authorization under the Endangered Species Act prior to removing any Butternut.

Barn Swallow

- Greenwood Aggregates Company Limited has registered with the OMNRF a Notice of Activity, to “Alter a Structure” that is Barn Swallow habitat, under Endangered Species Act exemption guidelines O. Reg. 242/08 23.3, certificate # X-102-0000000340.
- Prior to any land clearing within the licenced area and prior to removing the barn, all the exemption guidelines to protect Barn Swallow habitat outlined in the Endangered Species Act O. Reg. 242/08 Section 23.5 will be adhered to.

Bobolink and Eastern Meadowlark

- Exclude the natural vegetation communities including the cultural meadows along the north-west and west boundaries of the licenced area from the extraction limit.

Bat Species

- Exclude the on site north and south woodlands and potential bat maternity habitats from the extraction limit.
- Ensure a minimum 30 m setback between the extraction limit and the drip lines of any woodland community on or adjacent to the site.

Significant Woodlands

- Exclude the north and south woodlands from the extraction limit.
- Ensure a minimum 30 m setback from the drip lines of all woodlands on the site and their adjacent components.
- Implement dust control measures as required to protect vegetation and wildlife within woodlands.

Significant Wildlife Habitat

Shrub/Early Successional Bird Breeding Habitat

- Exclude the natural vegetation communities including the cultural thickets along the west boundary of the licence area from the extraction limit.

Eastern Wood Pewee

- Exclude the north and south woodlands from the extraction limit.

- Ensure a minimum 30 m setback from the drip lines of all woodlands on the site and their adjacent components.
- Implement dust control measures as required to protect vegetation and wildlife within woodlands.

Fish Habitat

- Store fuel and maintain equipment in a fuel and maintenance area in accordance with Provincial legislation.
- Prepare a Spills Response Plan that will be implemented and enforced to protect water quality.
- Monitor groundwater as described in the “Proposed Violet Hill Pit Combined Level 1 Level 2 Hydrogeological Assessment” by Whitewater Hydrogeology Ltd., 2015.

RESUMES

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Qualifications and Training

- B.Sc. U. of Guelph, (1970)
- M.Sc., U. of Guelph, (1972)
- Certified Wildlife Biologist, The Wildlife Society (since 1979)
- Ontario Wetland Evaluation Training
- Aquatic Habitat Inventory Training
- Wetland Restoration Training
- Larval Fish Identification Training
- Law Enforcement Training
- Ontario Municipal Board Training
- Negotiation Training
- Stresses and Management of Cold and Warmwater Fish communities Training
- First Nations Culture Training
- Fish Culture Training
- Fish and Wildlife Population Modeling
- Ecosystem Management
- Ecological Sustainability
- Waterfowl Identification and Management
- Provincial Planning Policies
- Federal Fisheries Act Habitat Policies
- Wildlife Management Area Planning
- St. John's Ambulance CPR/First Aid
- Ontario Health and Safety Act
- Butternut Health Assessor (#180)
- NHIC Sensitivity Training 2013
- Butternut Health Assessment Workshop 2013

2001-present Environmental Consultant

- - Natural Environment Reports Technical Reports for aggregate licence and other planning applications
- species at risk surveys including Bobolink, Eastern Meadowlark, Eastern Whip-poor-will, bat maternity habitats, American Ginseng, Butternut health assessments and others.
- appeared at 5 Ontario Municipal Board hearings as an expert in natural heritage issues
- Ontario's Ambassador to Canada's Recreational Fisheries Award Program (Federal Department of Fisheries and Oceans)
- assembled wildlife/fisheries data for Severn Sound Remedial Action Plan (SSRAP) de-listing report
- contracts with Ducks Unlimited and private landowners, trade shows, pond advice and wetland boundaries
- Barrie Ducks Unlimited Fund Raising Committee (Past Chairman).

1999-2001 Provincial Community Fisheries and Wildlife Involvement Program (CFWIP) Coordinator

- chair of Provincial Committee that developed program policies and procedures and annually allocated \$1.0 million to support over 500 volunteer groups with resource projects
- developed procedures to ensure CFWIP followed revised Fisheries Act protocol and assisted with review of all OMNR programs to ensure adherence to new protocols

1998-1999 Resource Liaison Officer, Midhurst District OMNR

- facilitated agreements with multi-interest volunteer groups regarding operations of Copeland Forest and 4 Simcoe County Provincial Wildlife Areas (PWA's)

- facilitated agreements with Ducks Unlimited to operate OMNR dams at Tiny and Wye Marsh PWAs
- managed SSRAP riparian Habitat restoration project including supervising staff, budgeting, approving projects, technical guidance; more than 85 projects were completed, 65 km of stream buffers created and over \$2.0 million in work completed
- worked with First Nations regarding resource issues

1973-1998 OMNR Field Biologist, Niagara and Huronia/Midhurst Districts

- SSRAP planning team member from 1986 involved with identifying issues, developing remedial options and implementing actions
- Provincial CFWIP Committee member for Southern Ontario from 1992-1999
- provided resource input to multi-agency, water quality improvement and landowner funding committees such as NVCA Lands and Waters Committee and SSRAP Non Point Source Committee
- managed various resource inventory and data collection projects such as lake, stream and wetland inventories and angler and hunter surveys
- lead development of local OMNR Fisheries Management Plan, wildlife area management plans, fish and wildlife Land Use Guidelines
- lead team that developed a Controlled Deer Hunt for Simcoe and Dufferin Counties, 1978
- member of a multi-agency Provincial team that developed guidelines for harvesting aquatic plants in Ontario
- worked with City of Barrie to develop a "Fish Habitat Study" to guide waterfront development and protect fish habitat, one result was the building of "habitat" islands by the Barrie Rotary Club in 1998
- conducted radio telemetry studies of walleye and muskellunge to determine spawning habitats in the Nottawasga River and southern Georgian Bay
- conducted workshops for contractors about Provincial Work Permit system and fish habitat protection
- accepted as an expert witness in court cases and Ontario Municipal Board hearings in issues about fish habitat and wetlands
- published papers in peer reviewed journals about wildlife diseases and fish habitat
- trained OMNR and Conservation Authority staff about Fisheries Act fish habitat protocols and procedures
- member of team that trained senior OMNR managers about sustainable development
- member of team that developed a wetland restoration training course for Ontario Biologists

JUDITH JONES, Biologist

Winter Spider Eco-Consulting

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B.S. Botany, University of Michigan, Ann Arbor 1980

Ontario provincial wetland evaluator--certified 1999

Canadian Environmental Assessment Agency—screening training, 2007

Certificate of Proficiency in Spanish, Ryerson University, 2012

I have been an independent biological consultant since 1995. My work covers a broad range, including recovery of species-at-risk; biological inventories and field surveys; environmental assessments (EIS, NETR, CEA) for private development and First Nations; management and conservation planning for natural areas and parks; working with First Nations on land use planning and conservation; alvar ecology; gathering traditional ecological knowledge (TEK), rehabilitation of wild rice, and teaching the general public. I am also the author of 17 federal or provincial strategies for the recovery of species-at-risk and 3 COSEWIC status reports (background for decisions on whether species become or remain legally at risk). I also coordinate a network of volunteers who monitor an endangered species on Manitoulin Island.

SUMMARY OF CONSULTING ACTIVITIES 2000-2012

Surveys of Natural Areas with Management and Conservation Planning

- 2013 • Rankin Management Area: Year 1- Isaac Lake (Aquatic and Wildlife Services)
- 2011-12 • Measuring 50 years of forest change on Niagara Escarpment using point-quarter & Vegetation Sampling Protocol (VSP) (NEC/NEBI)
- 2011 • Ecological values of a property for ecogift (Orland Conservation)
• Copeland Forest (Couchiching Conservancy)
- 2009-2010 • Oliphant Shoreline (Lake Huron Centre for Coastal Conservation)
- 2009 • Degrassi Point Prairie Remnant ANSI (OMNR Midhurst)
- 2004 • Carden Alvar ANSI (OMNR Bancroft)
• Trent-Severn Waterway (Parks Canada, Peterborough)
- 2003 • 20 candidate ANSIs on Manitoulin Island (Escarpment Biosphere Cons.)
• Wawashkesh - Naiscoot Conservation Reserve (OMNR Parry Sound)
• Naiscoot Forest Conservation Reserve (OMNR Parry Sound)
• Long Lake-Lancelot Creek Conservation Reserve (OMNR Parry Sound)
• Freeman Twp. Old Growth Conservation Reserve (OMNR Parry Sound)
- 2001-2002 • Field work Ontario Living Legacy/Georgian Bay Coast (NCC/OMNR)
- 2000 • Misery Bay Provincial Nature Reserve (Ontario Parks Sudbury)
• Queen Mother-M'Nidoo M'Nissing Provincial Park (Ontario Parks Sudbury)
• Blue Jay Creek Provincial Park (Ontario Parks Sudbury)
• Mac's Bay Conservation Reserve (Ontario Parks Sudbury)
• Niagara Escarpment of Manitoulin Island (Escarpment Biosphere Cons.)

Environmental Assessments

- 2013 • INAC environmental screening for Wikwemikong Unceded Indian Reserve
- 2005-present • Field surveys for EIS and NETR at proposed development and aggregate sites in southern Ontario (Aquatic and Wildlife Services, Owen Sound)
- 2006-2009 • INAC environmental screenings for Beausoleil First Nation

Species-At-Risk: Recovery Strategies, Action and Management Plans, Status Reports

- 2013 • Hart's-tongue Fern: Update status report (COSEWIC)
- 2012 • Slender Bush-clover, Willowleaf Aster, Nodding Pogonia, and Large Whorled Pogonia: Recovery Strategies (OMNR)
- 2011 • Colicroot, Willowleaf Aster, and Dense Blazing Star: RS (CWS)
• Cherry Birch: Addendum (CWS)
• Forked Three-awned Grass: Action Plan (CWS)
- 2010 • Forked Three-awned Grass: Addendum (OMNR)
• Pitcher's Thistle, Lakeside Daisy, Hill's Thistle: RS (Parks Canada)
• Dwarf Lake Iris: Update status report (Parks Canada/COSEWIC)
- 2009 • Gattinger's Agalinis, Pitcher's Thistle: Update status reports (COSEWIC)
• Hill's Pondweed, Climbing Prairie Rose: Management Plans (CWS)
- 2008 • Deerberry: RS (Parks Canada)
• Alvar Ecosystems [with Jarmo Jalava] including Gattinger's Agalinis, Lakeside Daisy, and Houghton's Goldenrod: RS (Parks Canada)
- 2007 • Forked Three-awned Grass: RS (Parks Canada)

Species-At-Risk: General Surveys, Threats Reduction, Conservation Planning

- 2007-present • Wikwemikong First Nation
- 2010 • United Chiefs and Councils of M'Nidoo M'Nissing (Manitoulin Island)
- 2009 • Serpent River First Nation
- 2005-6 • Beausoleil First Nation
- 2004-5 • North Channel and Manitoulin Island alvars (Parks Canada)
- 2003 • Sault Canal & Fort St. Joseph National Historic Sites (Parks Canada)

Species-At-Risk: Habitat Delineation, Field Mapping, and Protection

- 2005-6, 2010 • Forked Three-awned Grass (End.) (Canadian Wildlife Service)
- 2006- 2008 • Dwarf Lake Iris (Thr.) and Hill's Thistle's (Thr.) (Parks Canada, Ottawa)
- 2007 • Critical habitat for Pitcher's Thistle (End.) in Pukaskwa National Park
- 2001-2004 • Pitcher's Thistle populations and initial habitat characteristics
- 2002 & 1999 • Loggerhead Shrike & habitat on Manitoulin Island (OMNR Kempsville)

Species-At-Risk: Monitoring Design and Implementation

- 2009-present • Hill's Thistle (Thr.) for Wikwemikong First Nation, Ontario Parks, NCC
- 2003-present • Pitcher's Thistle (SC) on Manitoulin Island
- 2004-present • Coordination of volunteers who monitor Pitcher's Thistle
- 2008 • Forked Three-awned Grass at Georgian Bay Islands NP (Parks Canada)

Species-At-Risk: Research, Outreach, Education

- 2010 • Demographic trends in Pitcher's Thistle at Pukaskwa National Park
- 2008 • Land use history of Forked Three-awned Grass habitat (Parks Canada)
- 2006 • Workshops for school and general community Beausoleil First Nation
- 2005 • Preparation of web pages for www.pitchersthistle.ca

Other Work

- 2008 • Assisted with project to collect traditional ecological knowledge (TEK) (Sagamok Anishnawbek)
- 1993-2002 • Nature and environment columnist for *The Manitoulin Expositor*
- 1989-2002 • Instructor, Spring Flora 8-week field botany course (Cambrian College)

1988-1994 • Instructor, contract: College Preparation; General Science (Cambrian College)

References and list of publications on request.

program

- inaugurated databases and conducted field work and data input for the

on

- provided personal species lists and status for Muskoka flora and fauna based over ten years of observations

1995-6 Worked on surveys of alvars as part of the North America Alvar Initiative first with Claudia Schafer on vegetation and Amy Chabot on Loggerhead Shrikes.

1985-present Worked as a Private Environmental Consultant throughout Ontario

1975-present Compiled and Published Information on Muskoka and Simcoe Flora and Fauna

1997-2008 Worked with SAAR Environmental as field expert on several contracts within Ontario including Northern, Central, and Southern Ontario, Oak Ridges Moraine, Bruce Peninsula, Parry Sound, Muskoka, Simcoe, and City of Kawartha Lakes

2000-1 monitored and recorded nesting shrikes on Carden Alvar for the Eastern Loggerhead Shrike Recovery Team

2002 – Scientific advisor and consultant for completed wetland evaluation for St. Andrews Wetland for staff of the Severn Sound Environmental for the town of Penetang and MNR documenting species at risk and plant communities

2001-2 conducted a Biological Inventory for the Wye Valley for Wye Marsh Wildlife Centre through Severn Sound Environmental documenting plant communities and species at risk.

2001-2 conducted surveys on wetland Species At Risk for the Canadian Wildlife Service and MNR including king rail, yellow rail, least bittern, black tern

2003 – Scientific advisor and consultant for completion of wetland evaluation for Sucker Creek Wetland for staff of the Severn Sound Environmental for the town of Midland and MNR documenting species at risk and plant communities

2004 – Scientific advisor and consultant for wetland evaluation for Penetang Bay Wetland and Thunder Bay Wetland for staff of the Severn Sound Environmental for town of Midland and Penetang and MNR including documenting plant communities and species at risk

2004 – Biological inventory of The Gables for the City Of Barrie in partnership with the Brereton Field Naturalists who volunteered help for this project.

2005 - Scientific advisor and consultant for wetland evaluation for Midland Swamp for staff of the Severn Sound Environmental for town of Midland and MNR including documenting plant communities and species at risk

2005-6 – Biological inventory of Minesing Wetlands complex on all species of flora and fauna for the Nottawasaga Valley Conservation Authority

2006 – Founded and coordinator for Kids For Turtles Environmental Education who present outreach and educational programs to schools, businesses, and community organizations.

2007 – Carried out a life science inventory in partnership with Jarmo Jalava of Windmill Ranch and the MacDonal Nature Reserve on the Carden Alvar and co-author of the report for Ontario Parks and the Nature Conservancy of Canada.

2009 – Report of profile for Eastern Massasauga Rattlesnake hibernacula and gestation areas with regard to vegetation, ground cover, water levels and hummocks in wetland hibernacula in the Parry Sound area

Correlated the efforts of over 100 volunteers as Regional Coordinator for Muskoka for 5 years (1981-5) during “The Ontario Breeding Bird Atlas” (documents the distribution and abundance of breeding birds in Ontario)

Coordinated field work as Regional Coordinator for Simcoe County for the “Ontario Rare Breeding Bird Program”, 1989-1992 (monitoring breeding sites for rare species of birds in Ontario)

Regional Coordinator for Simcoe County for the second “Ontario Breeding Bird Atlas, 2001-2005” coordinating volunteers in more than 65 squares of 10 square km. each

Organized and compiled data for the Christmas Bird Count and North America Butterfly Count for the Gravenhurst-Bracebridge, Carden Alvar Plains, and Orillia areas

Coordinator for Eastern Canada for the July 1, North America Butterfly Counts organized by North America Butterfly Association in New York

Organized and compiled annual counts on butterflies and dragonflies for several years for Pelee Island, Orillia and Carden Alvar

Carried out detailed surveys, mapping of the alvars on the Carden Plains for the Couchiching Conservancy, and rated the quality of each of the alvar areas.

Conducted Element Occurrences studies for Species at Risk for the Ministry of Natural Resources, Midhurst District Office on birds, plants, dragonflies, reptiles, amphibians, for the last four years.

Acted as an Expert Witness in Ontario Municipal Board hearings (Moon Point & Big Bay Point)

Considered an expert on bird, plant, herp, mammals, mushrooms, butterfly and dragonfly species and the ecosystems that these species inhabit

Environmental Assessments

Assisted in Environmental Assessments for another Consultant Companies for sites in Bruce, Muskoka, and Simcoe County

Carried out environmental assessments for City of Barrie and several townships in the area
Conducted assessments for the Nottawasaga Valley Conservation Authority in Minesing Wetlands

Expert Witness for the Moon Point OMB hearing in 2005 and 2006.

Expert Witness for the Big Bay Point OMB hearing in 2007.

Expert Witness for the Walker Aggregate Duntroon Quarry Hearing 2009 – 2011.

Expert Witness for the MAQ Duntroon Quarry Hearing 2010-2011.

Other Natural History Experience

Lectures and Workshops

1990- paid night course instructor for Georgian College on birding, plants, mushrooms, and astronomy

Facilitated and conducted mushroom ecology tours for woodlot owners for MNR Midhurst District and Dufferin County Conservation Authority

Conducted lectures and work shops for Ministry of Natural Resources, Field Botanists Of Ontario, Federation Of Ontario Naturalists, and several special interest clubs on many nature topics including plants, birds, mushrooms, and insects

Conducted staff training workshops for the Wye Marsh Wildlife Centre interpretive staff on wetland, birds, plants, and insects

Conducted nature programs at YMCA Geneva Park, Orillia for several years for summer clients

Conducted programs for the Wye Marsh Wildlife Centre at Midland, Ontario on mushrooms and birds during the Wye Marsh Wildlife Festival

Conducted training seminars and training courses on Ontario butterflies for Ontario Parks naturalists at the Leslie Frost Outdoor Centre

Led and conducted workshops for Wilderness Canoe Trip leaders, Wye Marsh Wildlife Centre Naturalists, and Bird Atlas Volunteers on plants, reptiles and amphibians, birds, and insects

Organized and conducted Naturalists Workshops on Butterflies and Dragonflies for the Nature Conservancy of Canada and the Federation of Ontario Naturalists.

Organized Stream Stewardship Workshop and Course and took part in presentations of this course facilitated by the Federation Of Anglers and Hunters for local residents of the Orillia area.

Field Tours

1998-2002 Founded and Coordinated Cygnus Nature Trips organized through the Wye Marsh to teach participants about natural aspects of areas in Ontario

2001-present Executive Trip Director for Boots Adventure Tours leading ecotours to Central and South America including the Amazon River and Galapagos Islands

Conducted tours for New York Botanical Society featuring plants and plant communities in Ontario focusing on species at risk and special communities

Conducted several tours for Nature Conservancy of Canada and Federation of Ontario Naturalists to alvar plant and bird communities on the Carden Alvar

Paid leader and interpreter for public canoe trips into various wetlands within the Wye Valley for the Wye Marsh Wildlife Centre.

Conducted many field trips on several nature topics for the Federation Of Ontario Naturalists Trip Programme throughout Ontario from Lake of the Woods south to Pelee Island

Rated as one of the most popular leaders for the F.O.N. Trip Programme in “An Analysis of The Federation of Ontario Naturalists’ Membership Trips Programme” (Kretchman & Eagles, 1990) Department of Recreation and Leisure Studies, University of Waterloo

Leader for 12 years and Camp Director for the last two years for the Federation Of Ontario Naturalists Summer Camp (a weeklong learning experience for adults in Bruce County)

Studied tropical nature in several countries from Canada south through Central America to Ecuador, Peru, and the Galapagos Islands

One of the major trip leaders for several years for Quest Nature Tours to Mexico, Trinidad and Tobago, Cuba, Belize, Guatemala, Costa Rica, Ecuador, Peru, Amazon, Canadian Arctic, and the Galapagos

Founder and Trip Coordinator for the Cygnus Nature Trips designing nature programs to visit interesting locations in Ontario and selecting experienced leaders for these trips

Executive Trip Coordinator for Boots Adventure Tours, Midland Ontario setting up and leading nature trips around the world

Written Publications

2000-present Paid columnist and nature consultant for published Articles on Nature for “The Muskokan” newspaper

2002- Paid columnist and nature writer for a weekly column on Nature and Science for the Orillia Packet and Times newspaper

2002-3 Paid columnist and nature consultant for weekly columns “The Nature Detective” on Nature and the Ecology for the summer months for The Muskokan newspaper.

2006- Present Weekly column in Orillia Packet and Times on Outdoor Page for Kids For Turtles Environmental Education on projects, updates, public awareness and education.

Written reports and provide line drawings for “The Plant Press” and led field trips for the Field Botanists of Ontario throughout Ontario

Written Species Accounts for “The Ontario Herpetofaunal Summary” (documents the distribution, abundance, and ecology of Ontario’s amphibians and reptiles)

Awards

Recipient of the 2009 Wayland Drew Natural Heritage Award presented by the Muskoka Heritage Foundation. This award is presented to a person who demonstrates exceptional dedication to natural heritage and is not presented every year but only when there is a worthy recipient.

Recipient of the Province Of Ontario Outstanding Achievement Award For Voluntarism In Ontario in June, 2006.

Received the Lake Simcoe Region Conservation Authority top award in 2007, the George R. Richardson Conservation Award Of Honour for a life time of environmental work.

Recipient of the A.D. Latornell Conservation Pioneer Award for 2006 to honour individuals who have contributed significantly to the conservation movement in Ontario.

Winner of three Ontario Nature (Federation Of Ontario Naturalists) Conservation Awards, the Saunders Award (1985) and the Federation Of Ontario Naturalists Achievement Award (2004) and the W.W.H. Gunn award (2007).

Recipient of the Order Of Orillia for 2006 and metal presentation made on July 1, 2006.

Recipient of the City Of Orillia Citizen Of The Year Award for 2006 presented annually by the Orillia Packet and Times to the outstanding citizen for that year.

Recognized as an Environmental Giant in an award presented by the Lake Simcoe Regional Conservation Authority on October 12, 2006

Recipient of the Bob Whittam Environmental Award, the top award presented by the Severn Sound Public Advisory Committee in April 2006.

Nominated and recipient of the Lake Simcoe Region Conservation Authority Environmental Education Award for 2006.

Recipient of the Twin Lakes Conservation Club President's Award for 2006 in December.

Winner of the 1993 Gold Award of the Canadian National Magazine Awards for writing an article for "Cottage Life Magazine" on insects on your cottage screen

Nominated as Citizen Of the Year for The City of Orillia Citizen Award in 2004 and 2005.

Recipient of several MNR, Severn Sound Environmental Association, Nottawasaga Valley Conservation Authority and Lake Simcoe Region Conservation Authority Appreciation Awards.

Recipient of the Twin Lakes Conservation Club President's Award for 2005 and again in 2006 in December.

Recipient of Certificates Of Appreciation 2002 to 2006 inclusive from Severn Sound Environmental Association in Recognition of Efforts to Understand and Conserve Wetlands, Wildlife and Habitat.

Recipient of the Media Recognition Award by the Lake Simcoe Region Conservation Authority for 2008.

Education

1961-5 Attended Central Grey High School in Markdale and completed Grade 13

1965-8 Attended Ryerson Polytechnical College and received Engineering Technologist Diploma

1968-72 Complete Ontario Hydro Protection and Control Technologist Training Course

Certification and Training

Ontario Wetland Evaluation System Classification Course in May 1995 for Ontario Wetland Evaluation System, Southern Manual (3rd Edition) and Ontario Wetland Evaluation System, Northern System, Northern Manual (1st Edition).

Attended workshop on sedge identification conducted at Toronto Erindale College

Attended workshop on moss identification at the University of Western Ontario

Ministry Of Natural Resource Species At Risk Sensitivity Training Course in 2006.

Other Work Experience

1968-2000 Protection and Control Technologist, Ontario Hydro where supervision of major work projects were part of the work duties.

2000-2006 Completed several courses on Species At Risk, Stream Restoration, ELC and other courses offered by MNR and Conservation Authorities.

Computer Proficiency

Developed data base files to record birds, plants, butterflies, mammals, reptiles, mushrooms and dragonflies

Working knowledge of many software programs including dbase IV, Lotus 123, Symphony, QuatraPro, Access, AutoCad, Word Perfect, and MS Word

Designed home page and e-mail newsletters. Currently the web master for three nature related web sites

Publications

see attached listing

Community Involvement

Scout and Cub leader for a number of years.

Chair of City Of Orillia Trails For Life Committee currently on his third term on that committee

City Of Orillia Environmental Advisory Committee currently serving his third term.

One of 10 members appointed by City Of Orillia on the Public Liaison Committee for the MURF

Member of the City Of Orillia ad-hoc Anti Littering Committee

Member of the Scout Valley sub-committee for the City Of Orillia

Volunteer For Soldiers Memorial Hospital in Orillia

Member Of The Ontario Provincial Police, Orillia Detachment Community Volunteers

Founder and member of Friends of Scout Valley

Organized and acted as mentor for the Kids For Turtles group to raise public awareness for turtles

Memberships and Interests

Ganaraska Hiking Trail Director and Representative on the Hike Ontario Board of Directors
City of Orillia Trails for Life Committee and Representative on the Board of the Huronia
Trails and Greenways Executive
City of Orillia Environmental Advisory Committee member for City Council
Club Director of the Twin Lakes Conservation Club of Orillia
Past President and member of the Gravenhurst Curling Club
Past President of the Gravenhurst Lions Club
Past Master of the Gravenhurst Masonic Lodge
Past First Principal of the Orillia Royal Arch Masons
Past President of the Orillia Shrine Club
Beaver and scout leader in Orillia for Scouts Canada
Interests include: nature photography, curling, cross-country skiing, birding, and learning
Spanish
Volunteer of Ontario Provincial Police Community Team and Soldiers Memorial Hospital

References

Available upon request

Publications

Bowles, R.L. August 1983. Checklist of the Amphibians and Reptiles of the District of Muskoka, Muskoka Field Naturalists, and Huntsville Nature Club Newsletters

Bowles, R.L. 1983. Checklist of Birds of the District of Muskoka, published by author

Bowles, R.L. August 1983. Checklist of Conspicuous Fungi of the District of Muskoka, published for North America Mycology Foray at Dorset but additions added to date

Bowles, R.L. Sept. 1985. Checklist of the Mammals of the District of Muskoka, Muskoka Field Naturalists, and Huntsville Nature Club Newsletters

Bowles, R.L. 1986. Mushrooms of Awenda Provincial Park, Simcoe County, unpublished and ongoing

Bowles, R.L. 1986. Checklist of Conspicuous Fungi of the County of Simcoe, unpublished and ongoing

Bowles, R.L. 1988. Checklist of the Butterflies of the District of Muskoka, Muskoka Field Naturalists

Bowles, R.L. 1988. Checklist of the Dragonflies & Damselflies of the District of Muskoka, Muskoka Heritage Areas Program and ongoing by author

Bowles, R.L. 1988. Checklist of the Dragonflies & Damselflies of Simcoe County, unpublished and ongoing

- Bowles, R.L. 1989. Checklist of the Moths of the District of Muskoka, unpublished and ongoing
- Bowles, R.L. 1990. Checklist of the Butterflies of Simcoe County, unpublished and ongoing
- Bowles, R.L. 1990. Checklist of the Moths of Simcoe County, Orillia Naturalists Club
- Bowles, R.L. 1991. Flora of the Carden Plains Alvar, Carden township, ongoing by author
- Bowles, R.L. 1992. Checklist of the Plants of Minesing Swamp, F.O.N. Trips Programme
- Bowles, R.L. 1993 revision. Checklist of Birds of the District of Muskoka, Muskoka Field Naturalists
- Bowles, R.L. 1993. Vascular Plants of the Wye Valley, Wye Marsh Wildlife Centre
- Holt, M., R.L. Bowles 1993. Uhthoff Trail Life Science Study, Orillia Naturalists Club
- Reid, R., Bowles, R.L., Bergsma, B., Pollard, A., et al, 1991. Muskoka Heritage Areas Program Results of the 1991 Field Program, District Municipality of Muskoka, Bracebridge, Ontario
- Reid, R., Bowles, R.L., Sutherland, D.A., Sober, L., et al, 1990. Muskoka Heritage Areas Program Results of the 1990 Field Program, District Municipality of Muskoka, Bracebridge, Ontario
- Bowles, R.L., Bergsma, B.M., Reid, R. 1995. Species List, Technical Appendix of Natural Heritage Evaluation of Muskoka, District Municipality of Muskoka, Bracebridge, Ontario
- Bowles, R. L. 2002. Species at Risk in Simcoe County, completed for the Canadian Wildlife Service
- Bowles, R. L. 2002. The Occurrences of the Least Bittern in Simcoe County Wetland, completed for the Canadian Wildlife Service
- Bowles, R. L. 2002. A Biological Inventory and Evaluation Report of the Wye Valley completed for the Severn Sound Environmental Association.
- Bowles, R. L. 2002. A Biological Inventory and Evaluation of the Wye Valley Appendices and Species Lists, completed for the Severn Sound Environmental Association.
- Bowles, R. L. 2004. A Biological Inventory of the Gables and Comments on Usage complete for the City Of Barrie in partnership with the Brereton Field Naturalists' Club of Barrie.
- Bowles, R. L., J. Laverty, & D. Featherstone 2006. A Biological Inventory and Evaluation of the Minesing Wetlands and Turtle Inventory, completed for the Nottawasaga Valley Conservation Authority.
- Jalava, J., Bowles R. L. 2007. Life Science Inventory of the Windmill Ranch and MacDonald Nature Reserve, Carden Alvar, completed for Ontario Parks and the Nature Cons