

# ENVIRONMENTAL IMPACT STUDY

## VAUGHAN FIRE STATION 7-12 CITY OF VAUGHAN

*prepared for:*



*prepared by:*



APRIL 2022

LGL FILE TA9196



# ENVIRONMENTAL IMPACT STUDY

## VAUGHAN FIRE STATION 7-12 CITY OF VAUGHAN

*prepared by:*



---

**NANCY FALKENBERG, M.SC.**  
Botanist/Terrestrial Ecologist

*prepared by:*



---

**DAVID SMITH, DIPLOMA**  
Fish and Wildlife Technician

*prepared by:*



---

**JUSTIN BRODEUR, B.SC., I.S.A.**  
Certified Arborist

*prepared by:*



---

**ANDREW MELLICK, B.SC (GEOG.),  
GIS(PG)**  
GIS Analyst

*reviewed by:*



---

**GRANT KAUFFMAN, M.E.S.**  
Vice President, Ontario Region

**APRIL 2022**  
**LGL Project # TA9196**

## TABLE OF CONTENTS

<b>1.0</b>	<b>INTRODUCTION.....</b>	<b>1</b>
<b>2.0</b>	<b>EXISTING REGULATORY POLICIES .....</b>	<b>3</b>
2.1	Species at Risk Act.....	3
2.2	Migratory Birds Convention Act .....	3
2.3	Endangered Species Act .....	3
2.4	Ontario Regulation 166/06: Toronto and Region Conservation Authority: Development, Interference with Wetlands and Alterations to Shorelines and Watercourses .....	4
2.5	Provincial Policy Statement .....	4
2.6	York Region Official Plan .....	5
2.7	City of Vaughan Official Plan .....	8
2.8	Vaughan OPA 600 and Block 32 West Vellore Woods Community Plan.....	11
<b>3.0</b>	<b>EXISTING CONDITIONS.....</b>	<b>12</b>
3.1	Physiography and Geology.....	12
3.2	Fish and Fish Habitat.....	12
3.3	Vegetation and Vegetation Communities.....	12
3.3.1	Vegetation Communities .....	12
3.3.2	Flora .....	13
3.3.3	Species at Risk.....	13
3.4	Wildlife and Wildlife Habitat .....	15
3.4.1	Survey Results .....	16
3.4.2	Species at Risk.....	16
3.4.3	Significant Wildlife Habitat, Ecoregion 6E.....	17
<b>4.0</b>	<b>DESIGNATED NATURAL AREAS .....</b>	<b>19</b>
4.1	Provincially Significant Wetlands (PSWs).....	19
4.2	Areas of Natural and Scientific Interest (ANSIs) .....	19
4.3	Environmentally Significant Areas (ESAs) .....	19
4.4	Ontario Regulation 166/06: Toronto and Region Conservation Authority: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses.....	19
<b>5.0</b>	<b>PROPOSED DEVELOPMENT .....</b>	<b>20</b>
<b>6.0</b>	<b>IMPACT ASSESSMENT AND MITIGATION.....</b>	<b>22</b>
6.1	Potential Impacts to Soils .....	22
6.2	Fish and Fish Habitat.....	22
6.3	Vegetation and Vegetation Communities.....	22
6.3.1	Woodlot Impacts and Mitigation .....	22
6.4	Wildlife and Wildlife Habitat .....	24
6.4.1	Potential Impacts to Migratory Birds .....	25
6.4.2	Displacement of Rare, Threatened or Endangered Wildlife or Significant Wildlife Habitat.....	25
6.4.3	Potential Impacts to Significant Wildlife Habitat.....	25

6.5	Designated Natural Areas.....	25
<b>7.0</b>	<b>MITIGATION MEASURES.....</b>	<b>26</b>
7.1	Fish and Fish Habitat .....	26
7.2	Vegetation and Vegetation Communities .....	26
7.2.1	Forest Edge Management .....	26
7.3	Wildlife and Wildlife Habitat.....	29
<b>8.0</b>	<b>CONCLUSION .....</b>	<b>30</b>
<b>9.0</b>	<b>REFERENCES.....</b>	<b>31</b>

## LIST OF FIGURES

Figure 1.	Key Plan.....	2
Figure 2.	York Region Official Plan Map 1 – Urban Structure .....	6
Figure 3.	York Region Official Plan – Map 2 – Regional Greenlands System .....	7
Figure 4.	Vaughan Official Plan Schedule 1 – Urban Structure.....	9
Figure 5.	Vaughan Official Plan Schedule 2 - Natural Heritage Network (VOP).....	10
Figure 6.	Natural Heritage .....	14
Figure 7.	Proposed Design.....	21

## LIST OF TABLES

Table 1.	Summary of Ecological Land Classification Vegetation Communities.....	15
Table 2.	Recommended Plant Species for Edge Management/Compensation.....	27

## APPENDICES

Appendix A.	Natural Features Staking
Appendix B.	Vascular Plant List
Appendix C.	Species Rank Definitions and Acronyms
Appendix D.	Significant Wildlife Habitat Assessment



## 1.0 INTRODUCTION

LGL Limited was retained by the City of Vaughan to complete an Environmental Impact Study (EIS) for the proposed Fire Station 7-12 located at 9541 Weston Road in the City of Vaughan, Ontario. The property is located adjacent to the Vellore Tract Woodlot, a Core Feature (significant woodland) identified in Schedule 2 – Natural Heritage Network to Vaughan's Official Plan.

The Vellore Tract Woodlot, located adjacent to the property, triggers the requirement to prepare an EIS in accordance with Section 2.1 of the Provincial Policy Statement (MMAH 2020) and Policy 3.9.2 of the Vaughan Official Plan (Vaughan 2010). The scoped EIS will meet the requirements of the Environmental Management Guideline (Vaughan 2013) with modifications to address a reduced scope of investigation. A key plan showing the location of the property is presented in **Figure 1**.

The City of Vaughan proposes to develop a fire station on the property. The fire station will include a central building, parking lot and walkways. The Vellore Tract Woodlot is located on adjacent lands south and east of the property; however, the tree canopy extends onto the property along the south and east property lines. The dripline of the Woodlot was staked on December 15, 2021 with City of Vaughan environmental and forestry staff in attendance (see **Appendix A**). The dripline extends onto the property and the proposed fire station and parking lot encroaches into the 10 m vegetation protection zone typically maintained from the dripline in accordance with City of Vaughan policies.

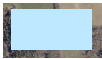




## LEGEND



Subject Property



Waterbody

Data Source: Contains public sector information made available under The Regional Municipality of York Open Data Licence. Contains information licensed under the Open Government Licence - Ontario. Produced by LGL Limited under License with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2022.

0 100 200 300 400 M



## 9541 Weston Road KEY MAP



Project: TA9196	Figure: 1
Date: February 22, 2022	Prepared By: AM
Scale: 1:10,000	Verified By: JB



## 2.0 EXISTING REGULATORY POLICIES

This section outlines the various policies, plans, and legislation related to natural heritage and land use applicable to the properties.

### 2.1 Species at Risk Act

The federal *Species at Risk Act* (SARA) outlines the responsibilities of agencies in the listing of species at risk, the preparation of recovery strategies and action plans for endangered, threatened and extirpated species, the preparation of management plans for special concern species, and the protection of critical habitat. The Act prohibits:

- kill, harm, harass, capture or take of an individual of a species listed under Schedule 1 of SARA as endangered, threatened or extirpated;
- possess, collect, buy, sell or trade an individual of a species listed under Schedule 1 of SARA as endangered, threatened or extirpated; or,
- damage or destroy the residence of one or more individuals of a species listed under Schedule 1 of SARA as endangered, threatened or extirpated, if a recovery strategy has recommended the reintroduction of that extirpated species.

These prohibitions apply to all federal lands (where present). On private land, these prohibitions apply to all aquatic species listed in Schedule 1 as endangered, threatened or extirpated, as well as migratory birds protected under the *Migratory Birds Convention Act*.

### 2.2 Migratory Birds Convention Act

The *Migratory Birds Convention Act* is administered by the Canadian Wildlife Service of Environment Canada. The *Migratory Birds Convention Act* enables regulations that require authorization for designs which cause permanent destruction/disturbance of migratory bird habitat and authorization for killing/removing migratory bird fledglings, eggs, nests, or for other harmful activity to migratory birds to enable bridge construction/demolition, construction access and construction work areas. The property falls within Environment Canada's Nesting Zone C2 (Nesting Period: end of March – end of August).

### 2.3 Endangered Species Act

The Ontario *Endangered Species Act* (ESA 2007) outlines the conservation, protection, restoration, and propagation of species of fauna and flora of the Province of Ontario that are threatened with extinction. The ESA (2007) outlines the responsibilities of the Committee on the Status of Species at Risk in Ontario (COSSARO) in the listing of species at risk, the preparation of recovery strategies for endangered or threatened species, and the preparation of management plans for special concern species. The

Species at Risk in Ontario List (O. Reg. 230/08) under the ESA lists the species and their status.

Section 9 of the ESA prohibits similar activities as the *Species at Risk Act* (SARA), such as prohibitions on the kill, harm, harass, capture or take of a living species at risk, or to possess, transport, collect, buy, sell, lease, trade a species at risk (living or dead). Section 10 of the ESA prohibits the damage or destruction of habitat of endangered, threatened, or extirpated species. Permits may be issued under Section 17 (2) of the ESA should a project result in a contravention of Section 9 and/or 10 of the ESA. As part of the permit process, an “overall benefit” to the impacted species must be included in the compensation package. It should be noted that the ESA was previously administered by the MNRF but is now under the jurisdiction of the Ministry of Environment, Conservation and Parks (MECP).

#### **2.4 Ontario Regulation 166/06: Toronto and Region Conservation Authority: Development, Interference with Wetlands and Alterations to Shorelines and Watercourses**

*Ontario Regulation 166/06* regulates work taking place within valley and stream corridors, wetlands and associated areas of interference. Consequently, any works undertaken within the regulation limit will require a permit from the Toronto and Region Conservation Authority. The property does not fall within a regulated area; therefore, *Ontario Regulation 166/06* does not apply.

#### **2.5 Provincial Policy Statement**

The Provincial Policy Statement (PPS) (Ministry of Municipal Affairs and Housing, 2020) is issued under Section 3 of the *Planning Act*. The PPS provides for development that protects resources of provincial interest, public health and safety, and the quality of the natural and built environment. All planning decisions under the York Region Official Plan and City of Vaughan Official Plan shall conform to provincial plans and be consistent with the PPS. Section 2.1 contains policies on protecting natural heritage features. The PPS states that the diversity and connectivity of natural features in an area, and the long-term ecological function and biodiversity of a natural heritage system should be maintained, restored or, where possible, improved, which includes improving connectivity of natural features in an area, recognizing linkages between and among natural heritage features, surface water features and ground water features (subsection 2.1.2).

There are two categories of natural heritage features and areas specified in the PPS for protection. Areas where no development or site alternation is permitted, including:

- provincially significant wetlands (PSW) (in Ecoregions 5E, 6E and 7E); and,

- provincially significant coastal wetlands (subsection 2.1.4).

The second category of natural heritage areas specified in the PPS are areas where development and site alteration may be permitted if it can be demonstrated that no negative impacts will occur on the natural features or their ecological functions. These areas include:

- significant woodlands;
- significant valleylands;
- significant wildlife habitat;
- significant Areas of Natural and Scientific Interest (ANSIs); and,
- coastal wetlands (subsection 2.15).

Subsections 2.1.6 and 2.1.7 indicate that fish habitat and habitat of endangered and threatened species shall not be permitted except in accordance with provincial and federal requirements.

Development and site alteration on adjacent lands to natural heritage features noted above (subsections 2.1.4, 2.1.5 and 2.1.6) shall not be permitted unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions (subsection 2.1.8). Given that the Vellore Tract Woodlot is identified as a “significant woodland” by the City of Vaughan, the Natural Heritage policies contained in the PPS apply.

## **2.6 York Region Official Plan**

York Region Council adopted the current York Region Official Plan 2010 in 2009 (YROP). The York Region Official Plan Office Consolidation 2019 includes decisions and amendments made up to April 2019. The purpose of the YROP is to guide economic, environmental, and community building decisions to manage growth. Chapter 2.0 Sustainable Natural Environment contains policies that are intended to protect key natural heritage features and key hydrological features, and the adjacent lands necessary to maintain these features in a linked system. Map 1 – Urban Structure (**Figure 2**) and Map 2- Regional Greenlands System (**Figure 3**) identify the property and adjacent lands as ‘Urban Area.’

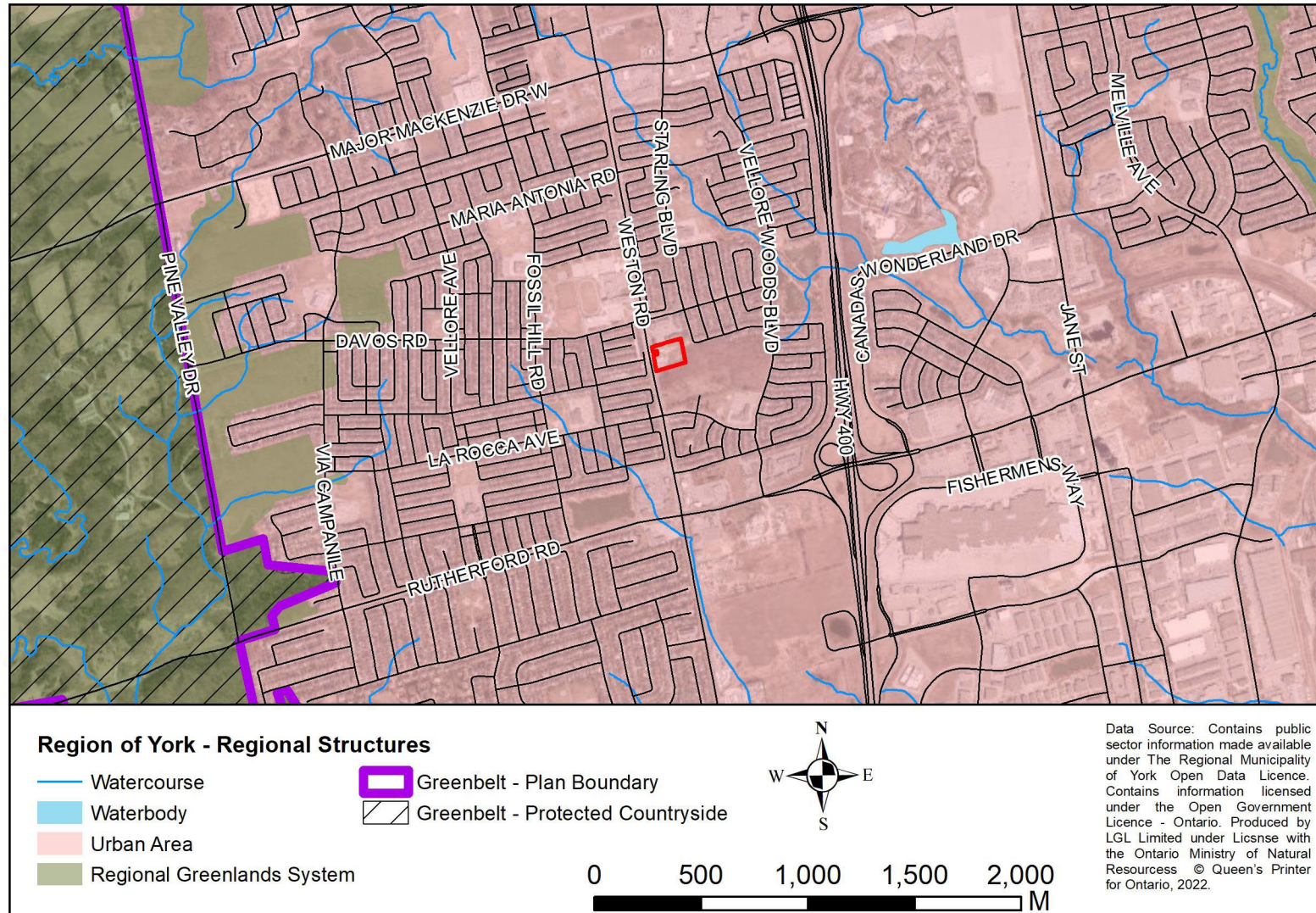


FIGURE 2. YORK REGION OFFICIAL PLAN MAP 1 – URBAN STRUCTURE



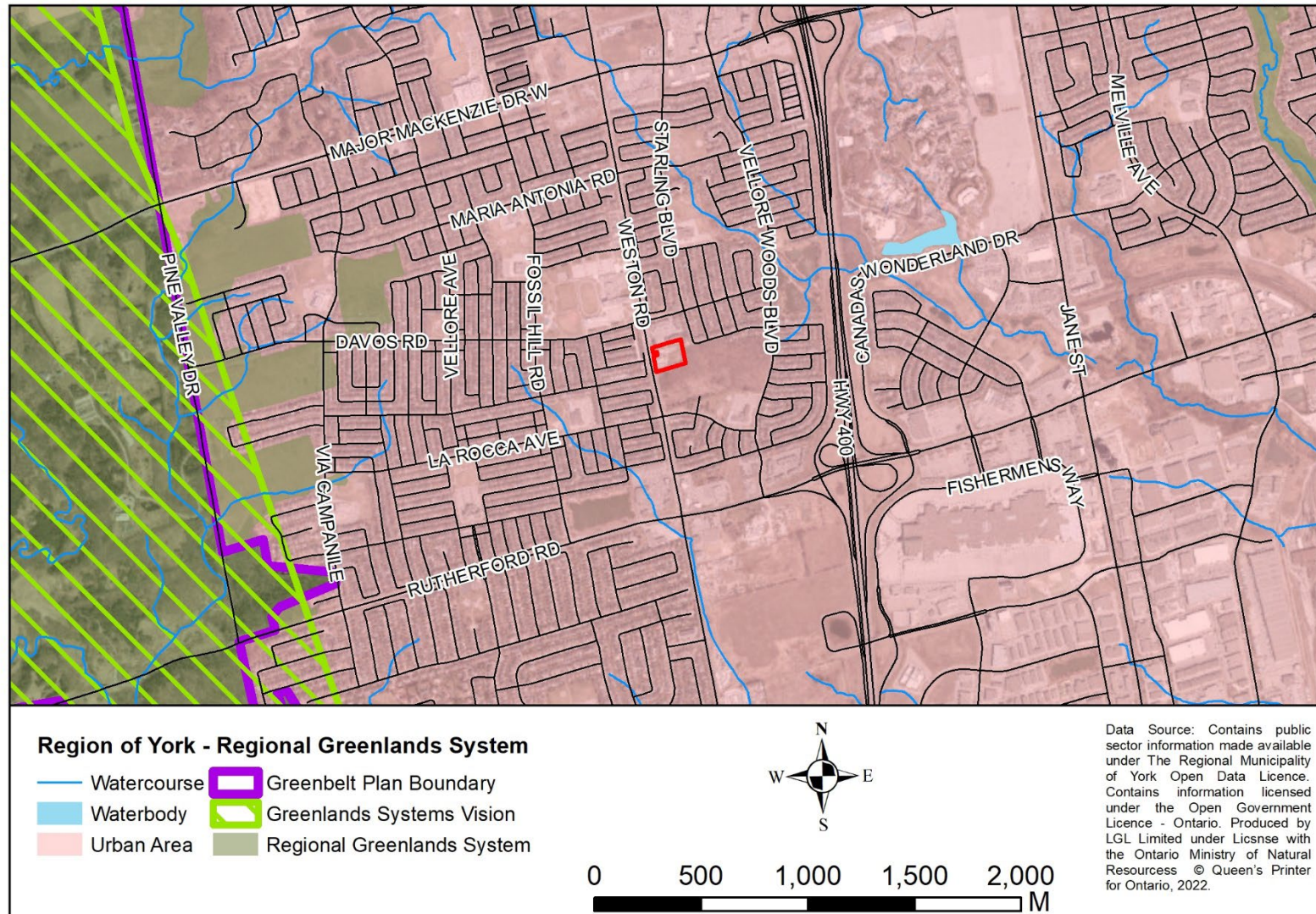


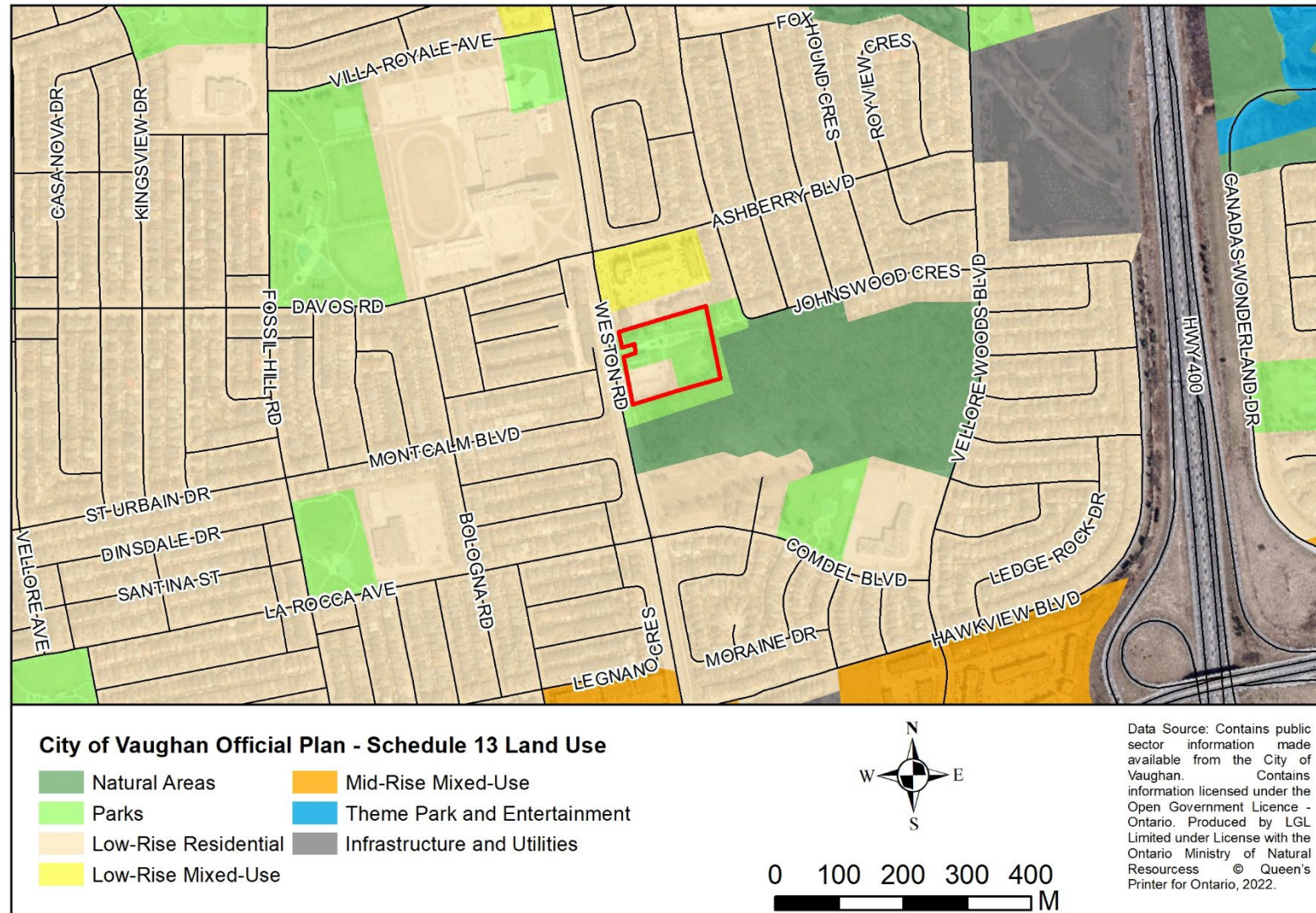
FIGURE 3. YORK REGION OFFICIAL PLAN – MAP 2 – REGIONAL GREENLANDS SYSTEM

## 2.7 City of Vaughan Official Plan

The City of Vaughan Council adopted the City of Vaughan: Official Plan 2010 (VOP), Volume 1 on September 7, 2010. The purpose of the VOP is to manage and direct changes on the spatial, economic and natural environment within the municipality. The subject property is designated as 'Community Areas' in Schedule 1 – Urban Structure to the VOP (**Figure 4**), while the Vellore Track Woodlot is designated as 'Natural Areas and Countryside.' Schedule 2 - Natural Heritage Network of the VOP identifies Vellore Track Woodlot as a 'Core Features' designation (**Figure 5**). The Natural Heritage Network represents an interconnected system of natural features and the functions they perform. Natural features such as wetlands, woodlands and the extensive valley and stream corridors are identified as 'Core Features' that provide critical ecosystem functions and are to be protected and enhanced. Policy 3.2.3.4 requires a minimum 10 m vegetation protection zone to be applied to 'Core Features.' Within the VOP, Policy 3.2.3.7 states that new development and/or site alteration within 'Core Features' designations will be prohibited except for the following circumstances:

- natural area management for the purposes of maintaining and enhancing the functions associated with Core Features;
- flood or erosion control projects, where such projects are necessary and deemed in the public interest after all alternatives have been considered, and where such projects will not result in a negative impact on the Core Features and will not have a negative impact on the ecosystem function;
- transportation, infrastructure and utilities, where such projects are necessary and deemed in the public interest after all alternatives have been considered, and where such projects will minimize negative impacts on the Core Features and measures shall be identified to maintain habitat area and enhance overall ecosystem function; and, Chapter 3 Environment 55; and,
- low-intensity and passive recreational activities where such activities will not result in a negative impact on the Core Features and will not have a negative impact on the ecosystem function.





**FIGURE 4. VAUGHAN OFFICIAL PLAN SCHEDULE 1 – URBAN STRUCTURE**



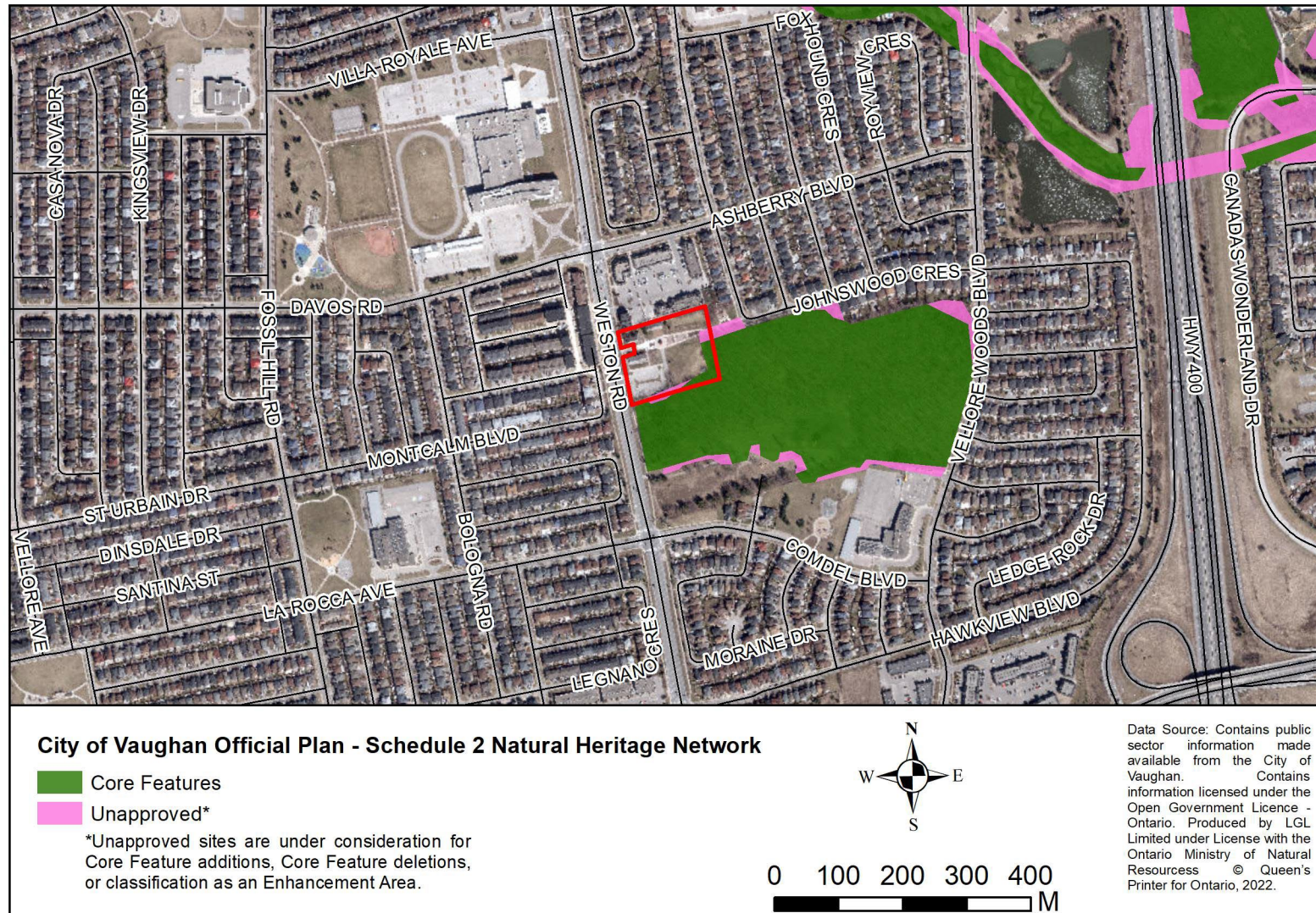


FIGURE 5. VAUGHAN OFFICIAL PLAN SCHEDULE 2 - NATURAL HERITAGE NETWORK (VOP)

## **2.8 Vaughan OPA 600 and Block 32 West Vellore Woods Community Plan**

The property is zoned 'Commercial' (C3) in Vaughan OPA 600 (Consolidated January 2003). The Vellore Tract Woodlot is zoned 'Open Space' (OS2) and 'Agricultural' (A) in OPA 600. The Block 32 West Vellore Woods Community Plan (City of Vaughan 1997) identifies the property as 'Neighbourhood Park' (NP) and the Vellore Tract Woodlot as 'Tableland Woodlot'. The Vellore Woods Community Plan describes the Vellore Tract Woodlot as follows:

"An approximate 15 ha woodlot identified by the Ministry of Natural Resources as an Area of Natural and Scientific Interest (ANSI) known as the Vellore Tract that contains a mixture of climax upland and lowland forest areas containing two regionally rare plant species. Up until 1993 this woodlot had been used for the past 30 to 40 years as a research/ education facility by the University of Toronto and was managed by the Ministry of Natural Resources. The woodlot contains mature sugar maples and beech trees over 20 metres in height and between 70 to 90 years of age. The MESP notes that these trees are in excellent condition and have been well managed. Two Regionally rare plant species are present in the woodlot. This woodlot was identified in OPA 400 as a "Tableland Woodlot" to be protected and retained."

The Vellore Tract Woodlot is not identified as an ANSI in Schedule 3 of the Vaughan Official Plan (Vaughan 2010).

### **3.0 EXISTING CONDITIONS**

Existing conditions on and adjacent to the property were identified through review of background information and a site visit conducted on February 15, 2022.

#### **3.1 Physiography and Geology**

The study area is located within the bevelled till plain of the Peel Plain physiographic region. The Peel Plain is characterized by level to gently rolling topography, with a consistent, gradual slope toward Lake Ontario. The underlying bedrock of the Peel Plain is Ordovician in age, comprising grey and black shale with some interbedded limestone of the Georgian Bay Formation. Surficial geology comprises glaciolacustrine deposits of young tills, including clayey silt till and sandy silt till. The property is flat.

#### **3.2 Fish and Fish Habitat**

No fish or fish habitat is located on or within 120 m adjacent to the property.

#### **3.3 Vegetation and Vegetation Communities**

The geographical extent, composition, structure and function of vegetation communities were identified through air photo interpretation and a field investigation. Air photos were interpreted to determine the limits and characteristics of vegetation communities within the property and adjacent woodlot followed up with a field investigation conducted on February 15, 2022. The investigation was carried out to ground truth the limit of the edge of the adjacent woodlot, and to conduct botanical surveys, to the extent possible.

##### **3.3.1 Vegetation Communities**

The vegetation communities were classified according to the Ecological Land Classification for Southern Ontario: First Approximation and Its Application (ELC, Lee et al., 1998). A plant list and a description of the general structure of vegetation communities were obtained during field investigations. Plant species status was reviewed for Ontario (Oldham 2009), for York Region (Varga *et al.* 2000), and the Toronto and Region Conservation Authority or TRCA (2020). Vascular plant nomenclature follows Newmaster et al. (1998) with a few exceptions that have been updated to Newmaster et al. (2005).

Manicured (M) areas dominate the property. Manicured is not identified by the ELC. This area includes mown lawns and planted trees. These trees included silver and sugar maples (*Acer saccharinum* and *A. saccharum* ssp. *saccharum*), honey locust (*Gleditsia triacanthos*), Kentucky coffee-tree (*Gymnocladus dioica*) and European beech (*Fagus sylvatica*). Ground flora could not be identified as the area was snow covered. Given the extent of planted trees and manicured lawn this area is considered to be of low quality.

One ELC community type, a Dry-Fresh Sugar Maple Deciduous Forest (FOD5) was identified on adjacent lands. This community was reviewed along its northwest corner in detail up to approximately 6 m from the property edge. A pedestrian survey approximately 40 m to 50 m beyond this edge was also conducted. Species included sugar maple, basswood (*Tilia americana*), black walnut (*Juglans nigra*), American beech (*Fagus grandifolia*) and swamp white oak (*Quercus bicolor*). Given the time of year of the survey, the ground was covered with snow and only a few species were observed within the ground flora including Canada goldenrod (*Solidago canadensis*), smooth brome (*Bromus inermis*), and garlic mustard (*Alliaria petiolata*).

Further to the east the vegetation community changes with a higher presence of silver maple and American beech, and there appears to be intermittent low points or slough-like depressions where water likely collects for prolonged periods in the spring, which would attribute to the increased presence of mesic species. This habitat transition was observed approximately 80 m to 100 m east of the western forest edge.

Overall, the naturalized forested area supports a higher proportion of native plant species and is of moderate to high quality. The western limit of the deciduous forest and manicured areas are delineated in **Figure 6** and further described in **Table 1**.

### 3.3.2 Flora

QPlant identification was limited because the survey was undertaken in the winter with snow covered conditions. A total of 39 plant species were recorded within the property and the adjacent forest community, with two plants only identified to genus. Of the remaining 37 species identified, 21 (57%) species are native to Ontario and 16 (43%) plant species are considered introduced and non-native to Ontario. A complete species list is presented in **Appendix B**. Definitions of the acronyms and species ranks used in **Appendix B** are described in **Appendix C**.

### 3.3.3 Species at Risk



Two plant species that are regulated under the ESA (2007) or the Canada Species at Risk Act (SARA) were encountered during LGL's botanical investigation, including Kentucky coffee-tree (regulated as 'Threatened' under the Ontario ESA and Canada SARA) and butternut (*Juglans cinerea*) (regulated as 'Endangered' by both the Ontario ESA and Canada SARA).

A review of the MNRF Natural Heritage Information Centre (2020) indicates an elemental occurrence of black ash (*Fraxinus nigra*) (listed as 'Threatened' under SARA) within a 1 km square occupied by the property. This species at risk was not identified within the immediate adjacent forested area that was surveyed.

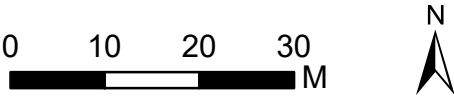




LEGEND

-  Subject Property
-  Vegetation Community Boundary
- FOD5** Dry-Fresh Sugar Maple Deciduous Forest Ecosite
- H** Hedgerow
- M** Manicured

Data Source: LGL Limited Field Survey, contains public sector information made available under The Regional Municipality of York Open Data Licence. Contains information licensed under the Open Government Licence - Ontario. Produced by LGL Limited under License with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2022.



9541 Weston Road  
EXISTING  
CONDITIONS



Project: TA9196	Figure: 6
Date: April 6, 2022	Prepared By: AM
Scale: 1:800	Verified By: NF



**TABLE 1. SUMMARY OF ECOLOGICAL LAND CLASSIFICATION VEGETATION COMMUNITIES**

ELC Code	Vegetation Type	Species Association	Comments
<b>Natural/Semi-Natural</b>			
FOD	Deciduous Forest		
FOD5	Dry-Fresh Sugar Maple Deciduous Forest	<p><b>Canopy:</b> includes sugar maple (<i>Acer saccharum</i> ssp. <i>saccharum</i>), basswood (<i>Tilia americana</i>), black walnut (<i>Juglans nigra</i>), and ironwood (<i>Ostrya virginiana</i>).</p> <p><b>Understorey:</b> includes sugar maple, tartarian honeysuckle (<i>Lonicera tatarica</i>), common buckthorn (<i>Rhamnus cathartica</i>) and ash (<i>Fraxinus</i> sp.).</p> <p><b>Ground Cover:</b> includes Canada goldenrod (<i>Solidago canadensis</i>) and garlic mustard (<i>Alliaria petiolata</i>).</p>	<ul style="list-style-type: none"> <li>• Tree cover &gt; 60 % (FO).</li> <li>• Deciduous trees &gt; 75 % of canopy cover (D).</li> <li>• Sugar maple with associates (5).</li> </ul>
<b>Other*</b>			
Manicured (M)	Manicured	<p>Areas where large expanses of grass/shrubs/ trees are maintained and/or planted.</p> <p><b>Planted trees/shrubs:</b> sugar maple, silver maple (<i>Acer saccharinum</i>), basswood, small leaf linden (<i>Tilia cordata</i>), white spruce (<i>Picea glauca</i>), Kentucky coffee-tree (<i>Gymnocladus dioica</i>), honey locust (<i>Gleditsia triacanthos</i>), Norway maple (<i>Acer platanoides</i>) and maiden-hair tree (<i>Ginkgo biloba</i>).</p>	

\* Not identified by ELC.

## Regionally Rare Plant Species

Four regionally rare plant species were documented during field investigations. White spruce (*Picea glauca*) and butternut are both TRCA species of concern ranked as L3 (TRCA, 2020). Within York Region black walnut (*Juglans nigra*) and Virginia stickweed (*Hackelia virginiana*) are identified as rare (Varga *et al.* 2000). A description of provincial species ranks is provided in **Appendix C**.

## 3.4 Wildlife and Wildlife Habitat

Field investigations were conducted with the purpose of documenting wildlife and wildlife habitat and to characterize the nature, extent, and significance of wildlife usage within the study area. Field investigations were conducted on February 15, 2022

Secondary source data from the MNR (NHIC/LIO), Toronto and Region Conservation Authority and Regional Municipality of York – open data, was reviewed to screen for wildlife, wildlife habitat and records of species at risk found within the study area.

### 3.4.1 Survey Results

Wildlife habitat within the study area was composed of a highly disturbed setting, limited mainly to an urbanized environment with manicured grass and scattered ornamental trees. The manicured grass community found within the study area was found to contain scattered trees and is expected to provide limited function as habitat for anthropogenic-tolerant wildlife species. No aquatic habitat types were identified within the lands examined. Based on the habitat types present, species which occupy woodland edges and anthropogenic communities are expected to be occupy the property. Adjacent to the study area (east and south), a deciduous forest community was present. Unevaluated wetlands were identified within the central portion of this forest community, according to the Ministry of Natural Resources and Forestry (LIO) layers.

Given a general lack of natural heritage features and the highly disturbed nature of the lands examined, specialized wildlife habitats were not identified within the study area. A screening of potential Significant Wildlife Habitat is discussed in **Section 3.4.3**.

### 3.4.2 Species at Risk

Endangered and threatened species are identified by the MNRF using procedures established by the Committee on the Status of Species at Risk in Ontario (COSSARO). Species designated as 'Endangered' or 'Threatened' and their habitats are protected under the *Endangered Species Act*, 2007. In order to address the most current species at risk (SAR) requirements, LGL completed a SAR habitat screening, whereby available data for the area was screened for SAR occurrences.

The MNRF 'Make a Map' (MNRF 2022) online utility has identified a single species at risk as previously recorded within the vicinity of the study area. In addition, based on a review of available habitats identified during LGL's field surveys (conducted February 2022) four species at risk bats, Little Brown Myotis (*Myotis lucifugus*), Northern Myotis (*Myotis septentrionalis*), Eastern Small-Footed Bat (*Myotis leibii*), and Tri-coloured Bat (*Perimyotis subflavus*) have the potential to be present within the vicinity of the study area.

Each of the five species identified above, their respective legal status, biological requirements, habitat suitability of the study area, survey requirement and likelihood of presence within the study area are discussed below.

#### **Midland Painted Turtle**

As noted above, MNRF 'Make a Map' (MNRF 2022) online utility has a record of Midland Painted Turtle (*Chrysemys picta marginata*) near the study area. Midland Painted Turtle is listed as Special Concern (Schedule 1) under the federal Species at



Risk Act (SARA); however, this species has no status under the Ontario ESA. Midland Painted Turtle are typically described as residents of aquatic habitats, such as ponds, marshes, lakes and slow-moving creeks. The species is often observed basking on logs, rocks and other features. Field investigations conducted by LGL (February 2022) noted that no habitats which would be considered suitable to support this species was identified within the study area. Additionally, the fragmented nature of the study area, because of extensive anthropogenic development/roads, also limit the suitability of the habitats found within the study area. No targeted survey or permitting requirement is anticipated to address potential impacts to this species.

## Bats

There are currently four bat species regulated as 'Endangered' under the Ontario ESA, including: eastern small-footed myotis (*Myotis leibii*); little brown myotis (*Myotis lucifugus*); northern myotis (*Myotis septentrionalis*); and, tri-colored bat (*Perimyotis subflavus*). The ESA affords protection for both individuals of these species (subsection 9(1)) and their habitat (subsection 10(1)). Given that species-specific habitat regulations have not yet been developed for SAR bats, habitat is protected according to the general definition provided in the ESA. Specifically, according to section 2(1), the Act protects "an area, on which the species depends, directly or indirectly, to carry on its life processes, including processes such as reproduction, rearing, hibernation, migration or feeding." A general description of the habitat requirements of each of the four bat species is provided below.

Little brown myotis and northern myotis will use cavities in the trees or exfoliating bark, while tri-coloured bat roosts in clumps of leaves in the foliage. Little brown myotis will frequently use buildings and the other three endangered bat species will use buildings, but far less frequently. Eastern small-footed myotis is a saxicolous (rock-loving) species and will frequently roost in rock piles, talus, or cracks and crevices in rock outcrops. Woodland communities found adjacent to the property may support habitat which is suitable to support bat species; however, no habitat which could support these species was identified on the property.

### 3.4.3 Significant Wildlife Habitat, Ecoregion 6E

Significant Wildlife Habitat (SWH) has been identified as a natural heritage area for the purposes of Section 2.1 of the PPS. The PPS 2020 defines wildlife habitat as: "*Areas where plants, animals, and other organisms live, and find adequate amounts of food, water, shelter, and space needed to sustain their populations. Specific wildlife habitats of concern may include areas where species concentrate at a vulnerable point in their annual or life cycle; and areas which are important to migratory or non-migratory species.*"

Wildlife habitat is considered significant by the province where it is:

“Ecologically important in terms of features, functions, representation, or amount, and contributing to the quality and diversity of an identifiable geographic area or Natural Heritage System. Criteria for determining significance may be recommended by the Province, but municipal approaches that achieve the same objective may also be used.”

SWH Criteria Schedules for Ecoregion 6E (MNRF 2015) was referenced to identify SWH. Data for ELC and wildlife as presented was compiled and assessed according to the criteria outlined in MNRF’s Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E (MNRF 2015). A summary of SWH screening criteria and analysis, based on natural heritage features found within the study area is presented in **Appendix D**. The geographic location of the study area, lack of natural heritage features, and highly urbanized nature of lands examined suggest that no candidate SWH is present.

## **4.0 DESIGNATED NATURAL AREAS**

Designated natural areas include areas that have been identified for protection by the Ontario MNRF, TRCA, the Region of York, and the City of Vaughan.

### **4.1 Provincially Significant Wetlands (PSWs)**

There are no Provincially Significant Wetlands (PSWs) or unevaluated wetlands located on or within 120 m of the property.

### **4.2 Areas of Natural and Scientific Interest (ANSIs)**

While the Block 32 West Vellore Woods Community Plan identifies the Vellore Tract Woodlot as an Area of Natural and Scientific Interest (ANSIs); the woodlot is not identified as an ANSI in Schedule 3 of Vaughan's Official Plan (City of Vaughan 2010).

### **4.3 Environmentally Significant Areas (ESAs)**

There are no Environmentally Significant Areas (ESAs) located on within 120 m of the property.

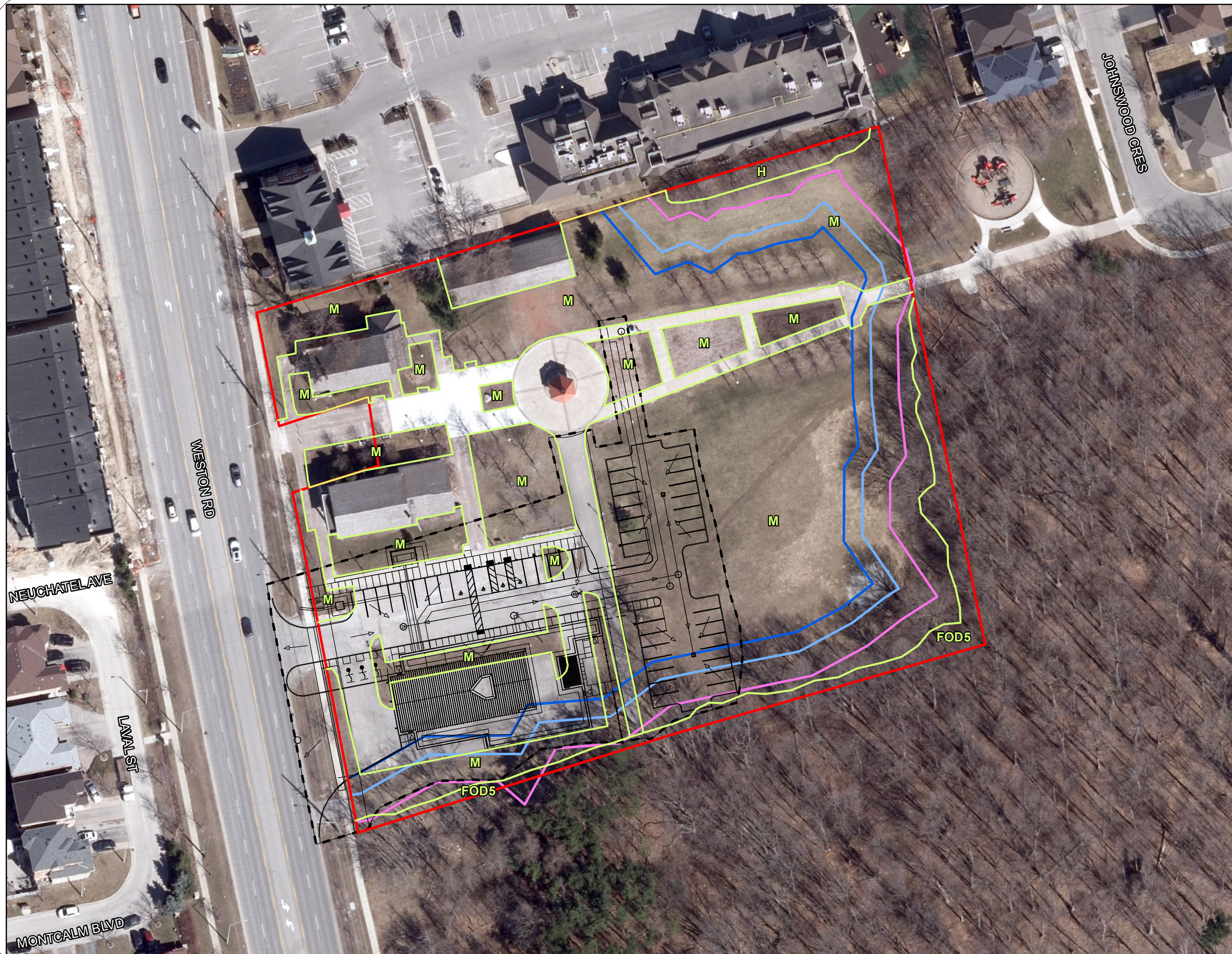
### **4.4 Ontario Regulation 166/06: Toronto and Region Conservation Authority: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses**

Toronto and Region Conservation Authority (TRCA) administers *Ontario Regulation 166/06* under Section 28 of the *Conservation Authorities Act* known as Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation. *Ontario Regulation 166/06* regulates work taking place within valley and stream corridors, wetlands, and associated areas of interference. Consequently, any works undertaken within the regulation limit will require a permit from the TRCA. There are no regulated areas on or within 120 m of the property.

## 5.0 PROPOSED DEVELOPMENT

The fire station includes an administrative building, attached multi-vehicle garage, driveways, parking and landscaping. The fire station will be connected to municipal services. The proposed development is presented in **Figure 7**.

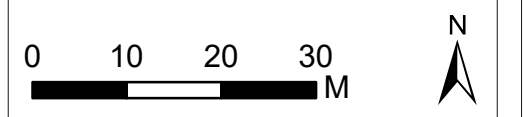




# LEGEND

- Subject Property
- Construction Limits
- Proposed Site Plan
- Vegetation Dripline
- 6m Vegetation Protection Zone
- 10m Vegetation Protection Zone
- Vegetation Community Boundary
- FOD5** Dry-Fresh Sugar Maple Deciduous Forest Ecosite
- H** Hedgerow
- M** Manicured

Data Source: LGL Limited Field Survey, contains public sector information made available under The Regional Municipality of York Open Data Licence. Contains information licensed under the Open Government Licence - Ontario. Produced by LGL Limited under License with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2022.



## 9541 Weston Road PROPOSED DESIGN



Project: TA9196	Figure: 7
Date: May 31, 2022	Prepared By: AM
Scale: 1:800	Verified By: GK



## **6.0 IMPACT ASSESSMENT AND MITIGATION**

### **6.1 Potential Impacts to Soils**

Grading and excavation will be required on the property to construct buildings, parking lots, driveways and walkways. These activities will disturb soils which may be transported beyond the work zone, resulting in impacts to vegetation located adjacent to the property.

An Erosion and Sediment Control (ESC) Plan shall be developed and implemented to minimize the risk of sedimentation during all phases of the project. Erosion and sediment control measures should be maintained, monitored, and repaired until all disturbed ground has been permanently stabilized. Erosion and sediment control measures should be implemented in accordance with OPSS 805 – Temporary Erosion and Sediment Control Measures and the Erosion and Sediment Control Guide for Urban Construction (TRCA 2019). As a minimum, silt fence shall be installed around the perimeter of the work area to prevent the migration of sediments off site. The incorporation of Low Impact Design (LID) to manage stormwater runoff and protect water quality during and post-construction should be implemented.

### **6.2 Fish and Fish Habitat**

There is no fish or fish habitat located on or adjacent to the property; therefore, no impacts to fish or fish habitat will occur.

### **6.3 Vegetation and Vegetation Communities**

#### **6.3.1 Woodlot Impacts and Mitigation**

As previously noted, a Dry-Fresh Sugar Maple Deciduous Forest (FOD5) was identified on adjacent lands. No direct removal of any part of the forest is expected due to the proposed redevelopment. However, the forest dripline, which was staked on December 15, 2021 by City of Vaughan and LGL staff, extends over onto the property along the eastern and southern property boundaries as presented in **Figure 6**. The forest community is identified as a Core Feature on Schedule 2, Natural Heritage Network in the City of Vaughan Official Plan (December 2020). As such, it requires a 10 m vegetation protection zone from development in accordance with Policy 3.2.3.4. Natural heritage attributes and functions of this forest feature are important as this community is of moderate to high sensitivity, covers an area of approximately 9.5 ha, likely supports a range of native plant species including species at risk and regionally rare species, and likely provides habitat for a range of wildlife, within an otherwise urban area.

With the proposed redevelopment, a 10 m vegetation protection zone can be accommodated along the northeast corner of the woodlot, but is not possible along the

northern boundary of the narrower portion of forest that extends out to Weston Road, adjacent to the existing parking lot. Within this forest area the habitat was observed to be in a somewhat disturbed state with gaps in the canopy, localized dead fall and snags observed as occasional to abundant, some planted amenity trees were observed along the edge, dumped garbage was observed, and there appears to be an increased presence of invasive species with shrubs that included Tartarian honeysuckle (*Lonicera tatarica*) and common buckthorn (*Rhamnus cathartica*), and ground flora that included Canada goldenrod (*Solidago canadensis*), smooth brome (*Bromus inermis*) and garlic mustard (*Alliaria petiolata*). This is different from the condition of the larger portion of forest habitat farther to the east which was typically observed to be in good condition with less invasive shrub species, what appeared to also be less invasive ground flora, and less overall disturbances. On the property itself, a paved parking lot and manicured grass are located within 10 m of the dripline of the woodlot and a recreational trail is located along the north edge of the woodlot; thus, a reduced vegetation protection zone of 6 m along the northern forest edge adjacent to the existing paved parking lot is not expected to cause additional negative impacts. To provide protection and compensation given the reduced vegetation protection zone of 6 m, supplemental planting of the forest edge by planting within a portion of the vegetation protection zone within the property, is recommended.

The 6 m vegetation protection zone will be continuous along the south boundary of the property, except for the new parking lot, which will extend up to the dripline of vegetation itself. Due to this encroachment into the minimum vegetation protection zone, the parking lot in this area will be paved with interlocking stone to provide for infiltration of rainfall/snow melt. Given that there will be no encroachment beyond the dripline, trees and vegetation in this vicinity will continue to survive post-construction. Extreme care must be taken during construction in the vicinity of the parking lot to prevent any damage/disturbance to vegetation located within the dripline, which will be clearly marked with tree protection barrier in accordance with OPSS 801.

Several Kentucky coffee-trees were identified as planted amenity trees within the manicured areas on the subject property. The locations of these trees are presented in the Arborist Report (LGL 2022) provided under separate cover. Kentucky coffee-tree is regulated as 'Threatened' under the Ontario ESA. Management Biologists with the Ministry of the Environment, Conservation and Parks (MECP) have advised that streetscape Kentucky coffee-trees are likely cultivars and, as such, do not require Ontario ESA authorization.

A total of four butternut trees were identified within the adjacent deciduous forest. Two of these are located along the forest edge of which one is dead, another butternut is located approximately 11.5 m from the property boundary and another is approximately

65 m from the property boundary. Butternut is regulated as 'Endangered' under the Ontario ESA. Based on the proposed development, no removal of these four butternut trees is anticipated. However, work will occur within the 50 m habitat protection zone of two of the live butternut trees. An in-season Butternut Health Assessment (BHA) conducted during leaf-on, typically between late May and August 31, should be carried out well prior to any proposed construction. The BHA will be conducted for any butternut trees within 50 m of the proposed limit of disturbance. This assessment should be conducted by an MNRF designated Butternut Health Assessor. Once the BHA has been undertaken it will be submitted to the MECP for a 30 day review period, with subsequent work which may include a Notice to Impact Butternuts to be completed by the proponent, and any necessary steps for protection, mitigation or permitting under the Ontario ESA, as required.

Where butternut trees are identified to be retained, fencing will be needed to delineate where encroachment must not occur. Any works undertaken associated with the proposed redevelopment must be undertaken in accordance with mitigation or overall benefit requirements under the ESA, to be determined following an in-season BHA.

### **Regionally Rare Plant Species**

Four regionally rare plant species documented included white spruce and butternut which are both TRCA species of concern ranked as L3 (TRCA, 2020), and black walnut and Virginia stickweed which are identified as rare in York Region (Varga *et al.* 2000). White spruce was identified only as planted within the manicured area of the property. Butternut, black walnut and Virginia stickweed were all identified within the Dry-Fresh Sugar Maple Deciduous Forest (FOD5) on the adjacent property where no direct impacts (i.e., removals) are expected. Butternut protection and efforts under the ESA associated with any retainable or archiveable butternut trees are outline above.

### **6.4 Wildlife and Wildlife Habitat**

Impacts based on the proposed works will occur within habitat types that consist of highly disturbed, low quality wildlife habitat. Impacts to specialized wildlife habitats or other significant natural heritage features are not expected. More naturalized wildlife habitats associated with deciduous forest community found east/south of the study area will not be impacted. Displacement of species at risk habitat is not anticipated. The proposed activities at this site should occur outside of the breeding bird window to minimize disturbance to birds and other wildlife species utilizing habitats within the study area.



#### 6.4.1 Potential Impacts to Migratory Birds

Bird species listed under the *Migratory Birds Convention Act* (MBCA) are expected to nest within the study area. The MBCA prohibits the killing, capturing, injuring, taking or disturbing of migratory birds (including eggs) or the damaging, destroying, removing or disturbing of nests. Mitigation efforts to protect migratory bird species protected under the MBCA are outlined below in **Section 7.3**.

#### 6.4.2 Displacement of Rare, Threatened or Endangered Wildlife or Significant Wildlife Habitat

Background data indicate that five species at risk have been previously identified/have the potential to be present within the vicinity of the study area. However, no species at risk or habitat considered suitable to support them was identified during field investigations. The likelihood of the project having a negative effect on species at risk is considered extremely low. Because of the unlikelihood of adverse effects on species at risk, no targeted surveys or permitting requirement under the ESA is anticipated.

#### 6.4.3 Potential Impacts to Significant Wildlife Habitat

No significant wildlife habitat(s) were identified within the study area during field investigations or a review of secondary data sources.

### 6.5 Designated Natural Areas

The Vellore Tract Woodlot is located adjacent to the property. Impacts to this deciduous forest are addressed under Section 6.3, Vegetation and Vegetation Communities.

## **7.0 MITIGATION MEASURES**

### **7.1 Fish and Fish Habitat**

The Erosion and Sediment Control measures identified in Section 6.1 will ensure that no sediment is allowed to migrate beyond the work area. As a result, no further mitigation measures are recommended to protect fish and fish habitat.

### **7.2 Vegetation and Vegetation Communities**

Sediment and erosion control fencing will be established along the perimeter of the disturbance limits and should be treated as tree protection fencing to delineate a tree protection zone.

The following shall not occur within the tree protection zone:

- Heavy machinery shall not to be operated within the TPZ (including overhead swinging of machine arms);
- Construction materials, equipment, soil, construction waste or debris shall not to be stored within the TPZ or dripline of the trees identified for protection;
- There shall be no movement or parking of vehicles, placement of equipment or pedestrian traffic within the TPZ; and,
- Disposal of any liquids shall not occur within the TPZ.

#### **7.2.1 Forest Edge Management**

Plantings within a portion of the vegetation protection zone within the property are recommended to compensate for a decreased setback to 6 m along a portion of the forest edge. The following recommendations should be incorporated into planting plan(s) to be prepared by a qualified landscape architect and installed by a qualified restoration specialist. Edge management/supplemental planting recommendations are in accordance with the TRCA Forest Edge Management Plan Guidelines (TRCA 2004), to the extent possible. This guideline is typically used when tree clearing occurs creating a new forest edge resulting with direct loss of habitat, changes in microclimates, increased susceptibility to windthrow, reduced species richness, etc. However, direct removal of habitat is not expected.

It is recommended that supplemental tree plantings within 3 m to 5 m of the vegetation protection zone closest to the existing forest edge be installed. Plantings should include a high density of shrubs which, over time, can mitigate inadvertent encroachment, minimize establishment of invasive species, increase structural diversity along the forest edge, and increase diversity of both plants and wildlife. Plantings should consist of suitable native and/or non-invasive trees and shrubs with species that are able to

tolerate some shade. A range of suitable species that are native and/or non-invasive is presented in **Table 2** and includes species present in the adjacent forest. Substrates should be conducive to receive plantings. Where there is manicured lawn within the planting area it should be tilled to disrupt competition with grass root mats to promote successful establishment and growth of planted stock. As soon as planting is completed, the area should be seeded with a native seed mix (see **Table 2**).

**TABLE 2. RECOMMENDED PLANT SPECIES FOR EDGE MANAGEMENT/COMPENSATION**

Scientific Name	Common Name	SRank	GRank
<b>TREE AND SHRUB SPECIES</b>			
<i>Picea glauca</i>	white spruce	S5	G5
<i>Pinus strobus</i>	white pine	S5	G5
<i>Populus tremuloides</i>	trembling aspen	S5	G5
<i>Populus grandidentata</i>	large-tooth aspen	S5	G5
<i>Populus balsamifera</i> ssp. <i>balsamifera</i>	Balsam poplar	S5	G5
<i>Tilia americana</i>	basswood	S5	G5
<i>Acer saccharinum</i>	sugar maple	S5	G5
<i>Quercus rubra</i>	red oak	S5	G5
<i>Amelanchier laevis</i>	smooth serviceberry	S5	G5
<i>Viburnum lentago</i>	nannyberry	S5	G5
<i>Prunus virginiana</i>	choke cherry	S5	G5
<i>Corylus cornuta</i>	beaked hazelnut	S5	G5
<i>Aronia melanocarpa</i>	black chokecherry	S5	G5
<i>Cornus sericea</i>	red-osier dogwood	S5	G5
<i>Cornus alternifolia</i>	alternate-leaved dogwood	S5	G5
<i>Sambucus canadensis</i>	common elderberry	S5	G5
<b>GROUND FLORA</b>			
<i>Elymus virginicus</i>	Virginia wild-rye	S5	G5
<i>Oenothera biennis</i>	common evening-primrose	S5	G5
<i>Rudbeckia hirta</i>	brown-eyed Susan	S5	G5
<i>Poa palustris</i>	fowl bluegrass	S5	G5
<i>Symphyotrichum novae-angliae</i>	New England aster	S5	G5
<i>Symphyotrichum lateriflorum</i>	Calico aster	S5	G5
<i>Symphyotrichum cordifolium</i>	heart-leaved aster	S5	G5
<i>Carex pensylvanica</i>	Pennsylvania sedge	S5	G5?
<i>Solidago nemoralis</i> ssp. <i>nemoralis</i>	gray goldenrod	S5	G5T?

It is recommended that deciduous tree seedling stock be 1 to 2 year old bare-root stock (~30 cm in height) and that coniferous tree stock be 2+1 to 2+2 bare-root stock (2 years grown in a bed + 1 to 2 years transplanted, >25 cm in height). Shrub seedling stock can be bareroot, 1 or 2 years (>18"). Species used will be dependent on availability at the time of planting. Plantings should be placed in an irregular pattern to provide a more naturalized appearance and include groupings of three shrubs of the same species intermittently installed among planted trees. Below are some recommendations for the installation of woody plantings.

- Tree stock should be planted 2.4 m to 3.0 m on centre using a variety of species from the list provided above.
- Shrub stock should be planted 0.5 to 1 m on centre for shrub stock, planted in clusters of three of the same species intermittently among the planted trees and close to the existing forest edge.
- If the planting area is manicured lawn, it should be tilled to disrupt competition with grass root mats to promote successful establishment and growth of planted stock and seeded with a high density of a native seed mix.
- Planting stock should be obtained from a reputable plant supplier.
- Where stock availability is a constraint at the time of planting, alternate species used shall be native to Ontario and non-invasive.
- Planting should be undertaken in the spring or fall when temperatures are lower and there is increased chance of precipitation.
- Watering should occur at the time of installation with additional watering during the first growing season as required when rainfall isn't regular (i.e.,  $\geq 20$  days).
- Native and/or non-invasive plant materials should be listed on planting plans and include species, quantity, stock form (i.e., potted, live stakes, burlapped, whips, etc.), and note details of any native seed mix proposed.
- Stock received should be of good quality acceptable for installation.
- Landscape plan(s) should be prepared by a qualified professional.
- Installation of plantings should be carried out by a knowledgeable, experienced professional.

Over time supplemental plantings will provide increased protection of the existing forest edges within increased buffering, increased canopy cover, and will increase infiltration, provide increased habitat for wildlife, and are expected to improve the ecological function of the woodlot edge.

As per TRCA (July 2004), the following mitigation measures to protect existing tree resources along forest edges includes the following.

- Tree protection fencing should be installed beyond the forest edge dripline prior to construction to delineate the area beyond which no impacts should occur.
- The location of tree protection fencing should be illustrated on plans and typical details included.
- Grading associated with the proposed redevelopment should be designed to meet existing grades a minimum of 3 m away from the tree dripline in order to mitigate suffocation of tree roots.

- Drainage patterns adjacent to the forest should be maintained to avoid a change in soil moisture resulting from the concentration/redirection of flows.
- If during construction pruning of tree roots, etc., is required to mitigate impacts to tree health, such work is to be conducted by a **qualified Arborist**.
- Construction materials, equipment, soil, construction waste or debris, parking of vehicles, etc., shall not be placed or stored within the vegetation protection zone, within the staked dripline or immediately adjacent to trees identified for protection.
- Should any additional, incidental or accidental tree injuries occur during construction, a **qualified Arborist** shall be consulted to determine whether additional mitigation measures should be employed.

These efforts will help to ensure that impacts to the retained forest habitat including the root zone of associated edge trees are minimized and that the condition and character of these trees will not change, either in the short-term or long-term period.

Following site preparation and planting, monitoring and maintenance of newly planted stock for two to three years following planting is important and strongly recommended.

### **7.3 Wildlife and Wildlife Habitat**

Several migratory bird species are anticipated to utilize the habitat adjacent to the property. While migratory insectivorous and non-game birds are protected year-round, migratory game birds are only protected from March 10 to September 1. The study area lands fall within Environment Canada's Nesting Zone C2 (Nesting Period: end of March – end of August). Consequently, to comply with the requirements of the MBCA, it is recommended that disturbance, clearing or disruption of vegetation where birds may be nesting should be completed outside the window of April 1 to August 31 to avoid the breeding bird season for the majority of the bird species protected under the act. In the event that these activities must be undertaken from April 1 to August 31, a nest screening survey will be conducted by a qualified avian biologist. If an active nest is located, a mitigation plan shall be developed and provided to Environment Canada – Ontario Region for review prior to implementation.

## 8.0 CONCLUSION

The proposed development will be located on a property that is previously disturbed by urban development and is characterized as manicured lawn and paved surfaces. There are no natural heritage features or areas located on the property; therefore, there will be no loss of natural heritage features.

The Vellore Tract Woodlot is located adjacent to the property and a minimum setback of 6 m will be implemented between the proposed development and the woodlot edge, with the exception of the parking lot, which will encroach up to the vegetation dripline. The parking lot in this area will be paved with interlocking stone to maintain infiltration of surface water and a tree protection barrier will be installed along the dripline of vegetation to prevent damage to vegetation and root systems. A restoration plan has been developed to enhance the vegetation protection zone from the woodlot to avoid potential woodlot edge effects and is presented in the Landscape Plan under separate cover.

An in-season Butternut Health Assessment (BHA) will be carried out prior to any proposed construction. The BHA will be conducted for the two butternut trees located within 50 m of the proposed limit of disturbance. Once the BHA has been undertaken it will be submitted to the MECP for a 30 day review period, with subsequent work which may include a Notice to Impact Butternuts to be completed by the proponent, and any necessary steps for protection, mitigation or permitting under the Ontario ESA, as required.

Silt fence will be installed around the perimeter of the work zone to prevent the migration of sediment off site. This silt fence will serve a dual purpose as tree protection barrier. As a result, the proposed Vaughan Fire Station 7-12 will have no significant impacts on natural heritage features or their ecological functions located on or adjacent to the property.

## 9.0 REFERENCES

Aerial photography, Google Earth and Google Maps (2020).

Cadman, M.D., D.A. Sutherland, G.G. Beck, D. Lepage, and A.R. Couturier (eds.). 2007. Atlas of the Breeding Birds of Ontario, 2001-2005. *Bird Studies Canada, Environment Canada, Ontario Field Ornithologists*, Ontario Ministry of Natural Resources, and Ontario Nature, Toronto, xxii + 706 pp.

City of Vaughan. 2010. *City of Vaughan Official Plan 2010: Volume 1*. (Adopted by City Council September 7, 2010).

DFO. 2019. Recovery Potential Assessment of Redside Dace (*Clinostomus elongatus*) in Canada. DFO Canadian Science Advisory Secretariat Science Advisory Report 2019/012.

DFO. 2021. Aquatic Fish Species at Risk Mapping. Website available online at: <https://www.dfo-mpo.gc.ca/species-especes/sara-lep/map-carte/index-eng.html>. Accessed April 2021, Department of Fisheries and Oceans Canada. Sarnia, Ontario.

Lee, H.T. et al. 1998. *Ecological Land Classification for Southern Ontario: First Approximation and Its Application*. Ontario Ministry of Natural Resources, Southcentral Science Section, Science Development and Transfer Branch, SCSS Field Guide FG-02.

*Migratory Birds Convention Act*. 1994 (S.C. 1994, c. 22).

Ministry of Municipal Affairs and Housing. 2020. *Provincial Policy Statement*.

Newmaster, S.G. 2005. *Flora Ontario - Integrated Botanical Information System (FOIBIS)* 2006 species scientific names obtained March 2007 from the University of Guelph.

Newmaster, S.G., A. Lehela, P.W.C. Uhlig, S. McMurray and M.J. Oldham. 1998. *Ontario Plant List*. Ontario Ministry of Natural Resources, Ontario Forest Research Institute, Sault Ste. Marie, Ontario, Forest Research Information Paper No. 123, 550 pp. + appendices.

Oldham, M.J. 1999. *Natural Heritage Resources of Ontario: Rare Vascular Plants*. Natural Heritage Information Centre, Ontario Ministry of Natural Resources. Peterborough, Ontario. 56 pp.

- Oldham, M.J. 2009. *Natural Heritage Resources of Ontario: Rare Vascular Plants*. Natural Heritage Information Centre, Ontario Ministry of Natural Resources, Peterborough, Ontario.
- Ontario Ministry of Natural Resources. 2000. *Significant Wildlife Habitat Technical Guide*. 151pp.
- Ontario Ministry of Natural Resources and Forestry. 2021. Natural Heritage Information Centre. Website available online at: <https://www.ontario.ca/environment-and-energy/natural-heritage-information-centre>. Accessed April 2021, Ministry of Natural Resources and Forestry. Peterborough, Ontario.
- O. Reg. 242/08: General. 2020. *Endangered Species Act*, 2007, S.O. 2007, c. 6.
- O. Reg. 166/06: Toronto and Region Conservation Authority Regulation of Development, Interference with wetlands and Alterations to shorelines and Watercourses. 2013. *Conservation Authorities Act*, R.S.O. 1990, c. C.27.
- Riley, J.L. 1989. Simcoe County. Distribution and Status of the Vascular Plants of Central Region. Ontario Ministry of Natural Resources. Richmond Hill, Ontario.
- Toronto and Region Conservation Authority. 2009a. Don River Watershed Plan: Aquatic Systems – Report on Current Conditions.
- Toronto and Region Conservation Authority. 2009c. *Flora Scores and Ranks*.
- Varga, S., and K. Mewa. 1998. List of Provincial and Regional Earth Science ANSIs in the Greater Toronto Area. Aurora District, Ontario Ministry of Natural Resources. 4 pp.
- Varga, S et al. 2000. *Regional Municipality of York Distribution and Status of the Vascular Plants of the Greater Toronto Area*.
- York Region. 2010. *York Region Official Plan*. (Office Consolidation January 2019).



## **APPENDICES**

**APPENDIX A**

**NATURAL FEATURE STAKING**

## Appendix A

### Vaughan Fire Station 7-12

Staking of Vegetation Dripline on December 15, 2021

Photo #1  
South Dripline (Looking East).



Photo #2  
South Dripline (Looking East).



Photo #3  
South Dripline (Looking East).



Photo #4  
South Dripline (Looking East).





## Appendix A

### Vaughan Fire Station 7-12

#### Staking of Vegetation Dripline on December 15, 2021

Photo #5  
East Dripline (Looking North).



Photo #6  
East Dripline (Looking Southeast).



Photo #7  
East Dripline (Looking Southeast).



Photo #8  
East Dripline (Looking North).



**APPENDIX B**

**VASCULAR PLANT LIST**

**Appendix B. Vascular Plant List**

Scientific Name	Common Name	GRank	SRank	MNR	COSEWIC	TRCA	York (Varga)	M	H	FOD5
<b>GINKGOACEAE</b>	<b>GINKGO FAMILY</b>									
* <i>Ginkgo biloba</i>	maiden-hair tree							X		
<b>PINACEAE</b>	<b>PINE FAMILY</b>									
* <i>Larix decidua</i>	European larch	G?	SE2			L+	X			X
<i>Picea glauca</i>	white spruce	G5	S5			L3	X	X		
* <i>Picea pungens</i>	Colorado spruce	G5	SE1			L+		X		
<i>Pinus strobus</i>	eastern white pine	G5	S5			L4	X	X		X
<b>PLATANACEAE</b>	<b>PLANE-TREE FAMILY</b>									
* <i>Platanus X acerifolia</i>	London plane-tree	GU	SE1					X		
<b>ULMACEAE</b>	<b>ELM FAMILY</b>									
<i>Ulmus</i> sp.	elm							X		
<i>Ulmus americana</i>	white elm	G5?	S5			L5	X			X
<b>JUGLANDACEAE</b>	<b>WALNUT FAMILY</b>									
<i>Carya cordiformis</i>	bitternut hickory	G5	S5			L4	X			X
<i>Juglans nigra</i>	black walnut	G5	S4			L5	R			X
<i>Juglans cinerea</i>	butternut	G3G4	S3?	END	END	L3	X			X
<b>FAGACEAE</b>	<b>BEECH FAMILY</b>									
* <i>Fagus sylvatica</i>	European beech							X		
<i>Quercus bicolor</i>	swamp white oak	G5	S4							X
<i>Quercus macrocarpa</i>	bur oak	G5	S5			L4	X			X
<i>Quercus rubra</i>	red oak	G5	S5			L4	X	X		
<i>Fagus grandifolia</i>	American beech	G5	S5			L4	X			X
<b>BETULACEAE</b>	<b>BIRCH FAMILY</b>									
<i>Carpinus caroliniana</i> ssp. <i>virginiana</i>	blue beech	G5T	S5			L4	X			X
<i>Ostrya virginiana</i>	ironwood	G5	S5			L5	X		X	X
<b>TILIACEAE</b>	<b>LINDEN FAMILY</b>									
* <i>Tilia cordata</i>	small leaf linden	G?	SE1			L+		X		
<i>Tilia americana</i>	basswood	G5	S5			L5	X	X	X	X
<b>BRASSICACEAE</b>	<b>MUSTARD FAMILY</b>									
* <i>Alliaria petiolata</i>	garlic mustard	G5	SE5			L+	X			X
<b>ROSACEAE</b>	<b>ROSE FAMILY</b>									
* <i>Pyrus communis</i>	common pear	G5	SE4			L+	X	X		
* <i>Prunus avium</i>	sweet cherry	G?	SE4			L+	X			X
* <i>Malus baccata</i>	Siberian crabapple	G?	SE1			L+		X		
<b>FABACEAE</b>	<b>PEA FAMILY</b>									
<i>Gymnocladus dioica</i>	Kentucky coffee-tree	G5	S2	THR	THR	L+		X		

**Appendix B. Vascular Plant List**

Scientific Name	Common Name	GRank	SRank	MNR	COSEWIC	TRCA	York (Varga)	M	H	FOD5
<i>Gleditsia triacanthos</i>	honey locust	G5	S2			L+	X	X		
<b>RHAMNACEAE</b>	<b>BUCKTHORN FAMILY</b>									
* <i>Rhamnus cathartica</i>	common buckthorn	G?	SE5			L+	X			X
<b>VITACEAE</b>	<b>GRAPE FAMILY</b>									
<i>Vitis riparia</i>	riverbank grape	G5	S5			L5	X			X
<b>ACERACEAE</b>	<b>MAPLE FAMILY</b>									
<i>Acer negundo</i>	Manitoba maple	G5	S5			L+?	X	X		X
* <i>Acer platanoides</i>	Norway maple	G?	SE5			L+	X	X		X
<i>Acer saccharinum</i>	silver maple	G5	S5			L4	X	X		
<i>Acer saccharum</i> ssp. <i>saccharum</i>	sugar maple	G5T?	S5			L5	X	X	X	X
<b>BORAGINACEAE</b>	<b>BORAGE FAMILY</b>									
<i>Hackelia virginiana</i>	Virginia stickweed	G5	S5			L5	R5			X
<b>OLEACEAE</b>	<b>OLIVE FAMILY</b>									
<i>Fraxinus</i> sp.	ash									X
<b>CAPRIFOLIACEAE</b>	<b>HONEYSUCKLE FAMILY</b>									
* <i>Lonicera tatarica</i>	tartarian honeysuckle	G?	SE5			L+	X			X
<b>ASTERACEAE</b>	<b>ASTER FAMILY</b>									
<i>Solidago canadensis</i>	Canada goldenrod	G5	S5			L5	X			X
* <i>Arctium minus</i> ssp. <i>minus</i>	common burdock	G?T?	SE5			L+	X			X
<b>POACEAE</b>	<b>GRASS FAMILY</b>									
* <i>Bromus inermis</i> ssp. <i>inermis</i>	awnless brome	G4G5T?	SE5			L+	X			X
* <i>Lolium perenne</i>	English rye grass	G?	SE4			L+	X			X

**APPENDIX C**

**SPECIES RANK DEFINITIONS AND ACRONYMS**



## Appendix C. Species Rank

### G-Rank                      Global Rank

Global ranks are assigned by a consensus of the network of Conservation Data Centres, scientific experts, and the Nature Conservancy to designate a rarity rank based on the range-wide status of a species, subspecies or variety.

The most important factors considered in assigning global ranks are the total number of known, extant sites world-wide, and the degree to which they are potentially or actively threatened with destruction. Other criteria the number of known populations considered to be securely protected, the size of the various populations, and the ability of the taxon to persist at its known sites. The taxonomic distinctness of each taxon has also been considered. Hybrids, introduced species, and taxonomically dubious species, subspecies and varieties have not been included.

- |      |   |
|------|---|
| G1   | Extremely rare; usually 5 or fewer occurrences in the overall range or very few remaining individuals; or because of some factor(s) making it especially vulnerable to extinction.                |
| G2   | Very rare; usually between 5 and 20 occurrences in the overall range or with many individuals in fewer occurrences; or because of some factor(s) making it vulnerable to extinction.              |
| G3   | Rare to uncommon; usually between 20 and 100 occurrences; may have fewer occurrences, but with a large number of individuals in some populations; may be susceptible to large-scale disturbances. |
| G4   | Common; usually more than 100 occurrences; usually not susceptible to immediate threats.  |
| G5   | Very common; demonstrably secure under present conditions.  |
| GH   | Historic, no records in the past 20 years.  |
| GU   | Status uncertain, often because of low search effort or cryptic nature of the species; more data needed.  |
| GX   | Globally extinct. No recent records despite specific searches.  |
| ?    | Denotes inexact numeric rank (i.e. G4?).  |
| G" " | A "G" (or "T") followed by a blank space means that the NHIC has not yet obtained the Global Rank from The Nature Conservancy.  |
| G?   | Unranked, or, if following a ranking, rank tentatively assigned (e.g. G3?).   |
| Q    | Denotes that the taxonomic status of the species, subspecies, or variety is questionable.   |
| T    | Denotes that the rank applies to a subspecies or variety.   |

### SRANK                      Provincial Rank

Provincial (or Sub-national) ranks are used by the Ontario Ministry of Natural Resources Natural Heritage Information Centre (NHIC) to set protection priorities for rare species and natural communities. These ranks are not legal designations. Provincial ranks are assigned in a manner similar to that described for global ranks, but consider only those factors within the political boundaries of Ontario. By comparing the global and provincial ranks, the status, rarity, and the urgency of conservation needs can be ascertained. The NHIC evaluates provincial ranks on a continual basis and produces updated lists at least annually.

- S1    **Critically Imperiled** in Ontario because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation.

- S2 **Imperiled** in Ontario because of rarity due to very restricted range, very few populations (often 20 or fewer occurrences) steep declines or other factors making it very vulnerable to extirpation.
- S3 **Vulnerable** in Ontario due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
- 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 Ontario.
- SX **Presumed Extirpated** – Species or community is believed to be extirpated from Ontario.
- SH **Possibly Extirpated** – Species or community occurred historically in Ontario and there is some possibility that it may be rediscovered.
- SNR **Unranked**—Conservation status in Ontario not yet assessed
- SU **Unrankable**—Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
- SNA **Not Applicable** —A conservation status rank is not applicable because the species is not a suitable target for conservation activities.
- S#S# **Range Rank** —A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species or community. Ranges cannot skip more than one rank (e.g., SU is used rather than S1S4).

COSEWIC (Committee on the Status of Endangered Wildlife in Canada):		OMNR (Ontario Ministry of Natural Resources):	
END	Endangered	END	Endangered
THR	Threatened	THR	Threatened
SC	Special Concern	SC	Special Concern
<b>Local Status:</b> Durham (Varga <i>et al.</i> 2000)		<b>Legal Status:</b>	
U	Uncommon	SARA	<i>Species at Risk Act</i> – Schedules (1), (2), (3)
R1-R10	Rarity Status (1-10 denotes number of stations at which a locally rare species is found) (Varga <i>et al.</i> 2000)	ESA	<i>Endangered Species Act</i>
<b>Toronto Region Conservation Authority</b>			
L1-L3	Species of Concern (see below)		

RANK	LEVEL OF CONSERVATION CONCERN OF FLORA AND FAUNA IN TRCA REGION (TRCA 2020)
L5	Able to withstand high levels of disturbance; generally secure throughout the jurisdiction, including the urban matrix. May be of very localized concern in highly degraded areas.
L4	Able to withstand some disturbance; generally secure in rural matrix; of concern in urban matrix.
L3	Able to withstand minor disturbance; generally secure in natural matrix; considered to be of regional concern.
L2	Unable to withstand disturbance; some criteria are very limiting factors; generally occur in high-quality natural areas, in natural matrix; probably rare in the TRCA jurisdiction; of concern regionally.
L1	Unable to withstand disturbance; many criteria are limiting factors; generally occur in high-quality natural areas in natural matrix; almost certainly rare in the TRCA jurisdiction; of concern regionally.
LX	Extirpated from our region with remote chance of rediscovery. Presumably highly sensitive.
LH	Hybrid between two native species. Usually not scored unless highly stable and behaves like a species (e.g. <i>Equisetum x nelsonii</i> )
L+	Exotic. Not native to TRCA jurisdiction. Includes hybrids between a native species and an exotic
L+?	Origin uncertain or disputed, i.e. may or may not be native.

**APPENDIX D**

**SIGNIFICANT WILDLIFE HABITAT ASSESSMENT**

**SCHEDULE 3:**  
**ECOREGION 6E CRITERIA**



SCHEDULE 3: ECOREGION 6E CRITERIA

This Schedule is designed to provide the recommended criteria for identifying Candidate Significant Wildlife Habitat within ecoregion 6E. Tables 1.1 through 1.4 within the Schedules provide guidance for Candidate SWH designation for the four categories of SWH outlined in the Significant Wildlife Habitat Technical Guide and its Appendices cxlviii, cxlix for ecoregion 6E. Table 1.5 contains and provides descriptions for exceptions to Eco-regional candidate SWH which will be identified at an ecodistrict scale. Exceptions occur when criteria for a specific habitat is different within an ecodistrict compared to the remainder of an ecoregion or if a habitat only occurs within a restricted area of the ecoregion.

The Schedules, including description of wildlife habitat, wildlife species, and the criteria provided for determining Candidate SWH, are based on science and expert knowledge. The information within these Schedules will require periodic updating to keep pace with changes to wildlife species status in Species at Risk schedules, or as new scientific information pertaining to wildlife habitats becomes available. Therefore, MNR will occasionally need to review and update these schedules and provide addenda. A reference document for all SWH found after the schedules, includes citations for all ecoregional schedules. Each citation used to assist with the criteria for SWH will be indicated by a roman numeric symbol. Where no reference exists, MNR expert opinion is used for determination of criteria, this symbol “Í” represents when MNR expert opinion is utilized.

3.1 Seasonal Concentration Areas

Seasonal Concentration Areas are areas where wildlife species occur in aggregations at certain times of the year, on an annual or predictable basis. Such areas are sometimes highly concentrated with members of a given species, or several species, within relatively small areas. In spring and autumn, migratory wildlife species will concentrate where they can rest and feed. Other wildlife species require habitats where they can survive winter. Examples of Seasonal Concentration Areas include deer wintering areas, breeding bird colonies, and hibernation sites for reptiles or bats (OMNR 2000a), amphibians, and some mammals. Table 1.1 outlines which Seasonal Concentration Areas constitute Candidate SWH.

Table 1.1 Seasonal Concentration Areas for Wildlife Species.

Wildlife Habitat	Wildlife Species	CANDIDATE SWH*		CONFIRMED SWH	LGL Discussion/ Analysis	SWH
		ELC Ecosite Codes	Habitat Characteristics and Information Sources	Defining Criteria		
<b>Waterfowl Stopover and Staging Areas (Terrestrial)</b>  <b><u>Rationale:</u></b> Habitat important to migrating waterfowl.	American Black Duck Northern Pintail Gadwall Blue-winged Teal American Green-winged Teal American Wigeon Northern Shoveler Tundra Swan	CUM1 CUT1 Plus evidence of annual spring flooding from melt water or run-off within these Ecosites.  Fields with waste grain in the Long Point, Rondeau, Lk. St. Clair, Grand Bend and Pt. Pelee areas may be important to Tundra Swans.	Fields with sheet water or fields utilized by Tundra Swans during Spring (March to May). <ul style="list-style-type: none"><li>Fields flooding during spring melt and run-off provide important invertebrate foraging habitat for migrating waterfowl.</li><li>Anecdotal information from the landowner, adjacent landowners, or local naturalist clubs may be good information in determining occurrence.</li><li>ESA Reports prepared by Conservation Authorities</li><li>Sites documented through waterfowl planning processes (e.g., EHJV implementation plan)</li><li>local naturalist clubs</li><li>Ducks Unlimited Canada</li><li>Long Point Bird Observatory</li></ul>	Studies carried out and verified presence of an annual concentration of any listed species: <ul style="list-style-type: none"><li>Aggregation of 100Í or more of any one of the listed species is required.</li><li>Annual use of habitat is documented from information sources or field studies (annual can be based on study or determined anecdotally).</li><li>Agricultural fields with waste grains are commonly used by waterfowl; these are not considered SWH, except when used by Tundra Swans during the spring migration and staging period.</li><li>SWHDSS cxlix Index #7 provides development effects and mitigation measures.</li></ul>	ELC Ecosites identified do not meet criteria.  No sheet water was observed on the field, and none was noted in incidental observations.  None of the wildlife species identified were observed on the property.  No aggregations of waterfowl in terrestrial habitat were noted at any time nor were criteria threshold numbers over 100 or more individuals of the species listed documented on the terrestrial habitat.	No candidate SWH identified.
<b>Waterfowl Stopover and Staging Areas (Aquatic)</b>  <b><u>Rationale:</u></b>	American Green-winged Teal American Black Duck Northern Pintail Northern Shoveler American Wigeon Gadwall Blue-winged Teal	MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 SWD1 SWD3	<ul style="list-style-type: none"><li>Ponds, marshes, lakes, bays, coastal inlets, and watercourses used during migration. Sewage treatment ponds and storm water ponds do not qualify as SWH, but a reservoir managed as large wetland or pond/lake does.</li></ul>	Studies carried out and verified presence of: <ul style="list-style-type: none"><li>Habitat used annually during spring, fall, or both seasons of any listed species.</li><li>Annual use of habitat is documented from information</li></ul>	ELC Ecosites identified do not meet criteria.  No suitable vegetation features were found within the study area and no notable aggregations of species as per the criteria were observed within the study area.	No candidate SWH identified.

Wildlife Habitat	Wildlife Species	CANDIDATE SWH*		CONFIRMED SWH	LGL Discussion/ Analysis	SWH
		ELC Ecosite Codes	Habitat Characteristics and Information Sources	Defining Criteria		
Important for local and migrant waterfowl populations during the spring or fall migration or both periods combined. Sites identified are usually only one of a few in the ecodistrict.	Wood Duck Hooded Merganser Common Merganser Red-breasted Merganser Lesser Scaup Greater Scaup Ring-necked duck Common Goldeneye Bufflehead Long-tailed Duck Surf Scoter White-winged Scoter Black Scoter Canvasback Redhead Ruddy Duck Brant White-winged Scoter Black Scoter Tundra Swans		<ul style="list-style-type: none"> <li>These habitats have an abundant food supply (mostly aquatic invertebrates and vegetation in shallow water).</li> <li>Canadian Wildlife Service staff know the larger, most significant sites. Check website: <a href="http://wildspace.ec.gc.ca">http://wildspace.ec.gc.ca</a></li> <li>Naturalist clubs often are aware of staging/stopover areas.</li> <li>OMNR Wetland Evaluations indicate presence of locally and regionally significant waterfowl staging.</li> <li>Sites documented through waterfowl planning processes (e.g., EHJV implementation plan)</li> <li>Ducks Unlimited Canada</li> </ul>	<p>sources or field studies (annual can be based on study or determined anecdotally).</p> <ul style="list-style-type: none"> <li>Aggregations of 100<sup>1</sup> or more of any one of listed species <b>and</b> 2-3 birds/ha for 7-20 days<sup>1</sup>.</li> <li>SWHDSS cxlix Index #7 provides development effects and mitigation measures.</li> </ul>		
<b>Colonial Nesting Bird Habitat</b>  <b>Rationale:</b> Historical use and number of nests in a colony make this habitat significant. An identified colony can be very important to local populations. All swallow populations in Ontario are declining cxcix.	Bank Swallow Cliff Swallow	Eroding banks, sandy hills, pits, steep slopes, rock faces or piles within these ecosites:  CUM1    CUT1 CUS1    BLO1 BLS1    BLT1 CLO1    CLS1 CLT1	<ul style="list-style-type: none"> <li>Any exposed soil banks, undisturbed or naturally eroding for 10 years or more.</li> <li>Does not include man-made structures (bridges or buildings) or recently (2 years) disturbed soil areas, such as berms, embankments, or soil or aggregate stockpiles.</li> <li>Does not include an active Mineral Aggregate Operation.</li> <li>ESA Reports prepared by Conservation Authorities</li> <li>Ontario Breeding Bird Atlas</li> <li>local Naturalist clubs</li> </ul>	<p>Studies confirming:</p> <ul style="list-style-type: none"> <li>Presence of 1 or more nesting sites with 8 or more Cliff Swallow pairs or 100 <sup>1</sup> Bank Swallow pairs during the spring breeding season.</li> <li>Anecdotal information from the landowner or adjacent landowners may be good information for determining occurrence.</li> <li>SWHDSS cxlix Index #4 provides development effects and mitigation measures.</li> </ul>	<ul style="list-style-type: none"> <li>No exposed soil along the banks of any watercourse feature within the study area. Suitable habitat does not exist within the study area and no species listed were confirmed during site surveys.</li> </ul>	No candidate SWH identified.
<b>Shorebird Migratory Stopover Area</b>  <b>Rationale:</b> High-quality shorebird	Wilson’s Snipe Greater Yellowlegs Lesser Yellowlegs Marbled Godwit Hudsonian Godwit Black-bellied Plover Am. Golden Plover	BBO1    BBO2 BBS1    BBS2 BBT1    BBT2 SDO1    SDS2 SDT1    MAM1 MAM2    MAM3 MAM4    MAM5	<ul style="list-style-type: none"> <li>Shorelines of lakes, rivers and wetlands, including beach areas, bars, and seasonally flooded shoreline, usually muddy and unvegetated.</li> <li>Great Lakes coastal shorelines are extremely important for migratory</li> </ul>	<p>Studies confirming:</p> <ul style="list-style-type: none"> <li>Presence of 3 or more of listed species and &gt; 1000 Shorebird Use Days<sup>1</sup> during spring or fall migration period (Shorebird Use Days are the accumulated number of shorebirds counted per day over</li> </ul>	<ul style="list-style-type: none"> <li>No un-vegetated or muddy shoreline within the study area. None of the species listed were confirmed within the study area.</li> </ul>	No candidate SWH identified.

Wildlife Habitat	Wildlife Species	CANDIDATE SWH*		CONFIRMED SWH	LGL Discussion/ Analysis	SWH
		ELC Ecosite Codes	Habitat Characteristics and Information Sources	Defining Criteria		
stopover habitat is extremely rare and typically has a long history of use.	Semipalmated Plover Solitary Sandpiper Spotted Sandpiper Pectoral Sandpiper White-rumped Sandpiper Baird's Sandpiper Western Sandpiper Buff-breasted Sandpiper Least Sandpiper Purple Sandpiper Semipalmated Sandpiper Long-billed Dowitcher Short-billed Dowitcher Wilson's Phalarope Red Phalarope Red-necked Phalarope Whimbrel Ruddy Turnstone Killdeer Red Knot Sanderling Dunlin		shorebirds from May to mid-June and July to October. <ul style="list-style-type: none"> <li>Western Hemisphere Shorebird Reserve Network.</li> <li>Canadian Wildlife Service (CWS) Ont. Shorebird Survey</li> <li>Bird Studies Canada</li> <li>local birders and naturalist clubs</li> </ul>	the course of the fall or spring migration period). <ul style="list-style-type: none"> <li>Whimbrel stop briefly (&lt;24hrs) during spring migration; any site with &gt;100 Whimbrel<sup>1</sup> used for 3 years or more would be considered significant.</li> <li>SWHDSS cxlix Index #8 provides development effects and mitigation measures.</li> </ul>		
<b>Songbird Migratory Stopover Areas</b>  <b>Rationale:</b> Sites with a high diversity of species as well as high numbers are most significant.	All migratory songbirds.  Canadian Wildlife Service Ontario website: <a href="http://www.on.ec.gc.ca/wildlife_e.html">http://www.on.ec.gc.ca/wildlife_e.html</a>	All Ecosites associated with these ELC Community Series; FOC FOM FOD SWC SWM SWD	<ul style="list-style-type: none"> <li>Woodlots located within 5km of Lake Erie/Lake Ontario. Woodlots directly on the shore of Lake Erie/Lake Ontario that are associated with peninsula or are adjacent to islands are potentially important migratory habitats. cxlviii</li> <li>Bird Studies Canada</li> <li>Ontario Nature</li> <li>Ontario Important Bird Areas (IBA) Program</li> <li>local birders and naturalist club</li> </ul>	<ul style="list-style-type: none"> <li>Woodlots need to be &gt;5 ha<sup>1</sup> in size and within 5 km iv, v, vi, vii, viii, ix, x, xi, xii, xiii, xiv, xv of Lake Erie.</li> </ul> Studies confirm: <ul style="list-style-type: none"> <li>Use of the woodlot by 35 <sup>1</sup> migratory bird species. This number of migrant bird species in a woodlot would be considered above average.</li> <li>Studies should be completed during spring (Apr./May) and fall (Aug/Oct) migration, using standardized assessment techniques; observation records and/or mist netting (permits required) are good methods to determine use of the area.</li> <li>SWHDSS cxlix Index #9 provides development effects and mitigation measures.</li> </ul>	<ul style="list-style-type: none"> <li>ELC Ecosites identified do not meet criteria.</li> <li>Forest communities within the study area are not within 5 km of Lake Erie/Lake Ontario.</li> </ul>	No candidate SWH identified.
<b>Raptor Wintering Area</b>  <b>Rationale:</b>	Rough-legged Hawk Red-tailed Hawk Northern Harrier American Kestrel	Combination of ELC Community Series; need to have present one Community	The habitat provides a combination of fields and woodlands that provide roosting, foraging, and resting habitats for wintering raptors.	<ul style="list-style-type: none"> <li>Raptor Wintering sites need to be &gt; 20ha cxlvii, cxlix with a combination of forest and upland xvi, xvii, xviii, xix, xx, xxi,</li> </ul>	<ul style="list-style-type: none"> <li>ELC Ecosites identified do not meet criteria. Natural vegetation communities do not meet the size criteria.</li> </ul>	No candidate SWH identified.



Wildlife Habitat	Wildlife Species	CANDIDATE SWH*		CONFIRMED SWH	LGL Discussion/ Analysis	SWH
		ELC Ecosite Codes	Habitat Characteristics and Information Sources	Defining Criteria		
Sites used by multiple species, a high number of individuals, and used annually are most significant.	Snowy Owl  <u>Special Concern</u> Short-eared Owl Bald Eagle	Series from each landclass:  <u>Forest</u> FOC      FOD FOM  <u>Upland</u> CUM      CUT CUS      CUW	<ul style="list-style-type: none"> <li>OMNR ecologist or biologist may be aware of locations of wintering raptors. In addition, these staff may know local naturalists that may be aware of the locations of raptor wintering habitats.</li> <li>Bird Studies Canada</li> <li>ESA reports and other studies prepared by Conservation Authorities</li> </ul>	<p>Studies confirm the use of these habitats by:</p> <ul style="list-style-type: none"> <li>1 or more Short-eared Owls <b>or</b>;</li> <li>2 or more of listed spp and 10 or more individuals<sup>Í</sup>.</li> <li>To be significant a site must be used annually for a minimum of 20 days by the above number of birds<sup>Í</sup>.</li> <li>SWHDSS cxlix Index #10 provides development effects and mitigation measures.</li> </ul>	<ul style="list-style-type: none"> <li>Study area surrounded by residential properties, and major thorough fares.</li> </ul>	
<b>Bat Hibernacula</b>  <b><u>Rationale:</u></b> Bat hibernacula are extremely rare in all Ontario landscapes.	Big Brown Bat Tri-coloured Bat	Bat Hibernacula may be found in these ecosites:  CCR1      CCR2 CCA1      CCA2  Maternal Colonies are not found in caves and mines in Ontario xxii. Maternal colonies can be found in tree cavities, vegetation and often buildings xxii, xxv, xxvi, xxvii, xxxi (buildings are not to be considered SWH)	<ul style="list-style-type: none"> <li>Hibernacula may be found in caves, mine shafts underground Karsts.</li> <li>Active mine sites should not be considered as SWH</li> <li>The locations and site characteristics of bat hibernacula are relatively poorly known.</li> </ul> <u>Information Sources</u> <ul style="list-style-type: none"> <li>OMNR for possible locations and contact information for local experts</li> <li>Natural Heritage Information Centre (NHIC) Bat Hibernaculum</li> <li>Ministry of Northern Development and Mines for location of (active or abandoned) mine shafts.</li> <li>clubs that explore caves (e.g., Sierra Club)</li> <li>University Biology Departments with bat experts</li> </ul>	<ul style="list-style-type: none"> <li>All sites with confirmed hibernating bats are SWH<sup>Ⓔ</sup></li> <li>The area includes 200m radius around the entrance of the hibernaculum <sup>cxlviii, ccvii</sup>, <sup>Ⓔ</sup> for most development types and 1000m for wind farms <sup>ccv</sup>.</li> <li>Studies are to be conducted during peak swarming period (Aug.- Sept) Suveys should be conducted following methods outlined in the “Bats and Bat Habitats: Guidelines for Wind Power Projects” <sup>ccv</sup>.</li> <li>SWH MIST<sup>cxlix</sup> Index #1 provides development effects and mitigation measures</li> </ul>	<ul style="list-style-type: none"> <li>No caves, mine shafts or underground karsts which could support hibernacula were identified within he study area.</li> </ul>	No candidate SWH identified on site.
<b>Bat Maternity Colonies</b>  <b><u>Rationale:</u></b> Known locations of forested bat maternity colonies are extremely rare in all Ontario landscapes.	Big Brown Bat Silver-haired Bat	Maternity colonies considered SWH are found in Forested Ecosites.  All ELC Ecosites in ELC Community Series: FOD FOM SWD SWM	<ul style="list-style-type: none"> <li>Maternity colonies can be found in tree cavities, vegetation and often in buildings<sup>xxii, xxv, xxvi, xvii, xxxi</sup> (buildings are not considered to be SWH).</li> <li>Maternity roosts are not found in caves and mines in Ontario<sup>xxii</sup>.</li> <li>Maternity colonies located in Mature deciduous or mixed forest stands<sup>ccix, ccx, ccv</sup> with &gt;10/ha large diameter (&gt;25cm dbh) wildlife trees<sup>ccvii</sup></li> </ul>	<ul style="list-style-type: none"> <li>Maternity Colonies with confirmed use by; <ul style="list-style-type: none"> <li>&gt;10 Big Brown Bats<sup>Ⓔ</sup></li> <li>&gt;5 Adult Female Silver- haired Bats<sup>Ⓔ</sup></li> </ul> </li> <li>The area of the habitat includes the entire woodland or a forest stand ELC Ecosite or an Ecoelement containing the maternity colonies<sup>Ⓔ</sup>.</li> <li>Evaluation methods for maternity</li> </ul>	<ul style="list-style-type: none"> <li>No Ecosites/ELC communities which meet identified criteria are present within the study area.</li> </ul>	No candidate SWH identified on site.

Wildlife Habitat	Wildlife Species	CANDIDATE SWH*		CONFIRMED SWH	LGL Discussion/ Analysis	SWH
		ELC Ecosite Codes	Habitat Characteristics and Information Sources	Defining Criteria		
			<ul style="list-style-type: none"> <li>Female Bats prefer wildlife tree (snags) in early stages of decay, class 1-3 ccxiv or class 1 or 2 ccxii .</li> <li>Silver-haired Bats prefer older mixed or deciduous forest and form maternity colonies in tree cavities and small hollows. Older forest areas with at least 21 snags/ha are preferred<sup>ccx, lxiv</sup></li> </ul> <u>Information Sources</u> <ul style="list-style-type: none"> <li>OMNRF for possible locations and contact for local experts</li> <li>University Biology Departments with bat experts.</li> </ul>	<p>colonies should be conducted following methods outlined in the “Bats and Bat Habitats: Guidelines for Wind Power Projects”<sup>ccv</sup> .</p> <ul style="list-style-type: none"> <li>SWH MiST<sup>cxlix</sup> Index #12 provides development effects and mitigation measures</li> </ul>		
<p><b>Turtle Wintering Areas</b></p> <p><b><u>Rationale:</u></b> Generally sites are the only known sites in the area. Sites with the highest number of individuals are most significant.</p>	<p>Midland Painted Turtle</p> <p><b><u>Special Concern:</u></b> Northern Map Turtle Snapping Turtle</p>	<p>Snapping and Midland Painted Turtles; ELC Community</p> <p>Classes; SW, MA, OA and SA: ELC Community Series; FEO and BOO</p> <p>Northern Map Turtle; Open Water areas such as deeper rivers or streams and lakes with current can also be used as over-wintering habitat.</p>	<ul style="list-style-type: none"> <li>For most turtles, wintering areas are in the same general area as their core habitat. Water has to be deep enough not to freeze and have soft mud substrates</li> <li>Over-wintering sites are permanent water bodies, large wetlands, and bogs or fens with adequate Dissolved Oxygen<sup>cix, cx, cxi, cxii</sup></li> <li>Man-made ponds such as sewage lagoons or storm water ponds should not be considered SWH.</li> </ul> <u>Information Sources</u> <ul style="list-style-type: none"> <li>EIS studies carried out by Conservation Authorities.</li> <li>OMNRF Ecologist or Biologist</li> <li>Field Naturalist clubs</li> <li>Natural Heritage Information Center (NHIC)</li> </ul>	<ul style="list-style-type: none"> <li>Presence of 5 over-wintering Midland Painted Turtles is significant<sup>Ⓔ</sup>.</li> <li>One or more Northern Map Turtle or Snapping Turtle over-wintering within a wetland is significant<sup>Ⓔ</sup>.</li> <li>The mapped ELC ecosite area with the over wintering turtles is the SWH. If the hibernation site is within a stream or river, the deep-water pool where the turtles are over wintering is the SWH.</li> <li>Over wintering areas may be identified by searching for congregations (Basking Areas) of turtles on warm, sunny days during the fall (Sept. – Oct.) or spring (Mar. – May) cvii.</li> <li>Congregation of turtles is more common where wintering areas are limited and therefore significant cix, cx, cxi, cxii.</li> <li>SWHMiST<sup>cxlix</sup> Index #28 provides development effects and mitigation measures for turtle wintering habitat.</li> </ul>	<ul style="list-style-type: none"> <li>No suitable wintering habitat observed within the stud area.</li> </ul>	No candidate SWH identified.
<p><b>Reptile Hibernaculum</b></p> <p><b><u>Rationale:</u></b> Generally</p>	<p><b><u>Snakes:</u></b> Eastern Gartersnake Northern Watersnake Northern Red-bellied Snake</p>	<p>For all snakes, habitat may be found in any ecosite other than very wet ones.</p>	<ul style="list-style-type: none"> <li>For snakes, hibernation takes place in sites located below frost lines in burrows, rock crevices and other natural or naturalized locations. The</li> </ul>	<p>Studies confirming:</p> <ul style="list-style-type: none"> <li>Presence of snake hibernacula used by a minimum of five individuals of a snake sp. <u>or</u>; individuals of two or more snake</li> </ul>	<ul style="list-style-type: none"> <li>No Talus, Rock Barren, Crevice, Cave, or Alvar sites identified on the property.</li> </ul>	No candidate SWH identified.

Wildlife Habitat	Wildlife Species	CANDIDATE SWH*		CONFIRMED SWH	LGL Discussion/ Analysis	SWH
		ELC Ecosite Codes	Habitat Characteristics and Information Sources	Defining Criteria		
sites are the only known sites in the area. Sites with the highest number of individuals are most significant	Northern Brownsnake Smooth Green Snake Northern Ring-necked Snake  <b>Special Concern:</b> Eastern Ribbonsnake	Talus, Rock Barren, Crevice, Cave, and Alvar sites may be directly related to these habitats.  Observations or congregations of snakes on sunny warm days in the spring or fall is a good indicator.	existence of features that go below frost line; such as rock piles or slopes, old stone fences, and abandoned crumbling foundations assist in identifying candidate SWH. <ul style="list-style-type: none"> <li>Areas of broken and fissured rock are particularly valuable since they provide access to subterranean sites below the frost line<sup>xliv, l, li, lii, cxii</sup>.</li> <li>Wetlands can also be important over-wintering habitat in conifer or shrub swamps and swales, poor fens, or depressions in bedrock terrain with sparse trees or shrubs with sphagnum moss or sedge hummock ground cover.</li> <li>Five-lined skink prefer mixed forests with rock outcrop openings providing cover rock overlaying granite bedrock with fissures cciii.</li> </ul> <u>Information Sources</u> <ul style="list-style-type: none"> <li>In spring, local residents or landowners may have observed the emergence of snakes on their property (e.g. old dug wells).</li> <li>Reports and other information available from Conservation Authorities.</li> <li>Field Naturalists clubs</li> <li>University herpetologists</li> <li>Natural Heritage Information Center (NHIC)</li> <li>OMNRF ecologist or biologist may be aware of locations of wintering skinks</li> </ul>	spp. Congregations of a minimum of five individuals of a snake sp. or; individuals of two or more snake spp. near potential hibernacula (egg. foundation or rocky slope) on sunny warm days in Spring (Apr/May) and Fall (Sept/Oct)Ⓔ <ul style="list-style-type: none"> <li><u>Note:</u> If there are Special Concern Species present, then site is SWH</li> <li><u>Note:</u> Sites for hibernation possess specific habitat parameters (e.g. temperature, humidity, etc.) and consequently are used annually, often by many of the same individuals of a local population (i.e. strong hibernation site fidelity). Other critical life processes (e.g. mating) often take place in close proximity to hibernacula. The feature in which the hibernacula is located plus a 30 m radius area is the SWHⒺ</li> <li>SWHMiSTcxlix Index #13 provides development effects and mitigation measures for snake hibernacula.</li> <li>Presence of any active hibernaculum for skink is significant.</li> <li>SWHMiSTcxlix Index #37 provides development effects and mitigation measures for five-lined skink wintering habitat.</li> </ul>	<ul style="list-style-type: none"> <li>None of the wildlife species identified were observed or anticipated to be present on the property.</li> </ul>	
<b>Colonial Bird Nesting Sites (Tree/Shrubs)</b>  <b><u>Rationale:</u></b>	Great Blue Heron Black-crowned Night-Heron Great Egret Green Heron	SWM2 SWM3 SWM5 SWM6 SWD1 SWD2 SWD3 SWD4 SWD5 SWD6 SWD7 FET1	<ul style="list-style-type: none"> <li>Nests in live or dead standing trees in wetlands, lakes, islands, and on peninsulas.</li> <li>Most nests in trees are 11- 15 m from ground, near the top of the tree</li> </ul>	Studies confirming: <ul style="list-style-type: none"> <li>Presence of 1 or more active nests of any of the listed species I.</li> <li>Studies would be done during April/June when actively nesting.</li> </ul>	<ul style="list-style-type: none"> <li>ELC Ecosites identified do not meet criteria.</li> <li>None of the wildlife species identified were observed on the property. No nests or suitable nesting habitat was identified.</li> </ul>	No candidate SWH identified.

Wildlife Habitat	Wildlife Species	CANDIDATE SWH*		CONFIRMED SWH	LGL Discussion/ Analysis	SWH
		ELC Ecosite Codes	Habitat Characteristics and Information Sources	Defining Criteria		
Colonies important to local bird population; typically, sites are only known colony in area.			<ul style="list-style-type: none"> <li>Ontario Breeding Bird Atlas, colonial nest records</li> <li>Ontario Nest Records Scheme (Royal Ontario Museum)</li> <li>Ontario Heronry Inventory 1991 available from Bird Studies Canada</li> <li>Sometimes aerial photographs can help identify large heronries.</li> <li>ESA reports and other studies prepared by Conservation Authorities</li> <li>OMNR District Offices</li> <li>local naturalist clubs</li> </ul>	<ul style="list-style-type: none"> <li>SWHDSS cxlix Index #5 provides development effects and mitigation measures.</li> </ul>		
<b>Colonial-Nesting Bird Breeding Habitat (Ground )</b>  <b><u>Rationale:</u></b> Colonies important to local bird population; typically, sites are only known colony in area.	Herring Gull Great Black-backed Gull Common Tern Caspian Tern Little Gull	Any rocky island or peninsula (natural or artificial) within a lake or large river (two-lined on a 1:50,000 NTS map).	<ul style="list-style-type: none"> <li>Nesting colonies are on islands or peninsulas associated with open water</li> <li>Ontario Breeding Bird Atlas, colonial nest records</li> <li>Ontario Nest Record Scheme (Royal Ontario Museum)</li> <li>Canadian Wildlife Service</li> <li>ESA reports and other studies prepared by Conservation Authorities <ul style="list-style-type: none"> <li>OMNR District Offices</li> </ul> </li> <li>local naturalist clubs</li> </ul>	Studies confirming: <ul style="list-style-type: none"> <li>Presence of &gt; 100 nests Herring Gulls, and &gt; 75 nests Caspian or Common Terns<sup>cxlix</sup>.</li> <li>Any nesting colony of 1 or more Little Gull or Great Black-backed Gull is to be considered significant.<sup>I</sup></li> <li>Studies would be done during May/June when actively nesting.</li> <li>SWHDSS cxlix Index #6 provides development effects and mitigation measures</li> </ul>	<ul style="list-style-type: none"> <li>Habitat types identified do not meet criteria.</li> <li>None of the wildlife species identified were observed on the property. No nests or suitable nesting habitat was identified.</li> </ul>	No candidate SWH identified.
<b>Butterfly Migratory Route/Stopover Areas</b>  <b><u>Rationale:</u></b> Butterfly stopover areas are extremely rare habitats and are biologically important for Butterfly species that migrate south for the winter.	Painted lady White Admiral  <u>Special Concern</u> Monarch Butterfly	Combination of ELC Community Series; need to have present one Community Series from each landclass:  <u>Field</u> CUM      CUT CUS  <u>Forest</u> FOC      FOD FOM      CUP  Anecdotally, a candidate sight for butterfly stopover will have a history of	<ul style="list-style-type: none"> <li>Butterfly stopover areas are rare habitats located within 5 km of Lake Erie (OMNR 2000b). The habitat is typically a combination of field and forest, and provides the butterflies with a location to rest prior to their long migration south. xxxii, xxxiii, xxxiv, xxxv, xxxvi.</li> <li>Staging areas usually provide protection from the elements and are often spits of land or areas with the shortest distance to cross the Great Lakes xxxvii, xxxviii, xxxix, xl, xli.</li> <li>OMNR for list of local butterfly experts</li> <li>Agriculture Canada in Ottawa may have list of butterfly experts.</li> </ul>	<ul style="list-style-type: none"> <li>A butterfly stopover area will be a minimum of 10 ha in size with a combination of field and forest habitat present, and will be located within 5 km of Lake Erie. cxlix</li> <li>Studies will confirm the presence of Monarch Use Days (MUD) during fall migration (Aug/Oct) xliii. MUD is based on the number of days a site is used by Monarchs, multiplied by the number of individuals using the site. Numbers of butterflies can range from 100-500/dayxxxvii, significant variation can occur between years and multiple years of sampling should occur xl, xlii.</li> <li>MUD of &gt;5000 or &gt;3000 with the presence of Painted Ladies or White</li> </ul>	<ul style="list-style-type: none"> <li>ELC Ecosites identified do not meet criteria.</li> <li>Vegetation communities present on site however are less than the minimum ha and not within 5 km of Lake Ontario.</li> </ul>	No candidate SWH identified.



Wildlife Habitat	Wildlife Species	CANDIDATE SWH*		CONFIRMED SWH	LGL Discussion/ Analysis	SWH
		ELC Ecosite Codes	Habitat Characteristics and Information Sources	Defining Criteria		
		butterflies being observed.	<ul style="list-style-type: none"> <li>Other sources of information would include naturalist clubs, the Toronto Entomologists Association, and Conservation Authorities.</li> </ul>	Admiral's is to be considered significant. <sup>I</sup> <ul style="list-style-type: none"> <li>SWHDSS cxlix Index #16 provides development effects and mitigation measures.</li> </ul>		
<b>Deer Winter Congregation Areas</b>  <b><u>Rationale:</u></b> Deer movement during winter in the southern areas of Ecoregion 6E are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands to reduce or avoid the impacts of winter conditions cxlviii.	White-tailed Deer	All Forested Ecosites with these ELC Community Series: FOC FOM FOD SWC SWM SWD  Conifer plantations much smaller than 50 ha may also be used.	<ul style="list-style-type: none"> <li>Woodlots will typically be &gt;100 ha in size<sup>Ⓔ</sup>. Woodlots &lt;100ha may be considered as significant based on MNRF studies or assessment.</li> <li>Deer movement during winter in the southern areas of Ecoregion 6E are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands cxlviii.</li> <li>If deer are constrained by snow depth refer to the Deer Yarding Area habitat within Table 1.1 of this Schedule.</li> <li>Large woodlots &gt; 100ha and up to 1500 ha are known to be used annually by densities of deer that range from 0.1-1.5 deer/ha ccxxiv.</li> <li>Woodlots with high densities of deer due to artificial feeding are not significant<sup>Ⓔ</sup>.</li> </ul> Information Sources <ul style="list-style-type: none"> <li>MNRF District Offices.</li> </ul> LIO/NRVIS	Studies confirm: <ul style="list-style-type: none"> <li>Deer management is an MNRF responsibility, deer winter congregation areas considered significant will be mapped by MNRF<sup>cxlviii</sup>.</li> <li>Use of the woodlot by white-tailed deer will be determined by MNRF, all woodlots exceeding the area criteria are significant, unless determined not to be significant by MNRF<sup>Ⓔ</sup></li> <li>Studies should be completed during winter (Jan/Feb) when &gt;20cm of snow is on the ground using aerial survey techniques<sup>ccxxiv</sup>, ground or road surveys. or a pellet count deer density survey<sup>ccxxv</sup>.</li> <li>If a SWH is determined for Deer Wintering Area or if a proposed development is within Stratum II yarding area then Movement Corridors are to be considered as outlined in Table 1.4.1 of this Schedule.</li> <li>SWHMiST<sup>cxlix</sup> Index #2 provides development effects and mitigation measures.</li> </ul>	<ul style="list-style-type: none"> <li>No available layers from LIO indicated the presence of this SWH type. Woodlots and vegetation communities within the study area do not meet the minimum size/ELC Ecosites criteria.</li> </ul>	No candidate SWH identified.

3.2 Rare Vegetation Communities or Specialized Habitat for Wildlife

3.2.1 Rare Vegetation Communities

The majority of Rare Vegetation Communities are protected within the Greenbelt planning area through the protection of Key Natural Heritage Features. For example, sand barrens, tallgrass prairie, alvars, and savannahs are all identified as Key Natural Heritage Features by the Greenbelt Plan. However, outside of the Natural Heritage System of the Protected Countryside landuse designation, the PPS is the relevant policy document and many rare vegetation habitats are candidate SWH, including: sand barrens, tallgrass prairies, alvars, and savannahs. Woodlands not protected as Significant Woodlands have the potential to be a Rare Vegetation Community, and therefore Candidate SWH. Table 1.2.1 contains a listing of Rare Vegetation Communities that are considered SWH for the Greenbelt planning area and where the PPS policy is the direction to be followed.

Table 1.2.1 Rare Vegetation Communities.

Rare Vegetation Community	ELC Ecosite Code	Habitat Description	Detailed Information and Sources	CONFIRMED SWH and Defining Criteria	LGL Discussion/ Analysis	SWH
<b>Cliff and Talus Slopes</b>  <b>Rationale:</b> Cliffs and Talus Slopes are extremely rare habitats in Ontario.	CLO1 CLS1 CLS2 CLT1 CLT2 TAO1 TAO2 TAS1 TAS2 TAT1 TAT2	A Cliff is vertical to near vertical bedrock >3m in height. A Talus Slope is rock rubble at the base of a cliff made up of coarse rocky debris.	<ul style="list-style-type: none"><li>• Most cliff and talus slopes occur along the Niagara Escarpment.</li><li>• The Niagara Escarpment Commission has detailed information on location of these habitats.</li><li>• Natural Heritage Information Centre.</li><li>• Conservation Authorities.</li></ul>	<ul style="list-style-type: none"><li>• Confirm any ELC Vegetation Type for Cliffs or Talus Slopes lxxviii</li><li>• SWHDSS (OMNR 2000c) Index #21 provides development effects and mitigation measures.</li><li>• </li></ul>	<ul style="list-style-type: none"><li>• No ELC Ecosites described of this type documented.</li></ul>	None identified
<b>Sand Barren</b>  <b>Rationale:</b> Sand barrens are rare in Ontario and support rare species. Most Sand Barrens have been lost due to cottage development and forestry.	SBO1 SBS1 SBT1  Vegetation cover varies from patchy and barren to continuous meadow (SBO1), thicket-like (SBS1), or more closed and treed (SBT1). Tree cover always ≤ 60%.	Sand Barrens typically are exposed sand habitats, generally sparsely vegetated and caused by lack of moisture, periodic fires, and erosion. They have little or no soil, and the underlying rock protrudes through the surface. Usually located within other types of natural habitat, such as forest or savanna.	<ul style="list-style-type: none"><li>• Sand Barrens support rare species such as provincially Endangered Forked Three-awned Grass and American Badger lxxxv, lxxxvi. By extension, sand barren sites that could support These rare species (close proximity to other populations), historically or currently should be considered for higher priority conservation.</li><li>• Natural Heritage Information Centre</li><li>• OMNR Ecologists</li><li>• District SAR Biologists</li><li>• local Naturalist clubs</li><li>• Conservation Authorities</li></ul>	<ul style="list-style-type: none"><li>• No minimum size to site.</li><li>• Confirm any ELC Vegetation Type for Sand Barrens lxxviii</li><li>• Site must not be dominated by exotic or introduced species</li><li>• SWHDSS cxlix Index #20 provides development effects and mitigation measures.</li><li>• </li></ul>	<ul style="list-style-type: none"><li>• No ELC Ecosites described of this type documented.</li></ul>	None identified
<b>Alvar</b>  <b>Rationale:</b> Alvars are extremely rare habitats in Ontario.	ALO1 ALS1 ALT1	An alvar will be level unfractured or partially fractured limestone, a patchy mosaic of bare rock pavement, or shallow substrate over limestone bedrock. The site will vary between being seasonally dry or inundated with water. Vegetation cover varies from	<ul style="list-style-type: none"><li>• In Ontario, alvars occur in a series of clusters just south of the contact line with the granitic uplands of the Canadian Shield and in a few small isolated areas to the south.</li></ul>	<ul style="list-style-type: none"><li>• Site to be &gt; 0.5 ha in size lxxv.</li><li>• Confirm any ELC Vegetation Type for Alvars lxxviii</li><li>• Site must not be dominated by exotic or introduced species. The alvar must be in excellent condition and fit in with</li></ul>	<ul style="list-style-type: none"><li>• No ELC Ecosites described of this type documented.</li></ul>	None identified

Rare Vegetation Community	ELC Ecosite Code	Habitat Description	Detailed Information and Sources	CONFIRMED SWH and Defining Criteria	LGL Discussion/ Analysis	SWH
		<p>patchy and barren with a less than 60% tree cover<sup>lxxviii</sup>.</p> <p>Alvar is particularly rare in ecoregion 6E where the only known sites are found in the western islands Lake Erie.<sup>cxix</sup></p>	<ul style="list-style-type: none"> <li>Alvars of Ontario (2000), Federation of Ontario Naturalists.</li> <li>Natural Heritage Information Centre.</li> <li>OMNR Ecologists.</li> <li>Local Naturalist clubs</li> <li>Conservation Authorities.</li> </ul>	<p>surrounding landscape with few conflicting landuses <sup>lxxv</sup>.</p> <ul style="list-style-type: none"> <li>Three or more of the Alvar indicator species <sup>lxxv</sup> listed in <sup>cxlix</sup> Appendix N should be present.</li> <li>SWHDSS <sup>cxlix</sup> Index #17 provides development effects and mitigation measures.</li> </ul>		
<b>Old-Growth Forest</b>  <b><u>Rationale:</u></b> Old Growth forest stands are rare in S. Ontario.	Forest Community Series: FOD FOC FOM	Old-growth forests tend to be relatively undisturbed, structurally complex, and contain a wide variety of trees and shrubs in various age classes. These habitats usually support a high diversity of wildlife species.	<ul style="list-style-type: none"> <li>OMNR Ecologists and Foresters</li> <li>Conservation Authorities</li> </ul>	<ul style="list-style-type: none"> <li>No minimum size to site<sup>Í</sup></li> <li>Determine ELC Vegetation Type for forest stand <sup>lxxviii</sup></li> <li>If dominant trees species of ELC Vegetation Type are &gt;100 years old, then stand is Significant Wildlife Habitat.<sup>Í</sup></li> <li>Human activity within the stand must be minimal, old growth characteristics require a relatively undisturbed forest stand.</li> <li>SWHDSS <sup>cxlix</sup> Index #23 provides development effects and mitigation measures.</li> </ul>	<ul style="list-style-type: none"> <li>No forest habitat was noted with trees of age class to meet criteria.</li> </ul>	None identified
<b>Savannah</b>  <b><u>Rationale:</u></b> Savannahs are extremely rare habitats in Ontario.	TPS1 TPS2 25%<tree cover<35% <sup>lxxviii</sup>  TPW1 TPW2 35%<tree cover<60% <sup>lxxviii</sup>	<p>A savannah is a tallgrass prairie habitat that has tree cover between 25-60%.</p> <p>Tallgrass Prairie (TGP) and savannah were historically common in the near-shore areas of the Great Lakes.</p> <p>In ecoregion 6E, known Tallgrass Prairie and savannah remnants are scattered between Lake Huron and Lake Erie, near Lake St. Clair, north of and along the Lake Erie shoreline, in Brantford and in the Toronto area (north of Lake Ontario). <sup>cc</sup></p>	<ul style="list-style-type: none"> <li>Natural Heritage Information Centre</li> <li>OMNR Ecologists</li> <li>local Naturalist clubs</li> <li>Conservation Authorities</li> </ul>	<ul style="list-style-type: none"> <li>No minimum size to site<sup>Í</sup>. Site must be restored or a natural site, remnant sites such as railway right of ways not to be considered significant.</li> <li>Confirm any ELC Vegetation Type for Savannahs <sup>lxxviii</sup></li> <li>Site must not be dominated by exotic or introduced species.</li> <li>One or more of the Savannah indicator species listed in <sup>lxxv</sup> Appendix N should be present<sup>Í</sup>.</li> <li>SWHDSS <sup>cxlix</sup> Index #18 provides development effects and mitigation measures.</li> </ul>	<ul style="list-style-type: none"> <li>No ELC Ecosites described of this type documented.</li> </ul>	None identified
<b>Tallgrass Prairie</b>  <b><u>Rationale:</u></b> Tallgrass Prairies are extremely rare habitats in Ontario.	TPO1 TPO2	<p>A tallgrass prairie has ground cover dominated by prairie grasses, an open tall grass prairie habitat will have less than 25% tree cover.</p> <p>Tallgrass Prairie (TGP) and savannah were historically common in the near-shore areas of the Great Lakes</p>	<ul style="list-style-type: none"> <li>Natural Heritage Information Centre.</li> <li>OMNR Ecologists.</li> <li>District SAR Biologists</li> <li>Stewardship Councils specializing in TGP (e.g., Brant, Lambton Counties</li> <li>Local Naturalist clubs</li> </ul>	<ul style="list-style-type: none"> <li>No minimum size to site<sup>Í</sup>.</li> <li>Site must be restored or a natural site, remnant sites such as railway right of ways not to be considered significant.</li> <li>Confirm any ELC Vegetation Type for Tall Grass Prairies <sup>lxxviii</sup></li> </ul>	<ul style="list-style-type: none"> <li>No ELC Ecosites described of this type documented.</li> </ul>	None identified

Rare Vegetation Community	ELC Ecosite Code	Habitat Description	Detailed Information and Sources	CONFIRMED SWH and Defining Criteria	LGL Discussion/ Analysis	SWH
		In ecoregion 6E, known Tallgrass Prairie and savannah remnants are scattered between Lake Huron and Lake Erie, near Lake St. Clair, north of and along the Lake Erie shoreline, in Brantford and in the Toronto area (north of Lake Ontario). <sup>cc</sup>	<ul style="list-style-type: none"> <li>Conservation Authorities.</li> </ul>	<ul style="list-style-type: none"> <li>Site must not be dominated by exotic or introduced species.</li> <li>One or more of the tall grass prairie indicator species listed in lxxv Appendix N should be present.</li> <li>SWHDSS cxlix Index #19 provides development effects and mitigation measures..</li> </ul>		
<b>Other Rare Vegetation Communities</b>  <b><u>Rationale:</u></b> Plant communities that often contain rare species which depend on the habitat for survival.	Provincially Rare S1, S2 and S3 vegetation communities are listed in Appendix M of the SWHTGcxlvihi . Any ELC Ecosite Code that has a possible ELC Vegetation Type that is Provincially Rare is Candidate SWH.	Rare Vegetation Communities may include beaches, fens, forest, marsh, barrens, dunes and swamps.	<p>ELC Ecosite codes that have the potential to be a rare ELC Vegetation Type as outlined in appendix M cxlviii</p> <p>The OMNRF/NHIC will have up to date listing for rare vegetation communities.</p> <p>Information Sources</p> <ul style="list-style-type: none"> <li>Natural Heritage Information Center (NHIC) has location information available on their website</li> <li>OMNRF Districts</li> <li>Feld Naturalist clubs.</li> <li>Conservation Authorities.</li> </ul>	<p>Field studies should confirm if an ELC Vegetation Type is a rare vegetation community based on listing within Appendix M of SWHTGcxlvihi .</p> <ul style="list-style-type: none"> <li>Area of the ELC Vegetation Type polygon is the SWH.</li> <li>SWHMiST cxlix Index #37 provides development effects and mitigation measures.</li> </ul>	<ul style="list-style-type: none"> <li>No MNRF significant community or species.</li> </ul>	None identified



3.2.2 Specialized Habitat for Wildlife

Some wildlife species require large areas of suitable habitat for their long-term survival. Many wildlife species require substantial areas of suitable habitat for successful breeding. Their populations decline when habitat becomes fragmented and reduced in size (OMNR 2000a). The largest and least fragmented habitats within a planning area will support the most significant populations of wildlife. Specialized habitat for wildlife is a community- or diversity-based category, therefore the more wildlife species a habitat contains the more significant the habitat becomes to the planning area. The specialized habitats for wildlife that are Candidate SWH are outlined in Table 1.2.2.

Table 1.2.2 Specialized Habitats of Wildlife considered Candidate SWH.

Specialized Wildlife Habitat	Wildlife Species	ELC Ecosite Codes	Habitat Characteristics and Information Sources	CONFIRMED SWH and Defining Criteria	LGL Discussion/ Analysis	SWH
<b>Waterfowl Nesting Area</b>  <b>Rationale:</b> Important to local waterfowl populations, sites with greatest number of species and highest number of individuals are significant.	American Black Duck Northern Pintail Northern Shoveler Gadwall Blue-winged Teal Green-winged Teal Wood Duck Hooded Merganser Mallard	All upland habitats located adjacent to these wetland ELC Ecosites are Candidate SWH:  MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 SWT1 SWT2 SWD1 SWD2 SWD3 SWD4  <b>Note: includes adjacency to Provincially Significant Wetlands</b>	<ul style="list-style-type: none"><li>A waterfowl nesting area extends 120 m cxlix from a wetland (&gt; 0.5 ha) or a cluster of 3 or more small (&lt;0.5 ha) wetlands within 150 m of each other where waterfowl nesting is known to occur cxlix Í.</li><li>Upland areas should be at least 120 m wide so that predators such as racoons, skunks, and foxes have difficulty finding nests.</li><li>Wood Ducks and Hooded Mergansers utilize large diameter trees (&gt;40cm dbh) in woodlands for cavity nest sites.</li><li>Ducks Unlimited staff may know the locations of particularly productive nesting sites.</li><li>OMNR Wetland Evaluations for indication of significant waterfowl nesting habitat.</li><li>ESA reports prepared by Conservation Authorities.</li></ul>	Studies confirmed: <ul style="list-style-type: none"><li>Presence of 3 or more nesting pairs for listed species except MallardÍ, or;</li><li>Presence of 10 or more nesting pairs for listed species including MallardÍ.</li><li>Nesting studies should be completed during the spring breeding season (April-June).</li><li>A field study confirming waterfowl nesting habitat will determine the boundary of the waterfowl nesting habitat for the SWH; this may be greater or less than 120 m from the wetland and will provide enough habitat for waterfowl to nest successfully.</li><li>SWHDSS cxlix Index #25 provides development effects and mitigation measures.</li></ul>	<ul style="list-style-type: none"><li>ELC Ecosites identified do not meet criteria.</li><li>None of the wildlife species listed were observed on the property.</li></ul>	No candidate SWH identified.
<b>Bald Eagle and Osprey Nesting, Foraging and Perching Habitat</b>  <b>Rationale:</b> Nest sites are fairly uncommon in Ecoregion 6E and are used by these species. Many suitable nesting locations may be lost due to increasing shoreline development	Osprey  <b>Species Concern</b> Bald Eagle	Forest Communities Series: FOD, FOM, FOC, SWD, SWM and SWC directly adjacent to riparian areas – rivers, lakes, ponds and wetlands	Nests are associated with lakes, ponds, rivers or wetlands along forested shorelines, islands, or on structures over water. <ul style="list-style-type: none"><li>Osprey nests are usually at the top of trees whereas Bald Eagle nests are typically in super canopy trees in a notch within the tree’s canopy.</li><li>Nests located on man-made objects are not to be included as SWH (e.g. telephone poles and constructed nesting platforms).</li></ul> <b>Information Sources</b> <ul style="list-style-type: none"><li>Natural Heritage Information Centre (NHIC) compiles all known nesting sites for Bald Eagles in Ontario.</li></ul>	Studies confirm the use of these nest by:: <ul style="list-style-type: none"><li>One or more active Osprey or Bald Eagle nests in an area<sup>cxlviii</sup>.</li><li>Some species have more than one nest in a given area and priority is given to the primary nest with alternate nests included within the area of the SWH.</li><li>For Osprey, the active nest and a 300 m radius around the nest or contiguous woodland stand is the SWH<sup>ccvii</sup>, maintaining undisturbed shorelines with large trees</li></ul>	<ul style="list-style-type: none"><li>ELC Ecosites identified do not meet criteria.</li><li>No existence of an existing or previous nests for Bald Eagle were observed within the study area. Study area surrounded by residential properties, and major thorough fares. Super canopy trees not present.</li></ul>	No significant SWH identified.

Specialized Wildlife Habitat	Wildlife Species	ELC Ecosite Codes	Habitat Characteristics and Information Sources	CONFIRMED SWH and Defining Criteria	LGL Discussion/ Analysis	SWH
pressures and scarcity of habitat.			<ul style="list-style-type: none"> <li>MNRF values information (LIO/NRVIS) will list known nesting locations. Note: data from NRVIS is provided as a point and does not represent all the habitat.</li> <li>Nature Counts, Ontario Nest Records Scheme data.</li> <li>OMNRF Districts.</li> <li>Check the Ontario Breeding Bird Atlas or Rare Breeding Birds in Ontario for species documented.</li> <li>Reports and other information available from Conservation Authorities.</li> <li>Field Naturalist clubs.</li> </ul>	<p>within this area is important <sup>cxclvii</sup>.</p> <ul style="list-style-type: none"> <li>For a Bald Eagle the active nest and a 400-800 m radius around the nest is the SWH. <sup>cvi</sup>, <sup>ccvii</sup> Area of the habitat from 400-800 m is dependent on site lines from the nest to the development and inclusion of perching and foraging habitat <sup>cvi</sup></li> <li>To be significant a site must be used annually. When found inactive, the site must be known to be inactive for ≥3 years or suspected of not being used for &gt;5 years before being considered not significant. <sup>ccvii</sup></li> <li>Observational studies to determine nest site use, perching sites and foraging areas need to be done from early March to August</li> <li>Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects”<sup>ccxii</sup></li> <li>SWHDSS <sup>cxlix</sup> Index #26 provides development effects and mitigation measures</li> </ul>		
<p><b>WOODLAND RAPTOR NESTING HABITAT</b></p> <p><u><b>Rationale:</b></u> Nest sites for these species are rarely identified, these habitats are often used annually by these species.</p>	<p>Broad-winged Hawk N. Goshawk Cooper’s Hawk Sharp-shinned Hawk Red-shouldered Hawk Barred Owl</p>	<p>May be found in all forested ELC Ecosites.</p> <p>May also be found in SWC SWM SWD CUP3</p>	<p>All natural or conifer plantation woodland/forest stands &gt;30 ha with &gt;4ha of interior habitat <sup>lxxxviii</sup>, <sup>lxxxix</sup>, <sup>xc</sup>, <sup>xc</sup>, <sup>xciii</sup>, <sup>xciv</sup>, <sup>xcv</sup>, <sup>xcvi</sup>, <sup>cxix</sup> Interior habitat determined with a 200m buffer<sup>cxlviii</sup></p> <ul style="list-style-type: none"> <li>Stick nests found in a variety of intermediate-aged to mature conifer, deciduous or mixed forests within tops or crotches of trees. Species such as Coopers hawk nest along forest edges sometimes on peninsulas or small off-shore islands.</li> <li>In undisturbed sites, nests may be used again, or a new nest will be in close proximity to old nest</li> </ul>	<p>Studies confirm;</p> <ul style="list-style-type: none"> <li>Presence of 1 or more active nests from species list is considered significant.</li> <li>Red-shouldered Hawk and Northern Goshawk - A 400m radius around the nest or 28 ha area of habitat is the SWH<sup>ccvii</sup>. (the 28 ha habitat area would be applied where optimal habitat is irregularly shaped around the nest)</li> <li>Broad-winged Hawk and Coopers Hawk, - A 100, radius around the nest is the SWH<sup>ccvii</sup></li> </ul>	<ul style="list-style-type: none"> <li>ELC Ecosites identified do not meet criteria.</li> <li>No evidence of an active nest or the presence of any species listed were identified during the field inventory. Forested communities within the study do not meet the size criteria nor do they contain interior habitat.</li> </ul>	No significant SWH identified.

Specialized Wildlife Habitat	Wildlife Species	ELC Ecosite Codes	Habitat Characteristics and Information Sources	CONFIRMED SWH and Defining Criteria	LGL Discussion/ Analysis	SWH
			<u>Information Sources</u> <ul style="list-style-type: none"> <li>• OMNRF Districts.</li> <li>• Check the Ontario Breeding Bird Atlas</li> <li>• Rare Breeding Birds Atlas or Rare Breeding Birds in Ontario for species documented</li> <li>• Check data from Birds Studies Canada</li> <li>• ESA reports and other studies prepared by Conservation Authorities</li> </ul>	<ul style="list-style-type: none"> <li>• Sharp-Shinned Hawk – A 50m radius around the nest is the SWH<sup>ccvii</sup></li> <li>• Conduct field investigations from March to the end of May. The use of call broadcasts can help in locating territorial (courting/nesting) raptors and facilitate the discovery of nests by narrowing down the search area.</li> <li>• SWHDSS cxlix Index #27 provides development effects and mitigation measures.</li> </ul>		
<b>TURTLE NESTING HABITAT AND TURTLE OVER-WINTERING AREAS</b>  <b><u>Rationale:</u></b> These habitats are rare and when identified will often be the only breeding or hibernating site for local populations of turtles.	Midland Painted Turtle  <u>Special Concern Species</u> Northern Map Turtle Snapping Turtle	Exposed mineral soil (sand or gravel) areas adjacent (<100m) <sup>cxivii</sup> or within the following ELC Ecosites: MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 BOO1 FEO1	<ul style="list-style-type: none"> <li>• Best nesting habitat for turtles are close to water and away from roads and sites less prone to loss of eggs by predation from skunks, raccoons or other animals.</li> <li>• For an area to function as a turtle-nesting area, it must provide sand and/or gravel that turtles are able to dig in and are located in open sunny areas. Nesting areas on the sides of municipal or provincial road embankments and shoulders are not SWH.</li> <li>• Sand and gravel beaches adjacent to undisturbed shallow weedy areas of marshes, lakes, and rivers are most frequently used.</li> <li>• Over-wintering sites are permanent water bodies, large wetlands, and bogs or fens with adequate Dissolved Oxygen. cix, cx, cxi, cxviii</li> </ul> <u>Information Sources</u> <ul style="list-style-type: none"> <li>• Use Ontario Soil Survey reports and maps to help find suitable substrate for nesting turtles (well-drained sands and fine gravels).</li> <li>• Check the Ontario Herpetofaunal Summary records for uncommon turtles; location information may help to find potential nesting habitat for them.</li> </ul>	Studies confirm: <ul style="list-style-type: none"> <li>• Presence of 5 or more nesting Midland Painted Turtles</li> <li>• One or more Northern Map Turtle or snapping Turtle nesting is SWH</li> <li>• The area of collection of sites within an area of exposed mineral soils where the turtles nest, plus a radius of 30-100m around the nesting area dependent on slope, riparian vegetation and adjacent land use is SWH. <sup>cxlviii</sup></li> <li>• Travel routes from wetland to nesting area are to be considered within the SWH as part of the 30-100m area of habitat.</li> <li>• Field investigations should be conducted in prime nesting season (May-July). Observational studies observing the turtles nesting is a recommended method.</li> <li>• SWHDSS cxlix Index #28 provides development effects and mitigation measures for turtle nesting habitat.</li> </ul>	<ul style="list-style-type: none"> <li>• ELC Ecosites identified do not meet criteria.</li> <li>• Midland Painted Turtle and Snapping Turtle were not observed/expected within the study area.</li> </ul>	No significant SWH identified.

Specialized Wildlife Habitat	Wildlife Species	ELC Ecosite Codes	Habitat Characteristics and Information Sources	CONFIRMED SWH and Defining Criteria	LGL Discussion/ Analysis	SWH
			<ul style="list-style-type: none"> <li>Natural Heritage Information Centre (NHIC)</li> <li>ESA reports and other studies prepared by Conservation Authorities</li> <li>local Naturalist groups</li> </ul>			
<b>Seeps and Springs</b>  <b>Rationale:</b> Seeps/Springs are typical of headwater areas and are often at the source of coldwater streams.	Wild Turkey Ruffed Grouse White-tailed Deer	Seeps/Springs are areas where ground water comes to the surface. Often they are found within headwater areas within forested habitats. Any forested Ecosite within the headwater areas of a stream could have seeps/springs.	Any predominantly forested area (with <25% meadow/field/pasture) within the headwaters of a stream or river system cxvii, cxlix.  Important feeding and drinking areas; will typically support a variety of plant and animal species, especially in the winter cxix, cxx, cxxi, cxxii, cxxiii, cxxiv. <u>Information Sources</u> <ul style="list-style-type: none"> <li>topographical map</li> <li>thermography</li> <li>Hydrological surveys conducted by Conservation Authorities and Ministry of Environment</li> <li>local naturalists and landowners</li> <li>Municipalities and Conservation Authorities may have drainage maps and headwater areas mapped..</li> </ul>	Studies confirm: <ul style="list-style-type: none"> <li>Presence of a site with &gt;2 or more seeps/springs confirmed by studies should be considered SWH.</li> <li>The area of a ELC forest ecosite or an ecoelement within ecosite contain the seeps/springs is the SWH. The protection of the recharge area considering the slope, vegetation, height of trees and ground water condition need to be considred in delineation the habitat cxlviii</li> <li>SWHDSS cxlix Index #30 provides development effects and mitigation measures</li> </ul>	<ul style="list-style-type: none"> <li>No seeps were observed within the study area during the field investigations.</li> </ul>	No significant SWH identified.
<b>Amphibian Breeding Habitat (Woodland).</b>  <b>Rationale:</b> These habitats are extremely important to amphibian biodiversity within a landscape and often represent the only breeding habitat for local amphibian populations	Eastern Newt Blue-spotted Salamander Spotted Salamander Gray Treefrog Spring Peeper Western Chorus Frog Wood Frog	All Ecosites associated with these ELC Community Series; FOC FOM FOD SWC SWM SWD  Breeding pools within the woodland or the shortest distance from forest habitat are more significant because they are more likely to be used due to reduced risk to	<ul style="list-style-type: none"> <li>Presence of a wetland, pond or woodland pool (including vernal pools) &gt;500m2 (about 25m diameter) ccvii within or adjacent (within 120m) to a woodland (no minimum size).clxxxii, lxiii, lxv, lxvi, lxvii, lxviii, lxix, lxx Some small wetlands may not be mapped and may be important breeding pools for amphibians.</li> <li>Woodlands with permanent ponds or those containing water in most years until mid-July are more likely to be used as breeding habitat cxlviii</li> </ul> <u>Information Sources</u> <ul style="list-style-type: none"> <li>Ontario Herpetofaunal Summary Atlas (or other similar atlases) for records</li> <li>Local landowners may also provide assistance as they may hear spring- time choruses of</li> </ul>	Studies confirm; <ul style="list-style-type: none"> <li>Presence of breeding population of 1 or more of the listed newt/salamander species or 2 or more of the listed frog species with at least 20 individuals (adults or eggs masses) lxxi or 2 or more of the listed frog species with Call Level Codes of 3Ⓔ.</li> <li>A combination of observational study and call count surveys cviii will be required during the spring (March-June) when amphibians are concentrated around suitable breeding habitat within or near the woodland/wetlands.</li> </ul>	<ul style="list-style-type: none"> <li>No Ecosites/ELC communities which meet identified criteria are present within the study area.</li> </ul>	No significant SWH identified.



Specialized Wildlife Habitat	Wildlife Species	ELC Ecosite Codes	Habitat Characteristics and Information Sources	CONFIRMED SWH and Defining Criteria	LGL Discussion/ Analysis	SWH
		migrating amphibians	<p>amphibians on their property.</p> <ul style="list-style-type: none"> <li>• OMNRF District.</li> <li>• OMNRF wetland evaluations</li> <li>• Field Naturalist clubs</li> <li>• Canadian Wildlife Service Amphibian Road Call Survey</li> </ul> <p>Ontario Vernal Pool Association:  <a href="http://www.ontariovernalpools.org">http://www.ontariovernalpools.org</a></p>	<ul style="list-style-type: none"> <li>• The habitat is the wetland area plus a 230m radius of woodland arealxiii, lxv, lxvi, lxvii, lxviii, lxix, lxx, lxxi . If a wetland area is adjacent to a woodland, a travel corridor connecting the wetland to the woodland is to be included in the habitat.</li> </ul> <p>SWHMiST cxlix Index #14 provides development effects and mitigation measures.</p>		
<p><b>Amphibian Breeding Habitat (Wetlands)</b></p> <p><b><u>Rationale:</u></b>  Wetlands supporting breeding for these amphibian species are extremely important and fairly rare within Central Ontario landscapes.</p>	<p>Eastern Newt  American Toad  Spotted Salamander  Four-toed Salamander  Blue-spotted Salamander  Gray Treefrog  Western Chorus Frog  Northern Leopard Frog  Pickerel Frog  Green Frog  Mink Frog  Bullfrog</p>	<p>ELC Community Classes SW, MA, FE, BO, OA and SA.</p> <p>Typically these wetland ecosites will be isolated (&gt;120m) from woodland ecosites, however larger wetlands containing predominantly aquatic species (e.g. Bull Frog) may be adjacent to woodlands.</p>	<ul style="list-style-type: none"> <li>• Wetlands&gt;500m2 (about 25m diameter) ccvii), supporting high species diversity are significant; some small or ephemeral habitats may not be identified on MNRF mapping and could be important amphibian breeding habitats clxxxii. <ul style="list-style-type: none"> <li>• Presence of shrubs and logs increase significance of pond for some amphibian species because of available structure for calling, foraging, escape and concealment from predators.</li> <li>• Bullfrogs require permanent water bodies with abundant emergent vegetation.</li> </ul> </li> </ul> <p><u>Information Sources</u></p> <ul style="list-style-type: none"> <li>• Ontario Herpetofaunal Summary Atlas (or other similar atlases)</li> <li>• Canadian Wildlife Service Amphibian Road Surveys and Backyard Amphibian Call Count.</li> <li>• OMNRF Districts and wetland evaluations</li> </ul> <p>Reports and other information available from Conservation Authorities</p>	<p>Studies confirm:</p> <ul style="list-style-type: none"> <li>• Presence of breeding population of 1 or more of the listed newt/salamander species or 2 or more of the listed frog/toad species with at least 20 individuals (adults or eggs masses) lxxi or 2 or more of the listed frog/toad species with Call Level Codes of 3(€). <b>or;</b> Wetland with confirmed breeding Bullfrogs are significant €.</li> <li>• The ELC ecosite wetland area and the shoreline are the SWH.</li> <li>• A combination of observational study and call count surveys cviii will be required during the spring (March-June) when amphibians are concentrated around suitable breeding habitat within or near the wetlands.</li> <li>• If a SWH is determined for Amphibian Breeding Habitat (Wetlands) then</li> </ul>	<ul style="list-style-type: none"> <li>• No Ecosites/ELC communities which meet identified criteria are present within the study area.</li> </ul>	No significant SWH identified.

Specialized Wildlife Habitat	Wildlife Species	ELC Ecosite Codes	Habitat Characteristics and Information Sources	CONFIRMED SWH and Defining Criteria	LGL Discussion/ Analysis	SWH
				Movement Corridors are to be considered as outlined in Table 1.4.1 of this Schedule. SWHMiST cxlix Index #15 provides development effects and mitigation measures.		
<b>Woodland Area-Sensitive Bird Breeding Habitat</b>  <b>Rationale:</b> Large, natural blocks of mature woodland habitat within the settled areas of Southern Ontario are important habitats for area sensitive interior forest song birds.	Yellow-bellied Sapsucker Red-breasted Nuthatch Veery Blue-headed Vireo Northern Parula Black-throated Green Warbler Blackburnian Warbler Black-throated Blue Warbler Ovenbird Scarlet Tanager Winter Wren  <b>Special Concern:</b> Cerulean Warbler Canada Warbler	All Ecosites associated with these ELC Community Series; FOC FOM FOD SWC SWM SWD	<ul style="list-style-type: none"><li>Habitats where interior forest breeding birds are breeding, typically large mature (&gt;60 yrs old) forest stands or woodlots &gt;30 ha. cv, cxxxi, cxxxii, cxxxiii, cxxxiv, cxxxv, cxxxvi, cxxxvii, cxxxviii, cxxxix, cxl, cxli, cxlii, cxliii, cxliv, cxlv, cxlvi, cl, cli, clii, cliii, cliv, clv, clvi, clvii, clviii, clix,</li><li>Interior forest habitat is at least 200 m from forest edge habitat. clxiv</li></ul> <u>Information Sources</u> <ul style="list-style-type: none"><li>Local bird clubs.</li><li>Canadian Wildlife Service (CWS) for the location of forest bird monitoring.</li><li>Bird Studies Canada conducted a 3- year study of 287 woodlands to determine the effects of forest fragmentation on forest birds and to determine what forests were of greatest value to interior species</li><li>Reports and other information available from Conservation Authorities.</li></ul>	Studies confirm: <ul style="list-style-type: none"><li>Presence of nesting or breeding pairs of 3 or more of the listed wildlife species. ⑤</li><li>Note: any site with breeding Cerulean Warblers or Canada Warblers is to be considered SWH.⑤</li><li>Conduct field investigations in spring and early summer when birds are singing and defending their territories.</li><li>Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects”ccxi</li></ul> SWHMiST cxlix Index #34 provides development effects and mitigation measures.	<ul style="list-style-type: none"><li>No Ecosites/ELC communities which meet identified criteria are present within the study area.</li><li>None of the species listed in the species list were identified within the study area.</li></ul>	No significant SWH identified.

3.3 Habitat for Species of Conservation Concern (not including Endangered or Threatened Species)

Habitats of Species of Conservation Concern for the purposes of this Technical Paper include wildlife species that are listed as Special Concern or rare, that are declining, or are featured species. Habitats of Species of Conservation Concern do not include habitats of Endangered or Threatened species, as their habitats are a separate Key Natural Heritage Feature, as outlined in the Greenbelt Plan and the PPS. Table 1.3 assists with the identification of Candidate SWH for Species of Conservation Concern.

Table 1.3 Habitats of Species of Conservation Concern considered Candidate SWH.

Wildlife	Species	ELC Ecosite		Habitat Description , Defining Criteria and Information Sources	CONFIRMED SWH	LGL Discussion/Analysis	SWH
<b>Marsh Bird Breeding Habitat</b>  <b>Rationale:</b> Wetlands for these bird species are typically productive and fairly rare in Southern Ontario landscapes.	American Bittern Virginia Rail Sora Common Moorhen American Coot Pied-billed Grebe Marsh Wren Sedge Wren Common Loon Green Heron  <b>Special Concern:</b> Black Tern Yellow Rail	MAM1 MAM3 MAM5 SAS1 SAF1 BOO1	MAM2 MAM4 MAM6 SAM1 FEO1	<ul style="list-style-type: none"><li>Nesting occurs in wetlands.</li><li>All wetland habitat is to be considered as long as there is shallow water with emergent aquatic vegetation present <sup>cxixiv</sup>.</li><li>For Green Heron, habitat is at the edge of water such as sluggish streams, ponds and marshes sheltered by shrubs and trees. Less frequently, it may be found in upland shrubs or forest a considerable distance from water.</li></ul> <u>Information Sources</u> <ul style="list-style-type: none"><li>OMNRF District and wetland evaluations.</li><li>Field Naturalist clubs</li><li>Natural Heritage Information Center (NHIC) Records.</li><li>Reports and other information available from Conservation Authorities.</li><li>Ontario Breeding Bird Atlas.</li></ul>	Studies confirm: <ul style="list-style-type: none"><li>Presence of 5 or more nesting pairs of Sedge Wren or Marsh Wren <b>or</b> 4 nesting pairs for any other listed; <b>or</b> breeding by any combination of 5 or more of the listed species. <sup>I</sup></li><li><u>Note:</u> any wetland with breeding Black Terns or Yellow Rail is to be considered SWH. <sup>I</sup></li><li>Breeding surveys should be done in May/June when these species are actively nesting in wetland habitats.</li><li>SWHDSS <sup>cxlix</sup> Index #35 provides development effects and mitigation measures</li></ul>	<ul style="list-style-type: none"><li>No Ecosites/ELC communities which meet identified criteria are present within the study area.</li><li>None of the species listed in the species list were identified/expected within the study area.</li></ul>	No significant SWH identified.
<b>Open Country Bird Breeding Habitat</b> <b>Rationale:</b> This wildlife habitat is declining throughout Ontario and North America. Species such as the Upland Sandpiper have declined significantly the past 40 years based	Vesper Sparrow Northern Harrier Savannah Sparrow  <b>Special Concern</b> Short-eared Owl	CUM1 CUM2		<ul style="list-style-type: none"><li>Large grassland areas (includes natural and cultural fields and meadows) &gt;30 ha <sup>clx</sup>, <sup>clxi</sup>, <sup>clxii</sup>, <sup>clxiii</sup>, <sup>clxiv</sup>, <sup>clxv</sup>, <sup>clxvi</sup>, <sup>clxvii</sup>, <sup>clxviii</sup>, <sup>clxix</sup>.</li><li>Grasslands not Class 1 or 2 agricultural lands, and not being actively used for farming (i.e. no row cropping or intensive hay or livestock pasturing in the last 5 years) <sup>E</sup>.</li><li>Grassland sites considered significant should have a history of longevity, either abandoned</li></ul>	Field Studies confirm: <ul style="list-style-type: none"><li>Presence of nesting or breeding of 2 or more of the listed species. <sup>E</sup></li><li>A field with 1 or more breeding Short-eared Owls is to be considered SWH.</li><li>The area of SWH is the contiguous ELC ecosite field areas.</li><li>Conduct field investigations of the most likely areas in spring and early summer when birds are singing and</li></ul>	<ul style="list-style-type: none"><li>No Ecosites/ELC communities which meet identified criteria are present within the study area.</li></ul>	No significant SWH identified.

on CWS (2004) trend records.			<p>fields, mature hayfields and pasturelands that are at least 5 years or older.</p> <ul style="list-style-type: none"> <li>The Indicator bird species are area sensitive requiring larger grassland areas than the common grassland species.</li> <li>Information Sources</li> <li>Agricultural land classification maps, Ministry of Agriculture.</li> <li>Local bird clubs.</li> <li>Ontario Breeding Bird Atlas</li> <li>Reports and other information available from Conservation Authorities.</li> </ul>	<p>defending their territories.</p> <ul style="list-style-type: none"> <li>Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects” ccxi</li> </ul> <p>SWHMiST cxlix Index #32 provides development effects and mitigation measures</p>		
<p><b>Shrub/Early Successional Bird Breeding Habitat;</b></p> <p><b>Rationale:</b> This wildlife habitat is declining throughout Ontario and North America. The Brown Thrasher has declined significantly over the past 40 years based on cxci trend records.</p>	<p><u>Indicator Spp:</u> Brown Thrasher Clay-coloured Sparrow</p> <p><u>Common Spp.</u> Field Sparrow Black-billed Cuckoo E. Towhee Willow Flycatcher Blue-winged Warbler</p> <p><b>Special Concern:</b> Yellow-breasted Chat Golden-winged Warbler</p>	CUT1 CUS1	<ul style="list-style-type: none"> <li>Large older field areas succeeding to shrub and thicket habitats.</li> <li>Larger shrub thicket habitats (&gt;10ha) are most likely to support and sustain a diversity of these species. clxxiii,</li> <li>Shrub and thicket habitat sites considered significant should have a history of longevity, either abandoned fields or pasturelands.</li> <li>Use agricultural land classification maps and recent aerial photographs to determine the locations of potential shrub and thicket habitats.</li> <li>Ask local birders for location of shrub and thicket habitats that support abundant and species-rich populations of area-sensitive species.</li> <li>ESA reports and other studies prepared by Conservation Authorities</li> </ul>	<p>Shrubland or Successional fields 10 ha or larger in size, not class 1 or 2 agricultural lands, not being actively used for farming (i.e., no row-cropping in the last 5 years).Í</p> <p>Studies confirm:</p> <ul style="list-style-type: none"> <li>Presence of nesting or breeding of 2 or more indicator or special concern species and at least 1 of the common species.Í</li> <li>A field with breeding Yellow-breasted Chat or Golden-winged Warbler is to be considered as Significant Wildlife Habitat. Í</li> <li>Conduct field investigations of the most likely areas in spring and early summer when birds are singing and defending their territories</li> </ul> <p>SWHDSS cxlix Index #33 provides development effects and mitigation measures.</p>	<ul style="list-style-type: none"> <li>No Ecosites/ELC communities which meet identified criteria are present within the study area.</li> </ul>	No significant SWH identified.
<p><b>Terrestrial Crayfish;</b></p> <p><b>Rationale:</b> Terrestrial Crayfish are only found within SW Ontario in Canada and their habitats are very rare. ccii</p>	<p>Chimney or Digger Crayfish; {<u>Fallicambarus fodiens</u>}</p> <p>Devil Crawfish or Meadow Crayfish; {<u>Cambarus Diogenes</u>}</p>	MAM1 MAM2 MAM3 MAM4 MAM5 MAM6	<p>Wet meadow and edges of shallow marshes (no minimum size) should be surveyed for terrestrial crayfish.</p> <ul style="list-style-type: none"> <li>Constructs burrows in marshes, mudflats, meadows, the ground can’t be too moist. Can often be found far from water.</li> <li>Both species are a semi-</li> </ul>	<p>Studies Confirm:</p> <ul style="list-style-type: none"> <li>Presence of 1 or more individuals of species listed or their chimneys (burrows) in suitable meadow marsh, swamp or moist terrestrial sites cci</li> <li>Area of ELC ecosite or an ecoelement area of meadow marsh or swamp within the larger ecosite area is the</li> </ul>	<ul style="list-style-type: none"> <li>No Ecosites/ELC communities which meet identified criteria are present within the study area.</li> </ul>	No significant SWH identified.



			<p>terrestrial burrower which spends most of its life within burrows consisting of a network of tunnels. Usually the soil is not too moist so that the tunnel is well formed.</p> <p>Information Sources</p> <p>Information sources from “Conservation Status of</p> <ul style="list-style-type: none"> <li>Freshwater Crayfishes” by Dr. Premek Hamr for the WWF and CNF March 1998</li> </ul>	<p>SWH.</p> <p>Surveys should be done April to August in temporary or permanent water. Note the presence of burrows or chimneys are often the only indicator of presence, observance or collection of individuals is very difficult cci</p> <p>SWHMiST cxlix Index #36 provides development effects and mitigation measures.</p>		
<p><b>Special Concern and S1-S3 Species and Communities</b></p> <p><b>Rationale:</b></p> <p>Special Concern and rare specie occurrences are significant due to their status or due to the relative number of occurrences within Ontario.</p>	<p>All Special Concern and rare (S1-S3, SH) plant and animal species or communities. Lists of these species and communities are tracked by the Natural Heritage Information Centre.</p>	<p>All plant and animal species or community element occurrences (EO).</p>	<ul style="list-style-type: none"> <li>Natural Heritage Information Centre will have the special concern and rare (S1-S3, SH) species lists and element occurrences for these species.</li> <li>NHIC Website: <a href="http://nhic.mnr.gov.on.ca/nhic">http://nhic.mnr.gov.on.ca/nhic</a></li> </ul>	<p>Studies Confirm:</p> <ul style="list-style-type: none"> <li>When an element occurrence is identified for a Special Concern or rare species then mapping of the habitat on the site needs to be completed to ELC Vegetation Type lxxviii Í.</li> <li>Assessment/Inventory of the site for the identified special concern or rare species needs to be completed during the time of year when the wildlife species is present or easily identifiable.</li> <li>Habitat form and function needs to be assessed from the assessment of vegetation types and an area of significant habitat that will protect the rare or special concern specie identified.</li> <li>SWHDSS cxlix Index #37 provides development effects and mitigation measures</li> </ul>	<ul style="list-style-type: none"> <li>Vegetation communities present however species identified in the list of species were not observed within the study area.</li> </ul>	<p>No significant SWH identified.</p>

3.4 Animal Movement Corridors

Animal Movement Corridors are elongated areas used by wildlife to move from one habitat to another. They are important to ensure genetic flow within and between populations, to allow seasonal migration of animals (e.g., deer moving from summer to winter range), and to allow animals to move throughout their home range from feeding areas to cover areas. Animal movement corridors function at different scales, often related to the size and home range of the animal. For example, short, narrow areas of natural habitat may function as corridors between amphibian breeding areas and their summer range, while wider, longer corridors are needed to allow deer to travel from their winter habitat to their summer habitat.

Identifying the most important corridors that provide connectivity across the landscape is challenging because of a lack of specific information on animal movements. There is also some uncertainty about the optimum width and mortality risks of corridors. Furthermore, a corridor may be beneficial for some species but detrimental to others. For example, narrow linear corridors may allow increased access for racoons, cats, and other predators associated with edges. Also, narrow corridors dominated by edge habitat may encourage invasion by weedy generalist plants and opportunistic species of birds and mammals. Corridors often consist of naturally vegetated areas that run through more open or developed landscapes. However, sparsely vegetated areas can also function as corridors. For example, many species move freely through agricultural land to reach natural areas. Despite the difficulty of identifying exact movement corridors for all species, these landscape features are important to the long-term viability of certain wildlife populations.

Animal Movement Corridors, should only be identified as Candidate SWH where:

1. A Confirmed or Candidate SWH has been identified by MNR or the planning authority based on documented evidence of a wildlife species identified within this Technical Paper using a distinct passageway or relying on well defined natural features for movements between habitats required by the species to complete its life cycle.

Table 1.4.1 Animal Movement Corridors considered Candidate Significant Wildlife Habitat.

Habitat	SPECIES	ELC Eco-sites	HABITAT - FUNCTION/Form and INFORMATION SOURCES	CONFIRMED SWH	LGL Description
<b>Amphibian Movement Corridors</b>  <b><u>Rationale:</u></b> Movement corridors for amphibians moving from their terrestrial habitat to breeding habitat can be extremely important for local populations.	Eastern Newt Blue-spotted Salamander Spotted Salamander Gray Treefrog Spring Peeper Chorus Frog Wood Frog	<ul style="list-style-type: none"><li>• habitat not ELC specific</li><li>• Corridors will be determined based on identifying the significant breeding habitat for these species in Table 1.1.</li></ul>	Movement corridors between breeding habitat and summer habitat. clxxiv, clxxv, clxxvi, clxxvii, clxxviii, clxxix, clxxx, clxxxi. Movement corridors must be determined when Amphibian breeding habitat is confirmed as SWH from Table 1.2.2 ( <b>Amphibian Breeding Habitat –Wetland</b> ) of this Schedule ⑥. <u>Information Sources</u> <ul style="list-style-type: none"><li>• MNRF District Office.</li><li>• Natural Heritage Information Center (NHIC).</li><li>• Reports and other information available from Conservation Authorities.</li><li>• Field Naturalist Clubs.</li></ul>	<ul style="list-style-type: none"><li>• Field Studies must be conducted at the time of year when species are expected to be migrating or entering breeding sites.</li><li>• Corridors should consist of native vegetation, with several layers of vegetation. Corridors unbroken by roads, waterways or bodies, and undeveloped areas are most significantclxlix</li><li>• Corridors should have at least 15m of vegetation on both sides of waterwayclxlix or be up to 200m wideclxlix of woodland habitat and with gaps &lt;20mclxlix .</li><li>• Shorter corridors are more significant than longer corridors, however amphibians must be able to get to and from their summer and breeding habitatclxlix.</li><li>• SWHMiST clxlix Index #40 provides development effects and mitigation measures</li></ul>	Amphibian habitat identified within the study area is not expected to meet the criteria for SWH based on number of species and calling levels. No significant SWH identified.

## REFERENCES

- i OMNR(1997). Natural Heritage Training Manual for Policy 2.3 of the Provincial Policy Statement, Version1.0. 141 pp.
- ii Bennun, L., Fishpool, L., Nagy, S. and I. Burfield. 2005. Monitoring Important Bird Areas: A Global Framework. Version 7 19-07-05. BirdLife International (unpub. Draft version).
- iii Chatterjee, A. and J. Pittock. 2005. Tracking Tool for Assessing Management. Effectiveness in Wetland Protected Areas. WWF.
- iv Diehl, R.H., Larkin, R.P and John E. Black. 2003. Radar Observation of Bird Migration Over the Great Lakes. *The Auk* 120(2): 278-290
- v Barrow, W.C. Jr., C.-C. Chen, R.B. Hamilton, K. Ouchley, and T.J. Spengler. 2000. Disruption and restoration of en route habitat, a case study: the Chenier Plain. *Studies in Avian Biology* 20: 71-87.
- vi Evans Ogden, L.J. 1996. Collision course; the hazards of lighted structures and windows to migrating birds. Toronto, ON: Prepared for the World Wildlife Fund Canada and the Fatal Light Awareness Program. 46 pp.
- vii Evans Ogden, L.J. 2002. Summary report on the Bird Friendly Building Program: effect of light reduction on collision of migratory birds. Toronto, ON: Prepared for the Fatal Light Awareness Program. 29 pp.
- viii Heglund, P.J., and S.K. Skagen. 2005. Ecology and physiology of en route nearctic-neotropical migratory birds: a call for collaboration. *Condor* 107: 193-196.
- ix Klem, D. Jr. 1990. Collisions between birds and windows: mortality and prevention. *Journal of Field Ornithology* 61: 120-128.
- x Klem, D. Jr. 1991. Glass and bird kills: an overview and suggested planning and design methods of preventing a fatal hazard. Pp. 99-102 in Adams, L.W., and D.L. Leedy, eds. *Wildlife conservation in metropolitan environments*. Columbia, MD: National Institute for Urban Wildlife.
- xi Simons, T.R., S.M. Pearson, and F.R. Moore. 2000. Application of spatial models to the stopover ecology of Trans-Gulf migrants. *Studies in Avian Biology* 20: 4-14
- xii Petit, D.R. 2000. Habitat use by landbirds along nearctic-neotropical migration routes: implications for conservation of stopover habitats. *Studies in Avian Biology* 20: 15-33.
- xiii Skagen S.K., J.F. Kelly, C. Van Riper III, R.L. Hutto, D.M. Finch, D.J. Krueper, and C.P. Melcher. 2005. Geography of spring landbird migration through riparian habitats in southwestern North America. *Condor* 107: 212-227.
- xiv Smith, R., M. Hamas, M. Dallman, and D. Ewert. 1998. Spatial variation in foraging of the Black-throated Green Warbler along the shoreline of northern Lake Huron. *Condor* 100: 474-484.
- xv Smith, R.J., F.R. Moore, and C.A. May. 2007. Stopover habitat along the shoreline of northern Lake Huron, Michigan: emergent insects as a food resource for spring migrating landbirds. *Auk* 124: 107-121.

- xvi Bildstein, K.L. 1987. Behavioral ecology of Red-tailed Hawks (*Buteo jamaicensis*), Rough-legged Hawks (*Buteo lagopus*), Northern Harriers (*Circus cyaneus*), and American Kestrels (*Falco sparverius*) in south central Ohio. Ohio Biological Survey Biological Notes 18. 53 pp.
- xvii Craighead, J.J., and F.C. Craighead, Jr. 1956. Hawks, owls and wildlife. Washington, DC: Wildlife Management Institute. 443 pp.
- xviii MacWhirter, R.B., and K.L. Bildstein. 1996. Northern Harrier (*Circus cyaneus*). In Poole, A., and F. Gill, eds. The birds of North America, No. 210. Philadelphia, PA: The Academy of Natural Sciences; Washington, DC: The American Ornithologists' Union. 31 pp.
- xix Temeles, E.J. 1987. The relative importance of prey availability and intruder pressure in feeding territory size regulation by harriers, *Circus cyaneus*. *Oecologia* 74: 286-297
- xx Enderson, J.H. 1960. A population study of the Sparrow Hawk in east-central Illinois. *Wilson Bulletin* 72: 222-231.
- xxi Mills, G.S. 1975. A winter population study of the American Kestrel in central Ohio. *Wilson Bulletin* 87: 241-247.
- xxii Sherwin, R.E., Altenbach, J.S. and P.E. Brown. 2000. Methods for Determining Local Mine Characteristics of Importance to Bats. Proceedings of Bat Conservation and Mining: A Technical Interactive Forum. Section 3:109-114. U.S. Department of Interior, Office of Surface Mining, Alton, Illinois and Coal Research Centre, Southern Illinois University, Carbondale, Illinois.
- xxiii Owen, S.F., Menzel. M.A. Ford, W.M., Edwards, J.W., Chapman, B.R., Miller, K.V. and P.B. Wood. 2002. Roost tree selection by maternal colonies of Northern Long-eared Myotis in an intensively managed forest. General Technical Report NE-292. USDA Forest Service, Northern Research Station.
- xxiv Ontario Ministry of Natural Resources. 2006. Wind turbines and bats: bat ecology background information and literature review of impacts. Wildlife Section and Renewable Energy Section.
- xxv Veilleux, J.P., Whitaker, J.O. and S.L. Veilleux. 2003. Tree-roosting ecology of reproductive female Eastern Pipistrelles, *Pipistrellus subflavus*, in Indiana. *Journal of Mammalogy* 84(3):1068-1075.
- xxvi Findley, J. S. 1964. Tree roosting of the Eastern Pipstrelle. *Journal of Mammalogy* 35(3): 433.
- xxvii Crampton, L. H. and R. R. Barclay. 1998. Selection of roosting and foraging habitat by bats in different-aged aspen mixedwood stands. *Conservation Biology*. 12(6):1347- 1351.
- Parsons, H. J., Smith, D. A. and R. F. Whittam. 1986. Maternity colonies of Silver-haired Bats, *Lasionycteris noctivagan*, in Ontario and Saskatchewan. *Journal of Mammalogy*. 67(3): 598-600..
- xxviii Agosta, S.J. 2003. Habitat use, diet and roost selection by the Big Bown Bat (*Eptesicus fuscus*) in North Amermrica: in case for conserving an abundant species. *Mammal Society, Mammal Review* 32:179-198.
- xxix Jung, T.S., Thompson, T.S. and R.D. Titman. 2004. Roost site selection by forest-dwelling male *Myotis* in central Ontario, Canada. *Forest Ecology and Management* 202:323.



- xxx Foster, R.W., Kurta, A., 1999. Roosting ecology of the northern bat (*Myotis septentrionalis*) and comparisons with the endangered Indiana bat (*Myotis sodalis*). *Journal of Mammalogy* 80:659–672.
- xxxi Gerson, H. 1984. Habitat Management Guidelines for Bats of Ontario. Ontario Ministry of Natural Resources. MNR# 516023 ISBN 07794-2347-X (Internet).
- xxxii Ontario Parks. 2000. Presqu'ile Provincial Park Management Plan. Queen's Printer 2000. p.7.
- xxxiii Environment Canada. 2007. National Wildlife Areas of Ontario: Prince Edward Point.
- xxxiv Parks Canada. 2007. Monarch Butterfly Migration. Accessed February 10, 2008.
- xxxv Environment Canada. 2007. National Wildlife Areas of Ontario: Long Point..
- xxxvi Shappert, P. 1996. Distribution, status and conservation of the Monarch butterfly, *Danaus plexippus* (L.), in Canada. York University Department of Biology.
- xxxvii Urquhart, F.A. 1987. The monarch butterfly: international traveller. Nelson-Hall, Chicago, 232 pp.
- xxxviii U.S. Fish and Wildlife Service. 2007. Monarch Butterfly migration and overwintering.
- xxxix Gibbs, D., Walton, R., Brower, L. and A.K. Davis. 2006. Monarch butterfly (*Lepidoptera: Nymphalidae*) migration monitoring at Chincoteague, Virginia and Cape May, New Jersey: a comparison of long-term trends. *Journal of the Kansas Entomological Society* 79(20):156-164.
- xl Meitner, C.J., Browner L.P. and A.K. Davis. 2004. Migration patterns and environmental effects on stopover of Monarch butterflies (*Lepidoptera, Nymphalidae*) at Peninsula Point, Michigan. *Population Ecology* 33(2):249-256.
- xli Walton, D., Brower, L.P. and A.K. Davis. 2005. Long-term monitoring and fall migration patterns of the monarch butterfly in Cape May, NJ. *Annals of the Entomological Society of America* 98(5):682-689.
- xl ii Davis, A.K. and M.S. Garland. 2002. An evaluation of three methods of counting migrating monarch butterflies in varying wind conditions. *Southeastern Naturalist* 1(1):55-68.
- xl iii Davis, A.K. 2005. Monarch Migration Association of North America: monitoring sites. Accessed February 12, 2008.
- xl iv Toronto Zoo. no date. Habitat Conservation: Snake Hibernacula. Toronto Zoo Adopt-A-Pond Wetland Conservation Programme.
- xl v Fischer, L. 2002. COSEWIC status report on the Milksnake *Lampropeltis triangulum* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 29pp.
- xl vi Coffin B. and L. Pfannmuller. 1988. Minnesota's Endangered Flora and Fauna. University of Minnesota Press, Minneapolis. 473 pp.
- xl vii Harding, J.H. 1997. Amphibians and Reptiles of the Great Lakes Region. The University of Michigan Press. 378 pp.
- xl viii Tynning, T.F. 1990. Stoke Nature Guides: A Guide to Amphibians and Reptiles. Little, Brown and Company, Boston. 400 pp.
- xl ix Row, J.R. and B. Blouin-Demers. 2006. Thermal quality influences effectiveness of thermoregulation, habitat use and behaviour in milk snakes. *Oecological* 148:1-11.

- l Smith, K. 2002. COSEWIC status report on the eastern ribbonsnake *Thamnophis sauritus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 24pp.
- li Carpenter, C.C. 1953. A study of hibernacula and hibernating associations of snakes and amphibians in Michigan. *Ecology* 34(1):74-80.
- lii Royal Ontario Museum. 2006. Species at risk profiles: Eastern Ribbon Snake. Accessed February 26, 2008.
- liii Parker, W.S. and W.S. Brown. 1973. Species composition and population changes in two complexes of snake hibernacula in northern Utah. *Herpetologica* 29(4):319-326.
- liv Nelson, M.E. 1998. Development of migratory behaviour in northern white-tailed deer. *Canadian Journal of Zoology* 76:426-432.
- lv Sabine, D.L., Morrison, S.F., Whitlaw, H.A., Ballard, W.B., Forbes, G.J. and J. Bowman. 2002. Migration behaviour of white-tailed deer under varying winter climate regimes in New Brunswick. *Journal of Wildlife Management* 66(3):718-728..
- lvi Brinkman, T.J., Deperno, C.S., Jenks, J.A., Haroldson, B.S. and R.G. Osborn. 2005. Movement of female white-tailed deer: effects of climate and intensive row-crop agriculture. *Journal of Wildlife Management* 69(3):1099-1111.
- lvii Fuller, T.K. 1991. Effect of snow depth on wolf activity and prey selection in north central Minnesota. *Canadian Journal of Zoology* 69(2):283-287..
- lviii Nelson, M.E. and L.D. Mech. 1986. Relationship between snow depth and gray wolf predation on white-tailed deer. *Journal of Wildlife Management* 50(3):471-474..
- lix Mech, L.D. 1977. Wolf-pack buffer zones as prey reservoirs. *Science* 198(4314):320-321.
- lx Ontario Ministry of Natural Resources. no date provided. The Why, When, What, and How of winter severity assessment in Ontario. The Snow Network for Ontario Wildlife.
- lxi Wisconsin Department of Natural Resources. 2008. The winter severity index. Wildlife Management.
- lxii Lamoureux, V.S., Marez, J.C. and D.M. Madison. 2002. Premigratory autumn foraging forays in the Green Frog, *Rana clamitans*. *Journal of Herpetology* 36(2):245-254.
- lxiii Windmiller B.S. 1996. The pond, the forest, and the city: spotted salamander ecology and conservation in a human dominated landscape. Ph.D. Dissertation, Tufts University, Medford, Massachusetts, USA. From Burne and Griffin 2005.
- lxv Faccio, S.D. 2003. Post-breeding emigration and habitat use of radio-implanted Jefferson and spotted salamanders in Vermont. *Journal of Herpetology* 37(3): 479–489.
- lxvi Calhoun, A.J.K., Miller, N.A. and M.W. Klemens. 2005. Conserving pool-breeding amphibians in human-dominated landscapes through local implementation of Best Development Practices. *Wetlands Ecology and Management* 13:291-304.

- lxvii Stone J. 1992. Vernal pools in Massachusetts: aerial photographic identification, biological and physiographic characteristics, and state certification. Master's Thesis, University of Massachusetts, Amherst, Massachusetts, USA. From Burne and Griffin 2005.
- lxviii Grant, E.H., Jung, R.E., Nichols, J.D. and J.E. Hines. 2005. Double-observer approach to estimating egg mass abundance of pool-breeding amphibians. *Wetlands Ecology and Management* 13:305-320.
- lxix Semlitsch, R.D. and J.R. Bodie. 2003. Biological criteria for buffer zones around wetlands and riparian habitats for amphibians and reptiles. *Conservation Biology* 17(5):1219-1228.
- lxx Gibbs, J.P. 1998. Distribution of woodland amphibians along a forest gradient. *Landscape Ecology* 13:263-268.
- lxxi Calhoun, A. J. K. and P. deMaynadier. 2004. Forestry habitat management guidelines for vernal pool wildlife. MCA Technical Paper No. 6, Metropolitan Conservation Alliance, Wildlife Conservation Society, Bronx, New York.
- lxxii Burne, M.R. and C.R. Griffin. 2005. Habitat associations of pool-breeding amphibians in eastern Massachusetts, USA. *Wetlands Ecology and Management* 13: 247-259.
- lxxiii Burne, M.R. and C.R. Griffin. 2005. Habitat associations of pool-breeding amphibians in eastern Massachusetts, USA. *Wetlands Ecology and Management* 13: 247-259.
- lxxiv Stark, K.E., Lundholm, J.T. and D.W. Larson. 2003. Relationships between seed banks and spatial heterogeneity of North American alvar vegetation. *Journal of Vegetation Science* 14:205-212.
- lxxv Reschke, C., Reid, R., Jones, J., Feeney, T. and H. Potter. 1999. Conserving Great Lakes alvars: Technical report for the International Alvar Conservation Initiative. The Nature Conservancy on behalf of the Alvar Working Group.
- lxxvi Brownell, V.R. and J.L. Riley. 2000. The alvars of Ontario: significant alvar areas in the Ontario Great Lakes Region. Don Mills, Ontario. Federation of Ontario Naturalists.
- lxxvii Reid, R. and H. Potter. 2000. Area, quality and protection of special lakeshore communities – alvars (Indicator #8129). State of the Great Lakes Ecosystem Conference (SOLEC) 2000. Environment Canada.
- lxxviii Lee, H.T., Bakowsky, W.D. Riley, J., Bowles, J., Puddister, M., Uhlig, P. and S. McMurray. 1998. Ecological land classification for southern Ontario: first approximation and its application. Ontario Ministry of Natural Resources. Southcentral science section, Science Development and Transfer branch. SCSS Field Guide FG-02.
- lxxix Bakowsky, W. and J.L. Riley. 1994. A survey of the prairies and savannas of southern Ontario. 10pp. In: Wickett, Robert G., et al. (eds). Proceedings of the Thirteenth North American Prairie Conference: spirit of the land, our prairie legacy: held 6-9 August 1992, Windsor, Ontario, Canada. Windsor, Ontario: Department of Parks and Recreation, 1994 viii, 262 p. : ill., maps ; 28 cm.
- lxxx Rodger, L. 1998. Tallgrass communities of southern Ontario: a recovery plan. Prepared for World Wildlife Fund Canada and the Ontario Ministry of Natural Resources. 66op.
- lxxxi Bakowsky, W. and J.L. Riley. 1994. A survey of the prairies and savannas of southern Ontario. 10pp. In: Wickett, Robert G., et al. (eds). Proceedings of the Thirteenth North American Prairie Conference: spirit of the land, our prairie legacy: held

- 6-9 August 1992, Windsor, Ontario, Canada. Windsor, Ontario: Department of Parks and Recreation, 1994 viii, 262 p. : ill., maps ; 28 cm.
- lxxxii Lee, J.T., Woddy, S.J. and S. Thompson. 2001. Targeting sites for conservation: using a patch-based ranking scheme to assess conservation potential. *Journal of Environmental Management* 61:367-380.
- lxxxiii Rodger, L. 1998. Tallgrass communities of southern Ontario: a recovery plan. Prepared for World Wildlife Fund Canada and the Ontario Ministry of Natural Resources. 66op.
- lxxxiv Kingsbury, B. and J. Gibson, eds. 2002. Habitat Management Guidelines for Amphibians and Reptiles of the Midwest: Exposed Rock and Sand. Partners in Amphibian and Reptile Conservation.
- lxxxv Allen, G.M. 2002. COSEWIC Status Report of Forked Three-awned Grass (*Aristida basiramea*). COSEWIC. 28 pages.
- lxxxvi Newhouse, N. and T. Kinley. 1999. Update COSEWIC Status Report on American Badger (*Taxidea taxus*). COSEWIC. 24 pp.
- lxxxvii Ontario Ministry of Natural Resources. 2006. Forest management guide to the protection of Osprey nests. Forest Management Branch, Ontario Ministry of Natural Resources. 37 pp.
- lxxxviii Armstrong, E.R., and D. Euler. 1983. Habitat usage of two woodland Buteo species in central Ontario. *Canadian Field-Naturalist* 97: 200-207.
- lxxxix Goodrich, L.J., S.C. Crocoll, and S.E. Senner. 1996. Broad-winged Hawk (*Buteo platypterus*). In Poole, A., and F. Gill, eds. *The birds of North America*, No.218. Philadelphia, PA: The Academy of Natural Sciences; Washington, DC: The American Ornithologists' Union. 27 pp.
- xc Reynolds, R.T., E.C. Meslow, and H.M. Wight. 1982. Nesting habitat of coexisting *Accipiter* in Oregon. *Journal of Wildlife Management* 46: 124-138.
- xci Squires, J.R., and R.T. Reynolds. 1997. Northern Goshawk (*Accipiter gentilis*). In Poole, A., and F. Gill, eds. *The birds of North America*, No. 298. Philadelphia, PA: The Academy of Natural Sciences; Washington, DC: The American Ornithologists' Union. 31 pp.
- xcii Woodbridge, B., and P.J. Detrich. 1994. Territory occupancy and habitat patch size of Northern Goshawks in the southern Cascades of California. *Studies in Avian Biology* 16: 83-87.
- xciii Bartelt, P.E. 1974. Management of the American Goshawk in the Black Hills National Forest. M.Sc. thesis, University of South Dakota. 102 pp.
- xciv Reynolds, R.T., and H.M. Wight. 1978. Distribution, density, and productivity of *Accipiter* hawks breeding in Oregon. *Wilson Bulletin* 90: 182-196.
- xcv Iversen, G.C., G.D. Hayward, K. Titus, E. DeGayner, R.E. Lowell, D.C. Crocker-Bedford, P.F. Schempf, and J. Lindell. 1996. Conservation assessment for the Northern Goshawk in southeast Alaska. United States Department of Agriculture, Forest Service, General Technical Report PNW-GTR-387. 101 pp.



- xcvi Reynolds, R.T. 1983. Management of western coniferous forest habitat for nesting accipiter hawks. United States Department of Agriculture, Rocky Mountain Forest and Range Experiment Station, General Technical Report RM-102. 7 pp.
- xcvii Sandilands, A. 2005. Birds of Ontario: habitat requirements, limiting factors, and status. Volume 1: nonpasserines, waterfowl through cranes. Vancouver, BC: UBC Press. 365 pp.
- xcviii Rosenfield, R.N., and J. Bielefeldt. 1992. Natal dispersal and inbreeding in the Cooper's Hawk. Wilson Bulletin 104: 182-184.
- xcix Coleman, J.L., D.M. Bird, and E.A. Jacobs. 2002. Habitat use and productivity of Sharp-shinned Hawks nesting in an urban area. Wilson Bulletin 114: 467-473.
- c Bildstein, K.L., and K. Meyer. 2000. Sharp-shinned Hawk (*Accipiter striatus*). In Poole, A., and F. Gill, eds. The birds of North America, No. 482. Philadelphia, PA: The Birds of North America, Inc. 27 pp.
- ci Allen, A.W. 1987. Habitat suitability index models: Barred Owl. United States Fish and Wildlife Service Biological Report 82 (10.143). 17 pp.
- cii Askins, R.A., and M.J. Philbrick. 1987. Effect of changes in regional forest abundance on the decline and recovery of a forest bird community. Wilson Bulletin 99: 7-21.
- ciiii Sharp, M.J., and C.A. Campbell. 1982. Breeding ecology and status of Red-shouldered Hawks (*Buteo l. lineatus*) in Waterloo Region, Ontario. Ontario Field Biologist 36: 1-10.
- civ Bryant, A.A. 1986. Influence of selective logging on Red-shouldered Hawks, *Buteo lineatus*, in Waterloo Region, Ontario 1953-1978. Canadian Field-Naturalist 100: 520-525.
- cv Robbins, C.S., D.K. Dawson, and B.A. Dowell. 1989. Habitat area requirements of breeding forest birds of the middle Atlantic States. Washington, DC: The Wildlife Management Institute, Wildlife Monographs 103. 34 pp.
- cvi James, R.D. 1984a. Habitat management guidelines for Ontario's forest nesting accipiters, buteos and eagles. Prepared for the Ontario Ministry of Natural Resources. 23 pp.
- cvii COSEWIC. 2002. COSEWIC assessment and status report on the Northern Map Turtle *Graptemys geographica* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 34pp.
- cviii Konze, K. 1998. Wildlife monitoring programs and inventory techniques for Ontario. NEST technical manual TM-009. Queen's Printer.
- cix Crocker, C.E., Feldman, R.A., Ultsch, G.R. and D.C. Jackson. 2000. Overwintering behaviour and physiology of eastern painted turtles (*Chrysemmys picta picta*) in Rhode Island. *Canadian Journal of Zoology* 78(6):936.
- cx Ultsch GR. 2006. The ecology of overwintering among turtles: where turtles overwinter and its consequences. Biol Rev Camb Philos Soc. 81(3):339-367.
- cxi Brown, G.P. and R.J. Brooks. 1994. Characteristics of and fidelity to hibernacula in a northern population of Snapping Turtles, *Chelydra serpentina*. *Copeia* 1994(1):p.222.

- cxii MacCulloch, R.D. 2002. ROM field guide to: amphibians and reptiles of Ontario. Royal Ontario Museum. 168pp.
- cxiii Royal Ontario Museum. 2005. Species at risk profiles: Northern Map Turtle.
- cxiv Toronto Zoo. no date. Turtle Nesting Areas: Existing Knowledge. Toronto Zoo Adopt-A-Pond Wetland Conservation Programme, Habitat Conservation section.
- cxv Idham, M.J. and W.F. Weller. 2000. Ontario Herpetofaunal Atlas. Natural Heritage Information Centre, Ontario Ministry of Natural Resources. Available online: <http://www.mnr.gov.on.ca/MNR/nhic/herps/ohs.html> (updated 15-01-2001).
- cxvi Johnson, B. and L. Sealock. no date. Turtle Curriculum: Turtles of Ontario Fact Sheets. Toronto Zoo Adopt-A-Pond Wetland Conservation Programme, Resources.
- cxvii Endangered Species Act 2007. R.S.O. 1990. Bill 184, Schedule 1 c.7a.
- cxviii Perkins, D.W. and M.L. Hunter. 2006. Use of amphibians to determine riparian zones of headwater streams. *Canadian Journal of Forest Research* 36:2124-2130.
- cxix New York State. 2008. Wild Turkey winter habitat. New York State Department of Environmental Conservation. Accessed February 27, 2008.
- cxx Haulton, S.G., Stauffer, D.F. and R.L. Kirkpatrick. 2003. Ruffed Grouse (*Bonasa umbellus*) brood microhabitat selection in the southern Appalachians. *American Midland Naturalist* 150:95-103.
- cxxi Glennon, M.J. and W.F. Porter. 1999. Using satellite imagery to assess landscape-scale habitat for wild turkeys. *Wildlife Society Bulletin* 27(3):646.
- cxxii Healy, W.M. and M.J. Casalena. 2008. Spring seep management for wild turkeys and other wildlife. National Wild Turkey Federation Wildlife Bulletin No. 20.
- cxxiii Nguyen, L.P., Hamr, J. and G.H. Parker. 2003. Survival and reproduction of wild turkey hens in central Ontario. *Willson Bulletin* 115(2):131-139.
- cxxiv Kirk, D, Csizy, M., Weeker, R. Francis, C. and J. McCracken. 2001. Habitat Associations of Marsh-nesting Birds in the Great Lakes Basin: Implications for Local Conservation and Management
- cxxv Crozier, G.E., and G.J. Niemi. 2003. Using patch and landscape variables to model bird abundance in a naturally heterogeneous landscape *Canadian Journal of Zoology* 81: 441-452.
- cxxvi Hobson, K.A., and E. Bayne. 2000. Effects of forest fragmentation by agriculture on avian communities in the southern boreal mixedwoods of western Canada. *Wilson Bulletin* 112:373-387.
- cxxvii Steeger, C., M. Machmer, and E. Walters. 1996. Ecology and management of woodpeckers and wildlife trees in British Columbia. Fraser River Action Plan, Environment Canada. 23 pp.
- cxxviii Gauthier, J., and Y. Aubry, eds. 1996. The breeding birds of Québec. Montreal, QC: Association Québécoise des Groupes d'Ornithologues, the Province of Quebec Society for the Protection of Birds, and the Canadian Wildlife Service. 1302 pp.
- cxxix James, R.D. 1984b. Habitat management guidelines for cavity-nesting birds in Ontario. Prepared for the Ontario Ministry of Natural Resources. 40 pp.

- cxxx Cheskey, E.D. 1990. Red-breasted Nuthatch nesting in residential Waterloo. *Ontario Birds* 8: 71-75
- cxxxi James, R.D. 1984c. Habitat management guidelines for warblers of Ontario's northern coniferous forests, mixed forests or southern hardwood forests. Prepared for the Ontario Ministry of Natural Resources. 31 pp.
- cxxxii Lynch, J.F., and D.L. Wigham. 1984. Effects of forest fragmentation on breeding bird communities in Maryland, U.S.A. *Biological Conservation* 28: 287-324.
- cxxxiii Whitcomb, R.F., C.S. Robbins, J.F. Lynch, M.K. Klimkiewicz, B.L. Whitcomb, and D. Bystrak. 1981. Effects of forest fragmentation on avifauna of the eastern deciduous forest. Pp. 125-206 in Burgess, R.L., and D.M. Sharpe, eds. *Forest island dynamics in man-dominated landscapes*. New York, NY: Springer-Verlag, Ecological Studies, Volume 41.
- cxxxiv Blake, J.G., and J.R. Karr. 1984. Species composition of bird communities and the conservation benefit of large versus small forests. *Biological Conservation* 30: 173-187.
- cxxxv Robbins, C.S. 1979. Effect of forest fragmentation on bird populations. Pp. 198-212 in DeGraaf, R.M., and K.E. Evans, eds. *Management of northcentral and northeastern forests for nongame birds*. United States Department of Agriculture, Forest Service General Technical Report NC-51. 268 pp.
- cxxxvi Morse, D.H. 1993. Black-throated Green Warbler (*Dendroica virens*). In Poole, A., and F. Gill, eds. *The birds of North America*, No. 55. Philadelphia, PA: The Academy of Natural Sciences; Washington, DC: The American Ornithologists' Union. 19 pp.
- cxxxvii Askins, R.A., and M.J. Philbrick. 1987. Effect of changes in regional forest abundance on the decline and recovery of a forest bird community. *Wilson Bulletin* 99: 7-21.
- cxxxviii Freemark, K.E., and B. Collins. 1992. Landscape ecology of birds breeding in temperate forest fragments. Pp. 443-454 in Hagan, J.M. III, and D.W. Johnston, eds. *Ecology and conservation of neotropical migrant landbirds*. Washington, DC: Smithsonian Institution Press. 609 pp.
- cxxxix Bushman, E.S., and G.D. Terres. 1988. Habitat management guidelines for forest interior breeding birds of coastal Maryland. Maryland Department of Natural Resources, Wildlife Technical Bulletin 88-1. 50 pp.
- cxl Howe, R.W. 1979. Distribution and behavior of birds on small islands in northern Minnesota. *Journal of Biogeography* 6: 379-390.
- cxli Rusterholz, K.A., and R.W. Howe. 1979. Species-area relations of birds on small islands in a Minnesota lake. *Evolution* 33: 468-477.
- cxlii Holmes, R.T. 1994. Black-throated Blue Warbler (*Dendroica caerulescens*). In Poole, A., and F. Gill, eds. *The birds of North America*, No. 87. Philadelphia, PA: The Academy of Natural Sciences; Washington, DC: The American Ornithologists' Union. 21 pp.
- cxliii Darveau, M., J.L. DesGranges, and G. Gauthier. 1992. Habitat use by three breeding insectivorous birds in declining maple forests. *Condor* 94: 72-82.

- cxliv Burke, D.M., and E. Nol. 1998. Influence of food abundance, nest-site habitat, and forest fragmentation on breeding Ovenbirds. *Auk* 115: 96-104.
- cxlv Mowbray, T.B. 1999b. Scarlet Tanager (*Piranga olivacea*). In Poole, A., and F. Gill, eds. *The birds of North America*, No. 479.. Philadelphia, PA: The Birds of North America, Inc. 27 pp.
- cxlvi Peck, G.K., and R.D. James. 1987. Breeding birds of Ontario: nidiology and distribution. Volume 2: passerines. Toronto, ON: Royal Ontario Museum, Life Sciences Miscellaneous Publications. 387 pp.
- cxlvii Hejl, S.J., J.A. Holmes, and D.E. Kroodsma. 2002b. Winter Wren (*Troglodytes troglodytes*). In Poole, A., and F. Gill, eds. *The birds of North America*, No. 623. Philadelphia, PA: The Birds of North America, Inc. 31 pp.
- cxlviii Ontario Ministry of Natural Resources. 2000. Significant Wildlife Habitat Technical Guide. Fish and Wildlife Branch. Wildlife Section. Science Development and Transfer Branch. Southcentral Sciences Section. 151 pp.
- cxlix Ontario Ministry of Natural Resources. 2000. Significant Wildlife Habitat Technical Guide Appendix. Fish and Wildlife Branch. Wildlife Section. Science Development and Transfer Branch. Southcentral Sciences Section. 244 pp.
- cl Hamel, P.B. 2000a. Cerulean Warbler (*Dendroica cerulea*). In Poole, A., and F. Gill, eds. *The birds of North America*, No. 511. Philadelphia, PA: The Birds of North America, Inc. 19 pp.
- cli Peterjohn, B.G., and D.L. Rice. 1991. *The Ohio breeding bird atlas*. Columbus, OH: Ohio Department of Natural Resources.
- clii Robbins et al. 1989 AND Robbins, C.S., J.W. Fitzpatrick, and P.B. Hamel. 1992. A warbler in trouble: *Dendroica cerulea*. Pp. 549-562 in Hagan, J.M. III, and D.W. Johnston, eds. *Ecology and conservation of neotropical migrant landbirds*. Washington, DC: Smithsonian Institution Press. 609 pp.
- cliii Bond, R.R. 1957. Ecological distribution of breeding birds in the upland forests of southern Wisconsin. *Ecological Monographs* 27: 351-384.
- cliv Wood, P.B., S.B. Bosworth, and R. Dettmers. 2006. Cerulean Warbler abundance and occurrence relative to large-scale edge and habitat characteristics. *Condor* 108: 154-165.
- clv Hamel, P.B. 2000a. Cerulean Warbler (*Dendroica cerulea*). In Poole, A., and F. Gill, eds. *The birds of North America*, No. 511. Philadelphia, PA: The Birds of North America, Inc. 19 pp.
- clvi Robinson, S.K., F.R. Thompson III, T.M. Donovan, D.R. Whitehead, and J. Faaborg. 1995. Regional forest fragmentation and the nesting success of migratory birds. *Science* 267: 1987-1990.
- clvii Hamel, P.B., R.J. Cooper, and W.P. Smith. 1998. The uncertain future of Cerulean Warblers in the Mississippi Alluvial Valley. Pp. 95-108 in *Proceedings of the Delta Conference*, Memphis, TN: United States Department of Agriculture, Natural Resource Conservation Service
- clviii McCracken, J. 1993. Status report on the Cerulean Warbler *Dendroica cerulea* in Canada. Prepared for the Committee on the Status of Endangered Wildlife in Canada. 31 pp.
- clix Hamel, P.B. 2000b. Cerulean Warbler status assessment. Stoneville, MS: United States Fish and Wildlife Service. 141 pp.



- clx Bollinger, E.K., Gavin, T.A., and D.C. McIntyre. 1988. Comparison of transects and circular plots for estimating Bobolink densities. *Journal of Wildlife Management* 52: 777-786.
- clxi Herkert, J.R. 1991. Prairie birds of Illinois: population response to two centuries of habitat change. *Illinois Natural History Survey Bulletin* 34: 393-399.
- clxii Swanson, D.A. 1996. Nesting ecology and nesting habitat requirements of Ohio's grassland-nesting birds: a literature review. Columbus, OH: Ohio Department of Natural Resources. Ohio Fish and Wildlife Report 13. 60 pp.
- clxiii Davis, S.K. 2004. Area sensitivity in grassland passerines: Effects of patch size, patch shape, and vegetation structure on bird abundance and occurrence in southern Saskatchewan. *Auk* 121: 1130-1145.
- clxiv Johnson, D.H., and L.D. Igl. 2001. Area requirements of grassland birds: a regional perspective. *Auk* 118: 24-34.
- clxv Vickery, P.D., M.L. Hunter, Jr., and S.M. Melvin. 1994. Effects of habitat area on the distribution of grassland birds in Maine. *Conservation Biology* 8: 1087-1097.
- clxvi Bollinger, E.K. 1995. Successional changes and habitat selection in hayfield bird communities. *Auk* 112: 720-730.
- clxvii Jones, A.L., and P.D. Vickery. 1995. Distribution and population status of grassland birds in Massachusetts. *Bird Observer* 23: 89-96.
- clxviii Walk, J.W., and R.E. Warner. 1999. Effects of habitat area on the occurrence of grassland birds in Illinois. *American Midland Naturalist* 141: 339-344.
- clxix Cadman, M.D. 1993. Status report on the Northern Harrier *Circus cyaneus* in Canada. Prepared for the Committee on the Status of Endangered Wildlife in Canada. 35 pp.
- clxx Austen, M.J.W., M.D. Cadman, and R.D. James. 1994. Ontario birds at risk: status and conservation needs. Toronto and Port Rowan, ON: Federation of Ontario Naturalists and Long Point Bird Observatory. 165 pp.
- clxxi Eastern Ontario Natural Heritage working Group. 2003. Eastern Ontario Wetland Valuation System: First Approximation. Technical Report prepared by Burns, C. and P. Wilson. v + 39pp.
- clxxii Rittenhouse, C.D., Dijak, W.D., Thompson, III, F.R., and J.J. Millspaugh. 2007. USDA, Forest Service, Northern Research Station, General Technical Report NRS-4.
- clxxiii Rodewald, A.D. & A.C. Vitz. 2005. Edge- and area-Sensitivity of Shrubland Birds. *The Journal of Wildlife Management* 69(2): 681-688.
- clxxiv Baldwin, R.F., Calhoun, A.K. and P.G. DeMaynadier. 2006. Conservation planning for amphibian species with complex habitat requirements: a case study using movements and habitat selection of the wood frog *Rana sylvatica*. *Journal of Herpetology* 40(4):442-453.
- clxxv Kingsbury, B. and J. Gibson, eds. 2002. Habitat Management Guidelines for Amphibians and Reptiles of the Midwest: Ephemeral Ponds. Partners in Amphibian and Reptile Conservation.
- clxxvi Vasconcelos, D. and A.K. Calhoun. 2004. Movement patterns of adult and juvenile *Rana sylvatica* and *Ambystoma maculatum* in three restored seasonal pools in Maine. *Journal of Herpetology* 38(4):551.

- clxxvii Mazerolle, M.J., and A. Desrochers. 2005. Landscape resistance to frog movements. *Canadian Journal of Zoology* 83:455-464.
- clxxviii Gibbons, J.W., Winne, C.T., Scott, D.E., Willson, J.D., Glaudas, X., K.M. Andrews, B.D. Todd, L.A. Fedewa, L. Wilkinson, R.N. Tasaliagos, S.J. Harper, J.L. Greene, T.D. Tuberville, B.S. Metts, M.E. Dorcas, J.P. Nestor, C.A. Young, T. Arke, R.N. Reed, K.A. Buhlman, J. Norman, D.A. Croshaw, C. Hagen, and B.B. Rothermel. 2005. Remarkable amphibian biomass and abundance in an isolated wetland: implications for wetland conservation. *Conservation Biology* 20:1457-1465.
- clxxix Shoop, C.R. 1968. Migratory orientation of *Ambystoma maculatum*: movements near breeding ponds and displacements of migrating individuals. *Biological Bulletin* 135:230-238.
- clxxx Calhoun, A.J.K., and M.W. Klemens. 2002. Best development practices: conserving pool-breeding amphibians in residential and commercial developments in the northeastern United States. Bronx, NY: Metropolitan Conservation Alliance, Wildlife Conservation Society, MCA Technical Paper 5. 57 pp.
- clxxxi Porej, D., Micacchion, M., and T.E. Hetherington. 2004. Core terrestrial habitat for conservation of local populations of salamanders and wood frogs in agricultural landscapes. *Biological Conservation* 120:399-409.
- clxxxii Environment Canada. 2004. How much habitat is enough? A framework for guiding habitat rehabilitation in Great lakes areas of concern, 2<sup>nd</sup> ed. Great Lakes Sustainability Fund and Canadian Wildlife Service – Ontario Region. Ministry of the Environment. 80pp.
- clxxxiii Hoskinson, R.L. and L.D. Mech. 1976. White-tailed deer migration and its role in wolf predation. *Journal of Wildlife Management* 40(3):429-441.
- clxxxiv Government of Australia. 2004. North east New South Wales: Wildlife Corridors. Natural Resource Advisory Series Note 15. Environment Protection and Regulation Division, Department of Environment and Conservation.
- clxxxv Ontario Ministry of Natural Resources. 2007. Bear wise – bears travel a long way.
- clxxxvi Young, V.H., Elliott, R.E., Hofstede, E., Dobbyn, J. and R.E. Harris. 1996. Bruce Peninsula National Park mammal inventory (vol IV) Final Report. Canadian Parks Service File CR92-26. 1-203. In: Howe, E.J. 2002. Population viability analysis for black bears (*Ursus americanus*) on the Bruce Peninsula, Ontario, Canada. M.Sc. thesis submitted to the Committee on Graduate Studies. Trent University.
- clxxxvii Brown, L; Obbard, M.E. and W.D. Towill. 1999. The ecology of northern Ontario black bear in relation to mixedwood forests. Ontario Ministry of Natural Resources, Peterborough, Ontario. 17pp. In: Howe, E.J. 2002. Population viability analysis for black bears (*Ursus americanus*) on the Bruce Peninsula, Ontario, Canada. M.Sc. thesis submitted to the Committee on Graduate Studies. Trent University.
- clxxxviii Howe, E.J. 2002. Population viability analysis for black bears (*Ursus americanus*) on the Bruce Peninsula, Ontario, Canada. M.Sc. thesis submitted to the Committee on Graduate Studies. Trent University. Library and Archives Canada.

- clxxxix Burrows, F., Schlosser, K., Calhoun, J. and M. Obbard 2005. Bruce Peninsula Black Bear Study Progress Report 1998-2002. Parks Canada internal report, 87pp.
- cxc Coady, M. 2005. A distance-based analysis of seasonal habitat use and den site selection by American black bears (*Ursus americanus*) on the Bruce Peninsula, Ontario. M.Sc. thesis submitted to the Committee on Graduate Studies. Trent University. Library and Archives Canada.
- cxcI Howe, E.J., M.E. Obbard, and J.A. Schaefer. 2007. Extirpation risk of an isolated black bear population under different management scenarios. *Journal of Wildlife Management* 71(2):603-612.
- cxcii Rogers, L.L. and A.W. Allen. 1987. Habitat suitability index models: black bear, upper Great Lakes Region. U.S. Fish and Wildlife Service. Biological Report 82 (10.144). 54pp.
- cxciii Zapisocki, R. Todd, M., Bonar, R., Beck, J., Beck, B., and R. Quinlan. 1998. Black bear summer/fall habitat: habitat suitability index model version 5. Foothills Model Forest, Weldwood of Canada Ltd, Department of Renewable Resources University of Alberta and Natural Resources Services.
- cxciv Voigt, D.R., J.D. Broadfoot, and J.A. Baker. 1997. Forest Management Guidelines for the Provision of White-tailed Deer Habitat. Queen's Printer for Ontario. 33pp.
- cxcv Ranta, W. Bruce. 1998. Selected Wildlife and Habitat Features: Inventory Manual. Queen's Printer for Ontario. 217pp.
- cxcvi OMNR. 1987. Bald Eagle Habitat Management Guidelines. Wildlife Branch. 18pp.
- cxcvii OMNR 1998. A silvicultural guide for Great Lakes St. Lawrence conifer forest in Ontario. Ont. Min. Nat. Resour. Queen's Printer for Ontario. Toronto. 424p.
- cxcviii Szuba, K. and Naylor, B. 1998. Forest Raptors and Their Nests in Central Ontario. A guide to Stick Nests and Their Users. Ont. Min. Nat. Resour. Queen's Printers for Ontario. 78p.
- cxcix CWS. 2002, (Downes, C.M., B.t. Collins and J.A Kennedy.) Canadian Bird Trends Web Site Version 2.0. Migratory Birds Conservation Division, Canadian Wildlife Service, Hull, Que. ([www.cws-scf.ec.gc.ca/birds/trends](http://www.cws-scf.ec.gc.ca/birds/trends))
- cc
- cci