Inverhaugh Pasture Edge Subdivision

Environmental Impact Study

Prepared for:

Elora Ridge Developments Ltd.

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NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Inverhaugh Pasture Edge Subdivision

Environmental Impact Study

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1.0 Introduction

Natural Resource Solutions Inc. (NRSI) was retained in August 2017 by Elora Ridge Developments Ltd. to complete an Environmental Impact Study (EIS) for a proposed residential subdivision on a property legally described as Park Lots 8 and 11, and Part of Park Lot 7, Part of Mill Property in the hamlet of Inverhaugh, Township of Centre Wellington (herein, the "subject property"). The proposed subdivision, known as the Inverhaugh Pasture Edge Subdivision, comprises 40 single detached residential lots, two stormwater management facilities, and an internal road network on a 15.20ha property. Each of the lots is to be serviced by individual water wells and septic systems. For the purposes of this report, the subject property orientation is such that true northwest is referred to as "north". The subject property including adjacent lands within 120m are referred to as the "study area". See Map 1 for the study area location.

The subject property is bounded to the north by woodland and an active aggregate extraction operation, to the east and south by agricultural lands, and to the west by residential development. The subject property currently comprises a mix of actively used agricultural lands and naturally regenerating idle lands that have undergone both recent and more historic disturbance through aggregate extraction. The southern half of the subject property is dominated by an agricultural field (planted in row crops during the EIS study) and turkey barns associated with an existing poultry business. The northern half of the property comprises irregularly undulating and sloped lands that were historically used for aggregate extraction but have since regenerated to cultural meadow. The northeast corner of the property was recently under aggregate extraction, but has since been backfilled and is currently in the early stages of successional meadow regeneration. Note that aerial imagery on EIS mapping depicts the property prior to this recent on-property aggregate extraction activity; refer to the EIS description of the northeast corner of the property as it currently exists.

Swan Creek traverses the southwest corner of the subject property approximately 670m upstream of its confluence with the Grand River. Wetland and lowland woodland features flanking Swan Creek are mapped as Core Greenlands and Greenlands in the Wellington County Official Plan (OP) (County of Wellington 2018; see Appendix I). Wetlands on the property have been mapped by the Ontario Ministry of Natural Resources and Forestry (MNRF) as part of the Inverhaugh Valley Provincially Significant Wetland (PSW) Complex. An off-site woodland abutting the north property boundary is also mapped as Greenlands in the County OP. The subject property is regulated by the Grand River Conservation Authority (GRCA) due to the

presence of Swan Creek and its associated floodplain, wetlands and steep slopes. A large (approximately 9m high) slope, which roughly parallels the Swan Creek floodplain, delineates a portion of the Acquisition Area for the future West Montrose Dam. A smaller portion of the Acquisition Area represents the natural Swan Creek floodplain.

The proposed development was discussed at a pre-consultation meeting held between staff of the Township of Centre Wellington, the County and the proponent study team on July 26, 2017 at which time required technical studies were identified for submission with the development application. A pre-consultation meeting was also held between the proponent and the GRCA, as well as a subsequent site meeting held with staff of the GRCA and the proponent's study team on August 10, 2017. Due to the presence of County-mapped Core Greenlands and Greenlands on the property, and because the property falls within the GRCA regulation limits, an EIS is required to demonstrate that the proposed development will not negatively impact the existing natural features and ecological their functions.

Engineering, hydrogeology and stormwater management studies for the proposed development have been addressed by GM BluePlan Engineering, while the Tree Protection Plan has been completed by MacKinnon and Associates. These findings and recommendations have been incorporated into this report where required.

This report summarizes background information on natural heritage features, as well as results of field surveys completed within the subject property. This information was used to define natural features as development constraints based on significance and sensitivity of the features, to inform the design of the proposed development. An impact assessment has been completed based on the comparison of the existing natural features to the development plan details. Recommendations have been provided to avoid, or otherwise minimize or mitigate impacts to the existing natural features.

1.1 Project Scoping

1.1.1 Background Information Review

In order to determine a study approach for the EIS, existing natural heritage information was first gathered and reviewed to identify key natural heritage features and species that are known or have potential to occur within the study area. Existing background information was requested

from the MNRF Guelph District and the GRCA. Written responses were received from the MNRF on April 4, 2017 and from the GRCA on January 11, 2018.

Background information on the natural environment features within the study area vicinity was also gathered from the MNRF Natural Heritage Information Centre significant species database (MNRF 2015a), the MNRF's Land Information Ontario, and relevant taxa-specific databases, as listed below.

Initial wildlife species lists were compiled to provide information on species reported from the vicinity of the study area (10km radius) using various atlases including the Ontario Mammal Atlas (Dobbyn 1994), the Ontario Reptile and Amphibian Atlas (Ontario Nature 2018), the Ontario Butterfly Atlas (MacNaughton et al. 2018), and the Ontario Odonata Atlas (MNRF 2018a). Data on breeding birds in the area was extracted from the Ontario Breeding Bird Atlas (BSC et al. 2008). Since this atlas provides data based on 10x10km survey squares, information on breeding birds from the square that overlaps the study area (17NJ43) was compiled. These initial species lists were used to guide the scope and type of field surveys required as outlined in the following sections.

Other information sources that were reviewed to inform project scoping included the following:

- Wellington County OP (County of Wellington 2018)
- Township pre-consultation meeting notes dated July 26, 2017
- Pre-consultation site meeting comments provided by GRCA (F. Natolochny) on August 10, 2017.

Based on the findings of the background review, draft Terms of Reference (TOR) for the EIS were prepared by NRSI and submitted to the County and GRCA on December 12, 2017. Written comments were received from the GRCA on December 15, 2017, after which the TOR were finalized and recirculated to the study team and regulatory agencies on January 29, 2018. See Appendix II for the final EIS TOR.

1.1.2 Significant Species and Habitat Screening

Species at Risk (SAR) are those listed on the Species at Risk in Ontario List (MNRF 2018b). These include species identified by the Committee on the Status of Species at Risk in Ontario (COSSARO) as provincially Endangered, Threatened, or Special Concern. Species listed as Endangered or Threatened are protected under the *Endangered Species Act* (ESA), which includes protection to their habitat.

Species considered Special Concern are included in the definition of Species of Conservation Concern (SCC), which includes the following:

- species designated provincially as Special Concern,
- species that have been assigned a conservation status (S-Rank) of S1 to S3 or SH by the Natural Heritage Information Centre (MNRF 2015a), and
- species that are designated federally as Threatened or Endangered by the Committee for the Status of Endangered Wildlife in Canada (COSEWIC) but not provincially by the COSSARO. These species may be protected by the federal *Species at Risk Act* (SARA) if they are listed as Threatened or Endangered on Schedule 1 of the SARA.

Habitat for SCC is considered Significant Wildlife Habitat (SWH) (OMNR 2010), which is afforded protection under the Provincial Policy Statement (OMMAH 2014) and County natural heritage protection policies. For the purposes of this report, the term "SAR" will refer to provincially Threatened and Endangered species regulated under the ESA while provincial species of Special Concern will be considered SCC.

Based on NRSI's examination of background sources and federally or provincially significant species with occurrence records in the study area vicinity (within 10km), an assessment of SAR and SCC suitable habitat presence within the study area was completed. Assessments of habitat suitability in the study area were made by cross-referencing each species' known habitat preferences or requirements (e.g., OMNR 2000) with NRSI biologist site knowledge based on a preliminary site visit completed in March 2017. This preliminary screening further informed the surveys required as part of the EIS scope, described below.

Based on the results of the preliminary screening, the following SAR were identified as having potential for suitable habitat within the study area:

- Barn Swallow (*Hirundo rustica*) – provincially and federally Threatened
- Eastern Meadowlark (*Sturnella magna*) – provincially and federally Threatened
- Little Brown Myotis (*Myotis lucifugus*) – provincially and federally Endangered
- Northern Myotis (*Myotis septentrionalis*) – provincially and federally Endangered
- Tri-colored Bat (*Perimyotis subflavus*) – provincially and federally Endangered

See the TOR (Appendix II) for the full habitat screening table for SAR and SCC with occurrence records in the study area vicinity.

A preliminary screening for the presence of Significant Wildlife Habitat (SWH) was also completed for the study area, as summarized in the TOR (Appendix II). The Significant Wildlife Habitat Technical Guide (SWHTG) outlines the types of habitats that the MNRF considers significant in Ontario as well as criteria to identify these habitats for Ecoregion 6E (OMNR 2000, MNRF 2015b). The SWHTG groups SWH into four broad categories: seasonal concentration areas, rare vegetation communities and specialized wildlife habitat, habitats of SCC, and animal movement corridors.

Based on the results of this preliminary screening exercise, the following SWH types were initially considered Candidate SWH for the study area to inform the need for further assessment through the field work and analysis in the EIS:

- Snake Hibernaculum
- Turtle Wintering Area
- Amphibian Breeding Habitat (Woodland)
- Potential habitat for the following SCC not covered under other SWH criteria:
    - Eastern Wood-Pewee (*Contopus virens*)
    - Wood Thrush (*Hylocichla mustelina*)

See Appendix II for the detailed SWH screening tables, including rationale as to whether the SWH types are considered “candidate” or not present within the study area.

1.1.3 Relevant Policies, Legislation, and Planning Studies

Table 1 provides an overview of natural heritage-based policies, planning studies and legislation that were considered and which informed the field program and analysis. To help inform suitable land-use concepts, guide the layout of development, and identify areas to be protected, inventoried natural features were evaluated against relevant policies, regulations and legislation outlined in the following sections. The specific implications of these policies to the proposed development are discussed in further in Section 4.0.

Table 1. Relevant Policies, Legislation and Planning Studies

Policy/Legislation	Description	Project Relevance
Provincial Policy Statement (OMMAH 2014).	• Issued under the authority of Section 3 of the Planning Act and came into effect on April 30, 2014, replacing the 2005 PPS (OMMAH 2005). • Section 2.1 of the PPS – Natural Heritage establishes clear direction on the adoption of an ecosystem approach and the protection of resources that have been identified as 'significant'. • The Natural Heritage Reference Manual (OMNR 2010) and the Significant Wildlife Habitat Technical Guide (OMNR 2000, MNRF 2015a) were prepared by the MNRF to provide guidance on identifying natural features and in interpreting the Natural Heritage sections of the PPS.	• Natural features that occur or may occur within the study area, and which receive protection under the PPS, include: o Significant Woodlands, o Provincially Significant Wetland, o Fish Habitat, o Potential Significant Wildlife Habitat, and o Potential habitat for Endangered and Threatened species. • Section 2.1.4 of the PPS states that development or site alteration shall not be permitted in Provincially Significant Wetlands located in Ecoregion 6E (in which the study area is located). • Section 2.1.5 of the PPS states that development or site alteration shall not be permitted in Significant Wildlife Habitat or Significant Woodland unless it has been demonstrated that there will be no negative impacts on the features or their ecological functions. • Section 2.1.6 of the PPS states that development or site alteration shall not be permitted in fish habitat except in accordance with provincial and federal requirements. • Section 2.1.8 of the PPS states that development and site alteration shall not be permitted on adjacent lands to the natural features described above unless it is demonstrated that there will be no negative impacts to the natural features or their ecological functions. • Section 2.1.7 of the PPS states that development or site alteration shall not be permitted in habitat of Endangered or Threatened species except in accordance with provincial or federal requirements. • Section 2.1.2 of the PPS states that the connectivity of natural features in an area should be maintained, restored, or where possible, improved.
Endangered Species Act	• The original ESA, written in 1971, underwent a year-long review which	• Based on a preliminary assessment, multiple SAR were identified as having the potential to occur within

Policy/Legislation	Description	Project Relevance
	resulted in a number of changes which came into force in 2007. • The ESA prohibits killing, harming, harassing or capturing SAR and protects their habitats from damage and destruction.	the study area based on presence of suitable habitat.
Migratory Birds Convention Act	• Prohibits the disturbance, destruction, or taking of a nest or eggs of migratory birds.	• Any vegetation removal required for construction of the proposed development must have regard for this legislation in the form of timing window restrictions or other suitable mitigation measures.
Wellington County Official Plan (June 1, 2018 consolidation)	• The County OP describes and outlines protection policies for the Natural Heritage System in Wellington County. • Wellington County's Natural Heritage System is classified and mapped within its Greenlands System, as shown on Schedule A1 of the OP. The Greenlands System is divided into features identified as Core Greenlands and Greenlands, according to their level of significance and sensitivity.	• The subject property and adjacent lands within the study area contain the following features mapped as Core Greenlands by the County: o Inverhaugh Valley PSW o Hazard lands associated with the Swan Creek floodplain and steep slopes, including lands regulated by the GRCA • The subject property and adjacent lands within the study area contain the following features mapped as Greenlands by the County: o Swan Creek and valleyland, including lands regulated by the GRCA o Significant Woodlands
Growth Plan for the Greater Golden Horseshoe (2017)	• The Growth Plan, in conjunction with other provincial land use plans, builds on the Provincial Policy Statement to establish a land use planning framework for the Greater Golden Horseshoe. • The Growth Plan identifies a Natural Heritage System (NHS) for the Greater Golden Horseshoe to be integrated into long-term regional planning approaches for the protection of these features and their ecological functions. • Updated NHS mapping for the Greater Golden Horseshoe was released in February 2018.	• February 2018 mapping identifies woodland abutting the north boundary of the subject property as a component of the Growth Plan NHS. Based on Land Information Ontario mapping, the Swan Creek wooded corridor is not included in the Growth Plan NHS; this feature falls within the County's Urban System designation (Hamlet) for Inverhaugh. • The Growth Plan defines Key Natural Heritage Features to include, in part, SAR habitat, fish habitat, wetlands, Significant Woodlands, and SWH. • The Growth Plan defines Key Hydrologic Features to include, in part, permanent and intermittent streams, seepage areas/springs, and wetlands. • The Growth Plan defines Key Hydrologic Areas to include significant groundwater recharge areas, highly

Policy/Legislation	Description	Project Relevance
		vulnerable aquifers, and significant surface water contribution areas. • Based on Section 4.2.2.3, new development and site alteration is to demonstrate that there no negative impacts to Key Natural Heritage Features and Key Hydrologic Features, and that connectivity between these features within 240m of each other will be maintained. • Based on Section 4.2.3.1, development and site alteration, of the type proposed for the subject property, is not permitted in Key Natural Heritage features or Key Hydrologic Features of the NHS. • Development and site alteration for large-scale developments such as subdivisions may be permitted within a Key Hydrologic Area provided the hydrologic functions, including water quantity and quality control, will be protected and where possible, enhanced or restored. • Based on Section 4.2.4, a vegetation protection zone (i.e., buffer), comprising natural self-sustaining vegetation, must be established from Key Natural Heritage Features or Key Hydrologic Features where adjacent development is proposed. • Minimum buffer width from Key Hydrologic Features, Fish Habitat, and Significant Woodlands is 30m. • Development and site alteration is prohibited within buffers. • The NHS mapping and policies of the Growth Plan have not been integrated into, and are not in force within, the policies of the Wellington County OP at the time of EIS development. The policies of the County OP are therefore deemed to apply for the purposes of this EIS.
Mapping of a Natural Heritage System in the County of Wellington (GRCA 2018)	• This study identifies a refined-scale NHS for Wellington County, building off of the coarser-level NHS mapping identified in the Growth Plan (2017) and the updated 2018 Growth Plan NHS mapping.	• A recommended NHS for Wellington County was developed which based on NHS mapping appears to include the Swan Creek wooded corridor and the off-property woodland abutting the north subject property boundary.

Policy/Legislation	Description	Project Relevance
	• This study was completed to facilitate the future incorporation of the Growth Plan NHS, and as supplemented and refined with features identified through this evaluation, into the Wellington County OP via an OP Review.	• The expanded NHS as identified in this evaluation is not yet reflected in the current Wellington County OP that is in force.
GRCA Regulation 150/06	• Regulation issued under *Conservation Authorities Act,* R.S.O. 1990. • Through this regulation, the GRCA has the responsibility to regulate activities in natural and hazardous areas (i.e., areas in and near rivers, streams, floodplains, wetlands, and slopes).	• The subject property includes lands that fall within the regulation limit of the GRCA due to the presence of Swan Creek, floodplain and steep slope hazard lands, and wetland (Inverhaugh Valley PSW). • As such, permitting from the GRCA must be obtained for proposed works within their regulation area. • An EIS is required to demonstrate that the proposed development will result in no negative impact to the regulated natural features and their ecological functions.
Fish and Wildlife Conservation Act	• Protects certain bird species not protected under the Migratory Birds Convention Act, such as raptors, and protects furbearing mammals and their dwellings.	• Various species are known from the study area vicinity that fall under the protective policies of this Act. Raptor nests were observed within the subject property that fall under the protective policies of this legislation, as described further below.

2.0 Field Methods

The EIS field survey methodology was described in the TOR as submitted to the County and GRCA (Appendix II). Table 2 provides a summary of field surveys undertaken in the study area as described in the TOR. Additional site visits were completed as described below. In total, 11 site visits were completed during the period March 2017-November 2018 to characterize the subject property natural features.

Table 2. Field Survey Summary

Survey Type	Survey Protocol	Dates
Ecological Land Classification	Lee et al. 1998	March 17, 2017 September 15, 2017
North Property Woodland Edge Tree Inventory	N/A	September 13, 2017
Vegetation Inventories	Comprehensive search by ELC polygon	March 17, 2017 September 15, 2017
Woodland Dripline and Wetland Boundary Delineation	Ontario Wetland Evaluation System (MNRF 2014) (wetland boundary delineation)	September 15, 2017
Snake Emergence Surveys	Comprehensive search of suitable habitat within the property and potential hibernaculum features	April 26, 2018 May 9, 2018 May 11, 2018
Bat Cavity Tree Assessment	MNRF 2017	April 26, 2018
Breeding Bird Surveys	BSC 2001	May 29, 2018 June 22, 2018

In addition to the surveys listed above, NRSI biologists also completed additional site visits to further review the mapped natural features with agency and study team staff. A site visit was completed with GRCA staff on September 20, 2017 to review and confirm the flagged wetland boundaries on the subject property. Based on correspondence with County staff, no agency site visit was required to confirm NRSI's flagged woodland dripline boundary. The confirmed wetland and woodland dripline boundaries were subsequently surveyed by Van Harten Surveying Inc. An NRSI biologist also completed a site visit on July 25, 2018 to examine the subject property and adjacent lands (i.e., the adjacent aggregate pit), as could be discerned from the property, for the presence of Bank Swallow (*Riparia riparia*) nesting habitat. An NRSI biologist and certified arborist also attended a site visit on November 28, 2018 with staff of GM

BluePlan to further review grading limits that could be accomplished without negatively impacting mature woodland edge trees along the north property boundary.

An NRSI certified arborist undertook a detailed tree inventory and health assessment for trees located along the northern boundary of the property, and adjacent trees (within 10m) within the GRCA-owned woodland to the north in accordance with the EIS TOR. MacKinnon and Associates undertook a tree inventory and health assessment for the remainder of the subject property. NRSI's north-property tree inventory data were submitted to MacKinnon and Associates for inclusion in their Tree Management Plan (MacKinnon and Associates 2018), which is attached as Appendix III. Summary information from all tree inventory data collected for the subject property and adjacent lands is provided in this EIS.

3.0 Existing Conditions

3.1 Physical and Hydrological Conditions

The subject property is located within a physiographic region known as the Guelph Drumlin Fields, which is an area that generally comprises stoney tills and deep gravel terraces associated with glacial drumlins and meltwater spillways. The subject property has an irregular topography caused by past aggregate extraction activities, but generally slopes from the northeast to the southwest toward Swan Creek. Notable low-lying areas occur within the north-central and central portions of the property (GM BluePlan 2018a). Steep slopes remain on the property, some of which may have derived from the former aggregate extraction activities. This includes an approximately 9m high south facing slope that roughly parallels the Swan Creek floodplain. The north edge of the property, outside of the former extraction area, contains a prominent downward slope that represents the edge of an area of fill deposition associated with the historic property use. The toe of slope meets the natural grade of the adjacent mature woodland to the immediate north of the property.

The subject property is underlain by glaciofluvial deposits of gravelly texture, with the exception of low-lying areas around Swan Creek that contain more modern alluvial deposits of soft silt and sand. Well records for the location indicate that surficial coarse glaciofluvial material is underlain by fine-textured glacial till, which is in turn underlain by other coarse materials in some areas (GM BluePlan 2018a).

The subject property falls within the Grand River watershed and the Swan Creek subwatershed. On-site drainage follows the topographical relief from northeast to southwest toward Swan Creek. The central-property low lying areas are believed to drain internally through infiltration. Shallow groundwater flow follows the property topography toward the southwest. The north edge of the subject property drains off-property to the north. Swan Creek represents the only watercourse on the property. Portions of the Swan Creek channel are braided within the lowest elevations of the riparian valley, which create small sloughs that are seasonally wet within the PSW feature.

Due to the coarse surficial soils, high groundwater recharge rates occur on the property, creating a condition in which runoff readily infiltrates rather than forming defined flow channels on the property. This infiltration is impeded by the till aquitard, which causes lateral (horizontal) flow through the upper soils. Hydrogeological investigations completed by GM BluePlan found

that Swan Creek did not have a strong influence on the shallow groundwater flow, although some shallow groundwater flow would be expressed as baseflow to the creek. However, for the majority of the year shallow groundwater does not flow directly to Swan Creek but more likely discharges further downstream at the Grand River. Groundwater levels are expected to be expressed at the surface within Swan Creek and adjacent wetland areas only during the spring when the water table elevation is highest. For the remainder of the year the water table is lower, and the creek is anticipated to contribute to groundwater recharge rather than receiving discharge (GM BluePlan 2018a).

3.2 Vegetation

3.2.1 Vegetation Communities

The subject property is generally characterized as a combination of land which has been exposed to historic and recent aggregate extraction land uses, and existing agricultural activities. The southern half of the property comprises a row crop agricultural field and turkey barns associated with an existing poultry business. The majority of the rest of the property represents early successional cultural meadow reflecting a significant historic disturbance regime. Areas of former excavation are still evident, comprising steep slopes and irregular terrain. Areas of fill have also been deposited on the property in the past, as evidenced by the prominent north property slope. A large portion of the north property was recently under aggregate excavation, contiguous with the existing aggregate pit activities to the north, but has since been backfilled on the subject property.

Wooded natural features on the subject property are primarily limited to a lowland complex of swamp and cedar forest flanking Swan Creek and extending out from the floodplain. A large deciduous woodland occurs to the north of the subject property, with its boundary roughly corresponding to the north subject property boundary. Regenerative tree and shrub growth has established along the edge of, and along the top of, the north property fill slope edge over the past several years.

See Map 2 for vegetation community and other land cover mapping for the study area. A summary of ELC communities identified within the study area is provided in Table 3.

Table 3. Vegetation Communities within the Study Area

ELC Ecosite Type	ELC Description	Environmental Characteristics
FOC4-1	Fresh-Moist White Cedar Coniferous Forest	Mature coniferous forest community associated with valley slope of Swan Creek corridor. Canopy: Eastern White Cedar (*Thuja occidentalis*), Black Cherry (*Prunus serotina*) Sub-canopy: Eastern White Cedar, Black Cherry, White Elm (*Ulmus americana*) Understorey: Alternate-leaved Dogwood (*Cornus alternifolia*), European Buckthorn (*Rhamnus cathartica*), Choke Cherry (*Prunus virginiana*) Groundcover: Herb Robert (*Geranium robertianum*), Spinulose Wood Fern (*Dryopteris carthusiana*), Yellowish Enchanter's Nightshade (*Circaea lutetiana* ssp. *canadensis*), Common Speedwell (*Veronica officinalis*) Two (2) distinct habitat inclusions exist within and adjacent to this community: White Cedar Mineral Coniferous Swamp (SWC1-1), and Mineral Cultural Thicket (CUT1). Note that the CUT1 inclusion occurs predominantly off-site. Common species within the habitat inclusions are as follows: SWC1-1: Eastern White Cedar, Black Ash (*Fraxinus nigra*), Manitoba Maple (*Acer negundo*), Red-osier Dogwood (*Cornus stolonifera*), Wood Nettle (*Laportea canadensis*), Spotted Touch-me-not (*Impatiens capensis*) CUT1: Large-fruited Thorn (*Crataegus punctata*), Manitoba Maple, Dame's Rocket, Yellow Avens (*Geum aleppicum*), Tall White Aster (*Symphyotrichum lanceolatum* var. *lanceolatum*), Field Horsetail (*Equisetum arvense*)
CUM1	Mineral Cultural Meadow	Early successional open habitat covering a large portion of the subject property. Localized thickets of young shrub and tree growth. Canopy: n/a Sub-canopy: Hawthorn (*Crataegus* spp.), Balsam Poplar (*Populus balsamifera* ssp. *balsamifera*), Eastern White Cedar Understorey: European Buckthorn, Wild Red Raspberry (*Rubus idaeus* ssp. *melanolasius*), Balsam Poplar Groundcover: Awnless Brome (*Bromus inermis* ssp. *inermis*), Canada Goldenrod (*Solidago canadensis*), Common Tansy (*Tanacetum vulgare*), Canada Anemone (*Anemone canadensis*)

ELC Ecosite Type	ELC Description	Environmental Characteristics
FOD5-7	Dry-Fresh Sugar Maple-Black Cherry Deciduous Forest	Mid-aged tableland deciduous forest community. Mature plantation of Eastern White Pine (*Pinus strobus*) along the southeastern edge. The majority of this community occurs off-site. Canopy: Sugar Maple (*Acer saccharum* ssp. *saccharum*), Black Cherry, Bur Oak (*Quercus macrocarpa*) Sub-canopy: Black Cherry, Ironwood (*Ostrya virginiana*), White Ash Understorey: Alternate-leaved Dogwood, Choke Cherry, European Buckthorn Groundcover: Dame's Rocket, Yellowish Enchanter's Nightshade, Spinulose Wood Fern, Calico Aster (*Symphyotrichum lateriflorum* var. *lateriflorum*)

3.2.2 Vascular Flora

In total, 162 plant species were identified during site investigations within the subject property, including adjacent areas within the GRCA-owned woodland to the north that were accessible to NRSI biologists. A complete list of these species is appended to this report (Appendix IV).

One provincially significant species, Black Ash (*Fraxinus nigra*), was inventoried within the study area. This species was observed within the White Cedar Mineral Coniferous Swamp (SWC1-1) community. Although Black Ash is not listed on the Species at Risk in Ontario list (MNRF 2018b), because it is designated as Threatened nationally by COSEWIC it is considered a SCC in Ontario. As a SCC, the ELC community that it occupies (SWC1-1) is considered SWH. No regionally significant species were inventoried within the subject property based on Riley (1989).

One provincially rare species, Great St. John's-wort (*Hypericum ascyron*) (S3?; Vulnerable in Ontario, with some uncertainty (MNRF 2015a)), was inventoried within the SWC1-1 community. As a provincially rare species, Great St. John's-wort is also considered a SCC and its habitat (SWC1-1) is considered SWH.

The coefficient of conservatism (CC), a value ranging from 0 (low) to 10 (high) and is based on a species' tolerance of disturbance and fidelity to a specific habitat integrity (Oldham et al. 1995), was low-to-moderate (average of 3.6) when considering all inventoried species that have an assigned CC value. Of 95 inventoried species with assigned CC values, 43 (45%) had relatively low values of 0-3, indicating species that are generally tolerant of various habitat conditions including disturbed conditions. Six inventoried species had relatively high CC values (≥7) indicating fidelity to specified habitat conditions that are currently provided on-site. All of these species were located within the wooded natural features on or adjacent to the property, with the exception of Common Hackberry (CC of 8) which was also found within the CUM1 meadow immediately outside of the FOC4-1 woodland. Among inventoried species, 38% are non-native in Ontario. Although the majority of the inventoried non-native species were found within the CUM1, Cultural Thicket (CUT1) and agricultural field, several non-native species were also documented within the FOC4-1 and SWC1-1 features. This is indicative of adjacent ecological disturbances and edge effects that have been imposed on these features from adjacent open lands and historic land uses. Relatively fewer non-native species were observed within the Dry-Fresh Sugar Maple-Black Cherry Deciduous Forest (FOD5-7).

3.2.3 Tree Inventory

The tree inventory completed by MacKinnon and Associates comprised inventories of individual trees as well as discrete groups of trees where these were found growing in dense clusters on the property. In the case of tree groups, the species composition of each was recorded. In total, 386 individual trees comprising 25 species, and 24 distinct tree groups were inventoried on the subject property. The following tables summarize the tree inventory results.

Table 4. Inventory of Individual Trees Within the Subject Property

Common Name	Scientific Name	Condition					Total
		Excellent	Good	Fair	Poor	Dead	
Manitoba Maple	*Acer negundo*	0	3	16	3	0	22
Norway Maple	*Acer platanoides*	0	16	0	1	0	17
Sugar Maple	*Acer saccharum*	0	19	4	0	1	24
White Birch	*Betula papyrifera*	0	1	0	0	0	1
Common Hackberry	*Celtis occidentalis*	0	3	0	0	0	3
Hawthorn species	*Crataegus sp.*	0	0	0	0	15	15
American Beech	*Fagus grandiflora*	0	0	0	1	0	1
Ash species	*Fraxinus* sp.	0	10	19	14	2	45
Honey Locust	*Gleditsia triacanthos*	0	6	0	0	0	6
Eastern Red Cedar	*Juniperus virginiana*	0	1	0	1	0	2
Apple species	*Malus* sp.	0	2	0	0	0	2
Hop Hornbeam	*Ostrya virginiana*	0	12	1	0	0	13
Norway Spruce	*Picea abies*	0	7	1	0	0	8
White Spruce	*Picea glauca*	0	0	1	0	0	1
Austrian Pine	*Pinus nigra*	0	5	7	0	0	12
Eastern White Pine	*Pinus strobus*	0	6	58	15	24	0
Scots Pine	*Pinus sylvestris*	0	0	2	4	6	12
Poplar species	*Populus* sp.	0	2	0	1	0	3
Black Cherry	*Prunus serotina*	0	10	54	11	4	79
Bur Oak	*Quercus macrocarpa*	0	1	3	0	0	4
Common Buckthorn	*Rhamnus cathartica*	0	1	0	1	0	2
Weeping Willow	*Salix babylonica*	0	1	0	0	0	1
American Basswood	*Tilia americana*	0	3	2	0	0	5
Small Leaf Linden	*Tilia cordata*	0	1	0	0	0	1
Siberian Elm	*Ulmus pumila*	0	4	0	0	0	4

Table 5 summarizes the distinct tree groups inventoried within the subject property, identified by the species that they were comprised of, or dominated by.

Table 5. Inventory of Tree Groups Within the Subject Property

Common Name	Scientific Name	Condition	
		Good to Fair	Fair to Poor
Common Hackberry	*Celtis occidentalis*	1	0
Hawthorn species	*Crataegus* sp. (principal species)	2	10
Colorado Spruce	*Picea pungens*	1	0
Poplar species	*Populus* sp.	3	0
Common Buckthorn	*Rhamnus cathartica*	1	0
Willow species	*Salix* sp.	1	0
White Cedar	*Thuja occidentalis*	4	0
Siberian Elm	*Ulmus pumila*	1	0

3.3 Wildlife

3.3.1 Birds

In total, 86 bird species are reported from within 10km of the study area based on the OBBA (BSC et al. 2008). Forty-eight (48) of these species were documented within the study area during field surveys. Of these, 43 species displayed evidence of possible, probable or confirmed breeding within the study area. Refer to Appendix V for a list of bird species recorded within in the subject property and vicinity.

As listed in Section 1.1.2, suitable habitat for 2 bird SAR (Barn Swallow and Eastern Meadowlark) and 2 bird SCC (Eastern Wood-Pewee and Wood Thrush) that are known from the study area vicinity were identified. Of these species, the SAR Barn Swallow and SCC Eastern Wood-Pewee were observed within the study area. In addition, 1 other bird SAR, Bank Swallow, was observed within the study area during the course of field surveys.

Species at Risk Birds

Two (2) Barn Swallows were observed foraging over the subject property during the April 26, 2018 site visit. These individuals were specifically observed foraging over the Cultural Meadow (CUM1) community central to the property, as well as flying over the Swan Creek corridor off-site to the southwest. Two potential Barn Swallow nests were also observed from a distance affixed to the outside wall of one of the turkey barns during the April 26 survey. Due to turkey health and contamination sensitivities, NRSI biologists were not permitted to approach the barns closely and therefore could not observe the nests in detail. However, no Barn Swallows were observed foraging over the subject property during the breeding bird surveys, and no activity around the nests was observed during those surveys. No other Barn Swallow nests were observed on subject property structures. Barn Swallow nesting activity on the subject property was considered absent during the 2018 breeding season. However, the subject property appears to have been periodically used for foraging by individuals nesting nearby in the vicinity (likely within 500m of the property).

During the June 22, 2018 breeding bird survey, a group of Bank Swallows of up to 15 individuals was observed foraging over the subject property. These individuals were seen flying over the agricultural field, turkey barns, cultural meadow and the backfilled extraction area on the property. An NRSI biologist undertook a follow-up site visit on July 25, 2018 to investigate lands on and adjacent to the subject property for the presence of Bank Swallow nesting habitat,

focusing on any areas of suitable slope within the former on-site extraction area and the adjacent active extraction area. No suitable nesting habitat was observed on the subject property, where slopes are relatively minimal and shallow due to the recent backfilling activity, and have since started regenerating with herbaceous plant growth. Although suitable slopes occur within the active pit area to the north of the property, no Bank Swallow nests and no individuals were observed during the site visit. However, other areas of the pit that could not be observed may provide nesting habitat for the species. Nesting habitat may also exist within suitable banks along the Grand River. The subject property provides at least periodic foraging habitat for the species.

Species of Conservation Concern Birds

A singing male Eastern Wood-Pewee was recorded within the Dry-Fresh Sugar Maple-Black Cherry Deciduous Forest (FOD5-7) during both breeding bird surveys. It is therefore likely that this individual maintained a breeding territory within this off-site woodland in 2018, indicating evidence of probable breeding (BSC 2001). As a SCC, probable breeding habitat is considered to be SWH. During each of these surveys, the recorded individual was located well within the feature from the north subject property boundary, either central within the woodland or towards its north end.

Other Bird Species

NRSI biologists observed 2 raptor stick nests within study area natural features (Map 3b). The smaller of these nests was observed within a small grouping of Scots Pine trees and was found unoccupied during all site visits. A Cooper's Hawk (*Accipiter cooperii*) was observed on April 26, 2018 to be flying over the Fresh-Moist White Cedar Coniferous Forest (FOC4-1) in close proximity to the nest. Due to this observation and the appearance of the nest, it is anticipated that the nest was likely used by Cooper's Hawk but this could not be confirmed. A larger stick nest was observed within one of the planted woodland edge pine trees at the north edge of the property. This nest was also found unoccupied during all site visits but a Red-tailed Hawk (*Buteo jamaicensis*) was frequently observed flying in the vicinity of this nest over the FOD5-7 woodland edge. The observed nest was therefore considered to likely belong to a Red-tailed Hawk.

The other observed bird species are relatively common and have secure populations in Ontario. The species composition is reflective of the habitats in the study area, and includes a mix of

species associated with woodlands, open lands and agricultural areas, and urban/disturbed environments.

3.3.2 Herpetofauna

According to the Ontario Amphibian and Reptile Atlas (Ontario Nature 2018), 17 species of herpetofauna are reported from within 10km of the subject property. Three herpetofauna species (Eastern Gartersnake (*Thamnophis sirtalis sirtalis*), Gray Treefrog (*Hyla versicolor*), and Green Frog (*Lithobates clamitans melanota*)) were observed within the study area during the site visits. Of these, Gray Treefrog and Green Frog were observed incidentally on the subject property during field surveys. A complete list of herpetofauna species recorded from the study area and vicinity is provided in Appendix VI.

Snake Emergence Surveys

The snake emergence surveys included investigation of various features that represented potential snake hibernaculum habitat, with a focus on the south-facing stoney slopes that exist on the property. Eastern Gartersnake was the only species observed during the three comprehensive area searches. Snakes were observed at 5 separate locations on the property, 4 of which occurred along the large 9m high slope at the west end of the property. The other location was at the smaller central-property slope. Four gartersnakes were observed at one of these locations on the large slope on April 26, 2018. One gartersnake was observed at each of the other sighting locations on May 11, 2018.

The presence of basking gartersnakes at these locations during early spring suggests that they may have been using the stoney south-facing slopes as overwintering hibernacula. However, the number of individuals observed at each location was too low to meet MNRF criteria to be considered Snake Hibernaculum SWH (MNRF 2015b).

3.3.3 Mammals

According to the Mammal Atlas of Ontario (Dobbyn 1994), 44 mammal species are reported from within 10km of the study area. Of these, direct observation or evidence of 6 species was observed within the study area. This included White-tailed Deer (*Odocoileus virginianus*), for which direct observations were made and tracks observed within the lower floodplain CUM1 lands adjacent to the Swan Creek corridor. Deer may use the Swan Creek corridor as a localized movement corridor to and from the Grand River. No mammal SAR or SCC were observed within the study area. All observed species are common and widespread on the

landscape. A complete list of mammals reported from the subject property vicinity, based on background information and observations made as part of this study is included in Appendix VII.

Three bat SAR; Little Brown Myotis, Northern Myotis and Tri-colored Bat, have potential to occur within the study area. Based on the results of the bat habitat assessment, 9 potential bat roosting trees were identified as shown on Map 3b. Following a conservative approach, these trees are assumed to represent possible roosting habitat for SAR bats. The majority of these trees are located within the FOD5-7 woodland off-property and will not be negatively impacted. Of the 4 on-property or boundary trees, 2 (trees A and B; both on-property) are anticipated to require removal to accommodate the proposed development. However, based on NRSI corporate experience, we anticipate that the removal of these trees will not represent a negative impact to SAR bat habitat. Impacts to bats that may be using these trees can be avoided through measures such as completing tree removal outside of the bat active period (April 1-September 30). NRSI will consult with the MNRF to present the results of the bat habitat assessment and anticipated tree removal requirements, and determine next steps and recommended measures to avoid impacts to SAR bats and their habitat.

3.3.4 Insects

According to the Ontario Butterfly Atlas (McNaughton et al. 2018), 11 butterfly species are known to occur within 10km of the subject property. Three butterfly species; (Cabbage White (*Pieris rapae*), Common Wood-Nymph (*Cercyonis pegala*), and Monarch (*Danaus plexippus*)) were observed during site investigations. Of these, Monarch is designated as Special Concern in Ontario and is therefore considered a SCC. Based on MNRF criteria, the SWH for Monarch is Migratory Butterfly Stopover Habitat SWH. However, the subject property does not meet the criteria for this SWH type since it is not located within 5km of Lake Ontario. A complete list of butterfly species observed and reported from the study area and vicinity is provided in Appendix VIII.

According to the Ontario Odonate Atlas (MNRF 2018a), a single odonate species, Twelve-spotted Skipper (*Libellula pulchella*), is known to occur within 10km of the subject property. No odonate species were observed within the subject property during site visits.

4.0 Natural Environment Development Constraints

The natural environment constraints analysis is used to identify natural features that are sensitive to disturbance based on the rarity or significance of the feature or species, or the functions/processes and/or policies prohibiting development within them. These areas are identified as "constraints" to the proposed development, and are discussed in the context of natural heritage policies governing their protection. Conversely, opportunities for development may occur outside of these natural environment constraints within the subject property. Development or site alteration within certain natural feature constraints may be permitted by the regulatory agencies subject to permitting and/or implementation of recommended measures to appropriately mitigate anticipated impacts as discussed below.

Results of this analysis have been provided as input to the proposed development plan in order to avoid or otherwise mitigate impacts to significant natural features and functions. A summary of this analysis for the study area is discussed below. Natural features identified as constraints to site alteration are shown on Maps 3a and 3b.

4.1 Significant Natural Features and Habitats

As detailed above, the study area contains aquatic, wetland and terrestrial features and functions that are afforded significance under the County OP, and areas that are regulated by the GRCA. The following is a summary of the significance and sensitivity of the study area natural features and how the natural heritage policies and legislation described in Section 2.0 inform the identification of constraints for the proposed development.

4.1.1 Designated Natural Features

Core Greenlands: Inverhaugh Valley PSW and Hazard Lands

NRSI's site investigations confirmed that Core Greenland, as mapped on the subject property in the Wellington County OP Schedule A1 (Appendix I) corresponds to the Inverhaugh Valley PSW as well as hazard lands associated with the Swan Creek floodplain and the high (approximately 9m tall) slope at the west end of the property. The GRCA-confirmed boundaries of the PSW on the subject property, which correspond to the White Cedar Mineral Coniferous Swamp (SWC1-1) community, are shown on Map 3a. The location of the existing slope hazard is depicted on Map 3a as well as on the grading plan for the proposed development (Appendix IX).

Swan Creek, the surrounding PSW and adjacent lands considered wetland “areas of interference”, as well as associated floodplain and slope hazard lands, are regulated by the GRCA. The GRCA regulation limit is shown on Map 2. According to the GRCA’s Ontario Regulation 150/06, development and site alteration within GRCA-regulated lands are not permitted unless it can be demonstrated through an EIS that the existing natural features and functions will not be negatively impacted. Furthermore, Section 2.1.5 of the Provincial Policy Statement (OMMAH 2014) states that development and site alteration is prohibited in PSWs in Ecoregion 6E (in which the property is located). Additional protection is afforded to the wetland under County policy as a form of Core Greenland (County of Wellington 2018).

In accordance with GRCA regulatory prohibitions on development within hazard lands (Ontario Regulation 150/06), the proposed development is to be maintained outside of the floodplain. As described below, the existing GRCA slope hazard paralleling the Swan Creek floodplain will be removed through re-grading the slope to a 3:1 stable slope. Site development, with the exception of stormwater management infrastructure, will be well-removed (>30m) from the PSW due to the existing floodplain.

Greenlands: Valleyland and Significant Woodland

Small areas of Greenland have been mapped in the Wellington County OP (2018) as occurring just outside the Core Greenlands on the subject property as shown in Appendix I. These mapped areas correspond to Significant Woodland and valleyland, which are considered Greenland features in the OP. The valleyland feature generally comprises lands down-gradient of the top of slope along the large west-property slope, or otherwise within the floodplain valley on the subject property. As stated above, future residential development is anticipated to be maintained outside of and set-back from these hazard features.

The wooded communities comprising the SWC1-1 swamp community and the adjacent Fresh-Moist White Cedar Coniferous Forest (FOC4-1) communities collectively satisfy the County criteria to be considered Significant Woodland. Specifically, as the on-site communities represent part of a larger wooded corridor along the Swan Creek valleylands, the features exceed the 1ha requirement for woodland significance in the County’s urban system (which includes the hamlet of Inverhaugh) identified in Section 5.5.4 of the County OP and as shown on Schedule A1 (Appendix I). See Map 3a for the extent of Significant Woodland on the subject property.

The majority of the on-site Significant Woodland falls within hazard lands associated with the Swan Creek valleyland and floodplain. However, a portion of the FOC4-1 woodland extends outside of the floodplain as shown on Map 3a.

Due to the dominance of shrubs within the Mineral Cultural Thicket (CUT1), this vegetation community is not considered part of the Significant Woodland as it does not meet the County's definition of "woodlands" defined in the OP which are considered "treed areas".

The off-property Dry-Fresh Sugar Maple-Black Cherry Deciduous Forest (FOD5-7) community, which is 3.4ha in size, meets the County's criterion for woodland significance due to size in the Urban System (i.e., >1ha; County of Wellington 2018). The southern edge of this woodland that extends onto the subject property primarily comprises earlier successional growth that has established on the sides and along the top of the fill slope, as well as a narrow band of planted Eastern White Pine (*Pinus strobus*) trees, and is of more recent origin than the more mature woodland that is based at the bottom of the slope and occurs off-property. The toe of the fill slope approximately corresponds to the subject property boundary. The early successional tree growth and planted pines that occur on the north subject property edge are considered contiguous with the larger off-property woodland. This is reflected in the surveyed woodland dripline boundary as shown on Map 3a. However, the ecological significance and function of this on-site southern woodland edge varies from that of the more mature off-site portion of the FOD5-7 woodland.

Based on EIS field studies and the woodland edge tree inventory, the FOD5-7 woodland edge largely comprises planted Eastern White Pine of various sizes, age classes and health conditions. The pines are primarily planted in roughly two narrow rows, one toward the bottom of the fill slope and one approximately mid-way up the fill slope, while some additional natural pine regeneration has occurred along the top of slope. The majority of inventoried tree growth along the top of the slope comprises young early successional tree species such as Trembling Aspen (*Populus tremuloides*) and Manitoba Maple (*Acer negundo*). The on-property south woodland edge therefore largely derives from anthropogenic origins and cultural regrowth as distinct from the naturally occurring Black Cherry (*Prunus serotina*) and Sugar Maple (*Acer saccharum*)-dominated woodland area to the immediate north. However, the south woodland edge provides an ecological supporting function for the adjacent natural woodland area, such as the buffering of light penetration and wind throw effects as provided by the narrow rows of tall pines, although the interior woodland would also be protected from wind effects to some extent

due to its lower elevation relative to the adjacent subject property lands. The on-site woodland edge also provides habitat features for edge-adapted or tolerant wildlife species. This includes Eastern Wood-Pewee, which is known to frequently use woodland edges although the recorded individual was never detected near the south property woodland edge during surveys. A raptor nest, anticipated to be used by Red-tailed Hawks, is also located in one of the tall woodland edge White Pines.

According to Sections 5.5.3 and 5.5.4 of the County OP, development and site alteration in valleylands and Significant Woodland, respectively, is prohibited unless it can be demonstrated that the proposed development will not negatively impact the features or their ecological functions. If development is proposed within a Greenland system or on adjacent lands, an EIS will be required to demonstrate that the development conforms to the applicable protective policies (e.g., Sections 5.5.3, 5.5.4) to the satisfaction of the County and other applicable regulatory agencies. Valleyland areas are also regulated by the GRCA, and development within these areas requires GRCA permitting as described above.

4.1.2 Watercourse and Fish Habitat

Swan Creek is identified as a coldwater watercourse by the GRCA (J. Wagler, GRCA, pers. comm., January 2018). Since the on-site portion of the watercourse only receives groundwater inputs during periods of seasonal high shallow groundwater elevation (i.e., during the spring) (GM BluePlan 2018a), it is anticipated that the coldwater thermal regime largely derives from upstream groundwater inputs. Detailed aquatic characterization of the watercourse was not completed as part of this EIS, in accordance with the TOR, since the development will be well set-back from the feature. However, the sensitivity of the watercourse as a coldwater feature must be addressed as part of the stormwater management plan for the development. Swan Creek is also known to provide spawning habitat for the coldwater-adapted Brook Trout (*Salvelinus fontinalis*), including at a location approximately 500m downstream of the subject property near the Grand River confluence, and near the Highway 6 crossing approximately 8-9km upstream (J. Wagler, GRCA, pers. comm., January 2018).

4.1.3 Species at Risk Habitat

Two SAR, Barn Swallow and Bank Swallow, were observed on the subject property during field investigations. Both species were observed foraging over the property and neither species was confirmed to nest on the property.

Barn Swallow

Barn Swallow is designated as Threatened in Ontario and is considered Threatened nationally by COSEWIC (MNRF 2018b, COSEWIC 2018). Consequently, this species and its general habitat are protected under the ESA. The MNRF definition of Barn Swallow general habitat includes suitable foraging habitat within 200m of the nest site (MNRF undated). However, Barn Swallows are known to travel as far as 500m from the nest site for foraging (Heagy et al. 2014). Lands within 500m of the subject property comprise a large area of agricultural and rural residential land use on which Barn Swallow nesting may occur. It can therefore not be confirmed that ESA-protected Barn Swallow foraging habitat within 200m of the nest occurs on the subject property. However, see Section 5.0 for further discussion about potential for impacts to Barn Swallow foraging habitat as caused by the proposed development.

Bank Swallow

Bank Swallow is also designated as Threatened in Ontario and is considered Threatened nationally by COSEWIC (MNRF 2018b, COSEWIC 2018). Consequently, this species and its general habitat are protected under the ESA. The MNRF has not specifically defined categorized general habitat for this species for the purposes of applying ESA protection policies. However, this species is known to require natural or anthropogenic open habitats for foraging, similar to that required for Barn Swallow (Falconer et al. 2016). No Bank Swallow nesting habitat was observed on the subject property. However, suitable nesting habitat may occur within the off-site aggregate pit to the north of the property, which is within the 1000m distance that Bank Swallows are known to forage within from a nesting colony (Falconer et al. 2016). Bank Swallows were observed foraging over the subject property during only one site visit. This, in combination with the abundance of suitable open land foraging habitat that occurs within 1km of the potential nest site on the surrounding landscape, suggests that the subject property does not provide important foraging habitat for the species.

Species at Risk Bats

Nine potential habitat trees were observed within the study area, 4 of which occur on the subject property (1 of these is a shared boundary tree with the GRCA woodland property to the north, 1 is a shared boundary tree with the property to the east) (Map 3b). Following a conservative approach, these trees, including the woodland to the north of the property, would be considered potential roosting habitat for SAR bats. As described in Section 3.3.3, only 2 of these trees (Cavity Trees A and B) would require removal, and based on the presence of abundant suitable

habitat within the FOD5-7 woodland, it is anticipated that this would not represent a negative impact to SAR bat habitat. However, further MNRF consultation may be required to confirm this. See Section 5.0 for recommendations to avoid or mitigate impact to potential bat roosting on and adjacent to the property.

4.1.4 Significant Wildlife Habitat

Based on the results of field surveys, 1 SWH category was confirmed to occur within the study area: Special Concern and Rare Wildlife Species (for the SCC Eastern Wood-Pewee and Black Ash, and the provincially rare Great St. John's-wort). Eastern Wood-Pewee was recorded with a probable level of breeding evidence within the FOD5-7 woodland community due to evidence of a likely breeding territory within the feature. The entire ELC community is considered as SWH due to this breeding evidence. The entire SWC1-1 community is considered SWH due to the presence of Black Ash and Great St. John's-wort.

As listed in Section 1.1.2, multiple forms of Candidate SWH were identified for the study area based on the preliminary screening. Based on the completion of additional field investigations, all of these Candidate SWH types are considered either absent in the study area or would not be negatively impacted by the proposed development (see Section 5.0). The following summarizes the assessment of these Candidate SWH types:

Table 6. Summary of Candidate Significant Wildlife Habitat Categories Identified During Preliminary Screening

Significant Wildlife Habitat Type	Assessment Result
Snake Hibernaculum	Comprehensive visual surveys for snakes were completed within suitable habitat on the subject property. Eastern Gartersnakes were observed basking at various locations along the west-property steep slope, suggesting likely use of the feature for overwintering. However, snake abundances did not meet MNRF criteria to be considered SWH (MNRF 2015b).
Turtle Wintering Habitat	No turtles were observed within the SWC1-1 feature during spring-based surveys. The proposed development will be set-back from the watercourse, wetland and floodplain features.
Amphibian Breeding Habitat (Woodland)	Targeted amphibian call surveys were not completed as the wetland and floodplain woodland features will be maintained outside of and buffered from development.
SCC Eastern Wood-Pewee Habitat	Confirmed as present; see above.
SCC Wood Thrush Habitat	No Wood Thrush individuals were recorded during breeding bird surveys or other site visits. Breeding habitat for this species is considered absent in the study area.

SWH is subject to the protection policies of the PPS and County OP (OMMAH 2014, County of Wellington 2018). Under these policies, development within SWH is prohibited unless it can be demonstrated that the development will not negatively impact the form and ecological function of the SWH.

5.0 Impact Assessment

5.1 Description of the Proposed Undertaking

Elora Ridge Developments proposes to construct a residential subdivision comprising 40 single detached lots, stormwater management facilities, and an internal road network that includes a connection to Sideroad 4. A 10m wide emergency access corridor with walkway would also connect the development to J.M. Quarrie Drive. Each lot would be serviced with a water well and septic bed treatment system. In order to rehabilitate the previous aggregate use and accommodate the development, the irregular topography would be levelled and graded. The large west-property slope hazard along the bank of Swan Creek will be regraded to a maximum 3:1 slope to improve stability, and smaller slopes on the property would be removed. The existing fill slope along the north property boundary will also be cut down approximately 1-3m to facilitate grading of back yards and to improve the developable area. To accommodate the residential development the existing turkey barns and other small structures on the property will be demolished and the existing driveway removed.

The stormwater management (SWM) system for the development comprises a 0.60ha wet pond (Block 41) and a 2.30ha dry pond (Block 42), and an on-site storm sewer network. Runoff from the subject property and upstream lands will be collected and conveyed via storm sewers to the SWM facilities. The Block 41 SWM facility will be designed as a wetland for quantity and quality control and will contain a permanent pool. Outflows from this facility will be conveyed to the Block 42 SWM facility along with collected surface runoff from portions of the subject property and adjacent off-property lands. Stormwater will discharge from the Block 41 SWM facility toward Swan Creek via a multi-stage outlet and a cooling trench (30m long x 2m wide x 1m deep), which will dissipate flows as they enter the wetland. See the Functional Servicing Report (GM BluePlan 2018b) for additional details about the stormwater management plan.

See Appendix IX for the proposed development plan (GM BluePlan 2018c).

5.2 Approach to Impact Analysis

Potential impacts arising from the proposed development are determined by comparing the details of the proposed undertaking with the characteristics of the existing natural features and their functions. Where the development limits overlap with the natural features or indirectly affect their functions, impacts may arise. The following is a description of the types of impacts which will be discussed.

- Direct impacts to the natural features within the subject property associated with disruption or displacement caused by the actual proposed 'footprint' of the undertaking, including impacts caused by site grading and the installation of site servicing features.

- Indirect impacts associated with changes in site conditions such as drainage, water balance and water quantity/quality, and effects of construction on adjacent natural features.

- Induced impacts associated with impacts after the development is constructed such as subsequent impacts to adjacent natural features created by increased human habitation/use of the area and vicinity.

5.3 Recommended Buffers

Buffers are required for natural heritage features such as woodlands and wetlands to protect them from impacts during and post-construction. Buffers represent an important component of a larger suite of recommended measures to mitigate impacts to the adjacent natural features (see below). Based on the characterization of the natural features on and adjacent to the subject property, woodland and wetland buffers warrant consideration in defining the limit of development on the property.

Typically, 30m buffers from confirmed PSW boundaries are required by regulatory agencies as a primary means of mitigating impacts to PSWs from adjacent development impacts. Most of the lands within 30m of the confirmed PSW boundary shown on Map 3a fall within hazard lands and are within the 10m Significant Woodland buffer limits (see below), and are not mapped. A small section of 30m PSW buffer extends beyond the 10m Significant Woodland buffer at the southeast end of the property. The PSW and associated 30m buffer do not represent a significant development constraint on the subject property based on the development layout. However, the PSW buffer is required to inform the design and location of stormwater management infrastructure which is permitted to occur within the floodplain area subject to the findings of this EIS.

Woodland buffers are prescribed based on protecting the trees and their root zones as well as providing associated open habitats required by forest wildlife species or for movement. Buffers from woodland driplines are important in maintaining the condition and function of trees within

the woodland while protecting them from impacts of adjacent site alteration. A 10m buffer is recommended from the dripline limits of the Fresh-Moist White Cedar Coniferous Forest (FOC4-1) community that falls within the wooded Swan Creek corridor on the subject property. Ten-metre (10m) dripline buffers are typically considered appropriate to set-back development limits while effectively buffering the woodland feature from development impacts. The 10m buffer ensures that existing root zones from woodland edge trees will be sufficiently protected while allowing room for future growth, and provides an area of natural woodland edge regeneration and active restoration to enhance the buffering capacity of the feature.

A small portion of FOC4-1 community extends onto the southwest edge of the subject property as shown on Map 3a. However, because this feature and 10m adjacent lands fall within the on-site hazard lands, a 10m buffer from this feature edge has not been delineated.

Although the Dry-Fresh Sugar Maple-Black Cherry Deciduous Forest (FOD5-7) community is considered Significant Woodland, the existing topography and cultural influences along the north property edge have been considered in developing a site plan that focuses on protection of the more mature woodland that is located off-property. As described in Section 4.1.1, the on-site portion of the south woodland edge that is rooted on and along the top of the fill slope comprises planted pines and early successional regrowth of previously disturbed lands and is of lesser ecological significance than the more mature woodland area. In order to protect the adjacent mature woodland area, NRSI certified arborists determined the maximum limits of site grading that could be accomplished while not negatively impacting the mature woodland edge tree root zones. Site alteration at the limits of grading along the north property woodland edge would be limited to the removal of a small layer of topsoil and would not include significant soil excavation (B. Fritz, GM BluePlan, pers. comm., November 2018). The arborist assessment of woodland edge impacts took into consideration the vertical elevation differences that will exist between the grading limit and the woodland edge root zone. In all cases, the north property grading limit will occur part-way up the existing fill slope, whereas the mature woodland edge trees are rooted at and beyond the base of the slope. Therefore, grading can extend horizontally into the mature woodland edge tree driplines without negatively impacting the root zones when accounting for this elevation difference. However, NRSI arborists also accounted for some degree of root zone growth that may extend upwards within the soil (e.g., feeder roots) when making the grading limit determination. The identified limit of grading impact to preserve the adjacent mature woodland edge trees is shown on Map 4 as “Mature Woodland Edge Protection Limit”.

The proposed development along the north property edge will comprise of cutting down the top portion of the existing fill slope to flatten the grading of the rear yards of the proposed lots. The depth of cut from the top of the slope will vary from approximately 1-3m. With the exception of Lots 22 and 23, the rear of the proposed septic beds will be located at least 10m from the Mature Woodland Edge Protection Limit. As described further below, it is recommended that rear lot areas to the rear of the septic beds be naturally restored with native vegetation plantings as they would within a formal woodland buffer in order to restore areas of construction disturbance and to enhance the woodland edge with a cohesive native planting plan.

5.4 Direct Impacts and Mitigations

5.4.1 Vegetation Removal and Site Grading

The approach to identifying and delineating the subject property natural features was used to avoiding direct impacts from development on significant and sensitive natural features. The proposed development has been designed to avoid direct impacts to the significant natural features on the subject property, including the PSW and Significant Woodland features within the Swan Creek corridor, their associated buffers and adjacent floodplain lands.

Direct impacts within the subject property will occur as a loss of natural vegetation as a result of clearing, grubbing and grading where indicated in the proposed development plan (Map 4). Natural feature removal on the property will primarily occur within the regenerating CUM1 meadow community. The majority of the CUM1 feature on the property will be removed, with the exception of meadow that is located below the west property slope and within the Swan Creek floodplain, as well as remnant fringing meadow within the woodland and wetland buffers and around the stormwater management facility within the southwest end of the property. Other lands to be redeveloped on the property comprise highly altered or recently disturbed areas (i.e., the agricultural row crop field, the recently backfilled former aggregate extraction area) and the area of actively used turkey barns.

The proposed development will require a small incursion into the southern edge of the contiguous woodland that is classified as FOD5-7 according to ELC. However, as described above, the on-site portion of the woodland that will be removed comprises a distinct edge of planted pines and predominantly young, regenerating tree and shrub growth which is considered of lesser ecological functional value than the more mature FOD5-7 woodland that is

located to the immediate north. Vegetation to be removed within this edge zone includes the majority of the planted pines as well as all of the young regenerating tree and shrub growth. No tree or other vegetation growth that is rooted at the base of the fill slope or beyond within the woodland will be removed.

Removal of the majority of tall pines along the south woodland edge will result in increased light and wind penetration into the adjacent woodland. However, this effect is offset to some degree by the lower elevation at which the mature woodland will continue to occur at relative to the adjacent development. The future woodland edge condition lacking most of the pines will also be consistent with the existing edges of the FOD5-7 feature along its south, north and east sides, and likely returns the southern edge closer to its natural condition prior to human establishment of the planted pines. As described in Section 6.0, buffering capacity of the south woodland edge will be reintroduced through the establishment of native vegetation plantings along the regraded north property slope and rear lot areas backing onto the woodland.

No federally, provincially or regionally significant plant species will require removal. The SCC Black Ash, which is located within the Swan Creek wooded corridor, will be protected and buffered from development. Species requiring removal are predominantly disturbance-tolerant, common and widespread on the surrounding landscape.

Tree Removal

See the Tree Management Plan (Appendix III; MacKinnon and Associates 2018) illustrating trees to be removed on the subject property, and to be retained outside of the construction limits. Shared boundary trees are to be retained where shown on the plan.

In total, 194 trees that fall within the subject property construction limits will require removal. Of these, 127 were inventoried to be in fair to excellent condition. Of the 194 trees to be removed, 114 (59%) are native to Ontario. In addition to these, 5 distinct tree groups on the subject property will require removal. All 5 of these groups comprise trees that were assessed to be in fair to excellent condition.

Tree removal on the property will be compensated for through the establishment of additional tree plantings within and adjacent to the development footprint. In addition to street tree plantings, additional trees will be established within the SWM facilities. Compensation tree plantings will also be provided within the woodland edge enhancement and restoration plantings that are discussed in Section 6.0. Specific tree compensation measures will be determined

during the detailed design stage of development in conjunction with the completion of a future Landscape Plan for the property.

5.4.2 Impacts to Wildlife and their Habitats

Barn Swallow and Bank Swallow Foraging Habitat

The proposed development will remove open lands on the property that provide foraging habitat for Barn Swallow and Bank Swallow. Due to the observation of Barn Swallow and Bank Swallow foraging during one site visit for each species, the subject property is not anticipated to represent important foraging habitat for either species. Furthermore, abundant open land and riverine foraging habitat exists on the surrounding landscape. The proposed development will primarily comprise large grassed residential lots with some areas of road ROW and SWM facilities. Barn Swallows are known to forage over a wide variety of natural and anthropogenic open habitats, including urban and rural residential areas and parkland (Heagy 2014). Bank Swallows are also known to utilize a wide variety of open habitats for foraging (Falconer et al. 2016). Therefore, the proposed development is not anticipated to negatively impact foraging habitat availability for Barn Swallows or Bank Swallows.

Potential Barn Swallow nests were observed on the exterior of one of the turkey barns, although these were not observed to be actively used in 2018. It is recommended that an updated inspection of the on-site structures for the presence of any active Barn Swallow nests be completed prior to removals. It is anticipated that any Barn Swallow nest removals that may be required will be subject to Ontario Regulation 242/08, which provides an exemptions to activities that would otherwise contravene the ESA. Under the Regulation, Barn Swallow nests may be removed subject to various measures to avoid and mitigate impact to the species, and to compensate for the habitat loss through the provision of replacement habitat. The MNRF should be consulted to determine appropriate next steps if any active Barn Swallow nests are confirmed at that time.

Species at Risk Bats

Of the 9 potential bat habitat trees that were identified in the study area, only 2 (Trees A and B) will require removal to accommodate the proposed development. Based on NRSI experience, the removal of 2 potential habitat trees would not represent a negative impact to SAR bat habitat. However, further MNRF consultation may be required to confirm this. Following a conservative assumption that SAR bats may use suitable habitat trees in the study area, various

measures are recommended to ensure that impacts to SAR bats and their habitat are avoided or appropriately mitigated:

- Tree removal activities should occur outside the period April 1-October 31 to avoid potential death or injury to any bats that may use the on-site trees for roosting;
- Construction activities during the active season should be restricted to daylight hours only and avoid use of artificial lighting, to avoid impacts to any adjacent bat habitat outside of the development area (e.g., within the off-site FOD5-7 woodland);
- Construction limits will be clearly demarcated to avoid impacts to adjacent trees to be retained that may be used by bats;

These and any other required avoidance or mitigation measures may be subject to confirmation by the MNRF.

Eastern Wood-Pewee Significant Wildlife Habitat

The proposed development will require the removal of the southern edge of the FOD5-7 woodland that represents SWH for the SCC Eastern Wood-Pewee. Eastern Wood-Pewees predominantly make use of intermediate-age to mature deciduous and mixed forests having a relatively open understorey. This species make use of woodland edge habitats in proximity to its nest area for foraging purposes, and tends to select breeding territories with fewer pines (COSEWIC 2012). During the site visits in which Eastern Wood-Pewee was detected, the singing male was located either interior to the woodland or closer to its northern end and at no time was observed near the southern woodland edge that will be removed. The younger, regenerating tree growth along the southern edge is not typical of the habitat features used by this species, which prefers taller, older-growth trees. The proposed removal of this southern regenerating edge and the planted pine rows are therefore not anticipated to negatively impact Eastern Wood-Pewee habitat which will continue to exist within the FOD5-7 woodland to the north of the property.

Raptor Nests

One of two raptor stick nests observed on the property will require removal. The nest to be removed is likely used by a Red-tailed Hawk pair and is located within one of the mature pines along the southern edge of the FOD5-7 woodland. The other nest, which may be used by a

Cooper's Hawk pair, is located within a small grouping of Scots Pine adjacent to the FOC4-1 woodland and falls outside of the development limits (see Maps 3b, 4).

Raptors, including Red-tailed Hawks, are not covered under the federal *Migratory Birds Convention Act*; however, these species including their nests (active or inactive) and eggs fall under the protections of the provincial *Fish and Wildlife Conservation Act* (FWCA). Removal of the existing nest will require an authorization from the MNRF. Based on NRSI experience, a request for authorization will require the submission of a brief report that documents details about the nest, describes the project and whether options were considered that would avoid nest removal, and the results of any nest monitoring that may be required by the MNRF. A timing window will be required to avoid impacts to the species if use of the nest continues. MNRF consultation will be required to confirm requirements to obtain authorization for nest removal under the FWCA.

Other Wildlife

The proposed development will remove habitat for species that utilize open, regenerating meadow, agricultural lands, and young, successional shrub and tree growth; however, portions of early successional habitat types will continue to exist on the property downslope of the development within the Swan Creek floodplain and woodland/wetland buffer areas, as well as on adjacent off-site lands. Habitats to be removed on the property are primarily used by species that are abundant and widespread on the landscape, and the habitat displacement on the property caused by the proposed development is not anticipated to negatively affect their local populations. Several of the bird species identified in the study area use wooded habitats that will fall outside of the development area. However, some species that were observed on the property, including Eastern Kingbird, Brown Thrasher, Savannah Sparrow, Orchard Oriole and Baltimore Oriole may be impacted through habitat removal. Individuals of these species may be displaced from the property following development. However, certain individuals may re-establish breeding territories within the retained suitable habitat on the property, or otherwise are expected to re-establish within the abundant suitable habitat that occurs within lands adjacent to the property. Some species that currently occupy the property, including Baltimore Oriole, are tolerant of human-developed areas including treed residential areas and are expected to return post-development.

Although the large west-property slope does not meet provincial criteria to be considered Reptile Hibernaculum SWH, survey results suggest that this feature is likely being used as

overwintering habitat for Eastern Gartersnake. It is therefore recommended that regrading of this slope feature be undertaken outside of the snake overwintering period (i.e., October 1 to May 15) to avoid species mortality. It is anticipated that the regraded slope will continue to be used by snakes for overwintering post-construction.

Vegetation clearing has the potential to directly impact bird breeding activity through damage and destruction of nests, eggs and young, or avoidance of the area by breeding adults. Vegetation clearing should therefore occur outside the bird nesting season of April 1-August 31 so as to limit disturbances to nesting activities of birds and to avoid destruction of active nests. The destruction of migratory birds and their nests is prohibited under the federal *Migratory Birds Convention Act*.

The subject property contains an ecological linkage along the wooded Swan Creek corridor that may provide a landscape-level movement corridor habitat for wildlife such as deer. However, this movement corridor is located entirely outside of the proposed development and will therefore not be directly impacted.

5.5 Indirect Impacts and Mitigations

Construction of the proposed development has the potential to cause indirect impacts to adjacent and downstream natural features and functions if not mitigated appropriately. Recommended mitigation measures are provided for each potential impact below.

5.5.1 Disturbance to Adjacent Natural Features and Wildlife Habitats

Vegetation clearing and other construction activities have the potential to inadvertently destroy, damage and degrade existing vegetation along the development limits unless the development limit boundaries are clearly marked. For example, construction activities can cause scarring and decreased health of adjacent trees whose branches or root systems have been damaged by machinery or affected by construction-related dust and sedimentation. Damage to trees and other vegetation can also be caused by the compaction of soils within tree rooting zones along the new woodland edges to be created at the development limits.

Direct damage and indirect disturbances can cause stresses on the natural features that weaken their ecological integrity. In these states, natural features are more prone to establishment and proliferation of invasive, non-native species such as Common Buckthorn.

Proliferation of invasive, non-native species within natural communities decreases their ecological value such as by suppressing native species, diminishing biodiversity and reducing habitat suitability.

To limit ecological impacts during construction, clearly defined construction limits, in the form of tree protection fencing should be established to avoid unnecessary vegetation removal. Tree protection fencing can take the form of brightly coloured snow fencing secured to t-bar posts. Where tree protection fencing is not required along construction area limits, construction limit fencing should still be used. Where trees are located along the natural feature edges to be retained, protective tree fencing should be installed at least 1m from dripline where possible to adequately protect the root zone from soil compaction and other disturbances. Due to the sensitivities associated with grading and construction activities along the north property boundary, it is recommended that a certified arborist oversee vegetation removal and preliminary grading activities along the north property edge to ensure that adjacent mature woodland trees are not negatively impacted. See Section 7.2 for recommended mitigative actions in the event that tree damage occurs. All tree protection fencing must be installed prior to site alteration and construction activities, and inspected by a certified arborist or environmental inspector.

Designated areas for construction lay-down, vehicle access and parking, equipment storage, materials stockpiling, and any on-site construction offices should be located entirely outside the retained natural features and their buffers, and preferably not adjacent to those features so as to limit potential to indirectly impact the adjacent natural features.

Potential indirect impacts to natural features and wildlife may also arise from noise, vibrations, human presence, dust and artificial lighting associated with construction activities.

During construction activities such as vegetation clearing and grubbing, dust can potentially result in the following:

- Changes in vegetation due to increased heat absorption and decreased transpiration,
- Immediate visual impacts.

Impacts due to dust should be mitigated for by moistening areas of bare, dry soil with water as needed during construction activities to reduce the amount of dust produced.

Excessive noise, vibrations, artificial lighting and human presence as a result of site preparation and construction activities may cause wildlife to temporarily avoid the area. These impacts can be mitigated by restricting the daily timing of construction activities to between 7:00hr and 19:00hr. This timing restriction should also apply to the use of generators or pumps insofar as possible. Any artificial lighting used for construction purposes should be turned off or directed away from the adjacent natural features following the completion of daily construction activities.

Such impacts resulting from dust, noise, and vibrations are expected to be temporary, minimal and localized during the construction of the proposed development. Significant effects on wildlife are not anticipated and it is expected that displaced wildlife species will return to the vicinity of the subject property following construction. The degree of temporary construction disturbance effects that will occur on the property is considered to be less than the regular dust, noise, and vibration disturbances that would have occurred on the property during periods of active aggregate extraction.

5.5.2 Sedimentation and Erosion

During vegetation removal and site grading activities, areas of bare soil will be exposed which have the potential to erode during rainfall events and impact adjacent natural features and downstream areas of Swan Creek. Reduced vegetation cover on the subject property in combination with the presence of exposed soils during construction activities may also increase the potential for stormwater flow to down-slope areas if not appropriately mitigated. Increased stormwater surface flow and erosion processes may cause the deposition of sediments onto down-slope vegetation, ultimately causing vegetation die-back or impaired health.

Soil compaction also has potential to occur as a result of heavy machinery in the area of development. Soil compaction can greatly reduce the permeability of soils and affect their ability to retain water during rain/snow melt events. This will result in an increase in surface water run-off which will ultimately increase the erosion potential and the amount of sediment being transported into adjacent natural features and Swan Creek.

In order to protect on-site natural features from potential impacts due to sediment, an Erosion and Sediment Control (ESC) Plan must be developed prior to any construction activities on-site. The primary principles associated with sedimentation and erosion protection measures are to: (1) minimize the duration of soil exposure, (2) retain existing vegetation, where feasible, (3)

encourage re-vegetation, (4) divert runoff away from exposed soils, (5) keep runoff velocities low, and (6) trap sediment as close to the source as possible.

An ESC Plan has been described in the Functional Servicing Report (GM BluePlan 2018b) for the proposed development and includes, but is not limited to, the following measures:

- Installation of silt fencing along the property boundary in all locations where run-off will discharge to adjacent lands. Accumulated sediment will be removed as needed.
- Placement of topsoil and hydroseeding of all graded areas not subject to active construction within 30 days. A native seed mix, appropriate to the site conditions, should be applied in areas adjacent to existing natural features.
- Installation of silt sacks following installation of manholes, catchbasins or inlet risers until landscaping is complete. Silt sacks will be monitored and repaired as necessary.

It is also recommended that topsoil piles be located away from adjacent natural features and that silt fencing be installed around piles to prevent off-site migration of water-borne sediments.

The impact resulting from soil compaction can be mitigated by minimizing the use of construction vehicles and equipment within 10m of the retained natural features, and by locating material stockpile and equipment storage locations away from the natural features.

5.5.3 Changes to Hydrologic Regime

Groundwater Infiltration

Construction of the proposed development has potential to alter the existing hydrological regime of the adjacent wetland, such as through changes to existing stormwater drainage patterns and amounts of impervious surface, and changes to shallow groundwater flow. These activities may cause changes to hydrological inputs to the PSW, ultimately impacting its form and function, if not appropriately mitigated.

As summarized in Section 3.1 and further described in the Functional Servicing Report, Swan Creek does not have a strong influence on the shallow groundwater flow within the subject property, which for most of the year flows at a lower elevation than the creek and wetland and is anticipated to discharge further downstream, such as at the Grand River. Groundwater inputs to the creek and wetland are limited to the spring period when groundwater levels are highest.

These periods of seasonal groundwater input are important to maintaining the hydrological regime of the swamp feature, which comprises an annual cycle of a spring wet period followed by a summer/fall dry-out. The development must therefore demonstrate a water balance with the wetland feature to maintain this condition.

The stormwater management plan for the site has been developed to maximize infiltration capacity on the lots. This will be achieved through the installation of 10-14m long x 1m wide x 0.6-1m deep infiltration galleries within the front yards of Lots 6-29 and 33-38, thereby infiltrating stormwater at its source and reducing the volume of surface runoff. Infiltration galleries are not feasible on Lots 1-5 and 30-31 due to grading and groundwater level constraints. The existing pre-development infiltration rate for the property is 34,029m^3/year. With the implementation of the infiltration galleries, the post-development infiltration rate for the property is expected to be 31,532m^3/year, which equates to an annual infiltration volume reduction of 7% from existing levels (GM BluePlan 2018b).

Surface Water Runoff

Hydrological inputs to the PSW will also be augmented through surface water inputs that are discharged from the SWM system through a dispersed flow pattern into the wetland. The existing drainage pattern for the subject property will be maintained, wherein the majority of the site drains to Swan Creek. This will be achieved through the stepwise collection and dispersal of stormwater runoff between SWM Block 41 and 42 facilities, and ultimately through a multi-stage outlet from the Block 42 facility, comprising a 150mm knockout for minor storms and 2 460mm orifices for major storms, as well as a 5m wide overflow weir prior to discharge to the cooling trench. The cooling trench, consisting of 19mm diameter clear stone, will percolate the flow through the stones and discharge the water as sheet flow along the entire 30m length of the structure toward the wetland and Swan Creek (GM BluePlan 2018b). In addition to the cooling properties afforded by this system (see below), this will slow down flow and disperse the flow over a wider area, enhance infiltration potential, and mitigate the effects of channelization and sedimentation of the receiving wetland. Based on calculations presented in the Functional Servicing Report, the proposed stormwater management system has been designed such that the 2, 5-, 10, 25, 50, and 100-year post-development flow rates have been attenuated to be less than the allowable pre-development flow rates.

Interference with Groundwater Flow

Based on groundwater levels collected from April 2018 to mid-January 2019, the maximum-recorded groundwater levels vary with respect to depth below the proposed grades. Groundwater levels rise near to proposed grades for Lots 7 through 20 and 33 through 36 and may intersect basements in these areas. At SWM Block 41, groundwater levels have been shown to lie above the proposed pond floor by up to 0.7m, but only during the spring. In other areas, (e.g. Lots 23 through 31 and Lots 1 to 5) proposed grades lie between approximately 4-9m above the highest groundwater levels recorded to date. Groundwater levels in the shallow overburden tend to fluctuate by approximately 1-2m over the course of the year. A more detailed assessment of groundwater levels and encroachment on proposed grades will be available following the completion of the 1-year monitoring period in April 2019. Construction dewatering requirements are expected to be minor across the property. Dewatering requirements, including any necessary measures to control and treat dewatering discharge, will be confirmed following the 1-year monitoring period (M. Long, GM BluePlan, pers. comm., January 2019).

5.5.4 Watercourse Thermal Regime Effects

Increases in impervious surface area within the property, and the resulting increase in surface runoff relative to existing conditions, can result in increased temperatures of the discharging water if not appropriately mitigated. Swan Creek, which is a coldwater watercourse and supports Brook Trout spawning habitat, is a receptor that is sensitive to changes in thermal conditions of stormwater inputs. The SWM system has been designed to mitigate thermal impacts to the receiving features by enhancing lot-level infiltration capacity where feasible across the property, and through incorporation of the end-of-pipe cooling trench system. Maximizing infiltration capacity on the property will mitigate the effects of thermal warming of surface-exposed stormwater runoff, and will facilitate a natural cooling of the infiltrated water prior to its discharge within the PSW and Swan Creek, and at further-downstream receptors. The cooling trench is also required to ensure that SWM facility discharge does not negatively influence the thermal regime of the receiving natural features.

The cooling trench will function to dissipate energy from the runoff and disperse the flows over a large area. Runoff discharging from the Block 42 SWM facility will percolate through the top of the clear stone trench and then sheet flow toward the wetland and watercourse. Assuming an input water temperature of 36°C, calculations presented in the Functional Servicing Report determined that the discharge from the trench will be cooled to achieve an average outflow

temperature of 24°C (GM BluePlan 2018b). These temperatures represent the upper-limit (i.e., mid-summer) temperatures that are expected according to the modelling analysis, and will be lower during other times of the year.

The cooling trench will be located up to approximately 70m up-gradient of the receiving watercourse. Due to the broad dissipation by sheet flow, it is anticipated that much of the stormwater discharge from the cooling trench will be captured by the existing vegetation, and/or infiltrate along the flow path. As a means to further mitigate potential thermal impacts, the land located between the cooling trench and the wooded natural features within the area of anticipated sheet flow will be planted with native woody vegetation species to provide additional shading (see Section 6.0). It is expected that sheet flow that enters the wooded natural features will be naturally cooled due to the largely shaded conditions provided by the cedar forest and swamp.

5.5.5 Water Quality Impacts

The SWM plan has been designed to achieve an Enhanced level of water quality control for the development (i.e., 80% Total Suspended Solids removal) prior to discharge of runoff to the adjacent natural features. The Block 41 SWM facility is designed as a wetland with permanent pool. Based on the extended detention time provided by the feature it will provide an Enhanced level of water quality treatment for post-development Catchment 102 (comprising much of the northern half of the development including front-lot and road runoff). Enhanced-level water quality treatment for post-development Catchment 103 (i.e., the southeast corner of the development) will be provided by an oil-grit separator unit prior to discharging into the Block 42 SWM facility. For the remainder of the property, clean runoff (e.g., rooftop and rear-lot) will sheet flow down-gradient and will be passively filtered through sodded rear-yard areas and naturally vegetated areas (e.g., within the Swan Creek floodplain) (GM BluePlan 2018b).

Water quality impacts can also arise where on-site sewage systems are utilized. This was investigated for the proposed development, which will incorporate the use of rear-lot septic beds. However, the analysis concluded that due to the thickness of the vadose zone within the soil, and the weak groundwater flow gradient toward Swan Creek, there was minimal potential for negative water quality impacts to the shallow groundwater or downstream wetland and watercourse groundwater receptors (GM BluePlan 2018a).

Measures should be implemented to ensure that spills, debris and other deleterious substances are prevented from migrating off-site into the adjacent natural features and watercourse. These

measures should be incorporated into the ESC Plan for the development. Vehicle refueling and equipment stockpiling should be completed at least 30m away from the wetland and away from any other natural features. A Spill Response Plan should be prepared and be ready to be implemented on-site if required.

5.6 Induced Impacts

Establishment of the proposed residential development may increase the potential for human disturbances to the adjacent natural features if not appropriately mitigated. In particular, the development may lead to increased human access to, and activity within, the woodland and wetland features, with associated potential for habitat degradation (e.g., vegetation trampling or damage, garbage or yard waste dumping). Habitat degradation may further facilitate the ongoing establishment of non-native, invasive species such as Common Buckthorn. Increased human population in the immediate vicinity will also increase the potential for domestic animal (e.g., cat (*Felis catus*)) and other development-tolerant and human-subsidized mammal (e.g., raccoon (*Procyon lotor*)) access to surrounding natural areas. Easier access provided to these animal groups may impact nesting success and direct mortality among certain small-size wildlife, such as passerine birds.

Permanent fencing with no gates will be installed along the rear limits of lots backing onto or in proximity to the adjacent natural features or floodplain hazards, including Lots 14-23 and Lots 25-31. Paige wire fencing is proposed along the rear limits of Lots 14-23 to improve maneuverability of the fence within the wooded edge area. Residential lots that back onto a SWM facility (e.g., Lot 31) will contain a 1.2m high chain-link fence between the rear lot boundary and SWM block. Installation of permanent fencing with no gates is anticipated to represent an effective deterrence to human encroachment from these lots, and the dumping of refuse or garden waste from the rear of these lots, into the adjacent natural features.

Despite the presence of permanent rear-lot fencing, some residual impact to the adjacent features may occur as a result of human access to and disturbance of the adjacent features. This can be mitigated by educating and informing the residents of the subdivision through a new homeowners' brochure that highlights the significance and sensitivity of the adjacent natural features, how they can be disturbed through certain human activities. Recommendations will be provided to homeowners, such as to keep cats indoors, to avoid activities that would attract

raccoons and other human-subsidized wildlife (e.g., by properly securing garbage in waste receptacles), avoiding backyard swimming pool drainage to the adjacent natural features, using native garden plantings and limiting the use of fertilizers). Human access to the adjacent natural features can be further mitigated by posting No Trespassing or Private Property signage.

The majority of wildlife species recorded within the study area are relatively tolerant and adaptable to human-occupied landscapes such as residential subdivisions and are expected to return post-development. Species that occupy the adjacent wooded features, such as Northern Flicker, Cooper's Hawk, Rose-breasted Grosbeak and Baltimore Oriole, are generally tolerant and are expected to persist in these features post-development. Red-tailed Hawks are expected to re-establish nesting habitat in nearby areas of woodland were suitable open foraging habitat is adjacent. The SCC Eastern Wood-Pewee, which maintains breeding habitat within the FOD5-7 woodland, is not expected to be negatively affected or displaced by human use of the proposed development. This species is generally tolerant of adjacent human-altered landscapes and occurs within areas of fragmented woodland habitat.

6.0 Restoration and Enhancement

The rear lot areas of Lots 18-23 extending up to approximately 10m from the rear lot boundary, outside of septic bed footprints, will be restored with native woody and herbaceous species plantings, and seeded with a native herbaceous seed mix. This will be completed to stabilize and restore lands along the north property boundary that are disturbed by construction, including the re-graded north property fill slope. This measure will also serve to enhance the existing woodland edge by replacing the existing young, regenerative growth of largely Trembling Aspen, Manitoba Maple and Common Buckthorn with a variety of native woody vegetation species that are suitable to the site conditions and that complement the adjacent woodland community. Enhancement of the woodland edge will ultimately restore some degree of buffering functionality to the woodland edge following removal of the mature pines and early successional growth, such as by reducing edge effects to more interior woodland areas. Although the restored woodland edge areas will also continue to provide habitat for birds and other small wildlife.

It is recommended that open floodplain lands that fall within and adjacent to woodland and wetland buffers be allowed to passively regenerate through natural seed sources as is occurring under current conditions. However, as recommended in Section 5.5.4, native woody vegetation plantings will be established within the CUM1 meadow around and immediately downstream of the cooling trench stormwater discharge to provide additional shading effects.

Restoration and enhancement seeding and planting details for the property will be provided in a future Landscape Plan prepared as part of the development application.

7.0 Monitoring

Pre-, during-, and post-construction monitoring is recommended as a means to ensure that adjacent features such as trees and watercourses are not impacted throughout all stages of property development. A monitoring program is recommended that generally comprises the following:

- Installation, inspection and compliance with construction-stage mitigation measures;
- Inspection of the GRCA-owned woodland edge north of the subject property and the Swan Creek buffer areas to assess any evidence of disturbance, or impacts to the restoration plantings near the cooling trench, post-construction;
- Water temperature monitoring of Swan Creek to ensure maintenance of a coldwater thermal regime.

7.1 Pre-Construction Monitoring

- Prior to any construction activity on-site, including vegetation clearing and grubbing, on-site inspections of the following should be undertaken to ensure proper installation:
    - sediment and erosion control measures (e.g., silt fencing); and
    - tree and natural area protection measures, including proper installation of tree protection fencing as confirmed by a certified arborist or environmental inspector;
- Water temperature data loggers will be installed within Swan Creek upstream, at, and downstream of the anticipated zone of stormwater discharge input to collect detailed baseline water temperature data. One year of pre-construction monitoring will be completed. Daily water temperature data from July 1-August 31 between 4pm-6pm will be collected. The temperature data will be analyzed against watercourse thermal ranges (i.e., coldwater, coolwater, warmwater) based on Chu et al. (2009).

7.2 During Construction Monitoring

Construction monitoring is the responsibility of the proponent and is tied to the specific undertaking. Generally, construction monitoring must occur to ensure compliance with the conditions of various permits.

The following measures are recommended during construction and will be the responsibility of the Environmental Inspector unless otherwise indicated:

- pruning of any limbs or roots (of trees to be retained) disrupted during construction, as completed by a certified arborist;
- maintaining, and where necessary, repairing or replacing silt fencing silt fencing, other ESC measures, and tree protection fencing;
- all construction personnel, vehicles and equipment are to remain outside of the natural features and their buffers;
- fuelling of machinery to be done at designated locations away from the wetland and woodland boundaries and their buffers (minimum 30m); and,
- storage of machinery and material, fill, etc. to be done in designated areas away from the wetland and woodland buffers.

Annual water temperature monitoring within Swan Creek will be completed during the construction period according to the method described in Section 7.1.

7.3 Post-Construction Monitoring

The post-construction period is assumed to begin once 90% build-out of the subdivision has occurred. A post-construction monitoring plan will be implemented to include the following components:

- Inspections of restoration/enhancement plantings near the cooling trench to ensure their successful establishment and survival. A two year warranty is recommended for all proposed planting material throughout the subject property. Planted material will be inspected at the end of the warranty period. Plants which, at that time, are not in healthy vigorous growing condition, to the inspector's approval, shall be replaced at a 1:1 ratio. All tree staking is to be removed just prior to final inspection.

- Inspections of the GRCA-owned FOD5-7 woodland edge and the Swan Creek woodland and wetland buffers will be completed to ensure that post-construction human use impacts are not occurring as a result of the residential development. Monitoring will be completed once annually during Years 1, 3 and 5 post-construction. If impacts are observed, additional mitigation measures will be considered as required.

- Annual water temperature monitoring of Swan Creek will be completed for Years 1, 3 and 5 post-construction according to the methods described in Section 7.1.

The details of this monitoring plan will be refined during the detailed design stage of the development application process in conjunction with County, Township and GRCA staff. The efficacy of stormwater management measures within the development will also be monitored according to standard monitoring practices to be detailed by the engineering consultant in consultation with the County, Township and GRCA as a condition of Subdivision Approval. This will include monitoring to confirm the effectiveness of water quality and quantity controls.

Additional mitigation measures can be considered to address negative effects observed through monitoring activities. Examples of measures that could be considered include adjusting SWM control structures to alter SWM pond water levels as a means of mitigating water quantity effects, implementing more frequent cleaning of SWM forebays, OGS units or catchbasins as a means of mitigating water quality impacts, and providing additional strategic shading in surface flow areas to mitigate observed thermal effects.

8.0 Summary

NRSI was retained by Elora Ridge Developments to complete an EIS associated with a proposed 40-lot residential subdivision with associated stormwater management facilities, internal road network and lot-level services. The subject property is traversed by the coldwater Swan Creek, and contains PSW, Significant Woodland, floodplain and slope hazard features that are identified by the County as Core Greenlands and Greenlands, and which fall within the GRCA's regulation limit. The property is also located adjacent to a Significant Woodland to the immediate north. This report has also been prepared to meet requirements under the *Planning Act* and the GRCA's O. Reg. 150/06 to demonstrate that the proposed development will not negatively impact the existing natural and GRCA-regulated features and their ecological functions. It provides a comprehensive characterization of the existing natural features and assesses natural feature significance and sensitivity to inform the design of the proposed development. Potential impacts to natural features and functions were assessed based on development details provided by GM BluePlan, and with tree removal and protection details provided by MacKinnon and Associates.

A development layout has been proposed which avoids the sensitive lands and natural features surrounding Swan Creek and its floodplain, which collectively comprise PSW, Significant Woodland, SWH for the SCC Black Ash and Great St. John's-wort, and their associated buffers. These features will be well set-back from the residential lots and access will be restricted through the installation of permanent fencing. Ecological functions provided by these features, including the landscape-level ecological linkage that it comprises, will continue post-development.

The proposed development will include re-grading the upper slope of the north property boundary fill slope, which will require removal of the planted pine trees and young regenerating tree and shrub growth that occur along and across the top of this slope. A grading and development limit has been identified to protect the more mature woodland edge trees that are rooted at the base of the slope and represent a portion of the off-property Black Cherry-Sugar Maple dominated forest community. The more mature and ecologically significant portions of the Significant Woodland, including the habitat function that it provides for the SCC Eastern Wood-Pewee, will not be negatively impacted by the removal of the planted pines and younger regenerating south woodland edge. It is recommended that the south woodland edge be restored and enhanced through native species plantings and herbaceous seeding which will fall

within the adjacent rear lots up to approximately 10m from the property boundary. Permanent fencing with no gates will be installed along the rear lot limits to mitigate human encroachment and dumping impacts.

A SWM plan has been developed that preserves the existing hydrological flow paths on the property and promotes lot-level infiltration through the use of infiltration galleries. A principle design criterion for the SWM system was to match pre- and post-development infiltration rates so as to achieve a water balance with the downstream natural features. The SWM plan has been designed to attenuate post-development surface runoff rates to pre-development rates to the full range of design storm events, and to provide an Enhanced level (80% TSS removal) of water quality control prior to discharge to receiving natural features. Along with optimizing lot-level infiltration capacity, which will mitigate the warming effects of sun-exposed surface runoff, a cooling trench has been incorporated into the SWM plan as a means of mitigating thermal impacts of runoff inputs into the coldwater Swan Creek. Discharge from the cooling trench will dissipate as broad sheet flow over the surface, and it is anticipated that much of this flow will be captured through evapotranspiration and infiltration prior to reaching the watercourse. The area of discharge flow at and down-gradient of the cooling trench will be planted with native woody vegetation species to provide additional shading effects.

Recommendations have been provided to minimize impacts and mitigate potential negative effects caused by the development. These include recommendations to mitigate direct, indirect and induced impacts that may arise through construction and human use of the proposed development. Monitoring recommendations have been provided to ensure that construction-stage mitigations are functioning appropriately and construction limits are being respected. These include monitoring the adjacent FOD5-7 woodland and the Swan Creek corridor and buffer features for human disturbances and unauthorized activities, and monitoring water temperatures within Swan Creek to ensure that the SWM system is not adversely affecting the existing coldwater thermal regime. Corrective mitigation strategies will be determined and employed, in consultation with regulatory agencies, if required.

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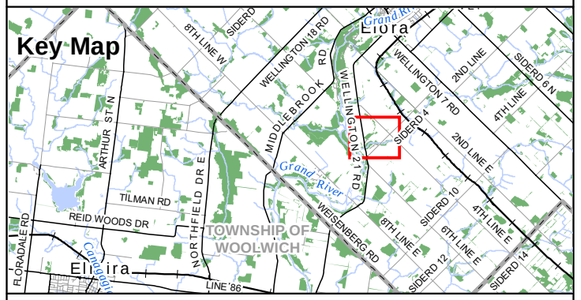
MAPS

Map 1

Inverhaugh Pasture Edge Subdivision

Study Area



Legend

- Subject Property
- Primary Road
- Secondary Road
- Permanent Watercourse
- Water Body
- Provincially Significant Wetland (PSW)

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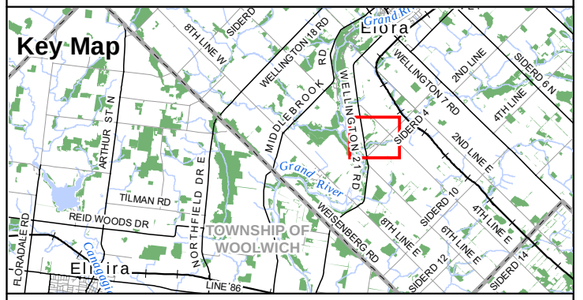
Map 2

Inverhaugh Pasture Edge Subdivision

Vegatation Communities



Legend

- Subject Property
- Surveyed Wetland Boundary
- Surveyed Dripline Boundary
- Floodplain (Approximate)
- Permanent Watercourse
- Regulation Limit (GRCA)
- Approximate Area of Steep Slopes
- Removed Vegetation
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite

(CUT1) Mineral Cultural Thicket Ecosite

(FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type

(FOD5-7) Dry - Fresh Sugar Maple - Black Cherry Deciduous Forest Type

(SWC1-1) White Cedar Mineral Coniferous Swamp Type

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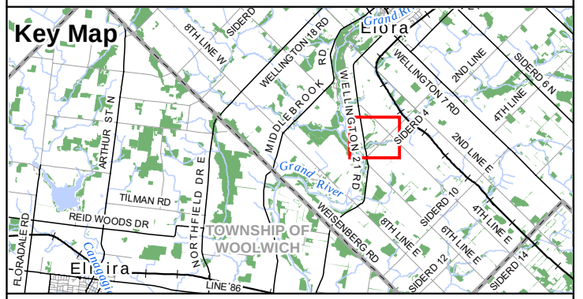
Map 3a

Inverhaugh Pasture Edge Subdivision

Natural Feature Constraints



Legend

- Subject Property
- Permanent Watercourse
- Surveyed Wetland Boundary
- Surveyed Outer Dripline Boundary
- Mature Woodland Edge Protection Limit
- Approximate Top of Slope
- Floodplain (Approximate)
- 10m Woodland Dripline Buffer
- 30m PSW Buffer
- Provincially Significant Wetland (PSW)
- Significant Woodland
- Approximate Area of Steep Slopes
- Removed Vegetation
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite

(CUT1) Mineral Cultural Thicket Ecosite

(FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type

(FOD5-7) Dry - Fresh Sugar Maple - Black Cherry Deciduous Forest Type

(SWC1-1) White Cedar Mineral Coniferous Swamp Type

Significant Vegetation Species

- Great St.John's-wort
- Black Ash (occasional throughout)

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Project: 1885 Date: January 11, 2019	NAD83 - UTM Zone 17 Size: 11x17" **1:2,500**

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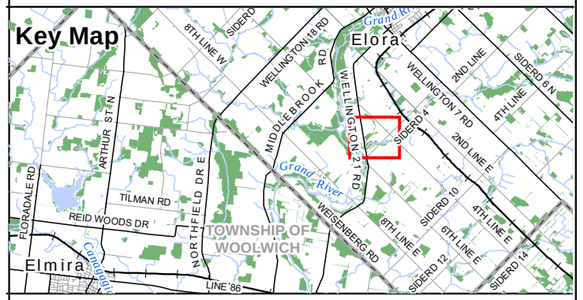
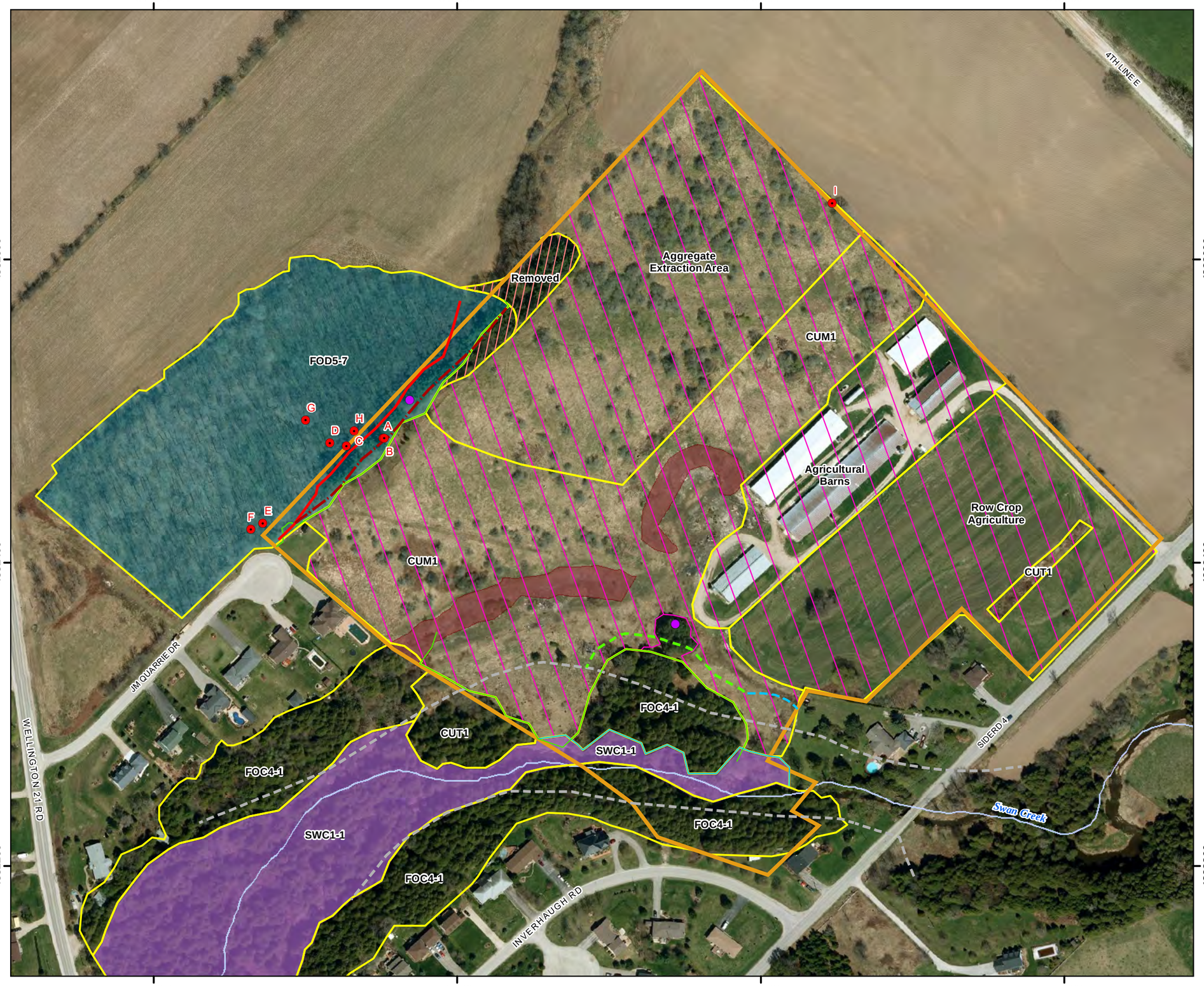
Map 3b

Inverhaugh Pasture Edge Subdivision

Natural Feature Constraints





Legend

- Subject Property
- Raptor Stick Nest
- Potential Bat Habitat Tree
- Eastern Wood-Pewee Significant Wildlife Habitat
- SCC and Rare Vegetation Significant Wildlife Habitat
- Barn Swallow and Bank Swallow Foraging Habitat
- Permanent Watercourse
- Surveyed Wetland Boundary
- Surveyed Outer Dripline Boundary
- Mature Woodland Edge Protection Limit
- Approximate Top of Slope
- Floodplain (Approximate)
- 10m Woodland Dripline Buffer
- 30m PSW Buffer
- Approximate Area of Steep Slopes
- Removed Vegetation
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite

(CUT1) Mineral Cultural Thicket Ecosite

(FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type

(FOD5-7) Dry - Fresh Sugar Maple - Black Cherry Deciduous Forest Type

(SWC1-1) White Cedar Mineral Coniferous Swamp Type

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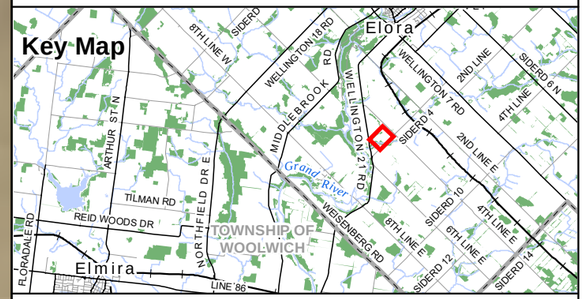
Map 4

Inverhaugh Pasture Edge Subdivision

Proposed Development



Legend

- Subject Property
- Permanent Watercourse
- Proposed Development
- Proposed Septic Bed
- Approximate Top of Slope
- Mature Woodland Edge Protection Limit
- Surveyed Wetland Boundary
- Surveyed Outer Dripline Boundary
- Floodplain (Approximate)
- 10m Woodland Dripline Buffer
- 30m PSW Buffer
- Approximate Area of Steep Slopes
- Removed Vegetation
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite

(CUT1) Mineral Cultural Thicket Ecosite

(FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type

(FOD5-7) Dry - Fresh Sugar Maple - Black Cherry Deciduous Forest Type

(SWC1-1) White Cedar Mineral Coniferous Swamp Type

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Project: 1885 Date: January 22, 2019	NAD83 - UTM Zone 17 Size: 11x17" **1:2,000**

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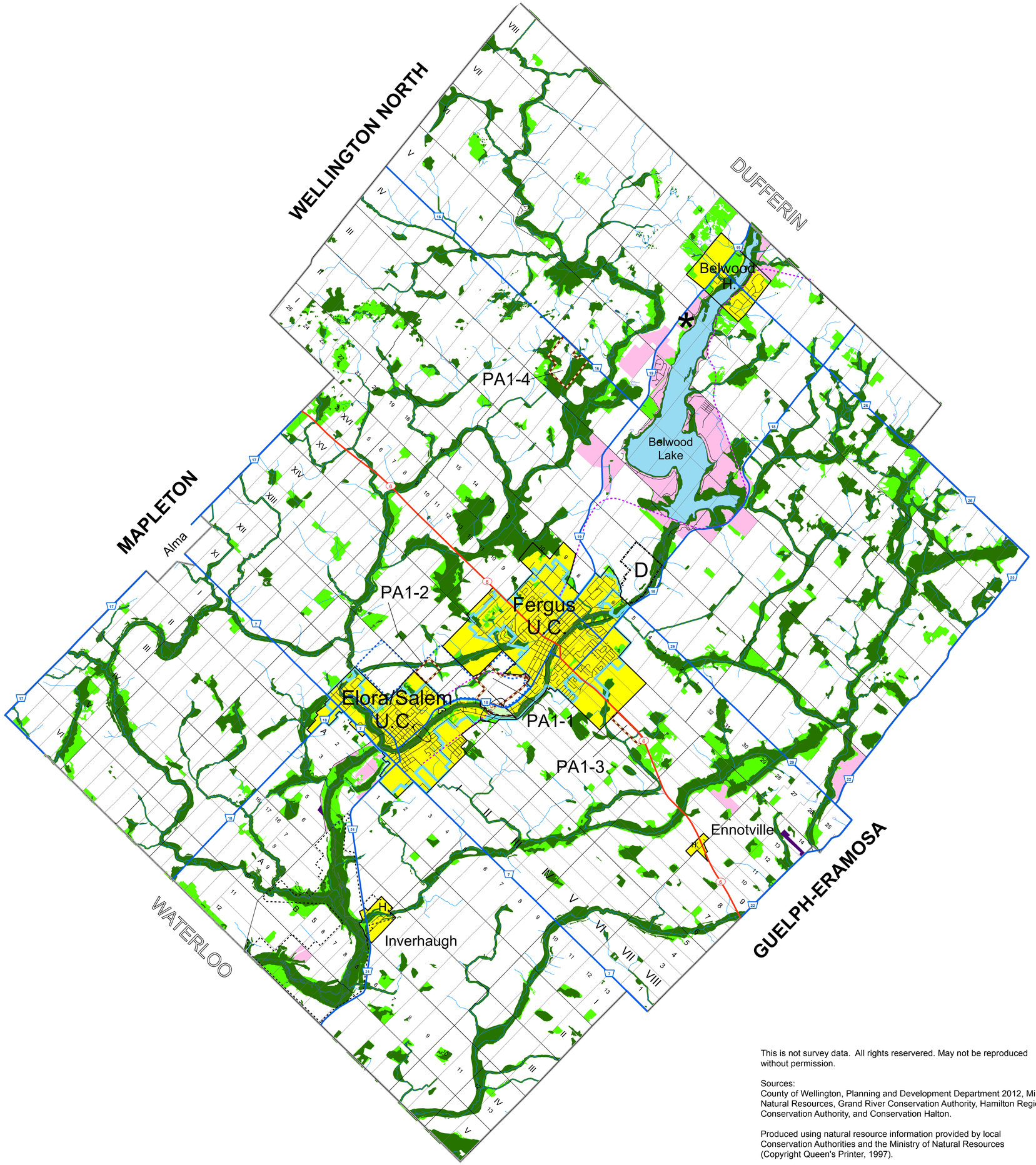
APPENDIX I Wellington County Official Plan Schedule A1

SCHEDULE A1

CENTRE WELLINGTON



Legend

The Greenlands System
- Core Greenlands
- Greenlands
- Earth Science ANSI

The Rural System
- Prime Agricultural
- Recreational
- Rural Employment Area
- PA — Policy Area
- Community Planning Study Area

The Urban System
- H. — Hamlet Area
- U.C. — Urban Centre

Other
- Trail
- Landfill Site
- Montrose Water Management Protection Area
- Grand River Crossing
- D — Deferral
- County Roads
- Provincial Highways
- Built Boundary

Mineral Aggregate Resources are identified on Schedule C of the Official Plan. Licensed Aggregate Operations are identified on Appendix 2 of the Official Plan.

N

0 1.25 2.5 5

Kilometres

May 6, 1999

Updated: March 9, 2015.

Date Printed: March 9, 2015.

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Sources:
County of Wellington, Planning and Development Department 2012, Ministry of Natural Resources, Grand River Conservation Authority, Hamilton Region Conservation Authority, and Conservation Halton.

Produced using natural resource information provided by local Conservation Authorities and the Ministry of Natural Resources (Copyright Queen's Printer, 1997).

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APPENDIX II Final EIS Terms of Reference

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

January 29, 2018 1885A

Fred Natolochny
Supervisor of Resource Planning
Grand River Conservation Authority
400 Clyde Road
Cambridge, Ontario N1R 5W6

Sarah Wilhelm
Manager of Development Planning
County of Wellington
74 Woolwich Street
Guelph, Ontario N1H 3T9

Dear Mr. Natolochny and Ms. Wilhelm,

Re: Proposed Inverhaugh Subdivision
Environmental Impact Study Terms of Reference

On behalf of Natural Resource Solutions Inc. (NRSI), I am pleased to provide the final Terms of Reference (TOR) for an Environmental Impact Study (EIS) associated with Thomasfield Homes Ltd.'s and Wrighthaven Homes Ltd.'s proposed residential subdivision located between Sideroad 4 and JM Quarrie Drive in the hamlet of Inverhaugh, Township of Centre Wellington. Comments received on December 15, 2017 from the Grand River Conservation Authority (GRCA) on the draft TOR submitted by NRSI have been integrated into this document.

Various significant natural features are known to exist on and adjacent to the subject property, including the Inverhaugh Valley Provincially Significant Wetland (PSW) and slope/floodplain hazard lands (designated as Core Greenlands in the Wellington County Official Plan) and Significant Woodland and valleyland (designated as Greenlands in the County Official Plan). Following preliminary NRSI characterization of the subject lands, potential natural feature constraints associated with potential Species at Risk (SAR) habitat and Candidate Significant Wildlife Habitat (SWH) were also identified, subject to further EIS-based field studies.

Based in part on the results of the preliminary natural feature constraints analysis, a conceptual site plan has been prepared and discussed as part of pre-consultations that have been held with staff of the Township, County of Wellington, and the GRCA. Due to the presence of County-designated Core Greenlands and Greenlands on/adjacent to the subject property, and the presence of GRCA-regulated lands, an EIS is required to demonstrate that the proposed residential development will not negatively impact the significant natural features and ecological functions in accordance with municipal Official Plan policies and the GRCA's Ontario Regulation 150/06.

The attached TOR outlines the steps required to complete the EIS and has been scoped based on findings and recommendations of NRSI's preliminary natural feature constraints analysis as well as the outcome of pre-consultation discussions. This includes a GRCA site visit and EIS scoping discussion held on August 10, 2017.

Sincerely,
Natural Resource Solutions Inc.

Ryan Archer, M.Sc.
Terrestrial and Wetland Biologist

Proposed Residential Development, Sideroad 4 and JM Quarrie Drive, Inverhaugh
Environmental Impact Study
Terms of Reference
January 29, 2018

Study Area General Description and Location

The lands owned by the proponents are located between Sideroad 4 and JM Quarrie Drive and are legally known as Park Lots 8 and 11, and Part of Park Lot 7, Part of Mill Property in the hamlet of Inverhaugh, Township of Centre Wellington (herein, the "subject property"). The northeast portion of the subject property is currently used for agricultural purposes, while the northwest portion contains a recently backfilled aggregate pit which is currently in the process of being decommissioned. The subject property contains features mapped as Core Greenlands and Greenlands in the Wellington County Official Plan (OP) (County of Wellington 2017) including the Inverhaugh Valley Provincially Significant Wetland (PSW) (MNRF 2015a) and areas regulated by the Grand River Conservation Authority (GRCA). A section of Swan Creek traverses the southern portion of the property, upstream of its confluence with the Grand River.

The majority of the subject property comprises regenerating cultural meadow, portions of which have experienced historic disturbance through previous aggregate extraction activities. These former on-site activities have left two areas of exposed steep slope. The larger of these slopes, approximately 9m in height, roughly parallels a portion of the Swan Creek floodplain. This slope delineates a portion of the Acquisition Area for the future West Montrose Dam. A smaller portion of the Acquisition Area represents the natural Swan Creek floodplain.

The landscape surrounding the subject property is primarily agricultural with some active aggregate extraction to the north, while residential lands associated with the hamlet of Inverhaugh occur to the south and southwest. A woodland abuts the northwestern boundary of the subject property, while wooded lands associated with the Swan Creek valley and wetlands extend off-site to the east and southwest. See Map 1 for the property and surrounding study area.

Lands within 120m of the subject property are referred to as the "study area". Adjacent lands, within 120m of the subject property, have been considered in cases where occurrence of adjacent significant habitat may require a buffer, development setback or other development constraints that extends onto the subject property. Herein, for the purposes of the Terms of Reference (TOR), true northeast is referred to as "north", true southeast is referred to as "east", true southwest is referred to as "south", and true northwest is referred to as "west".

NRSI completed a preliminary characterization of the subject property natural features on March 31, 2017 to inform the development concept and potential constraints on the subject property. The preliminary characterization was completed based on background review and a single site visit in March 2017. The natural feature characterization will be updated for the EIS based on additional seasonally-timed surveys. See Map 2 for preliminary vegetation community mapping completed as part of the constraints analysis.

Proposed Undertaking

The proponents, Thomasfield Homes and Wrighthaven Homes, propose to develop portions of the subject property to accommodate a residential subdivision. The subdivision will include approximately 42 single-detached residential lots as well as a stormwater management facility and associated servicing infrastructure. The residential lots will be located outside of the West Montrose Dam Acquisition Area, while the stormwater management facility will be located outside of the Swan Creek 100-year flood elevation. The stormwater management facility will discharge to Swan Creek and the existing hydrological balance with adjacent natural features will be maintained through use of infiltration techniques. An internal road network will be constructed to service the lots, comprising a street connection to Sideroad 4. The feasibility for a road connection to JM Quarrie Drive will be investigated as part of the development application process.

Prior to site development, the former on-site aggregate pit will be formally decommissioned by closing the *Aggregate Resources Act* license. In accordance with the pit rehabilitation plan, the former pit area, including the surrounding tablelands that are currently comprised of regenerating cultural meadow, will be temporarily returned to agricultural production prior to residential site development. In order to accommodate the proposed development, the existing 9m slope delineating a portion of the West Montrose Dam Acquisition Area will be regraded to a 3:1 slope

See Appendix I for the current development concept for the subject property.

Policy Context and Considerations

County-designated Natural Features

A preliminary review of background information and relevant policy documents was undertaken as part of NRSI's preliminary constraints assessment for the subject property. Based on that assessment, it is understood that the County of Wellington Official Plan (2017) identifies the presence of Core Greenlands and Greenlands as mapped on Schedule A1. These designations are associated with the following on-site biological and physical features:

- Core Greenlands:
    - Inverhaugh Valley PSW
    - Hazard lands associated with the Swan Creek floodplain and 9m-high steep slope
- Greenlands:
    - Significant Woodland
    - Valleyland

The extent of PSW on the subject property is anticipated to approximate the area identified on Map 2 as White Cedar Mineral Coniferous Swamp (SWC1-1). Wetland boundaries will be refined within the subject property as part of the fieldwork plan described below. No portion of the future site development is anticipated to encroach within the PSW, and is expected to be well-removed (>30m) from the PSW due to the existing floodplain and slope hazards with the exception of potential stormwater management requirements.

Greenlands on the subject property comprise a small area of existing natural features on the subject lands that fall outside of the Core Greenlands OP mapping overlay and are associated with woodland and valleyland adjacent to Swan Creek at the south end of the property. The off-site woodland immediately west of the property (Dry-Fresh Sugar Maple-Black Cherry Deciduous Forest (FOD5-7)) has also been mapped as Greenland (Significant Woodland) in the OP. During preliminary site investigations, NRSI mapped the presence of a narrow fringing White Pine Coniferous Plantation (CUP3-2) along the eastern boundary of this woodland, overlapping the west subject property boundary. NRSI will evaluate the significance of this narrow fringing plantation in relation to the adjacent natural FOD5-7 Significant Woodland as part of this EIS, as described below.

According to Sections 5.5.3 and 5.5.4 of the County OP, development and site alteration in valleylands and Significant Woodland, respectively, is prohibited unless it can be demonstrated that the proposed development will not negatively impact the features or their ecological functions. If development is proposed within a Greenland system or on adjacent lands, an EIS will be required to demonstrate that the development conforms to the applicable protective policies (e.g., Sections 5.5.3, 5.5.4) to the satisfaction of the County and other applicable regulatory agencies.

GRCA-Regulated Areas

Swan Creek, the surrounding PSW and adjacent lands considered wetland "areas of interference", as well as associated floodplain and slope hazard lands, are regulated by the GRCA. The GRCA regulation limit is shown on Map 2. According to Ontario Regulation 150/06 *Grand River Conservation Authority: Regulation of Development, Interference with Wetland and Alterations to Shorelines and Watercourses*, development and site alteration within GRCA-regulated lands are not permitted unless it can be demonstrated through an EIS that the existing natural features and functions will not be negatively impacted. In accordance with these regulatory prohibitions on development within hazard lands, it is anticipated that the future site development will be maintained outside of the floodplain and will be set-back from the slope hazard according to the appropriate geotechnical hazard setbacks. As stated above, the stormwater management facility can be located within the West Montrose Dam Acquisition Area, but the facility will be located outside of the natural Swan Creek floodplain.

Species at Risk

Provincially Threatened and Endangered species and their associated habitat that may be identified within the study area are protected under the *Endangered Species Act* (ESA). NRSI will consult with the Ontario Ministry of Natural Resources and Forestry (MNRF) on necessary steps to ensure compliance with the ESA should Threatened or Endangered species, or their habitats, be identified within the study area.

In addition to requirements under the ESA, Section 5.4 of the County OP states that new development and site alteration shall not be permitted within significant habitat of Threatened or Endangered species except in accordance with provincial and federal requirements. Further, new development will not be permitted on lands adjacent to significant habitat for Threatened and Endangered species unless it can be demonstrated that there will be no negative impacts on the natural features or their ecological functions.

Significant Wildlife Habitat

As stated in Section 5.5.1 of the County OP, SWH is considered a form of Greenland designation within the County's Natural Heritage System. Development and site alteration is not permitted in SWH unless it can be demonstrated that the development will not negatively impact the habitat or its ecological functions.

Fish Habitat

The federal Department of Fisheries and Oceans (DFO) is responsible for administering the *Fisheries Act* and its protective policies for fish and fish habitat. Section 5.5.1 of the County OP also prohibits development and site alteration in fish habitat except in accordance with provincial and federal requirements. Swan Creek provides direct fish habitat. However, because the conceptual development plan will not involve any development activities within or adjacent to the watercourse, no impacts to fish habitat and no DFO review of the proposed development concept are considered necessary.

Associated Studies

It is anticipated that geotechnical, stormwater management and hydrogeological analysis will be required by the agencies for consideration in the EIS impact assessment. These studies will be prepared by GM BluePlan and will be discussed and interpreted within the EIS.

Background Information Review

In order to determine a study approach for the EIS, existing natural heritage information was gathered and reviewed to identify key natural heritage features and species that are known, or have the potential to occur within the study area. Requests for background information were sent to the MNRF Guelph District and the GRCA on March 10, 2017. Information was received from the MNRF on April 4, 2017. GRCA input was provided during the site-based pre-consultation meeting held on August 10, 2017.

Relevant background information sources were also collected and reviewed, including the following:

- Natural Heritage Information Centre (NHIC) (MNRF 2015a);
- Land Information Ontario (LIO) data base mapping;
- Wellington County OP (County of Wellington 2017);
- GRCA online mapping;
- Department of Fisheries and Oceans Canada (DFO) SAR habitat mapping (DFO 2017);
- MNRF SAR list for Wellington County (MNRF 2016);
- Atlas of the Mammals of Ontario (Dobbyn 1994);
- Ontario Reptile and Amphibian Atlas (Ontario Nature 2015);
- Ontario Breeding Bird Atlas (BSC et al. 2008).

This background information will be integrated with original data collected by NRSI during the 2017 and 2018 field surveys to inform the characterization component of the EIS.

Species at Risk Habitat Screening

Based on the results of preliminary background information review and NRSI's March 2017 site visit, potential habitat for SAR was screened for the study area vicinity. SAR are those listed on the Species at Risk in Ontario List (MNRF 2017a). For the purposes of this report, SAR are defined as species listed as provincially Threatened or Endangered that are afforded protection under the *Endangered Species Act* (ESA).

Within Ontario, Species of Conservation Concern (SCC) refer to:

- Species designated provincially as Special Concern;
- Species that have been assigned a conservation status (S-Rank) of S1 to S3 or SH by the NHIC;
  Species that are designated federally as Threatened or Endangered by the Committee for the Status of Endangered Wildlife in Canada (COSEWIC) but not provincially by the Committee on the Status of Species at Risk in Ontario (COSSARO). These species are protected by the federal *Species at Risk Act* but not provincially by the ESA.

Habitats of SCC are considered a form of SWH (OMNR 2010) which is afforded protection under the Provincial Policy Statement (OMMAH 2014) and the Wellington County Official Plan (County of Wellington 2017).

Based on the results of preliminary background information review, SAR with occurrence records within 10km of the study area were identified, as well as all SAR and SCC identified as occurring elsewhere within Wellington County (MNRF 2016). Based on the habitat preferences/requirements for these species (e.g., OMNR 2000) and an assessment of existing study area habitat features based on NRSI's site investigation, a screening for suitable habitats was completed for the study area. This preliminary screening information further informed the surveys required as part of the EIS scope.

Based on the results of the preliminary screening, the following SAR were identified as having potentially suitable habitat in the subject lands:

<u>Threatened and Endangered Species Regulated Under the ESA</u>

- Barn Swallow (*Hirundo rustica*) – provincially and federally Threatened
- Eastern Meadowlark (*Sturnella magna*) – provincially and federally Threatened

Based on the March 2017 site investigation, no evidence of previous Barn Swallow nesting was observed on the on-site structures. However, updated assessments will be completed in conjunction with additional EIS fieldwork. The study area may provide foraging habitat for Barn Swallows that nest in the area. Cultural meadow areas on the property may provide suitable habitat for Eastern Meadowlark. However, as described above, meadow areas on the property are to be returned to agricultural production in conjunction with rehabilitation of the pit to be closed, prior to site development. The EIS will address the presence of suitable Eastern Meadowlark habitat on-site based on plans to convert these lands back to agriculture.

The MNRF also identified the potential presence of Little Brown Myotis (*Myotis lucifugus*) and Northern Myotis (*Myotis septentrionalis*) in their letter dated April 4, 2017. The EIS will assess the presence of habitat for these species within proposed development areas.

See Appendix II for the complete SAR habitat screening tables for additional information about SAR habitat presence/absence. Appendix II also identifies SCC for which suitable habitat may occur on the subject lands. See below for SCC whose habitats were screened as potentially occurring on the subject properties in the context of SWH considerations.

Significant Wildlife Habitat Screening

The collection and review of background information, in combination with the March 2017 site characterization, was used to complete a preliminary screening for SWH within the study area. This review compared conditions within the study area with criteria in the *SWH Ecoregion 6E Criterion Schedule* (MNRF 2015b) to determine the presence of any Candidate SWH. The results of the SWH screening have informed surveys required to confirm such habitat within the study area.

Based on the preliminary screening, the following were identified as Candidate SWH types pending further assessment during EIS site investigations:

- Snake Hibernaculum
- Turtle Wintering Area
- Amphibian Breeding Habitat (Woodland)
- Potential habitat for the following SCC not covered under other SWH criteria:
    - Eastern Wood-Pewee (*Contopus virens*)
    - Wood Thrush (*Hylocichla mustelina*)

See Appendix III for the complete SWH screening tables for additional information on SWH absence or presence of Candidate SWH within the study area.

Environmental Impact Study - Field Surveys

The following field studies will be completed to characterize the existing natural features within the study area and to inform the subsequent constraints analysis. Note that certain field studies described below have been completed at the time of writing in order to meet appropriate seasonal survey periods. This fieldwork plan was scoped based on the results of NRSI's preliminary March 2017 site characterization as well as subsequent pre-consultation discussions and correspondence with GRCA staff.

Vegetation Community Mapping

Preliminary NRSI vegetation community mapping for the study area was updated during a September 15, 2017 site visit. Vegetation community mapping followed the Ecological Land Classification (ELC) system for southern Ontario (Lee et al. 1998). Details on the vegetation communities were recorded including species composition, dominance, uncommon species or features, surficial soil types, and evidence of human disturbance.

Wetland and Woodland Boundary Delineation

In conjunction with ELC mapping, an NRSI biologist certified in the Ontario Wetland Evaluation System (OWES; MNRF 2014) identified and flagged wetland boundaries within the subject property. Woodland dripline boundaries were also flagged to delineate the boundaries of woodland features on the subject property. NRSI staff will meet with staff of the GRCA on-site on September 20, 2017 to review and confirm the wetland boundaries. Based on correspondence with

County staff, no agency site visit was required to confirm NRSI's flagged woodland dripline boundary, which was also flagged on September 20. The confirmed wetland and woodland dripline boundaries were subsequently surveyed by Van Harten (not included in the attached Map 2).

Breeding Bird Surveys

Two early morning breeding bird surveys will be completed between late May and early July 2017 in accordance with Ontario Breeding Bird Atlas (OBBA) protocol (BSC 2001). Surveys will be completed between a half-hour before sunrise and 10:00am. Surveys will be timed to occur at least 10 days apart. Surveys will be completed through a comprehensive area search of each vegetation community within the subject property and immediately adjacent lands as access permits. Standard breeding evidence codes will be recorded based on OBBA. Any observations of significant species will be recorded in detail, including their specific observation location(s), observed behaviour and highest level of breeding evidence.

Vascular Flora Inventories

A single-season (fall-based) vegetation inventory was conducted on September 15, 2017 to record all species of vascular flora within each vegetation community. The property was systematically searched for plant species and any rare species and their location(s) were recorded with a handheld GPS unit. Vascular flora species were recorded by ELC polygon.

Tree Inventory

All trees ≥ 10cm diameter at breast height (DBH) along the eastern edge of the Dry-Fresh Sugar Maple-Black Cherry Deciduous Forest (FOD5-7) community, including within 10m of the property boundary within the adjacent GRCA-owned property, and the White Pine Coniferous Plantation (CUP3-2) were inventoried by Certified Arborists and assessed for health condition and potential for structural failure on September 13 and 14, 2017. For each inventoried tree, the following information was recorded:

- Species common and scientific name,
- DBH,
- Crown radius (metres)
- General condition/health (excellent, good, fair, poor, very poor), including characteristics of any cavities from bat maternity perspective;
- Tree identification number,
- Potential for structural failure (low, medium, high),
- Tree location (UTM coordinates), and
- General comments (i.e. disease, aesthetic quality, development constraints, sensitivity to development)

Bat Cavity Tree Assessment

An inspection of trees outside of the woodland features within the subject property will be completed to determine the likelihood of suitable maternity colony or roosting habitat for bats. Cavity tree assessments will be completed by staff experienced in such surveys and will follow guidelines for the identification of suitable bat habitat outlined in the MNRF's *Bats and Bat Habitats: Guidelines for Wind Power Projects* (OMNR 2011), as well as recent MNRF guidance provided in the document *Survey Protocol for Species at Risk Bats within Tree Habitats: Little Brown Myotis, Northern Myotis & Tri-colored Bat* (MNRF 2017b). This

information will be used to assess the potential occurrence of habitat for SAR bats. NRSI staff will report on the occurrence of suitable habitat outside of the woodland features in completion of the EIS. If cavity trees are observed within the subject property, NRSI will consult with the MNRF on necessary next steps to meet the requirements of the *Endangered Species Act.* The cavity tree assessment will be completed during the early spring leaf-off period.

Snake Emergence Surveys

An area search within the subject property will be completed during a spring-based field survey, timed to coincide with the period following snake spring emergence. Specifically, areas of suitable habitat, including open sun-exposed areas, grassy riparian areas, and potential basking structures (e.g., woody debris, rocks, broken concrete debris) will be searched during suitable weather and temperature conditions for basking (e.g., sunny, warm, no precipitation). This information will be used to assess the potential occurrence of snake overwintering SWH on the subject property as well as other important functional microhabitats (e.g., basking, cover objects) and to assess species occurrence on the lands. A focus of this survey will be the sun-exposed slopes which may provide suitable hibernaculum habitat. If multiple reptiles are observed on the subject property, particularly if they are observed congregated in one area, additional surveys will be undertaken in the spring or fall to assess the occurrence and location of an on-site hibernaculum feature.

Terrestrial Habitat Assessments and Documentation of Other Wildlife

During all site visits, wildlife habitat will be assessed within the subject lands with an emphasis on any features that may be indicative of SWH or habitat for SAR. Any potentially significant habitats will be documented, photographed, and georeferenced using a hand-held GPS unit. Any incidental observations of wildlife will be recorded during all site visits including mammals, amphibians, butterflies and odonates (dragonflies/damselflies).

Identification of Development Opportunities and Constraints

Background information review and fieldwork results will be combined to accurately characterize the biological features and functions within the study area. Significant biological features will be identified as constraints based on current national, provincial, and regional species and habitat status listings. As well, the sensitivity of species and habitats will be documented based on current ecological trends, research and professional experience/expertise, and input from local agency staff. Characterization of the existing natural features will include the following to inform the EIS:

- Accurately delineated natural feature boundaries to inform buffer and development setback requirements;
- Significant natural heritage features and ecological functions present, such as within the FOD5-7 woodland;
- Presence of any significant species of plants or wildlife and their associated habitats, including any SAR habitat present within the study area;

The preliminary natural features constraints mapping will be updated and recommendations for their protection will be provided (e.g., buffers). The condition of the CUP3-2 White Pine plantation will be assessed based on the results of the tree inventory and health assessment as a means of assessing its significance in relation to the adjacent natural FOD5-7 forest community. The results of the constraints analysis

will be provided as a map to the client to assist in identifying a development layout that avoids significant and sensitive natural features. Required development setbacks will also include those determined through geotechnical and hydrological studies completed by other Project Team members.

Impact Assessment

The details of the development plan, including lot layout, stormwater management and grading details, will be reviewed and compared to the existing conditions within the subject property to inform the impact assessment. Any areas of conflict between natural feature constraints and the development will be assessed for the type, severity, spatial extent and duration of the impact on the natural features and functions. The assessment of potential development impacts will be divided into:

- Direct impacts associated with natural feature removal or wildlife displacement caused by the actual proposed 'footprint' of the development.

- Indirect impacts associated with changes in site conditions such as drainage and water quantity/quality as well as construction-related impacts.

- Induced impacts associated with post-construction stresses on the natural features caused by human habitation and use of the new lots.

Recommendations to avoid, or otherwise minimize or mitigate impacts to significant natural features and functions will be made in the EIS. A focus of this EIS will be the potential for negative impacts to the existing water balance between the subject property lands and the adjacent PSW and Swan Creek. The EIS will incorporate the results of hydrogeological assessments and water balance calculations prepared by GM BluePlan, and recommendations will be provided to ensure no negative impacts to the hydrological regime of the adjacent features.

The EIS will investigate opportunities for ecological enhancement or restoration of woodland edge areas through the implementation of recommended buffers. Monitoring recommendations will be provided where necessary to ensure the effectiveness of recommended mitigation measures and to track compliance with construction-stage mitigation measures.

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MAPS

APPENDIX I
Development Concept (Astrid J. Clos Planning Consultants 2017)

APPENDIX II
Species at Risk and Species of Conservation Concern Habitat Screening

Federally and Provincially Significant Species Known from the Study Area and Vicinity

Scientific Name	Common Name	SRANK[1]	COSSARO[2]	COSEWIC[3]	SARA Schedule[4]	Habitat Preference[5,6,7]	Background Source	Suitable Habitats within Study Area
Vascular Flora								
Castanea dentata	American Chestnut	S2	END	E	Schedule 1	moist to well drained forests on sand, occasionally heavy soils	MNRF 2016	Species not inventoried on the subject property
Carex lupuliformis	False Hop Sedge	S1				wet wooded habitats	MNRF 2016	Potentially within the cedar forest and swamp communities Species not inventoried on the subject property
Asplenium scolopendrium var	Hart's-tongue	S3	SC	SC	Schedule 1	Lower portions of large mossy dolomite boulders in moist deciduous forest understories, usually on talus below low escarpments or ridges, sometimes on the mossy sides of fissures in similar rich hardwood settings; very rare and local.	MNRF 2016	No
Potamogeton hillii	Hill's Pondweed	S2	SC	SC	Schedule 1	Shallow water of small lakes, ponds, ditches and streams.	MNRF 2016	No
Monarda didyma	Oswego-tea	S3				moist woods, swampy thickets and roadsides	MNRF 2015	Potentially within the cedar forest and swamp communities Species not inventoried on the subject property
Birds								
Haliaeetus leucocephalus	Bald Eagle	S2N, S4B	SC	NAR		require large continuous area of deciduous or mixed woods around large lakes, rivers; require area of 255 ha for nesting, shelter, feeding, roosting; prefer open woods with 30 to 50% canopy cover; nest in tall trees 50 to 200m from shore; require tall, dead, partially dead trees within 400 m of nest for perching	MNRF 2016	No
Riparia riparia	Bank Swallow	S4B	THR	T		sand, clay or gravel river banks or steep riverbank cliffs; lakeshore bluffs of easily crumbled sand or gravel; gravel pits, road-cuts, grassland or cultivated fields that are close to water	BSC et al. 2008	Bank habitat present. However, no nest holes observed in bank habitat on-site

Scientific Name	Common Name	SRANK[1]	COSSARO[2]	COSEWIC[3]	SARA Schedule[4]	Habitat Preference[5,6,7]	Background Source	Suitable Habitats within Study Area
Hirundo rustica	Barn Swallow	S4B	THR	T		farmlands or rural areas; cliffs, caves, rock niches; buildings or other man-made structures for nesting; open country near body of water	BSC et al. 2008; MNRF 2016	Suitable nesting structures and adjacent foraging habitat present. However, remnant nests not observed on existing structures
Chlidonias niger	Black Tern	S3B	SC	NAR		wetlands, coastal or inland marshes; large cattail marshes, marshy edges of rivers, lakes or ponds, wet open fens, wet meadows; returns to same area to nest each year in loose colonies; must have shallow (0.5 to 1 m deep) water and areas of open water near nests; requires marshes >20 ha in size; feeds over adjacent grasslands	MNRF 2016	No
Dolichonyx oryzivorus	Bobolink	S4B	THR	T		large, open expansive grasslands with dense ground cover; hayfields, meadows or fallow fields; marshes;	BSC et al. 2008; MNRF 2016	No
Chaetura pelagica	Chimney Swift	S4B, S4N	THR	T		commonly found in urban areas near buildings; nests in hollow trees, crevices of rock cliffs, chimneys; highly gregarious; feeds over open water	BSC et al. 2008	No
Sturnella magna	Eastern Meadowlark	S4B	THR	T		open, grassy meadows, farmland, pastures, hayfields or grasslands with elevated singing perches; cultivated land and weedy areas with trees; old orchards with adjacent, open grassy areas >10 ha in size	BSC et al. 2008; MNRF 2016	Yes
Contopus virens	Eastern Wood-Pewee	S4B	SC	SC		open, deciduous, mixed or coniferous forest; predominated by oak with little understory; forest clearings, edges; farm woodlots, parks	BSC et al. 2008	Not within subject property; suitable habitat present in adjacent FOD5-7 and fringing CUP3-2
Ammodramus henslowii	Henslow's Sparrow	SHB	END	E	Schedule 1	large, fallow, grassy area with ground mat of dead vegetation, dense herbaceous vegetation, ground litter and some song perches; neglected weedy fields; wet meadows; cultivated uplands; a moderate amount of moisture needed; requires a minimum tract of grassland of 40 ha, but usually in areas >100 ha	MNRF 2016	No

Scientific Name	Common Name	SRANK[1]	COSSARO[2]	COSEWIC[3]	SARA Schedule[4]	Habitat Preference[5,6,7]	Background Source	Suitable Habitats within Study Area
Lanius ludovicianus	Loggerhead Shrike	S2B	END	E	Schedule 1	Grazed pasture, marginal farmland with scattered hawthorn shrubs, hedgerows; fence posts, wires and associated low-lying wetland; located on core areas of limestone plain adjacent to Canadian Shield; greatest threat is fragmentation of suitable habitat due to natural succession; probably needs at least 25 ha of suitable habitat.	MNRF 2016	No
Melanerpes erythrocephalus	Red-headed Woodpecker	S4B	SC	T	Schedule 1	open, deciduous forest with little understory; fields or pasture lands with scattered large trees; wooded swamps; orchards, small woodlots or forest edges; groves of dead or dying trees; feeds on insects and stores nuts or acorns for winter; loss of habitat is limiting factor; requires cavity trees with at least 40 cm dbh; require about 4 ha for a territory	BSC et al. 2008	No
Asio flammeus	Short-eared Owl	S2N, S4B	SC	SC	Schedule 3	grasslands, open areas or meadows that are grassy or bushy; marshes, bogs or tundra; both diurnal and nocturnal habits; ground nester; destruction of wetlands by drainage for agriculture is an important factor in the decline of this species; home range 25 - 125 ha; requires 75-100 ha of contiguous open habitat	MNRF 2016	No
Hylocichla mustelina	Wood Thrush	S4B	SC	T		undisturbed moist mature deciduous or mixed forest with deciduous sapling growth; near pond or swamp; hardwood forest edges; must have some trees higher than 12 m	BSC et al. 2008	Not within subject property; suitable habitat present in adjacent FOD5-7
Icteria virens	Yellow-breasted Chat	S2B	END	E	Schedule 1	thickets, tall tangles of shrubbery beside streams, ponds; requires tracts of grassland >50 ha overgrown bushy clearings with deciduous thickets; nests above ground in bush, vines etc.	MNRF 2016	No
Herpetofauna								
Emydoidea blandingii	Blanding's Turtle (*Great Lakes/St Lawrence pop.*)	S3	THR	T		shallow water marshes, bogs, ponds or swamps, or coves in larger lakes with soft muddy bottoms and aquatic vegetation; basks on logs, stumps, or banks	Ontario Nature 2015; MNRF 2016	Yes. However, Blanding's Turtle not known to occur in the surrounding vicinity based on MNRF input.

Scientific Name	Common Name	SRANK[1]	COSSARO[2]	COSEWIC[3]	SARA Schedule[4]	Habitat Preference[5,6,7]	Background Source	Suitable Habitats within Study Area
Thamnophis butleri	Butler's Gartersnake	S2	END	E	Schedule 1	wet meadows, pastures, margins of marshes and streams, and open country	MNRF 2016	No
Thamnophis sauritus septentrionalis	Eastern Ribbonsnake	S3	SC	SC		sunny grassy areas with low dense vegetation near bodies of shallow permanent quiet water; wet meadows, grassy marshes or sphagnum bogs; borders of ponds, lakes or streams	MNRF 2016	Yes. Habitat significance is addressed under the Snake Hibernaculum SWH criteria.
Ambystoma jeffersonianum	Jefferson Salamander	S2	END	E		damp shady deciduous forest, swamps, moist pasture, lakeshores; temporary woodland pools for breeding; hides under leaf litter, stones or in decomposing logs	MNRF 2016	No
Graptemys geographica	Northern Map Turtle	S3	SC	SC	Schedule 1	large bodies of water with soft bottoms, and aquatic vegetation; basks on logs or rocks or on beaches and grassy edges, will bask in groups; uses soft soil or clean dry sand for nest sites; may nest at some distance from water; home range size is larger for females (about 70 ha) than males (about 30 ha) and includes hibernation, basking, nesting and feeding areas; aquatic corridors (e.g. stream) are required for movement	MNRF 2016	No
Chelydra serpentina serpentina	Snapping Turtle	S3	SC	SC		permanent, semi-permanent fresh water; marshes, swamps or bogs; rivers and streams with soft muddy banks or bottoms; often uses soft soil or clean dry sand on south-facing slopes for nest sites	Ontario Nature 2015; MNRF 2016	Yes. Habitat significance is addressed under the Turtle Wintering Habitat and Turtle Nesting Areas SWH criteria.
Pseudacris triseriata pop. 2	Western Chorus Frog *(Great Lakes/St. Lawrence - Canadian Shield Pop.)*	S3	NAR	T		roadside ditches or temporary ponds in fields; swamps or wet meadows; woodland or open country with cover and moisture; small ponds and temporary pools	Ontario Nature 2015	Yes. Habitat significance is addressed under the Amphibian Breeding Habitat (Woodlands) SWH criteria.
Mammals								
Myotis lucifuga	Little Brown Myotis	S3?	END	E		uses caves, quarries, tunnels, hollow trees or buildings for roosting; winters in humid caves; maternity sites in dark warm areas such as attics and barns; feeds primarily in wetlands, forest edges	Environment Canada 2015	Limited habitat potential within the property. More likely to occur within adjacent FOD5-7 community.

Scientific Name	Common Name	SRANK[1]	COSSARO[2]	COSEWIC[3]	SARA Schedule[4]	Habitat Preference[5,6,7]	Background Source	Suitable Habitats within Study Area
Myotis septentrionalis	Northern Myotis	S3	END	E		hibernates during winter in mines or caves; roosts in houses, manmade structures but prefers hollow trees or under loose bark; hunts within forests, below canopy	Environment Canada 2015	Limited habitat potential within the property. More likely to occur within adjacent FOD5-7 community.
Perimyotis subflavus	Tri-colored Bat	S3?	END	E	Schedule 1	Open woods near water; roosts in trees, cliff crevices, buildings or caves; hibernates in damp, draft-free warm caves, mines or rock crevices	Environment Canada 2015	Limited habitat potential within the property. More likely to occur within adjacent FOD5-7 community.
Insects								
Bombus affinis	Rusty-patched Bumblebee	S1	END	E	Schedule 1	can be found in open habitat such as mixed farmland, urban settings, savannah, open woods and sand dunes	MNRF 2016	No
Fish								
Moxostoma duquesnei	Black Redhorse	S2	THR	T		lives in pools and riffle areas of medium-sized rivers and streams that are usually less than two metres deep	MNRF 2015; MNRF 2016	No. No SAR known from the watercourse according to DFO SAR mapping
Clinostomus elongatus	Redside Dace	S2	END	E	Schedule 3	Prefers small, quite pools in coolwater streams.	MNRF 2016	No. No SAR known from the watercourse according to DFO SAR mapping
Notropis photogenis	Silver Shiner	S2S3	THR	T	Schedule 3	prefer moderate to large size streams with swift currents that are free of weeds and have clean gravel or boulder bottoms	MNRF 2016	No. No SAR known from the watercourse according to DFO SAR mapping
Molluscs								
Lampsilis fasciola	Wavy-rayed Lampmussel	S1	THR	SC	Schedule 1	small to medium rivers with clear water; shallow riffle areas with clean gravel or sand bottoms	MNRF 2016	No. No SAR known from the watercourse according to DFO SAR mapping

[1]MNRF 2015a; [2]MNRF 2016b; [3]COSEWIC 2016; [4]Government of Canada 2017; [5]OMNR 2000; [6]MNRF 2014b; [7]Michigan Flora Online 2016

LEGEND
SRANK
S1 Critically Imperiled
S2 Imperiled
S3 Vulnerable
S4 Apparently Secure
S5 Secure
SNA Unranked
B Breeding
N Non-breeding
S#? Rank Uncertain
COSSARO/COSEWIC
END/E Endangered
THR/T Threatened
SC/SC Special Concern

Scientific Name	Common Name	SRANK[1]	COSSARO[2]	COSEWIC[3]	SARA Schedule[4]	Habitat Preference[5,6,7]	Background Source	Suitable Habitats within Study Area

NAR Not at Risk
SARA Schedule
Schedule 1 Officially Protected under SARA
Schedule 3 Special concern; may be reassessed for consideration for inclusion to Schedule 1
Region of Waterloo Status
R Rare
R+ Most populations considered to be anthropogenic
R* rare, but further study may prove otherwise
C Common
√ Significant
√* Significant when nesting in natural circumstances
UC Uncommon
VC Very Common

APPENDIX III
Significant Wildlife Habitat Screening

Significant Wildlife Habitat Assessment Tables

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Waterfowl Stopover and Staging Areas (Terrestrial)					
Rationale: Habitat important to migrating waterfowl.	American Black Duck Wood Duck Green-winged Teal Blue-winged Teal Mallard Northern Pintail Northern Shoveler American Wigeon Gadwall	CUM1 CUT1 - Plus evidence of annual spring flooding from melt water or run-off within these Ecosites.	Fields with sheet water during Spring (mid March to May). • Fields flooding during spring melt and run-off provide important invertebrate foraging habitat for migrating waterfowl. • Agricultural fields with waste grains are commonly used by waterfowl, these are not considered SWH unless they have spring sheet water available[cxlviii]. Information Sources • Anecdotal information from the landowner, adjacent landowners or local naturalist clubs may be good information in determining occurrence. • Reports and other information available from Conservation Authorities (CAs) • Sites documented through waterfowl planning processes (eg. EHJV implementation plan) • Field Naturalist Clubs • Ducks Unlimited Canada • Natural Heritage Information Centre (NHIC) Waterfowl Concentration Area	Studies carried out and verified presence of an annual concentration of any listed species, evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • Any mixed species aggregations of 100 or more individuals required. • The area of the flooded field ecosite habitat plus a 100-300m radius buffer dependent on local site conditions and adjacent land use is the significant wildlife habitat[cxlviii]. • Annual use of habitat is documented from information sources or field studies (annual use can be based on studies or determined by past surveys with species numbers and dates). • SWHMiST[cxlix] Index #7 provides development effects and mitigation measures.	No evidence of seasonal flooding was observed during the mid-March site visit. **Not SWH**
Wildlife Habitat: Waterfowl Stopover and Staging Areas (Aquatic)					
Rationale: 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 eco-district.	Canada Goose Cackling Goose Snow Goose American Black Duck Northern Pintail Northern Shoveler American Wigeon Gadwall Green-winged Teal Blue-winged Teal Hooded Merganser Common Merganser Lesser Scaup Greater Scaup Long-tailed Duck Surf Scoter White-winged Scoter Black Scoter Ring-necked Duck Common Goldeneye Bufflehead Redhead Ruddy Duck Red-breasted Merganser Brant Canvasback	MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 SWD1 SWD2 SWD3 SWD4 SWD5 SWD6 SWD7	• Ponds, marshes, lakes, bays, coastal inlets, and watercourses used during migration. Sewage treatment ponds and storm water ponds do not qualify as a SWH, however a reservoir managed as a large wetland or pond/lake does qualify. • These habitats have an abundant food supply (mostly aquatic invertebrates and vegetation in shallow water). Information Sources • Environment Canada • Naturalist clubs often are aware of staging/stopover areas. • OMNRF Wetland Evaluations indicate presence of locally and regionally significant waterfowl staging. • Sites documented through waterfowl planning processes (eg. EHJV implementation plan) • Ducks Unlimited projects • Element occurrence specification by Nature Serve: http://www.natureserve.org • Natural Heritage Information Centre (NHIC) Waterfowl Concentration Area	Studies carried out and verified presence of: • Aggregations of 100[l] or more of listed species for 7 days[l], results in > 700 waterfowl use days. • Areas with annual staging of ruddy ducks, canvasbacks, and redheads are SWH[cxlix] • The combined area of the ELC ecosites and a 100m radius area is the SWH[cxlviii] • Wetland area and shorelines associated with sites identified within the SWHTG[cxlviii] Appendix K[cxlix] are significant wildlife habitat. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • Annual Use of Habitat is Documented from Information Sources or Field Studies (Annual can be based on completed studies or determined from past surveys with species numbers and dates recorded). • SWHMiST[cxlix] Index #7 provides development effects and mitigation measures.	Suitable habitat not present within the subject property. **Not SWH**

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Shorebird Migratory Stopover Area					
Rationale: High quality shorebird stopover habitat is extremely rare and typically has a long history of use.	Greater Yellowlegs Lesser Yellowlegs Marbled Godwit Hudsonian Godwit Black-bellied Plover American Golden-Plover Semipalmated Plover Solitary Sandpiper Spotted Sandpiper Semipalmated Sandpiper Pectoral Sandpiper White-rumped Sandpiper Baird's Sandpiper Least Sandpiper Purple Sandpiper Stilt Sandpiper Short-billed Dowitcher Red-necked Phalarope Whimbrel Ruddy Turnstone Sanderling Dunlin Whimbrel	BBO1 BBO2 BBS1 BBS2 BBT1 BBT2 SDO1 SDS2 SDT1 MAM1 MAM2 MAM3 MAM4 MAM5	Shorelines of lakes, rivers and wetlands, including beach areas, bars and seasonally flooded, muddy and un-vegetated shoreline habitats. Great Lakes coastal shorelines, including groynes and other forms of armour rock lakeshores, are extremely important for migratory shorebirds in May to mid-June and early July to October. Sewage treatment ponds and storm water ponds do not qualify as a SWH. Information Sources • Western hemisphere shorebird reserve network. • Canadian Wildlife Service (CWS) Ontario Shorebird Survey. • Bird Studies Canada • Ontario Nature • Local birders and naturalist clubs • Natural Heritage Information Center (NHIC) Shorebird Migratory Concentration Area	Studies confirming: • Presence of 3 or more of listed species and > 1000 shorebird use days during spring or fall migration period. (shorebird use days are the accumulated number of shorebirds counted per day over the course of the fall or spring migration period) • Whimbrel stop briefly (<24hrs) during spring migration, any site with >100 Whimbrel used for 3 years or more is significant. • The area of significant shorebird habitat includes the mapped ELC shoreline ecosites plus a 100m radius area[cxlviii] • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWHMiST[cxlix] Index #8 provides development effects and mitigation measures.	Suitable habitat not present within the subject property. **Not SWH**
Wildlife Habitat: Raptor Wintering Area					
Rational: Sites used by multiple species, a high number of individuals and used annually are most significant	Rough-legged Hawk Red-tailed Hawk Northern Harrier American Kestrel Snowy Owl Special Concern: Short-eared Owl Bald Eagle	Hawks/Owls: Combination of ELC Community Series; need to have present one Community Series from each land class: Forest: FOD, FOM, FOC Upland: CUM, CUT, CUS, CUW	The habitat provides a combination of fields and woodlands that provide roosting, foraging and resting habitats for wintering raptors. Raptor wintering sites need to be > 20 ha[cxlviii, cxlix] with a combination of forest and upland.[xvi, xvii, xviii, xix, xx, xxi]. Least disturbed sites, idle/fallow or lightly grazed field/meadow (>15ha) with adjacent woodlands[cxlix] Field area of the habitat is to be wind swept with limited snow depth or accumulation. Eagle sites have open water, large trees and snags available for roosting Information Sources • OMNRF Ecologist or Biologist • Field Natural Clubs • Natural Heritage Information Center (NHIC) Raptor Winter Concentration Area • Data from Bird Studies Canada • Reports and other information available from Conservation Authorities CAs.	Studies confirm the use of these habitats by: • One or more Short-eared Owls or; One or more Bald Eagles or; At least 10 individuals and two listed hawk/owl species • To be significant a site must be used regularly (3 in 5 years)[cxlix] for a minimum of 20 days by the above number of birds • The habitat area for an Eagle winter site is the shoreline forest ecosites directly adjacent to the prime hunting area • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWHMiST[cxlix] Index #10 and #11 provides development effects and mitigation measures.	Woodland and meadow areas of suitable size are not present on the subject property. **Not SWH**

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Bat Hibernacula					
Rationale Bat hibernacula are rare habitats in Ontario landscapes.	Big Brown Bat Tri-coloured Bat	Bat Hibernacula may be found in these ecosites: CCR1 CCR2 CCA1 CCA2 (Note: buildings are not considered to be SWH)	• Hibernacula may be found in caves, mine shafts, underground foundations and Karsts. • Active mine sites should not be considered as SWH • The locations of bat hibernacula are relatively poorly known. Information Sources • OMNRF for possible locations and contact for local experts • Natural Heritage Information Center (NHIC) Bat Hibernaculum • Ministry of Northern Development and Mines for location of mine shafts. • Clubs that explore caves (eg. Sierra Club) • University Biology Departments with bat experts.	• All sites with confirmed hibernating bats are SWH. • The habitat area includes a 200m radius around the entrance of the hibernaculum[cxlviii, ccvii] for most. • Studies are to be conducted during the peak swarming period (Aug. – Sept.). Surveys should be conducted following methods outlined in the "Bats and Bat Habitats: Guidelines for Wind Power Projects"[ccv] • SWHMiST[cxlix] Index #1 provides development effects and mitigation measures.	Suitable habitat not present within the subject property. **Not SWH**
Wildlife Habitat: Bat Maternity Colonies					

Rationale:
Known locations of forested bat maternity colonies is 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
			Maternity colonies can be found in tree cavities, vegetation and often in buildings[xxii, xxv, xxvi, xxvii, xxxi] (buildings are not considered to be SWH).
			• Maternity roosts are not found in caves and mines in Ontario[xxii]
			• Maternity colonies located in Mature deciduous or mixed forest stands[ccix, ccx] with >10/ha large diameter (>25cm dbh) wildlife trees[ccvii]
			• Female Bats prefer wildlife tree (snags) in early stages of decay, class 1-3[ccxiv] or class 1 or 2[ccxii]
			• 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[ccx]
			
			Information Sources
			• OMNRF for possible locations and contact for local experts
			• University Biology Departments with bat experts.
				• Maternity Colonies with confirmed use by:
				  • >10 Big Brown Bats
				  • >5 Adult Female Silver-haired Bats
				• The area of the habitat includes the entire woodland or a forest stand ELC Ecosite or an Ecoelement containing the maternity colonies.
				• Evaluation methods for maternity colonies should be conducted following methods outlined in the "Bats and Bat Habitats: Guidelines for wind Power Projects[ccv]
				• SWHMiS T[cxlix] Index #12 provides development effects and mitigation measures.
					Suitable habitat not present within the subject property.
					
					Not SWH

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Bat Migratory Stopover Area					
	Hoary Bat Eastern Red Bat Silver-haired Bat	No specified ELC types.	Long distance migratory bats typically migrate during late summer and early fall from summer breeding habitats throughout Ontario to southern wintering areas. Their annual fall migrations concentrate these species of bats at stopover areas. The location and characteristics of stopover habitats are generally unknown. Information Sources • OMNR for possible locations and contact for local experts • University of Waterloo, Biology Department	Long Point has been identified as a significant stopover habitat for fall migrating Silver-haired Bats, due to significant increases in abundance, activity and feeding that was documented during fall migration[ccxv] • The confirmation criteria and habitat areas for this SWH are still being determined. • SWHDSS[cxlix] Index #38 provides development effects and mitigation measures	Suitable habitat not present within the subject property. **Not SWH**
Wildlife Habitat: Turtle Wintering Area					
Rationale: Generally sites are the only known sites in the area. Sites with the highest number of individuals are most significant	Midland Painted Turtle Special Concern: Northern Map Turtle Snapping Turtle	Snapping and Midland Painted Turtles - ELC Community Classes: SW, MA, OA and SA; ELC Community Series: FEO and BOO Northern Map Turtle - Open Water areas such as deeper rivers or streams and lakes with current can also be used as over-wintering habitat.	For most turtles, wintering areas are in the same general area as their core habitat. Water has to be deep enough not to freeze and have soft mud substrates. • Over-wintering sites are permanent water bodies, large wetlands, and bogs or fens with adequate Dissolved Oxygen[cix, cx, cxi, cxviii]. • Man-made ponds such as sewage lagoons or storm water ponds should not be considered SWH. Information Sources • EIS studies carried out by Conservation Authorities. • Local field naturalists and experts, as well as university herpetologists may also know where to find some of these sites. • OMNRF ecologist or biologist • Natural Heritage Information Center (NHIC)	• Presence of 5 over-wintering Midland Painted Turtles is significant. • One or more Northern Map Turtle or Snapping Turtle over-wintering within a wetland is significant. • 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. • 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] • Congregation of turtles is more common where wintering areas are limited and therefore significant[cix, cx, cxi, cxii]. • SWHMiST[cxlix] Index #28 provides development effects and mitigation measures for turtle wintering habitat.	Potential turtle overwintering habitat is limited to Swan Creek wherever suitably deep pools may occur. **Candidate SWH**

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Snake Hibernaculum					
Rationale: Generally sites are the only known sites in the area. Sites with the highest number of individuals are most significant	Snakes: Eastern Gartersnake Northern Watersnake Northern Red-bellied Snake Northern Brownsnake Smooth Green Snake Northern Ring-necked Snake Special Concern: Milksnake Eastern Ribbonsnake Lizard: Special Concern (Southern Shield population): Five-lined Skink	For all snakes, habitat may be found in any ecosite other than very wet ones. Talus, Rock Barren, Crevice and Cave, and Alvar sites may be directly related to these habitats. Observations of congregations of snakes on sunny warm days in the spring or fall is a good indicator. For Five-lined Skink, ELC Community Series of FOD and FOM and Ecosites: FOC1 FOC3	• For snakes, hibernation takes place in sites located below frost lines in burrows, rock crevices and other natural locations. The existence of features that go below the frost line; such as rock piles or slopes, old stone fences, and abandoned crumbling foundations assist in identifying candidate SWH. • Areas of broken and fissured rock are particularly valuable since they provide access to subterranean sites below the frost line[xliv, l, li, lii, cxii.] • 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. • Five-lined skink prefer mixed forests with rock outcrop openings providing cover rock overlaying granite bedrock with fissures cciii. Information Sources • In spring, local residents or landowners may have observed the emergence of snakes on their property (e.g. old dug wells). • Reports and other information from CAs. • Local Field naturalists and experts, as well as university herpetologists may also know where to find some of these sites. clubs • Natural Heritage Information Center (NHIC) • OMNRF ecologist or biologist may be aware of locations of wintering skinks	Studies confirming: • Presence of snake hibernacula used by a minimum of five individuals of a snake sp. or; individuals of two or more snake spp. • Congregations of a minimum of five individuals of a snake sp. or; individuals of two or more snake spp. near potential hibernacula (eg. foundation or rocky slope) on sunny warm days in Spring (Apr/May) and Fall (Sept/Oct). • Note: If there are Special Concern Species present, then site is SWH • Note: 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 30m buffer is the SWH[i] • SWHMiST[cxlix] Index #13 provides development effects and mitigation measures for snake hibernacula. • Presence of any active hibernaculum for skink is significant. • SWHMiST[cxlix] Index #37 provides development effects and mitigation measures for five-lined skink wintering habitat.	Potential snake hibernaculum habitat on the property is primarily associated with the old/remnant aggregate pit walls and the floodplain slope that are located within the Mineral Cultural Meadow (CUM1) community. Potential for hibernaculum occurrence is highest in south-facing slope areas where there are exposed rocky areas. Surrounding snake foraging habitat is abundant in the surrounding meadow areas. **Candidate SWH**
Wildlife Habitat: Colonially - Nesting Bird Breeding Habitat (Bank and Cliff)					
Rationale: 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 are declining in Ontario.	Cliff Swallow Northern Rough-winged Swallow (this species is not colonial but can be found in Cliff Swallow colonies)	Eroding banks, sandy hills, borrow pits, steep slopes, and sand piles Cliff faces, bridge abutments, silos, barns Habitat found in the following ecosites: CUM1 CUT1 CUS1 BLO1 BLS1 BLT1 CLO1 CLS1 CLT1	• Any site or areas with exposed soil banks, undisturbed or naturally eroding that is not a licensed/permitted aggregate area. • Does not include man-made structures (bridges or buildings) or recently (2 years) disturbed soil areas, such as berms, embankments, soil or aggregate stockpiles. • Does not include a licensed/permitted Mineral Aggregate Operation. Information Sources • Reports and other information available from CAs • Ontario Breeding Bird Atlas [ccv] • Bird Studies Canada; *NatureCounts* http://www.birdscanada.org/birdmon/ • Field Naturalist clubs	Studies confirming: • Presence of 1 or more nesting sites with 8[cxlvix] or more cliff swallow pairs and/or rough-winged swallow pairs during the breeding season. • A colony identified as SWH will include a 50m radius habitat area from the peripheral nests[ccvii] • Field surveys to observe and count swallow nests are to be completed during the breeding season Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWHMiST[cxlix] Index #4 provides development effects and mitigation measures	Banks and slopes occur on the subject property, associated with the floodplain and old/remnant aggregate pit walls. No evidence of nest holes were observed along the slope walls. **Not SWH**

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Colonially - Nesting Bird Breeding Habitat (Tree/Shrubs)					
Rationale: Large Colonies are important to local bird population, typically sites are only known colony in area and are used annually.	Great Blue Heron Black-crowned Night-heron Great Egret Green Heron	SWM2 SWM3 SWM5 SWM6 SWD1 SWD2 SWD3 SWD4 SWD5 SWD6 SWD7 FET1	• Nests in live or dead standing trees in wetlands, lakes, islands, and peninsulas. Shrubs and occasionally emergent vegetation may also be used. • Most nests in trees are 11 to 15m from ground, near the top of the tree. Information Sources • Ontario Breeding Bird Atlas[ccv], colonial nest records. • Ontario Heronry Inventory 1991 available from Bird Studies Canada or NHIC (OMNR). • NHIC Mixed Wader Nesting Colony • Aerial photographs can help identify large heronries • Reports and other information available from CAs • MNRF District Offices • Local naturalist clubs	Studies confirming: • Presence of 5[l] or more active nests of Great Blue Heron or other listed species. • The habitat extends from the edge of the colony and a minimum 300m radius or extent of the Forest Ecosite containing the colony or any island <15.0ha with a colony is the SWH [cc, ccvii] • Confirmation of active heronries are to be achieved through site visits conducted during the nesting season (April to August) or by evidence such as the presence of fresh guano, dead young and/or eggshells • SWHMiST[cxlix] Index #5 provides development effects and mitigation measures.	Suitable habitat not present within the subject property. **Not SWH**
Wildlife Habitat: Colonially - Nesting Bird Breeding Habitat (Ground)					
Rationale: Colonies are important to local bird populations, typically sites are only known colony in area and are used annually.	Herring Gull Great Black-backed Gull Little Gull Ring-billed Gull Common Tern Caspian Tern Brewer's Blackbird	Any rocky island or peninsula (natural or artificial) within a lake or large river (two-lined on a 1:50,000 NTS map). Close proximity to watercourses in open fields or pastures with scattered trees or shrubs (Brewer's Blackbird) MAM1 – 6 MAS1 – 3 CUM CUT CUS	• Nesting colonies of gulls and terns are on islands or peninsulas associated with open water or in marshy areas. • Brewers Blackbird colonies are found loosely on the ground in or in low bushes in close proximity to streams and irrigation ditches within farmlands. Information Sources • Ontario Breeding Bird Atlas[ccv], rare/colonial species records. • Canadian Wildlife Service • Reports and other information available from CAs • Natural Heritage Information Center (NHIC) Colonial Waterbird Nesting Area • MNRF District Offices • Field naturalist clubs	Studies confirming: • Presence of >25 active nests for Herring Gulls or Ring-billed Gulls, >5 active nests for Common Tern or >2 active nests for Caspian Tern[l]. • Presence of 5 or more pairs for Brewer's Blackbird. • Any active nesting colony of one or more Little Gull, and Great Black-backed Gull is significant. • The edge of the colony and a minimum 150m area of habitat, or the extent of the ELC ecosites containing the colony or any island <3.0ha with a colony is the SWH[cc, ccvii] • Studies would be done during May/June when actively nesting. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWHMiST[cxlix] Index #6 provides development effects and mitigation measures.	Suitable habitat not present within the subject property. Brewer's Blackbird not known to breed in the subject property vicinity based on the Ontario Breeding Bird Atlas (BSC et al. 2008). **Not SWH**

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Migratory Butterfly Stopover Areas					
Rationale: Butterfly stopovers areas are extremely rare habitats and are biologically important for butterfly species that migrate south for the winter.	Painted Lady Red Admiral Special Concern: Monarch	Combination of ELC Community Series: Need to have present one Community Series from each landclass: Field: CUM CUS CUT Forest: FOC FOM FOD CUP Anecdotally, a candidate sight for butterfly stopover will have a history of butterflies being observed.	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 Ontario[cxlix]. • 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.] • The habitat should not be disturbed, fields/meadows with an abundance of preferred nectar plants and woodland edge providing shelter are requirements for this habitat cxlviii, cxlix. • 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.] Information Sources • OMNRF (NHIC) • Agriculture Canada in Ottawa may have list of butterfly experts. • Field Naturalist Clubs • Toronto Entomologists Association • Conservation Authorities	Studies 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/day[xxxvii], significant variation can occur between years and multiple years of sampling should occur [xl, xlii]. • Observational studies are to be completed and need to be done frequently during the migration period to estimate MUD • MUD of >5000 or >3000 with the presence of Painted Ladies or Red Admiral's is to be considered significant. • SWHMiST[cxlix] Index #16 provides development effects and mitigation measures.	The subject property is not located within 5km of Lake Ontario. **Not SWH**
Wildlife Habitat: Landbird Migratory Stopover Areas					
Rationale: Sites with a high diversity of species as well as high number are most significant	All migratory songbirds. Canadian Wildlife Service Ontario website: http://www.on.ec.gc.ca/wildlife_e.html All migrant raptors species: Ontario Ministry of Natural Resources: Fish and Wildlife Conservation Act, 1997. Schedule 7: Specially Protected Birds (Raptors)	All Ecosites associated with these ELC Community Series: FOC FOM FOD SWC SWM SWD	Woodlots need to be >10 ha[i] in size and within 5km [iv, v, vi, vii, viii, ix, x, xi, xii, xiii, xiv, xv] of Lake Ontario. • If multiple woodlands are located along the shoreline, those woodlands <2km from Lake Ontario are more significant[cxlix] • Sites have a variety of habitats; forest, grassland and wetland complexes[cxlix]. • The largest sites are more significant[cxlix] • Woodlots and forest fragments are important habitats to migrating birds[ccxviii], these features located along the shore and located within 5km of Lake Ontario are Candidate SWH[cxlviii]. Information Sources • Bird Studies Canada • Ontario Nature • Local birders and naturalist club • Ontario Important Bird Areas (IBA) Program	Studies confirm: • Use of the woodlot by >200 birds/day and with >35 spp. with at least 10 bird spp. recorded on at least 5 different survey dates. This abundance and diversity of migrant bird species is considered above average and significant. • Studies should be completed during spring (Apr/May) and fall (Aug/Oct) migration using standardized assessment techniques. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxl] • SWHMiST[cxlix] Index #9 provides development effects and mitigation measures.	The subject property is not located within 5km of Lake Ontario. **Not SWH**

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Deer Yarding Areas					
Rationale: Winter habitat for deer is considered to be the main factor for northern deer populations. In winter, deer congregate in "yards" to survive severe winter conditions. Deer yards typically have a long history of annual use by deer, yards typically represent 10-15% of an areas summer range.	White-tailed Deer	Note: OMNRF to determine this habitat. ELC Community Series providing a thermal cover component for a deer yard would include: FOM, FOC, SWM and SWC. Or these ELC Ecosites: CUP2 CUP3 FOD3 CUT	• Deer yarding areas or winter concentration areas (yards) are areas deer move to in response to the onset of winter snow and cold. This is a behavioural response and deer will establish traditional use areas. The yard is composed of two areas referred to as Stratum I and Stratum II. Stratum II covers the entire winter yard area and is usually a mixed or deciduous forest with plenty of browse available for food. Agricultural lands can also be included in this area. Deer move to these areas in early winter and generally, when snow depths reach 20cm, most of the deer will have moved here. If the snow is light and fluffy, deer may continue to use this area until 30cm snow depth. In mild winters, deer may remain in the Stratum II area the entire winter. • The Core of a deer yard (Stratum I) is located within the Stratum II area and is critical for deer survival in areas where winters become severe. It is primarily composed of coniferous trees (pine, hemlock, cedar, spruce) with a canopy cover of more than 60%[cxciv]. • OMNRF determines deer yards following methods outlined in "Selected Wildlife and Habitat Features: Inventory Manual"[cxcv] • Woodlots with high densities of deer due to artificial feeding are not significant.	No Studies Required: • Snow depth and temperature are the greatest influence on deer use of winter yards. Snow depths > 40cm for more than 60 days in a typically winter are minimum criteria for a deer yard to be considered as SWH[lvi, lvii, lviii, lix, lx, i]. • Deer Yards are mapped by OMNRF District offices. Locations of Core or Stratum 1 and Stratum 2 Deer yards considered significant by OMNRF will be available at local MNRF offices or via Land Information Ontario (LIO). • Field investigations that record deer tracks in winter are done to confirm use (best done from an aircraft). Preferably, this is done over a series of winters to establish the boundary of the Stratum I and Stratum II yard in an "average" winter. MNRF will complete these field investigations[cxcv]. • 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. • SWHMiST[cxlix] Index #2 provides development effects and mitigation measures.	Deer overwintering habitat has not been mapped within or adjacent to the subject property by the MNRF **Not SWH**
Wildlife Habitat: Deer Winter Congregation Areas					
Rationale: 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 50ha may also be used.	• Woodlots will typically be >100 ha in size. Woodlots <100ha may be considered as significant based on MNRF studies or assessment. • Deer movement during winter in the southern areas of Eco-region 6E are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands[cxlviii]. • If deer are constrained by snow depth refer to the Deer Yarding Area habitat within Table 1.1 of this Schedule. • Large woodlots > 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]. • Woodlots with high densities of deer due to artificial feeding are not significant. Information Sources • MNRF District Offices • LIO/NRVIS	Studies confirm: • Deer management is an MNRF responsibility, deer winter congregation areas considered significant will be mapped by MNRF[cxlviii]. • 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 MNR[i]. • Studies should be completed during winter (Jan/Feb) when >20cm of snow is on the ground using aerial survey techniques[ccxxiv], ground or road surveys, or a pellet count deer density survey[ccxxv]. • If a SWH is determined for Deer Wintering Area of 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. • SWHMiST[cxlix] Index #2 provides development effects and mitigation measures.	Deer overwintering habitat has not been mapped within or adjacent to the subject property by the MNRF **Not SWH**

Significant Wildlife Habitat Assessment Tables

Table 2. Characteristics of Rare Vegetation Communities for Ecoregion 6E.

Rare Vegetation Community[1]	Candidate SWH			Confirmed SWH	Study Area
	ELC Ecosite Codes[1]	Habitat Description[1]	Detailed Information and Sources[1]	Defining Criteria[1]	Assessment Details
Cliff and Talus Slopes					
Rationale: Cliffs and Talus Slopes are extremely rare habitats in Ontario.	Any ELC Ecosite within Community Series: TAO CLO TAS CLS TAT CLT	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.	Most cliff and talus slopes occur along the Niagara Escarpment. Information Sources • The Niagara Escarpment Commission has detailed information on location of these habitats. • OMNRF District • Natural Heritage Information Center (NHIC) has location information on their website • Local naturalist clubs • Conservation Authorities	• Confirm any ELC Vegetation Type for Cliffs or Talus Slopes[lxxviii] • SWHMiST[cxlix] Index #21 provides development effects and mitigation measures.	Vegetation community not present within the subject property. **Not SWH**
Sand Barrens					
Rationale: Sand barrens are rare in Ontario and support rare species. Most Sand Barrens have been lost due to cottage development and forestry.	ELC Ecosites: 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, 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 savannah. Vegetation can vary from patchy and barren to tree covered but less than 60%.	Any sand barren area, >0.5ha in size. Information Sources • OMNRF Districts. • Natural Heritage Information Center (NHIC) has location information on their website • Field naturalist clubs • Conservation Authorities	• Confirm any ELC Vegetation Type for Sand Barrens[lxxviii] • Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics)[l]. • SWHMiST[cxlix] Index #20 provides development effects and mitigation measures.	Vegetation community not present within the subject property. **Not SWH**
Alvar					
Rationale: Alvars are extremely rare habitats in Ecoregion 6E. Most alvars in Ontario are in Ecoregion 6E and 7E. Alvars in 6E are small and highly localized just north of the Palaeozoic-Precambrian contact.	ALO1 ALS1 ALT1 FOC1 FOC2 CUM2 CUS2 CUT2-1 CUW2 Five Alvar Indicator Species: 1) Carex crawei 2) Panicum philadelphicum 3) Eleochairs compressa 4) Scutellaria parvula 5) Trichostema branchiatum These indicator species are very specific to Alvars within Ecoregion 6E	An alvar is typically a level, mostly unfractured calcareous bedrock feature with a mosaic of rock pavements and bedrock overlain by a thin veneer of soil. The hydrology of alvars is complex, with alternating periods of inundation and drought. Vegetation cover varies from sparse lichen-moss associations to grasslands and shrublands and comprising a number of characteristic or indicator plant. Undisturbed alvars can be phyto- and zoo geographically diverse, supporting many uncommon or are relict plant and animals species. Vegetation cover varies from patchy to barren with a less than 60% tree cover[lxxviii].	An Alvar site > 0.5 ha in size[lxxv]. Information Sources • Alvars of Ontario (2000), Federation of Ontario Naturalists[lxxvi]. • Ontario Nature – Conserving Great Lakes Alvars[ccviii]. • Natural Heritage Information Center (NHIC) has location information on their website • Field Naturalist clubs • Conservation Authorities	Field studies identify four of the five Alvar indicator species[lxxv, cxlix] at a Candidate Alvar site is Significant. • Site must not be dominated by exotic or introduced species (<50% vegetative cover are exotics sp.). • The alvar must be in excellent condition and fit in with surrounding landscape with few conflicting land uses[lxxv]. • SWHMiST[cxlix] Index #17 provides development effects and mitigation measures.	Vegetation community not present within the subject property. **Not SWH**

Table 2. Characteristics of Rare Vegetation Communities for Ecoregion 6E.

Rare Vegetation Community[1]	Candidate SWH			Confirmed SWH	Study Area
	ELC Ecosite Codes[1]	Habitat Description[1]	Detailed Information and Sources[1]	Defining Criteria[1]	Assessment Details
Old Growth Forest					
Rationale: Due to historic logging practices, extensive old growth forest is rare in the Ecoregion. Interior habitat provided by old growth forests is required by many wildlife species.	Forest Community Series: FOD FOC FOM SWD SWC SWM	Old Growth forests are characterized by heavy mortality or turnover of over-storey trees resulting in a mosaic of gaps that encourage development of a multi-layered canopy and an abundance of snags and downed woody debris.	Woodland Stands areas 30ha or greater in size or with at least 10 ha interior habitat assuming 100m buffer at edge of forest Í. Information Sources • OMNRF Forest Resource Inventory mapping • OMNRF Forester, Ecologist or Biologist • Field Local naturalist clubs • Conservation Authorities • Sustainable Forestry License (SFL) companies will possibly know locations through field operations. • Municipal forestry departments	Field Studies will determine: • If dominant trees species of the ecosite are >140 years old, then stand is Significant Wildlife Habitat[cxlviii] • The stand will have experienced no recognizable forestry activities[cxlviii] • The area of Forest Ecosites combined to make up the stand is the SWH. • Determine ELC Vegetation Type for forest stand[lxxviii] • SWHDSS[cxlix] Index #23 provides development effects and mitigation measures.	Vegetation community not present within the subject property. **Not SWH**
Savannah					
Rationale: Savannahs are extremely rare habitats in Ontario.	TPS1 TPS2 TPW1 TPW2 CUS2	A Savannah is a tallgrass prairie habitat that has tree cover between 25 – 60%.	• No minimum size to site Site must be restored or a natural site. Remnant sites such as railway right of ways are not considered to be SWH. Information Sources • Natural Heritage Information Center (NHIC) has location information on their website • OMNRF Ecologists • Field naturalists clubs • Conservation Authorities	Field studies confirm one or more of the Savannah indicator species listed in[lxxv] Appendix N should be present. Note: Savannah plant spp. list from Ecoregion 6E should be used[cxlviii]. • Area of the ELC Ecosite is the SWH. • Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics sp.). • SWHMiST[cxlix] Index #18 provides development effects and mitigation measures.	Vegetation community not present within the subject property. **Not SWH**
Tallgrass Prairie					
Rationale: Tallgrass Prairies are extremely rare habitats in Ontario.	TPO1 TPO2	A Tallgrass Prairie has ground cover dominated by prairie grasses. An open Tallgrass Prairie habitat has < 25% tree cover.	• No minimum size to site Site must be restored or a natural site. Remnant sites such as railway right of ways are not considered to be SWH. Information Sources • OMNR Districts • Natural Heritage Information Center (NHIC) has location information available on their website • Field naturalists clubs • Conservation Authorities	Field studies confirm one or more of the Prairie indicator species listed in[lxxv] Appendix N should be present. Note: Prairie plant spp. list from Ecoregion 6E should be used[cxlviii]. • Area of the ELC Ecosite is the SWH • Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics). • SWHMiST[cxlix] Index #19 provides development effects and mitigation measures.	Vegetation community not present within the subject property. **Not SWH**

Table 2. Characteristics of Rare Vegetation Communities for Ecoregion 6E.

Rare Vegetation Community[1]	Candidate SWH			Confirmed SWH	Study Area
	ELC Ecosite Codes[1]	Habitat Description[1]	Detailed Information and Sources[1]	Defining Criteria[1]	Assessment Details
Other Rare Vegetation Communities					
Rationale: 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 SWHTG[cxlviii]. 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.	ELC Ecosite codes that have the potential to be a rare ELC Vegetation Type as outlined in appendix M[cxlviii] The OMNR/NHIC will have up to date listing for rare vegetation communities. Information Sources • Natural Heritage Information Center (NHIC) has location information available on their website • OMNRF Districts • Field naturalists clubs • Conservation Authorities	Field studies should confirm if an ELC Vegetation Type is a rare vegetation community based on listing within Appendix M of SWHTG[cxlviii]. • Area of the ELC Vegetation Type polygon is the SWH. • SWHMiST[cxlix] Index #37 provides development effects and mitigation measures.	No other rare vegetation communities are present within the subject property. **Not SWH**

Significant Wildlife Habitat Assessment Tables

Table 3. Characteristics of Specialized Wildlife Habitat for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Waterfowl Nesting Area					
Rationale: 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 Note: includes adjacency to Provincially Significant Wetlands	A waterfowl nesting area extends 120m[cxlix] from a wetland (> 0.5 ha) or a wetland (>0.5ha) and any small wetlands (0.5ha) within 120m or a cluster of 3 or more small (<0.5 ha) wetlands within 120m of each individual wetland where waterfowl nesting is known to occur[cxlix]. • Upland areas should be at least 120m wide so that predators such as raccoons, skunks, and foxes have difficulty finding nests. • Wood Ducks and Hooded Mergansers utilize large diameter trees (>40cm dbh) in woodlands for cavity nest sites. Information Sources • Ducks Unlimited staff may know the locations of particularly productive nesting sites. • OMNRF Wetland Evaluations for indication of significant waterfowl nesting habitat. • Reports and other information available from CAs	Studies confirmed: • Presence of 3 or more nesting pairs for listed species excluding Mallards, or • Presence of 10 or more nesting pairs for listed species including Mallards. • Any active nesting site of an American Black Duck is considered significant. • Nesting studies should be completed during the spring breeding season (April - June). Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • 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 120m[cxlviii] from the wetland and will provide enough habitat for waterfowl to successfully nest. • SWHMiST[cxlix] Index #25 provides development effects and mitigation measures.	Suitable habitat not present within the subject property. **Not SWH**
Wildlife Habitat: Bald Eagle and Osprey Nesting, Foraging and Perching Habitat					
Rationale: Nest sites are fairly uncommon in Eco-region 6E are used annually by these species. Many suitable nesting locations may be lost due to increasing shoreline development pressures and scarcity of habitat.	Osprey Special Concern: Bald Eagle	ELC Forest Community 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. • Osprey nests are usually at the top a tree whereas Bald Eagle nests are typically in super canopy trees in a notch within the tree's canopy. • Nests located on man-made objects are not to be included as SWH (e.g. telephone poles and constructed nesting platforms). Information Sources • Natural Heritage Information Center (NHIC) compiles all known nesting sites for Bald Eagles in Ontario. • 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. • Nature Counts, Ontario Nest Records Scheme data. • OMNRF Districts • Sustainable Forestry License (SFL) companies will identify additional nesting locations through field operations. • Check the Ontario Breeding Bird Atlas[ccv] or Rare Breeding Birds in Ontario for species documented • Reports and other information available from CAs. • Field naturalists clubs	Studies confirm the use of these nests by: • One or more active Osprey or Bald Eagle nests in an area[cxlviii]. • 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. • For an Osprey, the active nest and a 300m radius around the nest or the contiguous woodland stand is the SWHccvii, maintaining undisturbed shorelines with large trees within this area is important[cxlviii]. • For a Bald Eagle the active nest and a 400-800m radius around the nest is the SWH[cvi], ccvii. Area of the habitat from 400-800m is dependent on site lines from the nest to the development and inclusion of perching and foraging habitat[cvi]. • 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 >5 years before being considered not significant[ccvii] • Observational studies to determine nest site use, perching sites and foraging areas need to be done from mid March to mid August. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWHMiST[cxlix] Index #26 provides development effects and mitigation measures	No large stick nests were observed within the subject property, and the watercourse is likely too small to provide suitable foraging habitat. Osprey and Bald Eagle are not known to nest within the subject property vicinity according to the Ontario Breeding Bird Atlas (BSC et al. 2008). **Not SWH**

Table 3. Characteristics of Specialized Wildlife Habitat for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Woodland Raptor Nesting Habitat					
Rationale: Nests sites for these species are rarely identified; these area sensitive habitats and are often used annually by these species.	Northern Goshawk Cooper's Hawk Sharp-shinned Hawk Red-shouldered Hawk Barred Owl Broad-winged Hawk	May be found in all forested ELC Ecosites. May also be found in SWC, SWM, SWD and CUP3.	All natural or conifer plantation woodland/forest stands >30ha with >10ha of interior habitat[lxxxviiii, lxxxix, xc, xci, xciii, xciv, xcv, xcvi, cxxxiii]. Interior habitat determined with a 200m buffer[cxlviii]. • 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 Cooper's hawk nest along forest edges sometimes on peninsulas or small off-shore islands. • In disturbed sites, nests may be used again, or a new nest will be in close proximity to old nest. Information Sources • OMNRF • Check the Ontario Breeding Bird Atlas[ccv] or Rare Breeding Birds in Ontario for species documented. • Check data from Bird Studies Canada • Reports and other information available from CAs	Studies confirm: • Presence of 1 or more active nests from species list is considered significant[cxlviii]. • Red-shouldered Hawk and Northern Goshawk – a 400m radius around the nest or 28ha area of habitat is the SWH[ccvii]. • Barred Owl – a 200m radius around the nest is the SWH[ccvii]. • Broad-winged Hawk and Coopers Hawk – a 100m radius around the nest is the SWH[ccvii]. • Sharp-shinned Hawk – a 50m radius around the nest is the SWH[ccvii]. • Conduct field investigations from mid-March to 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. • SWHMiST[cxlix] Index #27 provides development effects and mitigation measures.	Suitable habitat not present within the subject property. **Not SWH**
Wildlife Habitat: Turtle Nesting Area					
Rationale: These habitats are rare and when identified will often be the only breeding site for local populations of turtles	Midland Painted Turtle Special Concern: Northern Map Turtle Snapping Turtle	Exposed mineral soil (sand or gravel) areas adjacent (<100m)[cxlviii] or within the following ELC Ecosites: MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 BOO1 FEO1	• Best nesting habitat for turtles are close to water and away from roads and sites less prone to loss of eggs by predation from skunks, raccoons or other animals. • For an area to function as a turtle-nesting area, it must provide sand and gravel that turtles are able to dig in and are located in open, sunny areas. Nesting areas on the sides of municipal or provincial road embankments and shoulders are not SWH. • Sand and gravel beaches adjacent to undisturbed shallow weedy areas of marshes, lakes, and rivers are most frequently used. Information Sources • Use Ontario Soil Survey reports and maps to help find suitable substrate for nesting turtles (well-drained sands and fine gravels). • Check the Ontario Herpetofaunal Summary Atlas records or other similar atlases for uncommon turtles; location information may help to find potential nesting habitat for them. • Natural Heritage Information Center (NHIC) • Field Naturalist clubs and landowners	Studies confirm: • Presence of 5 or more nesting Midland Painted Turtles • One or more Northern Map Turtle or Snapping Turtle nesting is a SWH[l] • The area or 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 the SWH[cxlviii]. • Travel routes from wetland to nesting area are to be considered within the SWH[cxlix]. • Field investigations should be conducted in prime nesting season typically late spring to early summer. Observational studies observing the turtles nesting is a recommended method. • SWHMiST[cxlix] Index #28 provides development effects and mitigation measures for turtle nesting habitat.	Suitable habitat not present within the subject property. **Not SWH**

Table 3. Characteristics of Specialized Wildlife Habitat for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Seeps and Springs					
Rationale: Seeps/Springs are typical of headwater areas and are often at the source of coldwater streams.	Wild Turkey Ruffed Grouse Spruce Grouse White-tailed Deer Salamander spp.	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 forested area (with <25% meadow/field/pasture) within the headwaters of a stream or river system[cxvii, cxlix]. • Seeps and springs are important feeding and drinking areas especially in the winter will typically support a variety of plant and animal species[cxlx, cxx, cxxi, cxxii, cxiii, cxiv] Information Sources • Topographical Map • Thermography • Hydrological surveys conducted by CAs and MOE • Field naturalists clubs and landowners • Municipalities and Conservation Authorities may have drainage maps and headwater areas mapped.	Field Studies confirm: • Presence of a site with 2 or more seeps/springs should be considered SWH. • The area of a ELC forest ecosite containing the seeps/springs is the SWH. The protection of the recharge area considering the slope, vegetation, height of trees and groundwater condition need to be considered in delineation the habitat[cxlviii] • SWHMiST[cxlix] Index #30 provides development effects and mitigation measures	The subject property is not located within a headwaters area. **Not SWH**
Wildlife Habitat: Amphibian Breeding Habitat (Woodland)					
Rationale: 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 migrating amphibians.	• Presence of a wetland, pond or woodland pool (including vernal pools) >500m^2 (about 25m diameter) [cvi] 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. • Woodlands with permanent ponds or those containing water in most years until mid-July are more likely to be used as breeding habitat[cxlviii] Information Sources • Ontario Herpetofaunal Summary Atlas (or other similar atlases) for records • Local landowners may also provide assistance as they may hear spring-time choruses of amphibians on their property. • OMNRF District • OMNRF wetland evaluations • Field naturalist clubs • Canadian Wildlife Service Amphibian Road Call Survey • Ontario Vernal Pool Association: http://www.ontariovernalpools.org	Studies confirm: • 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. • 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. • The habitat is the woodland area plus a 230m radius of woodland area[lxiii,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 the be included in the habitat. • SWHMiST[cxlix] Index #14 provides development effects and mitigation measures.	Suitable amphibian breeding habitat exists within the White Cedar Mineral Coniferous Swamp (SWC1-1) community. **Candidate SWH**

Table 3. Characteristics of Specialized Wildlife Habitat for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Amphibian Breeding Habitat (Wetland)					
Rationale: These habitats are extremely important to amphibian biodiversity within a landscape and often represent the only breeding habitat for local amphibian populations	Eastern Newt American Toad Spotted Salamander Four-toed Salamander Blue-spotted Salamander Gray Tree frog Western Chorus Frog Northern Leopard Frog Pickerel Frog Green Frog Mink Frog Bullfrog	ELC Community Classes SW, MA, FE, BO, OA and SA. Typically these wetland ecosites will be isolated (>120m) from woodland ecosites, however larger wetlands containing predominantly aquatic species (e.g. Bull Frog) may be adjacent to woodlands.	• Wetlands >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[clxxxiv]. • 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. • Bullfrogs require permanent water bodies with abundant emergent vegetation. Information Sources • Ontario Herpetofaunal Summary Atlas (or other similar atlases) • Canadian Wildlife Service Amphibian Road Surveys and Backyard Amphibian Call Count. • OMNRF Districts and wetland evaluations • Reports and other information available from CAs.	Studies confirm: • Presence of breeding population of 1 or more of the listed newt/salamander species or 2 or more of the listed frog/toad species and with at least 20 individuals (adults or eggs masses)[lxxi, lxxiii], or 2 or more of the listed frog/toad species with Call Level Codes of 3. or; Wetland with confirmed breeding Bullfrogs are significant. • The ELC ecosite wetland area and the shoreline are the SWH. • A combination of observational study and call count surveys[cviii] will be required during spring March to June) when amphibians are concentrated around suitable breeding habitat within or near the wetlands. • If a SWH is determined for Amphibian Breeding Habitat (Wetlands) then 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.	Suitable habitat not present within the subject property. **Not SWH**
Woodland Area-Sensitive Bird Breeding Habitat					
Rationale: 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 Special Concern: Cerulean Warbler Canada Warbler	All Ecosites associated with these ELC Community Series: FOC FOM FOD SWC SWM SWD	• Habitats where interior forest breeding birds are breeding, typically large mature (>60 yrs old) forest stands or woodlots >30 ha.[cv, cxxxi, cxxxii, cxxxiii, cxxxiv, cxxv, cxxvi, cxxxvii, cxxxviii, cxxxix, cxl, cxli, cxlii, cxliii, cxliv, cxlv, cxlvi, cl, cli, clii, cliii, cliv, clv, clvii, clviii, clix] • Interior forest habitats are at least 200m from forest edge habitat. Information Sources • Local bird clubs • Canadian Wildlife Service (CWS) for the location of forest bird monitoring. • Bird studies Canada conducted a 3-year study of 287 woodlands to determine the effects of forest fragmentation on forest birds and to greatest value to interior species • Reports and other information available from CAs.	• Presence of nesting or breeding pairs of 3 or more of the listed wildlife species. • Note: any site with breeding Cerulean Warblers or Canada Warblers is to be considered SWH. • Conduct field investigations in spring and early summer when birds are singing and defending their territories. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWHMiST[cxlix] Index #34 provides development effects and mitigation measures.	Suitable habitat not present within the subject property. **Not SWH**

Significant Wildlife Habitat Assessment Tables

Table 4. Characteristics of Habitat for Species of Conservation Concern for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Marsh Bird Breeding Habitat					
Rationale: Wetlands for these bird species are typically productive and fairly rare in Southern Ontario landscapes.	American Bittern Virginia Rail Sora Common Gallinule American Coot Pied-billed Grebe Marsh Wren Sedge Wren Common Loon Sandhill Crane Green Heron Trumpeter Swan Special Concern: Black Tern Yellow Rail	MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 SAS1 SAM1 SAF1 FEO1 BOO1 For Green Heron: All SW, MA and CUM1 sites.	• Nesting occurs in wetlands • All wetland habitat is to be considered as long as there is shallow water with emergent aquatic vegetation present[cxxiv]. • 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. Information Sources • Contact OMNRF, wetland evaluations are a good source of information. • Field naturalist clubs • Natural Heritage Information Center (NHIC) Records • Reports and other information available from CAs. • Ontario Breeding Bird Atlas[ccv]	Studies confirm: • Presence of 5 or more nesting pairs of Sedge Wren or Marsh Wren or 1 pair of Sandhill Cranes; or breeding by any combination of 5 or more of the listed species[l]. • Note: any wetland with breeding of 1 or more Black Terns, Trumpeter Swan, Green Heron or Yellow Rail is SWH[l]. • Area of the ELC ecosite is the SWH • Breeding surveys should be done in May/June when these species are actively nesting in wetland habitats. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi]. • SWHMiST[cxlix] Index #35 provides development effects and mitigation measures	Suitable habitat not present within the subject property. **Not SWH**
Wildlife Habitat: Open Country Bird Breeding Habitat					
Rationale: This wildlife habitat is declining throughout Ontario and North America. Species such as the Upland Sandpiper have declined significantly the past 40 years based on CWS (2004) trend records.	Upland Sandpiper Grasshopper Sparrow Vesper Sparrow Northern Harrier Savannah Sparrow Special Concern: Short-eared Owl	CUM1 CUM2	Large grassland areas (includes natural and cultural fields and meadows) >30 ha [clx, clxi, clxii, clxiii, clxiv, clxv, clxvi, clxvii, clxviii, clxix]. 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)[l]. Grassland sites considered significant should have a history of longevity, either abandoned fields, mature hayfields and pasturelands that are at least 5 years or older. The Indicator bird species are area sensitive requiring larger grassland areas than the common grassland species. Information Sources • Agricultural land classification maps, Ministry of Agriculture. • Ask local birders • Ontario Breeding Bird Atlas[ccv] • Reports and other information available from CAs.	Field Studies confirm: • Presence of nesting or breeding of 2 or more of the listed species. • A field with 1 or more breeding Short-eared Owl is to be considered SWH. • The area of SWH is the contiguous ELC ecosite field areas. • Conduct field investigations of the most likely areas in spring and early summer when birds are singing and defending their territories. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi]. • SWHMiST[cxlix] Index #32 provides development effects and mitigation measures.	Suitable habitat not present within the subject property. **Not SWH**

Table 4. Characteristics of Habitat for Species of Conservation Concern for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Shrub/Early Successional Bird Breeding Habitat					
Rationale: This wildlife habitat is declining throughout Ontario and North America. The Brown Thrasher has declined significantly over the past 40 years based on CWS (2004) trend records cxcix.	Indicator spp.: Brown Thrasher Clay-coloured Sparrow Common spp.: Field Sparrow Black-billed Cuckoo Eastern Towhee Willow Flycatcher Special Concern: Yellow-breasted Chat Golden-winged Warbler	CUT1 CUT2 CUS1 CUS2 CUW1 CUW2 Patches of shrub ecosites can be complexed into a larger habitat for some bird species.	Large field areas succeeding to shrub and thicket habitats>10ha[clxiv] in size. • Shrub land or early successional fields, not class 1 or 2 agricultural lands, not being actively used for farming (i.e. no row-cropping, haying or live-stock pasturing in the last 5 years)[l]. Shrub thicket habitats (>10 ha) are most likely to support and sustain a diversity of these species [clxxiii]. Shrub and thicket habitat sites considered significant should have a history of longevity, either abandoned fields or pasturelands. Information Sources • Agricultural land classification maps Ministry of Agriculture Local bird clubs • Ontario Breeding Bird Atlas[ccv] • Reports and other information available from CAs	Field Studies confirm: • Presence of nesting or breeding of 1 of the indicator species and at least 2 of the common species[l]. • A field with breeding Yellow-breasted Chat or Golden-winged Warbler is to be considered as Significant Wildlife Habitat. • The area of the SWH is the contiguous ELC ecosite field/thicket area. • Conduct field investigations of the most likely areas in spring and early summer when birds are singing and defending their territories • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWHMiST[cxlix] Index #33 provides development effects and mitigation measures.	Suitable habitat not present within the subject property. **Not SWH**
Wildlife Habitat: Terrestrial Crayfish					
Rationale: Terrestrial Crayfish are only found within SW Ontario in Canada and their habitats are very rare.[ccii]	Chimney or Digger Crayfish: (*Fallicambarus fodiens*) Devil Crawfish or Meadow Crayfish: (*Cambarus Diogenes*)	MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 MAS1 MAS2 MAS3 SWD SWT SWM	Wet meadow and edges of shallow marshes (no minimum size) identified should be surveyed for terrestrial crayfish. • Constructs burrows in marshes, mudflats, meadows, the ground can't be too moist. Can often be found far from water. • Both species are a semi-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. Information Sources • Information sources from "Conservation Status of Freshwater Crayfishes" by Dr. Premek Hamr for the WWF and CNF March 1998	Studies Confirm: • Presence of 1 or more individuals of species listed or their chimneys (burrows) in suitable marsh meadow or terrestrial sites[cci] • Area of ELC Ecosite or an ecoelement area of meadow marsh or swamp within the larger ecosite area is the SWH • Surveys should be done April to August during in temporary or permanent water Note the presence of burrows or chemistry are often the only indicator of presence, observance or collection of individuals is very difficult[cci] • SWHMiST[cxlix] Index #36 provides development effects and mitigation measures.	Suitable habitat not present within the subject property. **Not SWH**

Table 4. Characteristics of Habitat for Species of Conservation Concern for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Special Concern and Rare Wildlife Species					
Rationale: These species are quite rare or have experienced significant population declines in Ontario.	All Special Concern and Provincially Rare (S1-S3, SH) plant and animal species. Lists of these species are tracked by the Natural Heritage Information Centre.	All plant and animal element occurrences (EO) within a 1 or 10km grid. Older element occurrences were recorded prior to GPS being available, therefore location information may lack accuracy.	When an element occurrence is identified within a 1 or 10 km grid for a Special Concern or provincially Rare species; linking candidate habitat on the site needs to be completed to ELC Ecosites[lxxviii]. Information Sources • Natural Heritage Information Centre (NHIC) will have the Special Concern and Provincially Rare (S1-S3, SH) species lists with element occurrences data. • NHIC Website: "Get Information": http://nhic.mnr.gov.on.ca • Ontario Breeding Bird Atlas[ccv] • Expert advice should be sought as many of the rare spp. have little information available about their requirements.	Studies Confirm: • Assessment/inventory of the site for the identified special concern or rare species needs to be completed during the time of year when the species is present or easily identifiable. • The area of the habitat to the finest ELC scale that protects the habitat form and function is the SWH, this must be delineated through detailed field studies. The habitat needs to be easily mapped and cover an important life stage component for a species e.g. specific nesting habitat or foraging habitat. • SWHMiST[cxlix] Index #37 provides development effects and mitigation measures.	Potential habitat for the following SCC, that are not already covered by other SWH categories, occurs in the study area : - Eastern Wood-Pewee - Wood Thrush Potential habitat for both species occurs within the off-site FOD5-7 forest community. **Candidate SWH**

Significant Wildlife Habitat Assessment Tables

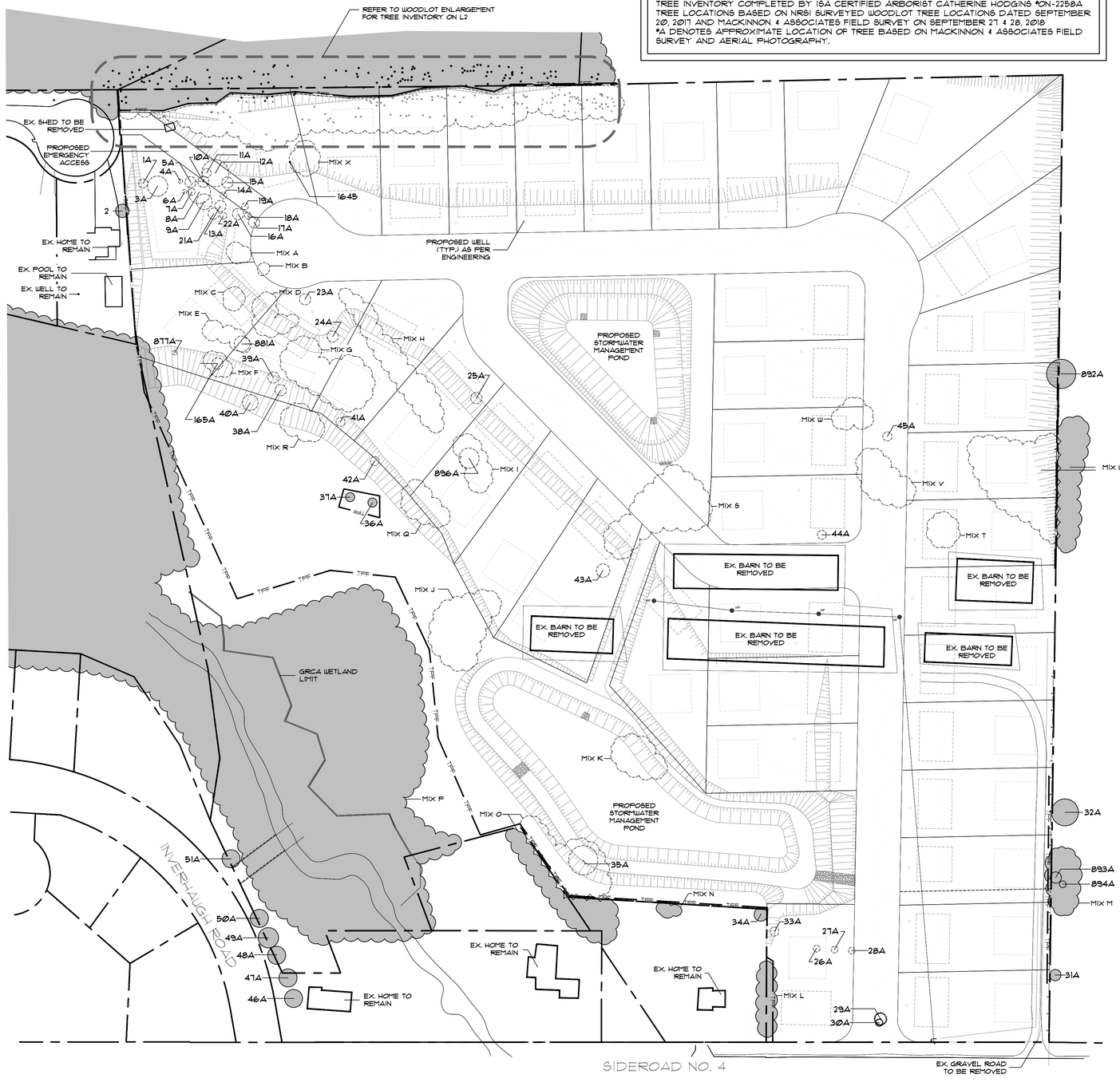
Table 5. Characteristics of Animal Movement Corridors for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Amphibian Movement Corridors					
Rationale: 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 Western Chorus Frog Northern Leopard Frog Pickerel Frog Green Frog Mink Frog Bullfrog	Corridors may be found in all ecosites associated with water. • Corridors will be determined based on identifying the significant breeding habitat for these species in Table 1.1.	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 (Amphibian Breeding Habitat – Wetland) of this Schedule[i]. Information Sources • MNRF District Office • Natural Heritage Information Center NHIC • Reports and other information available from CAs • Field Naturalist Clubs	• Field Studies must be conducted at the time of year when species are expected to be migrating or entering breeding sites. • Corridors should consist of native vegetation, with several layers of vegetation. Cooridors unbroken by roads, waterways or bodies, and undeveloped areas are most significant[cxlix]. • Corridors should have at least 15m of vegetation on both sides of waterway [cxlix] or be up to 200m wide[cxlix] of woodland habitat and with gaps <20m [cxlix]. • Shorter corridors are more significant than longer corridors, however amphibians must be able to get to and from their summer and breeding habitat[cxlix]. • SWHMiST[cxlix] Index #40 provides development effects and mitigation measures.	Potential corridor habitat, connecting upland terrestrial habitat that is otherwise separated from the breeding wetland habitat, is not present within the subject property. **Not SWH**
Wildlife Habitat: Deer Movement Corridors					
Rationale: Corridors important for all species to be able to access seasonally important life-cycle habitats or to access new habitat for dispersing individuals by minimizing their vulnerability while travelling.	White-tailed Deer	Corridors may be found in all forested ecosites. A Project Proposal in Stratum II Deer Wintering Area has potential to contain corridors.	Movement corridor must be determined when Deer Wintering Habitat is confirmed as SWH from Table 1.1 of this schedule[i]. • A deer wintering habitat identified by the OMNRF as SWH in Table 1.1 of this Schedule will have corridors that the deer use during fall migration and spring dispersion [clxxxii, clxxxiii, cxlix, cxciv]. • Corridors typically follow riparian areas, woodlots, areas of physical geography (ravines, or ridges). Information Sources • MNRF District Office • Natural Heritage Information Center (NHIC) • Reports and other information available from CAs • Field Naturalist Clubs	• Studies must be conducted at the time of year when deer are migrating or moving to and from winter concentration areas. • Corridors that lead to a deer wintering yard should be unbroken by roads and residential areas. • Corridors should be at least 200m wide[cxlix] with gaps <20m[cxlix] and if following riparian area with at least 15m of vegetation on both sides of waterway[cxlix] . Shorter corridors are more significant than longer corridors[cxlix] • SWHMiST[cxlix] Index #39 provides development effects and mitigation measures.	The PSW and adjacent cedar forest on the subject property represents part of a larger wooded corridor that extends through the property to the Grand River. Deer overwintering habitat has been mapped by the MNRF on the opposite side of the Grand River as well as areas to the north along the east bank of the Grand River. However, the Swan Creek wooded corridor is narrow in locations (<200m wide) and is interrupted by a road crossing (County Road 21). This corridor therefore does not meet criteria for provincially significant habitat. **Not SWH**

APPENDIX III Tree Management Plan (Mackinnon and Associates 2018)

NOTE:

SITE VISIT DATE: SEPTEMBER 27 & 28, 2018
TREE INVENTORY COMPLETED BY ISA CERTIFIED ARBORIST CATHERINE HODGINS *ON-2258A
TREE LOCATIONS BASED ON NRSI SURVEYED WOODLOT TREE LOCATIONS DATED SEPTEMBER 20, 2017 AND MACKINNON & ASSOCIATES FIELD SURVEY ON SEPTEMBER 27 & 28, 2018
*A DENOTES APPROXIMATE LOCATION OF TREE BASED ON MACKINNON & ASSOCIATES FIELD SURVEY AND AERIAL PHOTOGRAPHY.



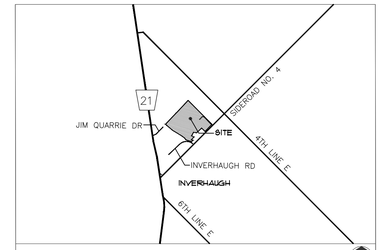
LEGEND	
19A 4	EXISTING TREES TO REMAIN
27A 29A	EXISTING TREES TO BE REMOVED
TPF	TREE PROTECTION FENCE

TREE PROTECTION NOTES

1. AS PART OF ANY TREE REMOVAL OPERATION ALL STEMS, LIMBS AND STUMPS SHOULD BE REMOVED FROM THE SITE.
2. UPON COMPLETION OF ANY TREE REMOVAL OPERATIONS, TREE PROTECTION FENCING SHOULD BE INSTALLED AS ILLUSTRATED. THIS PROTECTION FENCING SHOULD BE MAINTAINED UNTIL ALL EXCAVATION AND BUILDING CONSTRUCTION WORK IS COMPLETED. SEE TREE PROTECTION FENCING DETAIL ON L2.
3. ANY ROOTS DISTURBED DURING CONSTRUCTION SHOULD BE CUT CLEANLY AND BURIED IMMEDIATELY.
4. NO HEAVY EQUIPMENT OR STOCKING OF MATERIAL SHALL OCCUR WITHIN THE DRIPLINES OF ANY TREES THAT ARE TO BE PRESERVED.
5. TREE PROTECTION MEASURES TO BE INSPECTED BY LANDSCAPE ARCHITECT AND CITY FORESTRY STAFF PRIOR TO START OF CONSTRUCTION.
6. IF CONSTRUCTION OR ANY WORK OCCURS WITHIN THE TREE PRESERVATION ZONE, INSIDE THE LIMITS OF THE TREE PROTECTION FENCE, IT IS NECESSARY TO ONLY USE HAND TOOLS. NO MACHINERY WILL BE PERMITTED IN THIS ZONE.
7. ANY EXISTING VEGETATION THAT IS IMPACTED DURING SITE DEVELOPMENT WILL BE REINSTATED TO THE SATISFACTION OF THE CITY.

MIX	SPECIES	D.B.H.	CONDITION	STATUS	ADDITIONAL NOTES
A	CRATAEGUS SP. AND RHAMNUS CATHARTICA	20cm-30cm	FAIR-DEAD	TO BE REMOVED	
B	CRATAEGUS SP. AND RHAMNUS CATHARTICA	20cm-30cm	FAIR-DEAD	TO BE REMOVED	VINE CHOKED
C	CRATAEGUS SP. AND RHAMNUS CATHARTICA	20cm-30cm	FAIR-DEAD	TO BE REMOVED	
D	CRATAEGUS SP. AND RHAMNUS CATHARTICA	20cm-30cm	FAIR-DEAD	TO BE REMOVED	
E	CRATAEGUS SP., RHAMNUS CATHARTICA AND FRAXINUS SP.	10cm-25cm	FAIR-DEAD	TO BE REMOVED	
F	THUJA OCCIDENTALIS, CELTIS OCCIDENTALIS AND RHAMNUS CATHARTICA	>10cm-20cm	GOOD-POOR	TO BE REMOVED	AT EDGE OF SLOPE AND DOWN SLOPE
G	CRATAEGUS SP. AND RHAMNUS CATHARTICA	>10cm-25cm	FAIR-DEAD	TO BE REMOVED	
H	CRATAEGUS SP. AND RHAMNUS CATHARTICA	>10cm-30cm	FAIR-DEAD	TO BE REMOVED	
I	CRATAEGUS SP., LONICERA SP., FRAXINUS SP., AND RHAMNUS CATHARTICA	>10cm-45cm	GOOD-DEAD	TO BE REMOVED	
J	THUJA OCCIDENTALIS, FRAXINUS SP., PINUS SYLVESTRIS AND RHAMNUS CATHARTICA	>10cm-45cm	GOOD-DEAD	TO BE REMOVED	
K	ULMUS PIMULA AND RHAMNUS CATHARTICA	>10cm-50cm	GOOD-FAIR	TO BE PRESERVED	
L	PICEA PUNGENS	20cm-25cm	GOOD	TO BE PRESERVED	BOUNDARY TREES
M	CRATAEGUS SP., CELTIS OCCIDENTALIS, RHAMNUS CATHARTICA AND FRAXINUS SP.	>10cm-35cm	FAIR-DEAD	TO BE PRESERVED	
N	THUJA OCCIDENTALIS AND PICEA PUNGENS	20cm	GOOD	TO BE PRESERVED	ON ADJACENT PROPERTY
O	CELTIS OCCIDENTALIS, RHUS TYPHINA, THUJA OCCIDENTALIS, FRAXINUS SP., AND RHAMNUS CATHARTICA	>10cm-25cm	GOOD-FAIR	TO BE REMOVED (SEE NOTE)	TO BE REMOVED ON SUBJECT PROPERTY ONLY
P	SALIX BABYLONICA, THUJA OCCIDENTALIS, PINUS SYLVESTRIS, ACER NEGUNDO, CELTIS OCCIDENTALIS, ULMUS PIMULA., LONICERA SP., FRAXINUS SP., AND RHAMNUS CATHARTICA	>10cm-60cm	GOOD-DEAD	TO BE PRESERVED	
Q	POPULUS SP.	>10cm-25cm	GOOD	TO BE REMOVED	
R	THUJA OCCIDENTALIS	>10cm-25cm	GOOD	TO BE REMOVED	
S	POPULUS SP., SALIX ALBA, AND THUJA OCCIDENTALIS	>10cm-25cm	GOOD-FAIR	TO BE REMOVED	
T	RHAMNUS CATHARTICA	>10cm-20cm	GOOD	TO BE REMOVED	
U	CRATAEGUS SP., FRAXINUS SP., AND RHAMNUS CATHARTICA	>10cm-25cm	GOOD-DEAD	TO BE REMOVED (SEE NOTE)	TO BE REMOVED ON SUBJECT PROPERTY ONLY
V	CRATAEGUS SP., ACER NEGUNDO, AND MALUS SP.	30cm-45cm	FAIR-DEAD	TO BE REMOVED	
W	CRATAEGUS SP., ACER NEGUNDO, FRAXINUS SP., AND RHAMNUS CATHARTICA	>10cm-40cm	FAIR -POOR	TO BE REMOVED	
X	POPULUS SP.	>10cm-25cm	GOOD	TO BE REMOVED	

NO.	SPECIES	D.B.H	COND.	STATUS	ADDITIONAL NOTE
1A	CRATAEGUS SP.	15cm	DEAD	TO BE REMOVED	MULTI TRUNK
2	ACER PLATANOIDES	25cm	GOOD	TO BE PRESERVED	ON ADJACENT PROPERTY
3A	FRAXINUS SP.	25cm	FAIR	TO BE REMOVED	TRUNK WOUNDS
4A	FRAXINUS SP.	15cm	GOOD	TO BE REMOVED	
5A	CRATAEGUS SP.	15cm	DEAD	TO BE REMOVED	MULTI TRUNK
6A	QUERCUS MACROCARPA	10cm	GOOD	TO BE REMOVED	
7A	FRAXINUS SP.	10cm	FAIR	TO BE REMOVED	2 TRUNKS, TRUNK DAMAGE
8A	FRAXINUS SP.	35cm	FAIR	TO BE REMOVED	
9A	FRAXINUS SP.	25cm	FAIR	TO BE REMOVED	LEANING
10A	FRAXINUS SP.	20cm	FAIR	TO BE REMOVED	
11A	FRAXINUS SP.	20cm	FAIR	TO BE REMOVED	
12A	MALUS SP.	45cm	FAIR	TO BE REMOVED	30% DEAD BRANCHES
13A	CRATAEGUS SP.	20cm	DEAD	TO BE REMOVED	MULTI TRUNK
14A	FRAXINUS SP.	15cm	GOOD	TO BE REMOVED	
15A	CRATAEGUS SP.	25cm	DEAD	TO BE REMOVED	MULTI TRUNK
16A	CRATAEGUS SP.	25cm	DEAD	TO BE REMOVED	MULTI TRUNK
17A	CRATAEGUS SP.	20cm	DEAD	TO BE REMOVED	COPPICE
18A	CRATAEGUS SP.	20cm	DEAD	TO BE REMOVED	
19A	CRATAEGUS SP.	20cm	DEAD	TO BE REMOVED	VINE CHOKED
20A	CRATAEGUS SP.	25cm	DEAD	TO BE REMOVED	
21A	RHAMNUS CATHARTICA	15cm	POOR	TO BE REMOVED	MULTI TRUNK
22A	CRATAEGUS SP.	35cm	DEAD	TO BE REMOVED	
23A	CRATAEGUS SP.	25cm	DEAD	TO BE REMOVED	
24A	CRATAEGUS SP.	20cm	DEAD	TO BE REMOVED	
25A	CRATAEGUS SP.	25cm	DEAD	TO BE REMOVED	
26A	ULMUS PUMILA	10cm	GOOD	TO BE REMOVED	MULTI TRUNK
27A	ULMUS PUMILA	10cm	GOOD	TO BE REMOVED	MULTI TRUNK
28A	ULMUS PUMILA	10cm	GOOD	TO BE REMOVED	MULTI TRUNK
29A	JUNIPERUS VIRGINIANA	25cm	GOOD	TO BE REMOVED	
30A	JUNIPERUS VIRGINIANA	15cm	POOR	TO BE REMOVED	DEAD LEADER
31A	CRATAEGUS SP.	20cm	DEAD	TO BE PRESERVED	
32A	PRUNUS SEROTINA	30cm	FAIR	TO BE PRESERVED	TRUNK DAMAGE, 4 TRUNKS
33A	ACER PLATANOIDES	15cm	GOOD	TO BE REMOVED	
34A	BETULA PAPYRIFERA	25cm	GOOD	TO BE PRESERVED	ON ADJACENT PROPERTY
35A	SALIX BABYLONICA	<65cm	GOOD	TO BE REMOVED	
36A	MALUS SP.	20cm	POOR	TO BE PRESERVED	
37A	MALUS SP.	20cm	FAIR	TO BE PRESERVED	
38A	ACER NEGUNDO	25cm	FAIR	TO BE REMOVED	
39A	ACER NEGUNDO	20cm	FAIR	TO BE REMOVED	COPPICE
40A	ACER NEGUNDO	35cm	POOR	TO BE REMOVED	50% DEAD
41A	ACER NEGUNDO	15cm	FAIR	TO BE REMOVED	ON SLOPE
42A	ACER NEGUNDO	15cm	FAIR	TO BE REMOVED	TRUNK DAMAGE, MULTI TRUNKS
43A	POPULUS SP.	30cm	GOOD	TO BE REMOVED	CO-DOMINANT STEMS W INCLUDED BARK
44A	RHAMNUS CATHARTICA	25cm	GOOD	TO BE REMOVED	MULTI TRUNK
45A	FRAXINUS SP.	25cm	DEAD	TO BE REMOVED	
46A	ACER PLATANOIDES	50cm	GOOD	TO BE PRESERVED	CO-DOMINANT STEMS W INCLUDED BARK
47A	ACER PLATANOIDES	50cm	GOOD	TO BE PRESERVED	CO-DOMINANT STEMS W INCLUDED BARK
48A	ACER PLATANOIDES	50cm	GOOD	TO BE PRESERVED	CO-DOMINANT STEMS W INCLUDED BARK
49A	ACER PLATANOIDES	60cm	GOOD	TO BE PRESERVED	CO-DOMINANT STEMS W INCLUDED BARK
50A	ACER PLATANOIDES	50cm	GOOD	TO BE PRESERVED	CO-DOMINANT STEMS W INCLUDED BARK
51A	ACER PLATANOIDES	50cm	GOOD	TO BE PRESERVED	CO-DOMINANT STEMS W INCLUDED BARK
165A	CELTIS OCCIDENTALIS	15cm	FAIR	TO BE REMOVED	
877A	FRAXINUS SP.	10cm	GOOD	TO BE REMOVED	
881A	FRAXINUS SP.	35cm	GOOD	TO BE REMOVED	
892A	ACER PLATANOIDES	<65cm	GOOD	TO BE PRESERVED	BOUNDARY TREE
893A	CELTIS OCCIDENTALIS	35cm	FAIR	TO BE REMOVED	
895A	CELTIS OCCIDENTALIS	15cm	FAIR	TO BE PRESERVED	
896A	FRAXINUS SP.	45cm	GOOD	TO BE PRESERVED	



KEY MAP N.T.S.

GENERAL NOTES

1. ALL WORKMANSHIP WILL BE TO THE STANDARDS OF LANDSCAPE ONTARIO.
2. ALL PLANT MATERIAL TO BE NO.1 GRADE NURSERY GROWN IN ACCORDANCE WITH THE CANADIAN STANDARDS FOR NURSERY STOCK, 6TH EDITION, 1998, BY THE CANADIAN NURSERY TRADES ASSOCIATION.
3. BACKFILL WILL CONSIST OF SOIL NATIVE TO THE SITE OR GENERAL SOIL TYPE/CLASS NATIVE TO THE SITE. TOPSOIL TO BE TESTED FOR NUTRIENT VALUE, AND AMENDED FOR OPTIMAL GROWTH AS PER THE RECOMMENDATIONS OF THE SOIL TEST.
4. CONTRACTOR SHALL MAINTAIN ALL LANDSCAPE AREAS UNTIL OWNER'S ACCEPTANCE OF PROJECT.
5. CONTRACTOR TO LOCATE ALL UNDERGROUND UTILITIES.
6. PLANTING MAY BE ADJUSTED TO SUIT LOCATIONS OF SITE UTILITY STRUCTURES/SERVICES.
7. ALL MATERIALS MUST BE APPROVED BY LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.
8. SPREAD MULCH TO A MINIMUM OF 100mm COMPACTED DEPTH ON ALL TREE PITS AND PLANTING BEDS.
9. CHECK AND VERIFY ALL DIMENSIONS AND QUANTITIES PRIOR TO COMMENCEMENT OF WORK. ANY DISCREPANCIES ARE TO BE REPORTED IN WRITING TO THE LANDSCAPE ARCHITECT. QUANTITIES NOTED WITHIN THE PLAN SUPERCEDE THOSE IN THE PLANT LIST. ANY SUBSTITUTIONS SHALL BE APPROVED BY THE LANDSCAPE ARCHITECT.
10. SOD AS MARKED WITH NURSERY SOD ON A MINIMUM OF 100mm OF CLEAN TOPSOIL. FINE GRADE AND SOD ALL BOULEVARD AREAS TO MUNICIPAL SPECIFICATIONS AND REPAIR DAMAGE TO ADJACENT PROPERTIES, AS REQUIRED.
11. FINAL INSPECTION AND ACCEPTANCE OF PLANTING WORK SHALL COINCIDE WITH THE FINAL INSPECTION AND ACCEPTANCE OF ALL WORK INCLUDED IN THE CONTRACT.
12. ALL SEEDED SLOPES 3:1 AND GREATER TO RECEIVE EROSION CONTROL MATTING (COIR MAT, OR OTHER WILDLIFE FRIENDLY ALTERNATIVE). PIN SOD ON ALL SLOPES OF 3:1 OR GREATER.
13. SUBMIT A WRITTEN GUARANTEE TO THE EFFECT THAT ALL PLANTS ACCEPTED DURING THE PERIOD OF JANUARY 1st TO JULY 15th SHALL BE GUARANTEED UNTIL JULY 15th THE FOLLOWING YEAR. PLANTS ACCEPTED DURING THE PERIOD OF JULY 15th TO DECEMBER 31st SHALL BE GUARANTEED FOR ONE YEAR FROM THE DATE OF ACCEPTANCE. THE GUARANTEE PERIODS LISTED ABOVE SHALL APPLY TO ALL 'NURSERY GROUN' PLANTS.
14. AT THE TIME OF FINAL INSPECTION ALL PLANTS SHALL BE IN A HEALTHY, VIGOUROUS GROWING CONDITION, PLANTED IN FULL ACCORDANCE WITH DRAWINGS AND CONDITIONS.
15. TOPOGRAPHIC INFORMATION AS PER VAN HARTEN SURVEYING.
16. DRAFT PLAN OF SUBDIVISION INFORMATION AS PER ASTRID J CLOS PLANNING CONSULTANTS.
17. ENGINEERING AS PER GM BLUEPLAN ENGINEERING LIMITED.

ELORA RIDGE DEVELOPMENTS LIMITED
INVERHAUGH PASTURE EDGE SUBDIVISION

ASSOCIATION OF LANDSCAPE ARCHITECTS ONTARIO — AARON W. HILL — OALA — MEMBER

no.	date	description	by
1.	Dec.14.18	Issued for approval	CMH
REVISIONS			

PROPOSED DEVELOPMENT
INVERHAUGH
TOWNSHIP OF CENTRE WELLINGTON

Tree Management Plan

MacKinnon & Associates
a division of 907216 Ontario Inc.
Providing Solutions in Urban, Landscape and Environmental Planning
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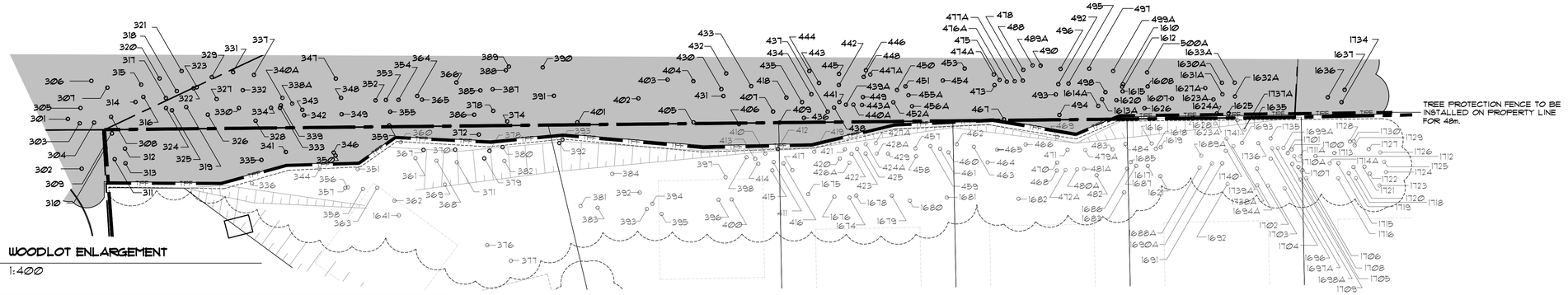
DRAWN BY:	DESIGNED BY:	APPROVED BY:
CMH	CMH	AWH
PROJECT NO.: 2018-58	SCALE: 1:1000	DATE: August 2018
PLOTTED: December 14, 2018	SHEET: L1	



1 **WOODLOT ENLARGEMENT**
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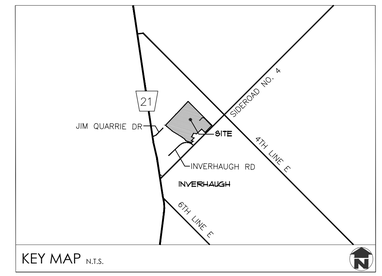
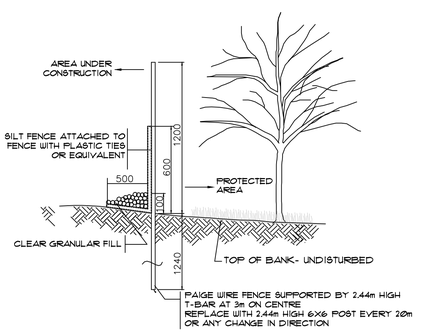


KEY MAP N.T.S.

NO.	SPECIES	D.B.H.	COND.	STATUS	ADDITIONAL NOTE
302	ACER NEGUNDO	30cm	FAIR	TO BE PRESERVED	LEANING
303	FRAXINUS SP.	40cm	POOR	TO BE PRESERVED	75% DEAD
301	ACER NEGUNDO	25cm	FAIR	TO BE PRESERVED	LEANING
305	FRAXINUS SP.	40cm	FAIR	TO BE PRESERVED	30% DEAD
306	FAGUS GRANDIFLORA	55cm	POOR	TO BE PRESERVED	70% CROWN DIEBACK
307	FRAXINUS SP.	40cm	GOOD	TO BE PRESERVED	
308	ACER NEGUNDO	25cm	FAIR	TO BE PRESERVED	LEANING
304	ACER NEGUNDO	25cm	FAIR	TO BE PRESERVED	LEANING
309	ACER NEGUNDO	20cm	POOR	TO BE PRESERVED	75% DEAD
310	ACER NEGUNDO	30cm	POOR	TO BE PRESERVED	BROKEN TRUNK, LEANING
311	ACER NEGUNDO	25cm	FAIR	TO BE PRESERVED	LEANING
312	ACER NEGUNDO	25cm	FAIR	TO BE PRESERVED	VINE CHOKED
313	ACER NEGUNDO	35cm	FAIR	TO BE PRESERVED	LEANING
314	FRAXINUS SP.	35cm	POOR	TO BE PRESERVED	LEANING, 75% DEAD
315	OSTYRA VIRGINIANA	25cm	GOOD	TO BE PRESERVED	
316	OSTYRA VIRGINIANA	30cm	GOOD	TO BE PRESERVED	
324	FRAXINUS SP.	40cm	POOR	TO BE PRESERVED	75% DEAD
317	FRAXINUS SP.	40cm	POOR	TO BE PRESERVED	75% DEAD
325	PRUNUS SEROTINA	45cm	FAIR	TO BE PRESERVED	40% DEAD
319	FRAXINUS SP.	35cm	POOR	TO BE PRESERVED	80% DEAD
318	FRAXINUS SP.	35cm	POOR	TO BE PRESERVED	80% DEAD
320	FRAXINUS SP.	35cm	POOR	TO BE PRESERVED	70% DEAD
321	FRAXINUS SP.	25cm	POOR	TO BE PRESERVED	BLOWN OVER, SPLIT TRUNK
322	PRUNUS SEROTINA	20cm	GOOD	TO BE PRESERVED	LEANING
323	FRAXINUS SP.	20cm	GOOD	TO BE PRESERVED	
326	FRAXINUS SP.	30cm	POOR	TO BE PRESERVED	LEANING, TRUNK ROT
327	FRAXINUS SP.	45cm	POOR	TO BE PRESERVED	50% DEAD, TRUNK WOUND
330	FRAXINUS SP.	50cm	FAIR	TO BE PRESERVED	40% DEAD, EXPOSED ROOTS
328	ACER SACCHARUM	40cm	FAIR	TO BE PRESERVED	TWISTED TRUNK
332	PRUNUS SEROTINA	35cm	DEAD	TO BE PRESERVED	TRUNK ONLY
331	OSTYRA VIRGINIANA	25cm	GOOD	TO BE PRESERVED	
337	PRUNUS SEROTINA	45cm	FAIR	TO BE PRESERVED	
334	PRUNUS SEROTINA	50cm	FAIR	TO BE PRESERVED	CO-DOMINANT STEMS W INCLUDED BARK
333	ACER SACCHARUM	45cm	DEAD	TO BE PRESERVED	TRUNK ONLY
335	QUERCUS MACROCARPA	65cm	FAIR	TO BE PRESERVED	20%DEAD
336	QUERCUS MACROCARPA	25cm	FAIR	TO BE REMOVED	
338A	PRUNUS SEROTINA	45cm	FAIR	TO BE PRESERVED	30% DEAD
339	PRUNUS SEROTINA	45cm	FAIR	TO BE PRESERVED	30% DEAD
340A	PRUNUS SEROTINA	40cm	FAIR	TO BE PRESERVED	30% DEAD
341	QUERCUS MACROCARPA	45cm	FAIR	TO BE PRESERVED	
342	TILIA AMERICANA	25cm	FAIR	TO BE PRESERVED	LEANING
343	TILIA AMERICANA	40cm	GOOD	TO BE PRESERVED	
347	ACER SACCHARUM	60cm	GOOD	TO BE PRESERVED	
349	ACER SACCHARUM	50cm	GOOD	TO BE PRESERVED	
349	FRAXINUS SP.	25cm	POOR	TO BE PRESERVED	60% DEAD
344	FRAXINUS SP.	45cm	POOR	TO BE REMOVED	TRUNK ROT, 75% DEAD
346	FRAXINUS SP.	30cm	FAIR	TO BE PRESERVED	
350	PRUNUS SEROTINA	30cm	GOOD	TO BE PRESERVED	
351	PINUS SYLVESTRIS	25cm	DEAD	TO BE REMOVED	TRUNK ONLY
356	ACER SACCHARUM	20cm	GOOD	TO BE REMOVED	
357	ACER SACCHARUM	25cm	FAIR	TO BE REMOVED	TRUNK WOUND
358	FRAXINUS SP.	65cm	FAIR	TO BE REMOVED	BENT TRUNK, TRUNK WOUND
362	FRAXINUS SP.	65cm	FAIR	TO BE REMOVED	
363	FRAXINUS SP.	60cm	FAIR	TO BE REMOVED	
1641	ACER SACCHARUM	20cm	GOOD	TO BE REMOVED	
352	ACER SACCHARUM	45cm	GOOD	TO BE PRESERVED	
353	ACER SACCHARUM	45cm	GOOD	TO BE PRESERVED	
355	PRUNUS SEROTINA	65cm	POOR	TO BE PRESERVED	TRUNK ROT
354	ACER SACCHARUM	25cm	GOOD	TO BE PRESERVED	
359	PINUS STROBUS	40cm	GOOD	TO BE PRESERVED	
360	PINUS STROBUS	40cm	DEAD	TO BE REMOVED	TRUNK ONLY
361	PINUS STROBUS	25cm	DEAD	TO BE REMOVED	TRUNK ONLY
369	ACER SACCHARUM	25cm	GOOD	TO BE PRESERVED	
368	PINUS STROBUS	45cm	FAIR	TO BE REMOVED	
367	PINUS STROBUS	45cm	FAIR	TO BE REMOVED	
365	OSTYRA VIRGINIANA	35cm	GOOD	TO BE PRESERVED	
364	ACER SACCHARUM	60cm	GOOD	TO BE PRESERVED	
366	PRUNUS SEROTINA	50cm	FAIR	TO BE PRESERVED	
385	FRAXINUS SP.	20cm	FAIR	TO BE PRESERVED	LEANING
387	FRAXINUS SP.	30cm	FAIR	TO BE PRESERVED	TRUNK WOUND
386	FRAXINUS SP.	35cm	POOR	TO BE PRESERVED	90% DEAD
388	FRAXINUS SP.	15cm	GOOD	TO BE PRESERVED	
389	PRUNUS SEROTINA	25cm	GOOD	TO BE PRESERVED	
373	PRUNUS SEROTINA	20cm	GOOD	TO BE PRESERVED	
374	PRUNUS SEROTINA	40cm	GOOD	TO BE PRESERVED	
370	PINUS STROBUS	25cm	GOOD	TO BE REMOVED	
371	PINUS STROBUS	45cm	POOR	TO BE REMOVED	SMALL CROWN
376	PINUS STROBUS	45cm	POOR	TO BE REMOVED	VINE CHOKED
377	PINUS STROBUS	65cm	FAIR	TO BE REMOVED	
372	FRAXINUS SP.	20cm	FAIR	TO BE PRESERVED	
378	PINUS STROBUS	20cm	DEAD	TO BE REMOVED	TRUNK ONLY
380	PINUS STROBUS	35cm	DEAD	TO BE REMOVED	TRUNK ONLY
379	PINUS STROBUS	35cm	FAIR	TO BE REMOVED	CO-DOMINANT STEMS W INCLUDED BARK
382	PINUS STROBUS	25cm	FAIR	TO BE REMOVED	VINE CHOKED
381	PINUS STROBUS	15cm	FAIR	TO BE REMOVED	SMALL CROWN
384	PINUS STROBUS	20cm	FAIR	TO BE REMOVED	
383	PINUS STROBUS	20cm	FAIR	TO BE REMOVED	CO-DOMINANT STEMS W INCLUDED BARK
390	TILIA AMERICANA	50cm	FAIR	TO BE PRESERVED	TRUNK CAVITIES
391	TILIA AMERICANA	35cm	GOOD	TO BE PRESERVED	
392	PINUS STROBUS	60cm	FAIR	TO BE REMOVED	
393	PINUS STROBUS	50cm	FAIR	TO BE REMOVED	
394	PINUS STROBUS	40cm	DEAD	TO BE REMOVED	
395	PINUS STROBUS	50cm	GOOD	TO BE REMOVED	TRUNK ONLY
396	ACER SACCHARUM	20cm	GOOD	TO BE REMOVED	
397	TILIA AMERICANA	50cm	GOOD	TO BE REMOVED	3 TRUNKS
398	FRAXINUS SP.	40cm	FAIR	TO BE REMOVED	50% DEAD, CO-DOM. STEMS W INCL. BARK
401	ACER SACCHARUM	65cm	GOOD	TO BE PRESERVED	
402	OSTYRA VIRGINIANA	60cm	GOOD	TO BE PRESERVED	
403	OSTYRA VIRGINIANA	25cm	GOOD	TO BE PRESERVED	
405	PINUS STROBUS	60cm	DEAD	TO BE PRESERVED	TRUNK ONLY
407	PINUS STROBUS	50cm	DEAD	TO BE PRESERVED	TRUNK ONLY
406	PINUS STROBUS	45cm	POOR	TO BE PRESERVED	
404	OSTYRA VIRGINIANA	20cm	GOOD	TO BE PRESERVED	
430	PRUNUS SEROTINA	45cm	FAIR	TO BE PRESERVED	
431	PRUNUS SEROTINA	45cm	FAIR	TO BE PRESERVED	
432	PRUNUS SEROTINA	60cm	FAIR	TO BE PRESERVED	
433	PRUNUS SEROTINA	65cm	FAIR	TO BE PRESERVED	
400	POPULUS SP.	25cm	POOR	TO BE REMOVED	
414	FRAXINUS SP.	20cm	GOOD	TO BE REMOVED	
413	PINUS SYLVESTRIS	35cm	DEAD	TO BE REMOVED	TRUNK ONLY
415	FRAXINUS SP.	25cm	FAIR	TO BE REMOVED	

410	PINUS STROBUS	25cm	DEAD	TO BE REMOVED	TRUNK ONLY
411	PINUS STROBUS	25cm	FAIR	TO BE REMOVED	
409	PINUS STROBUS	55cm	FAIR	TO BE PRESERVED	
412	FRAXINUS SP.	20cm	FAIR	M.	
416	ACER SACCHARUM	20cm	GOOD	TO BE REMOVED	ON SLOPE, CO-DOM. STEMS W INCL.BARK
417	ACER SACCHARUM	20cm	GOOD	TO BE REMOVED	ON SLOPE
1675	ACER SACCHARUM	20cm	GOOD	TO BE REMOVED	ON SLOPE
418	FRAXINUS SP.	20cm	GOOD	TO BE PRESERVED	
419	OSTYRA VIRGINIANA	20cm	GOOD	TO BE REMOVED	
438	PRUNUS SEROTINA	25cm	GOOD	TO BE PRESERVED	
435	PRUNUS SEROTINA	40cm	GOOD	TO BE PRESERVED	
434	PRUNUS SEROTINA	50cm	GOOD	TO BE PRESERVED	
444	PRUNUS SEROTINA	40cm	FAIR	TO BE PRESERVED	
421	PINUS STROBUS	45cm	FAIR	TO BE REMOVED	
423	PINUS STROBUS	25cm	DEAD	TO BE REMOVED	TRUNK ONLY
424A	PINUS STROBUS	25cm	DEAD	TO BE REMOVED	TRUNK ONLY
427A	PINUS STROBUS	35cm	FAIR	TO BE REMOVED	
420	PINUS STROBUS	45cm	DEAD	TO BE REMOVED	TRUNK ONLY
422	PINUS STROBUS	45cm	FAIR	TO BE REMOVED	
425	PINUS STROBUS	45cm	FAIR	TO BE REMOVED	
428A	PINUS STROBUS	25cm	POOR	TO BE REMOVED	SMALL CROWN
429	PINUS STROBUS	25cm	POOR	TO BE REMOVED	50% DEAD, 2 TRUNKS
467	FRAXINUS SP.	40cm	FAIR	TO BE PRESERVED	CO-DOMINANT STEMS W INCLUDED BARK
426A	PRUNUS SEROTINA	30cm	POOR	TO BE REMOVED	80% DEAD, LEANING
445A	PRUNUS SEROTINA	40cm	FAIR	TO BE PRESERVED	
442	PRUNUS SEROTINA	50cm	FAIR	TO BE PRESERVED	
446	PRUNUS SEROTINA	20cm	POOR	TO BE PRESERVED	TRUNK ROT, 75% DEAD
441	PRUNUS SEROTINA	25cm	FAIR	TO BE PRESERVED	
437	ACER SACCHARUM	15cm	GOOD	TO BE PRESERVED	
435	PRUNUS SEROTINA	50cm	FAIR	TO BE PRESERVED	
439A	PRUNUS SEROTINA	30cm	FAIR	TO BE PRESERVED	
440A	PRUNUS SEROTINA	20cm	FAIR	TO BE PRESERVED	
443A	PRUNUS SEROTINA	20cm	DEAD	TO BE PRESERVED	
449	PRUNUS SEROTINA	25cm	GOOD	TO BE PRESERVED	
447A	PRUNUS SEROTINA	20cm	DEAD	TO BE PRESERVED	
446	PRUNUS SEROTINA	30cm	FAIR	TO BE PRESERVED	
450	PRUNUS SEROTINA	45cm	FAIR	TO BE PRESERVED	
451	PRUNUS SEROTINA	20cm	DEAD	TO BE PRESERVED	
452A	OSTYRA VIRGINIANA	30cm	GOOD	TO BE PRESERVED	LEANING
457	PRUNUS SEROTINA	25cm	FAIR	TO BE REMOVED	
458	ACER SACCHARUM	25cm	GOOD	TO BE PRESERVED	CO-DOMINANT STEMS W INCLUDED BARK
460	PINUS STROBUS	35cm	FAIR	TO BE REMOVED	
459	PINUS STROBUS	50cm	FAIR	TO BE REMOVED	
461	PINUS STROBUS	40cm	DEAD	TO BE REMOVED	
462	PINUS STROBUS	50cm	FAIR	TO BE REMOVED	
463	PINUS STROBUS	40cm	FAIR	TO BE REMOVED	
464	PINUS STROBUS	40cm	POOR	TO BE REMOVED	VINE CHOKED
465	PINUS STROBUS	35cm	POOR	TO BE REMOVED	SMALL CROWN
466	PINUS STROBUS	50cm	FAIR	TO BE REMOVED	
456A	PRUNUS SEROTINA	25cm	FAIR	TO BE PRESERVED	
455A	PRUNUS SEROTINA	55cm	FAIR	TO BE PRESERVED	
454	PRUNUS SEROTINA	45cm	FAIR	TO BE PRESERVED	
453	PRUNUS SEROTINA	30cm	FAIR	TO BE PRESERVED	
474A	PRUNUS SEROTINA	20cm	FAIR	TO BE PRESERVED	
473	OSTYRA VIRGINIANA	25cm	GOOD	TO BE PRESERVED	
475	PRUNUS SEROTINA	30cm	FAIR	TO BE PRESERVED	
476A	OSTYRA VIRGINIANA	25cm	GOOD	TO BE PRESERVED	
477A	OSTYRA VIRGINIANA	30cm	FAIR	TO BE PRESERVED	CO-DOMINANT STEMS W INCLUDED BARK
468	PINUS STROBUS	20cm	POOR	TO BE REMOVED	VINE CHOKED
469	ACER SACCHARUM	25cm	FAIR	TO BE REMOVED	
470	PINUS STROBUS	25cm	DEAD	TO BE REMOVED	
471	PINUS STROBUS	30cm	FAIR	TO BE REMOVED	
472A	PINUS STROBUS	40cm	FAIR	TO BE REMOVED	
480A	PINUS STROBUS	45cm	FAIR	TO BE REMOVED	SUPPRESSED ONE SIDE
481A	PINUS STROBUS	25cm	DEAD	TO BE REMOVED	
482	PINUS STROBUS	40cm	FAIR	TO BE REMOVED	
479A	PINUS STROBUS	50cm	FAIR	TO BE REMOVED	
483	PINUS STROBUS	25cm	FAIR	TO BE REMOVED	
488	PRUNUS SEROTINA	50cm	FAIR	TO BE PRESERVED	
489A	PRUNUS SEROTINA	45cm	FAIR	TO BE PRESERVED	
490	PRUNUS SEROTINA	20cm	FAIR	TO BE PRESERVED	
491	PRUNUS SEROTINA	30cm	FAIR	TO BE PRESERVED	
475	PRUNUS SEROTINA	25cm	FAIR	TO BE PRESERVED	
489	PINUS STROBUS	50cm	FAIR	TO BE PRESERVED	SUPPRESSED ONE SIDE
486	PINUS STROBUS	50cm	FAIR	TO BE REMOVED	
484	PINUS STROBUS	45cm	DEAD	TO BE REMOVED	
485	PINUS STROBUS	50cm	FAIR	TO BE PRESERVED	
487	PINUS STROBUS	50cm	FAIR	TO BE REMOVED	
492	PRUNUS SEROTINA	45cm	FAIR	TO BE PRESERVED	
493	PRUNUS SEROTINA	45cm	POOR	TO BE PRESERVED	CO-DOMINANT STEMS W INCLUDED BARK
494	PRUNUS SEROTINA	25cm	FAIR	TO BE PRESERVED	LEANING
1616	PINUS STROBUS	25cm	POOR	TO BE REMOVED	SMALL CROWN
495	PRUNUS SEROTINA	25cm	FAIR	TO BE PRESERVED	LEANING
496	PRUNUS SEROTINA	35cm	FAIR	TO BE PRESERVED	
497	PRUNUS SEROTINA	50cm	FAIR	TO BE PRESERVED	
498	ACER SACCHARUM	20cm	GOOD	TO BE PRESERVED	
499A	PRUNUS SEROTINA	20cm	FAIR	TO BE PRESERVED	
1617	PINUS STROBUS	25cm	FAIR	TO BE REMOVED	SUPPRESSED ONE SIDE
1618	PINUS STROBUS	55cm	POOR	TO BE REMOVED	75% DEAD
1619	PINUS STROBUS	55cm	POOR	TO BE REMOVED	
1610	PRUNUS SEROTINA	20cm	POOR	TO BE PRESERVED	
1611	PRUNUS SEROTINA	20cm	FAIR	TO BE PRESERVED	
1612	PRUNUS SEROTINA	25cm	POOR	TO BE PRESERVED	
1613A	PRUNUS SEROTINA	35cm	POOR	TO BE PRESERVED	TRUNK ROT
1614A	PRUNUS SEROTINA	50cm	FAIR	TO BE PRESERVED	CO-DOMINANT STEMS W INCLUDED BARK
1615	PRUNUS SEROTINA	40cm	FAIR	TO BE PRESERVED	2 TRUNKS
1620	PINUS STROBUS	25cm	DEAD	TO BE PRESERVED	
1621	PINUS STROBUS	45cm	FAIR	TO BE REMOVED	
1626	PRUNUS SEROTINA	45cm	FAIR	TO BE PRESERVED	3 TRUNKS
1608	PRUNUS SEROTINA	45cm	FAIR	TO BE PRESERVED	CO-DOM. STEMS W INCL. BARK, TRUNK ROT
1607	PRUNUS SEROTINA	55cm	FAIR	TO BE PRESERVED	
500A	PRUNUS SEROTINA	35cm	POOR	TO BE PRESERVED	CO-DOM. STEMS W INCL. BARK, TRUNK ROT
1629	PRUNUS SEROTINA	45cm	FAIR	TO BE PRESERVED	
1627A	PRUNUS SEROTINA	40cm	POOR	TO BE PRESERVED	90% DEAD
1628	PRUNUS SEROTINA	40cm	FAIR	TO BE REMOVED	
1632A	PRUNUS SEROTINA	45cm	FAIR	TO BE PRESERVED	
1631A	PRUNUS SEROTINA	45cm	FAIR	TO BE PRESERVED	CO-DOM. STEMS W INCL. BARK, TRUNK ROT
1630A	PRUNUS SEROTINA	45cm	FAIR	TO BE PRESERVED	
1633A	PRUNUS SEROTINA	20cm	FAIR	TO BE PRESERVED	LEANING
1634	PRUNUS SEROTINA	20cm	POOR	TO BE PRESERVED	3 DEAD TRUNKS
1624A	PRUNUS SEROTINA	30cm	FAIR	TO BE PRESERVED	
1625	PINUS STROBUS	20cm	DEAD	TO BE PRESERVED	
1623A	PINUS STROBUS	45cm	FAIR	TO BE REMOVED	

1741	PINUS STROBUS	45cm	FAIR	TO BE REMOVED	
1740	PINUS STROBUS	25cm	DEAD	TO BE REMOVED	
1739	PINUS STROBUS	25cm	DEAD	TO BE REMOVED	
1738A	PINUS SYLVESTRIS	25cm	POOR	TO BE REMOVED	SMALL CROWN
1693	PINUS STROBUS	25cm	FAIR	TO BE REMOVED	
1737A	PINUS STROBUS	40cm	POOR	TO BE PRESERVED	SMALL CROWN
1635	PRUNUS SEROTINA	50cm	FAIR	TO BE PRESERVED	2 TRUNKS
1736	PRUNUS SEROTINA	25cm	POOR	TO BE REMOVED	90% DEAD
1735	PINUS STROBUS	25cm	DEAD	TO BE REMOVED	
1754	OSTYRA VIRGINIANA	20cm	GOOD	TO BE PRESERVED	
1636	PRUNUS SEROTINA	40cm	FAIR	TO BE PRESERVED	CO-DOM. STEMS W INCL. BARK
1637	ACER SACCHARUM	20cm	FAIR	TO BE PRESERVED	TRUNK WOUND
1696	PINUS STROBUS	30cm	POOR	TO BE REMOVED	95% DEAD
1697A	PINUS STROBUS	45cm	FAIR	TO BE REMOVED	
1698A	PINUS STROBUS	50cm	FAIR	TO BE REMOVED	
1699A	PINUS STROBUS	45cm	DEAD	TO BE REMOVED	
1702	PINUS STROBUS	45cm	FAIR	TO BE REMOVED	
1684A	PINUS STROBUS	25cm	DEAD	TO BE REMOVED	
1700	PINUS STROBUS	40cm	FAIR	TO BE REMOVED	
1701	PINUS STROBUS	30cm	FAIR	TO BE REMOVED	
1703	PINUS STROBUS	25cm	DEAD	TO BE REMOVED	
1704	PINUS SYLVESTRIS	35cm	POOR	TO BE REMOVED	
1709	PINUS STROBUS	15cm	FAIR	TO BE REMOVED	
1710A	PINUS SYLVESTRIS	15cm	POOR	TO BE REMOVED	90% DEAD
1708	PINUS SYLVESTRIS	30cm	POOR	TO BE REMOVED	
1707	PINUS STROBUS	45cm	FAIR	TO BE REMOVED	
1705	PINUS STROBUS	20cm	FAIR	TO BE REMOVED	
1706	PINUS STROBUS	30cm	POOR	TO BE REMOVED	
1711A	PINUS SYLVESTRIS	20cm	FAIR	TO BE REMOVED	
1712	ACER SACCHARUM	20cm	GOOD	TO BE REMOVED	
1713	PINUS STROBUS	30cm	FAIR	TO BE REMOVED	
1714A	PINUS STROBUS	40cm	FAIR	TO BE REMOVED	
1715	PINUS SYLVESTRIS	25cm	FAIR	TO BE PRESERVED	
1728	PINUS STROBUS	30cm	FAIR	TO BE REMOVED	
1729	ACER NEGUNDO	20cm	GOOD	TO BE REMOVED	
1730	PINUS SYLVESTRIS	25cm	DEAD	TO BE REMOVED	
1716	PINUS STROBUS	40cm	FAIR	TO BE REMOVED	
1719	PINUS STROBUS	30cm	FAIR	TO BE REMOVED	
1720	PINUS STROBUS	25cm	DEAD	TO BE REMOVED	
1718	PINUS STROBUS	30cm	FAIR	TO BE REMOVED	
1721	PINUS STROBUS	20cm	FAIR	TO BE REMOVED	
1727	PINUS STROBUS	25cm	DEAD	TO BE REMOVED	
1722	PINUS SYLVESTRIS	25cm	DEAD	TO BE REMOVED	
1726	PINUS STROBUS	25cm	FAIR	TO BE REMOVED	
1725	PINUS STROBUS	40cm	FAIR	TO BE REMOVED	
1724	PINUS STROBUS	30cm	FAIR	TO BE REMOVED	
1723	PINUS SYLVESTRIS	25cm	DEAD	TO BE REMOVED	
1692	PINUS SYLVESTRIS	25cm	DEAD	TO BE REMOVED	
1691	PINUS STROBUS	15cm	POOR	TO BE REMOVED	
1690A	PINUS STROBUS	45cm	FAIR	TO BE REMOVED	
1688A	PINUS STROBUS	45cm	FAIR	TO BE REMOVED	
1689A	PINUS STROBUS	25cm	FAIR	TO BE REMOVED	
1687	PRUNUS SEROTINA	40cm	GOOD	TO BE REMOVED	COPPICE
1686	PINUS STROBUS	45cm	FAIR	TO BE REMOVED	
1685	PINUS STROBUS	45cm	FAIR	TO BE REMOVED	
1683	ACER SACCHARUM	25cm	GOOD	TO BE REMOVED	
1682	ACER NEGUNDO	25cm	FAIR	TO BE REMOVED	LEANING
1681	ACER NEGUNDO	25cm	FAIR	TO BE REMOVED	LEANING
1680	ACER NEGUNDO	20cm	FAIR	TO BE REMOVED	LEANING
1679	ACER NEGUNDO	20cm	FAIR	TO BE REMOVED	LEANING
1678	ACER NEGUNDO	30cm	FAIR	TO BE REMOVED	3 TRUNKS
1674	ACER NEGUNDO	40cm	GOOD	TO BE REMOVED	3 TRUNKS
1676	FRAXINUS SP.	25cm	DEAD	TO BE REMOVED	
1645	CRATAEGUS SP.	25cm	DEAD	TO BE REMOVED	



2 **TREE PROTECTION FENCING**
NTS

GENERAL NOTES

1. ALL WORKMANSHIP WILL BE TO THE STANDARDS OF LANDSCAPE ONTARIO.
2. ALL PLANT MATERIAL TO BE NO.1 GRADE NURSERY GROWN IN ACCORDANCE WITH THE CANADIAN STANDARDS FOR NURSERY STOCK, 6TH EDITION, 1998, BY THE CANADIAN NURSERY TRADES ASSOCIATION.
3. BACKFILL WILL CONSIST OF SOIL NATIVE TO THE SITE OR GENERAL SOIL TYPE/CLASS NATIVE TO THE SITE. TOPSOIL TO BE TESTED FOR NUTRIENT VALUE, AND AMENDED FOR OPTIMAL GROWTH AS PER THE RECOMMENDATIONS OF THE SOIL TEST.
4. CONTRACTOR SHALL MAINTAIN ALL LANDSCAPE AREAS UNTIL OWNER'S ACCEPTANCE OF PROJECT.
5. CONTRACTOR TO LOCATE ALL UNDERGROUND UTILITIES.
6. PLANTING MAY BE ADJUSTED TO SUIT LOCATIONS OF SITE UTILITY STRUCTURES/SERVICES.
7. ALL MATERIALS MUST BE APPROVED BY LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.
8. SPREAD MULCH TO A MINIMUM OF 100mm COMPACTED DEPTH ON ALL TREE PITS AND PLANTING BEDS.
9. CHECK AND VERIFY ALL DIMENSIONS AND QUANTITIES PRIOR TO COMMENCEMENT OF WORK. ANY DISCREPANCIES ARE TO BE REPORTED IN WRITING TO THE LANDSCAPE ARCHITECT. QUANTITIES NOTED WITHIN THE PLAN SUPERCEDE THOSE IN THE PLANT LIST. ANY SUBSTITUTIONS SHALL BE APPROVED BY THE LANDSCAPE ARCHITECT.
10. SOD AS MARKED WITH NURSERY SOD ON A MINIMUM OF 100mm OF CLEAN TOPSOIL. FINE GRADE AND SOD ALL BOULEVARD AREAS TO MUNICIPAL SPECIFICATIONS AND REPAIR DAMAGE TO ADJACENT PROPERTIES, AS REQUIRED.
11. FINAL INSPECTION AND ACCEPTANCE OF PLANTING WORK SHALL COINCIDE WITH THE FINAL INSPECTION AND ACCEPTANCE OF ALL WORK INCLUDED IN THE CONTRACT.
12. ALL SEEDED SLOPES 3:1 AND GREATER TO RECEIVE EROSION CONTROL MATTING (COIR MAT, OR OTHER WILDLIFE FRIENDLY ALTERNATIVE). PIN SOD ON ALL SLOPES OF 3:1 OR GREATER.
13. SUBMIT A WRITTEN GUARANTEE TO THE EFFECT THAT ALL PLANTS ACCEPTED DURING THE PERIOD OF JANUARY 1st TO JULY 15th SHALL BE GUARANTEED UNTIL JULY 15th THE FOLLOWING YEAR. PLANTS ACCEPTED DURING THE PERIOD OF JULY 15th TO DECEMBER 31st SHALL BE GUARANTEED FOR ONE YEAR FROM THE DATE OF ACCEPTANCE. THE GUARANTEE PERIODS LISTED ABOVE SHALL APPLY TO ALL "NURSERY GROWN" PLANTS.
14. AT THE TIME OF FINAL INSPECTION ALL PLANTS SHALL BE IN A HEALTHY, VIGOUROUS GROWING CONDITION, PLANTED IN FULL ACCORDANCE WITH DRAWINGS AND CONDITIONS.
15. TOPOGRAPHIC INFORMATION AS PER VAN HARTEN SURVEYING.
16. DRAFT PLAN OF SUBDIVISION INFORMATION AS PER ASTRID J CLOS PLANNING CONSULTANTS.
17. ENGINEERING AS PER GM BLUEPLAN ENGINEERING LIMITED.

ELORA RIDGE DEVELOPMENTS LIMITED
INVERHAUGH PASTURE EDGE SUBDIVISION

ONTARIO ASSOCIATION OF LANDSCAPE ARCHITECTS
AARON W. HILL
OALA
MEMBER

no.	date	description	by
1.	Dec.14.18	Issued for approval	CMH
REVISIONS			

PROPOSED DEVELOPMENT
INVERHAUGH
TOWNSHIP OF CENTRE WELLINGTON

Tree Management Plan

MacKinnon & Associates
a division of 907216 Ontario Inc.
Providing Solutions in Urban, Landscape and Environmental Planning
550 Parkside Drive, Unit A-21, Waterloo, Ontario N2L 5V4
Tel. (519) 725-5140 FAX (519) 725-5144

DRAWN BY:	DESIGNED BY:	APPROVED BY:
CMH	CMH	AWH
PROJECT NO. 2018-58	SCALE: 1:400	DATE: August 2018
PLOTTED: December 14, 2018	SHEET: L2	

APPENDIX IV Plant Species Inventoried Within the Study Area

Vascular Plant Species Reported From the Study Area

Scientific Name	Common Name	SRANK[1]	COSSARO[2]	COSEWIC[3]	SARA Schedule[4]	Wellington/ Dufferin County[5]	NRSI Observed					
							CUM1	CUP3-3	CUT1	FOC4-1	FOD5-7	SWC1-1
Pteridophytes	**Ferns & Allies**											
Dryopteridaceae	**Wood Fern Family**											
Cystopteris bulbifera	Bulblet Fern	S5				X				X		
Dryopteris carthusiana	Spinulose Wood Fern	S5				X				X	X	X
Matteuccia struthiopteris var. pensylvanica	Ostrich Fern	S5				X				X	X	
Onoclea sensibilis	Sensitive Fern	S5				X				X		X
Equisetaceae	**Horsetail Family**											
Equisetum arvense	Field Horsetail	S5				X				X		X
Gymnosperms	**Conifers**											
Cupressaceae	**Cypress Family**											
Thuja occidentalis	White Cedar	S5				X	X			X		X
Pinaceae	**Pine Family**											
Pinus sylvestris	Scots Pine	SE5				X		X				
Dicotyledons	**Dicots**											
Aceraceae	**Maple Family**											
Acer negundo	Manitoba Maple	S5				X	X	X		X		X
Acer saccharum ssp. saccharum	Sugar Maple	S5				X				X		
Acer saccharum ssp. nigrum	Black Maple	S4?				X					X	
Anacardiaceae	**Sumac or Cashew Family**											
Toxicodendron rydbergii	Poison-ivy	S5				X						X
Apiaceae	**Carrot or Parsley Family**											
Cicuta bulbifera	Bulb-bearing Water-hemlock	S5				X						X
Cicuta maculata	Spotted Water-hemlock	S5				X						X
Daucus carota	Wild Carrot	SE5				X			X			
Heracleum maximum	Cow-parsnip	S5				X						X
Asclepiadaceae	**Milkweed Family**											
Asclepias incarnata ssp. incarnata	Swamp Milkweed	S5				X						X
Asclepias syriaca	Common Milkweed	S5				X	X		X			
Asteraceae	**Composite or Aster Family**											
Achillea millefolium ssp. millefolium	Common Yarrow	SE?				X	X					
Antennaria neglecta	Field Pussytoes	S5				X	X					
Arctium minus ssp. minus	Common Burdock	SE5				X	X		X			
Bidens cernua	Stick-tight	S5				X						X
Bidens frondosa	Devil's Beggar-ticks	S5				X				X		X
Carduus nutans ssp. nutans	Musk Thistle	SE?				X	X					
Cirsium arvense	Canada Thistle	SE5				X			X			
Conyza canadensis	Horseweed	S5				X	X		X		X	
Erigeron philadelphicus ssp. philadelphicus	Philadelphia Fleabane	S5				X		X	X			
Eupatorium perfoliatum	Perfoliate Thoroughwort	S5				X						X
Eupatorium maculatum ssp. maculatum	Spotted Joe-pye-weed	S5				X				X		X
Euthamia graminifolia	Flat-topped Bushy Goldenrod	S5				X	X					X
Hieracium caespitosum ssp. caespitosum	Field Hawkweed	SE5					X					
Lapsana communis	Nipplewort	SE5				X				X		

Scientific Name	Common Name	SRANK[1]	COSSARO[2]	COSEWIC[3]	SARA Schedule[4]	Wellington/ Dufferin County[5]	NRSI Observed					
							CUM1	CUP3-3	CUT1	FOC4-1	FOD5-7	SWC1-1
Solidago altissima var. altissima	Tall Goldenrod	S5				X	X					
Solidago canadensis	Canada Goldenrod	S5				X	X		X	X		
Sonchus arvensis ssp. arvensis	Field Sow-thistle	SE5				X	X					
Sonchus asper ssp. asper	Spiny-leaved Sow-thistle	SE5				X	X					
Sonchus oleraceus	Common Sow-thistle	SE5				X	X				X	
Symphyotrichum lanceolatum var. lanceolatum	Tall White Aster	S5				X	X			X		X
Symphyotrichum lateriflorum var. lateriflorum	Calico Aster	S5				X				X	X	X
Symphyotrichum novae-angliae	New England Aster	S5				X	X	X	X			
Symphyotrichum puniceum	Purple-stemmed Aster	S5							X			X
Tanacetum vulgare	Common Tansy	SE5				X	X	X	X			
Tragopogon pratensis ssp. pratensis	Meadow Goat's-beard	SE5				X	X					
Tussilago farfara	Coltsfoot	SE5				X				X		
Balsaminaceae	**Touch-me-not Family**											
Impatiens capensis	Spotted Touch-me-not	S5				X				X		
Boraginaceae	**Borage Family**											
Echium vulgare	Blueweed	SE5				X	X	X				
Myosotis scorpioides	Mouse-ear Scorpion-grass	SNA				X				X		X
Brassicaceae	**Mustard Family**											
Alliaria petiolata	Garlic Mustard	SE5					X	X	X	X	X	
Hesperis matronalis	Dame's Rocket	SE5				X		X		X	X	
Lepidium densiflorum	Common Pepper-grass	SE5				X	X					
Nasturtium officinale	Water-cress	SE?										X
Campanulaceae	**Bellflower Family**											
Lobelia siphilitica	Great Lobelia	S5				X				X		
Caprifoliaceae	**Honeysuckle Family**											
Lonicera tatarica	Tartarian Honeysuckle	SE5				X	X	X	X			
Sambucus racemosa ssp. pubens	Red-berried Elderberry	S5				X				X	X	
Triosteum aurantiacum	Wild Coffee	S5								X		
Viburnum opulus	Guelder Rose	SE4								X		
Caryophyllaceae	**Pink Family**											
Cerastium arvense	Field Chickweed	S5				X	X					
Chenopodiaceae	**Goosefoot Family**											
Chenopodium album var. album	Lamb's-quarters	SE5				X	X					
Cornaceae	**Dogwood Family**											
Cornus alternifolia	Alternate-leaved Dogwood	S5				X		X		X		X
Cornus stolonifera	Red-osier Dogwood	S5				X			X	X		X
Cucurbitaceae	**Gourd Family**											
Echinocystis lobata	Prickly Cucumber	S5				X		X		X		
Dipsacaceae	**Teasel Family**											
Dipsacus fullonum ssp. sylvestris	Wild Teasel	SE5				X	X		X			
Fabaceae	**Pea Family**											
Amphicarpaea bracteata	Hog Peanut	S5				X				X		X
Lotus corniculatus	Bird's-foot Trefoil	SE5				X	X					

Scientific Name	Common Name	SRANK[1]	COSSARO[2]	COSEWIC[3]	SARA Schedule[4]	Wellington/ Dufferin County[5]	NRSI Observed					
							CUM1	CUP3-3	CUT1	FOC4-1	FOD5-7	SWC1-1
Melilotus alba	White Sweet-clover	SE5				X	X					
Fagaceae	**Beech Family**											
Quercus macrocarpa	Bur Oak	S5				X					X	
Geraniaceae	**Geranium Family**											
Geranium robertianum	Herb Robert	SE5				X		X		X	X	
Grossulariaceae	**Currant Family**											
Ribes cynosbati	Prickly Gooseberry	S5				X		X				
Guttiferae	**St. John's-wort Family**											
Hypericum ascyron	Great St. John's-wort	S3?				X						X
Hypericum perforatum	Common St. John's-wort	SE5				X	X		X			
Juglandaceae	**Walnut Family**											
Juglans nigra	Black Walnut	S4				X Int	X			X		
Lamiaceae	**Mint Family**											
Clinopodium vulgare	Wild Basil	S5				X	X				X	
Glechoma hederacea	Creeping Charlie	SE5				X				X		
Leonurus cardiaca ssp. cardiaca	Common Motherwort	SE5				X	X	X	X			
Lycopus uniflorus	Northern Water-horehound	S5				X						X
Mentha X piperita	Pepper Mint	SE4				X						X
Nepeta cataria	Catnip	SE5				X	X					
Scutellaria lateriflora	Mad-dog Skullcap	S5				X						X
Lythraceae	**Loosestrife Family**											
Lythrum salicaria	Purple Loosestrife	SE5				X						X
Oleaceae	**Olive Family**											
Fraxinus americana	White Ash	S5				X		X			X	
Fraxinus nigra	Black Ash	S5		T		X						X
Onagraceae	**Evening-primrose Family**											
Circaea lutetiana ssp. canadensis	Yellowish Enchanter's Nightshade	S5				X				X	X	
Epilobium coloratum	Purple-veined Willow-herb	S5				X				X		
Epilobium hirsutum	Great Hairy Willow-herb	SE5				X						X
Oenothera biennis	Common Evening-primrose	S5				X			X			
Oxalidaceae	**Wood Sorrel Family**											
Oxalis stricta	Upright Yellow Wood-sorrel	S5				X						X
Papaveraceae	**Poppy Family**											
Chelidonium majus	Celandine	SE5				X		X		X		
Sanguinaria canadensis	Bloodroot	S5				X		X				
Plantaginaceae	**Plantain Family**											
Plantago lanceolata	Ribgrass	SE5				X	X					
Polygonaceae	**Smartweed Family**											
Persicaria hydropiper	Water-pepper	SE5				X				X		
Rumex crispus	Curly-leaf Dock	SE5				X				X		
Rumex obtusifolius ssp. obtusifolius	Bitter Dock	SE5				X				X		

Scientific Name	Common Name	SRANK[1]	COSSARO[2]	COSEWIC[3]	SARA Schedule[4]	Wellington/ Dufferin County[5]	NRSI Observed					
							CUM1	CUP3-3	CUT1	FOC4-1	FOD5-7	SWC1-1
Primulaceae	**Primrose Family**											
Lysimachia ciliata	Fringed Loosestrife	S5				X				X		X
Lysimachia nummularia	Moneywort	SE5				X				X		
Ranunculaceae	**Buttercup Family**											
Anemone canadensis	Canada Anemone	S5				X	X					
Caltha palustris	Marsh-marigold	S5				X						X
Ranunculus acris	Tall Buttercup	SE5				X				X		
Ranunculus hispidus var. caricetorum	Swamp Buttercup	S5				X						X
Thalictrum dasycarpum	Purple Meadow-rue	S4?										X
Thalictrum pubescens	Tall Meadow-rue	S5				X				X		
Rhamnaceae	**Buckthorn Family**											
Rhamnus cathartica	European Buckthorn	SE5				X	X	X	X	X	X	X
Rosaceae	**Rose Family**											
Agrimonia gryposepala	Tall Hairy Agrimony	S5				X					X	
Crataegus punctata	Large-fruited Thorn	S5				X	X			X		
Geum aleppicum	Yellow Avens	S5				X		X	X	X		X
Potentilla inclinata	Downy Cinquefoil	SNA					X					
Potentilla recta	Rough-fruited Cinquefoil	SE5					X		X			
Prunus serotina	Black Cherry	S5						X		X		
Prunus virginiana ssp. virginiana	Choke Cherry	S5				X		X		X		X
Rubus caesius	European Dewberry	SEH									X	
Rubus idaeus ssp. melanolasius	Wild Red Raspberry	S5				X	X	X	X		X	
Rubus occidentalis	Black Raspberry	S5				X	X		X	X	X	
Sorbus aucuparia	European Mountain-ash	SE4				X				X		
Salicaceae	**Willow Family**											
Populus balsamifera ssp. balsamifera	Balsam Poplar	S5				X			X			
Salix alba var. vitellina	Weeping Willow	SU										X
Salix bebbiana	Long-beaked Willow	S5				X						X
Salix eriocephala	Heart-leaved Willow	S5				X	X		X			
Salix exigua	Sandbar Willow	S5							X			
Salix fragilis	Crack Willow	SE5				X						X
Salix nigra	Black Willow	S4?										X
Scrophulariaceae	**Figwort Family**											
Chelone glabra	Turtlehead	S5				X						X
Linaria vulgaris	Butter-and-eggs	SE5				X	X					
Verbascum thapsus	Common Mullein	SE5				X	X					
Veronica anagallis-aquatica	Water Speedwell	SE5				X						X
Veronica officinalis	Common Speedwell	SE5				X				X		
Solanaceae	**Nightshade Family**											
Solanum dulcamara	Bitter Nightshade	SE5				X	X	X	X	X		X
Tiliaceae	**Linden Family**											
Tilia americana	American Basswood	S5				X				X		
Ulmaceae	**Elm Family**											
Celtis occidentalis	Common Hackberry	S4				X	X			X		
Ulmus americana	White Elm	S5				X				X		

Scientific Name	Common Name	SRANK[1]	COSSARO[2]	COSEWIC[3]	SARA Schedule[4]	Wellington/ Dufferin County[5]	NRSI Observed					
							CUM1	CUP3-3	CUT1	FOC4-1	FOD5-7	SWC1-1
Ulmus pumila	Siberian Elm	SE3							X			
Urticaceae	**Nettle Family**											
Laportea canadensis	Wood Nettle	S5				X				X		X
Pilea pumila	Dwarf Clearweed	S5				X				X		
Urtica dioica ssp. dioica	European Stinging Nettle	SE2								X		X
Verbenaceae	**Vervain Family**											
Verbena hastata	Blue Vervain	S5				X						X
Verbena urticifolia	White Vervain	S5				X	X					
Vitaceae	**Grape Family**											
Parthenocissus vitacea	Woodbine	S5				X		X			X	
Parthenocissus quinquefolia	Virginia-creeper	S4?						X				
Vitis riparia	Riverbank Grape	S5				X			X			
Monocotyledons	**Monocots**											
Alismataceae	**Water-plantain Family**											
Alisma plantago-aquatica	Common Water-plantain	S5				X						X
Araceae	**Arum Family**											
Arisaema triphyllum	Jack-in-the-pulpit	S5				X				X		
Cyperaceae	**Sedge Family**											
Carex arctata	Drooping Wood Sedge	S5				X				X		
Carex hirtifolia	Pubescent Sedge	S5				X					X	
Liliaceae	**Lily Family**											
Allium tricoccum	Wild Leek	S5									X	
Trillium grandiflorum	White Trillium	S5				X				X		
Orchidaceae	**Orchid Family**											
Epipactis helleborine	Common Helleborine	SE5				X				X		
Poaceae	**Grass Family**											
Agrostis gigantea	Redtop	SE5				X	X					
Agrostis stolonifera	Redtop	S5				X						X
Arrhenatherum elatius	Tall Oat Grass	SE4				X						X
Bromus inermis ssp. inermis	Awnless Brome	SE5				X	X	X				
Dactylis glomerata	Orchard Grass	SE5				X	X			X		
Digitaria sanguinalis	Large Crabgrass	SE5				X			X			
Elymus repens	Quack Grass	SE5				X	X					
Elymus virginicus var. virginicus	Virginia Wild Rye	S5				X				X		X
Glyceria grandis	Tall Manna Grass	S4S5				X						X
Glyceria striata	Fowl Meadow Grass	S5				X						X
Leersia oryzoides	Rice Cut Grass	S5				X				X		X
Muhlenbergia mexicana var. mexicana	Mexican Satin Grass	S5				X						X
Panicum capillare	Witch Grass	S5				X	X					
Phalaris arundinacea	Reed Canary Grass	S5				X			X			X
Phleum pratense	Timothy	SE5				X	X	X				
Poa compressa	Canada Blue Grass	S5				X Int	X					
Poa palustris	Fowl Meadow Grass	S5				X						X
Poa pratensis ssp. pratensis	Kentucky Bluegrass	S5				X	X					
Setaria pumila	Yellow Foxtail	SE5				X	X		X			

Scientific Name	Common Name	SRANK[1]	COSSARO[2]	COSEWIC[3]	SARA Schedule[4]	Wellington/ Dufferin County[5]	NRSI Observed					
							CUM1	CUP3-3	CUT1	FOC4-1	FOD5-7	SWC1-1
Sphenopholis intermedia	Slender Wedge Grass	S4S5				X						X
Typhaceae	**Cattail Family**											
Typha latifolia	Broad-leaved Cattail	S5				X						X

[1,2]MNRF 2018b, [3,4]Government of Canada 2018, [5]Riley 1989

LEGEND
SRANK
S2 Imperiled
S3 Vulnerable
S4 Apparently Secure
S5 Secure
SNA Unranked
SE# Exotic
S#? Rank Uncertain
SH Presumably Extirpated (Historical)
Wellington/Dufferin County
X Native ,Present and all Introduced Species
R Native, Present, and Provincially or Otherwise Rare

APPENDIX V Bird Species Reported From the Study Area and Vicinity

Bird Species Reported From the Study Area

Scientific Name	Common Name	SRANK[1]	COSSARO[2]	COSEWIC[3]	SARA Schedule[4]	OBBA 17NJ43	NRSI Observed
Anatidae	**Ducks, Geese & Swans**						
Branta canadensis	Canada Goose	S5				CO	
Aix sponsa	Wood Duck	S5				CO	
Anas platyrhynchos	Mallard	S5				CO	
Lophodytes cucullatus	Hooded Merganser	S5B, S5N				PR	
Phasianidae	**Partridges, Grouse & Turkeys**						
Bonasa umbellus	Ruffed Grouse	S4				PR	
Meleagris gallopavo	Wild Turkey	S5				PR	PO
Columbidae	**Pigeons & Doves**						
Columba livia	Rock Pigeon	SNA				CO	PO
Zenaida macroura	Mourning Dove	S5				CO	PR
Apodidae	**Swifts**						
Chaetura pelagica	Chimney Swift	S4B, S4N	THR	T	Schedule 1	PO	
Trochilidae	**Hummingbirds**						
Archilochus colubris	Ruby-throated Hummingbird	S5B				PO	PO
Charadriidae	**Plovers**						
Charadrius vociferus	Killdeer	S5B, S5N				CO	PR
Scolopacidae	**Waders**						
Bartramia longicauda	Upland Sandpiper	S4B				CO	
Gallinago delicata	Wilson's Snipe	S5B				PO	CO
Scolopax minor	American Woodcock	S4B				PR	PO
Actitis macularia	Spotted Sandpiper	S5				PR	
Laridae	**Gulls, Terns & Skimmers**						
Larus delawarensis	Ring-billed Gull	S5B, S4N					X
Ardeidae	**Herons & Bitterns**						
Ardea herodias	Great Blue Heron	S4B				CO	
Butorides virescens	Green Heron	S4B				PO	
Cathartidae	**Vultures**						
Cathartes aura	Turkey Vulture	S5B				PO	X

Scientific Name	Common Name	SRANK[1]	COSSARO[2]	COSEWIC[3]	SARA Schedule[4]	OBBA 17NJ43	NRSI Observed
Accipitridae	**Hawks, Kites, Eagles & Allies**						
Circus cyaneus	Northern Harrier	S4B	NAR	NAR		PR	
Accipiter cooperii	Cooper's Hawk	S4	NAR	NAR		PR	X
Buteo jamaicensis	Red-tailed Hawk	S5	NAR	NAR		CO	PR
Strigidae	**Typical Owls**						
Megascops asio	Eastern Screech-Owl	S4	NAR	NAR		PR	
Bubo virgianus	Great Horned Owl	S4				PR	
Alcedinidae	**Kingfishers**						
Megaceryle alcyon	Belted Kingfisher	S4B				CO	X
Picidae	**Woodpeckers**						
Melanerpes erythrocephalus	Red-headed Woodpecker	S4B	SC	END	Schedule 1	PO	
Picoides pubescens	Downy Woodpecker	S5				PR	
Picoides villosus	Hairy Woodpecker	S5				PO	
Colaptes auratus	Northern Flicker	S4B				CO	PO
Dryocopus pileatus	Pileated Woodpecker	S5				PO	
Falconidae	**Caracaras & Falcons**						
Falco sparverius	American Kestrel	S4				PR	
Tyrannidae	**Tyrant Flycatchers**						
Contopus virens	Eastern Wood-Pewee	S4B	SC	SC		PO	PR
Empidonax minimus	Least Flycatcher	S4B				PR	
Sayornis phoebe	Eastern Phoebe	S5B				CO	
Myiarchus crinitus	Great Crested Flycatcher	S4B				PR	PR
Tyrannus tyrannus	Eastern Kingbird	S4B				CO	CO
Vireonidae	**Vireos**						
Vireo gilvis	Warbling Vireo	S5B				PO	PR
Vireo olivaceus	Red-eyed Vireo	S5B				PR	PO
Corvidae	**Crows & Jays**						
Cyanocitta cristata	Blue Jay	S5				CO	PR
Corvus brachyrhynchos	American Crow	S5B				CO	PO
Alaudidae	**Larks**						
Eremophila alpestris	Horned Lark	S5B				PR	PO

Scientific Name	Common Name	SRANK[1]	COSSARO[2]	COSEWIC[3]	SARA Schedule[4]	OBBA 17NJ43	NRSI Observed
Hirundinidae	**Swallows**						
Progne subis	Purple Martin	S4B				PO	
Tachycineta bicolor	Tree Swallow	S4B				CO	PR
Stelgidopteryx serripennis	Northern Rough-winged Swallow	S4B				CO	
Riparia riparia	Bank Swallow	S4B	THR	T		CO	PO
Petrochelidon pyrrhonota	Cliff Swallow	S4B				CO	
Hirundo rustica	Barn Swallow	S4B	THR	T		CO	PR
Paridae	**Chickadees & Titmice**						
Poecile atricapillus	Black-capped Chickadee	S5				CO	PR
Sittidae	**Nuthatches**						
Sitta canadensis	Red-breasted Nuthatch	S5				CO	
Sitta carolinensis	White-breasted Nuthatch	S5				PR	PR
Troglodytidae	**Wrens**						
Troglodytes aedon	House Wren	S5B				CO	PR
Mussciciapidae	**Old world Flycatchers**						
Turdidae	**Thrushes**						
Sialia sialis	Eastern Bluebird	S5B	NAR	NAR		CO	
Catharus fuscescens	Veery	S4B				PO	
Hylocichla mustelina	Wood Thrush	S4B	SC	T		PR	
Turdus migratorius	American Robin	S5B				CO	CO
Mimidae	**Mockingbirds, Thrashers & Allies**						
Dumetella carolinensis	Gray Catbird	S4B				PR	PR
Toxostoma rufum	Brown Thrasher	S4B				PO	PO
Sturnidae	**Starlings**						
Sturnus vulgaris	European Starling	SNA				CO	PR
Bombycillidae	**Waxwings**						
Bombycilla cedrorum	Cedar Waxwing	S5B				CO	PR
Passeridae	**Old World Sparrows**						
Passer domesticus	House Sparrow	SNA				CO	PR
Fringillidae	**Finches & Allies**						
Carpodacus mexicanus	House Finch	SNA				CO	PR
Carpodacus purpureus	Purple Finch	S4B				CO	

Scientific Name	Common Name	SRANK[1]	COSSARO[2]	COSEWIC[3]	SARA Schedule[4]	OBBA 17NJ43	NRSI Observed
Spinus tristis	American Goldfinch	S5B				CO	PR
Parulidae	**Wood Warblers**						
Mniotilta varia	Black-and-white Warbler	S5B				PR	
Oreothlypis ruficapilla	Nashville Warbler	S5B				PO	
Geothylpis philadelphia	Mourning Warbler	S4B				PR	
Geothylpis trichas	Common Yellowthroat	S5B				CO	
Setophaga ruticilla	American Redstart	S5B				PR	
Setophaga petechia	Yellow Warbler	S5B				PO	PR
Setophaga pinus	Pine Warbler	S5B				PO	PR
Setophaga coronata	Yellow-rumped Warbler	S5B				PO	X
Emberizidae	**New World Sparrows & Allies**						
Spizella passerina	Chipping Sparrow	S5B				CO	PR
Pooecetes gramineus	Vesper Sparrow	S4B				PO	
Passerculus sandwichensis	Savannah Sparrow	S4B				CO	PO
Melospiza melodia	Song Sparrow	S5B				CO	PR
Melospiza georgiana	Swamp Sparrow	S5B				PR	
Zonotrichia albicollis	White-throated Sparrow	S5B				PR	
Cardinalidae	**Cardinals, Grosbeaks & Allies**						
Piranga olivacea	Scarlet Tanager	S4B				PR	
Cardinalis cardinalis	Northern Cardinal	S5				PR	PR
Pheucticus ludovicianus	Rose-breasted Grosbeak	S4B				CO	PO
Passerina cyanea	Indigo Bunting	S4B				PR	PO
Icteridae	**Blackbirds**						
Dolichonyx oryzivorus	Bobolink	S4B	THR	T	No Schedule	CO	
Agelaius phoeniceus	Red-winged Blackbird	S4				CO	
Sturnella magna	Eastern Meadowlark	S4B	THR	T	No Schedule	CO	
Quiscalus quiscula	Common Grackle	S5B				CO	PR
Molothrus ater	Brown-headed Cowbird	S4B				CO	PR
Icterus spurius	Orchard Oriole	S4B					PR
Icterus galbula	Baltimore Oriole	S4B				CO	PR

[1,2]MNRF 2018b, [3,4]Government of Canada 2018, [5]BSC et al. 2008

LEGEND	
SRANK	
S4	Apparently Secure
S5	Secure

Scientific Name	Common Name	SRANK[1]	COSSARO[2]	COSEWIC[3]	SARA Schedule[4]	OBBA 17NJ43	NRSI Observed
SNA Unranked							
B Breeding							
N Non-breeding							
Breeding Evidence Codes							
X Observed							
PO Possible							
PR Probable							
CO Confirmed							
COSSARO/COSWEIC							
END/E Endangered							
THR/T Threatened							
SC Special Concern							
NAR Not at Risk							
SARA Schedule							
Schedule 1 Officially Protected under SARA							

APPENDIX VI Herpetofauna Species Reported From the Study Area and Vicinity

Reptile and Amphibian Species Reported From the Study Area

Scientific Name	Common Name	SRANK[1]	COSSARO[2]	COSEWIC[3]	SARA Schedule[4]	Ontario Reptile and Amphibian Atlas[5]	NRSI Observed
Turtles							
Chelydra serpentina serpentina	Snapping Turtle	S3	SC	SC	Schedule 1	X	
Chrysemys picta marginata	Midland Painted Turtle	S5		SC		X	
Emydoidea blandingii	Blanding's Turtle (*Great Lakes/St Lawrence population*)	S3	THR	T	Schedule 1	X	
Snakes							
Lampropeltis triangulum	Eastern Milksnake	S4	NAR	SC	Schedule 1	X	
Opheodrys vernalis	Smooth Greensnake	S4				X	
Storeria occipitomaculata occipitomaculata	Northern Red-bellied Snake	S5				X	
Thamnophis sirtalis sirtalis	Eastern Gartersnake	S5				X	X
Salamanders							
Necturus maculosus	Mudpuppy	S4	NAR	NAR		X	
Notophthalmus viridescens louisianensis	Central Newt	S4?				X	
Plethodon cinereus	Eastern Red-backed Salamander	S5				X	
Toads and Frogs							
Anaxyrus americanus	American Toad	S5				X	
Hyla versicolor	Tetraploid Gray Treefrog	S5				X	X
Pseudacris crucifer	Spring Peeper	S5				X	
Lithobates catesbeiana	American Bullfrog	S4				X	
Lithobates clamitans melanota	Northern Green Frog	S5				X	X
Lithobates pipiens	Northern Leopard Frog	S5	NAR	NAR		X	
Lithobates sylvaticus	Wood Frog	S5				X	

[1,2]MNRF 2018b, [3,4]Government of Canada 2018, [5]Ontario Nature 2018

Legend
SRANK
S3 Vulnerable
S4 Apparently Secure
S5 Secure
S#? Rank Uncertain
COSSARO/COSEWIC
THR/T Threatened
SC Special Concern
NAR Not at Risk
SARA Schedule
Schedule 1 Officially Protected under SARA

APPENDIX VII Mammal Species Reported From the Study Area and Vicinity

Mammal Species Reported From the Study Area

Scientific Name	Common Name	SRANK[1]	COSSARO[2]	COSEWIC[3]	SARA Schedule[4]	Ontario Mammal Atlas[5]	NRSI Observed
Didelphimorphia	**Opossums**						
Didelphis virginiana	Virginia Opossum	S4				X	
Insectivora	**Shrews and Moles**						
Blarina brevicauda	Northern Short-tailed Shrew	S5				X	
Condylura cristata	Star-nosed Mole	S5				X	
Parascalops breweri	Hairy-tailed Mole	S4				X	
Sorex cinereus	Masked Shrew	S5				X	
Sorex fumeus	Smoky Shrew	S5				X	
Chiroptera	**Bats**						
Eptesicus fuscus	Big Brown Bat	S4				X	
Lasionycteris noctivagans	Silver-haired Bat	S4				X	
Lasiurus borealis	Eastern Red Bat	S4				X	
Lasiurus cinereus	Hoary Bat	S4				X	
Myotis lucifugus	Little Brown Myotis	S4	END	E	Schedule 1	X	
Myotis septentrionalis	Northern Myotis	S3	END	E	Schedule 1	X	
Perimyotis subflavus	Tri-colored Bat	S3?	END	E	Schedule 1	X	
Lagomorpha	**Rabbits and Hares**						
Lepus americanus	Snowshoe Hare	S5				X	
Lepus europaeus	European Hare	SNA				X	
Sylvilagus floridanus	Eastern Cottontail	S5				X	X
Rodentia	**Rodents**						
Castor canadensis	Beaver	S5				X	
Erethizon dorsatum	Porcupine	S5				X	
Glaucomys sabrinus	Northern Flying Squirrel	S5				X	
Glaucomys volans	Southern Flying Squirrel	S4	NAR	NAR		X	
Marmota monax	Woodchuck	S5				X	
Microtus pennsylvanicus	Meadow Vole	S5				X	
Microtus pinetorum	Woodland Vole	S3?	SC	SC	Schedule 1	X	
Mus musculus	House Mouse	SNA				X	
Napaeozapus insignis	Woodland Jumping Mouse	S5				X	
Ondatra zibethicus	Muskrat	S5				X	
Peromyscus leucopus	White-footed Mouse	S5				X	
Peromyscus maniculatus	Deer Mouse	S5				X	
Rattus norvegicus	Norway Rat	SNA				X	
Sciurus carolinensis	Eastern Gray Squirrel	S5				X	X
Synaptomys cooperi	Southern Bog Lemming	S4				X	

Scientific Name	Common Name	SRANK[1]	COSSARO[2]	COSEWIC[3]	SARA Schedule[4]	Ontario Mammal Atlas[5]	NRSI Observed
Tamiasciurus hudsonicus	Red Squirrel	S5				X	X
Tamias striatus	Eastern Chipmunk	S5				X	X
Zapus hudsonius	Meadow Jumping Mouse	S5				X	X
Carnivora	**Carnivores**						
Canis latrans	Coyote	S5				X	
Lynx rufus	Bobcat	S4				X	
Mephitis mephitis	Striped Skunk	S5				X	
Mustela erminea	Ermine	S5				X	
Mustela frenata	Long-tailed Weasel	S4				X	
Mustela vison	American Mink	S4				X	
Procyon lotor	Northern Raccoon	S5				X	
Taxidea taxus jacksoni	American Badger	S2	END	E	Schedule 1	X	
Vulpes vulpes	Red Fox	S5				X	
Artiodactyla	**Deer and Bison**						
Odocoileus virginianus	White-tailed Deer	S5				X	X

[1,2]MNRF 2018b, [3,4]Government of Canada 2018, [5]Dobbyn 1994

Legend
SRANK
S3 Vulnerable
S4 Apparently Secure
S5 Secure
SNA Unranked
S#? Rank Uncertain
COSSARO/COSEWIC
SC Special Concern
END/E Endangered
NAR Not At Risk
SARA Schedule
Schedule 1 Officially Protected under SARA

APPENDIX VIII Butterfly Species Reported From the Study Area and Vicinity

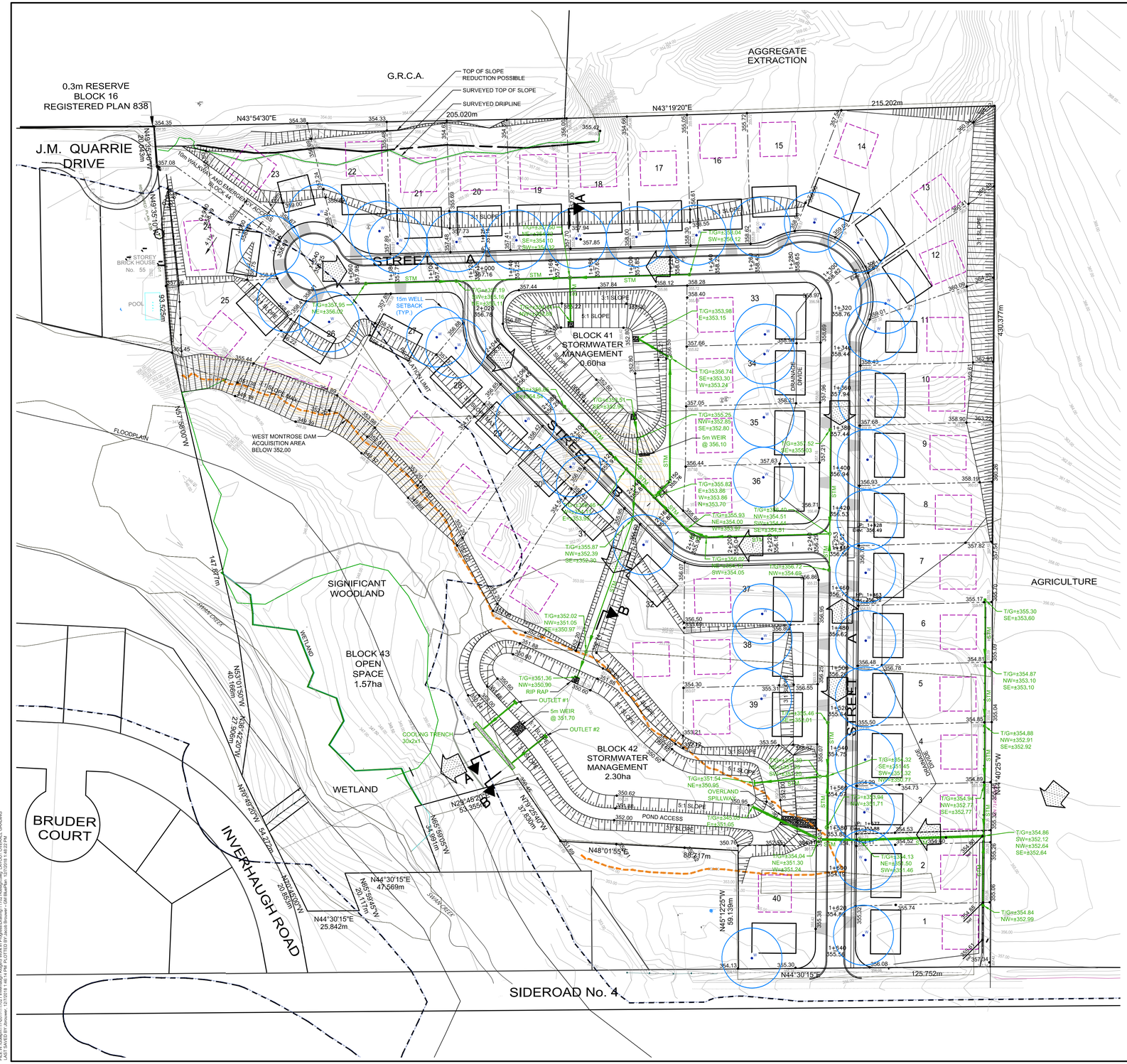
Butterfly Species Reported From the Study Area

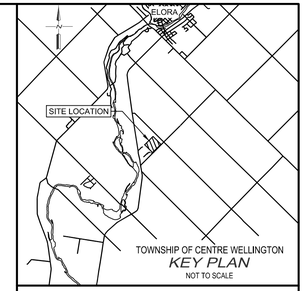
Scientific Name	Common Name	SRANK[1]	COSSARO[2]	COSEWIC[3]	SARA Schedule[4]	TEA Atlas[5] (17NJ43)	NRSI Observed
Hesperiidae	**Skippers**						
Thymelicus lineola	European Skipper	SNA				X	
Papilionidae	**Swallowtails**						
Papilio glaucus	Eastern Tiger Swallowtail	S5				X	
Papilio polyxenes	Black Swallowtail	S5				X	
Pieridae	**Whites and Sulphurs**						
Colias eurytheme	Orange Sulphur	S5				X	
Colias philodice	Clouded Sulphur	S5				X	
Pieris rapae	Cabbage White	SNA				X	X
Pyrisitia lisa	Little Yellow	SNA				X	
Lycaenidae	**Harvesters, Coppers, Hairstreaks, Blues**						
Satyrium calanus	Banded Hairstreak	S4				X	
Nymphalidae	**Brush-footed Butterflies**						
Cercyonis pegala	Common Wood-Nymph	S5					X
Danaus plexippus	Monarch	S2N, S4B	SC	END	Schedule 1	X	X
Lethe anthedon	Northern Pearly-Eye	S5				X	
Lethe eurydice	Eyed Brown / Northern Eyed Brown	S5				X	
					Total	**11**	**3**

[1,2]MNRF 2018b, [3,4]Government of Canada 2018, [5]MacNaughton et al. 2018

LEGEND
SRANK
S2 Imperiled
S4 Apparently Secure
S5 Secure
SNA Unranked
COSSARO/COSEWIC
END/E Endangered
SC Special Concern
SARA Schedule
Schedule 1 Officially protected under SARA

APPENDIX IX Proposed Development and Grading Plan (GM BluePlan 2018c)





NOTES :

1. TOPOGRAPHIC INFORMATION AND EXISTING FEATURES SURVEY PROVIDED BY VAN HARTEN SURVEYING INC, DATED 2017-12-20 & 2018-03-04,
2. PROPOSED DRAFT PLAN SUBDIVISION PREPARED BY ASTRID J CLOS PLANNING DATED AUGUST 28, 2018,

BENCH MARKS :

BENCHMARK INFORMATION PROVIDED BY VAN HARTEN SURVEYING INC.:

ELEVATIONS ARE BASED ON GPS OBSERVATIONS TO PERMANENT REFERENCE STATIONS AND HAVE BEEN CORRECTED TO ORTHOMETRIC ELEVATIONS WITH GEOID MODEL HTv2.0, AS SUPPLIED BY NATURAL RESOURCES CANADA.

THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED.

BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR ANY DAMAGE TO THEM.

NO.	DATE	REVISION DESCRIPTION	CHKD
1.	2018-08-01	FOR REVIEW	

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INVERHAUGH PASTURE EDGE SUBDIVISION

TOWNSHIP OF CENTRE WELLINGTON
INVERHAUGH, ONTARIO

PRELIMINARY OVERALL GRADING & SERVICING PLAN

DRAWN BY :	APPROVED BY :	PROJECT NO. :	DRAWING NO. :
MJB	BJF	117021	1
DESIGNED BY :	DATE :	SCALE :	
MJB	OCTOBER 2018	1:1000	

FILE:W:\Guelph\117\21\117021 Inverhaugh Ridge\5 Work In Progress\Drafting\117021-Design.dwg, LAYOUT:OVERALL GRADING
LAST SAVED BY: Alicrowell 10/7/2018 1:45:14 PM PLOTTED BY: Jacob Brouwer - GM BluePlan 10/7/2018 1:48:23 PM