



Arkell Road Properties Environmental Impact Study

Prepared for:

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NATURAL RESOURCE SOLUTIONS INC.

Aquatic, Terrestrial and Wetland Biologists

Arkell Road Properties Environmental Impact Study

Project Team

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1.0 Introduction

Natural Resource Solutions Inc. (NRSI) was retained in December 2016 by Crescent Homes to complete an Environmental Impact Study (EIS) and Tree Inventory and Preservation Plan (TIPP) for a proposed redevelopment at 190 – 216 Arkell Road, Guelph, Ontario.

The subject property is comprised of separate parcels legally described as 190, 202, 210, and 216 Arkell Road, City of Guelph. The combined parcels are rectangular in shape and are approximately 2.58 ha in area. The property is located on the north side of Arkell Road, opposite Summerfield Drive, southwest of Amos Drive and northeast of Torrance Creek (Map 1). A small area of the northwestern portion of the subject property overlaps with Significant Natural Features, including Provincially Significant Wetland (PSW), Significant Woodlands, and potential habitat for locally significant species (City of Guelph 2018). However, the proposed residential development area is largely limited to the southern portion of the subject property, and is dominated by planted trees and manicured lawn, and is outside of the natural feature boundaries (Map 1). For the purposes of this report the lands in total will be referred to as the ‘subject property’ or the ‘Arkell Road properties’, while the portion of the lands being proposed for development will be referred to as the ‘development area’.

Crescent Homes has commissioned a number of studies to facilitate the redevelopment of the Arkell Road properties. The project team includes:

- MTE Consultants Inc. (engineering, hydrogeology, and servicing)
- MHBC Planning Urban Design & Landscape Architecture (planning), and
- NRSI (natural heritage).

This EIS has been developed in accordance with the Grand River Conservation Authority Environmental Impact Study Guidelines and Submission Standards for Wetlands (GRCA 2005), Draft City of Guelph’s Guidelines for the Preparation of Environmental Impact Studies (City of Guelph 2014), and the City’s Official Plan (OP) (2018).

1.1 Proposed Undertaking

Crescent Homes is proposing to redevelop the site from 4 single-detached houses and associated out-buildings to 34 townhome units and 2, three-storey apartment buildings with a combined total of 32 apartment units. The proposed redevelopment includes both private and municipal street construction and associated parking and common amenity areas, in conjunction

with private stormwater management. The Concept Plan was prepared by MHBC Planning Urban Design & Landscape Architecture and is provided in Appendix I.

1.2 Project Scoping

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 reported from, or have potential to occur within the study area. The following background sources assisted in guiding the study approach:

- Grand River Conservation Authority (GRCA) – Grand River Conservation Network: Interactive Mapping Tool (2018);
- GRCA Ontario Regulation 150/06 (1990);
- Ministry of Natural Resources and Forestry (MNRF), Guelph District;
- City of Guelph Official Plan (2018);
- City of Guelph's Guidelines for the Preparation of Environmental Impact Studies (2017);
- City of Guelph Trail Master Plan (2017);
- City of Guelph Locally Significant Species Lists;
- Natural Heritage Information Centre (NHIC) database (OMNRF 2018);
- Guelph Natural Heritage System Report (2009);
- Government of Canada SARA Registry (2018);
- Ontario Breeding Bird Atlas (OBBA) (Bird Studies Canada et al. 2008);
- Ontario Reptile and Amphibian Atlas (Ontario Nature 2018);
- Atlas of the Mammals of Ontario (Dobbyn 1994);
- Ontario Butterfly Atlas (Jones et al. 2018);
- Ontario Odonata Atlas (OMNR 2005)

Initial wildlife species lists were compiled to provide information on species reported from the vicinity of the study area (10km radius) using the various atlases listed above. The atlases provide data based on 10x10km survey squares; therefore, information on species from the square that overlaps the study area was compiled (Square 17NJ61 from the Ontario Butterfly and Breeding Bird Atlases). These initial species lists were used to guide the scope and type of wildlife field surveys required as outlined in the following sections.

1.2.1 Species at Risk and Species of Conservation Concern Screening

Based on these initial species lists, a number of Species at Risk (SAR) and Species of Conservation Concern (SCC) were identified as having records from within the vicinity of study area. SAR are those listed on the Species at Risk in Ontario List (SARO, OMNRF 2017a).

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 by COSSARO as Endangered or Threatened are protected by the *Endangered Species Act* (ESA, 2007), which includes protection to their habitat, and are referred to herein as “regulated SAR”.

Species considered Special Concern are included in the definition of 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 NHIC, 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. If these species are listed under the *Species at Risk Act* (SARA) under Schedule 1 they are protected by the federal Act, but not provincially by the ESA.

A preliminary screening exercise was conducted on these species to identify which species have suitable habitat within the study area. This involved cross-referencing the preferred habitat for reported SAR (OMNRF 2017a, OMNR 2000) against habitats known to occur within the subject property or adjacent properties. This was completed to ensure that the potential presence of all SAR and SCC within the study area was adequately assessed in this EIS.

The following 3 SAR and 8 SCC were identified as having potentially suitable habitat within the subject property:

- Butternut (*Juglans cinerea*);
- Eastern Milksnake (*Lampropeltis taylori triangulum*);
- Eastern Ribbonsnake (*Thamnophis sauritus septentrionalis*);
- Eastern Wood-Pewee (*Contopus virens*);
- Hop-like Sedge (*Carex lupuliformis*);

- Little Brown Myotis (*Myotis lucifungus*);
- Monarch (*Danaus plexippus*);
- Western Chorus Frog (*Pseudacris triseriata* pop. 2);
- Wood Thrush (*Hylocichla mustelina*); and
- Yellow-banded Bumble Bee (*Bombus terricola*).

These species are discussed further in this report under their respective biota subsections (e.g. Birds). Full results of the SAR and SCC screening exercise are provided in Appendix II.

1.2.2 Significant Wildlife Habitat Screening

Based on background information review and desktop analysis a preliminary screening for potential Significant Wildlife Habitat (SWH) was completed within the study area. This review compared site conditions with criteria set in the SWH Ecoregion 6E Criterion Schedule (OMNRF 2015) to determine the presence of any candidate SWH. Two confirmed SWH habitat types were documented within the Study Area: Special Concern and Rare Wildlife Species and Deer Winter Congregation Areas. Full results of the SWH screening exercise are provided in Appendix II.

1.2.3 Terms of Reference

A Terms of Reference (TOR) for the EIS and TIPP was prepared by NRSI and submitted to the City of Guelph, Grand River Conservation Authority (GRCA), and Ontario Ministry of Natural Resources and Forestry (MNRF) on December 2, 2016. Based on comments received, the TOR was subsequently updated and recirculated on February 23, 2017. The final approved TOR is provided in Appendix III.

2.0 Relevant Policies, Legislation and Planning Studies

Table 1 provides an overview of policies that were considered and which informed the field program and analysis. This section of the report was used to guide the assessment of specific implications of these policies to the proposed development. The City of Guelph OP (2018) contains specific policies which speak to activities associated with maintenance of existing servicing infrastructure with respect to natural heritage features. Encroachment within the Natural Heritage System (NHS) may be permitted if it is demonstrated through an EIS that there will be no serious adverse impacts to the features' form or function.

Table 1. Relevant Policies, Legislation and Planning Studies

| Policy/Legislation | Description | Project Relevance |
|------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Provincial Policy Statement (OMMAH 2014). | <ul style="list-style-type: none"> • Issued under the authority of Section 3 of the Planning Act and came into effect on April 30, 2014, replacing the 2005 PPS. • 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, OMNR 2012) were prepared by the MNRF to provide guidance on identifying natural features and in interpreting the Natural Heritage sections of the PPS. | <ul style="list-style-type: none"> • The following natural features afforded consideration within the PPS were identified within the study area: <ul style="list-style-type: none"> ○ Significant Woodland, ○ Significant Wetland, and ○ Significant Wildlife Habitat. |
| Endangered Species Act (Government of Ontario 2007) | <ul style="list-style-type: none"> • The original ESA, written in 1971, underwent a year-long review which 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. | <ul style="list-style-type: none"> • Based on the background review and SAR/SCC screening, several SAR were identified as potentially occurring within the subject property (Appendix II). |
| Migratory Birds Convention Act (Government of Canada 1994) | <ul style="list-style-type: none"> • The MBCA protects migratory game birds, insectivorous birds, and several other migratory non-game birds from persecution in the form of harassment. • The schedule of on-site work must consider MBCA windows, with timing of breeding bird season typically occurring between May 1 and July 31, however, this is a guideline, since the MBCA applies to nesting bird species. • "Incidental take" is considered illegal, with the exception of a permit obtained by the Canadian Wildlife Service (CWS). | <ul style="list-style-type: none"> • The timing of construction activities, especially vegetation clearing and site grading, must have consideration for the MBCA. |

| Policy/Legislation | Description | Project Relevance |
|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Canadian Fisheries Act (Government of Canada 1985) | <ul style="list-style-type: none"> Manages threats to the sustainability and productivity of Canada's commercial, recreational and Aboriginal fisheries. The Act prohibits "serious harm to fish", including destruction of habitat. Dept. of Fisheries and Oceans (DFO) has developed an online, self-assessment tool, where proponents can determine whether their projects require DFO review based on the type of water body the work is occurring in and the nature of the proposed activity. | <ul style="list-style-type: none"> The Act will not apply to the proposed development of the subject property as no aquatic habitat features or fish habitat are present. |
| Fish and Wildlife Conservation Act (Government of Ontario 1997) | <ul style="list-style-type: none"> The FWCA provides protection for certain bird species, not protected under the MBCA (e.g., raptors), as well as furbearing mammals and their dens or habitual dwellings, aside from the Red Fox (<i>Vulpes vulpes</i>) and Striped Skunk (<i>Mephitis mephitis</i>). | <ul style="list-style-type: none"> The timing of construction activities, especially vegetation clearing and site grading must have consideration for bird nesting and den sites for furbearing mammals. |
| City of Guelph Official Plan (2018) | <ul style="list-style-type: none"> Lands within the study area are identified on Schedule 1 (Land Use Plan) as Significant Natural Area. Development is not permitted with Significant Natural Areas or their minimum buffers (Table 4.1 /Schedule 2). Exceptions to encroachment within Significant Natural Areas are described under general policies, however, it must be demonstrated through an EIS that no negative impacts to the natural system or ecological functions occur. Consideration for Urban Forests that are <1 ha must be taken to determine opportunities for restoration and enhancement (Section 4.1.6). | <ul style="list-style-type: none"> The Natural Heritage System identifies the following features present within the study area: <ul style="list-style-type: none"> Provincially Significant Wetlands, Significant Woodlands, and Significant Wildlife Habitat. |
| City of Guelph Tree Bylaw (2010) No. 19058 | <ul style="list-style-type: none"> Aims to regulate tree protection within City limits. Statutes of protection, aims that no person shall destroy, injure, or permit destruction towards a defined, regulated tree. | <ul style="list-style-type: none"> A Tree Inventory and Preservation Plan is required to demonstrate how trees on-site will be protected from injury, while outlining a replanting and compensation plan, where appropriate (Appendix IV). |

| Policy/Legislation | Description | Project Relevance |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GRCA Regulation 150/06 (1990) | <ul style="list-style-type: none"> • Regulation issued under <i>Conservation Authorities Act</i>, 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). • GRCA requires that an EIS be undertaken in accordance with their <i>EIS Guidelines and Submission Standards for Wetlands</i> where development is proposed within 120m of PSW or 30m of non-PSW (GRCA 2005). | <ul style="list-style-type: none"> • More than half of the subject property, identified as the Torrance Creek Provincially Significant Wetland Complex is regulated by the GRCA. |

3.0 Field Methods

A comprehensive, multi-season field program was developed and detailed in the revised TOR, with the exception of bat surveys (Appendix III). The field program was initiated in February 2016. A total of 17 field visits were carried out between February and September 2017 to complete a variety of field surveys which are described in detail within the revised TOR and summarized in Table 2. The locations of monitoring stations are shown on Maps 2 and 3.

3.1 Bat Surveys

The following methodology and guidance was used in NRSI's approach to determine presence and abundance of bats within the subject property.

3.1.1 Bat Habitat Assessment

An assessment of potential bat habitats within the subject property was undertaken on April 13, 2017, to determine the presence of potential suitable significant bat maternity colony habitat and/or suitable habitat for SAR bats. The following provides an outline of the methods and results of the habitat assessments.

Candidate Significant Bat Maternity Colony Habitat

Habitats for candidate significant bat maternity colonies were identified based on criteria outlined in the documents, *Bats and Bat Habitats: Guidelines for Wind Power Projects* (OMNRF 2011) and the Significant Wildlife Habitat Technical Guide (OMNRF 2000), as well as training from MNRF-led field sessions to help identify appropriate maternity colony habitats (i.e. cavity trees). The MNRF documents outline that any deciduous or mixed forest or swamp communities (FOD, FOM, SWD, SWM) should be assessed for cavity trees with a DBH of $\geq 25\text{cm}$, which may be suitable for roosting bats.

An inventory of all trees with a DBH of $\geq 25\text{cm}$ was completed for potential bat maternity colony habitat in the Mineral Deciduous Swamp Ecosite (SWD4) within the subject property boundary. The tree species, DBH, decay class according to Watt and Caceres (1999), and the number, height, and type (e.g., cavity, crevice, sloughing bark, etc.) of suitable roost sites was documented for each identified potential maternity roost tree. The location of each inventoried roost tree was subsequently surveyed using a Trimble SXBlue II GNSS GPS unit by NRSI staff and are shown on Map 3.

Habitat for Bat Species at Risk

An evaluation of the potential presence of SAR bat habitats was completed in accordance with the *Survey Protocol for Species at Risk (SAR) Bats within Treed Habitats* (OMNRF 2017b) and OMNRF (2011). As per the guidelines outlined in MNRF (2017b), *any coniferous, deciduous or mixed wooded ecosite, including treed swamps, that include trees at least 10cm diameter-at-breast height (dbh) should be considered suitable maternity roost habitat*. Based on the results of the ELC mapping completed within the study area, the SWD Ecosite is considered suitable maternity roost habitat for SAR bats. Several hedgerows within the subject property and human-made structures may also provide suitable habitats for SAR bats.

An inventory of all trees with a DBH of $\geq 10\text{cm}$ was completed to assess the presence of potential bat SAR habitats in the Mineral Deciduous Swamp Ecosite (SWD4), isolated trees, and all treed hedgerows within the subject property boundary. Information recorded for identified roost trees included tree species, DBH, decay class according to Watt and Caceres (1999), and the number, height, and type (e.g., cavity, crevice, sloughing bark, etc.) of potentially suitable roost sites. The location of each inventoried roost tree was subsequently surveyed using a Trimble SXBlue II GNSS GPS unit by NRSI staff and are shown on Map 3. All buildings within the subject property were also assessed for potential entry and exit points that could provide SAR bats access to roost sites. Any evidence of use of any of the buildings, including the presence of guano, was documented.

Due to the timing of the survey, the inventory focused on documenting potential roost trees for Little Brown Myotis (*Myotis lucifugus*) and Northern Myotis (*Myotis septentrionalis*), however, any dead leaf clusters observed during the inventory were also recorded as potential habitat for Tri-colored Bat (*Perimyotis subflavus*).

3.1.2 Bat Monitoring

Roost Site Monitoring

Identified potential bat SAR roost habitats within the subject property were assessed for their use by bats. As all identified roost habitats consisted of isolated trees or buildings, visual and acoustic bat exit surveys were completed in accordance with the guidance document, *Use of Buildings and Isolated Trees by Species at Risk Bats Survey Methodology* (MNRF 2014). Exit surveys were conducted by NRSI biologists on 2 evenings in June, 2018 when weather conditions were suitable for bat activity ($>10^{\circ}\text{C}$, no precipitation and little to no wind). Surveys

were conducted for a total of 90 minutes, beginning at 30 minutes before dusk and continuing until 60 minutes after dusk.

Visual surveys were completed with the use of video cameras equipped with night-vision capability and assisted with an external infrared spotlight. One video camera was deployed at each candidate roost tree and 4 video cameras were deployed at each building to ensure thorough coverage of the entire structure. A broadband ultrasound bat detector (Pettersson D240X) paired with a portable recording device was used in conjunction with each video camera recorder in order to identify to species level any bats exiting or entering the trees and buildings. Microphones and video cameras were positioned to maximize bat visibility and acoustic detection. Video cameras were positioned at each tree and building to ensure a clear view of each side of the structure or potentially suitable hole, crack, sloughing bark, or other roost feature. In addition to video cameras, two NRSI biologists were stationed at each building during the survey with a clear view of potential entrance/exit locations.

The acoustic detectors paired with each video camera are designed to record both Heterodyne and Time Expansion data simultaneously to allow for a full analysis of activity in the vicinity of each monitoring station. Although Time Expansion records broadband data, the Heterodyne setting typically records narrowband data within approximately 5kHz of the recording frequency. Based on call frequencies of Ontario's SAR bats, a recording frequency of 40kHz was chosen to provide the most accurate representation of SAR bat presence and abundance in the subject properties.

Foraging Habitat Monitoring

In order to assess the use of identified potential foraging habitat within the subject property by SAR bats, passive acoustic monitoring of the habitat was completed in conjunction with exit surveys on June 12, 2018.

One acoustic monitoring station was deployed along the edge of the Cultural Meadow vegetation community within the subject property (Map 3). The acoustic detector was set to record bat passes for a total of five hours, commencing at sunset.

The acoustic recorder employs direct digital recording technology and is designed to collect records from the full spectrum of bat calls (15-120kHz) for the entire duration of the monitoring period. This allows for a full analysis of activity in the vicinity of the acoustic monitoring station.

Identification of call sequences to species level are typically possible with a quality ultrasound microphone (as used in this study) when recordings of bat echolocation calls are made in the open, the bat approaches close to the microphone, the bat produces echolocation calls typical for that species, and there are few things interfering with the passage of ultrasound from the bat to the microphone (wind, proximity to the ground, type and abundance of vegetation, etc.). However, this perfect scenario rarely exists. All of the above factors can influence the ability to identify a call sequence to the species level. In addition to these conditional factors, many of the sounds produced by a particular species of bat are also produced by other species, i.e. they have overlapping ranges of call characteristics. The degree of overlap in call characteristics varies by species. These factors must all be taken into consideration when acoustic bat monitoring is undertaken. Table 6 provides a summary of the classifications to species or group of bat species that are used by NRSI biologists.

Table 2. Field Survey Summary

| Survey Type | Protocol ¹ | Date (2017) ² | Start and End Time (24 hrs) | Temp. (°C) | Wind Speed (Beaufort Scale) | Cloud Cover (%) | Precipitation | Observers |
|-----------------------------------------------------------------------------------------------------------------------|------------------------------------|--------------------------|-----------------------------|------------|-----------------------------|-----------------|---------------|-------------------------|
| Winter Wildlife Surveys | N/A | February 2 | 1345-1505 | -10 | 2 | 100 | None | J. Linton |
| | | February 7 | 0905-1030 | 0 | 3 | 100 | None | K. Burrell |
| | | February 15 | 1200-1430 | -4 | 2 | 100 | Light Snow | P. Anderson |
| | | February 22 | 1215-1400 | 7 | 3 | 100 | None | S. Burgin |
| Ecological Land Classification | Lee et. al (1998) | May 15 | 0915-1131 | 7 | 2 | 0 | None | T. Brenton P. Deacon |
| Vascular Flora Inventory (Spring) | Systematic search by ELC polygon | May 15 | 0915-1131 | 7 | 2 | 0 | None | T. Brenton P. Deacon |
| Vascular Flora Inventory (Summer) | Systematic search by ELC polygon | July 26 | 1230-1420 | 23 | 1 | 70 | None | J. Bannon |
| Vascular Flora Inventory (Fall) | Systematic search by ELC polygon | September 5 | 0945-1300 | 15 | 1 | 100 | None | P. Deacon |
| Tree Inventory | N/A | July 11 | 0915-1700 | 23 | 1 | 40 | None | T. Brenton J. Lance |
| | | July 26 | 0800-1615 | 26 | 1 | 20 | None | J. Lance J. Bannon |
| Staking Significant Woodland dripline (A. Nix, City of Guelph) and Wetland Boundary (N. Garland and R. Messier, GRCA) | N/A | July 22, 2016 | 0815-1400 | 28 | 1 | 80 | None | T. Brenton |
| Breeding Bird Surveys | OBBA (2001) | June 6 | 0734-0814 | 12 | 2 | 100 | None | K. Burrell |
| | | July 6 | 0710-0758 | 18 | 0 | 5 | None | T. Brenton |
| Nocturnal Bird Surveys | G. Buck pers. comm. (May 19, 2012) | May 24 | 2026-2036 | 17 | 1 | 100 | Light rain | T. Brenton |
| | | May 29 | 2106-2130 | 15 | 0 | 25 | None | P. Anderson |
| | | June 15 | 2133-2202 | 18 | 1 | 20 | None | P. Deacon |

¹ See Terms of Reference in Appendix III for a detailed description of the methods employed during each survey.

² 2017 unless otherwise stated.

| Survey Type | Protocol ¹ | Date (2017) ² | Start and End Time (24 hrs) | Temp. (°C) | Wind Speed (Beaufort Scale) | Cloud Cover (%) | Precipitation | Observers |
|-----------------------------------------------------|----------------------------------------------------------------------|--------------------------|-----------------------------|------------|-----------------------------|-----------------|---------------|-------------------------|
| Winter Raptor Surveys | OMNR (2012) | February 2 | 1345-1505 | -10 | 2 | 100 | None | J. Linton |
| | | February 7 | 0905-1030 | 0 | 3 | 100 | None | K. Burrell |
| | | February 15 | 1200-1430 | -4 | 2 | 100 | Light Snow | P. Anderson |
| | | February 22 | 1215-1400 | 7 | 3 | 100 | None | S. Burgin |
| Bat Habitat Assessment | OMNRF (2016 and 2017b) | April 13 | 1535-1805 | 11 | 1 | 70 | None | H. Fotherby |
| Anuran Surveys (Visits #1 - #3) | BSC 2009 | April 18 | 2123-2135 | 6 | 2 | 100 | None | K. Burrell |
| | | May 29 | 2152-2215 | 13 | 0 | 40 | None | P. Anderson |
| | | June 15 | 2135-2150 | 16 | 1 | 20 | None | P. Deacon |
| Reptile active hand searches and Coverboard surveys | Systematic search by ELC polygon | May 15 | 0925-1130 | 19 | 3 | 0 | None | T. Brenton P. Deacon |
| | | May 24 | 1358-1446 | 25 | 3 | 80 | None | P. Deacon |
| | | May 29 | 1645-1705 | 25 | 3 | 10 | None | A. Dean |
| | | June 6 | 0730-0845 | 12 | 2 | 100 | None | K. Burrell |
| | | July 6 | 0710-0822 | 19 | 0 | 5 | None | T. Brenton |
| | | July 11 | 1530-1605 | 27 | 0 | 10 | None | T. Brenton J. Lance |
| | | July 26 | 0844-1345 | 24 | 1 | 70 | None | J. Lance |
| | | September 5 | 0900-0945 | 17 | 1 | 100 | None | N. Miller P. Deacon |
| Insect (Bumble Bees) Surveys | Systematic search by ELC polygon, and Colla and Taylor-Pindar (2011) | July 26 | 1300-1410 | 26 | 1 | 20 | None | C. Wurtz |
| | | August 14 | 1510-1610 | 25 | 1 | 40 | None | N. Miller |
| | | September 5 | 0945-1100 | 15 | 1 | 100 | None | N. Miller |

¹ See Terms of Reference in Appendix I for a detailed description of the methods employed during each survey.

² 2017 unless otherwise stated

4.0 Existing Conditions

4.1 Soil, Terrain and Drainage

Background information indicates that the dominant soil type found within the study area is well-drained gravel (Hoffman et al. 1963). A moderately stony Burford Loam soil is known throughout the subject property, and the topography is described as smooth to very gently sloping (Soil Research Institute 1962). The subject property is located within the Speed River Subwatershed, while tributaries of the Eramosa River (Torrance Creek) are located 575m northeast of the subject property (MTE 2018a). The Eramosa River flows to the Speed River, which drains directly into the Grand River (MTE 2018a).

Topography on the subject property is generally flat with elevations typically ranging between 333 to 335.5m, decreasing towards the northeast (MTE 2018a). Surface water runoff drains from south to north, towards the PSW. During field investigations, NRSI biologists did not observe any defined drainage channels within or adjacent to the subject property.

4.2 Vegetation

Consistent with the City of Guelph's Tree Protection Policies and Guidelines (2010), a comprehensive tree inventory was undertaken documenting all trees that are ≥ 10 cm Diameter at Breast Height (DBH) within and adjacent to the proposed construction footprint. A summary of inventory findings, tree retention and removal analysis, mitigation and protection measures, as well as compensation requirements are included in the TIPP in Appendix III.

4.2.1 Vegetation Communities

A summary of Ecological Land Classification (ELC) communities identified within the study area is provided in Table 3 and shown on Map 4. Original ELC data sheets are provided in Appendix V.

Table 3. Vegetation Communities Identified within the Subject Property

| ELC Ecosite Type | ELC Description | Environmental Characteristics |
|------------------|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Forest | | |
| FOD8-1 | Fresh – Moist Poplar Deciduous Forest Type | This inclusion within the Mineral Deciduous Swamp Ecosite is located in the extreme northern corner of the subject property, adjacent to the Cultural Meadow. Throughout the canopy and sub-canopy Balsam Poplar (<i>Populus balsamifera</i>) and Trembling Aspen (<i>Populus tremuloides</i>) are abundant. Common Buckthorn (<i>Rhamnus cathartica</i>) is abundant within the understorey. |
| SWD3-2 | Silver Maple Mineral Deciduous Swamp Type | This wooded community is located to the north and west of the subject property. Within the canopy, Silver Maple (<i>Acer saccharinum</i>) is dominant, with a lesser proportion of Green Ash (<i>Fraxinus pennsylvanica</i>) present. Within the subcanopy, Green Ash, Common Buckthorn, and Glossy Buckthorn (<i>Frangula alnus</i>) are occasional. Common Buckthorn, Glossy Buckthorn, Green Ash, and Canada Elderberry (<i>Sambucus canadensis</i>) are present within the understorey, while Enchanter's-Nightshade (<i>Circaea lutetiana</i>), Common Dandelion (<i>Taraxacum officinale</i>), Boneset (<i>Eupatorium perfoliatum</i>) and Red Raspberry (<i>Ribes americana</i>) were observed throughout the groundcover layer. |
| SWD4 | Mineral Deciduous Swamp Ecosite | This treed swamp community comprises the rear of the Arkell Road properties and extends beyond the property boundaries to the northwest. The canopy layer is mostly Trembling Aspen in greater proportion to Green Ash, while the sub-canopy is dominated by these 2 species in addition to White Elm (<i>Ulmus americana</i>). The understorey and ground cover layers are dominated by the invasive Common and Glossy Buckthorns. |

| ELC Ecosite Type | ELC Description | Environmental Characteristics |
|--------------------------------|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SWM1-1 | White Cedar Mineral Mixed Swamp Ecosite | Located off the subject property, this community is dominated by Eastern White Cedar (<i>Thuja occidentalis</i>), with a lesser proportion of Silver Maples, Green Ash, and Trembling Aspen in the canopy. The subcanopy is comprised primarily of Silver Maple, with Green Ash interspersed throughout. The understorey is comprised of Canada Elderberry, Glossy Buckthorn, and Riverbank Grape (<i>Vitis riparia</i>), while the groundcover is dominated by Woodbine (<i>Parthenocissus vitacea</i>) and Trembling Aspen saplings. |
| Open/Semi-open Habitats | | |
| CUT | Cultural Thicket | What canopy there is in this thicket community is dominated by Trembling Aspen, followed by Balsam Poplar and Paper Birch (<i>Betula papyrifera</i>) in roughly equal proportion. Balsam Poplar is regenerating more in the understorey than is Trembling Aspen, whereas the understorey thicket is comprised mainly of Red-osier Dogwood (<i>Cornus sericea</i>) and Common and Glossy Buckthorn. The ground cover is comprised of Goldenrod species and, to a lesser degree, Wild Strawberry (<i>Fragaria virginiana</i>). |
| CUM | Cultural Meadow | A swath of the backyards of the Arkell Road properties have been left unmaintained and have transitioned into Cultural Meadow, with less than 10% area cover from either the sub-canopy (Trembling Aspen) or understorey (Common Buckthorn) layers. Most of this community is dominated by Kentucky Bluegrass (<i>Poa pratensis ssp. pratensis</i>), followed by Goldenrod species and Smooth Brome (<i>Bromus inermis ssp. inermis</i>) in roughly equal proportion. |
| H | Hedgerow | Located along the extreme northern property boundary is a deciduous hedgerow, situated between the subject property boundary and the Mineral Deciduous Swamp Type. Balsam Poplar and Trembling Aspen are common throughout the canopy and sub-canopy, while Common and Glossy Buckthorn are |

| ELC Ecosite Type | ELC Description | Environmental Characteristics |
|------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | prevalent within the ground cover and sub-canopy layers. |
| Residential | | The southern half of the subject property is characterized as residential in nature. Throughout there are several, large landscape trees and shrubs. |

4.2.2 Vascular Flora

Detailed vegetation inventories resulted in the identification of 95 species in ELC polygons which overlap with the study area. A complete list of species observed within each vegetation community is provided in Appendix VI.

During the scoping of the TOR, a thorough review of background information pertaining to federally, provincially or regionally rare plant species reported from the vicinity of subject property was completed (Appendix I). This assisted in identifying species to be targeted during the multi-season vascular flora inventories. NRSI did not document any rare plant species during vegetation inventories.

As per the revised Terms of Reference (Appendix III), vegetation inventories extended approximately 50m into adjacent natural areas, where access was permitted, in order to consider the regulated habitat of Butternut (*Juglans cinerea*). No Butternut trees were found in the study area.

4.3 Wildlife

4.3.1 Birds

A total of 113 species are reported from the 10 x 10km OBBA square that overlaps with the study area (BSC et al. 2008). The data found in the OBBA includes those species that have been observed in the area (10 x 10km range), are known to nest, and/or have exhibited some evidence of breeding in the area. A total of 27 of these species were documented within the study area during the field surveys, of which 26 species exhibited signs of breeding, such as males singing, females carrying food or nest materials, and the presence of fledged young. An additional (1) species was observed during other field investigations that did not exhibit signs of breeding. A complete list of bird observations is provided in Appendix VI.

A total of 10 significant bird species are known from the 10 x 10km atlas square that overlaps with the subject property based on OBBA records or other background data (BSC et al. 2008, OMNRF 2017a). Based on results of the SAR and SCC screening (Appendix VI), possible habitats within the study area were identified as suitable for 2 of these bird species, Eastern Wood-Pewee (*Contopus virens*) and Wood Thrush (*Hylocichla mustelina*). Based on field work conducted, 1 of these species, a singing male Eastern Wood-Pewee, was observed on both breeding bird visits (June 6 and July 6, 2017), indicating probable breeding behaviour. The observations of the Eastern Wood-Pewee were made within the larger Torrance Creek Swamp PSW adjacent to the subject property. However, suitable breeding habitat is found within the SWD4 community within the subject property. Given the location of the proposed development to the SWD4 community and suitable breeding habitat (i.e. >20m), it is not anticipated that the proposed development will impact the species.

A total of 7 locally significant bird species were observed within the study area during field surveys:

- Ring-billed Gull (*Larus delawarensis*),
- Northern Flicker (*Colaptes auratus*),
- Eastern Wood-Pewee,
- Red-breasted Nuthatch (*Sitta canadensis*),
- American Redstart (*Setophaga ruticilla*),
- Rose-breasted Grosbeak (*Pheucticus ludovicianus*), and
- Baltimore Oriole (*Icterus galbula*).

All of these species are ranked as common and secure within the province (Appendix VI). All of the locally significant bird species except the Ring-billed Gull were observed exhibiting possible breeding behaviour, with singing males or suitable nesting habitat detected during breeding bird surveys. With the exception of Ring-billed Gull, suitable breeding habitat for the remaining species is found only within the SWD4 community, as well as within the larger Torrance Creek Swamp PSW Complex. Based on the location of the proposed development (i.e. >20m), it is not expected that any suitable habitat will be removed or negatively altered in association with the proposed development.

Winter raptor surveys were conducted throughout the study area in February 2017 over a total of 4 surveys. No raptor or bird of prey species were observed during these surveys.

Refer to Appendix VI for a list of bird species found in habitats contiguous to the study area and documented within 10km of the subject property, based on background data.

4.3.2 Herpetofauna

According to the Ontario Amphibian and Reptile Atlas, 26 species of herpetofauna are reported from the vicinity (approximately 10km) of the subject property, including 8 significant species (Ontario Nature 2018). Based on the results of the SAR and SCC screening (Appendix II), 3 herpetofauna species were identified as having suitable habitat within the study area: Eastern Milksnake (*Lampropeltis taylori triangulum*), Western Chorus Frog (*Pseudacris triseriata*), Eastern Ribbonsnake (*Thamnophis sauritus septentrionalis*).

A complete list of species observed is provided in Appendix VI. The results of the species-specific surveys are detailed in the following sections.

Anuran (Frogs and Toads)

Anuran call surveys detected 3 anuran species: American Toad (*Anaxyrus americanus*), Northern Green Frog (*Lithobates clamitans melanota*), and Gray Treefrog (*Hyla chrysoscelis*).

Individual American Toads and Northern Green Frog were heard calling at 1 monitoring station (ANR-002 and ANR-001, respectively) at a call level code of 1. Gray Treefrog was recording calling at ANR-002 at a call level code of 2 (Map 2).

Snakes

One species of snake, Eastern Gartersnake (*Thamnophis sirtalis*), was observed during the targeted visual and cover board surveys throughout the subject property.

During field investigations, no suitable snake hibernacula were observed within the subject property.

Turtles

No suitable turtle basking, nesting, or hibernation habitat was identified within the proposed development area of the subject property.

4.3.3 Insects

Bumble Bees

Based on background sources, the Yellow-banded Bumble Bee (*Bombus terricola*) and the Rusty-patched Bumble Bee (*Bombus affinis*) were identified as having possible habitat in the study area.

Targeted surveys following Colla and Taylor-Pindar (2011) did not observe these species within the study area, though *B. impatiens* and *B. bimaculatus* were observed. Both of these Bumble Bee species are common and secure in Ontario.

Butterflies

According to the Ontario Butterfly Atlas (Jones et al. 2017), 38 butterfly species are known to occur within the 10 x 10km atlas square that overlaps with the study area, 5 of which are identified as regionally significant. NRSI biologists observed 8 species during surveys completed within the study area, including the Monarch (*Danaus plexippus*), a species of Special Concern provincially and federally.

Within Ontario, Monarchs are a widespread species, whose primary host plant is Milkweed (*Asclepias* sp.) (Layberry et al. 1998). Vascular floral surveys conducted by NRSI documented the presence of Common Milkweed (*Asclepias syriaca*) within the Cultural Meadow community. Refer to Section 4.3.2 for further discussion on Monarch.

Based on results of the SAR and SCC screening (Appendix II), no other butterfly species were identified as having suitable habitat within the study area. A complete list of species observed is provided in Appendix VI.

Odonata

According to the Ontario Odonata Atlas (OMNR 2005), 65 Odonata species are known to occur within the 10 x 10km atlas square that overlaps with the study area, 11 of which are identified as regionally significant. NRSI biologists observed 8 species during surveys completed within the study area, all of which are identified as common and secure within Ontario. A complete list of species observed is provided in Appendix VI.

4.3.4 Mammals

According to the Mammal Atlas of Ontario (Dobbyn 1994), 37 mammal species are reported from within 10km of the study area. A total of 8 of these species, or evidence, such as tracks, scat, etc., were observed by NRSI biologists within the study area. These included species commonly found within urban and woodland environments: Red Squirrel (*Tamiasciurus hudsonicus*), Eastern Chipmunk (*Tamias striatus*), Eastern Cottontail (*Sylvilagus floridanus*), and White-tailed Deer (*Odocoileus virginianus*). Appendix VI provides a complete list of mammal species reported from the study area.

Bat Habitat Assessment

An assessment of potential bat habitats within the subject property was undertaken on April 13, 2017, to determine the presence of potential suitable significant bat maternity colony habitat and/or suitable habitat for SAR bats. The following provides an outline of the methods and results of the habitat assessments.

Candidate Significant Bat Maternity Colony Habitat

An inventory of all trees with a DBH of $\geq 25\text{cm}$ was completed for potential bat maternity colony habitat in the Mineral Deciduous Swamp Ecosite (SWD4) within the subject property boundary. The tree species, DBH, decay class according to Watt and Caceres (1999), and the number, height, and type (e.g., cavity, crevice, sloughing bark, etc.) of suitable roost sites was documented for each identified potential maternity roost tree. The location of each inventoried roost tree was subsequently surveyed using a Trimble SXBlue II GNSS GPS unit by NRSI staff and are shown on Map 3.

No habitats for significant bat maternity colonies were identified based on the results of the roost tree inventory within the portion of the SWD4 Ecosite that overlaps with the subject property.

Habitat for Bat Species at Risk

Five potential roost trees for Little Brown Myotis and/or Northern Myotis were identified within the study area. No roost trees for Tri-colored Bat were documented. All identified potential roost trees were either isolated or within treed hedgerows. Two buildings within the subject property were identified as providing potential habitat for bat SAR. The Cultural Meadow (CUM), especially along the edge of the SWD4 vegetation community (woodland edge), potentially provides suitable foraging habitat for bat SAR. Due to the identification of potential

bat SAR habitats within the subject property, an assessment of the use of such habitats by bats was then completed as outlined in following sections.

Bat Monitoring

Roost Site Monitoring

Exit surveys were conducted on June 12 and 13, 2018. Weather conditions on both nights were above 10°C (27°C and 25°C, respectively), with little wind (Beaufort Scale of 1) and no rain. Five candidate roost trees and two buildings were monitored during each survey (Map 3). A biologist was stationed at each of the northeast and southwest corners of each building, providing views of the north, east, south, and west sides of the building.

All video camera footage collected during exit surveys was reviewed by NRSI biologists. No bats were observed emerging or entering potential roost sites of any of the candidate roost trees or on Building 2 (Map 3). Exit survey results are summarized for Building 1 in the following table.

Table 4. Visual Exit Survey Results for Building 1

| Date | Side of Building | | | | | | | | Total Counted |
|---------------|------------------|-----|------|-----|-------|-----|------|-----|---------------|
| | North | | East | | South | | West | | |
| | Obs. | Cam | Obs. | Cam | Obs. | Cam | Obs. | Cam | |
| June 12, 2018 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 1 |
| June 13, 2018 | 1 | 2 | 0 | 0 | 0 | 1 | 1 | 1 | 6 |

Based on the review of video data, the bat documented using Building 1 on June 12 emerged at 21:30:48 hrs. Three of the four bats documented by video cameras on June 13 emerged at 21:30:05, 21:34:28, and 21:56:41 hrs. The 4th bat observed on June 13 entered Building 1 at 21:56:37 and was likely the same bat that emerged five seconds later at 21:56:41 hrs.

Bat echolocation calls recorded at the time bats were observed as emerging from or entering Building 1 were visualized with the software program SonoBat for the US North Northeast and Ontario Region v3.1 and identified manually to species or species grouping. Table 5 provides a summary of the classifications to species or group of bat species that are used by NRSI biologists. A total of 4 and 30 call sequences were reviewed from the evenings of June 12 and

13, respectively. All 34 call sequences were classified to 3 species groupings and 1 species as shown in the following figure.

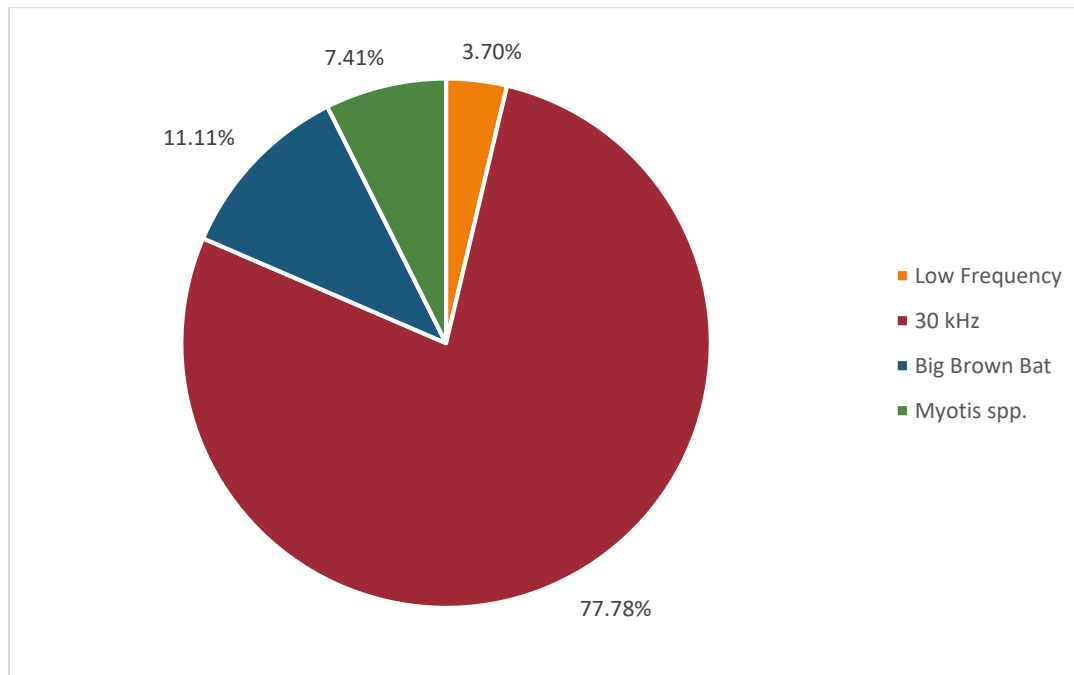


Figure 1. Bat Species Classification (Building 1)

As identified in Figure 1, 78% of time-expanded calls collected were classified to the species grouping, 30 kHz. Several call sequences were also classified to Big Brown Bat (11%) and the species grouping, Low Frequency (4%). An additional 7% of calls were identified as a *Myotis* species. Classifications to groupings (e.g. *Myotis* sp., 30kHz, or Low Frequency) are made when one or more of the following occurs: 1) the vocalizations produced by the bat are not easily classified to species (such as calls recorded in a cluttered environment, when multiple bats of the same species are present, or social calls are produced to vocalize to other bats in the area), 2) the bat is not close to the microphone and therefore calls are quiet, or 3) environmental conditions interfere with the sound produced by the bat before it reaches the detector, reducing the quality of the recording (e.g. echoes, refractions, or wind). The *Myotis* species grouping includes Little Brown Myotis, Northern Myotis, and Eastern small-footed Myotis (*Myotis leibii*). Based on results of the foraging habitat monitoring as described in the following section, it is likely that the *Myotis* calls represent calls of Little Brown Myotis.

Little Brown Myotis are colonial, with anywhere from a dozen to over a thousand having been known to form maternity colonies, comprised of females and their young (van Zyll de Jong 1985,

Environment Canada 2015). Since only a maximum of 2 *Myotis* individuals were documented as using Building 1 based on visual and acoustic data, it is likely that the surveyed building on the subject property does not represent a maternity colony for this species. However, the results indicate that this building is being used by individual bats, including *Myotis* species, as roosting habitat.

Foraging Habitat Monitoring

Bat echolocation calls recorded on the evening of June 12, 2017 during passive acoustic surveys were visualized with the software program SonoBat for the US North Northeast and Ontario Region v3.1 and identified to species with the SonoBat auto-classifier. Settings for the auto-classification were the default and included the following:

- Maximum number of calls to consider per file: 8 (8 best calls in the sequence);
- Acceptable call quality: 0.80;
- Decision threshold: 0.90; and
- Acceptable quality to tally passes: 0.20.

Upon review of the auto-classification results, all call sequences classified by the software with the following features were manually vetted by NRSI biologists to bat species or species grouping:

- No consensus decision was made regarding identification to bat species or species grouping;
- Species identification was based on 4 or fewer call pulses; and
- Call pulse characteristics within the sequence overlapped with more than 1 bat species.

Table 5. Call Classifications for Ontario Bat Species

| Species Groupings | | | Species | Typical Characteristic Frequency (kHz) | Call Sequence Classification | | | |
|-------------------|--|--|------------------------------------------------------------------|----------------------------------------|------------------------------|--------|------------|---------------------------------|
| 20 kHz | | | Hoary Bat (<i>Lasiurus cinereus</i>) | 20 (~to 30) | Low Frequency | 30 kHz | | Hoary Bat |
| | | | Big Brown Bat (<i>Eptesicus fuscus</i>) | ~30 | | | | Big Brown Bat |
| | | | Silver-haired Bat (<i>Lasionycteris noctivagans</i>) | ~30 | | | | Silver-haired Bat |
| 30 kHz | | | Eastern Red Bat (<i>Lasiurus borealis</i>) | ~40 | High Frequency | 40 kHz | | Eastern Red Bat |
| | | | Tricoloured Bat (<i>Perimyotis subflavus</i>) | ~40 | | | | Tri-coloured Bat |
| | | | Eastern Small-footed Bat (<i>Myotis leibii</i>) | ~40 | | | Myotis sp. | Eastern small-footed bat |
| | | | Little Brown Myotis (<i>Myotis lucifugus</i>) | ~40 | | | | Little Brown Myotis |
| | | | Northern Myotis (<i>Myotis septentrionalis</i>) | ~40 | | | | Northern Myotis |
| | | | | | | | | |
| 40 kHz | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

A total of 4 bat species were documented during passive acoustic monitoring conducted within the subject property in June 2017 including one Endangered species, Little Brown Myotis (*Myotis lucifugus*). A summary of the classification of bat pass sequences collected during the monitoring period is provided below in Figure 2.

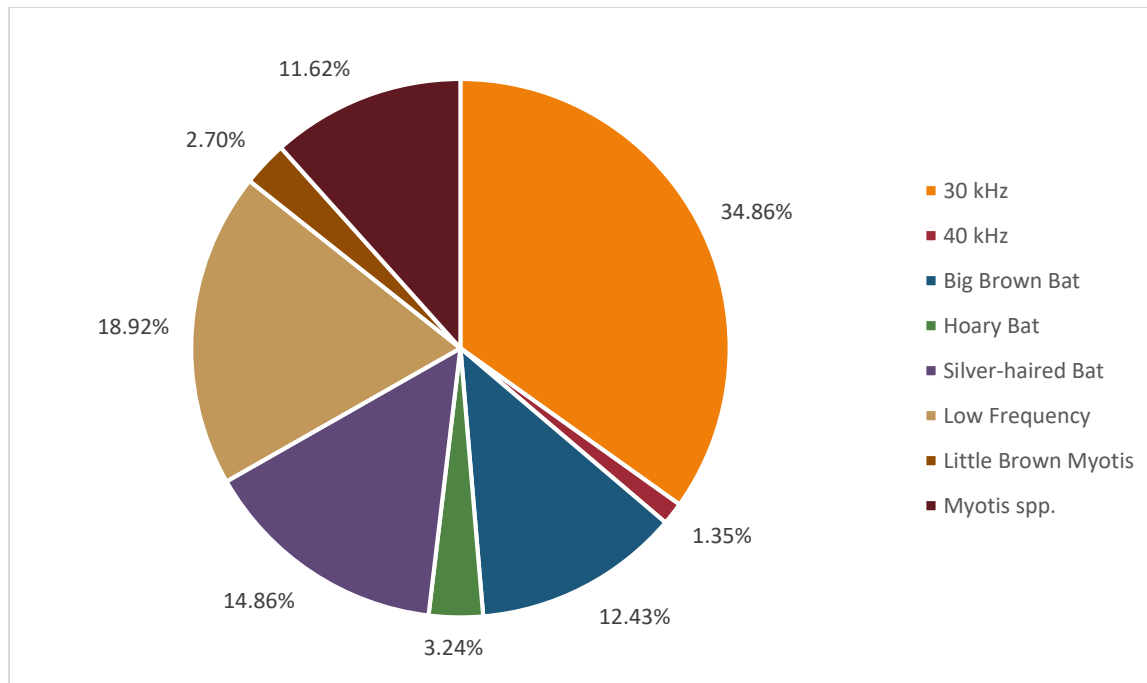


Figure 2. Bat Species Classification (BAT-001)

In total, 370 bat pass sequences were recorded on the evening of June 12, 2017. The majority of these bat pass sequences were classified to the species groupings, 30 kHz and Low Frequency. A number of calls were also classified to the species level as Big Brown Bat, Hoary Bat, and Silver-haired Bat. Ten of the 370 collected bat pass sequences were classified as Little Brown Myotis, 43 to the Myotis species grouping and 5 to the 40 kHz species grouping. While SAR bats are included in the 40 kHz species grouping, this species grouping also includes the non-SAR bat, Eastern Red Bat, and should not be considered probable evidence of the presence of SAR. However, the lack of any Eastern Red Bat classifications suggests that call sequences classified as 40 kHz are likely the call of a SAR bat and most likely of Little Brown Myotis.

The majority of bat pass sequences classified to Little Brown Myotis, and the species grouping, Myotis species, were recorded between 22:00 and 02:00 hrs. Figure 3 provides a summary of the bat species detected at acoustic monitoring station BAT-001 by monitoring hour.

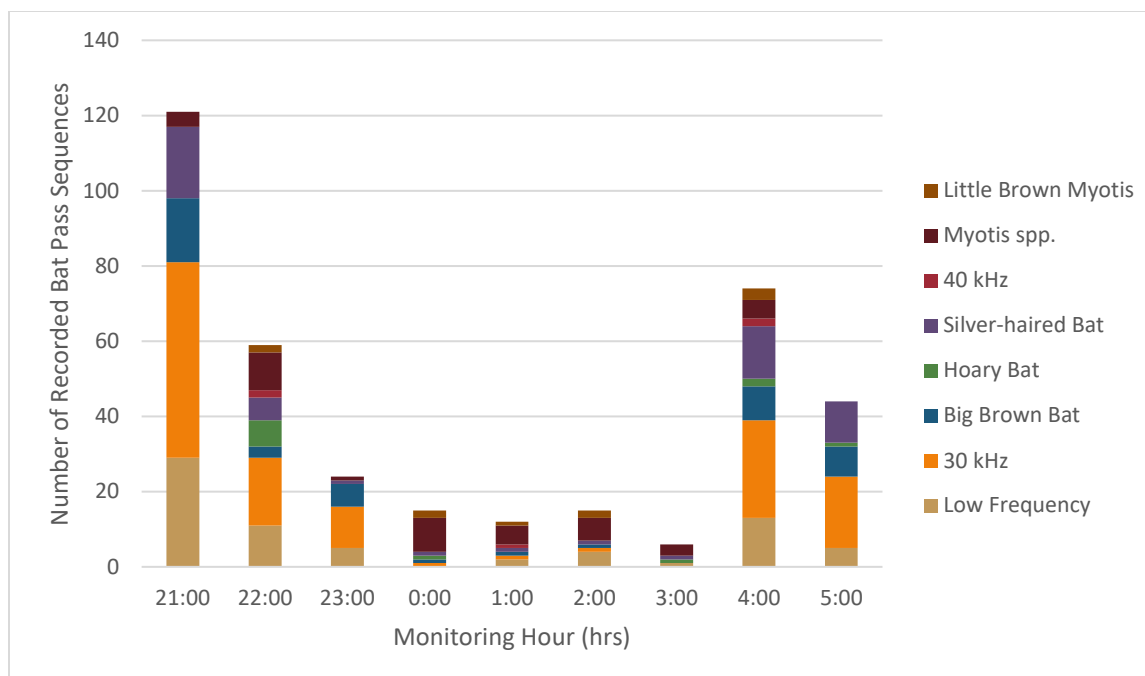


Figure 3. Bat Species Detected per Monitoring Hour at Acoustic Monitoring Station BAT-001

Results of the acoustic data collected indicate that bats are utilizing the Cultural Meadow vegetation community as foraging habitat including Little Brown Myotis, a species considered Endangered provincially and federally (COSEWIC 2018, OMNRF 2017a).

5.0 Significance and Sensitivity of Natural Features

This section of the report provides an overview of the important natural heritage features in the study area and analysis of policies related to these features per Table 3 from the *Guidelines for the Preparation of EISs* (City of Guelph 2014).

5.1 Provincially Significant Wetlands

The Torrance Creek Swamp PSW Complex is located within the study area. Part of this complex, a Mineral Deciduous Swamp Ecosite (SWD4), extends into the subject property from the northwest and is identified within the City of Guelph OP (2018) (Map 1).

The boundary of the wetland adjacent to the proposed development was flagged by NRSI and confirmed with GRCA staff on July 22, 2016 (Map 4). As per the wetland confirmation with GRCA, it is noted that the wetland boundary is $\geq 30\text{m}$ from the proposed development, with the exception being the extreme northern corner of the subject property, where the proposed concept plan has identified Street 'A' and its associated grading as being located partially within the outer 15m buffer from the PSW (Map 2). Significant Wetland buffers are prescribed based on protecting the wetlands form and function, as well as providing associated water protection. Buffers are discussed in greater detail in Section 6.4.

5.2 Significant Woodlands

The City of Guelph Official Plan (2018) identifies significant woodlands in the study area that are closely associated with the limits of the PSW and extend into the subject property; as such, lands regulated by the OP are present within the subject property. NRSI coordinated a site visit with City of Guelph staff (A. Nix) on July 22, 2016, and mapped the woodland dripline (Map 4).

Woodland buffers are prescribed based on protecting the trees and their root zones, as well as providing associated open habitats required by forest species or for species movement. Buffers are discussed in greater detail in Section 5.4.

5.3 Significant Wildlife Habitat

Based on the background information review, desktop analysis, and original field studies, 2 SWH types were confirmed as occurring within the subject property: Deer Winter Congregation Areas and Special Concern and Rare Wildlife Species (Eastern Wood-Pewee and Monarch). Full results of the SWH screening are provided in Appendix II.

5.3.1 Seasonal Concentration Areas

Wildlife seasonal concentration areas are defined as areas where animals occur in relatively high densities for all, or portions, or their life cycle (OMNR 2000). These areas are generally relatively small in size, particularly when compared to areas used by these species during other times of the year.

Deer Winter Congregation Area

Background data from the MNRF confirms that the Torrance Creek PSW Complex provides habitat for wintering White-Tailed Deer as a congregation area. Winter mammal surveys documented the presence of White-Tailed Deer throughout the subject property, specifically within the mineral deciduous swamp community, outside of the proposed development.

5.3.2 Habitats for Species of Conservation Concern

Species of Conservation Concern are species with a provincial S-rank of S1 to S3, species listed as species of Special Concern provincially, or species listed as Endangered or Threatened nationally with no provincial designation (i.e. not protected by the ESA). Confirmed habitat for SCC may be considered Significant Wildlife Habitat (OMNR 2000). Based on the results of wildlife-specific field surveys, SWH for Eastern Wood-Pewee and Monarch was confirmed within the study area. Further discussion is provided below.

Species Concern and Rare Wildlife Species (Eastern Wood-Pewee and Monarch)

Eastern Wood-Pewee SWH has been confirmed within the study area. A singing male was documented on both breeding bird survey dates (June 6 and July 6, 2017) within the study area, outside of the subject property (Map 5). Vegetation communities that the Eastern Wood-Pewee was observed in include: Silver Maple Deciduous Swamp Type, while the Mineral Deciduous Swamp, White Cedar Mineral Mixed Swamp Ecosite, and Fresh – Moist Poplar Deciduous Forest Type inclusion also provides suitable habitat for the species.

Monarch is designated as Special Concern both provincially in Ontario and nationally (MNRF 2017; Government of Canada 2017). A single individual was documented within the Cultural Meadow community, adjacent to the significant woodland feature. Marginal suitable habitat for this species is found in the Cultural Meadow community. In order to determine what constitutes SWH for a given species, it is important to consider the factors that have led to this species being designated as rare or of concern (MNRF 2016). This species currently has a provincial S-Rank of S2N, S4B, meaning that the non-breeding (migratory stopover) habitat in Ontario is

considered 'Imperiled' while the breeding population is considered 'Apparently Secure'. Much of the conservation efforts for this species have been targeted at the wintering grounds and stopover locations where loss of habitat is thought to drive the declines in this species (Brower et al. 2002; Brower et al. 2004). However, recent research has shown that this species is most sensitive to loss of breeding habitat, consisting of milkweed and associated open areas containing nectar sources than to losses on the wintering ground (Flockhart et al. 2014). Hence, the need to protect breeding habitat for this species remains important. Since breeding habitat for this species can be found in nearly any open area (e.g. roadside, backyards, developed areas), delineation of SWH should focus on the highest quality habitat. Higher quality habitat is generally considered to be areas with larger concentrations of milkweed, since patches containing only single or a few milkweed tend to be overloaded with eggs which increases competition and may decrease survivorship to maturation (Zalucki and Suzuki 1987). In addition, areas immediately adjacent to agricultural fields, disturbed areas and roadsides are likely to experience decreased survival due to corn pollen, pesticide usage and dust (Tschenn et al. 2001). Within the subject property marginal habitat was found within the Cultural Meadow community with only a few Milkweed specimens present; as such, SWH is not present for the species within the study area.

5.4 Habitat of Endangered and Threatened Species

Based on the completion of the background information review and field investigations, a single SAR, Little Brown Myotis, was documented within the subject property.

Little Brown Myotis was documented during acoustic monitoring at building 1 and within the Cultural Meadow (i.e. foraging habitat), adjacent to the mineral deciduous swamp, comprising approximately 2 and 10 calls, respectively. Within the Cultural Meadow, calls classified as Myotis sp. known as either Little Brown, Northern Myotis, or Eastern Small-footed Myotis (all of which are classified as Endangered) comprised approximately 43 additional calls. Based on studies conducted involving insectivorous bats, peak foraging habitat has been shown to be $\leq 15\text{m}$ of forest-edge interfaces (Jantzen and Fenton 2013). Given the low number of Little Brown Myotis (and Myotis spp.) documented throughout the remainder of the subject property, it is expected that suitable foraging habitat is not found $\geq 15\text{m}$ from the significant woodland dripline boundary.

Additionally, based on the infrequency of Little Brown Myotis calls from building 1, it was determined that the building is an occasional roost site and does not constitute a maternity

colony (i.e. maternity sites are known to have ≥ 10 individual Little Brown Myotis present). However, under the ESA, building 1 is protected habitat. At this time, NRSI is pursuing discussions with the MNRF in process for removing building 1.

6.0 Impact Analysis

6.1 Proposed Undertaking

The redevelopment proposed on the subject property includes 34 townhouse units and 2, 3-storey apartment buildings with a combined total of 32 apartment units. The proposed development also includes associated parking (46 spaces), a 20m right-of-way for a roadway (Street 'A') and two common amenity areas (Map 5).

Traffic access for the proposed redevelopment will be provided from Arkell Road and the existing subdivision east of the subject property, along Dawes Avenue. The existing cul-de sac at the end of Dawes Avenue will be extended west, through the subject property, to Arkell Road and Summerfield Drive. Significant amounts of fill will be required to match existing grades, where Dawes Avenue is currently 4m higher in elevation to the adjacent subject property lines. Dawes Avenue will extend along the 30m PSW buffer; however, 3:1 side slopes from Dawes Avenue will be required to extend within the outer half of the PSW buffer (MTE 2018b) (Map 5).

Stormwater management will include the collection of stormwater runoff from the right-of-way and the front half of the on-street townhome roofs. Stormwater runoff from the right-of-way will be collected via storm sewers that will then drain to an oil grit separator (OGS) for pre-treatment. This treated stormwater will then be discharged to a wet pond for quantity control and then discharged into an infiltration gallery (MTE 2018c). Stormwater runoff from the apartment block (including the clean rooftop water) will also discharge to the wet pond and be pre-treated with an Oil Grit Separator (OGS), however, the OGS will be designed as part of the Site Plan stage (MTE 2018c).

Clean stormwater runoff from the rear yards of the townhouse units, west of the proposed right-of-way will discharge unattenuated, directly to the PSW, due to elevational differences (MTE 2018c).

The proposed grading strategy for the subject property will respect the existing grades along all subject property lines. Re-grading within the subject property will focus on directing runoff to the stormwater management (SWM) facility and Arkell Road.

6.2 Approach to Impact Analysis

The impact analysis presented here is based on the redevelopment details submitted as part of the Functional Servicing and Stormwater Management Reports prepared by MTE (2018b, c) and the concept plan prepared by MHBC (Appendix VI).

The following is a description of the types of impacts that are discussed.

- Direct impacts to the study area associated with disruption or displacement caused by the actual proposed 'footprint' of the undertaking;
- Indirect impacts associated with changes in site conditions such as drainage and water quantity/quality;
- Induced impacts associated with impacts after the development is constructed such as increased use of natural areas.

6.3 Direct Impacts and Mitigation Measures

The approach to identifying and delineating the natural features was aimed at avoiding direct impacts from development on important natural heritage features. Map 5 presents the proposed development layout over the delineated natural features showing the direct impacts. These impacts are discussed in more detail below.

6.3.1 Site Grading

Several existing grading constraints influenced and/or governed the grading plans as outlined in the Functional Servicing (MTE 2018b) and Stormwater Management Reports (MTE 2018c).

This included:

- Matching existing road grades at subdivision accesses (i.e. Dawes Avenue);
- Matching existing or proposed boundary grades around the perimeter of the site;
- Ensuring adequate cover is provided over municipal services;
- Ensuring "major" overland flow routes are directed to the SWM facility and ultimately to Arkell Road; and
- Compliance with municipal standards for minimum and maximum road grades.

Utilizing the proposed Site Plan concept (Appendix VI), the site grading was designed to satisfy the constraints outlined above (MTE 2018b, c). The design strategy for the site grades was

largely determined by the requirements to maintain existing baseflows, while minimizing cut/fill and attempting to match the existing perimeter grades.

The limit of site grading and earth removals will match the perimeter of the subject property. Tree loss will be required to effectively grade and service the proposed redevelopment, which is discussed below and detailed in Appendix III. Grading will occur during the construction phase of the project and result in permanent cut/fills and vegetation clearing. Areas to be graded/disturbed must be clearly marked using flagging tape, fencing, spray paint, or other signage prior to beginning any activities. Strategies for controlling erosion and sedimentation is discussed further later in this report. For detailed grading plans the reader is referred to the Functional Servicing (MTE 2018b) and Stormwater Management Reports (MTE 2018c).

Mitigation

- *Site grading will occur entirely outside of the required 15 m buffer around the Torrance Creek PSW Complex;*
- *Suitable ESC will be required to help control and reduce the turbidity of run-off water which may flow;*
- *To avoid impacts to the wetland, the water balance of the wetland should be maintained during all construction activities.*

6.3.2 Tree Removal

A total of 339 trees were inventoried within the subject property. As detailed in the TIPP (Appendix III), the location of these trees was compared to the grading and concept plans to determine if and where the urban forest could be retained under the proposed redevelopment plan.

The proposed redevelopment will result in the removal of 206 trees. This includes trees situated along the grading limit or in close proximity that may incur extensive root damage as a result of grading. Trees identified for removal have been planted and are located outside the Natural Heritage System. Removals in this area include some larger White Cedar and White Spruce (*Picea glauca*); however, the majority are smaller trees (e.g., 10 – 20cm DBH).

The TIPP recommends that all trees ≥ 10 cm DBH in excellent to fair condition, with an improbable, probable or possible potential for structural failure be compensated at a 3:1 ratio (trees) and 5:1 ratio (shrubs), or a financial compensation to the City of Guelph (Appendix IV).

Mitigation

- *Final details of the vegetation to be removed, vegetation to be retained, and specific mitigation strategies (e.g. tree protection fencing) should be detailed and included at the Site Plan Approval Stage;*
- *Detailed landscaping and compensation planting plans will be required for the property at the Site Plan Stage; however, it is anticipated that plantings can be provided within open spaces of the proposed development, as well as any street tree plantings required by the City of Guelph through the Site Plan Approval stage;*
- *Trees identified for removal that are in excellent to fair condition (18) may be compensated at a 3:1 ratio with trees and 5:1 with shrubs. Where on-site plantings are not achievable, cash in lieu equal to the value of the replacement vegetation will be required to be paid to the City;*
- *Final compensation strategy, including appropriate species and potential use of trees, shrubs and herbaceous species for pollinator habitat is to be determined at the Site Plan Approval Stage;*
- *Suitable regionally-native species should be selected for any planting that occurs within the natural feature buffer area and adjacent stormwater management areas. Plantings should be maintained appropriately throughout the warranty period.*

6.3.3 Wildlife and Their Habitats

The Tree Inventory and Preservation Plan Report (Appendix III) was used to assess impacts associated with tree removal. The proposed undertaking will result in site grading to the subject property line, vegetation removal and tree removal within the development footprint. As the existing subject property is currently developed, much of the habitat on-site is urban in nature and largely degraded from its natural state. Vegetation removal will consist primarily of the existing buildings, with isolated trees and a small portion of Cultural Meadow.

According to the Canadian Wildlife Service (CWS), the peak breeding period for migratory birds that nest in treed habitat in southern Ontario is between April 1 and August 31 (Government of Canada 1994). During this period the CWS recommends that no clearing of vegetation within simple and/or complex habitats occur. The *Migratory Birds Convention Act* (MBCA, 1994) protects migratory birds, their eggs and nests from being harmed or destroyed at any time of the year. However, nest searches, as a means of mitigation during the core breeding period, may be undertaken in “simple” habitats such as hedgerows, isolated trees, or constructed features (e.g. bridges, barns, etc.) where the potential to observe all active nests is relatively high. It is

therefore recommended that tree and vegetation removal occur outside the peak breeding bird period, where possible.

As a general means to limit the extent of impacts to wildlife habitat during construction, efforts should be made to clearly demarcate the limits of development, including vegetation cutting and grading boundaries, so as to prevent unnecessary encroachment into the surrounding natural features and their associated buffers. These boundaries should be clearly marked using heavy-duty filter fabric Erosion and Sediment Control (ESC) fencing erected for the purposes of on-site stormwater runoff control. The location of temporary tree protection fencing, which will provide protection to areas being retained and tree root zones, is included in the appended TIPP (Appendix IV).

Mitigation

- *Vegetation removal is recommended to occur outside of the breeding and nesting season for migratory birds as established by the Canadian Wildlife Service. The peak breeding period for birds in southern Ontario extends from approximately April 1 through August 31;*
- *Should vegetation removal be required during the nesting season for migratory birds, surveys for nesting birds in “simple habitats” may be undertaken to permit vegetation removal should breeding bird absence be confirmed;*
- *In the event a nest survey is conducted, a clearance letter is to be prepared by the qualified biologist that undertook the nest searches and submitted to the Developer for their files in the event a record of due diligence is requested by CWS;*
- *ESC fencing is to be erected along the limit of development prior to any on-site works to ensure that construction activities and equipment are maintained outside of the protected areas and their buffers*

6.4 Indirect Impacts and Mitigation Measures

For the purposes of the analysis of potential indirect impacts, the following categories are discussed:

- Sediment and erosion;
- Encroachment into buffers;
- Management of stormwater quality and quantity; and
- Indirect impacts to wildlife

6.4.1 Sediment and Erosion

During construction, areas of bare soil will be exposed which have the potential to erode during rainfall events and impact adjacent natural features. In the event of a heavy rain, sediment laden runoff can enter adjacent natural areas by way of overland flow. In order to protect off-site natural features from potential impacts due to sediment, an ESC plan must be developed and implemented prior to any construction activities on the site, including any vegetation removals and clearing / grubbing.

Mitigation

- *Develop and implement an ESC Plan prior to construction. Siltation control measures such as heavy-duty filter fabric silt fencing, a mud mat at the construction entrance, and Tree Protection Fencing are recommended.*
- *Disturbed areas should be kept to a minimum and re-vegetated with an approved seed mix in a reasonable timeframe in order to stabilize soil and minimize dust.*
- *Inspection and maintenance of the installed ESC measures throughout the duration construction phase of the project by a qualified Environmental Monitor and until the site is stabilized, to ensure they are functioning as originally intended.*

6.4.2 Encroachment into Buffers

Buffers are required for natural heritage features such as woodlands, wetlands, and watercourses to protect them from impacts during development. Wetland and woodland buffers are required to protect these features' form and function and protect the species that inhabit them. The outer limit of the buffers determines the outer boundary of the protected natural features and the constraints to guide development activities within the subject property. Recommended buffers to the proposed redevelopment are illustrated on Map 5. As per the City OP and GRCA Ontario Reg 150/06, development is to be maintained outside of natural features and their buffers. Development may be warranted within the outer extents of these buffers where impacts are determined to be negligible.

Typical woodland buffers are prescribed based on protecting the trees and their root zones. In order to adequately protect these features from the proposed development, a 10m buffer is recommended beyond the outer boundaries of the Significant Woodland communities within the subject property.

In order to adequately protect wetland features from the proposed development, typically a minimum 30m buffer is recommended. A minor encroachment within the outer 15m of the 30m buffer will be required at the extreme northern section of the subject property where Street 'A' meets with Dawes Avenue on the adjoining property to accommodate grading primarily. However, a small component of the road extension from Dawes Avenue will be within the extreme outer portion of the PSW buffer. It should be noted that the layout of the adjoining development (i.e. north and east of the subject property), specifically the road layout of Dawes Avenue, was previously approved by the City of Guelph, with the intent that Street 'A' would eventually provide a connection to Dawes Avenue. The project team proposed alternative alignments/road widths and internal road connections to the City of Guelph in an attempt to maintain all development and associated grading outside of the 30m wetland buffer. Due to municipal requirements in association with public roadways (i.e. road widths, sidewalks, etc.); the location of Dawes Avenue and its approved connection with Street 'A' preclude the achievement of realizing the minimum buffer for the Significant Wetland feature. As such, under the City of Guelph's OP (2018), specifically Section 4.1.1.11, essential transportation infrastructure is permitted within 30m of the Significant Wetland buffer, due to the existing development precluding the achievement of a minimum buffer (i.e. 30m), identified on Table 4.1.

As per Section 4.1.1.11:

"Notwithstanding 4.1.1.9, minimum buffers have not been applied to lands containing existing development which may preclude achievement of the minimum buffer specified on Table 4.1. For the any redevelopment of such lands, an EIS will be completed to the satisfaction of the that evaluates the need for an established buffer, and determines an appropriate width where a buffer is required."

Based on the existing condition of this encroachment, the ecological form and function of the significant wetland is not expected to be negatively impacted, given the distance buffered in this area and the proposed plantings and restoration associated with the proposed redevelopment (see Section 6). Through discussions with the project team, NRSI proposed a graded side slope to the road. While the slope encroaches further into the buffer, it was felt that this area would provide a plantable space and ultimately provide more area for a naturalized buffer. As such, NRSI does not expect there to be any negative impacts on the ecological form or function of these natural features, specifically based on the inclusion of Street 'A' within 30m of the PSW.

Mitigation

- *To ensure that works within the buffer are limited to the localized areas adjacent to the graded slope, heavy-duty Erosion and Sediment Control (ESC) fence should be erected to delineate the exact extent of encroachment required to install the graded slope;*
- *The ESC fence should be installed to delineate the buffer (Development Limit Line), as well as to ensure that no sediment or on-site material migrates into the adjacent natural area during the construction phase of the site;*
- *ESC fencing should be installed prior to any on-site activities, including vegetation clearing and grubbing;*
- *Once construction activities are complete, any exposed or disturbed soils should be seeded with an appropriate seed mix (i.e. native meadow mix) within approximately 30 days of the area being inactive. The composition of the seed mix should be determined by a qualified biologist or Ontario Landscape Architect (OALA) and applied in conjunction with a nurse crop of Annual Rye (*Lolium multiflorum*) at a seeding rate to be determined once the disturbance has been evaluated;*
- *Any seeded areas should be inspected for establishment by the on-site Environmental Monitor or qualified biologist who will notify the City and GRCA once the site has been stabilized and the seeded area has established. In the event that areas of disturbed soil do not establish sufficiently, additional seeding is recommended;*
- *ESC measures, including fencing, stakes, waste materials, etc. are to be removed from the site and properly disposed of once the site is stabilized to the satisfaction of the Environmental Monitor or qualified biologist.*

6.4.3 Management of Stormwater Quantity and Quality

The approach to stormwater management for the proposed redevelopment is summarized in this report, however, the reader is referred to the Hydrogeological Characterization Study (MTE 2018a), the Functional Servicing Report (MTE 2018b), and the Stormwater Management Report (MTE 2018c) for further details.

Storm drainage for the proposed development will be provided through a combination of minor (piped) and major (overland) drainage system inputs (MTE 2018b, c). The proposed development follows a 'treatment train' approach. An OGS will be utilized to provide pre-treatment to runoff prior to releasing flows to the wet pond (MTE 2018c). The wet pond in turn will then provide quality control to runoff before releasing flows to the infiltration gallery (MTE 2018c). The OGS will be designed to treat runoff from minor events ($\leq 25\text{mm}$) before releasing to the wet pond, providing an enhanced level of water quality, however, this will be designed during the Site Plan stage (MTE 2018c).

Flows from all storm events will be conveyed to the SWM facility by a combination of storm sewers and overland flow routes (MTE 2018c). Peak flows from the pre- and post-development scenario are accounted for in the 5, 25, and 100-year storm events within the wet pond and wetland, while average annual infiltration and runoff from the subject property will increase by 12% and 42% respectively, with the majority of runoff being directed to Arkell Road, away from the wetland (MTE 2018c). When factored into the seasonal and annual variation in the pre-developed condition, the increase in average annual infiltration does not account to a significant magnitude of change. Surface water inputs to the PSW will be maintained at pre-development rates, while groundwater inputs will be maintained at pre-development levels by directing clean stormwater to infiltration galleries (MTE 2018a, b, c).

Mitigation

- *Stormwater management planning should consider the water budget associated with the adjacent wetland area with respect to pre-development run-off and appropriate water quality controls;*
- *Contractors should develop a spill contingency plan and keep clean-up materials on-site;*
- *Install ESC measures along the limit of development and where runoff will discharge from the site to adjacent lands until the site is stabilized;*
- *Equipment storage and refueling areas to be situated away from the natural features and their buffers;*
- *Maintenance and refueling of machinery during construction is to occur at a designated locations away from the natural features and their buffers;*
- *Implement a post-construction monitoring and maintenance program for the stormwater management system;*
- *Develop Best Management Practices for salt and snow at the Site Plan Stage and implement post development*

6.4.4 Indirect Impacts to Wildlife Habitats

The proposed redevelopment will maintain and buffer the important natural features within the Subject Property, thereby maintaining these important areas for wildlife. Potential indirect impacts to wildlife in the retained natural areas may arise from noise and dust associated with construction activities and unnatural lighting resulting from the development. Noise and dust associated with construction is anticipated to be temporary, therefore significant impacts to wildlife from noise and dust are not expected.

During construction activities, such as clearing and grubbing, dust can lead to large amounts of dust which can induce changes in vegetation due to increased heat absorption and decreased transpiration. High levels of dust can also fall into aquatic or wetland systems, causing adverse effects to plants and / or wildlife that are not adapted to high levels of sedimentation. Dust also produces an immediate visual impact.

Mitigation

- *In order to suppress dust, areas of bare soil should be moistened with water during construction activities to ensure that the amount of dust within the Subject Property is reduced. Topsoil stockpile locations should be in areas of lesser wind exposure and away from natural features and their buffers;*
- *Disturbed areas with exposed soils should be kept to a minimum and re-vegetated with an approved seed mix in a reasonable timeframe in order to stabilize soils and minimize dust;*
- *Detailed lighting designs will be provided at the detailed design stage. Lighting designs should include directional lighting for developments that are within 30 m of natural features to eliminate lightwash;*
- *All machinery, storage and refueling to be maintained outside of the natural features.*

6.5 Induced Impacts and Mitigation Measures

Induced impacts are described as those that are not directly related to the construction or operation of the facilities in question, but rather arise from the use of the natural areas as a result of the development. The simplest example is increased use of a natural area by residents or users of the property, feral domestic wildlife, and unauthorized trail/pathway construction.

Natural areas and wildlife can be affected by the presence of a development and its occupants. As a residential development, the induced impacts relating to the development are most likely to include the dumping of refuse or yard waste and development of ad-hoc trails throughout the adjacent natural area. The dumping of yard waste presents the issue of non-native species establishment including aggressive plants such as Periwinkle (*Vinca minor*). While the dumping of yard waste is difficult to control, the establishment of non-native species can be avoided by excluding them from any landscaping which will be installed on site. Direction should be provided to the landscaping maintenance company to ensure that buffer areas are not disturbed and that no landscape material or cuttings are dumped into the natural areas and associated buffers.

It is recommended that the buffer area be enhanced through the planting of trees and shrubs and where suitable, open meadow herbaceous species. Plantings can aid in screening the natural area from the development. Plantings in the natural area buffer are to be comprised of native species known from Wellington County, while the landscape plantings incorporated into the development / common amenity areas can be comprised of species tolerant of urban conditions (i.e. drought, salt, compaction, etc.); however, should not include any aggressive / invasive species known to colonize into natural areas, such as Norway Maple (*Acer platanoides*).

Mitigation

- *Use of the natural areas by community residents or other users is difficult to control. Education with respect to the values and implications of the neighbouring natural areas is one tool that can be used. Signage should be used to direct community members or other recreational users not to trespass into sensitive natural areas;*
- *A new home owner's brochure should be developed to educate new residents on the important natural features in their neighbourhood;*
- *Incorporate native plantings throughout the natural area buffer to enhance and screen from the adjacent residential development.*

Table 6. Summary of Significant Natural Features, Potential Impacts and Recommended Mitigation

| Significant Natural Feature | Relevant Policies | Potential Impacts | Recommended Mitigation |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Significant Wetland | <ul style="list-style-type: none"> Provincial Policy Statement (MMAH 2014) City of Guelph Official Plan (2018) Grand River Conservation Authority Ontario Regulation 150/06 (1990) (Government of Ontario 2013) | <p>Direct Impacts:</p> <ul style="list-style-type: none"> The overall function of the wetland will be maintained. <p>Indirect Impacts:</p> <ul style="list-style-type: none"> Changes to surface flow, groundwater balance and water quality Sedimentation and erosion Indirect impacts to wildlife <p>Induced Impacts:</p> <ul style="list-style-type: none"> Increased use of a natural area by future residents or users of the property, feral domestic wildlife, dumping of yard-waste, invasive species proliferation, and unauthorized trail/pathway construction. | <p>Direct and Indirect Impacts</p> <ul style="list-style-type: none"> Minimum 15m no-touch buffers around the wetland are recommended Buffers should be delineated in the field prior to any construction activities <p>Indirect Impacts:</p> <ul style="list-style-type: none"> To avoid impacts to the wetlands, the water balance of the wetlands should be maintained during all construction activities and in the post-development scenario. A detailed Sediment and Erosion Control Plan should be developed at the Detailed Design Stage. All fueling and maintenance of machinery should be done at designated locations away from natural features. <p>Induced Impacts:</p> <ul style="list-style-type: none"> Signage should be used to direct community members or other recreational users not to trespass into sensitive natural areas. Planting of native plants, known from region. |
| Significant Woodland | <ul style="list-style-type: none"> Provincial Policy Statement (MMAH 2014) | <p>Direct Impacts:</p> <ul style="list-style-type: none"> Direct impacts to the deciduous forest have been avoided through the proposed | <p>Direct Impacts:</p> <ul style="list-style-type: none"> Dripline buffers (10 m) are required around the woodland. Site-specific tree protection measures should be identified through the Detailed Vegetation Plan at Site Plan Approval stage. |

| Significant Natural Feature | Relevant Policies | Potential Impacts | Recommended Mitigation |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | <ul style="list-style-type: none"> City of Guelph Official Plan (2018) City of Guelph Tree Bylaw (2010) No. 19058 | <p>development design which is completely outside the dripline buffers. The overall function of this woodland will be maintained.</p> <p>Indirect Impacts:</p> <ul style="list-style-type: none"> Sedimentation and erosion Indirect impacts to wildlife <p>Induced Impacts:</p> <ul style="list-style-type: none"> Induced impacts include increased use of a natural area by future residents or users of the property, feral domestic wildlife, and unauthorized trail/pathway construction. | <p>Indirect Impacts:</p> <ul style="list-style-type: none"> A detailed Sediment and Erosion Control Plan should be developed at the Site Plan stage. <p>Induced Impacts:</p> <ul style="list-style-type: none"> Signage should be used to direct community members or other recreational users not to trespass into sensitive natural areas. |
| Significant Wildlife Habitat | <ul style="list-style-type: none"> Provincial Policy Statement (MMAH 2014) City of Guelph Official Plan (2018) Grand River Conservation Authority Ontario | <p>Direct Impacts:</p> <ul style="list-style-type: none"> Direct impacts to the SWH within the Subject Property have been avoided through the proposed concept plan and through the implementation of buffers around the woodland/wetland. | <p>Direct and Indirect Impacts:</p> <ul style="list-style-type: none"> Minimum 10 m Dripline and 15 m wetland buffers are recommended around the woodland/wetland community. Buffers should be delineated in the field prior to any construction activities. <p>Indirect Impacts:</p> <ul style="list-style-type: none"> To avoid impacts to the wetland, the water balance should be maintained during all construction activities and in the post-development scenario. |

| Significant Natural Feature | Relevant Policies | Potential Impacts | Recommended Mitigation |
|-----------------------------|------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | <ul style="list-style-type: none"> Regulation 150/06 (1990) (Government of Ontario 2013) | <p>Indirect Impacts:</p> <ul style="list-style-type: none"> Sedimentation and erosion Indirect impacts to wildlife <p>Induced Impacts:</p> <ul style="list-style-type: none"> Induced impacts include increased use of a natural area by future residents or users of the property, feral domestic wildlife, and unauthorized trail/pathway construction. | <ul style="list-style-type: none"> A detailed Sediment and Erosion Control Plan should be developed at the Detailed Design Stage. All machinery, storage and refueling to be maintained outside of the natural features and their demarcated buffers. <p>Induced Impacts:</p> <ul style="list-style-type: none"> Signage should be used to direct community members or other recreational users not to trespass into sensitive natural areas. |
| Locally Significant Species | <ul style="list-style-type: none"> City of Guelph Official Plan (2018) | <p>Direct Impacts:</p> <ul style="list-style-type: none"> Removal of 339 isolated trees with the developed portion of the subject property. <p>Indirect Impacts:</p> <ul style="list-style-type: none"> Potential indirect impacts to wildlife in the retained natural areas may arise from noise and dust associated with construction activities and unnatural lighting resulting from the development. Noise and dust associated with construction is | <p>Direct Impacts:</p> <ul style="list-style-type: none"> Final details of the vegetation to be removed from the Subject Property will be included at the Site Plan Stage. Vegetation removal is recommended to occur outside of the breeding and nesting season for migratory birds as established by the Canadian Wildlife Service. This period extends from approximately April 1 through August 31. Should vegetation removal be required during the nesting season for migratory birds, surveys for nesting birds may be undertaken to permit vegetation removal should breeding bird absence be confirmed. Where trees are to be retained, tree protection fencing should be installed along the limit of grading (i.e. the buffer edge). Trees identified for removal that are in excellent to fair condition (169) may be compensated at a 3:1 ratio with trees and 5:1 with shrubs. Where on-site plantings are not achievable, cash in lieu equal to the value of the replacement vegetation will be required to be paid to the City. |

| Significant Natural Feature | Relevant Policies | Potential Impacts | Recommended Mitigation |
|-----------------------------|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | <p>anticipated to be temporary, therefore significant impacts to wildlife from noise and dust are not expected.</p> <p>Induced impacts:</p> <ul style="list-style-type: none"> Increased use of a natural area by residents or users of the property, feral domestic wildlife, and unauthorized trail/pathway construction. | <ul style="list-style-type: none"> It is recommended that planting of new native trees, be incorporated into the proposal in order to compensate for any tree loss. <p>Indirect Impacts:</p> <ul style="list-style-type: none"> In order to suppress dust, areas of bare soil can be moistened with water during construction activities to ensure that the amount of dust within the subject property is reduced. Topsoil stockpile locations should be in areas of lesser wind exposure and away from natural features and their buffers. Disturbed areas should be kept to a minimum and re-vegetated with an approved seed mix in a reasonable timeframe in order to minimize dust. Detailed lighting designs will be provided at the detailed design stage. Lighting designs should include directional lighting for developments that are within 30 m of natural features to eliminate lightwash. All machinery, storage and refueling to be maintained outside of the natural features and their demarcated buffers. <p>Induced Impacts:</p> <ul style="list-style-type: none"> Signage should be used to direct community members or other recreational users not to trespass into sensitive natural areas. |

7.0 Recommendations

7.1 Environmental Implementation Report

As a condition of a site alteration permit, the City requires that an Environmental Implementation Report (EIR) be prepared and submitted to agency staff for approval. The EIR serves as a summary document to describe how all the conditions of the application decision have been met and any other special requirements that are required to protect the overall natural environment of the area. It is recommended that the EIR include the following components:

- A description of how municipal infrastructure servicing and the protection of natural heritage system functions have been addressed;
- Specific direction for any other special requirements to support the protection and/or management of a significant natural feature or area (e.g., management prescriptions, etc.);
- Site-specific details for mitigation measures;
- Guidance for all monitoring plans including specific locations, sampling methods, and dates/timing;
- Detailed restoration and planting plans (including tree compensation details and restoration plans for areas impacted by development);
- Detailed educational signage and environmental outreach;
- Preparation of Landscape Plans complete with details addressing demarcation and removal of hazard trees;
- Specific requirements which need to be addressed for a Tree Cutting Permit (e.g. landowner permission letters for boundary trees);
- A review of the final development details (e.g. final stormwater management report, grading plans, sediment and erosion control details, etc.) and an updated impact assessment, where necessary.

8.0 Summary and Conclusion

NRSI was retained in December 2016 by Crescent Homes to complete an EIS and TIPP to address potential impacts associated with the redevelopment of 190 – 216 Arkell Road, Guelph, Ontario. The intent of this report is to characterize important natural features, recommend appropriate buffers, and identify potential impacts associated with the development.

A portion of the subject property, situated at the northwestern corner, is comprised of Significant Woodland and PSW, associated with the Torrance Creek Swamp. Identified natural feature constraints were used to guide the layout of the Concept Plan and to mitigate the direct displacement of this identified feature, where possible.

Direct impacts associated with this undertaking are grading and soil excavation and the resulting tree removal and vegetation clearing. Recommendations have been made for tree preservation and compensation. A Tree Inventory and Preservation Plan has been prepared that provides recommendations for tree protection, mitigation and compensation.

Indirect impacts to water quality and quantity are addressed in the Functional Servicing and Stormwater Management Reports prepared by MTE (2018b, c). This report also includes sediment and erosion controls to avoid indirect impacts to the natural features and will be finalized during the detailed design stage.

This report provides recommendations to minimize impacts to the adjacent natural heritage features and ensure that mitigation measures are installed and functioning properly. These include recommendations to mitigate direct, indirect, and induced impacts that may arise during the proposed development, as well as a monitoring program to ensure impacts to important natural features are not realized.

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APPENDIX I Concept Plan



Preliminary Concept Plan

Arkell Road Properties
City of Guelph

LEGEND

Subject Lands

| | Proposed |
|--------------------|---------------------------------|
| Gross Area | 25,768 m ² (2.57 ha) |
| Net Area | 12,532 m ² (1.25 ha) |
| Number of Units | 66 |
| No. of Storeys | 3 |
| Gross Area Density | 25.7 units/ha |
| Net Area Density | 52.8 units/ha |
| Parking Required | 39 spaces |
| Parking Provided | 46 spaces |

Notes:

- Net Area excludes: NRSI wetland limit, 30m buffer from NRSI wetland, 20m wide right of way and 5m road widening.
- Standards for Residential Townhouse (R.3) Zone used for Concept Plan.
- Parking Required includes 1 space/unit and 20% visitor parking requirement.
- Site Boundary is approximate and should be verified by Survey.
- Natural feature limits from NRSI (August 28, 2018)
- Density to be confirmed through City review.

Sources:

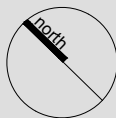
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- Parcel Fabric - Grand River Conservation Authority (GRIN) 2010
- Dripline Limits - Natural Resource Solutions Inc. (NRSI) August, 2018
- Wetland Limits - Natural Resource Solutions Inc. (NRSI) August, 2018
- City of Guelph Zoning By-law (1995) 14864

DATE: September 12, 2018

FILE: 15246A

SCALE ±1:750

DRAWN: GC



K:\15246A-CRESCENT HOMES-ARKELL ROAD-GUELPH\CONCEPT\CONCEPT DP SEPTEMBER 12 2018.DWG

APPENDIX II SAR/SCC and SWH Screening Tables

Arkell Rd Properties EIS
SAR/SCC Screening

| Scientific Name | Common Name | S-RANK ¹ | COSEWIC ² | ESA/ COSSARO ³ | SARA | Background Source | Habitat Preference ^{4,5} | Suitable Habitats within Subject Property | Rationale |
|------------------------------------------------------|----------------------------|---------------------|----------------------|------------------------------|-------------|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Vascular Plants | | | | | | | | | |
| <i>Asplenium scolopendrium</i> var. <i>americana</i> | Hart's-tongue | S3 | SC | SC | Schedule 1 | MNRF, 2018 | Shaded calcareous rock (limestone and dolostone). | No | Suitable habitat is not present within the subject property. Foral inventories did not observe the species. |
| <i>Eurybia schreberi</i> | Schreber's Aster | S2S3 | | | | MNRF, 2018 | Damp mesic deciduous mixed woods, most often those with Maple, Elm, or Oak, as well as in thickets and shaded roadbanks. | No | Suitable habitat is not present within the subject property. Foral inventories did not observe the species. |
| <i>Juglans cinerea</i> | Butternut | S3? | END | E | Schedule 1 | MNRF, 2018 | Stream banks and swamps, as well as upland beech-maple, oak-hickory, and mixed hardwood stands. | Possible | Suitable habitat is present within the subject property. Foral inventories did not observe the species. |
| <i>Oenothera clelandii</i> | Cleland's Evening-primrose | S1 | | | | MNRF, 2018 | Sandy roadsides, fields, and railroads; plains and dry savanna (oak, sassafras), generally in disturbed areas. | No | Suitable habitat is not present within the subject property. Foral inventories did not observe the species. |
| <i>Cypripedium arietinum</i> | Ram's-head Lady's Slipper | S3 | | | | MNRF, 2018 | Low dunes, in partial shade of fringing conifers, along the northern shores of Lakes Michigan and Huron and on Lake Superior (where it also occurs on thin soil over rock); inland, under jack pine and oak and also in coniferous swamps (cedar, tamarack, spruce, fir). | No | Suitable habitat is present within the subject property. Foral inventories did not observe the species. |
| <i>Carex careyana</i> | Carey's Sedge | S2 | | | | MNRF, 2018 | Rich deciduous forests; rather local. | No | Suitable habitat is not present within the subject property. Foral inventories did not observe the species. |
| <i>Carex lupuliformis</i> | Hop-like Sedge | S1 | END | E | Schedule 1 | MNRF, 2018 | Wet, wooded habitats. | Possible | Suitable habitat is present within the subject property. Foral inventories did not observe the species. |
| <i>Castanea dentata</i> | American Chestnut | S2 | END | E | Schedule 1 | MNRF, 2018 | Moist to well drained forests on sand, occasionally heavy soils. | No | Suitable habitat is present within the subject property. Foral inventories did not observe the species. |
| <i>Hypericum prolificum</i> | Shrubby St. John's-wort | S2 | | | | MNRF, 2018 | Swamp borders, thickets, meadows, fields, roadsides, sandy open forests (oak). | Yes | Suitable habitat is present within the subject property but foral inventories did not find this species. |
| <i>Monarda didyma</i> | Oswego-tea | S3 | | | | MNRF, 2018 | Rich deciduous forests on banks and floodplains. | No | Suitable habitat is present within the subject property. Foral inventories did not observe the species. |
| <i>Erigeron bulbosa</i> | Harbinger-of-spring | S3? | | | | MNRF, 2018 | Rich, often moist deciduous forests, including floodplains and river banks. | No | Suitable habitat is present within the subject property. Foral inventories did not observe the species. |
| <i>Potamogeton hillii</i> | Hill's Pondweed | S2 | SC | SC | Schedule 1 | MNRF, 2018 | Shallow water of small lakes, ponds, ditches, and streams. | No | Suitable habitat is present within the subject property. Foral inventories did not observe the species. |
| Birds | | | | | | | | | |
| <i>Ammodramus henslowii</i> | Henslow's Sparrow | SHB | END | E | Schedule 1 | MNRF, 2018 | 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 plands; a moderate amount of moisture needed; requires a minimum tract of grassland of 40 ha, but usually in areas >100 ha. | No | Suitable habitat not present within the subject property. Breeding bird surveys did not observe the species. |
| <i>Ammodramus savannarum</i> | Grasshopper Sparrow | S4B | SC | SC | | Atlas of the Breeding Birds of Ontario, 2016 | Well-drained grassland or prairie with low cover of grasses, taller weeds on sandy soil; hayfields or weedy fallow fields; uplands with ground vegetation of various densities; perches for singing; requires tracts of grassland > 10 ha. | No | Suitable habitat not present within the subject property. Breeding bird surveys did not observe the species. |
| <i>Asio flammeus</i> | Short-eared Owl | S2N, S4B | SC | SC | Schedule 3 | MNRF, 2018 | 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. | No | Suitable habitat not present within the subject property. Breeding bird surveys did not observe the species. |
| <i>Chaetura pelagica</i> | Chimney Swift | S4B, S4N | THR | T | Schedule 1 | Atlas of the Breeding Birds of Ontario, 2016 | Urban areas near buildings; nests in hollow trees, crevices of rock cliffs, chimneys; highly gregarious; feeds over open water. | No | Suitable habitat not present within the subject property. Breeding bird surveys did not observe the species. |
| <i>Chordeiles minor</i> | Common Nighthawk | S4B | SC | T | Schedule 1 | Atlas of the Breeding Birds of Ontario, 2016 | Open ground; clearings in dense forests; ploughed fields; gravel beaches or barren areas with rocky soils; open woodlands; flat gravel roofs. | No | Suitable habitat not present within the subject property. Breeding bird surveys did not observe the species. |
| <i>Contopus virens</i> | Eastern Wood-Pewee | S4B | SC | SC | | Atlas of the Breeding Birds of Ontario, 2016 | Open, deciduous, mixed or coniferous forest; predominated by oak with little understory; forest clearings, edges; farm woodlots, parks | Yes | Suitable habitat may be present within the extreme northwestern portion of the subject property. Breeding bird surveys documented the present on singing male off the subject property, within the Torrance Creek Swamp PSW. |
| <i>Dolichonyx oryzivorus</i> | Bobolink | S4B | THR | T | No Schedule | Atlas of the Breeding Birds of Ontario, 2016 | Large, open expansive grasslands with dense ground cover; hayfields, meadows or fallow fields; marshes; requires tracts of grassland >50 ha. | No | Suitable habitat not present within the subject property. Breeding bird surveys did not observe the species. |

Arkell Rd Properties EIS
SAR/SCC Screening

| Scientific Name | Common Name | S-RANK ¹ | COSEWIC ² | ESA/ COSSARO ³ | SARA | Background Source | Habitat Preference ^{4,5} | Suitable Habitats within Subject Property | Rationale |
|-----------------------------------|-----------------------|---------------------|----------------------|------------------------------|------------|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Haliaeetus leucocephalus</i> | Bald Eagle | S2N, S4B | SC | NAR | | MNRF, 2018 | 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 200 m from shore; require tall, dead, partially dead trees within 400 m of nest for perching; sensitive to toxic chemicals. | No | Suitable habitat not present within the subject property. Breeding bird surveys did not observe the species. |
| <i>Hirundo rustica</i> | Barn Swallow | S4B | THR | T | | Atlas of the Breeding Birds of Ontario, 2016 | Farmlands or rural areas; cliffs, caves, rock niches; buildings or other man-made structures for nesting; open country near body of water. | No | Suitable habitat not present within the subject property. Breeding bird surveys did not observe the species. |
| <i>Hylocichla mustelina</i> | Wood Thrush | S4B | SC | T | | Atlas of the Breeding Birds of Ontario, 2016 | Carolinian and Great Lakes-St. Lawrence forest zones; 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. | Yes | Suitable habitat may be present within the extreme northwestern portion of the subject property. Breeding bird surveys did not detect the species. |
| <i>Icteria virens</i> | Yellow-breasted Chat | S2B | END | E | Schedule 1 | MNRF, 2018 | Thickets, tall tangles of shrubbery beside streams, ponds; overgrown bushy clearings with deciduous thickets; nests above ground in bush, vines etc. | No | Suitable habitat not present within the subject property. Breeding bird surveys did not observe the species. |
| <i>Lanius ludovicianus</i> | Loggerhead Shrike | S2B | END | E (ssp. <i>migrans</i>) | Schedule 1 | MNRF, 2018 | 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. | No | Suitable habitat not present within the subject property. Breeding bird surveys did not observe the species. |
| <i>Melanerpes erythrocephalus</i> | Red-headed Woodpecker | S4B | SC | T | Schedule 1 | Atlas of the Breeding Birds of Ontario, 2016 | 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. | No | Suitable habitat not present within the subject property. Breeding bird surveys did not observe the species. |
| <i>Chlidonias niger</i> | Black Tern | S3B | SC | NAR | | MNRF, 2018 | 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 for insects; also feeds on fish, crayfish and frogs. | No | Suitable habitat not present within the subject property. Breeding bird surveys did not observe the species. |
| <i>Riparia riparia</i> | Bank Swallow | S4B | THR | T | Schedule 1 | Atlas of the Breeding Birds of Ontario, 2016 | 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; nesting sites are limiting factor for species presence. | No | Suitable habitat not present within the subject property. Breeding bird surveys did not observe the species. |

Arkell Rd Properties EIS
SAR/SCC Screening

| Scientific Name | Common Name | S-RANK ¹ | COSEWIC ² | ESA/ COSSARO ³ | SARA | Background Source | Habitat Preference ^{4,5} | Suitable Habitats within Subject Property | Rationale |
|--------------------------------------------|----------------------------------------------------------------------------------------------|---------------------|----------------------|------------------------------|-------------|-------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Sturnella magna</i> | Eastern Meadowlark | S4B | THR | T | No Schedule | Atlas of the Breeding Birds of Ontario, 2016 | 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. | No | Suitable habitat not present within the subject property. Breeding bird surveys did not observe the species. |
| Herpetofauna | | | | | | | | | |
| <i>Ambystoma jeffersonianum</i> | Jefferson Salamander | S2 | END | E | Schedule 1 | Ontario Nature 2016 | Damp shady deciduous forest, swamps, moist pasture, lakeshores; temporary woodland pools for breeding; hides under leaf litter, stones or in decomposing logs. | No | Suitable habitat is not present throughout the subject property. MNRF has confirmed very low probability of species occurring in area. |
| <i>Chelydra serpentina serpentina</i> | Snapping Turtle | S3 | SC | SC | Schedule 1 | Ontario Nature 2016 | 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; may nest at some distance from water; often hibernate together in groups in mud under water; home range size ~28 ha. | No | Suitable habitat is not present within the subject property; man-made pond is too shallow to allow for over-wintering habitat. MNRF correspondence indicates a sighting of the species in "close proximity". Area searches did not observe the species within the subject property to confirm presence/absence. |
| <i>Emydoidea blandingii</i> | Blanding's Turtle (<i>Great Lakes/St. Lawrence population</i>) | S3 | THR | T | Schedule 1 | Ontario Nature 2016 | 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; surrounding natural habitat is important in summer as they frequently move from aquatic habitat to terrestrial habitats; hibernates in bogs; not readily observed. | No | Suitable habitat is not present within the subject property. Area searches did not observe the species within the subject property. |
| <i>Graptemys geographica</i> | Northern Map Turtle | S3 | SC | SC | Schedule 1 | Ontario Nature 2016 | 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; not readily observed. | No | Suitable habitat is not present within the subject property. Area searches did not observe the species within the subject property. |
| <i>Lampropeltis taylori triangulum</i> | Eastern Milksnake | S4 | NAR | SC | | Ontario Nature 2016 | Farmlands, meadows, hardwood or aspen stands; pine forest with brushy or woody cover; river bottoms or bog woods; hides under logs, stones, or boards or in outbuildings; often uses communal nest sites. | Possible | Snake surveys were conducted throughout the subject property and this species was not observed. |
| <i>Thamnophis butleri</i> | Butler's Gartersnake | S2 | END | E | Schedule 1 | MNRF, 2016 | Wet meadows, pastures, margins of marshes and streams, and open country. | No | Species known only from the Luther Marsh region in Wellington County. Suitable habitat is not present within the subject property. Area searches and snake coverboards did not observe the species within the subject property. |
| <i>Pseudacris triseriata</i> pop. 2 | Western Chorus Frog (<i>Great Lakes/St. Lawrence - Canadian Shield Population</i>) | S3 | NAR | T | Schedule 1 | Ontario Nature 2016 | Roadside ditches or temporary ponds in fields; swamps or wet meadows; woodland or open country with cover and moisture; small ponds and temporary pools. | Possible | Evening Amphibian call surveys were conducted and this species was not observed. |
| <i>Thamnophis sauritus septentrionalis</i> | Eastern Ribbonsnake (<i>Great Lakes population</i>) | S3 | SC | SC | Schedule 1 | Ontario Nature 2016, MNRF, 2016 | 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; hibernates in groups. | Possible | Snake surveys were conducted throughout the subject property and this species was not observed. |
| Mammals | | | | | | | | | |
| <i>Myotis lucifungus</i> | Little Brown Myotis | S5 | E | END | | Atlas of the Mammals of Ontario, 1990 | 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 | Yes | Acoustic bat exit surveys documented the species utilizing the Cultral Meadow habitat. Assessments for suitable maternity roosting habitat was conducted throughout the developable portion of the subject property and did not detect the species within this portion of the subject property. |
| <i>Myotis leibii</i> | Eastern Small-footed Bat | S2S3 | END | | | Atlas of the Mammals of Ontario, 1990 | Roosts in caves, mine shafts, crevices or buildings that are in or near woodland; hibernates in cold dry caves or mines; maternity colonies in caves or buildings; hunts in forests. | No | Acoustic bat exit surveys did not detect the species throughout the study area and this species was not detected. |
| Insects | | | | | | | | | |
| <i>Arigomphus villosipes</i> | Unicorn Clubtail | S2S3 | | | | MNRF, 2005 | Ponds and sluggish streams with mucky bottoms and little emergent vegetation. | No | Insect surveys were conducted throughout the subject property and this species was not observed. |
| <i>Asterocampa clyton</i> | Tawny Emperor | S2S3 | | | | Jones et al. 2016 | Forests with Common Hackberry trees throughout. | No | Insect surveys were conducted throughout the subject property and this species was not observed. |
| <i>Bombus affinis</i> | Rusty-patched Bumble Bee | S2 | END | E | Schedule 1 | MNRF, 2016 | Open habitats, such as oak savannah. | No | Suitable habitat is not present within the subject property, however, Bumble Bee surveys will confirm presence/absence of the species. |
| <i>Bombus terricola</i> | Yellow-banded Bumble Bee | S5 | SC | SC | | NHIC, 2016 | Found in mixed woodlands, and a variety of open habitats, specifically native grasslands, farmlands, and urban areas, where abandoned rodent burrows or decomposing logs are prevalent. | Possible | Bumble Bee surveys conducted throughout the subject property did not observe the species. |

Arkell Rd Properties EIS
SAR/SCC Screening

| Scientific Name | Common Name | S-RANK ¹ | COSEWIC ² | ESA/ COSSARO ³ | SARA | Background Source | Habitat Preference ^{4,5} | Suitable Habitats within Subject Property | Rationale |
|-------------------------------|-------------------------|---------------------|----------------------|------------------------------|------------|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Danaus plexippus</i> | Monarch | S2N, S4B | SC | SC | Schedule 1 | Jones et al. 2016 | Open fields and meadows with milkweed. | Yes | Suitable habitat is present within the subject property, though Milkweed is not present in high concentrations. This species was observed during insect surveys. |
| <i>Gomphus graslinellus</i> | Pronghorn Clubtail | S3 | | | | MNRF, 2005 | Ponds, lakes and slow streams. | No | Insect surveys were conducted throughout the subject property and this species was not observed. |
| <i>Lestes eurinus</i> | Amber-winged Spreadwing | S3 | | | | MNRF, 2005 | Small ponds, quarries, bogs and lakes. | No | Insect surveys were conducted throughout the subject property and this species was not observed. |
| <i>Rhionaeschna mutata</i> | Spatterdock Damselfly | S1 | | | | MNRF, 2005 | Bogs, swamps and shallow ponds. | No | Insect surveys were conducted throughout the subject property and this species was not observed. |
| <i>Somatochlora tenebrosa</i> | Clamp-tipped Emerald | S2S3 | | | | MNRF, 2005 | Shady forest streams with intermittent rapids and pools. | No | Insect surveys were conducted throughout the subject property and this species was not observed. |
| Fish | | | | | | | | | |
| <i>Clinostomus elongatus</i> | Redside Dace | S2 | END | E | Schedule 3 | MNRF, 2016 | Pools and slow-moving areas of small streams and headwaters with gravel bottoms. | No | Suitable habitat is not present within the subject property. |
| <i>Lampsilis fasciola</i> | Wavy-rayed Lampmussel | S1 | THR | SC | Schedule 1 | MNRF, 2016 | Gravel and sand bottoms in medium-sized streams; is particularly sensitive to changes in their environment. | No | Suitable habitat is not present within the subject property. |
| <i>Moxostoma duquesnei</i> | Black Redhorse | S2 | THR | T | | MNRF, 2016 | Generally inhabits moderately sized, cool, clear streams. | No | Suitable habitat is not present within the subject property. |
| <i>Notropis photogenis</i> | Silver Shiner | S2S3 | THR | T | SC | MNRF, 2016 | Found in flowing pools, runs and riffles in occupied reaches. Shallow, nearshore habitats, and areas with aquatic vegetation in occupied reaches. | No | Suitable habitat is not present within the subject property. |

¹S-Ranks (OMNR 2013)

S1-critically imperiled

S2-imperiled

S3-vulnerable

S4- apparently secure

S5- secure

²COSEWIC – Committee on the Status of Endangered Wildlife in Canada (2016)

³COSSARO- Committee on Species at Risk in Ontario (2015), ESA –

Endangered Species Act (2007)

⁴COSEWIC – Committee on the Status of Endangered Wildlife in Canada (2013)

⁵OMNR 2000

Ranks

END/E- Endangered

SC- Special Concern

THR/T – Threatened

NAR- Not at Risk

Significant Wildlife Habitat Assessment Tables

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

| | Wildlife Species ¹ | ELC Ecosite Codes ¹ | Candidate SWH Habitat Criteria and Information Sources ¹ | Confirmed SWH Defining Criteria ¹ | Study Area 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 ^{cdviii} . 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" ^{cccd} • 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 ^{cdviii} . • 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 ^{cdix} Index #7 provides development effects and mitigation measures. | Fields with sheet water are not present. 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 ¹ or more of listed species for 7 days ¹ , results in > 700 waterfowl use days. • Areas with annual staging of ruddy ducks, canvasbacks, and redheads are SWH ^{cdix} • The combined area of the ELC ecosites and a 100m radius area is the SWH ^{cdviii} • Wetland area and shorelines associated with sites identified within the SWHTG ^{cdviii} Appendix K ^{cdix} are significant wildlife habitat. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" ^{cccd} • 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 ^{cdix} Index #7 provides development effects and mitigation measures. | Suitable aquatic habitat is not present within the study area. Not SWH |

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

| | Wildlife Species ¹ | ELC Ecosite Codes ¹ | Candidate SWH Habitat Criteria and Information Sources ¹ | Confirmed SWH Defining Criteria ¹ | Study Area Assessment Details |
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| 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 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. <u>Information Sources</u> • 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 ^{cdviii} • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" ^{ccxi} • SWHMiST ^{cdix} Index #8 provides development effects and mitigation measures. | Shorebird stopover habitats are typically associated with large bodies of water such as the Great Lakes and associated wetlands. 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 <u>Special Concern:</u> 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 ^{cdviii, cdix} with a combination of forest and upland. ^{xxv, xxvi, xxviii, xix, xx, xxi} Least disturbed sites, idle/fallow or lightly grazed field/meadow (>15ha) with adjacent woodlands ^{cdix} 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 <u>Information Sources</u> • 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) ^{cdix} 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 ^{cdix} Index #10 and #11 provides development effects and mitigation measures. | Subject property is surrounded by residential development, with which wintering raptor species are not tolerant to. Suitable open habitat (15ha) is also not present within study area. Winter raptor surveys were conducted and did not document this feature within the study area. Not SWH |

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

| | Wildlife Species ¹ | Candidate SWH | | Confirmed SWH | Study Area |
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| | | 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) | <ul style="list-style-type: none"> 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. <u>Information Sources</u> <ul style="list-style-type: none"> 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. | <ul style="list-style-type: none"> All sites with confirmed hibernating bats are SWH. The habitat area includes a 200m radius around the entrance of the hibernaculum^{ccviii, 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^{cclix} Index #1 provides development effects and mitigation measures. | This habitat was not identified during the background review process. 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, xxviii} (buildings are not considered to be SWH). <ul style="list-style-type: none"> 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} <u>Information Sources</u> <ul style="list-style-type: none"> OMNRF for possible locations and contact for local experts University Biology Departments with bat experts. | <ul style="list-style-type: none"> Maternity Colonies with confirmed use by: <ul style="list-style-type: none"> >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^{cclix} Index #12 provides development effects and mitigation measures. | Suitable habitat was not documented during a review of roost trees within the SWD4 community within the subject property. Not SWH |
| 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. <u>Information Sources</u> <ul style="list-style-type: none"> 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 ^{ccv} <ul style="list-style-type: none"> The confirmation criteria and habitat areas for this SWH are still being determined. SWHDSS^{cclix} Index #38 provides development effects and mitigation measures | Criteria unavailable to assess significance of habitat within the study area. |

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

| | Wildlife Species ¹ | ELC Ecosite Codes ¹ | Candidate SWH Habitat Criteria and Information Sources ¹ | Confirmed SWH Defining Criteria ¹ | Study Area Assessment Details |
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| 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 <u>Special Concern:</u> 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 ^{cxix, cx, cxii, cxviii} . • Man-made ponds such as sewage lagoons or storm water ponds should not be considered SWH. <u>Information Sources</u> • 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) ^{cxvi} . • Congregation of turtles is more common where wintering areas are limited and therefore significant ^{cxix, cx, cxii, cxli} . • SWHMiST ^{cxlix} Index #28 provides development effects and mitigation measures for turtle wintering habitat. | Aquatic habitat within the subject property not suitable for overwintering turtle species. Not SWH |
| 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 | <u>Snakes:</u> Eastern Gartersnake Northern Watersnake Northern Red-bellied Snake Northern Brownsnake Smooth Green Snake Northern Ring-necked Snake <u>Special Concern:</u> Milksnake Eastern Ribbonsnake <u>Lizard:</u> <u>Special Concern</u> (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 ^{dxiv, i, ii, lii, cxli} . • 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} . <u>Information Sources</u> • 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. <u>or</u> ; individuals of two or more snake spp. • Congregations of a minimum of five individuals of a snake sp. <u>or</u> ; 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). • <u>Note:</u> If there are Special Concern Species present, then site is SWH • <u>Note:</u> Sites for hibernation possess specific habitat parameters (e.g. temperature, humidity, etc.) and consequently are used annually, often by many of the same individuals of a local population [i.e. strong hibernation site fidelity]. Other critical life processes (e.g. mating) often take place in close proximity to hibernacula. The feature in which the hibernacula is located plus a 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. | Suitable characteristics of hibernacula features are not present within the subject property. Snake surveys conducted within the subject property documented a single Eastern Garter Snake. Not SWH |

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

| | Wildlife Species ¹ | ELC Ecosite Codes ¹ | Candidate SWH Habitat Criteria and Information Sources ¹ | Confirmed SWH Defining Criteria ¹ | Study Area Assessment Details |
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| 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 | <ul style="list-style-type: none"> 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. <u>Information Sources</u> <ul style="list-style-type: none"> Reports and other information available from CAs Ontario Breeding Bird Atlas^{ccv} Bird Studies Canada; <i>NatureCounts</i> http://www.birdscanada.org/birdmon/ Field Naturalist clubs | Studies confirming: <ul style="list-style-type: none"> Presence of 1 or more nesting sites with 8^{cdvix} 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} <ul style="list-style-type: none"> SWHMiST^{cdix} Index #4 provides development effects and mitigation measures | Banks and cliffs are not present within the study area. Not SWH |
| 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 | <ul style="list-style-type: none"> 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. <u>Information Sources</u> <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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^{cdix} Index #5 provides development effects and mitigation measures. | Breeding bird surveys did not document stick nests or other evidence of heron nesting within the subject property and adjacent lands. 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 | <ul style="list-style-type: none"> Nesting colonies of gulls and terns are on islands or peninsulas associated with open water or in marshy areas. Brewer's Blackbird colonies are found loosely on the ground in or in low bushes in close proximity to streams and irrigation ditches within farmlands. <u>Information Sources</u> <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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^{cdix} Index #6 provides development effects and mitigation measures. | Brewer's Blackbirds and nesting gulls are not present within the study area. Not SWH |

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

| | Wildlife Species ¹ | Candidate SWH | | Confirmed SWH | Study Area |
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| | | ELC Ecosite Codes ¹ | Habitat Criteria and Information Sources ¹ | Defining Criteria ¹ | Assessment Details |
| Wildlife Habitat: Migratory Butterfly Stopover Areas | | | | | |
| <p>Rationale: Butterfly stopovers areas are extremely rare habitats and are biologically important for butterfly species that migrate south for the winter.</p> | <p>Painted Lady Red Admiral</p> <p><u>Special Concern:</u> Monarch</p> | <p>Combination of ELC Community Series: Need to have present one Community Series from each landclass:</p> <p>Field: CUM CUS CUT</p> <p>Forest: FOC FOM FOD CUP</p> <p>Anecdotal, a candidate sight for butterfly stopover will have a history of butterflies being observed.</p> | <p>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}.</p> <ul style="list-style-type: none"> 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^{ccxli, ccxlii, ccxiv, ccxv, ccxvi}. 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 cxlvi, 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^{ccxvii, ccxviii, ccxix, xl, xli}. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> OMNRF (NHIC) Agriculture Canada in Ottawa may have list of butterfly experts. Field Naturalist Clubs Toronto Entomologists Association Conservation Authorities | <p>Studies confirm:</p> <ul style="list-style-type: none"> The presence of Monarch Use Days (MUD) during fall migration (Aug/Oct)^{ccxii}. 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^{ccxvii}, significant variation can occur between years and multiple years of sampling should occur^{xl, xli}. 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. | <p>Study area not located within 5 km of Lake Ontario.</p> <p>Not SWH</p> |
| Wildlife Habitat: Landbird Migratory Stopover Areas | | | | | |
| <p>Rationale: Sites with a high diversity of species as well as high number are most significant</p> | <p>All migratory songbirds.</p> <p>Canadian Wildlife Service Ontario website: http://www.on.ec.gc.ca/wildlife_e.html</p> <p>All migrant raptors species:</p> <p>Ontario Ministry of Natural Resources: Fish and Wildlife Conservation Act, 1997, Schedule 7: Specially Protected Birds (Raptors)</p> | <p>All Ecosites associated with these ELC Community Series: FOC FOM FOD SWC SWM SWD</p> | <p>Woodlots need to be >10 ha^l in size and within 5km^{lv, v, vi, vii, viii, ix, x, xi, xii, xiii, xiv, xv} of Lake Ontario.</p> <ul style="list-style-type: none"> 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^{cxviii}. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> Bird Studies Canada Ontario Nature Local birders and naturalist club Ontario Important Bird Areas (IBA) Program | <p>Studies confirm:</p> <ul style="list-style-type: none"> 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"^{ccxi} SWHMiST^{cxlix} Index #9 provides development effects and mitigation measures. | <p>Study area not located within 5 km of Lake Ontario.</p> <p>Not SWH</p> |

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

| | Wildlife Species ¹ | ELC Ecosite Codes ¹ | Candidate SWH Habitat Criteria and Information Sources ¹ | Confirmed SWH Defining Criteria ¹ | Study Area Assessment Details |
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| Wildlife Habitat: Deer Yarding Areas | | | | | |
| <p>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.</p> | White-tailed Deer | <p>Note: OMNRF to determine this habitat.</p> <p>ELC Community Series providing a thermal cover component for a deer yard would include: FOM, FOC, SWM and SWC.</p> <p>Or these ELC Ecosites: CUP2 CUP3 FOD3 CUT</p> | <ul style="list-style-type: none"> 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%^{CXCV}. 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. | <p>No Studies Required:</p> <ul style="list-style-type: none"> 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^{vi, vii, viii, ix, x, 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^{CXIX} Index #2 provides development effects and mitigation measures. | <p>Suitable habitat is present within the study area, but not in the subject property. Field studies documented the use by <4 white-tailed deer throughout the study area, however, usage was determined to be of individuals passing through and not consistently utilizing the study area.</p> <p>Not SWH</p> |
| Wildlife Habitat: Deer Winter Congregation Areas | | | | | |
| <p>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^{CXVIII}</p> | White-tailed Deer | <p>All Forested Ecosites with these ELC Community Series: FOC FOD SWC SWM SWD</p> <p>Conifer plantations much smaller than 50ha may also be used.</p> | <ul style="list-style-type: none"> 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 Ecoregion 6E are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands^{CXVIII}. 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^{CXIX}. Woodlots with high densities of deer due to artificial feeding are not significant. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> MNRF District Offices LIO/NRVIS | <p>Studies confirm:</p> <ul style="list-style-type: none"> Deer management is an MNRF responsibility, deer winter congregation areas considered significant will be mapped by MNRF^{CXVIII}. 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 MNRFⁱ. Studies should be completed during winter (Jan/Feb) when >20cm of snow is on the ground using aerial survey techniques^{CXIX}, ground or road surveys, or a pellet count deer density survey^{CXIX}. 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^{CXIX} Index #2 provides development effects and mitigation measures. | <p>MNRF has confirmed that Torrance Creek PSW wetland is a known Deer winter congregation area.</p> <p>Confirmed SWH</p> |

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. <u>Information Sources</u> • 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 ^{boxvii} • SWHMiST ^{cdix} Index #21 provides development effects and mitigation measures. | ELC surveys confirm that vegetation type is not present within the study area. 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. <u>Information Sources</u> • 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 ^{boxviii} • Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics) ¹ . • SWHMiST ^{cdix} Index #20 provides development effects and mitigation measures. | ELC surveys confirm that vegetation type is not present within the study area. Not SWH |

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

| Rare Vegetation Community ¹ | Candidate SWH | | | Confirmed SWH | Study Area |
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| | ELC Ecosite Codes ¹ | Habitat Description ¹ | Detailed Information and Sources ¹ | Defining Criteria ¹ | Assessment Details |
| Alvar | | | | | |
| <p>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.</p> | <p>ALO1 ALS1 ALT1 FOC1 FOC2 CUM2 CUS2 CUT2-1 CUW2</p> <p>Five Alvar</p> <p>Indicator Species: 1) Carex crawei 2) Panicum philadelphicum 3) Eleocharis compressa 4) Scutellaria parvula 5) Trichostema branchiatum</p> <p>These indicator species are very specific to Alvars within Ecoregion 6E</p> | <p>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^{bocviii}.</p> | <p>An Alvar site > 0.5 ha in size^{bocv}.</p> <p><u>Information Sources</u></p> <ul style="list-style-type: none"> • Alvars of Ontario (2000), Federation of Ontario Naturalists^{bocvi}. • Ontario Nature – Conserving Great Lakes Alvars^{bocviii}. • Natural Heritage Information Center (NHIC) has location information on their website • Field Naturalist clubs • Conservation Authorities | <p>Field studies identify four of the five Alvar indicator species^{bocv, cdxix} at a Candidate Alvar site is Significant.</p> <ul style="list-style-type: none"> • 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^{bocv}. • SWHMiST^{cdlix} Index #17 provides development effects and mitigation measures. | <p>ELC surveys confirm that vegetation type is not present within the study area.</p> <p>Not SWH</p> |
| Old Growth Forest | | | | | |
| <p>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.</p> | <p>Forest Community Series: FOD FOC FOM SWD SWC SWM</p> | <p>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.</p> | <p>Woodland Stands areas 30ha or greater in size or with at least 10 ha interior habitat assuming 100m buffer at edge of forest I.</p> <p><u>Information Sources</u></p> <ul style="list-style-type: none"> • 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 | <p>Field Studies will determine:</p> <ul style="list-style-type: none"> • If dominant trees species of the ecosite are >140 years old, then stand is Significant Wildlife Habitat^{cdlviii} • The stand will have experienced no recognizable forestry activities^{cdlviii} • The area of Forest Ecosites combined to make up the stand is the SWH. • Determine ELC Vegetation Type for forest stand^{bocviii} • SWHDSS^{cdlix} Index #23 provides development effects and mitigation measures. | <p>ELC surveys confirm that vegetation type is not present within the study area.</p> <p>Not SWH</p> |

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 |
| Savannah | | | | | |
| <u>Rationale:</u> 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%. | <ul style="list-style-type: none"> • 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. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> • 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 ^{ixv} Appendix N should be present. Note: Savannah plant spp. list from Ecoregion 6E should be used ^{cxviii} . <ul style="list-style-type: none"> • 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. | ELC surveys confirm that vegetation type is not present within the study area. Not SWH |
| Tallgrass Prairie | | | | | |
| <u>Rationale:</u> 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. | <ul style="list-style-type: none"> • 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. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> • 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 ^{ixv} Appendix N should be present. Note: Prairie plant spp. list from Ecoregion 6E should be used ^{cxviii} . <ul style="list-style-type: none"> • 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. | ELC surveys confirm that vegetation type is not present within the study area. 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 | | | | | |
| <p><u>Rationale:</u> Plant communities that often contain rare species which depend on the habitat for survival.</p> | <p>Provincially Rare S1, S2 and S3 vegetation communities are listed in Appendix M of the SWHTG^{cdviii}. Any ELC Ecosite Code that has a possible ELC Vegetation Type that is Provincially Rare is Candidate SWH.</p> | <p>Rare Vegetation Communities may include beaches, fens, forest, marsh, barrens, dunes and swamps.</p> | <p>ELC Ecosite codes that have the potential to be a rare ELC Vegetation Type as outlined in appendix M^{cdviii}</p> <p>The OMNR/NHIC will have up to date listing for rare vegetation communities.</p> <p><u>Information Sources</u></p> <ul style="list-style-type: none"> • Natural Heritage Information Center (NHIC) has location information available on their website • OMNRF Districts • Field naturalists clubs • Conservation Authorities | <p>Field studies should confirm if an ELC Vegetation Type is a rare vegetation community based on listing within Appendix M of SWHTG^{cdviii}.</p> <ul style="list-style-type: none"> • Area of the ELC Vegetation Type polygon is the SWH. • SWHMiST^{cdix} Index #37 provides development effects and mitigation measures. | <p>ELC surveys confirm that other rare vegetation types are not present within the study area.</p> <p>Not SWH</p> |

Significant Wildlife Habitat Assessment Tables

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

| | Wildlife Species ¹ | ELC Ecosite Codes ¹ | Candidate SWH Habitat Criteria and Information Sources ¹ | Confirmed SWH Defining Criteria ¹ | Study Area Assessment Details |
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| 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 ^{cxix} 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 ^{cxix} . • 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. <u>Information Sources</u> • 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 ^{cxviii} from the wetland and will provide enough habitat for waterfowl to successfully nest. • SWHMiST ^{cxix} Index #25 provides development effects and mitigation measures. | Suitable habitat not present within the study area. Field studies confirmed lack of habitat feature 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 <u>Special Concern:</u> 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). <u>Information Sources</u> • 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 ^{cxviii} . • 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 SWH ^{ccvii} , maintaining undisturbed shorelines with large trees within this area is important ^{cxviii} . • For a Bald Eagle the active nest and a 400-800m radius around the nest is the SWH ^{cxvi} , 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 ^{cxvi} . • 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 ^{cxix} Index #26 provides development effects and mitigation measures | Suitable habitat is not present within the subject property, as natural features within the subject property and adjacent are surrounded by development, with which species are intolerant to. Not SWH |

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

| Table 3: Characteristics of Specialized Wildlife Habitat for Ecoregion 02. | | | | | |
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| | Wildlife Species ¹ | ELC Ecosite Codes ¹ | Candidate SWH | Confirmed SWH | Study Area |
| | | | 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 ^{bcooviii, boodx, xc, xci, xciii, xciv, xcv, xcvi, ccooiii} . Interior habitat determined with a 200m buffer ^{cdxviii} . • 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. <u>Information Sources</u> • 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 ^{cdxviii} . • 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 ^{cdix} Index #27 provides development effects and mitigation measures. | Field studies confirmed absence of this feature 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 <u>Special Concern:</u> Northern Map Turtle Snapping Turtle | Exposed mineral soil (sand or gravel) areas adjacent (<100m) ^{cdxviii} 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. <u>Information Sources</u> • 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 ⁱ • 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 ^{cdxviii} . • Travel routes from wetland to nesting area are to be considered within the SWH ^{cdix} . • 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 ^{cdix} Index #28 provides development effects and mitigation measures for turtle nesting habitat. | Field studies confirmed absence of this feature within the subject property. Not SWH |

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

| | Wildlife Species ¹ | ELC Ecosite Codes ¹ | Candidate SWH Habitat Criteria and Information Sources ¹ | Confirmed SWH Defining Criteria ¹ | Study Area Assessment Details |
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| 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 ^{cxix, cxox, cxoi, cxoii, cxiii, cxiv} <u>Information Sources</u> • 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 ^{cxviii} • SWHMiST ^{cxlix} Index #30 provides development effects and mitigation measures | Field studies confirmed absence of this feature within the subject property. 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) within or adjacent (within 120m) to a woodland (no minimum size) ^{cxvii, cxooii, cxii, cxv, cxvi, cxvii, cxviii, cxix, cxo} 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 ^{cxviii} <u>Information Sources</u> • 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) ^{cxoi} or 2 or more of the listed frog species with Call Level Codes of 3. • A combination of observational study and call count surveys ^{cxviii} 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 ^{cxviii, cxv, cxvi, cxvii, cxviii, cxix, cxo, cxoi} if a wetland area is adjacent to a woodland, a travel corridor connecting the wetland to the woodland is to be included in the habitat. • SWHMiST ^{cxlix} Index #14 provides development effects and mitigation measures. | Field studies confirmed absence of this feature within the subject property. Not SWH |

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

| | Wildlife Species ¹ | ELC Ecosite Codes ¹ | Candidate SWH Habitat Criteria and Information Sources ¹ | Confirmed SWH Defining Criteria ¹ | Study Area Assessment Details |
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| 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. | <ul style="list-style-type: none"> 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^{CKXXIV}. 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. <p>Information Sources</p> <ul style="list-style-type: none"> 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. | <p>Studies confirm:</p> <ul style="list-style-type: none"> 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)^{boxi, boxiii}, 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^{CKLIX} Index #15 provides development effects and mitigation measures. | Field studies confirmed absence of this feature 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 | <ul style="list-style-type: none"> Habitats where interior forest breeding birds are breeding, typically large mature (>60 yrs old) forest stands or woodlots >30 ha.^{CV, CXXIX, CXXDI, CXXDII, CXXDIV, CXXV, CXXVI, CXXVII, CXXVIII, CXXIX, CXI, CXII, CXIII, CXIV, CXV, CXVI, CI, CII, CIII, CLIV, CLV, CLVI, CLVII, CLIX} Interior forest habitats are at least 200m from forest edge habitat. <p>Information Sources</p> <ul style="list-style-type: none"> 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. | <ul style="list-style-type: none"> 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^{CKLIX} Index #34 provides development effects and mitigation measures. | Field studies confirmed absence of this feature 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 | ELC Ecosite Codes ¹ | Candidate SWH Habitat Criteria and Information Sources ¹ | Confirmed SWH Defining Criteria ¹ | Study Area 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 <u>Special Concern:</u> Black Tern Yellow Rail | MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 SAS1 SAM1 SAF1 FEO1 BOO1 For Green Heron: All SW, MA and CUM1 sites. | <ul style="list-style-type: none"> Nesting occurs in wetlands All wetland habitat is to be considered as long as there is shallow water with emergent aquatic vegetation present^{ccxiv}. 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. <u>Information Sources</u> <ul style="list-style-type: none"> Contact OMNR, 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: <ul style="list-style-type: none"> 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 species¹. Note: any wetland with breeding of 1 or more Black Terns, Trumpeter Swan, Green Heron or Yellow Rail is SWH¹. 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^{ccix} Index #35 provides development effects and mitigation measures | Suitable habitat is not present within the study area. 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 <u>Special Concern:</u> Short-eared Owl | CUM1 CUM2 | Large grassland areas (includes natural and cultural fields and meadows) >30 ha ^{ccx, cbi, cbii, cbiv, cbv, cbvi, cbvii, cbviii, cbix} . 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) ⁱ . 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. <u>Information Sources</u> <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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^{ccix} Index #32 provides development effects and mitigation measures. | Large fields of suitable size and composition are not present within the study area. 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 | | | | | |
| <u>Rationale:</u> 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. | <u>Indicator spp.:</u> Brown Thrasher Clay-coloured Sparrow <u>Common spp.:</u> Field Sparrow Black-billed Cuckoo Eastern Towhee Willow Flycatcher <u>Special Concern:</u> 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 ^{cxiiv} 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) ⁱ . Shrub thicket habitats (>10 ha) are most likely to support and sustain a diversity of these species ^{cboiii} . Shrub and thicket habitat sites considered significant should have a history of longevity, either abandoned fields or pasturelands. <u>Information Sources</u> • 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 ⁱ . • 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 ^{cdix} Index #33 provides development effects and mitigation measures. | Large thicket habitats are not present within the study area. Not SWH |
| Wildlife Habitat: Terrestrial Crayfish | | | | | |
| <u>Rationale:</u> Terrestrial Crayfish are only found within SW Ontario in Canada and their habitats are very rare. ^{ccii} | Chimney or Digger Crayfish: (<i>Fallicambarus fodiens</i>) Devil Crawfish or Meadow Crayfish: (<i>Cambarus Diogenes</i>) | 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. <u>Information Sources</u> • 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 ^{cdix} Index #36 provides development effects and mitigation measures. | Field studies confirmed absence of this feature 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 ^{boxvii} . <u>Information Sources</u> • 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. | Eastern Wood-Pewee and Monarch were documented within the subject property. Confirmed 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 ^{cboiv, cbov, cbovi, cbovii, cboviii, cboxi, cbox, cboxii} . 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. <u>Information Sources</u> • 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. Corridors 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. | Field studies did not document Amphibian Breeding Habitat - Wetland as occurring within the study area, therefore presence of Amphibian movement corridors are not present within the study area. 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 ^{cboxii, cboxiii, cxlix, cxci} . • Corridors typically follow riparian areas, woodlots, areas of physical geography (ravines, or ridges). <u>Information Sources</u> • 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. | Deer wintering yards are not present within the study, while as well, suitable habitat for this feature are not present within the study area. Not SWH |

APPENDIX III Terms of Reference and Agency Comments



February 23, 2017

Project 1771

April Nix
Environmental Planner
City of Guelph
1 Carden Street, Guelph ON
N1H 3A1

Dear Ms. Nix,

**Re: 190 - 216 Arkell Road, Guelph, Ontario
Environmental Impact Study – Revised Terms of Reference**

On behalf of Natural Resource Solutions Inc. (NRSI), I am pleased to provide the following Revised Terms of Reference (TOR) to prepare an Environmental Impact Study (EIS) for proposed residential development at 190 - 216 Arkell Road, Guelph, Ontario.

NRSI submitted a preliminary TOR for this file (dated December 2, 2016) which was reviewed by the City of Guelph (April Nix), Grand River Conservation Authority (GRCA, Nathan Garland) and the City of Guelph Environmental Advisory Committee (EAC). Comments were provided by the reviewers and they are appended to this submission (Appendix I). The following TOR has addressed these comments and as such supercedes the December 2, 2016 TOR.

The subject property is approximately 2.54ha in area and is located north of Arkell Road in the City of Guelph. The northwestern portion of the subject property is bounded by the Torrance Creek Swamp Provincially Significant Wetland (PSW) Complex located within the Torrance Creek Subwatershed. The southwestern portion of the subject property, in which the development is proposed, is bounded by Arkell Road to the southeast and existing properties to the northeast and southwest. The proposed development area is characterized primarily as residential in nature, with an existing residential home and landscaped lawn. The extreme northwestern section of the subject property is situated on, and adjacent to, a portion of the Torrance Creek Swamp PSW Complex. As such, lands regulated under the GRCA Regulation 150/06 are present within the subject property. The City of Guelph Official Plan Amendment 42 (OPA 42, 2014a) has identified Significant Natural Areas consisting of wetlands and woodlands within the extreme northwestern portion of the subject property. Based on the identified significant features, and associated policies/regulations, any development within regulated area requires the preparation of an EIS to demonstrate that no negative impacts to the features will occur as a result of the proposed undertaking.

The following TOR outlines the steps required to complete the EIS for the proposed development within the subject property in accordance with *Grand River Conservation Authority Environmental Impact Study Guidelines and Submission Standards for Wetlands* (GRCA 2005), *Draft City of Guelph's Guidelines for the Preparation of Environmental Impact Studies* (City of Guelph 2014b), and the City's OPA 42 (2014a).

Please do not hesitate to contact me if you have any questions or comments regarding the following TOR.

Sincerely,
Natural Resource Solutions Inc.

A handwritten signature in black ink, appearing to read "Tara Brenton".

Tara M. Brenton, B.Sc., Certified Arborist
Project Lead, Terrestrial & Wetland Biologist

| | | |
|-----|------------------|------------------------------------------------------------------|
| CC: | Melinda Thompson | Management Biologist, MNRF, Guelph District |
| | Nathan Garland | Resource Planner, GRCA |
| | Robert Messier | Ecologist, GRCA |
| | Mitchell Avis | Planner, MHBC Planning, Urban Design & Landscape Architecture |

190 - 216 Arkell Road, Guelph, Ontario
Environmental Impact Study
Revised Terms of Reference
February 23, 2017

Introduction

The subject property is comprised of separate parcels legally described as 190, 202, 210, and 216 Arkell Road, City of Guelph, County of Wellington. The combined parcels are rectangular in shape and are approximately 2.54ha in area. The property is located on the north side of Arkell Road, opposite Summerfield Drive, southwest of Amos Drive and northeast of Torrance Creek (Map 1).

A small area of the northwestern portion of the subject property overlaps with Significant Natural Features, including PSW, Significant Woodlands, and potential habitat for locally significant species (City of Guelph 2014a, City of Guelph 2014c). However, the proposed residential development area is largely limited to the southern portion of the subject property, and is dominated by planted trees and manicured lawn, and is outside of the natural feature boundaries (Map 1).

For the purposes of this TOR the lands in total will be referred to as the 'subject property', while the portion of the lands being proposed for development will be referred to as the 'development area'. The proposed development includes 74 residential units, including a mix of stacked townhouses and street townhouses, parking and common amenity areas and a street connecting Arkell Road to Dawes Avenue in the adjacent development to the east (Map 2).

The proposed undertaking may include a pedestrian trail connection through the subject property. The ultimate alignment for the trail will consider the City of Guelph's Trail Master Plan; however, the inclusion of a pedestrian trail will be based on an analysis of natural environmental constraints, site grading, and discussions with the City.

The location and approach to stormwater management for the development area will be determined following collection of groundwater monitoring data, the analysis of natural environment constraints, and in consideration of technical constraints identified on the site.

Associated Studies

To ensure a fulsome analysis of potential environmental impacts and to meet both the City and GRCA's EIS requirements, associated reporting will be completed by the consulting team to provide detailed information on site topography, drainage, hydrology, soils and hydrogeological conditions. This will supplement the natural characterization reporting to be completed by NRSI and will inform the impact assessment for the EIS. Technical support work to be completed to inform the EIS will include:

- Hydrogeology Study (MTE),
- Servicing and Stormwater Management Report (MTE),
- Surveying and Topography (MTE),
- Planning (MHBC).

The hydrogeology study will include a detailed monitoring program to inform a wetland water balance on a monthly basis. This information will be used to develop an

appropriate concept plan, including placement and design of a stormwater management system. The EIS will summarize this information and include an analysis of impacts and suitable mitigation measures to ensure protection of the natural features.

The approach to stormwater management, being completed by MTE, will have considerations for the targets and modelling identified for the Torrance Creek subwatershed and will incorporate opportunities to incorporate low impact design. The EIS will review the proposed approach and assess potential impacts to natural features based on the design. Opportunities for mitigation will be highlighted where appropriate.

The planning report to be prepared by MHBC will include a detailed analysis of the off-road trail alignments identified under the City of Guelph's Master Trail Plan, including alternative alignments. The EIS will summarize this information and include an analysis of impacts and suitable alternative alignments to ensure natural features are adequately protected.

Environmental Impact Study - Scoping

In order to determine a study approach for this 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 in the vicinity of the subject property. The following is a description of information that has informed the study approach.

Study Area

A study area that extends beyond the proposed development area will be investigated. A nested series of areas will be investigated including legacy data collection from lands within 1 to 10km (depending on the scale of background sources). In addition to the limits of the proposed development footprint, the study area will include all lands within approximately 120m of the development area (as property access allows). This area is considered sufficient to characterize the neighbouring natural features that may be influenced by on-site development.

For the purposes of the required tree inventory, the lands proposed for development, as well as trees within approximately 30m of the property boundary will be assessed, where land access is permitted. The classification of vegetation communities and the inventory of vegetation within each community will extend into the adjacent natural area approximately 50m where land access is permitted to capture the potential presence of any Butternut (*Juglans cinerea*).

Collection and Review of Background Information

The following background information sources assisted in guiding the study approach outlined in this TOR:

- Grand River Conservation Authority (GRCA Information Network);
- Natural Heritage Information Centre database;
- Ministry of Natural Resources, Guelph District;
- City of Guelph Official Plan, including OPA42;
- Guelph Natural Heritage System Report;
- GRCA Wetland Policy and EIS Guidelines;
- GRCA Ontario Regulation 150/06;
- Government of Canada SARA Registry;
- OMNRF Species at Risk in Ontario (Wellington County List);
- Ontario Breeding Bird Atlas;
- Ontario Reptile and Amphibian Atlas;
- Ontario Odonata Atlas;

- Mammal Atlas of Ontario;
- Ontario Butterfly Atlas; and
- Torrance Creek Subwatershed Study – Management Strategy Addendum.

This background information will be integrated with original data collected by NRSI during the 2016 and 2017 field surveys to form the characterization component of the EIS.

The Natural Heritage Information Centre (NHIC) (OMNRF 2016) and GRCA mapping identify the Torrance Creek Swamp PSW Complex overlapping with the subject property (Map 1). Appendix I of the City of Guelph's OPA 42 identifies the PSW as mixed swamp and is located along the northwestern boundary of the subject property, northwest of Arkell Road. This wetland has been extensively studied as part of EISs for lands to the north and west of the subject property, neighbouring developments, as well as relevant watershed/subwatershed studies, including the following reports:

- 1274 – 1288 Gordon Street EIS (North-South Environmental Inc. 2011);
- Arkell Woods EIS (NRSI 2013);
- 60 Arkell Road, City of Guelph Environmental Implementation Report (NRSI 2015);
- Arkell Road Environmental Impact Study (Stantec Consulting Ltd. 2010);
- 246 Arkell Road, City of Guelph Environmental Implementation Report (North-South Environmental Inc. 2013a);
- 1274 – 1288 Gordon Street, Guelph Environmental Impact Statement Addendum (North-South Environmental Inc. 2013b);
- 1211, 1221 and 1231 Solstice II Mixed Commercial and Residential Development Environmental Implementation Report (NRSI 2014a);
- Hart Property EIS (NRSI 2014b);
- 635 Woodlawn Road, City of Guelph Environmental Implementation Report (NRSI 2016a); and
- 132 Harts Lane, City of Guelph Environmental Implementation Report (NRSI 2016b).

Data from completed EIS reports on neighbouring properties provide valuable information relating to the subject property and also influence the locations of proposed infrastructure, such as trails, lots, and road alignments. Review of this background material will allow for the identification of data deficiencies, such as out-dated and missing data, data collected at unsuitable scales, etc.

Additionally, Significant Woodlands and Potential Habitat for Locally Significant Species within the subject property were identified in Schedules 10C and 10E of OPA 42 (Guelph 2014c). These natural features share boundaries with the PSW within the subject property and are located adjacent to the proposed development area.

NRSI flagged the boundary of the PSW and Significant Woodland dripline within the subject property on June 3, 2016. The flagged boundaries were reviewed and approved by the GRCA and the City of Guelph on July 22, 2016 and are reflected in the natural feature layers shown on Map 1.

An associated hydrogeological study will be used to assess surface water, groundwater features and hydrologic functions that support ecological functions for natural features such as the PSW. The EIS will characterize these features and functions and describe all potential direct, indirect or cumulative impacts to the Natural Heritage System.

Review of Potential Significant Species in the Area

A review of background information, including the sources mentioned above, was conducted to determine significant species that are reported to occur in the vicinity of the subject property and to further inform the scope for the field survey and impact analysis portions of the EIS. A screening exercise to determine the potential for Species at Risk (SAR) and Species of Conservation (SCC) to occur within the subject property is provided in Appendix II.

Review of Potential Significant Wildlife Habitat (SWH)

The collection and review of background information informed the preliminary screening for potential SWH within the study area. This review compared site conditions with criteria set in the SWH Ecoregion 6E Criterion Schedule (OMNRF 2015) to determine the presence of any candidate SWH. The results of the SWH screening informed surveys required to confirm such habitat within or adjacent to the subject property and are appended to this TOR (Appendix III) and will be carried forward into the EIS and impact analysis.

Field Surveys

Field surveys will be undertaken in spring, summer, and fall of 2017, building on the background information collected. The following is a description of the surveys that will be conducted by NRSI:

Vegetation Community Mapping

Vegetation communities on-site will be characterized and mapped in the spring of 2017 using the Ecological Land Classification (ELC) for Southern Ontario (Lee et al. 1998). Details on the vegetation communities will be recorded including species composition, dominance, uncommon species or features.

Vascular Flora Inventories

Multi-season vascular flora inventories will be conducted within each ELC community (spring, summer and fall). Any rare species or vegetation communities identified and their location(s) will be recorded with a handheld GPS unit.

Tree Inventory

All trees $\geq 10\text{cm}$ Diameter at Breast Height (DBH) on and within approximately 30m of the development area (where access allows) will be inventoried and assessed by a Certified Arborist according to the City of Guelph's Tree By-law (2010)-19058. Trees within the subject property will be tagged with a pre-numbered aluminum forestry tag and off-site/private trees will be given a numeric identifier for mapping purposes. The following will be recorded for each tree inventoried:

- Tree tag / identification number,
- Species,
- DBH (cm),
- Crown radius (metres),
- General condition/health (excellent, good, fair, poor, very poor, dead), including characteristics of any cavities from a bat maternity perspective;
- Potential for structural failure (improbable, possible, probable, imminent),
- Tree location (on-site, off-site, boundary trees), and
- General comments (i.e. disease, aesthetic quality, development constraints, sensitivity to development)

Specific searches for Butternut (*Juglans cinerea*) will be undertaken throughout the subject property during the tree and vascular flora inventories.

A hazard assessment of all trees within 30m of all City owned lands, especially along potential trail alignments, will be undertaken throughout the subject property. Trail alignment alternatives will be flagged and reviewed with City staff in the field.

Amphibian Surveys

Evening surveys for calling frogs and toads will be completed 3 times during the amphibian breeding season (approximately late March/early April – June) following the Marsh Monitoring Program protocol (BSC 2009). This will involve 3 minute point counts during peak breeding periods to record species calling and their abundance. Two point counts will be located adjacent to suitable habitat within the PSW and the man-made pond located behind the existing residential home (Map 1).

MNRF has confirmed that Jefferson Salamander (*Ambystoma jeffersonianum*) is highly unlikely (“very-low to non existent”) to be present within the study area. Furthermore, habitat for this species is not present within the subject property.

Snake Surveys

Features which may be suitable for reptile hibernacula will be identified during early spring survey work. Habitat within the subject property, particularly adjacent to the PSW, may provide foraging and basking habitat for snakes species including Eastern Ribbonsnake (*Thamnophis sauritus septentrionalis*), a Species of Conservation Concern. A total of 5 snake coverboards will be placed in early April throughout the subject property (see Map 1) and are anticipated to be checked on all subsequent fieldwork. Additionally, area searches will be conducted in conjunction with other scheduled field surveys beginning during the spring emergence period (late March/early April) through to the fall, to record the presence of snake species within the subject property and identify any significant habitat for snakes.

Turtle Surveys

Area searches for nesting turtles will be conducted throughout the subject property, with emphasis on optimal nesting habitat (open, sandy and gravel habitats). Area searches will occur in conjunction with other field surveys from approximately mid-May through June and will document any evidence of nesting observed (e.g. predated nests, exposed eggs or shells, dig evidence, etc.).

Breeding Bird Surveys

Two breeding bird surveys will be conducted during the peak breeding season (May – early July) in accordance with Ontario Breeding Bird Atlas (OBBA) methodology. Point counts and area surveys will be conducted within all habitat types within 120m of the subject property and will document species by ELC vegetation community. Existing buildings will also be examined for potential nesting bird species (e.g., Barn Swallow (*Hirundo rustica*) and Chimney Swift (*Chaetura pelagica*)). It is anticipated that 3 point count stations will be established in the study area (see Map 1). Standard breeding evidence will be recorded during both early morning surveys. These surveys, along with habitat characterization, will allow for the identification of any SWH present within or adjacent to the subject property.

It is acknowledged that woodland within the Torrance Creek PSW that extends into the subject property is confirmed SWH (Woodland Area Sensitive Bird Breeding Habitat).

Throughout the study area, 2 crepuscular surveys will be conducted to document presence/absence and abundance of Common Nighthawk (*Chordeiles minor*), in late May and June 2017. Surveys will follow the MNRF, Guelph District protocol (G. Buck pers. comm. 2012). Preliminary survey locations are shown on Map 1.

Four winter raptor surveys will occur throughout February and early March and involve area searches to determine winter raptor use and habitat suitability throughout the subject property.

Insect Surveys

Odonata (dragonflies and damselflies) and Lepidoptera (butterflies and moths) observed will be recorded during all field surveys. Survey conditions will occur during favourable weather (i.e. warm, sunny, and little to no wind), within the mid-morning to early afternoon time period throughout May, June, and July. Additionally, surveys to determine if larval foodplants and habitat for locally and provincially significant species are present within the subject property will occur in conjunction with vascular floral surveys.

Three area searches designed specifically for the Yellow-banded Bumble Bee (*Bombus terricola*) will occur in July and August. At the recommendation of MNRF, surveys will follow the Rusty-patched Bumble Bee Survey Protocol (see Appendix 3 in Colla and Taylor-Pindar 2011) and will occur during conducive survey conditions (i.e. warm, sunny, and little wind).

Mammal Surveys

As assessment of trees $\geq 10\text{cm}$ DBH, snags and any on-site structures (i.e. houses, barns, outbuildings) within the proposed development area will be undertaken to identify suitable maternity roosting habitat for bat SAR. Assessments will follow both the Bats and Bat Habitats: Guidelines for Wind Power Projects (OMNR 2011) and Use of Buildings and Isolated Trees by Species at Risk Bats Survey Methodology (OMNRF 2014a).

In the event that any suitable maternity roosting habitat is identified within the proposed development footprint, pending discussions with the MNRF, Guelph District, bat exit/acoustic surveys may be required following the *Use of Buildings and Isolated Trees by Species at Risk Bats Survey Methodology* (OMNRF 2014a).

Habitat for bat SAR may be present within the woodland that extends onto the subject property; however, as the feature will be retained and buffered, focused plot surveys to identify potential maternity roosts are not deemed necessary.

The Torrance Creek PSW is a known deer winter congregation area. To characterize the area and inform an analysis of impacts/mitigation strategies (if required), 4 winter wildlife surveys will occur throughout February and early March. This will involve area searches to determine winter habitat use by White-tailed Deer (*Odocoileus virginianus*) and other mammal species throughout the subject property.

Incidental Wildlife

In addition to the targeted surveys noted above, all wildlife species will be recorded during field surveys. This includes direct observations, as well as signs such as dens, tracks, scats, etc.

Data Analysis

Based on the field surveys and background information review, sensitive biological features on the subject property will be identified along with appropriate buffers. This analysis will take into consideration all relevant policies relating to natural features, provincial and local species listings, wildlife habitats, and the recommendations in the subwatershed study. Habitat for locally significant species in the City of Guelph, Species of Conservation Concern (special concern and provincially tracked species), and SWH (Ecoregion 6E) will be identified and assessed.

Identified constraints will be mapped on a digital base map and will include: vegetation communities designated natural features, wetland and significant woodland boundaries and any significant species and their habitats. Candidate and confirmed SWH identified throughout the subject property will also be mapped. A buffer analysis will be completed as part of the impact analysis within the EIS and will be informed by the identified constraints. Buffers will take into account the City's OP guidelines as well as biological requirements of the species and features identified.

Implications of development within or adjacent to the identified natural features based on current policies and regulations will be identified, including the GRCA Wetlands Policy, the City of Guelph OP and OPA 42, City of Guelph Tree Bylaw, and the Provincial Policy Statement (OMMAH 2014).

Impact Analysis

The details and rationale of the proposed undertaking, including the proposed Draft Plan, stormwater management strategy, trail alignment, and grading and drainage plans will be reviewed and compared to the existing conditions on the subject property. Any areas of conflict between significant natural features, buffers, etc. and the development will be discussed with the client and options for minimizing impacts will be recommended. Impacts will be determined based on the direct, indirect, induced and cumulative effects of the proposal. Specific emphasis will be placed on the review of grading plans in consideration of the groundwater table associated with Torrance Creek PSW and the possible need for raised grading.

The EIS will include an evaluation of significance for SWH and Habitat for Significant Species.

The potential alignments of trail alternatives identified within the City of Guelph's Trail Master Plan will be discussed with City staff and the potential direct, indirect and induced impacts associated with each alternative will be assessed in the EIS. Additionally, if a trail alignment is deemed appropriate and feasible following the analysis of natural feature constraints, a plan will be prepared by a Landscape Architect who is a member of the OALA. The plan will identify the preferred trail alignment in relation to the natural features and associated buffers, preliminary grading requirements, recommended surfacing, clearance areas, etc.

The analysis of impacts will be divided into:

- **Direct impacts** associated with disruption or displacement caused by the actual proposed 'footprint' of the undertaking, such as tree removal, direct impacts to wildlife and/or their habitats, or removal of invasive/hazard species.
- **Indirect impacts** associated with changes in site conditions such as indirect impacts to wildlife and modifications to drainage and water quantity/quality. This will include a description of the overland and groundwater flow, as well as direction and quantity of flow.
- **Induced impacts** associated with impacts after the development is constructed such as subsequent demand on the resources created by habitation/use of the area and vicinity.
- **Cumulative impacts** associated with surrounding activities over time and space.

Recommendations & Monitoring

Recommendations with regard to mitigation of construction and residual impacts will also be made and opportunities for enhancement will be highlighted (e.g., impacts associated with pedestrian traffic). The EIS will reiterate the approach and monitoring recommendations in the stormwater management report and hydrogeological study to ensure groundwater functions, including recharge and wetland water balance will be maintained as per the requirements of the subwatershed study. The EIS will discuss recommendations, including the management of the woodlot along the trail route, including the removal of invasive species and hazard trees up to 30m. It is also noted that the proponent will be responsible for the implementation of City approved landscape plans in accordance with the final approved Environmental Implementation Report (EIR) that includes, but is not limited to: restoration, compensation, and enhancement plantings within the open space.

A Tree Inventory and Preservation Plan (TIPP) outlining which trees are recommended to be retained, removed or transplanted will be prepared by a Certified Arborist and appended to the EIS. Details about tree protection, mitigation, compensation measures and guidance will be included. The location of Tree Protection Fencing and other associated mitigation and protection measures will be shown on associated mapping and will follow City Standard SD-90a. Opportunities for the protection of trees within the subject property which are part of the urban forest will also be examined, including removal of invasive species. Guidance for monitoring the success of mitigation measures will also be provided.

The EIS will identify surveys and tasks/items to be considered and detailed in an Environmental Implementation Report (EIR) prior to Site Plan approval. This will include specific guidance for mitigation measures such as signs for environmental outreach and education, and recommendations going forward. It will also include specific recommendations that should be carried forward from the EIS with regards to management of the retained woodlot area trail and landscape drawings (including grading and drainage plans).

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Authorities Consulted

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- Thompson, Melinda. November 29, 2016. Management Biologist, Ministry of Natural Resources and Forestry, Guelph District. Email Correspondence.

Appendix I

Terms of Reference – Agency Review Comments

January 12, 2017

Sent via email

Tara Brenton
Terrestrial and Wetland Biologist
Natural Resource Solutions Inc.
1-225 Labrador Drive
Waterloo, ON N2K 4M8

Dear Tara,

RE: 190 – 216 Arkell Rd. EIS TOR

City staff has reviewed the proposed Environmental Impact Study Terms of Reference (EIS TOR) prepared by NRSI and dated December 2, 2016 and have provided comments below. Furthermore, on January 11, 2016 the EIS TOR was brought forward to the Environmental Advisory Committee and conditional support was provided.

Staff note that the Grand River Conservation Authority has also provided comments in regards to the above.

COMMENTS:

1. The proposed development concept also needs to consider the trail connection across the site, as well as locations for storm water management. This is not reflected in the discussion of the development proposal nor the rest of the TOR, please clarify. In addition alternatives for a trail alignment should also be considered.
2. While it is noted that a breeding bird survey is proposed no information on the number or locations of stations has been included. Given that there is both forested and meadow communities as well as feature edges on/adjacent to the site, point locations should ensure that representative samples for the various habitat types are captured. Please clarify.
3. In addition to the NRSI studies listed – it may be beneficial to look at the EIS/EIR for 246 Arkell (prepared by Stantec, and North South Environmental respectively).
4. Related to the characterization of the hydrology and hydrogeology for the site. It within the area identified in the Torrance Creek Subwatershed Study that provides recharge to Torrance Creek. Further it is also noted that groundwater monitoring associated with the 246 Arkell EIR found that groundwater levels along the northwest portion of the site (and adjacent to this site) were within 1.5m to 2.3m of the existing grades. This resulted in parts of the site being raised in order to provide required separation for the development from the

ground water table. It is anticipated that similar measures will need to be considered for this site and that this may impact the development concept.

5. The EIS and supporting Hydrogeological study should include a wetland water balance; in addition the site based water balance typically associated with the SWM report. The wetland water balance is to broken down on a monthly basis.
6. The SWM design should also include the targets/modelling for the Torrance Creek subwatershed (per the subwatershed study). In addition, opportunities to incorporate low impact design (LID) methods to assist with achieving a water balance for the site, and maintaining infiltration and recharge functions should also be incorporated.
7. In relation to the screening for species at risk:
 - a. Potential habitat for Chimney Swift (Threatened) associated with hollow trees and foraging. Is there possible habitat associated with the existing houses (chimneys)?
 - b. The row in regards to JESA in Appendix II appears to be a contradiction – one column says there is no suitable habitat but under the rationale says there might be. Please clarify. In addition staff note that advice coming from MNRFB does indicate the chances of JESA being within this area is very low to non-existent.
 - c. ELC work in combination with proposed Lepidoptera surveys should look at identifying areas with concentrations of milkweed for breeding feeding habitat associated with Monarch (Special Concern).
 - d. The Yellow-Banded Bumble Bee was recently listed as Special Concern – however it is not mentioned in the screening – given the potential for habitat on site should it not also be included?
8. In relation to the review of potential significant wildlife habitat (SWH) (pg. 3) and appendix II:
 - a. Winter raptor areas – the study assessment rationale appears to contradict itself. In addition given the size of the Torrance PSW combined with the remnant edges/fallow fields this could provide foraging opportunities. Red tailed hawks have been seen foraging along hedgerows to the east of the site as well.
 - b. Unclear how the proposed incidental snake surveys support the identification of potential hibernacula. Surveys should look for candidate hibernacula sites and assess potential use of any that are identified. Please clarify.
 - c. MNRFB has identified the Torrance Creek PSW as a deer winter congregation area. The habitat should be characterized and impacts assessed through the EIS. Please clarify.

- d. It would be beneficial to have the proposed location(s) for the amphibian calling stations identified as it relates to assessing amphibian breeding habitat for anurans.
 - e. With respect to area sensitive breeding bird habitat – based on results from multiple EISs completed in this area of the City, it has been confirmed that the Torrance Creek PSW is SWH in regards to area sensitive breeding bird habitat. The proposed studies should assess the use of habitat edges/ areas in relation to the site in order to assess potential impacts.
 - f. Habitats for species of conservation concern (special concern and rare wildlife species) – it would be beneficial for the EIS to go through each potential habitat/species group in order to understand what is being assessed.
 - g. Deer movement corridors - the row in the table in appendix II should be revised to reflect the information regarding deer habitat noted above.
 - h. With respect to the proposed crepuscular surveys the draft nightjar survey protocol from Environment Canada (2016) is cited as a source. However this is a landscape level survey protocol to assess overall population/ presence absence to be completed with driving surveys with points at least 1.6km apart. How is the study being completed relative to the site in question? Please clarify.
9. Pertaining to Habitats for (locally) Significant Species (HSS) – habitats that support locally significant species should be identified (similar to the SWH process) and assessed per the OP policies, including with respect to impacts.
10. Consideration should also be given to the protection of ground water functions including recharge. Also review and consider any other recommendations or requirements from the Torrance Creek Subwatershed Study within the EIS.
11. Opportunities for protection, enhancement and restoration of trees within the Urban Forest should also be identified.
12. A buffer analysis should also be included within the impacts assessment/avoidance discussion. While the City's OP does include policies for minimum buffers – the establishment of larger buffers also warrants consideration in the EIS and is also reflected in the City's OP policies.
13. The EIS should also recommend mitigation measures including environmental education and outreach opportunities, demarcation, and any recommendations for monitoring plans.
14. The sites are regulated under the tree by-law. A Tree Inventory and Preservation Plan is to be included in the EIS and should also include:
- a. Tree Protection Fencing locations and other associated mitigation/protection measures as recommended. Note that TPF is to

follow City Standard SD-90a which can be found on the City's website under Part 'B' Contract Specifications 2016.

- b. A hazard assessment for all trees that would be within striking distance (generally 30m) of City owned lands/facilities including trails and consider removals where needed. Please note that this will need to include the edges of the woodland where trail connections are being assessed.

Parks Planning staff comments:

15. Guelph Trail Network:

- a. Schedule 7 - Trail Network of the Official Plan Amendment 48 (currently under appeal to OMB) identifies a proposed off-road trail on the subject property following the southern edge of the natural features located north of the property. (Attachment -1)
- b. The proposed off-road trail route connects the development on the subject property and the adjacent property to the west to the planned off-road 'Victoria Park Village subdivision' trail to the north and to Arkell Road to the south. (Attachment -2)
- c. The trail is proposed to be 2.5 metre wide with one metre wide mow strips along both edges and would require additional space for grading and drainage that is coordinated with the adjacent development and trail amenities (e.g. signage, rest areas) – in accordance with Guelph's Facility Accessibility Design

16. Preliminary concept plan:

- a. Revise the preliminary concept plan to reflect the proposed public trail on the subject property as indicated in the Attachments - 1 & 2 in consultation with City staff.

17. Environmental impacts and mitigation:

- a. Assess the impacts of the proposed trail development through the EIS.
- b. Recommend measures to mitigate the impacts due to the proposed trail development through the EIS.
- c. Recommend management of the woodlot along the trail route including removal of invasive species and hazard trees through the EIS.
- d. Recommend preparation of an Environmental Implementation Report (EIR), Trail and Landscape Drawings through EIS to detail design an appropriate trail system and associated mitigation measures in accordance with the City's design and development standards.

18. Trail route alignment:

- a. Identify the preferred trail alignment through EIS and flag the trail route on site for City's review.

19. Grading and drainage:

- a. Provide preliminary grading and drainage plans to demonstrate that the design of the trail and open space meets City's standards.

20. Open space restoration and enhancement:

- a. The owner will be responsible for implementation of City approved landscape plans in accordance with the final approved EIR including, but not limited to, restoration, compensation and enhancement planting

within the open space.

21. Demarcation of public open space:

- a. Describe the recommended approach to demarcation of the public open spaces in accordance with the City's Property Demarcation Policy that will be provided by the owner. City's standard 1.5 m high heavy duty black vinyl chain link fence along the proposed boundary is normally required.

22. Public education:

- a. Recommend provision of public education through educational/interpretive signage at the entry points to the trail and open space system. Public education should address the environmental sensitivity of natural Heritage features and procedures residents can follow to protect and/or enhance these areas.
- b. City will review and approve the design and locations.

Environmental Advisory Committee:

On January 11, 2017, the EIS TOR was brought forward to the Environmental Advisory Committee and resulted in the following Draft motion. Note that motions remain Draft until such time that the EAC formally adopts the minutes.

EAC draft motion:

That the Environmental Advisory Committee conditionally support the EIS Terms of Reference for 190-216 Arkell Rd, prepared by NRSI subject to the following:

THAT a revised EIS TOR is provided which includes:

- A more detailed description of the proposed undertaking recognizing the necessary trail connections and storm water management facilities that will be part of the development;
- That the trail alignments clearly illustrate the proximity to the wetland and buffer area and that the preliminary design will be completed by a Landscape Architect (member of the OALA).
- Clarification as it relates to the field study program including point/plot locations for amphibian, breeding bird and crepuscular bird surveys;
- Clarification that the EIS will include an evaluation of significance for Significant Wildlife Habitat and Habitat for Significant Species, as applicable and that this be carried into the impact assessment;
- Consideration for the protection of ground water functions including recharge, as well as recommendations or requirements from the Torrance Creek Subwatershed Study within the EIS; and,
- Identification of Opportunities for protection, enhancement and restoration of trees within the Urban Forest as part of the EIS;
- The use of current protocols for bat surveys (including SAR bats) of treed habitats and buildings as available from Guelph District MNRF;
- Clear rationale for the identification of candidate SWH that reflects MNRF's

Criteria Schedules for Ecoregion 6E;

Do not hesitate to contact me further should you have any questions.

Regards,

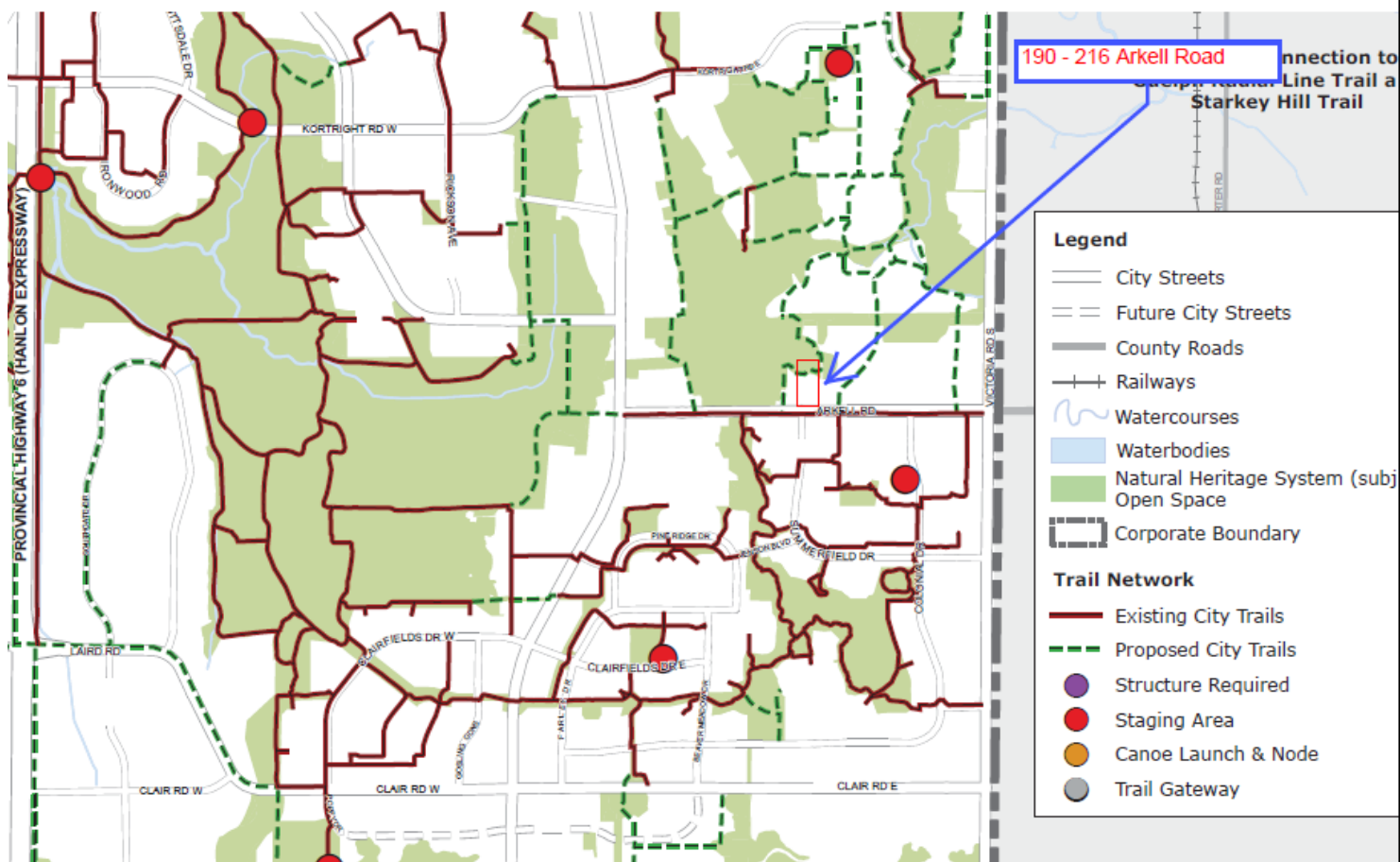
A handwritten signature in black ink, appearing to read 'April Nix'.

April Nix, BES MCIP RPP
Environmental Planner

Planning, Urban Design and Building Services
Infrastructure, Development and Enterprise
City of Guelph
1 Carden St Guelph
T 519-822-1260 x 2718
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E april.nix@guelph.ca

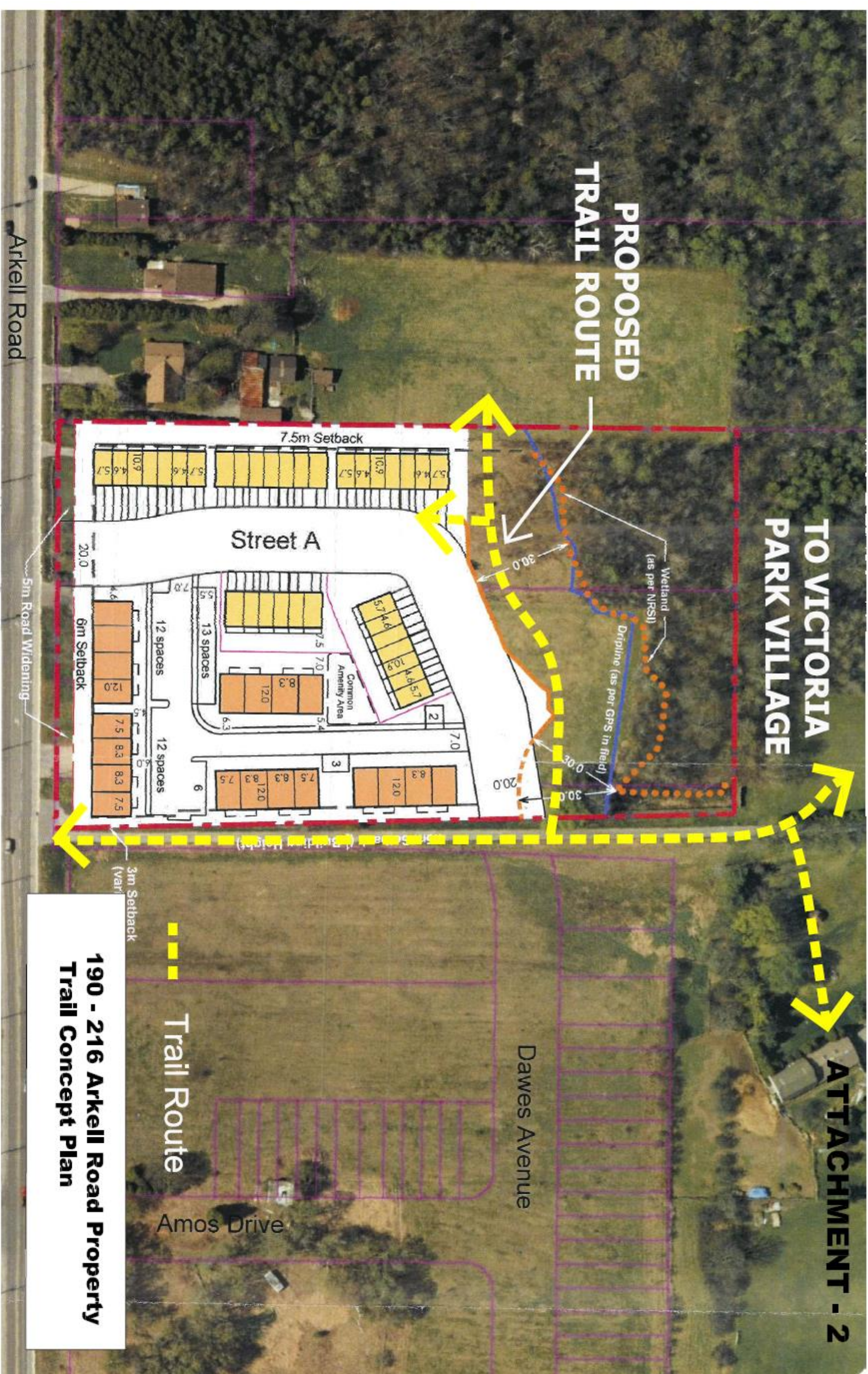
Cc. Chris DeVriendt - Senior Development Planner
Melissa Aldunate - Manager - Planning Policy and Urban Design
Mary Angelo - Supervisor, Development Engineering
Jyoti Pathak - Parks Planner

Attachments: Attachment 1 – OPA 48 Schedule 7 (remains under appeal) excerpt
Attachment 2 – Trail Concept Plan



TO VICTORIA
PARK VILLAGE

PROPOSED
TRAIL ROUTE



190 - 216 Arkell Road Property
Trail Concept Plan



December 15th, 2016

Natural Resource Solutions Inc.
225 Labrador Drive, Unit 1
Waterloo, ON N2K 4M8

Attn: Tara Brenton, Terrestrial and Wetland Biologist

Dear Ms. Brenton,

**Re: Terms of Reference for an Environmental Impact Study
190-216 Arkell Road
City of Guelph, Ontario**

We have now had the opportunity to review the Terms of Reference for the Environmental Impact Study (EIS) dated December 2nd, 2016 the Terms of Reference are satisfactory and offer the following comments to be addressed through the EIS.

- 1) The provided draft site plan does not show a proposed location for storm water management (SWM) facilities. Results of the Hydrogeology Study, to be completed by MTE, should be discussed within the EIS with supporting rationale and justification around a hydrology change to the Provincially Significant Torrance Creek Swamp Wetland Complex
- 2) The GRCA would request that projected water balance should be broken down into monthly intervals.
- 3) Please review and provide reference to the Torrance Creek Sub-watershed Study.

Advisory Comments

- 4) If there is potential for Salamander breeding habitat within the subject property, appropriate Salamander surveys or habitat review should be completed. It is recommended that you contact the MNRF for further recommendations regarding the identification of Salamander habitat which may qualify as Significant Wildlife Habitat or SAR habitat.
- 5) The proposed development is within a Wellhead Protection Area and should consult with the City of Guelph Source Water Protection staff. These discussions may influence water balance discussions and potential impacts on the wetland.

Comments to be addressed at the EIR and/or GRCA permit

- 1) A Buffer Management Plan should be developed, which details the restoration and monitoring strategies for the set-back and buffer area from the natural features. This may be required as part of the EIR.
- 2) A detailed Erosion and Sediment Control (ESC) Plan should be developed and shown on site plan drawings.

Should you have any questions or require additional information, please contact the undersigned at 519-621-2763 ext. 2236.

Yours truly,



Nathan Garland
Resource Planner
Grand River Conservation Authority

c.c. April Nix, Environmental Planner, City of Guelph, City Hall, 1 Carden Street., Guelph, ON N1H 3A1
Mitchell Avis, Planner, MHBC Planning, 540 Bingham Centre Drive, Suite 200, Kitchener, ON N2B 3X9

Appendix II
SAR/SCC Screening Table

Arkell Rd Properties EIS
SAR/SCC Screening

| Scientific Name | Common Name | S-RANK ¹ | COSEWIC ² | ESA/ COSSARO ³ | SARA | Background Source | Habitat Preference ^{4,5} | Suitable Habitats within Subject Property | Rationale |
|-----------------------------------------------------|----------------------------|---------------------|----------------------|------------------------------|------------|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Vascular Plants | | | | | | | | | |
| <i>Asplenium scolopendrium</i> var. <i>american</i> | Hart's-tongue | S3 | SC | SC | Schedule 1 | MNRF, 2016 | Shaded calcareous rock (limestone and dolostone). | No | Suitable habitat is not present within the subject property. Foral inventories will be conducted to confirm presence/absence of species. |
| <i>Eurybia schreberi</i> | Schreber's Aster | S2S3 | | | | MNRF, 2016 | Damp mesic deciduous mixed woods, most often those with Maple, Elm, or Oak, as well as in thickets and shaded roadbanks. | No | Suitable habitat is not present within the subject property. |
| <i>Juglans cinerea</i> | Butternut | S3? | END | E | Schedule 1 | NHIC, 2016 | Stream banks and swamps, as well as upland beech-maple, oak-hickory, and mixed hardwood stands. | Possible | Species is highly varied in its habitat and maybe present within the subject property. Field studies will confirm the presence or absence of this species throughout the subject property. |
| <i>Oenothera clelandii</i> | Cleland's Evening-primrose | S1 | | | | MNRF, 2016 | Sandy roadsides, fields, and railroads; plains and dry savanna (oak, sassafras), generally in disturbed areas. | Possible | Suitable habitat maybe present throughout the subject property. Field studies are recommended to confirm species presence or absence. |
| <i>Cypripedium arietinum</i> | Ram's-head Lady's Slipper | S3 | | | | MNRF, 2016 | Low dunes, in partial shade of fringing conifers, along the northern shores of Lakes Michigan and Huron and on Lake Superior (where it also occurs on thin soil over rock); inland, under jack pine and oak and also in coniferous swamps (cedar, tamarack, spruce, fir). | No | Suitable habitat is not present within the subject property. Foral inventories will be conducted to confirm presence/absence of species. |
| <i>Carex careyana</i> | Carey's Sedge | S2 | | | | MNRF, 2016 | Rich deciduous forests; rather local. | Possible | Suitable habitat may be present within the subject property. Floral inventories will confirm presence/absence of species. |
| <i>Carex lupuliformis</i> | Hop-like Sedge | S1 | END | E | Schedule 1 | MNRF, 2016 | Wet, wooded habitats. | Possible | Suitable habitat may be present within the subject property. Floral inventories will confirm presence/absence of species. |
| <i>Castanea dentata</i> | American Chestnut | S2 | END | E | Schedule 1 | MNRF, 2016 | Moist to well drained forests on sand, occasionally heavy soils. | No | Suitable habitat not present within the subject property. Floral inventories will confirm presence/absence of species. |
| <i>Hypericum prolificum</i> | Shrubby St. John's-wort | S2 | | | | MNRF, 2016 | Swamp borders, thickets, meadows, fields, roadsides, sandy open forests (oak). | Yes | Suitable habitat is present within the subject property. Floral inventories will confirm presence/absence of species. |
| <i>Monarda didyma</i> | Oswego-tea | S3 | | | | MNRF, 2016 | Rich deciduous forests on banks and floodplains. | No | Suitable habitat is not present within the subject property. Foral inventories will be conducted to confirm presence/absence of species. |
| <i>Erigenia bulbosa</i> | Harbinger-of-spring | S3? | | | | MNRF, 2016 | Rich, often moist deciduous forests, including floodplains and river banks. | Possible | Suitable habitat may be present within the subject property. Floral inventories will confirm presence/absence of species. |

Arkell Rd Properties EIS
SAR/SCC Screening

| Scientific Name | Common Name | S-RANK ¹ | COSEWIC ² | ESA/ COSSARO ³ | SARA | Background Source | Habitat Preference ^{4,5} | Suitable Habitats within Subject Property | Rationale |
|------------------------------|---------------------|---------------------|----------------------|------------------------------|-------------|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Potamogeton hillii</i> | Hill's Pondweed | S2 | SC | SC | Schedule 1 | MNRF, 2016 | Shallow water of small lakes, ponds, ditches, and streams. | No | Suitable habitat not present within the subject property. Floral inventories will confirm presence/absence of species. |
| Birds | | | | | | | | | |
| <i>Ammodramus henslowii</i> | Henslow's Sparrow | SHB | END | E | Schedule 1 | MNRF, 2016 | 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 plands; a moderate amount of moisture needed; requires a minimum tract of grassland of 40 ha, but usually in areas >100 ha. | No | Suitable habitat not present within the subject property. Breeding bird surveys will confirm presence/absence of species. |
| <i>Ammodramus savannarum</i> | Grasshopper Sparrow | S4B | SC | SC | | Atlas of the Breeding Birds of Ontario, 2016 | Well-drained grassland or prairie with low cover of grasses, taller weeds on sandy soil; hayfields or weedy fallow fields; uplands with ground vegetation of various densities; perches for singing; requires tracts of grassland > 10 ha. | No | Suitable habitat not present within the subject property. Breeding bird surveys will confirm presence/absence of species. |
| <i>Asio flammeus</i> | Short-eared Owl | S2N, S4B | SC | SC | Schedule 3 | MNRF, 2016 | 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. | No | Suitable habitat not present within the subject property. Breeding bird surveys will confirm presence/absence of species. |
| <i>Chaetura pelagica</i> | Chimney Swift | S4B, S4N | THR | T | Schedule 1 | Atlas of the Breeding Birds of Ontario, 2016 | Urban areas near buildings; nests in hollow trees, crevices of rock cliffs, chimneys; highly gregarious; feeds over open water. | Possible | Foraging habitat may be present throughout the subject property. Marginal nest sites, in the form of hollow trees, may be present throughout the subject property, however, few trees >55cm dbh are present. Possible nest sites associated with existing chimneys on buildings may be present. Breeding bird surveys will be conducted to confirm presence/absence of species. |
| <i>Chordeiles minor</i> | Common Nighthawk | S4B | SC | T | Schedule 1 | Atlas of the Breeding Birds of Ontario, 2016 | Open ground; clearings in dense forests; ploughed fields; gravel beaches or barren areas with rocky soils; open woodlands; flat gravel roofs. | Possible | Suitable breeding habitat may be present within the subject property. Crepuscular breeding bird surveys will be conducted to confirm presence/absence of species. |
| <i>Contopus virens</i> | Eastern Wood-Pewee | S4B | SC | SC | | Atlas of the Breeding Birds of Ontario, 2016 | Open, deciduous, mixed or coniferous forest; predominated by oak with little understory; forest clearings, edges; farm woodlots, parks | Possible | Suitable habitat may be present within the extreme northwestern portion of the subject property. Breeding bird surveys will confirm presence/absence of species. |
| <i>Dolichonyx oryzivorus</i> | Bobolink | S4B | THR | T | No Schedule | Atlas of the Breeding Birds of Ontario, 2016 | Large, open expansive grasslands with dense ground cover; hayfields, meadows or fallow fields; marshes; requires tracts of grassland >50 ha. | No | Suitable habitat not present within the subject property. Breeding bird surveys will confirm presence/absence of species. |

Arkell Rd Properties EIS
SAR/SCC Screening

| Scientific Name | Common Name | S-RANK ¹ | COSEWIC ² | ESA/ COSSARO ³ | SARA | Background Source | Habitat Preference ^{4,5} | Suitable Habitats within Subject Property | Rationale |
|-----------------------------------|-----------------------|---------------------|----------------------|------------------------------|------------|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Haliaeetus leucocephalus</i> | Bald Eagle | S2N, S4B | SC | NAR | | MNRF, 2016 | 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 200 m from shore; require tall, dead, partially dead trees within 400 m of nest for perching; sensitive to toxic chemicals. | No | Suitable habitat is not present within the subject property. Breeding bird surveys will confirm presence/absence of the species. |
| <i>Hirundo rustica</i> | Barn Swallow | S4B | THR | T | | Atlas of the Breeding Birds of Ontario, 2016 | Farmlands or rural areas; cliffs, caves, rock niches; buildings or other man-made structures for nesting; open country near body of water. | No | Foraging habitat may be present throughout the subject property, however, no suitable nesting locations are present. Breeding bird surveys will be conducted to confirm presence/absence of species. |
| <i>Hylocichla mustelina</i> | Wood Thrush | S4B | SC | T | | Atlas of the Breeding Birds of Ontario, 2016 | Carolinian and Great Lakes-St. Lawrence forest zones; 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. | Possible | Suitable habitat may be present within the extreme northwestern portion of the subject property. Breeding bird surveys will confirm presence/absence of species. |
| <i>Icteria virens</i> | Yellow-breasted Chat | S2B | END | E | Schedule 1 | MNRF, 2016 | Thickets, tall tangles of shrubbery beside streams, ponds; overgrown bushy clearings with deciduous thickets; nests above ground in bush, vines etc. | No | Suitable habitat is not present within the subject property. Breeding bird surveys will confirm presence/absence of the species. |
| <i>Lanius ludovicianus</i> | Loggerhead Shrike | S2B | END | E (ssp. <i>migrans</i>) | Schedule 1 | MNRF, 2016 | 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. | No | Suitable habitat is not present within the subject property. Breeding bird surveys will confirm presence/absence of the species. |
| <i>Melanerpes erythrocephalus</i> | Red-headed Woodpecker | S4B | SC | T | Schedule 1 | Atlas of the Breeding Birds of Ontario, 2016 | 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. | Possible | Suitable habitat may be present throughout the subject property. Breeding bird surveys will confirm presence/absence of species. |
| <i>Chlidonias niger</i> | Black Tern | S3B | SC | NAR | | MNRF, 2016 | 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 for insects; also feeds on fish, crayfish and frogs. | No | Suitable habitat is not present throughout the subject property. Breeding bird surveys will confirm presence/absence of species. |
| <i>Riparia riparia</i> | Bank Swallow | S4B | THR | T | Schedule 1 | Atlas of the Breeding Birds of Ontario, 2016 | 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; nesting sites are limiting factor for species presence. | No | Foraging habitat may be present throughout the subject property, however, no suitable nesting locations are present. Breeding bird surveys will be conducted to confirm presence/absence of species. |

Arkell Rd Properties EIS
SAR/SCC Screening

| Scientific Name | Common Name | S-RANK ¹ | COSEWIC ² | ESA/ COSSARO ³ | SARA | Background Source | Habitat Preference ^{4,5} | Suitable Habitats within Subject Property | Rationale |
|----------------------------------------|--------------------------------------------------------------------------------------|---------------------|----------------------|------------------------------|-------------|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Sturnella magna</i> | Eastern Meadowlark | S4B | THR | T | No Schedule | Atlas of the Breeding Birds of Ontario, 2016 | 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. | No | Suitable habitat is not present throughout the subject property. Breeding bird surveys will confirm presence/absence of species. |
| Herpetofauna | | | | | | | | | |
| <i>Ambystoma jeffersonianum</i> | Jefferson Salamander | S2 | END | E | Schedule 1 | Ontario Nature 2016 | Damp shady deciduous forest, swamps, moist pasture, lakeshores; temporary woodland pools for breeding; hides under leaf litter, stones or in decomposing logs. | No | Suitable habitat is not present throughout the subject property. MNRF has confirmed very low probability of species occurring in area. |
| <i>Chelydra serpentina serpentina</i> | Snapping Turtle | S3 | SC | SC | Schedule 1 | Ontario Nature 2016 | 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; may nest at some distance from water; often hibernate together in groups in mud under water; home range size ~28 ha. | No | Suitable habitat is not present within the subject property; man-made pond is too shallow to allow for over-wintering habitat. MNRF correspondence indicates a sighting of the species in "close proximity". Area searches will be conducted throughout the subject property to confirm presence/absence. |
| <i>Emydoidea blandingii</i> | Blanding's Turtle (<i>Great Lakes/St Lawrence population</i>) | S3 | THR | T | Schedule 1 | Ontario Nature 2016 | 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; surrounding natural habitat is important in summer as they frequently move from aquatic habitat to terrestrial habitats; hibernates in bogs; not readily observed. | No | Suitable habitat is not present within the subject property. Area searches will be conducted throughout the subject property to confirm presence/absence. |
| <i>Graptemys geographica</i> | Northern Map Turtle | S3 | SC | SC | Schedule 1 | Ontario Nature 2016 | 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; not readily observed. | No | Suitable habitat is not present within the subject property. Area searches will be conducted throughout the subject property to confirm presence/absence. |
| <i>Lampropeltis taylori triangulum</i> | Eastern Milksnake | S4 | NAR | SC | | Ontario Nature 2016 | Farmlands, meadows, hardwood or aspen stands; pine forest with brushy or woody cover; river bottoms or bog woods; hides under logs, stones, or boards or in outbuildings; often uses communal nest sites. | Possible | Potential habitat may exist on the subject property. Snake surveys will be conducted throughout the subject property to confirm the presence or absence of this species. |
| <i>Thamnophis butleri</i> | Butler's Gartersnake | S2 | END | E | Schedule 1 | MNRF, 2016 | Wet meadows, pastures, margins of marshes and streams, and open country. | No | Species known exclusively from the Luther Marsh region. Snake surveys will be conducted to confirm presence or absence of the species. |
| <i>Pseudacris triseriata</i> pop. 2 | Western Chorus Frog (<i>Great Lakes/St. Lawrence - Canadian Shield Population</i>) | S3 | NAR | T | Schedule 1 | Ontario Nature 2016 | Roadside ditches or temporary ponds in fields; swamps or wet meadows; woodland or open country with cover and moisture; small ponds and temporary pools. | Possible | Potential habitat may exist on the subject property. Evening Amphibian call surveys will be conducted to confirm the presence or absence of this species. |

Arkeil Rd Properties EIS
SAR/SCC Screening

| Scientific Name | Common Name | S-RANK ¹ | COSEWIC ² | ESA/ COSSARO ³ | SARA | Background Source | Habitat Preference ^{4,5} | Suitable Habitats within Subject Property | Rationale |
|--------------------------------------------|----------------------------------------------|---------------------|----------------------|------------------------------|------------|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Thamnophis sauritus septentrionalis</i> | Eastern Ribbonsnake (Great Lakes population) | S3 | SC | SC | Schedule 1 | Ontario Nature 2016, MNRF, 2016 | 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; hibernates in groups. | Possible | Potential habitat may exist on the subject property. Snake surveys will be conducted throughout the subject property to confirm the presence or absence of this species. |
| Mammals | | | | | | | | | |
| <i>Myotis lucifungus</i> | Little Brown Myotis | S5 | E | END | | Atlas of the Mammals of Ontario, 1990 | 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 | Possible | Suitable habitat may be present within the subject property. Assessments for suitable maternity roosting habitat will be conducted throughout the developable portion of the subject property to confirm presence of suitable maternity roosting features. |
| <i>Myotis leibii</i> | Eastern Small-footed Bat | S2S3 | END | | | Atlas of the Mammals of Ontario, 1990 | Roosts in caves, mine shafts, crevices or buildings that are in or near woodland; hibernates in cold dry caves or mines; maternity colonies in caves or buildings; hunts in forests. | Possible | Suitable habitat may be present within the subject property. Assessments for suitable maternity roosting habitat will be conducted throughout the developable portion of the subject property to confirm presence of suitable maternity roosting features. |
| Insects | | | | | | | | | |
| <i>Arigomphus villosipes</i> | Unicorn Clubtail | S2S3 | | | | MNRF, 2005 | Ponds and sluggish streams with mucky bottoms and little emergent vegetation. | Possible | Suitable habitat may be present within the subject property. Insect surveys will be conducted throughout the subject property to confirm presence/absence of the species. |
| <i>Asterocampa clyton</i> | Tawny Emperor | S2S3 | | | | Jones et al. 2016 | Forests with Common Hackberry trees throughout. | No | Suitable habitat may be present within the subject property. Insect surveys will be conducted throughout the subject property to confirm presence/absence of the species. |
| <i>Bombus affinis</i> | Rusty-patched Bumble Bee | S2 | END | E | Schedule 1 | MNRF, 2016 | Open habitats, such as oak savannah. | No | Suitable habitat is not present within the subject property, however, Bumble Bee surveys will confirm presence/absence of the species. |
| <i>Bombus terricola</i> | Yellow-banded Bumble Bee | S5 | SC | SC | | NHIC, 2016 | Found in mixed woodlands, and a variety of open habitats, specifically native grasslands, farmlands, and urband areas, where abandoned rodent burrows or decomposing logs are prevalent. | Possible | Suitable habitat may be present throughout the subject property. Bumble Bee surveys will be conducted to confirm presence/absence of the species. |

Arkell Rd Properties EIS
SAR/SCC Screening

| Scientific Name | Common Name | S-RANK ¹ | COSEWIC ² | ESA/ COSSARO ³ | SARA | Background Source | Habitat Preference ^{4,5} | Suitable Habitats within Subject Property | Rationale |
|-------------------------------|-------------------------|---------------------|----------------------|------------------------------|------------|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Danaus plexippus</i> | Monarch | S2N, S4B | SC | SC | Schedule 1 | Jones et al. 2016 | Open fields and meadows with milkweed. | Possible | Suitable habitat may be present within the subject property. Insect surveys will confirm presence/absence of the species. ELC surveys will determine if areas of Milkweed concentrations are present. |
| <i>Gomphus graslinellus</i> | Pronghorn Clubtail | S3 | | | | MNRF, 2005 | Ponds, lakes and slow streams. | Possible | Suitable habitat may be present within the subject property. Insect surveys will be conducted throughout the subject property to confirm presence/absence of the species. |
| <i>Lestes eurinus</i> | Amber-winged Spreadwing | S3 | | | | MNRF, 2005 | Small ponds, quarries, bogs and lakes. | Possible | Suitable habitat may be present within the subject property. Insect surveys will be conducted throughout the subject property to confirm presence/absence of the species. |
| <i>Rhionaeschna mutata</i> | Spatterdock Darner | S1 | | | | MNRF, 2005 | Bogs, swamps and shallow ponds. | Possible | Suitable habitat may be present within the subject property. Insect surveys will be conducted throughout the subject property to confirm presence/absence of the species. |
| <i>Somatochlora tenebrosa</i> | Clamp-tipped Emerald | S2S3 | | | | MNRF, 2005 | Shady forest streams with intermittent rapids and pools. | No | Suitable habitat is not present within the subject property. Insect surveys will be conducted throughout the subject property to confirm presence/absence of the species. |
| Fish | | | | | | | | | |
| <i>Clinostomus elongatus</i> | Redside Dace | S2 | END | E | Schedule 3 | MNRF, 2016 | Pools and slow-moving areas of small streams and headwaters with gravel bottoms. | No | Suitable habitat is not present within the subject property. |
| <i>Lampsilis fasciola</i> | Wavy-rayed Lampmussel | S1 | THR | SC | Schedule 1 | MNRF, 2016 | Gravel and sand bottoms in medium-sized streams; is particularly sensitive to changes in their environment. | No | Suitable habitat is not present within the subject property. |
| <i>Moxostoma duquesnei</i> | Black Redhorse | S2 | THR | T | | MNRF, 2016 | Generally inhabits moderately sized, cool, clear streams. | No | Suitable habitat is not present within the subject property. |
| <i>Notropis photogenis</i> | Silver Shiner | S2S3 | THR | T | SC | MNRF, 2016 | Found in flowing pools, runs and riffles in occupied reaches. Shallow, nearshore habitats, and areas with aquatic vegetation in occupied reaches. | No | Suitable habitat is not present within the subject property. |

¹S-Ranks (OMNR 2013)
S1-critically imperiled
S2-imperiled
S3-vulnerable
S4- apparently secure
S5- secure

⁵OMNR 2000

Ranks
END/E- Endangered
SC- Special Concern
THR/T – Threatened

²COSEWIC – Committee on the Status of Endangered Wildlife in Canada (2016)

NAR- Not at Risk

³COSSARO- Committee on Species at Risk in Ontario (2015), ESA – Endangered Species Act (2007)

⁴COSEWIC – Committee on the Status of Endangered Wildlife in Canada (2013)

Appendix III
SWH Screening Table

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) | | | | | |
| <u>Rationale:</u> 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 ^{exlviii} . <u>Information Sources</u> • 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. | Fields with sheet water are not present. Not SWH |
| Wildlife Habitat: Waterfowl Stopover and Staging Areas (Aquatic) | | | | | |
| <u>Rationale:</u> 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). <u>Information Sources</u> • 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 aquatic habitat is not present within the study area. 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 | | | | | |
| <u>Rationale:</u> 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. <u>Information Sources</u> • 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. | Shorebird stopover habitats are typically associated with large bodies of water such as the Great Lakes and associated wetlands. Not SWH |
| Wildlife Habitat: Raptor Wintering Area | | | | | |
| <u>Rational:</u> 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 <u>Special Concern:</u> 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 <u>Information Sources</u> • 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. | Subject property is surrounded by residential development, with which wintering raptor species are not tolerant to. Suitable open habitat (15ha) is also not present within study area; however, winter raptopr surveys will be completed inconjunction with winter deer surveys. 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 | | | | | |
| <u>Rationale</u> 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) | <ul style="list-style-type: none">Hibernacula may be found in caves, mine shafts, underground foundations and Karsts.Active mine sites should not be considered as SWHThe locations of bat hibernacula are relatively poorly known. <u>Information Sources</u> <ul style="list-style-type: none">OMNRF for possible locations and contact for local expertsNatural Heritage Information Center (NHIC) Bat HibernaculumMinistry of Northern Development and Mines for location of mine shafts.Clubs that explore caves (eg. Sierra Club)University Biology Departments with bat experts. | <ul style="list-style-type: none">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. | This habitat was not identified during the background review process. Not SWH |
| Wildlife Habitat: Bat Maternity Colonies | | | | | |
| <u>Rationale</u> 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). <ul style="list-style-type: none">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} <u>Information Sources</u> <ul style="list-style-type: none">OMNRF for possible locations and contact for local expertsUniversity Biology Departments with bat experts. | <ul style="list-style-type: none">Maternity Colonies with confirmed use by:<ul style="list-style-type: none">>10 Big Brown Bats>5 Adult Female Silver-haired BatsThe 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. | Cavity trees may be present throughout the subject property that may provide suitable maternity habitat for bats. Candidate SWH |
| 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. <u>Information Sources</u> <ul style="list-style-type: none">OMNR for possible locations and contact for local expertsUniversity 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} <ul style="list-style-type: none">The confirmation criteria and habitat areas for this SWH are still being determined.SWHDSS^{cxlix} Index #38 provides development effects and mitigation measures | Criteria unavailable to assess significance of habitat within the study area. |

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

| | Wildlife Species ¹ | Candidate SWH | | Confirmed SWH | Study Area |
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| | | ELC Ecosite Codes ¹ | Habitat Criteria and Information Sources ¹ | Defining Criteria ¹ | Assessment Details |
| Wildlife Habitat: Turtle Wintering Area | | | | | |
| <u>Rationale:</u> Generally sites are the only known sites in the area. Sites with the highest number of individuals are most significant | Midland Painted Turtle <u>Special Concern:</u> 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. <u>Information Sources</u> • 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. | Aquatic habitat within the subject property not suitable for overwintering turtle species. Not SWH |
| Wildlife Habitat: Snake Hibernaculum | | | | | |
| <u>Rationale:</u> Generally sites are the only known sites in the area. Sites with the highest number of individuals are most significant | <u>Snakes:</u> Eastern Gartersnake Northern Watersnake Northern Red-bellied Snake Northern Brownsnake Smooth Green Snake Northern Ring-necked Snake <u>Special Concern:</u> Milksnake Eastern Ribbonsnake <u>Lizard:</u> <u>Special Concern</u> (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 ccciii. <u>Information Sources</u> • 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. <u>or</u> ; individuals of two or more snake spp. • Congregations of a minimum of five individuals of a snake sp. <u>or</u> ; 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). • <u>Note:</u> If there are Special Concern Species present, then site is SWH • <u>Note:</u> Sites for hibernation possess specific habitat parameters (e.g. temperature, humidity, etc.) and consequently are used annually, often by many of the same individuals of a local population [i.e. strong hibernation site fidelity]. Other critical life processes (e.g. mating) often take place in close proximity to hibernacula. The feature in which the hibernacula is located plus a 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. | Suitable characteristics of hibernacula features may be present within the subject property. Snake surveys will be conducted to confirm presence/absence of feature during early spring period. Candidate SWH |

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

| | Wildlife Species ¹ | Candidate SWH | | Confirmed SWH | Study Area |
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| | | ELC Ecosite Codes ¹ | Habitat Criteria and Information Sources ¹ | Defining Criteria ¹ | Assessment Details |
| Wildlife Habitat: Colonially - Nesting Bird Breeding Habitat (Bank and Cliff) | | | | | |
| <u>Rationale:</u> 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 | <ul style="list-style-type: none">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. <u>Information Sources</u> <ul style="list-style-type: none">Reports and other information available from CAsOntario Breeding Bird Atlas^{ccv}Bird Studies Canada; <i>NatureCounts</i> http://www.birdscanada.org/birdmon/Field Naturalist clubs | Studies confirming: <ul style="list-style-type: none">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} <ul style="list-style-type: none">SWHMiST^{cxlix} Index #4 provides development effects and mitigation measures | Banks and cliffs are not present within the study area. Not SWH |
| Wildlife Habitat: Colonially - Nesting Bird Breeding Habitat (Tree/Shrubs) | | | | | |
| <u>Rationale:</u> 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 | <ul style="list-style-type: none">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. <u>Information Sources</u> <ul style="list-style-type: none">Ontario Breeding Bird Atlas^{ccv}, colonial nest records.Ontario Heronry Inventory 1991 available from Bird Studies Canada or NHIC (OMNR).NHIC Mixed Wader Nesting ColonyAerial photographs can help identify large heronriesReports and other information available from CAsMNRF District OfficesLocal naturalist clubs | Studies confirming: <ul style="list-style-type: none">Presence of 5ⁱ 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 eggshellsSWHMiST^{cxlix} Index #5 provides development effects and mitigation measures. | Stick nests or other evidence of heron nesting are not likely to be present throughout the subject property and adjacent lands. Breeding bird surveys will confirm presence/absence of this feature. Not SWH |
| Wildlife Habitat: Colonially - Nesting Bird Breeding Habitat (Ground) | | | | | |
| <u>Rationale:</u> 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 | <ul style="list-style-type: none">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. <u>Information Sources</u> <ul style="list-style-type: none">Ontario Breeding Bird Atlas^{ccv}, rare/colonial species records.Canadian Wildlife ServiceReports and other information available from CAsNatural Heritage Information Center (NHIC) Colonial Waterbird Nesting AreaMNRF District OfficesField naturalist clubs | Studies confirming: <ul style="list-style-type: none">Presence of >25 active nests for Herring Gulls or Ring-billed Gulls, >5 active nests for Common Tern or >2 active nests for Caspian Ternⁱ.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 nesting habitat for gulls and Brewer's Blackbird is not present. Not SWH |

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

| | Wildlife Species ¹ | Candidate SWH | | Confirmed SWH | Study Area |
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| | | ELC Ecosite Codes ¹ | Habitat Criteria and Information Sources ¹ | Defining Criteria ¹ | Assessment Details |
| Wildlife Habitat: Migratory Butterfly Stopover Areas | | | | | |
| <u>Rationale:</u> Butterfly stopovers areas are extremely rare habitats and are biologically important for butterfly species that migrate south for the winter. | Painted Lady Red Admiral <u>Special Concern:</u> Monarch | Combination of ELC Community Series: Need to have present one Community Series from each landclass: <u>Field:</u> CUM CUS CUT <u>Forest:</u> 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 cxlvi, 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} . <u>Information Sources</u> • 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. | Study area not located within 5 km of Lake Ontario. Not SWH |
| Wildlife Habitat: Landbird Migratory Stopover Areas | | | | | |
| <u>Rationale:</u> 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} . <u>Information Sources</u> • 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" ^{ccxi} • SWHMiST ^{cxlix} Index #9 provides development effects and mitigation measures. | Study area not located within 5 km of Lake Ontario. Not SWH |

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

| | Wildlife Species ¹ | Candidate SWH | | Confirmed SWH | Study Area |
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| | | ELC Ecosite Codes ¹ | Habitat Criteria and Information Sources ¹ | Defining Criteria ¹ | Assessment Details |
| Wildlife Habitat: Deer Yarding Areas | | | | | |
| <u>Rationale:</u> 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 | <ul style="list-style-type: none">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%^{cxciiv}.OMNRF determines deer yards following methods outlined in "Selected Wildlife and Habitat Features: Inventory Manual"^{mcxcv}Woodlots with high densities of deer due to artificial feeding are not significant. | No Studies Required: <ul style="list-style-type: none">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^{lvii, lviii, lix, lx, í}.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^{cxliix} Index #2 provides development effects and mitigation measures. | MNRF has confirmed that Torrance Creek PSW wetland is a known Deer winter congregation area. Winter wildlife surveys are being undertaken to determine if feature is present within the subject property. Candidate SWH |
| Wildlife Habitat: Deer Winter Congregation Areas | | | | | |
| <u>Rationale:</u> 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 ^{exlviii} | 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. | <ul style="list-style-type: none">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. <u>Information Sources</u> <ul style="list-style-type: none">MNRF District OfficesLIO/NRVIS | Studies confirm: <ul style="list-style-type: none">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^í.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^{cxliix} Index #2 provides development effects and mitigation measures. | MNRF has confirmed that Torrance Creek PSW wetland is a known Deer winter congregation area. Confirmed 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 |
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| | ELC Ecosite Codes ¹ | Habitat Description ¹ | Detailed Information and Sources ¹ | Defining Criteria ¹ | Assessment Details |
| Cliff and Talus Slopes | | | | | |
| <p><u>Rationale:</u> Cliffs and Talus Slopes are extremely rare habitats in Ontario.</p> | <p>Any ELC Ecosite within Community Series:</p> <p>TAO CLO TAS CLS TAT CLT</p> | <p>A Cliff is vertical to near vertical bedrock >3m in height.</p> <p>A Talus Slope is rock rubble at the base of a cliff made up of coarse rocky debris.</p> | <p>Most cliff and talus slopes occur along the Niagara Escarpment.</p> <p><u>Information Sources</u></p> <ul style="list-style-type: none">• 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 | <ul style="list-style-type: none">• Confirm any ELC Vegetation Type for Cliffs or Talus Slopes^{lxxviii}• SWHMiST^{cxlix} Index #21 provides development effects and mitigation measures. | <p>Vegetation type likely not present within the study area. ELC surveys to confirm presence/absence of this feature.</p> <p>Not SWH</p> |
| Sand Barrens | | | | | |
| <p><u>Rationale:</u> Sand barrens are rare in Ontario and support rare species. Most Sand Barrens have been lost due to cottage development and forestry.</p> | <p>ELC Ecosites: SBO1 SBS1 SBT1</p> <p>Vegetation cover varies from patchy and barren to continuous meadow (SBO1), thicket-like (SBS1), or more closed and treed (SBT1). Tree cover always <60%.</p> | <p>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%.</p> | <p>Any sand barren area, >0.5ha in size.</p> <p><u>Information Sources</u></p> <ul style="list-style-type: none">• OMNRF Districts.• Natural Heritage Information Center (NHIC) has location information on their website• Field naturalist clubs• Conservation Authorities | <ul style="list-style-type: none">• 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. | <p>Vegetation type likely not present within the study area. ELC surveys to confirm presence/absence of this feature.</p> <p>Not SWH</p> |

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 |
| Alvar | | | | | |
| <p><u>Rationale:</u> 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.</p> | <p>ALO1 ALS1 ALT1 FOC1 FOC2 CUM2 CUS2 CUT2-1 CUW2</p> <p>Five Alvar</p> <p>Indicator Species: 1) Carex crawei 2) Panicum philadelphicum 3) Eleocharis compressa 4) Scutellaria parvula 5) Trichostema branchiatum</p> <p>These indicator species are very specific to Alvars within Ecoregion 6E</p> | <p>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^{lxxxviii}.</p> | <p>An Alvar site > 0.5 ha in size^{lxxv}.</p> <p><u>Information Sources</u></p> <ul style="list-style-type: none">• 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 | <p>Field studies identify four of the five Alvar indicator species^{lxxv, cxlix} at a Candidate Alvar site is Significant.</p> <ul style="list-style-type: none">• 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. | <p>Vegetation type likely not present within the study area. ELC surveys to confirm presence/absence of this feature.</p> <p>Not SWH</p> |
| Old Growth Forest | | | | | |
| <p><u>Rationale:</u> 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.</p> | <p>Forest Community Series: FOD FOC FOM SWD SWC SWM</p> | <p>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.</p> | <p>Woodland Stands areas 30ha or greater in size or with at least 10 ha interior habitat assuming 100m buffer at edge of forest Í.</p> <p><u>Information Sources</u></p> <ul style="list-style-type: none">• 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 | <p>Field Studies will determine:</p> <ul style="list-style-type: none">• 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. | <p>Vegetation type likely not present within the study area. ELC surveys to confirm presence/absence of this feature.</p> <p>Not SWH</p> |

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 |
| Savannah | | | | | |
| <u>Rationale:</u> 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%. | <ul style="list-style-type: none">• 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. <u>Information Sources</u> <ul style="list-style-type: none">• 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 ^{lxv} Appendix N should be present. Note: Savannah plant spp. list from Ecoregion 6E should be used ^{cxlviii} . <ul style="list-style-type: none">• 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 type likely not present within the study area. ELC surveys to confirm presence/absence of this feature. Not SWH |
| Tallgrass Prairie | | | | | |
| <u>Rationale:</u> 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. | <ul style="list-style-type: none">• 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. <u>Information Sources</u> <ul style="list-style-type: none">• 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 ^{lxv} Appendix N should be present. Note: Prairie plant spp. list from Ecoregion 6E should be used ^{cxlviii} . <ul style="list-style-type: none">• 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 type likely not present within the study area. ELC surveys to confirm presence/absence of this feature. Not SWH |

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

| Rare Vegetation Community ¹ | Candidate SWH | | | Confirmed SWH | Study Area |
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| | ELC Ecosite Codes ¹ | Habitat Description ¹ | Detailed Information and Sources ¹ | Defining Criteria ¹ | Assessment Details |
| Other Rare Vegetation Communities | | | | | |
| <u>Rationale:</u> 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. <u>Information Sources</u> <ul style="list-style-type: none">• 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. | Other rare vegetation types may be present within the study area. Field surveys to confirm presence/absence of this feature. Candidate 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 |
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| | | ELC Ecosite Codes ¹ | Habitat Criteria and Information Sources ¹ | Defining Criteria ¹ | Assessment Details |
| Wildlife Habitat: Waterfowl Nesting Area | | | | | |
| <u>Rationale:</u> 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. <u>Information Sources</u> • 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 study area. Field studies to confirm lack of habitat feature 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 |
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| | | ELC Ecosite Codes ¹ | Habitat Criteria and Information Sources ¹ | Defining Criteria ¹ | Assessment Details |
| Wildlife Habitat: Bald Eagle and Osprey Nesting, Foraging and Perching Habitat | | | | | |
| <u>Rationale:</u> 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 <u>Special Concern:</u> Bald Eagle | ELC Forest Community Series: FOD, FOM, FOC, SWD, SWM and SWC directly adjacent to riparian areas – rivers, lakes, ponds and wetlands | <ul style="list-style-type: none">• 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). <u>Information Sources</u> <ul style="list-style-type: none">• 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 | <p>Studies confirm the use of these nests by:</p> <ul style="list-style-type: none">• 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 SWH^{ccvii}, 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^{cv}, ^{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^{cv}.• 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 | <p>Suitable habitat is not present within the subject property, as natural features within the subject property and adjacent are surrounded by development, with which species are intolerant to.</p> <p>Not SWH</p> |

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

| | Wildlife Species ¹ | Candidate SWH | | Confirmed SWH | Study Area |
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| | | ELC Ecosite Codes ¹ | Habitat Criteria and Information Sources ¹ | Defining Criteria ¹ | Assessment Details |
| Wildlife Habitat: Woodland Raptor Nesting Habitat | | | | | |
| <u>Rationale:</u> 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 ^{lxxxviii, 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. <u>Information Sources</u> • 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. | Small section of subject property is contiguous with the Torrence Creek natural feature that is >30ha. Field studies to confirm presence or absence of this feature within the subject property. Candidate SWH |

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

| | Wildlife Species ¹ | Candidate SWH | | Confirmed SWH | Study Area |
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| | | ELC Ecosite Codes ¹ | Habitat Criteria and Information Sources ¹ | Defining Criteria ¹ | Assessment Details |
| Wildlife Habitat: Turtle Nesting Area | | | | | |
| <u>Rationale:</u> These habitats are rare and when identified will often be the only breeding site for local populations of turtles | Midland Painted Turtle <u>Special Concern:</u> 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 | <ul style="list-style-type: none">• 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. <u>Information Sources</u> <ul style="list-style-type: none">• 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: <ul style="list-style-type: none">• Presence of 5 or more nesting Midland Painted Turtles• One or more Northern Map Turtle or Snapping Turtle nesting is a SWHⁱ• 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. | Gravel or sandy areas may be present within the subject property. Area searches will confirm presence/absence of this feature from the subject property. Candidate SWH |
| Wildlife Habitat: Seeps and Springs | | | | | |
| <u>Rationale:</u> 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} . <ul style="list-style-type: none">• Seeps and springs are important feeding and drinking areas especially in the winter will typically support a variety of plant and animal species^{cxix, cxx, cxxi, cxvii, cxviii, cxiv} <u>Information Sources</u> <ul style="list-style-type: none">• 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: <ul style="list-style-type: none">• 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 | Seeps and/or springs may be present throughout the subject property. Field studies to confirm presence/absence of this feature. Candidate SWH |

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

| | Wildlife Species ¹ | Candidate SWH | | Confirmed SWH | Study Area |
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| | | ELC Ecosite Codes ¹ | Habitat Criteria and Information Sources ¹ | Defining Criteria ¹ | Assessment Details |
| Wildlife Habitat: Amphibian Breeding Habitat (Woodland) | | | | | |
| <u>Rationale:</u> 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. | <ul style="list-style-type: none">• Presence of a wetland, pond or woodland pool (including vernal pools) >500m² (about 25m diameter) ^{ccvii} within or adjacent (within 120m) to a woodland (no minimum size) ^{clxxxii, lxiii, lxv, lxvi, lxvii, lxviii, lxix, lxx} Some small wetlands may not be mapped and may be important breeding pools for amphibians.• Woodlands with permanent ponds or those containing water in most years until mid-July are more likely to be used as breeding habitat ^{cxlviii} <u>Information Sources</u> <ul style="list-style-type: none">• 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 | <p>Studies confirm:</p> <ul style="list-style-type: none">• 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. | <p>Suitable habitat may be present within the study area. Field studies to confirm presence/absence of this feature.</p> <p>Candidate SWH</p> |

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

| | Wildlife Species ¹ | Candidate SWH | | Confirmed SWH | Study Area |
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| | | ELC Ecosite Codes ¹ | Habitat Criteria and Information Sources ¹ | Defining Criteria ¹ | Assessment Details |
| Wildlife Habitat: Amphibian Breeding Habitat (Wetland) | | | | | |
| <u>Rationale:</u> 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. | <ul style="list-style-type: none">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. <u>Information Sources</u> <ul style="list-style-type: none">Ontario Herpetofaunal Summary Atlas (or other similar atlases)Canadian Wildlife Service Amphibian Road Surveys and Backyard Amphibian Call Count.OMNRF Districts and wetland evaluationsReports and other information available from CAs. | <p>Studies confirm:</p> <ul style="list-style-type: none">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. | <p>Suitable habitat may be present within the study area. Field studies to confirm presence or absence of this feature.</p> <p>Candidate SWH</p> |
| Woodland Area-Sensitive Bird Breeding Habitat | | | | | |
| <u>Rationale:</u> 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 | <ul style="list-style-type: none">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, cxv, cxvii, cxxxvii, cxxxviii, cxxxix, cxi, 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. <u>Information Sources</u> <ul style="list-style-type: none">Local bird clubsCanadian 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 speciesReports and other information available from CAs. | <ul style="list-style-type: none">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. | <p>Small section of subject property is contiguous with the Torrence Creek natural feature that is >30ha. Field studies will confirm presence or absence of this feature within the subject property. Study will assess use of indicator species on edge habitats as well.</p> <p>Candidate SWH</p> |

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 | | | | | |
| <u>Rationale:</u> 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 <u>Special Concern:</u> Black Tern Yellow Rail | MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 SAS1 SAM1 SAF1 FEO1 BOO1 For Green Heron: All SW, MA and CUM1 sites. | <ul style="list-style-type: none">• Nesting occurs in wetlands• All wetland habitat is to be considered as long as there is shallow water with emergent aquatic vegetation present^{ccxiv}.• 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. <u>Information Sources</u> <ul style="list-style-type: none">• 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: <ul style="list-style-type: none">• 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 species¹.• Note: any wetland with breeding of 1 or more Black Terns, Trumpeter Swan, Green Heron or Yellow Rail is SWH¹.• 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 is not present within the study area. Not SWH |
| Wildlife Habitat: Open Country Bird Breeding Habitat | | | | | |
| <u>Rationale:</u> 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 <u>Special Concern:</u> Short-eared Owl | CUM1 CUM2 | <p>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)¹.</p> <p>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.</p> <p>The Indicator bird species are area sensitive requiring larger grassland areas than the common grassland species.</p> <u>Information Sources</u> <ul style="list-style-type: none">• 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: <ul style="list-style-type: none">• 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. | Large fields of suitable size and composition are not present within the study area. 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 | | | | | |
| <u>Rationale:</u> 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. | <u>Indicator spp.:</u> Brown Thrasher Clay-coloured Sparrow <u>Common spp.:</u> Field Sparrow Black-billed Cuckoo Eastern Towhee Willow Flycatcher <u>Special Concern:</u> 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) ⁱ . 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. <u>Information Sources</u> • 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 ⁱ . • 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. | Large thicket habitats are not present within the study area. Not SWH |
| Wildlife Habitat: Terrestrial Crayfish | | | | | |
| <u>Rationale:</u> Terrestrial Crayfish are only found within SW Ontario in Canada and their habitats are very rare. ccii | Chimney or Digger Crayfish: (<i>Fallicambarus fodiens</i>) Devil Crawfish or Meadow Crayfish: (<i>Cambarus Diogenes</i>) | 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. <u>Information Sources</u> • 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. | Terrestrial Crayfish chimneys may be present within the study area. Field studies to confirm presence/absence of this feature within the subject property. Candidate 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 | | | | | |
| <u>Rationale:</u> 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 ^{lxviii} . <u>Information Sources</u> • 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. | Several Species of Conservation Concern are recorded from the vicinity of the study area based on the background review and may be present. Seasonal surveys necessary to confirm presence/absence of this features. 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 . <u>Information Sources</u> • 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. Corridors 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. | Amphibian Breeding Habitat - Wetland is possibly present within the study area. Field surveys will be conducted to confirm if suitable habitats are present. Candidate 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, cxliv} . • Corridors typically follow riparian areas, woodlots, areas of physical geography (ravines, or ridges). <u>Information Sources</u> • 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. | A deer winter congregation area was identified by the MNRF as present within the Torrance Creek PSW. Potential movement corridors are present within the subject property, specifically along the edge of the natural feature. Candidate SWH |

Significant Wildlife Habitat Assessment Tables

Table 6. Exceptions for Ecodistricts within Ecoregion 6E.

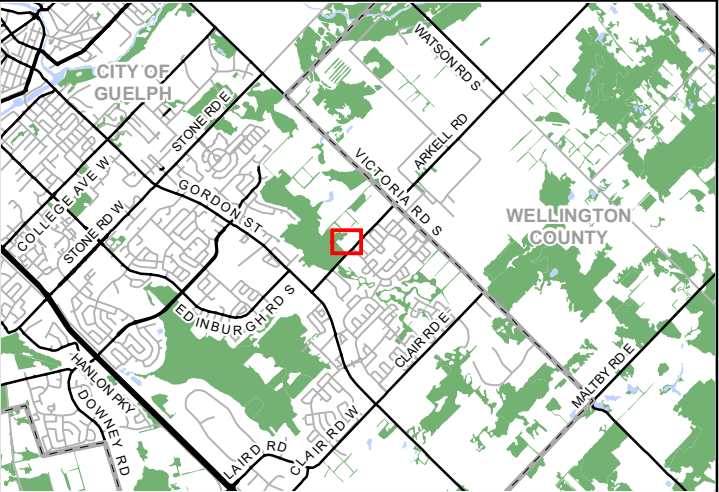
| | Wildlife Habitat and Species | Candidate SWH | | | Confirmed SWH | Study Area |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|--------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| | | Ecosites | Habitat Description | Habitat Criteria and Information Sources ¹ | Defining Criteria ¹ | Assessment Details |
| EcoDistrict: 6E-14 | | | | | | |
| <p><u>Rationale:</u> The Bruce Peninsula has an isolated and distinct population of black bears. Maintenance of large woodland tracks with mast producing tree species is important for bears. ^{clxxxvi, ccxvii}</p> | <p>Mast Producing Areas</p> <p>Black Bear</p> | <p>All Forested habitat represented by ELC Community Series: FOM FOD</p> | <ul style="list-style-type: none">• Black bears require forested habitat that provides cover, winter hibernation sites, and mast producing tree species. ^{clxxxv, clxxxvii, clxxxviii, clxxxix, cxc, cxci, cxcii, cxci, ccxvii}• Forested habitats need to be large enough to provide cover and protection for black bears ^{ccxvii}. | <p>Woodland ecosites >30ha with mast-producing tree species, either soft (cherry) or hard (oak and beech), Information Sources Important forest habitat for black bears may be identified by OMNRF.</p> | <ul style="list-style-type: none">• All woodlands > 30 ha with a 50% composition of these ELC Vegetation Types are considered significant: FOM1-1 FOM2-1 FOM3-1 FOD1-1 FOD1-2 FOD2-1 FOD2-2 FOD2-3 FOD2-4 FOD4-1 FOD5-2 FOD5-3 FOD5-7 FOD6-5• SWHMiST ^{cxlix} Index #3 provides development effects and mitigation measures. | <p>Black Bears are not present within this portion of 6E. Not SWH</p> |
| EcoDistrict: 6E-17 | | | | | | |
| <p><u>Rationale:</u> Sharp-tailed grouse only occur on Manitoulin Island in Ecoregion 6E, Leks are an important habitat to maintain their population</p> | <p>Lek</p> <p>Sharp-tailed Grouse</p> | <p>CUM CUS CUT</p> | <ul style="list-style-type: none">• The lek or dancing ground consists of bare, grassy or sparse shrubland. There is often a hill or rise in topography^{ccxix}.• Leks are typically a grassy field/meadow >15h with adjacent shrublands and >30ha with adjacent deciduous woodland. Conifer trees within 500m are not tolerated. ^{ccxix} | <p>Grasslands (field/meadow) are to be >15ha when adjacent to shrubland and >30ha when adjacent to deciduous woodland^{ccxix}.</p> <ul style="list-style-type: none">• Grasslands are to be undisturbed with low intensities of agriculture (light grazing or late haying)• Leks will be used annually if not destroyed by cultivation or invasion by woody plants or tree planting^{ccxix} Information Sources• OMNRF district office• Bird watching clubs• Local landowners• Ontario Breeding Bird Atlas | <p>Studies confirming lek habitat are to be completed from late March to June.</p> <ul style="list-style-type: none">• Any site confirmed with sharp-tailed grouse courtship activities is considered significant• The field/meadow ELC ecosites plus a 200 m radius area with shrub or deciduous woodland is the lek habitat• SWHMiST ^{cxlix} Index #32 provides development effects and mitigation measures | <p>Sharp-tailed Grouse are not present within this portion of 6E. Not SWH.</p> |

Maps




Path: X:\1771_ArkellRoadPropertiesEIS\NRSI_1771_Map1_StudyArea_NaturalFeatures_1K_2017_02_17_OL.mxd

Arkell Road Properties EIS Subject Property and Survey Locations



- Legend**
- Subject Property
 - Anuran Station
 - Anuran Station / Bird Breeding Monitoring (BMB)
 - Bird Breeding Monitoring (BMB) / Nocturnal Bird Monitoring (NOC)
 - Snakeboard Cover Location (SNK)

*Survey locations are subject to change based on site conditions.


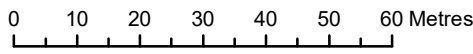


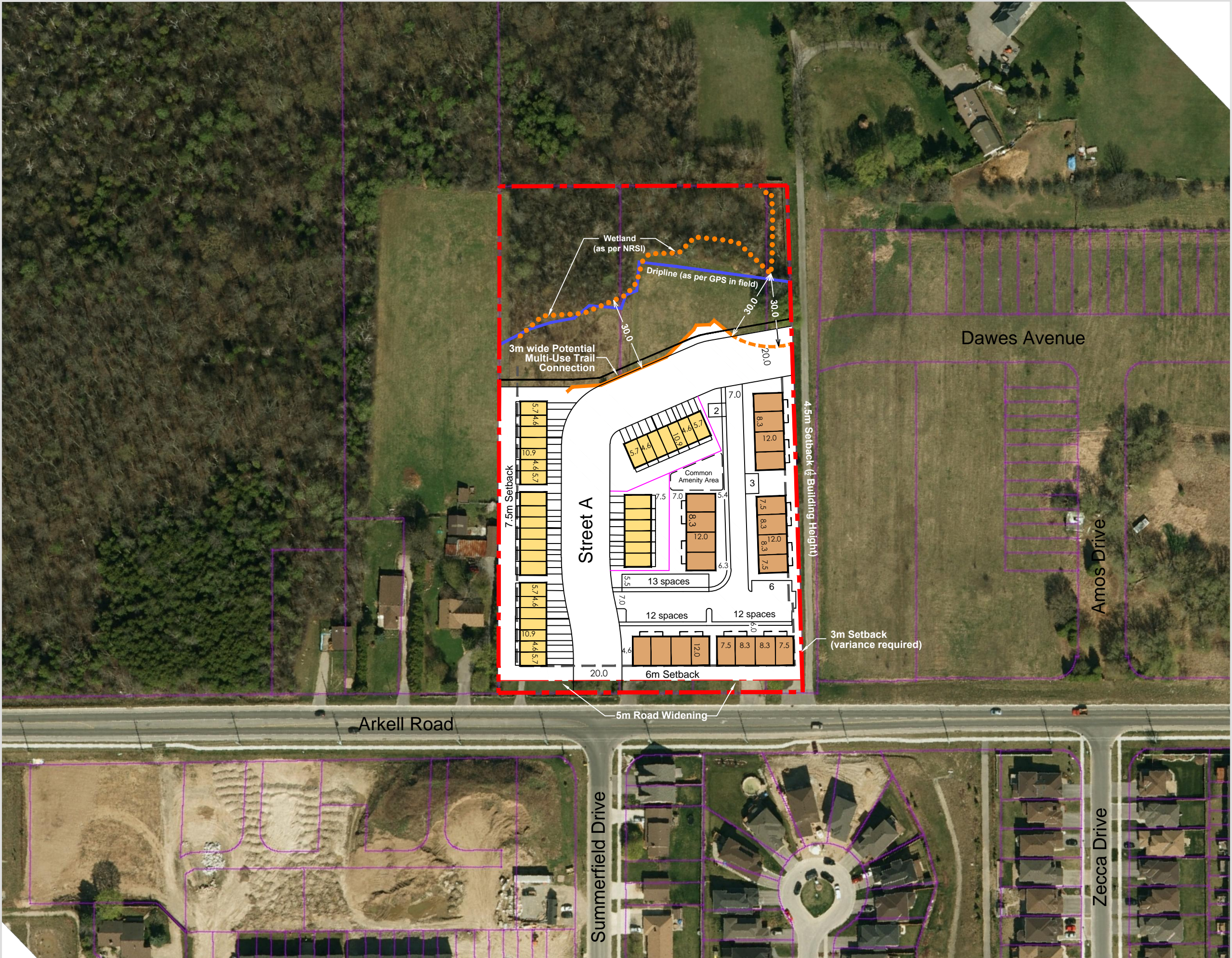
NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Map Produced by Natural Resource Solutions Inc. This map is proprietary and confidential and must not be duplicated or distributed by any means without express written permission of NRSI. Data provided by MNRF© Copyright: Queen's Printer Ontario. Imagery: ESRI (2012).

Project: 1771
Date: February 17, 2017


NAD83 - UTM Zone 17
Size: 11x17"
1:1,200





Preliminary Concept Plan

Arkell Road Properties
City of Guelph
County of Wellington

LEGEND
 Subject Lands

| | Proposed |
|--------------------|---------------------------------|
| Gross Area | 25,443 m ² (2.54 ha) |
| Net Area | 12,410 m ² (1.24 ha) |
| Number of Units | 74 |
| No. of Storeys | 3 |
| Gross Area Density | 29 units/ha |
| Net Area Density | 60 units/ha |
| Parking Required | 48 spaces |
| Parking Provided | 48 spaces |

- Notes:**
- Net Area excludes: NRSI wetland limit, 30m buffer from NRSI wetland, 20m wide right of way and 5m road widening.
 - Standards for Residential Townhouse (R.3) Zone used for Concept Plan.
 - Parking Required includes 1 space/unit and 20% visitor parking requirement.
 - Site Boundary is approximate and should be verified by Survey.
 - Natural feature limits from NRSI (July 28, 2016) and verified by GRCA and City of Guelph staff.
 - Density to be confirmed through City review.

Sources:

- Air Photo/Parcel Fabric - Grand River Conservation Authority (GRIN) 2010
- Dripline Limits - Natural Resource Solutions Inc. (NRSI) June 2016
- Wetland Limits - Natural Resource Solutions Inc. (NRSI) July 28, 2016
- City of Guelph Zoning By-law (1995) 14864

DATE: January 31, 2017

FILE: 15246A

SCALE ±1:1,500

DRAWN: DGS



K:\15246A-CRESCENT HOMES-ARKELL ROAD-GUELPH\CONCEPT\CONCEPT PLAN JANUARY31 2017.DWG

APPENDIX IV Tree Inventory and Preservation Plan



Arkell Road Properties Tree Inventory and Preservation Plan

Prepared for:

Nitin Jain
Crescent Homes
151 Curzon Crescent
Guelph, ON
N1K 0B3

Project No. 1771 | October 2018



NATURAL RESOURCE SOLUTIONS INC.

Aquatic, Terrestrial and Wetland Biologists

Arkell Road Properties Tree Inventory and Preservation Plan

Project Team

| | |
|---------------|------------------------------------------------------------------------------|
| Tara Brenton | Project Manager, Senior Terrestrial & Wetland Biologist / Certified Arborist |
| Ken Burrell | Project Coordinator, Terrestrial & Wetland Biologist |
| Joseph Lance | Terrestrial & Wetland Biologist / Certified Arborist |
| Laura Hockley | GIS Analyst, Mapping |

Report submitted on October 17, 2018



Joseph Lance
Terrestrial & Wetland Biologist / Certified Arborist

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1.0 Introduction

Natural Resource Solutions Inc. (NRSI) was retained by Crescent Homes (the “Client”) to undertake a Tree Inventory and Preservation Plan (TIPP) in conjunction with an Environmental Impact Study (EIS) for a proposed residential development on the properties at 190-216 Arkell Road (the “subject property”) in the City of Guelph. The landowner is proposing to redevelop the properties as a residential neighbourhood that will include 34 townhome units and 2 three-storey apartment buildings with a combined total of 32 apartment units, parking and common amenity areas and a street connecting Arkell Road to Dawes Avenue in the adjacent development (Map 1).

This TIPP was conducted in accordance with the City of Guelph By-law (2010) -19058. The by-law states that if an owner wishes to destroy or injure a regulated tree and if none of the exemptions set out in this by-law are applicable, then the owner shall submit the information required in Part 5 of the by-law, including a Landscaping, Replanting and Replacement Plan. Within the By-law, a regulated tree is defined as

“a specimen of any species of deciduous or coniferous growing woody perennial plant, supported by a single root system, which has reached, or could have reached a height at least 4.5m from the ground at physiological maturity, is located on a lot that is greater than 0.2 hectares (0.5 acres) in size and has a DBH of at least 10cm”.

Section 4.2.4 of the City of Guelph Official Plan (2018) requires that a Tree Inventory and Tree Preservation Plan be completed where development or site alteration is proposed. The TIPP is to provide an inventory of all trees over 10cm DBH and identify a Preservation Plan for healthy indigenous and non-invasive trees.

In compliance with the City’s By-law (2010)-19058 and OP (2018), this report summarizes the following:

- Findings of the tree inventory;
- Assessment of overall health and potential for structural failure of inventoried trees;
- Tree retention analysis based on details of the proposed development;
- Protection measures for trees to be retained and;
- Recommended mitigation and compensation measures.

2.0 Tree Inventory and Methodology

A comprehensive inventory and assessment of trees $\geq 10\text{cm}$ in Diameter at Breast Height (DBH) on and within approximately 30m (where property access allowed) of the subject property was completed by NRSI Certified Arborists on July 11 and July 26, 2017. Inventoried trees on the subject property were tagged with a pre-numbered aluminum forestry tag, excepting some individuals in a cedar hedgerow. As per correspondence with City staff, this hedgerow was treated as a group of trees in the inventory and the limits of this group, based on the dripline extending into the subject property, are shown in Map 1 (A. Nix, pers. comm. 2017). The location of trees inventoried was subsequently surveyed using an SXBlue II GNSS GPS unit by the Certified Arborist and are shown on Map 1. A complete list of the trees that were assessed and their overall health and potential for structural failure is included in Appendix I.

The following information was recorded for each tree:

- Location;
- Species;
- Tag number (on-site trees) / numeric identifier (off-site trees and Cedar Hedgerow);
- DBH (cm),
- Crown radius (metres);
- General health (excellent, good, fair, poor, very poor, dead);
- Potential for structural failure (improbable, possible, probable, imminent), and
- General comments (i.e. disease, aesthetic quality, development constraints, sensitivity to development).

The potential for structural failure and the overall health of each tree was assessed based on the criteria outlined in Appendix II. In carrying out these assessments, NRSI has exercised a reasonable standard of care, skill and diligence as would be customarily and normally provided in carrying out these assessments. The assessments have been made using accepted arboricultural techniques including a visual examination of each tree for structural defects, scars, external indications of decay such as fungal fruiting bodies, evidence of insect attack, the condition of any visible root structures, the degree and direction of lean (if any), the general condition of the tree(s) and the surrounding site, and the current or planned proximity of property and people. None of the trees examined on the property were dissected, cored, probed, or climbed and detailed root crown examinations involving excavation were not

undertaken. The conditions for this assessment, including restrictions, professional responsibility, and third-party liability can be found in Appendix III.

2.1 Bat Habitat Assessment Methodology

One bat species, the Little Brown Myotis (*Myotis lucifugus*), is known from the area and is listed as Endangered provincially, therefore is afforded general habitat protection under the Endangered Species Act (2007). This species is known to roost in tree cavities, hollows, or under loose bark, as well as within buildings (OMNR 2000). NRSI biologists who are trained and experienced in the Ministry of Natural Resources and Forestry (MNRF) bat habitat assessment protocols (OMNR 2011, OMNRF 2014, OMNRF 2017) searched for the presence of features (i.e. cavities, loose bark, etc.) that may provide bat maternity colony habitat. All buildings within the subject property were also assessed for potential entry and exit points that could provide SAR bats access to roost sites.

Information considered (and recorded, where applicable) for cavity trees included tree species, location, DBH, canopy cover, tree height, decay class according to Watt and Caceres (1999), and number of potentially suitable cavities. Other criteria were considered, including the use of cavities by other wildlife, the potential for cavities to be used by predators, supporting/surrounding habitat, and other characteristics which may contribute to the habitat requirements of these species, such as temperature regulation. For more information regarding bat habitat assessments, refer to Section 4.3.4 in the Arkell Road Properties Environmental Impact Study (NRSI 2018).

3.0 Summary of Tree Inventory

The tree inventory included the assessment of 339 trees within and adjacent to the subject property, comprised of 31 species. A hedgerow of 79 Eastern White Cedar (*Thuja occidentalis*) trees along the southwest property boundary were treated as a group and defined by their dripline, as described in Section 2.0. Of the 339 trees inventoried and assessed, 295 (87%) are native and 44 (13%) are non-native. A complete list of trees inventoried is provided in Appendix I and tree locations are shown on Map 1. A series of summary tables is provided in Appendix IV.

3.1 Bat Habitat Assessment Findings

Five potential roost trees for Little Brown Myotis and/or Northern Myotis (*Myotis septentrionalis*) were identified within the study area in either isolated trees or treed hedgerows. Two buildings within the subject property were identified as providing potential habitat for bat SAR. See Section 4.3.4 in the Arkell Road Properties Environmental Impact Study (NRSI 2018).

4.0 Tree Preservation Plan

4.1 Tree Removal and Retention Analysis

Tree removal and retention was based on two considerations:

- Trees that require removal based on the extent of proposed site grading. This was determined by comparing the location of the trees to the location of the components of the development proposal as shown on Map 1 (MHBC 2018);
- Trees identified as being in poor or very poor health, or identified as dead, and having the possibility of impacting a target in the event of structural failure. The removal of these trees would be recommended for safety, especially if they are located within striking distance of a component of the proposed development. For the purpose of this report, trees which fall into this category are identified for removal.

Of the 339 trees inventoried, 206 are anticipated to be removed. This includes 1 tree that has been identified as being in poor health, and is a potential hazard to users of a sidewalk along the proposed public road. The removal of this tree (211) will not significantly impact the woodland feature as it is at the edge of the feature and adjacent to 2 large trees that will be removed due to site grading in the vicinity. It is anticipated that tree 211 can be felled into the cultural meadow or in the direction of trees 212-213, after they are removed, without damage to inventoried trees to be retained.

The remaining 205 trees require removal based on the extent of the proposed site grading, which is required to effectively service the lands. This includes trees situated along the grading limit or in close proximity that may incur extensive root damage as a result of grading. Most of these trees are in fair health with a possible to improbable potential for structural failure, and range in size from 10.1cm DBH to 118.0cm DBH.

5.0 Tree Compensation Plan

Section 5 (h) in the City's tree by-law (2010)-19058 states that *"where three or more trees are proposed for Destruction or Injuring, and where the Inspector so requires, a Landscaping, Replanting and Replacement Plan"* is required. Overall compensation for tree loss is a requirement of the City's by-law which notes that *"each tree Destroyed or Injured be replaced with one or more replacements trees to be planted and maintained to the satisfaction of the Inspector in accordance with the Landscaping, Replanting and Replacement Plans approved by the Inspector"* [Section 7 (b)]. The City's OP (2018) also requires that a 'Vegetation Compensation Plan' be developed to replace trees lost through the development and site alteration process (Section 4.1.6.4).

According to City of Guelph Tree By-law Number (2010)-19058, trees exempt from compensation must have the following site specific criteria:

- *"A tree having no living tissue, having 70% or more of its crown dead, or being infected by a lethal pathogen, fungus or insect (including the Emerald Ash Borer or the Asian Longhorned Beetle), and where required, a certificate issued by an Arborist, confirming this justification for Destruction or Injuring, has been submitted to an Inspector" [Part 4, section (a)],*
- *"A tree which is Hazardous, and where required, a certificate issued by an Arborist, confirming this justification for Destruction or Injuring, has been submitted to an Inspector" [Part 4, section (b)]*
- *"A specimen of Rhamnus cathartica (Common Buckthorn), Rhamnus frangula (European or Glossy Buckthorn), Alnus glutinosa (Black Alder), Elaeagnus umbellata (Autumn Olive), or Morus alba (White Mulberry)" [Part 4, section (g)],*
- *"A fruit tree that is capable of producing fruit for human consumption" [Part 4, section (h)].*

Trees proposed for removal that have an imminent potential for structural failure and/or are in poor to very poor health and/or are dead are exempt pursuant to Section 4 of the City's tree by-law and do not require compensation. Table 1 provides a summary of the trees inventoried throughout the property, total number proposed for removal and the proposed compensation plan. A complete list of inventoried trees, including a determination of whether trees require compensation, is provided in Appendix I.

Table 1. Summary of Trees to be Removed and Recommended Compensation Plan

| Tree Inventory | Total |
|------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| Total number of trees inventoried | 339 |
| Total number of trees to be removed | 206 |
| Tree Compensation | |
| Trees exempt from compensation (poor to very poor condition, and/or have an imminent potential for structural failure; dead; hazardous; fruit trees) | 44 |
| Trees requiring compensation (using 3:1 trees and 5:1 shrubs) | 162 |

Detailed landscaping plans will be required for the property at the Site Plan Stage; however, it is anticipated that some of the required compensation plantings can be provided within the graded slope at the rear of the property, adjacent to the proposed road. Additional compensation plantings may be feasible within the wetland buffer, though some of this area has tree and shrub cover and plantings would need to be complementary to the existing vegetation. Any street tree plantings will not be acceptable as compensation plantings, as these are required by the City of Guelph through the Site Plan Approval stage. In the event that the accepted number of compensation plantings cannot be accommodated on the subject property, cash-in-lieu equal to the value of the replacement vegetation will be required to be paid to the City of Guelph. It is recommended that the final compensation strategy, including appropriate species and potential use of trees and shrubs and herbaceous species for pollinator habitat, be determined once a formal site plan application has been submitted and prior to the development of detailed landscaping plans.

6.0 Tree Protection Measures

6.1 Prior to Construction and Site Alteration

Temporary tree protection fencing (TPF) will be situated where trees are adjacent to the limit of disturbance/grading as shown on Map 2. A combined sediment and erosion control fence (i.e. silt fence) and TPF is recommended where trees are situated adjacent to the limit of disturbance. This TPF is to take the form of 1200mm high heavy-duty paige-wire fencing secured to iron T-posts at 2400mm on centre, in accordance with the City of Guelph's Tree Protection guidelines (Tree Protection Zone Fence Detail SD-90a).

The temporary TPF will be installed and maintained by the Developer. Prior to any construction activities (rough grading, vegetation and tree removal), the TPF will be installed at the limit of grading in the northwest and southwest of the development area in order to protect the root systems of trees to be retained. This placement will be greater than 1m beyond the dripline of most trees to be retained, but may be closer to the Eastern White Cedar hedgerow at the property boundary (Map 2). An effort is being made to retain these trees in order to provide screening of construction activities and buildings for the adjacent landowner, and to avoid having to remove these privately- or jointly-owned trees.

Prior to works commencing on-site, fence installation and location is to be inspected by a Certified Arborist and/or the on-site Environmental Monitor. Signage, as per the City of Guelph Tree Protection Zone Information Signage (SD-90c), indicating the purpose of protection fencing will be attached to the paige-wire fencing every 20m. Recommended fencing locations are shown on Map 2.

The Tree Protection Plan is to be reviewed and approved by the City of Guelph. Upon approval of the Tree Protection Plan, and prior to any on-site works (i.e. rough grading, tree removal), a qualified environmental consultant is to submit written verification to the City that all of the recommended tree protection measures have been installed in accordance with the Tree Protection Plan.

6.2 During Construction

A Certified Arborist is to be on-site during any tree removal activities to ensure that trees identified for retention are not removed or damaged. The Certified Arborist will also be on-site to ensure that the TPF is functioning as intended and that tree and vegetation removal is in accordance with the Migratory Birds Convention Act (MBCA) (Government of Canada 1994).

Temporary TPF is to be maintained by the Developer and/or their representative during the entire construction period to ensure that trees being retained and their root systems are protected. Any minimal damage (i.e. damage to limbs or roots) to trees to be retained during construction must be pruned using proper arboricultural techniques. Should any of the trees intended to be retained be seriously damaged or die as a result of construction activities, the City will be consulted and presented with a proposed plan of action, such as treatment or replacement. Any replacement species are to be reviewed by a Certified Ontario Landscape Architect (OLA) or Certified Arborist. Watering and pruning of newly planted trees will be carried out by the owner/contractor as required during the warranty period (approximately 2 years).

6.3 Post Construction

As trees being retained are situated along the boundaries of the Torrance Creek Swamp PSW Complex, and the property line, it is recommended that the temporary TPF be removed upon completion of construction activities and adjacent areas are stabilized with a vegetative cover (i.e. sod in urban area or native vegetation along buffer edge) to the satisfaction of the Environmental Monitor, Certified Arborist, City or qualified biologist.

7.0 Recommended Mitigation Measures

7.1 Pre and During Construction Activities

To minimize disturbance to vegetation being retained, maintenance and refueling of machinery during construction is to occur at a designated location away from the natural area being protected off-site / tree protection zone. No storage of equipment, materials or fill is to occur within these areas.

7.1.1 Migratory Birds Convention Act

The removal of trees within the subject property has the potential to disrupt nesting birds. The Migratory Birds Convention Act (MBCA, Government of Canada 1994) identifies a list of migratory bird species that are protected. It prohibits the destruction of nests, individuals and activities that would cause an adult bird to abandon a nest. Tree removal is to occur outside of the core nesting period for migratory birds as established by the Canadian Wildlife Service (CWS 2012) which extends from approximately April 1 through August 31. Every developer/consultant/contractor, etc. is legally obliged to carry out due diligence to protect migratory birds from harm during all construction projects.

Historically, the implementation policies of the MBCA provided for biologists to conduct nest searches when vegetation removals were to occur during the nesting period; these provisions were revoked in 2014. One exception is for when the removals are to occur in simple habitats which are characterized in the MBCA (i.e. bridge structures, isolated trees, vacant lot). Trees inventoried and identified for removal from within the Arkell Road Properties are within hedgerow areas, or are individual trees within the existing residential landscaped areas and are therefore considered 'simple' habitat. Should tree/vegetation removal be required to occur within the peak breeding window, pending discussion and approval by the CWS, nest surveys may be conducted by a qualified biologist just prior to the removal activity (less than 48 hours prior to) to ensure that nesting birds are not present. Should a nest be identified within a tree(s) to be removed, there shall be no removal or construction activity until sign-off is obtained from the qualified biologist that the nest is no longer active. Trees identified as having no nesting activity can be removed; however, tree removal is to occur within 48 hours of the nest search. If tree removal does not occur within this time frame, additional nest searches are to be conducted.

In the event a nest survey is conducted, a clearance letter is to be prepared by the qualified biologist that undertook the surveys and submitted to the Developer for their files in the event a record of due diligence is requested by the CWS.

7.2 Post Construction Activities

It is recommended that any areas of bare soil within the construction area be re-vegetated as soon as feasible to prevent erosion of soils and keep dust to a minimum. Seeding (native seed mix in areas adjacent to protected natural area) or a dust suppression plan as agreed upon with the City of Guelph is recommended within 30 days of vegetation removal in areas with no active construction.

7.2.1 Restoration and Landscaping

The recommendations provided below are aimed at protecting retained trees and associated natural features. Species used for replacement/enhancement plantings should be native to Wellington County and not include any species that are listed as introduced or invasive. The use of hardy species will ensure successful early establishment and minimize the potential for invasive species proliferation. For street tree plantings, the use of non-native species that are sometimes more tolerant of urban conditions (i.e. salt and drought tolerant) may be suitable as long as they do not include invasive species such as Norway Maple (*Acer platanoides*).

At the Site Plan Stage, it is recommended that the following criteria be considered during the development of proposed restoration and planting plans:

- Buffer plantings are to be limited to native, non-invasive tree, shrub and herbaceous species indigenous to Wellington County that complement the surrounding natural features
- Tree species to be situated in close proximity to roads should be salt tolerant;
- Avoid Ash species due to the risk of the Emerald Ash Borer (*Agrilus planipennis*);
- All plant material is to conform to the latest edition of the *Canadian Nursery Trades Association Specifications and Standards*,
- Plantings installed as per specifications outlined in planting plans to be prepared by an OLA or Certified Arborist'
- Spacing of plant material should account for the ultimate size and form of the selected species and also the purpose of the planting, whether it be for screening, shade, naturalizing, rehabilitation, etc.;
- Special attention to location and height of trees in proximity to utilities, and,
- Ensure that there is sufficient soil volume for all plantings.

8.0 References

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APPENDIX I Arkell Road Properties – Tree Inventory Data

Arkell Road Properties Tree Preservation Plan
Tree Inventory Data, Individual Trees

| Tree Number | Common Name | Scientific Name | Native/ Non-native | Stem Count | DBH (cm) | Crown Radius (m) | Potential for Structural Failure Rating | Overall Condition | Proposed Action | Rationale for Removal | Compensation Required | Comments |
|-------------|---------------------|----------------------------|--------------------|------------|----------|------------------|-----------------------------------------|-------------------|-----------------|-----------------------|-----------------------|------------------------------------------------------------------------------------------------------------|
| 47 | Common Pear | <i>Pyrus communis</i> | Non-Native | 2 | 20 | 4.0 | Possible | Fair | Remove | Development | No | 2 dead branches; some foliar necrosis; small section shedding bark; minor crown thinning; some fruit set. |
| 48 | Manitoba Maple | <i>Acer negundo</i> | Native | 1 | 14 | 3.0 | Improbable | Good | Remove | Development | Yes | Codominant leaders; exposed root; slight lean. |
| 49 | Freeman's Maple | <i>Acer X freemanii</i> | Native | 3 | 46 | 7.0 | Possible | Fair | Remove | Development | Yes | Basal sprouting; history of branch failure; minor dieback. |
| 50 | White Birch | <i>Betula papyrifera</i> | Native | 2 | 28 | 5.0 | Improbable | Good | Remove | Development | Yes | Codominant stems with included bark. |
| 51 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 4 | 24 | 2.5 | Improbable | Good | Remove | Development | Yes | Few small broken branches; small basal cavity; near existing driveway. |
| 52 | Pin Cherry | <i>Prunus pensylvanica</i> | Native | 1 | 12 | 2.5 | Improbable | Fair | Retain | | No | Phototropic growth, next to cedar hedge at fenceline; thin crown; light insect defoliation. |
| 53 | Freeman's Maple | <i>Acer X freemanii</i> | Native | 6 | 16 | 3.5 | Improbable | Fair | Remove | Development | Yes | 1 stem dead; minor dieback. |
| 54 | Scots Pine | <i>Pinus sylvestris</i> | Non-Native | 1 | 16 | 2.0 | Improbable | Fair | Remove | Development | Yes | Minor crown thinning; poor branch structure. |
| 55 | Scots Pine | <i>Pinus sylvestris</i> | Non-Native | 1 | 16 | 2.0 | Possible | Poor | Remove | Development | No | Significant dieback; stunted needles, swollen stem. |
| 56 | White Birch | <i>Betula papyrifera</i> | Native | 2 | 20 | 3.0 | Possible | Fair | Remove | Development | Yes | 1 stem dead; other has dead leader; 10% dieback. |
| 57 | White Spruce | <i>Picea glauca</i> | Native | 2 | 10 | 2.5 | Improbable | Good | Remove | Development | Yes | Codominant stems. |
| 58 | Scots Pine | <i>Pinus sylvestris</i> | Non-Native | 1 | 16 | 2.0 | Improbable | Good | Retain | | No | Slightly crooked stem. |
| 59 | Eastern White Pine | <i>Pinus strobus</i> | Native | 1 | 15 | 2.5 | Improbable | Good | Remove | Development | Yes | Crooked stem; broken top. |
| 60 | Scots Pine | <i>Pinus sylvestris</i> | Non-Native | 1 | 35 | 3.5 | Improbable | Good | Remove | Development | Yes | Top broke at some point and new leader took over. |
| 61 | Scots Pine | <i>Pinus sylvestris</i> | Non-Native | 1 | 14 | 1.5 | Improbable | Good | Remove | Development | Yes | Lower crown thinning; vine in lower crown. |
| 62 | Scots Pine | <i>Pinus sylvestris</i> | Non-Native | 1 | 18 | 2.0 | Improbable | Excellent | Remove | Development | Yes | Vines in lower crown. |
| 63 | Scots Pine | <i>Pinus sylvestris</i> | Non-Native | 1 | 14 | 2.0 | Improbable | Excellent | Remove | Development | Yes | Vines throughout. |
| 64 | Scots Pine | <i>Pinus sylvestris</i> | Non-Native | 1 | 11 | 1.5 | Improbable | Good | Remove | Development | Yes | Very minimal dieback; landscape tree. |
| 65 | Manitoba Maple | <i>Acer negundo</i> | Native | 1 | 22 | 3.5 | Improbable | Fair | Remove | Development | Yes | Minor crown thinning. |
| 66 | Manitoba Maple | <i>Acer negundo</i> | Native | 1 | 22 | 4.0 | Possible | Fair | Remove | Development | Yes | Some crown dieback and insect feeding in foliage. |
| 67 | Black Walnut | <i>Juglans nigra</i> | Native | 2 | 56 | 8.0 | Improbable | Good | Remove | Development | Yes | Included bark; woundwood at base of 1 limb. |
| 68 | Black Walnut | <i>Juglans nigra</i> | Native | 1 | 14 | 3.5 | Improbable | Good | Remove | Development | Yes | Minimal light pruning; relatively healthy crown. |
| 69 | Black Walnut | <i>Juglans nigra</i> | Native | 2 | 20 | 3.5 | Improbable | Good | Remove | Development | Yes | Old pruning cuts low in crown. |
| 70 | Sweet Cherry | <i>Prunus avium</i> | Non-Native | 1 | 12 | 1.0 | Probable | Very Poor | Remove | Development | No | Most of crown dead with 1 living limb. |
| 71 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 2 | 24 | 2.3 | Improbable | Good | Remove | Development | Yes | Relatively full, healthy crown; wound and prune cuts compartmentalizing. |
| 72 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 28 | 3.0 | Improbable | Fair | Remove | Development | Yes | Main stem topped and bark stripped. |
| 73 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 2 | 15 | 2.0 | Possible | Fair | Remove | Development | Yes | Reduced crown due to competition; wounds compartmentalized. |
| 74 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 21 | 2.0 | Possible | Good | Remove | Development | Yes | Reduced crown due to competition, otherwise healthy. |
| 75 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 2 | 24 | 2.0 | Improbable | Good | Remove | Development | Yes | Somewhat narrow crown, phototropic growth. |
| 76 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 34 | 2.5 | Improbable | Good | Remove | Development | Yes | Relatively healthy, full crown. |
| 77 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 2 | 16 | 2.0 | Possible | Poor | Remove | Development | No | Codominant stems with included bark; upper crown dead. |
| 78 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 2 | 18 | 2.3 | Possible | Fair | Remove | Development | Yes | Some crown dieback, stem still relatively solid. |
| 79 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 12 | | Probable | Dead | Remove | Development | No | Basal rot; slight lean; dead crown, no leaves. |
| 80 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 2 | 23 | 2.0 | Improbable | Good | Remove | Development | Yes | Some bark missing from root. |
| 81 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 30 | 0.5 | Probable | Dead | Remove | Development | No | Missing bark; insect feeding; hedgerow tree. |
| 82 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 2 | 21 | 2.0 | Possible | Poor | Remove | Development | No | Dieback on main stem; stem still relatively solid. |
| 83 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 25 | 2.0 | Possible | Good | Remove | Development | Yes | Codominant stems with included bark in long vertical crack. |
| 84 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 19 | 1.3 | Possible | Poor | Remove | Development | No | Minimal crown due to competition; dieback. |
| 85 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 33 | 2.5 | Possible | Good | Remove | Development | Yes | Codominant stems with included bark; tight branch angles. |
| 86 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 21 | 2.0 | Possible | Poor | Remove | Development | No | Reduced crown due to competition; wound on upper stem; crown dieback. |
| 87 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 19 | 2.0 | Improbable | Good | Remove | Development | Yes | Tight branch angles with included bark. |
| 88 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 21 | 2.0 | Improbable | Fair | Remove | Development | Yes | Codominant leaders; exfoliating bark. |
| 89 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 29 | 1.5 | Possible | Fair | Remove | Development | Yes | Some squirrel damage on main stem; larger open cavity with compartmentalization; crown relatively healthy. |
| 90 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 2 | 15 | 2.5 | Possible | Fair | Remove | Development | Yes | Unbalanced crowns, leaning away from one another; minor crown thinning. |
| 91 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 2 | 23 | 2.3 | Possible | Fair | Remove | Development | Yes | One-sided crown due to competition; some crown dieback. |
| 92 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 16 | 2.5 | Improbable | Fair | Remove | Development | Yes | Lower crown thinning; strong taper. |
| 93 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 2 | 17 | 2.5 | Improbable | Fair | Remove | Development | Yes | Included bark; secondary stem has laterals as leaders. |

| Tree Number | Common Name | Scientific Name | Native/ Non-native | Stem Count | DBH (cm) | Crown Radius (m) | Potential for Structural Failure Rating | Overall Condition | Proposed Action | Rationale for Removal | Compensation Required | Comments |
|-------------|---------------------|---------------------------|--------------------|------------|----------|------------------|-----------------------------------------|-------------------|-----------------|-----------------------|-----------------------|---------------------------------------------------------------------------------------------------|
| 94 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 2 | 24 | 2.5 | Improbable | Good | Remove | Development | Yes | Minimal dieback; narrow crown due to competition. |
| 95 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 25 | 2.5 | Possible | Good | Remove | Development | Yes | Codominant leaders with included bark. |
| 96 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 21 | 0.8 | Possible | Fair | Remove | Development | Yes | Narrow crown due to competition; some crown dieback. |
| 97 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 2 | 14 | 2.5 | Improbable | Good | Remove | Development | Yes | Tight branch angle. |
| 98 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 6 | 23 | 3.5 | Improbable | Good | Remove | Development | Yes | Relatively healthy crown; solid stems. |
| 99 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 2 | 21 | 2.5 | Improbable | Good | Remove | Development | Yes | Each stem with 1 dead branch; exfoliating bark. |
| 100 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 2 | 19 | 2.0 | Possible | Fair | Remove | Development | Yes | Some crown dieback due to competition; minimal included bark. |
| 101 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 6 | 21 | 3.0 | Improbable | Good | Remove | Development | Yes | |
| 102 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 28 | 1.5 | Possible | Poor | Remove | Development | No | Squirrel damage; upper stems intertwining; bark cracks; narrow crown due to competition; dieback. |
| 103 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 2 | 23 | 2.5 | Improbable | Fair | Remove | Development | Yes | Poor branch structure. |
| 104 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 18 | 2.5 | Improbable | Good | Remove | Development | Yes | Unbalanced crown, stout laterals; codominant leaders. |
| 105 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 38 | 2.5 | Improbable | Good | Remove | Development | Yes | Relatively healthy, full crown. |
| 106 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 3 | 18 | 2.5 | Possible | Fair | Remove | Development | Yes | Some included bark; bark damage from squirrel; narrow crown due to competition. |
| 107 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 22 | 2.5 | Possible | Good | Remove | Development | Yes | Codominant leaders with included bark in very tight branch angle. |
| 108 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 33 | 3.0 | Possible | Fair | Remove | Development | Yes | Some crown dieback; minor bark cracks. |
| 109 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 30 | 3.0 | Improbable | Good | Remove | Development | Yes | Tight branch angles. |
| 110 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 28 | 4.0 | Improbable | Fair | Remove | Development | Yes | One-sided crown with majority leaning away from driveway; some crown dieback. |
| 111 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 3 | 30 | 3.0 | Possible | Fair | Remove | Development | Yes | 1 stem with long crack; tight branch angles with included bark. |
| 112 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 19 | 2.3 | Probable | Poor | Remove | Development | No | Crack up main stem with hollow; crown dieback; insect holes on main stem. |
| 113 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 10 | 1.5 | Improbable | Fair | Remove | Development | Yes | Thin crown. |
| 114 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 2 | 24 | 3.0 | Improbable | Fair | Remove | Development | Yes | Broken branch on 1 stem. |
| 115 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 13 | 2.3 | Possible | Fair | Remove | Development | Yes | Slight lean toward driveway; narrow crown due to competition. |
| 116 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 16 | 1.8 | Possible | Fair | Remove | Development | Yes | Lean toward driveway; one-sided crown with dieback. |
| 117 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 2 | 28 | 3.0 | Improbable | Good | Remove | Development | Yes | Tight branch angle. |
| 118 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 16 | 1.5 | Possible | Poor | Remove | Development | No | One-sided crown with dieback; some evidence of rot on main stem. |
| 119 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 16 | 2.0 | Possible | Fair | Remove | Development | Yes | Stems twist around each other, poor structure. |
| 120 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 2 | 24 | 3.0 | Possible | Fair | Remove | Development | Yes | One-sided crown away from driveway with some dieback; split on 1 stem with staining. |
| 121 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 2 | 18 | 2.5 | Improbable | Fair | Remove | Development | Yes | Unbalanced crown, phototropic; smaller stem with much dieback. |
| 122 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 2 | 11 | 2.0 | Improbable | Fair | Remove | Development | Yes | Slight lean; improper pruning cuts; unbalanced crown. |
| 123 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 13 | 1.5 | Possible | Poor | Remove | Development | No | One-sided crown with dieback. |
| 124 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 14 | 3.0 | Possible | Fair | Remove | Development | Yes | Heavy bend likely from ice/snow load; codominant leaders; exfoliating bark. |
| 125 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 3 | 18 | 2.3 | Possible | Poor | Remove | Development | No | 1 stem with crown snapped off; split between larger stems. |
| 126 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 2 | 11 | 1.5 | Improbable | Fair | Remove | Development | Yes | Unbalanced crown, phototropic growth. |
| 127 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 16 | 2.0 | Possible | Fair | Remove | Development | Yes | One-sided crown with lean toward driveway. |
| 128 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 19 | 2.0 | Improbable | Good | Remove | Development | Yes | Codominant leaders. |
| 129 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 3 | 18 | 1.3 | Possible | Fair | Remove | Development | Yes | Narrow crown due to competition; some crown dieback. |
| 130 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 16 | 2.0 | Possible | Fair | Remove | Development | Yes | Crown thinning; 1 leader dead. |
| 131 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 14 | 2.0 | Possible | Poor | Remove | Development | No | Reduced crown; dieback; one-sided crown. |
| 132 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 12 | 2.0 | Improbable | Good | Remove | Development | Yes | Lower crown thinning. |
| 133 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 17 | 1.5 | Possible | Fair | Remove | Development | Yes | Narrow crown due to competition; some crown dieback. |
| 134 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 2 | 13 | 2.0 | Possible | Fair | Remove | Development | Yes | Codominant stems with included bark; unbalanced crown, phototropic growth. |
| 135 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 17 | 0.8 | Improbable | Fair | Remove | Development | Yes | Narrow crown due to competition; some crown dieback; main stem still relatively solid. |
| 136 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 2 | 18 | 2.5 | Improbable | Good | Remove | Development | Yes | Good condition but for codominant leaders. |
| 137 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 10 | 2.3 | Possible | Poor | Remove | Development | No | One-sided crown with dieback. |
| 138 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 2 | 18 | 2.0 | Possible | Fair | Remove | Development | Yes | Exfoliating bark; codominant leaders; secondary stem dead. |

| Tree Number | Common Name | Scientific Name | Native/ Non-native | Stem Count | DBH (cm) | Crown Radius (m) | Potential for Structural Failure Rating | Overall Condition | Proposed Action | Rationale for Removal | Compensation Required | Comments |
|-------------|-----------------------|-----------------------------------------|--------------------|------------|----------|------------------|-----------------------------------------|-------------------|-----------------|-----------------------|-----------------------|-------------------------------------------------------------------------------------|
| 139 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 4 | 19 | 2.0 | Possible | Fair | Remove | Development | Yes | One-sided crown due to competition; stems relatively solid; some crown dieback. |
| 140 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 17 | 2.0 | Improbable | Fair | Remove | Development | Yes | Exfoliating bark; lower crown thinning. |
| 141 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 4 | 24 | 3.0 | Improbable | Fair | Remove | Development | Yes | Narrow crown due to competition; some crown dieback. |
| 142 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 4 | 21 | 2.0 | Possible | Fair | Remove | Development | Yes | Some included bark; minimal dieback. |
| 143 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 18 | 2.0 | Possible | Fair | Remove | Development | Yes | Codominant leaders with included bark. |
| 144 | Eastern White Pine | <i>Pinus strobus</i> | Native | 1 | 29 | 2.0 | Possible | Fair | Remove | Development | Yes | Narrow crown due to competition with some dieback; stem relatively solid. |
| 145 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 20 | 2.0 | Improbable | Fair | Remove | Development | Yes | Improper pruning cuts. |
| 146 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 18 | 1.5 | Possible | Poor | Remove | Development | No | Crown dieback; split up main stem. |
| 147 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 2 | 14 | 2.0 | Improbable | Good | Remove | Development | Yes | Slightly narrow crown due to competition, otherwise relatively healthy; solid stem. |
| 148 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 2 | 14 | 1.5 | Possible | Fair | Remove | Development | Yes | Wound from old failed branch. |
| 149 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 15 | 1.0 | Improbable | Good | Remove | Development | Yes | Slightly one-sided crown due to competition, otherwise relatively healthy. |
| 150 | Golden Weeping Willow | <i>Salix alba</i> var. <i>vitellina</i> | Non-Native | 1 | 118 | 5.3 | Probable | Very Poor | Remove | Development | No | Large cavity with rot in main stem; dieback in large scaffold branches. |
| 151 | Common Apple | <i>Malus domestica</i> | Non-Native | 4 | 62 | 4.0 | Possible | Fair | Remove | Development | No | Open crown, crown thinning; 2 dead branches; minor leaf necrosis; water sprouts. |
| 152 | Freeman's Maple | <i>Acer X freemanii</i> | Native | 2 | 26 | 4.0 | Possible | Fair | Remove | Development | Yes | Some included bark in upper scaffold; epicormic growth; full, vigorous crown. |
| 153 | Common Apple | <i>Malus domestica</i> | Non-Native | 2 | 38 | 4.0 | Possible | Poor | Remove | Development | No | Spreading crown; lower crown dead; centre rot in both stems; shedding some bark. |
| 154 | Plum species | <i>Prunus</i> sp. | Non-Native | 1 | 16 | 2.0 | Possible | Poor | Remove | Development | No | Sparse crown with dieback. |
| 155 | Black Walnut | <i>Juglans nigra</i> | Native | 1 | 18 | 3.0 | Improbable | Good | Remove | Development | Yes | Codominant leaders; crown extends to ground. |
| 156 | Green Ash | <i>Fraxinus pennsylvanica</i> | Native | 1 | 30 | 3.0 | Probable | Fair | Remove | Development | Yes | Some crown dieback; minimal woodpecker damage in upper stem. |
| 157 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 1 | 13 | 2.0 | Improbable | Fair | Retain | | No | Some foliar chlorosis; crooked stem. |
| 158 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 1 | 18 | 2.3 | Improbable | Fair | Retain | | No | Slightly unbalanced crown due to competition; minimal dieback. |
| 159 | White Birch | <i>Betula papyrifera</i> | Native | 1 | 25 | 2.5 | Possible | Dead | Retain | | No | No leaves, catkins retained; died within last year. |
| 160 | White Birch | <i>Betula papyrifera</i> | Native | 1 | 24 | 3.0 | Possible | Dead | Retain | | No | Some borer holes up main stem; looks like it died recently. |
| 161 | Balsam Poplar | <i>Populus balsamifera</i> | Native | 1 | 11 | 1.5 | Improbable | Good | Retain | | No | 2 dead lower branches. |
| 162 | Balsam Poplar | <i>Populus balsamifera</i> | Native | 1 | 11 | 1.3 | Possible | Fair | Retain | | No | Wound on main stem with some staining; narrow crown with minimal dieback. |
| 163 | Balsam Poplar | <i>Populus balsamifera</i> | Native | 1 | 13 | 1.3 | Improbable | Good | Retain | | No | Small amount of included bark in upper branch union; full crown. |
| 164 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 1 | 13 | 2.0 | Possible | Fair | Remove | Development | Yes | Discolored, sunken canker on stem; some chlorosis. |
| 165 | White Spruce | <i>Picea glauca</i> | Native | 1 | 11 | 1.0 | Improbable | Excellent | Remove | Development | Yes | Full, vigorous tree; some competition with dogwood. |
| 166 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 1 | 13 | 1.5 | Improbable | Fair | Retain | | No | Codominant leaders with included bark; healthy crown. |
| 167 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 1 | 12 | 2.0 | Improbable | Fair | Retain | | No | Thin crown; strong leader. |
| 168 | Balsam Poplar | <i>Populus balsamifera</i> | Native | 1 | 12 | 2.0 | Improbable | Fair | Retain | | No | Unbalanced crown; 3 dead branches; minor leaf chlorosis. |
| 169 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 1 | 13 | 2.0 | Improbable | Fair | Retain | | No | Dead lower branches; healthy form and canopy. |
| 170 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 2 | 14 | 3.0 | Improbable | Fair | Retain | | No | Thin crown. |
| 171 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 2 | 15 | 1.5 | Improbable | Fair | Retain | | No | Included bark; dead lower branches; minor dieback. |
| 172 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 1 | 11 | 1.5 | Improbable | Fair | Retain | | No | Dead branches; dieback; debris around base. |
| 173 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 1 | 15 | 2.5 | Improbable | Good | Retain | | No | Good health. |
| 174 | Green Ash | <i>Fraxinus pennsylvanica</i> | Native | 1 | 13 | 1.5 | Improbable | Fair | Retain | | No | D-shaped exit holes; minor dieback; minor epicormic growth. |
| 175 | Balsam Poplar | <i>Populus balsamifera</i> | Native | 1 | 14 | 1.5 | Improbable | Fair | Retain | | No | Dieback; dead branches; minor damage at base. |
| 176 | Balsam Poplar | <i>Populus balsamifera</i> | Native | 1 | 13 | 2.0 | Possible | Fair | Retain | | No | Stem wound, bark discoloration; minor leaf chlorosis; 1 dead branch. |
| 177 | Balsam Poplar | <i>Populus balsamifera</i> | Native | 1 | 12 | 2.0 | Improbable | Poor | Retain | | No | 30% dieback; asymmetrical crown to southeast. |
| 178 | Balsam Poplar | <i>Populus balsamifera</i> | Native | 1 | 10 | 1.5 | Possible | Fair | Retain | | No | Leaning; minor dieback. |
| 179 | Balsam Poplar | <i>Populus balsamifera</i> | Native | 1 | 14 | 1.5 | Improbable | Fair | Retain | | No | 15% dieback; minor pistol butt. |
| 180 | Balsam Poplar | <i>Populus balsamifera</i> | Native | 1 | 10 | 1.5 | Improbable | Fair | Retain | | No | Minor pistol butt; minor lean south. |
| 181 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 1 | 11 | 1.5 | Improbable | Fair | Retain | | No | Open seam near base, good reaction wood; healthy crown. |
| 182 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 1 | 13 | 2.0 | Improbable | Fair | Retain | | No | Exposed roots, 1 girdling; bark rubbing; codominant leaders. |
| 183 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 1 | 14 | 1.5 | Improbable | Fair | Retain | | No | 20% dieback; minor dead branches. |
| 184 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 1 | 12 | 2.0 | Possible | Poor | Retain | | No | Stem canker; sapwood rot; sunken lesion. |

| Tree Number | Common Name | Scientific Name | Native/ Non-native | Stem Count | DBH (cm) | Crown Radius (m) | Potential for Structural Failure Rating | Overall Condition | Proposed Action | Rationale for Removal | Compensation Required | Comments |
|-------------|---------------------------|-----------------------------------------|--------------------|------------|----------|------------------|-----------------------------------------|-------------------|-----------------|-----------------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------|
| 185 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 1 | 15 | 2.5 | Improbable | Fair | Retain | | No | Minor dieback; thin canopy. |
| 186 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 1 | 13 | 2.5 | Improbable | Fair | Retain | | No | Small cankers; slight lean south; minor dieback. |
| 187 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 1 | 18 | 3.0 | Improbable | Fair | Retain | | No | Bark lesion in crown; dead lower branches. |
| 188 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 1 | 13 | 1.5 | Improbable | Fair | Retain | | No | Minor dieback. |
| 189 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 1 | 11 | 2.0 | Improbable | Good | Retain | | No | Leaning, phototropic growth. |
| 190 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 1 | 18 | 1.5 | Improbable | Good | Retain | | No | Minor dieback of lower branches. |
| 191 | Green Ash | <i>Fraxinus pennsylvanica</i> | Native | 1 | 12 | 1.5 | Improbable | Fair | Retain | | No | Vines in canopy; minor dieback. |
| 192 | White Elm | <i>Ulmus americana</i> | Native | 1 | 11 | 2.0 | Improbable | Good | Retain | | No | Very minor insect defoliation. |
| 193 | Balsam Poplar | <i>Populus balsamifera</i> | Native | 1 | 21 | 2.0 | Possible | Poor | Retain | | No | Open cankers; sapwood rot; 30% dieback. |
| 194 | Eastern Cottonwood | <i>Populus deltoides</i> | Native | 1 | 30 | 3.5 | Possible | Poor | Retain | | No | 40% dieback; crooked stem. |
| 195 | Green Ash | <i>Fraxinus pennsylvanica</i> | Native | 1 | 18 | 1.5 | Improbable | Good | Retain | | No | Healthy crown; minor exfoliating bark. |
| 196 | Green Ash | <i>Fraxinus pennsylvanica</i> | Native | 1 | 13 | 2.5 | Improbable | Good | Retain | | No | Excurrent growth with strong leader; minor crown thinning. |
| 197 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 1 | 30 | 2.0 | Possible | Poor | Retain | | No | Sapwood rot; open canker; poor reaction wood; dieback. |
| 198 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 1 | 11 | 2.0 | Possible | Fair | Retain | | No | Leaning south. |
| 199 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 1 | 26 | 2.5 | Improbable | Fair | Retain | | No | Open wounds, poor reaction wood; dieback. |
| 200 | Balsam Poplar | <i>Populus balsamifera</i> | Native | 1 | 24 | 2.5 | Possible | Fair | Retain | | No | Vines along stem; minor dieback; asymmetrical crown to south. |
| 201 | Green Ash | <i>Fraxinus pennsylvanica</i> | Native | 1 | 14 | 2.5 | Improbable | Good | Retain | | No | No exit holes observed. |
| 202 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 1 | 25 | 2.0 | Improbable | Fair | Retain | | No | Dead lower branches; healthy canopy. |
| 203 | White Ash | <i>Fraxinus americana</i> | Native | 1 | 11 | 1.5 | Possible | Poor | Retain | | No | 30% dieback; epicormic growth; vines in crown. |
| 204 | Manitoba Maple | <i>Acer negundo</i> | Native | 1 | 30 | 4.0 | Possible | Fair | Retain | | No | Leaning; chlorosis; minor thinning.; vine in crown. |
| 205 | White Ash | <i>Fraxinus americana</i> | Native | 1 | 23 | | Probable | Dead | Retain | | No | Recently dead. |
| 206 | Silver Maple | <i>Acer saccharinum</i> | Native | 1 | 12 | 2.5 | Improbable | Fair | Retain | | No | Heavy lean, weighed by other branches; minor leaf necrosis and some pustules. |
| 207 | Green Ash | <i>Fraxinus pennsylvanica</i> | Native | 1 | 11 | 1.0 | Improbable | Fair | Retain | | No | Dieback; dead lower branches. |
| 208 | Green Ash | <i>Fraxinus pennsylvanica</i> | Native | 1 | 13 | 1.5 | Improbable | Fair | Retain | | No | Minor dieback; dead lower branches. |
| 209 | White Ash | <i>Fraxinus americana</i> | Native | 1 | 25 | 3.5 | Improbable | Fair | Retain | | No | Epicormic growth. |
| 210 | White Ash | <i>Fraxinus americana</i> | Native | 1 | 11 | 2.0 | Improbable | Fair | Retain | | No | Minor dieback. |
| 211 | White Ash | <i>Fraxinus americana</i> | Native | 1 | 58 | 6.0 | Possible | Poor | Remove | Safety | No | Vines in crown; 30% dieback. |
| 212 | Manitoba Maple | <i>Acer negundo</i> | Native | 2 | 55 | 7.0 | Possible | Poor | Remove | Development | No | Codominant leaders with included bark; dieback and dead branches; poor structure; epicormic growth. |
| 213 | Golden Weeping Willow | <i>Salix alba</i> var. <i>vitellina</i> | Non-Native | 1 | 81 | 5.5 | Improbable | Good | Remove | Development | Yes | 2 instances of past branch failure. |
| 214 | Norway Maple | <i>Acer platanoides</i> | Non-Native | 1 | 26 | 2.5 | Possible | Poor | Remove | Development | No | Large vertical open wound; exit holes; dead branches; poor reaction wood. |
| 215 | Colorado Spruce | <i>Picea pungens</i> | Non-Native | 1 | 28 | 2.5 | Improbable | Excellent | Remove | Development | Yes | No apparent problems. |
| 216 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 2 | 31 | 4.5 | Possible | Fair | Remove | Development | Yes | Codominant stems with included bark; minor crown thinning. |
| 217 | Eastern Cottonwood | <i>Populus deltoides</i> | Native | 4 | 47 | 6.0 | Improbable | Fair | Remove | Development | Yes | Small witch's broom; minor dieback; codominant leaders with included bark. |
| 218 | Chanticleer Pear | <i>Pyrus calleryana</i> 'Chanticleer' | Non-Native | 1 | 17 | 2.5 | Improbable | Fair | Remove | Development | Yes | Minor dieback; minor wounds with good reaction wood; minor included bark. |
| 219 | Common Apple | <i>Malus domestica</i> | Non-Native | 1 | 14 | 4.5 | Improbable | Poor | Remove | Development | No | 80% dieback; epicormic growth; large dying branches. |
| 220 | Eastern Red Cedar | <i>Juniperus virginiana</i> | Native | 1 | 11 | 2.0 | Improbable | Good | Remove | Development | Yes | Heavy fruit set. |
| 221 | Eastern Red Cedar | <i>Juniperus virginiana</i> | Native | 1 | 11 | 2.0 | Improbable | Good | Remove | Development | Yes | Heavy fruit set; 1 subordinate branch with tight angle. |
| 222 | Alaska Yellow Cedar | <i>Cupressus nootkatensis</i> | Non-Native | 1 | 11 | 1.5 | Improbable | Excellent | Remove | Development | Yes | No apparent problems. |
| 223 | Norway Maple | <i>Acer platanoides</i> | Non-Native | 2 | 57 | 7.0 | Improbable | Fair | Remove | Development | Yes | Codominant stems with included bark; old pruning cuts; exposed roots; very minor crown thinning; hydro wires through crown. |
| 224 | Alaska Yellow Cedar | <i>Cupressus nootkatensis</i> | Non-Native | 1 | 14 | 2.0 | Improbable | Good | Remove | Development | Yes | Suppressed by nearby Norway Maple. |
| 225 | Flowering Crab Apple | <i>Malus baccata</i> | Non-Native | 1 | 15 | 1.5 | Improbable | Fair | Remove | Development | Yes | Pruned to spreading, umbrella-shaped crown; healed stem wound. |
| 226 | Common Apple | <i>Malus domestica</i> | Non-Native | 1 | 29 | 3.0 | Possible | Poor | Remove | Development | No | Major bark wound, sapwood and heartwood rot; water sprouts; thin crown. |
| 227 | Crimson King Norway Maple | <i>Acer platanoides</i> 'Crimson King' | Non-Native | 3 | 29 | 4.0 | Possible | Fair | Remove | Development | Yes | Codominant leaders; rotting at base; vertical crack with good reaction wood. |
| 228 | Common Apple | <i>Malus domestica</i> | Non-Native | 1 | 24 | 3.0 | Improbable | Fair | Remove | Development | No | Dense interior crown. |
| 229 | Common Apple | <i>Malus domestica</i> | Non-Native | 1 | 15 | 2.5 | Improbable | Fair | Remove | Development | No | Stem wound nearly compartmentalized. |
| 230 | Common Apple | <i>Malus domestica</i> | Non-Native | 1 | 26 | 2.0 | Improbable | Fair | Remove | Development | No | Epicormic growth; dieback. |
| 231 | Common Pear | <i>Pyrus communis</i> | Non-Native | 3 | 13 | 1.5 | Possible | Very Poor | Remove | Development | No | Crown mostly dead; epicormic growth along stem. |
| 232 | Common Apple | <i>Malus domestica</i> | Non-Native | 1 | 27 | 3.0 | Possible | Fair | Remove | Development | No | Epicormic growth; dieback; wounds with some reaction wood. |
| 233 | Common Apple | <i>Malus domestica</i> | Non-Native | 1 | 30 | 3.5 | Possible | Fair | Remove | Development | No | Open wound; epicormic growth; dieback. |
| 234 | White Spruce | <i>Picea glauca</i> | Native | 1 | 25 | 3.5 | Improbable | Fair | Remove | Development | Yes | Asymmetrical crown to south; minor dieback. |

| Tree Number | Common Name | Scientific Name | Native/ Non-native | Stem Count | DBH (cm) | Crown Radius (m) | Potential for Structural Failure Rating | Overall Condition | Proposed Action | Rationale for Removal | Compensation Required | Comments |
|-------------|---------------------|---------------------------|--------------------|------------|----------|------------------|-----------------------------------------|-------------------|-----------------|-----------------------|-----------------------|-----------------------------------------------------------------------------------------------------|
| 235 | White Spruce | <i>Picea glauca</i> | Native | 1 | 15 | 2.0 | Improbable | Fair | Remove | Development | Yes | Suppressed; minor dieback; minor vines along stem. |
| 236 | Silver Maple | <i>Acer saccharinum</i> | Native | 1 | 67 | 4.0 | Possible | Poor | Remove | Development | No | Large split along stem, 2m tall; broken top; healthy remaining crown. |
| 237 | White Spruce | <i>Picea glauca</i> | Native | 1 | 14 | | Probable | Dead | Remove | Development | No | Hazardous snag. |
| 238 | White Spruce | <i>Picea glauca</i> | Native | 1 | 18 | 2.0 | Possible | Poor | Remove | Development | No | Strong taper; crown thinning; dead leader. |
| 239 | White Spruce | <i>Picea glauca</i> | Native | 1 | 13 | 2.0 | Improbable | Fair | Remove | Development | Yes | Leaning stem; bark crack; thin, narrow crown. |
| 240 | White Spruce | <i>Picea glauca</i> | Native | 1 | 28 | 3.0 | Improbable | Fair | Remove | Development | Yes | Minor thinning; cone production. |
| 241 | White Spruce | <i>Picea glauca</i> | Native | 1 | 21 | 3.0 | Improbable | Fair | Remove | Development | Yes | Strong taper; minor dieback; bark stem wound. |
| 242 | White Spruce | <i>Picea glauca</i> | Native | 1 | 23 | 2.5 | Improbable | Fair | Remove | Development | Yes | Minor thinning; seed production. |
| 243 | Silver Maple | <i>Acer saccharinum</i> | Native | 4 | 58 | 8.0 | Possible | Good | Remove | Development | Yes | Codominant stems; 1 limb dying; minor dieback. |
| 244 | Silver Maple | <i>Acer saccharinum</i> | Native | 1 | 57 | 6.5 | Improbable | Fair | Remove | Development | Yes | Codominant stems with included bark; minor leaf necrosis; exposed roots with lawnmower injuries. |
| 245 | Silver Maple | <i>Acer saccharinum</i> | Native | 2 | 37 | 5.0 | Possible | Poor | Remove | Development | No | Unbalanced crown; 40% dieback; epicormic growth; sooty lesions; vine in crown. |
| 246 | Tamarack | <i>Larix laricina</i> | Native | 1 | 36 | 4.0 | Improbable | Good | Remove | Development | Yes | Minor broken branches. |
| 247 | Tamarack | <i>Larix laricina</i> | Native | 1 | 22 | 3.0 | Improbable | Fair | Remove | Development | Yes | Bark wounds; epicormic growth; bent top. |
| 248 | Tamarack | <i>Larix laricina</i> | Native | 1 | 30 | 3.0 | Possible | Fair | Remove | Development | Yes | Bent top/crooked stem; vertical crack closed. |
| 249 | Silver Maple | <i>Acer saccharinum</i> | Native | 1 | 73 | 8.0 | Possible | Fair | Remove | Development | Yes | Open crack in 1 limb; another limb dead and pruned; bark discoloration; history of branch failure. |
| 250 | White Ash | <i>Fraxinus americana</i> | Native | 1 | 49 | 5.0 | Probable | Very Poor | Remove | Development | No | Dead crown; sprouting from base; EAB exit holes; broken branches. |
| 251 | Red Pine | <i>Pinus resinosa</i> | Non-Native | 1 | 15 | 1.5 | Improbable | Fair | Remove | Development | Yes | Crooked stem; unbalanced crown; thin crown. |
| 252 | Red Pine | <i>Pinus resinosa</i> | Non-Native | 1 | 21 | 2.5 | Improbable | Good | Remove | Development | Yes | Lower branches dead. |
| 253 | Scots Pine | <i>Pinus sylvestris</i> | Non-Native | 1 | 22 | 2.5 | Improbable | Fair | Remove | Development | Yes | Compartmentalized stem wound; crooked stem. |
| 254 | Scots Pine | <i>Pinus sylvestris</i> | Non-Native | 1 | 29 | 4.5 | Improbable | Fair | Remove | Development | Yes | Unbalanced crown; 10% dieback. |
| 255 | Scots Pine | <i>Pinus sylvestris</i> | Non-Native | 1 | 30 | 5.0 | Possible | Fair | Remove | Development | Yes | Crooked stem; sapsucker holes. |
| 256 | White Spruce | <i>Picea glauca</i> | Native | 1 | 20 | 2.5 | Probable | Dead | Remove | Development | No | Shedding bark, showing insect galleries and stem crack; no leaves. |
| 257 | White Spruce | <i>Picea glauca</i> | Native | 1 | 11 | 1.5 | Improbable | Good | Remove | Development | Yes | Narrow crown. |
| 258 | White Spruce | <i>Picea glauca</i> | Native | 1 | 24 | 4.0 | Improbable | Excellent | Remove | Development | Yes | |
| 259 | White Spruce | <i>Picea glauca</i> | Native | 1 | 23 | 4.0 | Improbable | Fair | Remove | Development | Yes | Healed bark cracks; gumosis. |
| 260 | White Spruce | <i>Picea glauca</i> | Native | 1 | 17 | 2.0 | Possible | Dead | Remove | Development | No | Shedding bark; insect galleries; no leaves. |
| 261 | White Spruce | <i>Picea glauca</i> | Native | 1 | 24 | 4.0 | Improbable | Good | Remove | Development | Yes | Unbalanced crown. |
| 262 | White Spruce | <i>Picea glauca</i> | Native | 1 | 29 | 3.0 | Improbable | Good | Remove | Development | Yes | Broken branches in lower crown. |
| 263 | White Spruce | <i>Picea glauca</i> | Native | 1 | 26 | 3.0 | Improbable | Good | Remove | Development | Yes | Good fruit set. |
| 264 | White Spruce | <i>Picea glauca</i> | Native | 1 | 27 | 4.0 | Improbable | Fair | Remove | Development | Yes | Narrow, thin crown; strong taper. |
| 265 | White Spruce | <i>Picea glauca</i> | Native | 1 | 21 | 3.0 | Improbable | Fair | Remove | Development | Yes | Narrow crown. |
| 266 | White Spruce | <i>Picea glauca</i> | Native | 1 | 12 | 1.0 | Possible | Dead | Remove | Development | No | No bark, no leaves. |
| 267 | White Spruce | <i>Picea glauca</i> | Native | 2 | 24 | 3.5 | Possible | Fair | Remove | Development | Yes | Codominant stems with included bark; 1 stem topped, other has codominant leaders. |
| 268 | White Spruce | <i>Picea glauca</i> | Native | 2 | 23 | 3.5 | Improbable | Fair | Remove | Development | Yes | Mildly crooked stem; 2nd stem dead. |
| 269 | White Spruce | <i>Picea glauca</i> | Native | 1 | 22 | 3.5 | Improbable | Good | Remove | Development | Yes | |
| 270 | White Spruce | <i>Picea glauca</i> | Native | 1 | 21 | 2.5 | Improbable | Good | Remove | Development | Yes | Thin crown. |
| 271 | White Spruce | <i>Picea glauca</i> | Native | 1 | 15 | 2.0 | Improbable | Good | Remove | Development | Yes | |
| 272 | Norway Spruce | <i>Picea abies</i> | Non-Native | 1 | 41 | 4.0 | Improbable | Good | Remove | Development | Yes | |
| 273 | White Spruce | <i>Picea glauca</i> | Native | 1 | 24 | 3.0 | Improbable | Good | Remove | Development | Yes | Lower branches dead. |
| 274 | White Spruce | <i>Picea glauca</i> | Native | 1 | 26 | 3.0 | Improbable | Good | Remove | Development | Yes | |
| 275 | White Spruce | <i>Picea glauca</i> | Native | 1 | 36 | 4.0 | Improbable | Good | Remove | Development | Yes | |
| 276 | White Spruce | <i>Picea glauca</i> | Native | 1 | 31 | 3.5 | Improbable | Good | Remove | Development | Yes | Dead lower branch. |
| 277 | White Spruce | <i>Picea glauca</i> | Native | 1 | 27 | 3.0 | Improbable | Good | Remove | Development | Yes | Dead lower branch. |
| 278 | White Spruce | <i>Picea glauca</i> | Native | 1 | 28 | 3.5 | Improbable | Good | Remove | Development | Yes | |
| 279 | Norway Spruce | <i>Picea abies</i> | Non-Native | 1 | 43 | 5.0 | Improbable | Excellent | Remove | Development | Yes | |
| 280 | Norway Spruce | <i>Picea abies</i> | Non-Native | 1 | 33 | 4.0 | Improbable | Excellent | Remove | Development | Yes | |
| 281 | Norway Spruce | <i>Picea abies</i> | Non-Native | 1 | 30 | 4.5 | Possible | Fair | Remove | Development | Yes | Sap running; topped, lateral has become leader. |
| 282 | White Spruce | <i>Picea glauca</i> | Native | 1 | 32 | 3.5 | Improbable | Good | Remove | Development | Yes | |
| 283 | Common Apple | <i>Malus domestica</i> | Non-Native | 1 | 22 | 3.0 | Possible | Poor | Remove | Development | No | Open crown; history of branch failure; foliar necrosis; basal bark wounds. |
| 284 | Common Apple | <i>Malus domestica</i> | Non-Native | 1 | 16 | 2.5 | Probable | Poor | Remove | Development | No | Heavy lean; missing much bark; fruiting bodies. |
| 285 | Common Pear | <i>Pyrus communis</i> | Non-Native | 1 | 26 | 1.5 | Probable | Very Poor | Remove | Development | No | Major stem crack with heartwood rot; 1 broken scaffold limb; 20% dieback; still bearing fruit. |
| 286 | Common Pear | <i>Pyrus communis</i> | Non-Native | 3 | 27 | 2.5 | Possible | Poor | Remove | Development | No | 1 stem broken; heartwood rot; frass at base; 10% dieback; history of branch failure; bearing fruit. |
| 287 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 2 | 27 | 2.0 | Improbable | Fair | Remove | Development | Yes | Closely planted; codominant leaders. |
| 288 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 2 | 13 | 2.0 | Improbable | Fair | Remove | Development | Yes | Closely planted; codominant leaders. |
| 289 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 2 | 18 | 2.0 | Improbable | Fair | Remove | Development | Yes | Closely planted; codominant leaders. |

| Tree Number | Common Name | Scientific Name | Native/ Non-native | Stem Count | DBH (cm) | Crown Radius (m) | Potential for Structural Failure Rating | Overall Condition | Proposed Action | Rationale for Removal | Compensation Required | Comments |
|-------------|---------------------|---------------------------|--------------------|------------|----------|------------------|-----------------------------------------|-------------------|-----------------|-----------------------|-----------------------|-------------------------------------------------|
| 290 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 2 | 23 | 2.0 | Improbable | Fair | Remove | Development | Yes | Closely planted; codominant leaders. |
| 291 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 2 | 17 | 2.0 | Improbable | Fair | Remove | Development | Yes | Closely planted; codominant leaders. |
| 292 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 15 | 2.0 | Improbable | Fair | Remove | Development | Yes | Closely planted. |
| 293 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 3 | 13 | 2.0 | Improbable | Fair | Remove | Development | Yes | Closely planted. |
| 294 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 3 | 15 | 2.0 | Improbable | Fair | Remove | Development | Yes | Closely planted; codominant leaders. |
| 295 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 2 | 17 | 2.0 | Improbable | Fair | Remove | Development | Yes | Closely planted; codominant leaders. |
| 296 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 2 | 17 | 1.0 | Improbable | Fair | Remove | Development | Yes | Closely planted. |
| 297 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 15 | 2.0 | Improbable | Fair | Remove | Development | Yes | Closely planted. |
| 298 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 16 | 2.0 | Improbable | Fair | Remove | Development | Yes | Closely planted. |
| 299 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 2 | 16 | 2.0 | Improbable | Fair | Remove | Development | Yes | Closely planted; codominant leaders. |
| 300 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 2 | 16 | 2.0 | Improbable | Fair | Remove | Development | Yes | Closely planted; codominant leaders. |
| 624 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 13 | 1.5 | Improbable | Fair | Remove | Development | Yes | Closely planted; next to shed. |
| 625 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 12 | 1.5 | Improbable | Fair | Remove | Development | Yes | Closely planted; near shed. |
| 626 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 1 | 16 | 1.5 | Improbable | Fair | Remove | Development | Yes | Closely planted; near shed. |
| 627 | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 3 | 14 | 1.5 | Improbable | Fair | Remove | Development | Yes | Closely planted; near shed; codominant leaders. |
| 628 | Freeman's Maple | <i>Acer X freemanii</i> | Native | 4 | 44 | 7.0 | Possible | Good | Remove | Development | Yes | 4 large, codominant stems with included bark. |
| A | Eastern White Cedar | <i>Thuja occidentalis</i> | Native | 5 | 25 | 3.5 | Improbable | Good | Remove | Development | Yes | Included bark; near fence and hydro wire. |

APPENDIX II Tree Health & Risk Assessment Criteria

Tree Health Assessment Criteria

| Assessment Criteria* | Definition ¹ |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Excellent | Represents a tree in near perfect form, health, and vigour. This tree would exhibit no deadwood, no decline, and no visible defects. |
| Good | Represents a tree ranging from a generally healthy tree to a near perfect tree in terms of health, vigour and structure. This tree exhibits a complete, balanced crown structure with little to no deadwood and minimal defects as well as a properly formed root flare. |
| Fair | Represents a tree with minor health, balance or structural issues with minimal to moderate deadwood. Branching structure shows signs of included bark or minor rot within the branch connections or trunk wood. The root flare shows minimal signs of mechanical injury, decay, poor callusing, or girdling roots. Trees in the category require minor remedial actions to improve the vigour and structure of the tree. |
| Poor | Represents a tree that exhibits a poor vigour, reduced crown size (<30% of crown typical of species caused by overcrowding or decline), extreme crown unbalance, or extensive rot in the branching and trunk wood. Fungus could be seen from these rotting areas, suggesting further decay. These trees have extensive crown die back with a large amount of deadwood, and possibly dead sections. These weakened areas can lead to a potential failure of tree sections. Rooting zones show signs of extensive root decay or damage (fruiting bodies or mechanical damage) or girdling roots. Trees in this category require more extensive actions to prevent failure. A tree identified as poor would be a candidate for removal in the near future. |
| Very Poor | Represents a tree that exhibits major health and structural defects. Quite often the defects or diseases affecting this tree will be fatal. Large quantities of fungus, large dead sections with possible cavities and bark falling off all are signs that a tree is in an advanced state of decline and would be identified as very poor. These trees may have a probable or imminent potential for structural failure and may be identified for removal. |
| Dead | Represents a tree that exhibits no sign of new growth, including buds, foliage, or shoot growth. These trees may have a probable or imminent potential for structural failure and may be identified for removal. |
| <p>* Trees which are located within dense groupings are evaluated as individual specimens. Trees within these stands quite often have a reduced crown size (<30% of crown typical of species), off balanced crowns, and prioritized upward growth (i.e. low trunk taper and few lateral branches). As such, these trees would be considered to have poor vigour. As well, these trees pose a probable potential for structural failure when newly exposed edges or individual trees are isolated through removal of surrounding trees. This is often the case with overstocked plantations. Individual trees which meet the above criteria will be identified as poor or probable potential for structural failure.</p> | |

¹Dunster 2009

Tree Risk Assessment Criteria

| Assessment Criteria* | Definition ¹ |
|-------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Improbable | The tree or branch is not likely to fail during normal weather conditions and may not fail in many severe weather conditions within the specified time frame. |
| Possible | Failure could occur, but it is unlikely during normal weather conditions within the specified time frame. |
| Probable | Failure may be expected under normal weather conditions within the specified time frame. |
| Imminent | Failure has started or is most likely to occur in the near future, even if there is no significant wind or increased load. This is a rare occurrence for a risk assessor to encounter, and it may require immediate action to protect people from harm. |
| *A specified time frame of 1 year will be used when assessing potential for structural failure. | |

¹Dunster et al. 2013

APPENDIX III Conditions of Tree Inventory Assessment

Conditions of Tree Assessment

Limitations

This tree inventory and assessment is based on the circumstances and observations as they existed at the time of the site inspection of the Client's properties at 190 – 216 Arkell Road, Guelph, Ontario (the "Property") and the trees situated thereon by NRSI and upon information provided by the Client to NRSI. The opinions in this assessment are given based on observations made and using generally accepted professional judgment, however, because trees are living organisms and subject to change, damage and disease, the results, observations, recommendations, and analysis as set out in this assessment are valid only at the date any such observations and analysis took place. No guarantee, warranty, representation or opinion is offered or made by NRSI as to the length of the validity of the results, observations, recommendations and analysis contained within this assessment. As a result, the Client shall not rely upon this assessment, save and except for representing the circumstances and observations, analysis and recommendations that were made as at the date of such inspections. It is recommended that the trees discussed in this assessment should be re-assessed periodically, where required (i.e. within 1 year).

Further Services

Neither NRSI, nor any assessor employed or retained by NRSI (the "Assessor") for the purpose of preparing or assisting in the preparation of this assessment shall be required to provide any further consultation or services to the Client, save and except as already carried out in the preparation of this assessment and including, without limitation, to act as an expert witness or witness in any court in any jurisdiction unless the Client has first made specific arrangements with respect to such further services, including, without limitation, providing the payment of the Assessor's regular hourly billing fees.

NRSI accepts no responsibility for the implementation of all or any part of the assessment, unless specifically requested to examine the implementation of such activities recommended herein. In the event that inspection or supervision of all or part of the implementation is requested, that request shall be in writing and the details agreed to in writing by both parties.

Assumptions

The Client is hereby notified and does hereby acknowledge and agree that where any of the facts and information set out and referenced in this assessment are based on assumptions, facts or information provided to NRSI, the Client and/or third parties and unless otherwise set out within this assessment, NRSI will in no way be responsible for the veracity or accuracy of any such information and further, the Client acknowledges and agrees that NRSI has, for the purposes of preparing their assessment, assumed that the Property, which is the subject of this assessment is in full compliance with all applicable federal, provincial, municipal and local statutes, regulations, by-laws, guidelines and other related laws. NRSI explicitly denies any legal liability for any and all issues with respect to non-compliance with any of the above-referenced statutes, regulations, by-laws, guidelines and laws as it may pertain to or affect the Property to which this assessment applies.

Restriction of Assessment

The assessment carried out was restricted to the Property as identified within this report. No assessment of any other trees has been undertaken by NRSI. NRSI is not legally liable for any other trees on the Property except those expressly discussed herein. The conclusions of this assessment do not apply to any areas, trees, or any other property not covered or referenced in this assessment.

Professional Responsibility

In carrying out this assessment, NRSI and any Assessor appointed for and on behalf of NRSI to perform and carry out the assessment has exercised a reasonable standard of care, skill and diligence as would be customarily and normally provided in carrying out this assessment. The assessment has been made using accepted arboricultural techniques. These include a visual examination of each tree for structural defects, scars, external indications of decay such as fungal fruiting bodies, evidence of insect attack, discolored foliage (during the leaf-on period), the condition of any visible root structures, the degree and direction of lean (if any), the general condition of the tree(s) and the surrounding site, and the current or planned proximity of property and people. Except where specifically noted in the assessment, none of the trees examined on the

property were dissected, cored, probed, or climbed and detailed root crown examinations involving excavation were not undertaken.

While reasonable efforts have been made to ensure that the trees recommended for retention are healthy, no guarantees are offered, or implied, that these trees, or all parts of them will remain standing. It is professionally impossible to predict with absolute certainty the behaviour of any single tree or group of trees, or all their component parts, in all given circumstances. Inevitably, a standing tree will always pose some risk. Most trees have the potential to fall, lean, or otherwise pose a danger to property and persons in the event of adverse weather conditions, and this risk can only be eliminated if the tree is removed.

Without limiting the foregoing, no liability is assumed by NRSI or its directors, officers, employers, contractors, agents or Assessors for:

- a) any legal description provided with respect to the Property;
- b) issues of title and or ownership respect to the Property;
- c) the accuracy of the Property line locations or boundaries with respect to the Property; and
- d) the accuracy of any other information provided to NRSI by the Client or third parties;
- e) any consequential loss, injury or damages suffered by the Client or any third parties, including but not limited to replacement costs, loss of use, earnings and business interruption; and
- f) the unauthorized distribution of the assessment.

Third Party Liability

This assessment was prepared by NRSI exclusively for the Client. The contents reflect NRSI's best assessment of the trees situated on the Property in light of the information available to it at the time of preparation of this assessment. Any use which a third party makes of this assessment, or any reliance on or decisions made based upon this assessment, are made at the sole risk of any such third parties. NRSI accepts no responsibility for any damages or loss suffered by any third party or by the Client as a

result of decisions made or actions based upon the use or reliance of this assessment by any such party.

General

Any plans and/or illustrations in this assessment are included only to help the Client visualize the issues in this assessment and shall not be relied upon for any other purpose.

This report shall be considered as a whole, no sections are severable, and the assessment shall be considered incomplete if any pages are missing.

APPENDIX IV Tree Inventory Summary Tables

Summary of Inventoried Trees

| Common Name | Scientific Name | Excellent | Good | Fair | Poor | Very Poor | Dead | Total |
|-----------------------|-------------------------------|-----------|------|------|------|-----------|------|-------|
| Native Species | | | | | | | | |
| Balsam Poplar | <i>Populus balsamifera</i> | | 2 | 8 | 2 | | | 12 |
| Black Walnut | <i>Juglans nigra</i> | | 4 | | | | | 4 |
| Eastern Cottonwood | <i>Populus deltoides</i> | | | 1 | 1 | | | 2 |
| Eastern Red Cedar | <i>Juniperus virginiana</i> | | 2 | | | | | 2 |
| Eastern White Cedar | <i>Thuja occidentalis</i> | | 66 | 97 | 12 | | 2 | 177 |
| Eastern White Pine | <i>Pinus strobus</i> | | 1 | 1 | | | | 2 |
| Freeman's Maple | <i>Acer X freemanii</i> | | 1 | 3 | | | | 4 |
| Green Ash | <i>Fraxinus pennsylvanica</i> | | 3 | 5 | | | | 8 |
| Manitoba Maple | <i>Acer negundo</i> | | 1 | 3 | 1 | | | 5 |
| Pin Cherry | <i>Prunus pensylvanica</i> | | | 1 | | | | 1 |
| Silver Maple | <i>Acer saccharinum</i> | | 1 | 3 | 2 | | | 6 |
| Tamarack | <i>Larix laricina</i> | | 1 | 2 | | | | 3 |
| Trembling Aspen | <i>Populus tremuloides</i> | | 3 | 20 | 2 | | | 25 |
| White Ash | <i>Fraxinus americana</i> | | | 2 | 2 | 1 | 1 | 6 |
| White Birch | <i>Betula papyrifera</i> | | 1 | 1 | | | 2 | 4 |
| White Elm | <i>Ulmus americana</i> | | 1 | | | | | 1 |
| White Spruce | <i>Picea glauca</i> | 2 | 15 | 11 | 1 | | 4 | 33 |
| Total | | 2 | 102 | 158 | 23 | 1 | 9 | 295 |

| Non-Native Species | | | | | | | | |
|---------------------------|-----------------------------------------|---|-----|-----|----|---|---|-----|
| Alaska Yellow Cedar | <i>Cupressus nootkatensis</i> | 1 | 1 | | | | | 2 |
| Chanticleer Pear | <i>Pyrus calleryana</i> 'Chanticleer' | | | 1 | | | | 1 |
| Colorado Spruce | <i>Picea pungens</i> | 1 | | | | | | 1 |
| Common Apple | <i>Malus domestica</i> | | | 6 | 5 | | | 11 |
| Common Pear | <i>Pyrus communis</i> | | | 1 | 1 | 2 | | 4 |
| Crimson King Norway Maple | <i>Acer platanoides</i> 'Crimson King' | | | 1 | | | | 1 |
| Flowering Crab Apple | <i>Malus baccata</i> | | | 1 | | | | 1 |
| Golden Weeping Willow | <i>Salix alba</i> var. <i>vitellina</i> | | 1 | | | 1 | | 2 |
| Norway Maple | <i>Acer platanoides</i> | | | 1 | 1 | | | 2 |
| Norway Spruce | <i>Picea abies</i> | 2 | 1 | 1 | | | | 4 |
| Plum species | <i>Prunus</i> sp. | | | | 1 | | | 1 |
| Red Pine | <i>Pinus resinosa</i> | | 1 | 1 | | | | 2 |
| Scots Pine | <i>Pinus sylvestris</i> | 2 | 4 | 4 | 1 | | | 11 |
| Sweet Cherry | <i>Prunus avium</i> | | | | | 1 | | 1 |
| Total | | 6 | 8 | 17 | 9 | 4 | | 44 |
| Overall Total | | 8 | 110 | 175 | 32 | 5 | 9 | 339 |

Overall Condition of Trees Inventoried

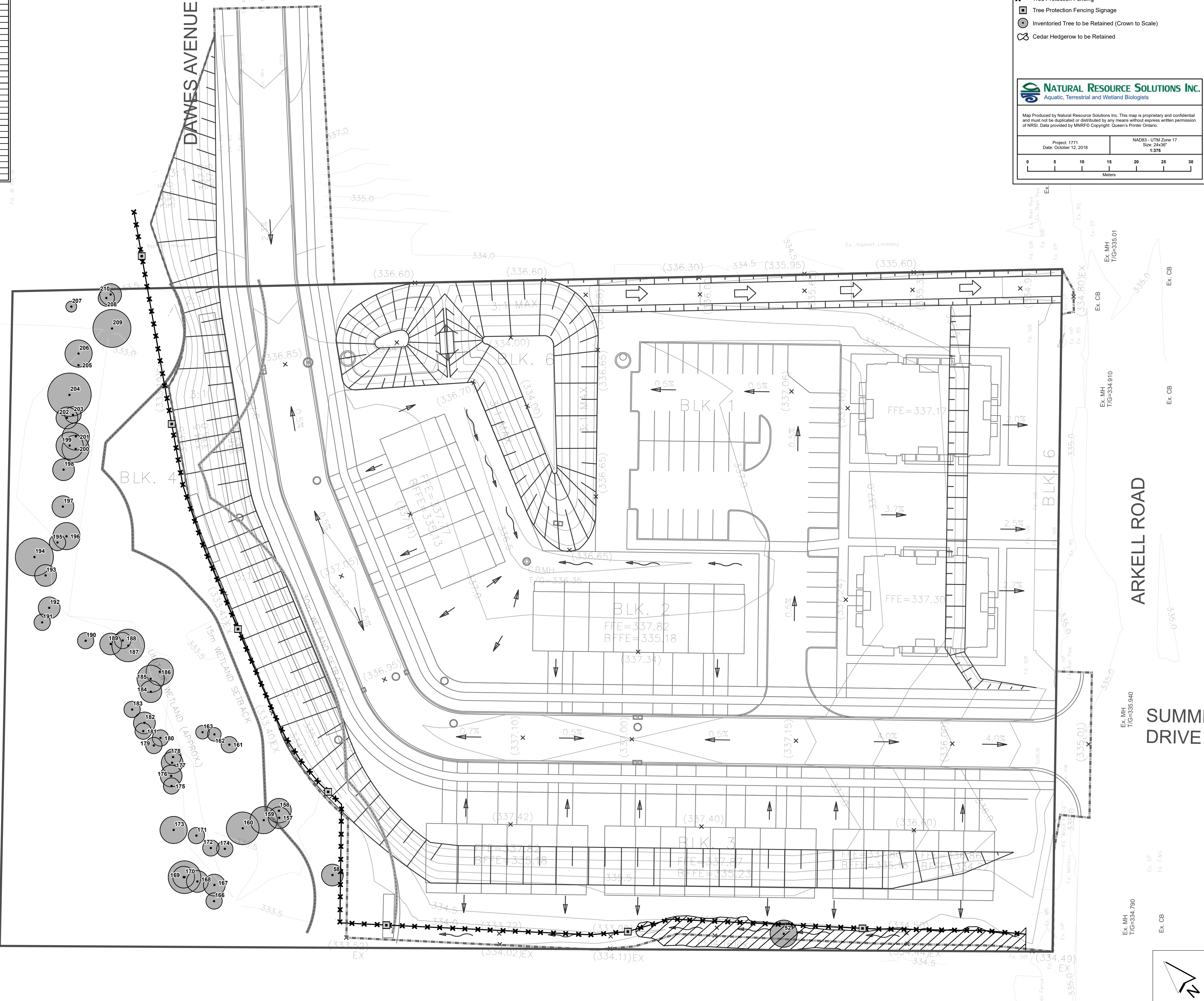
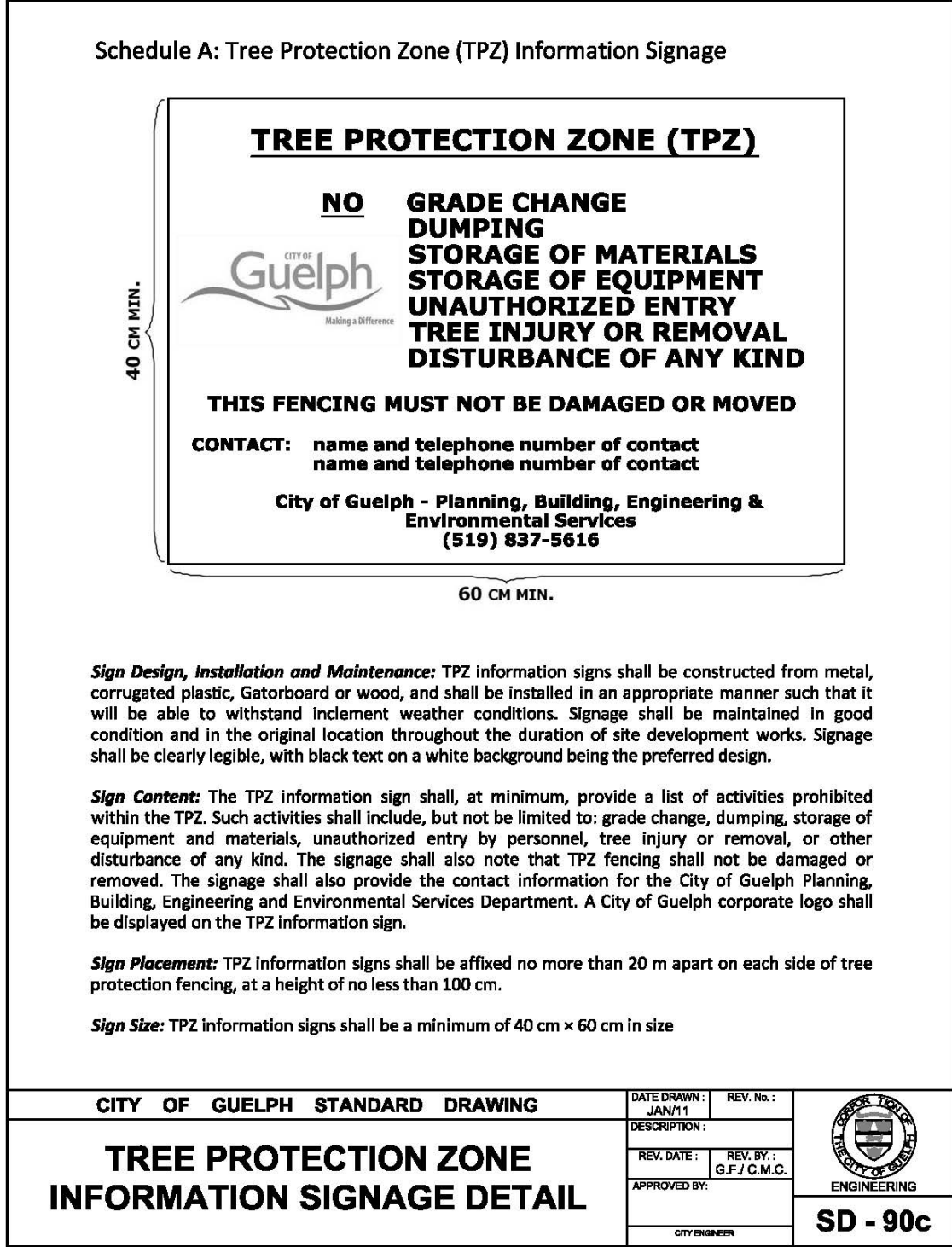
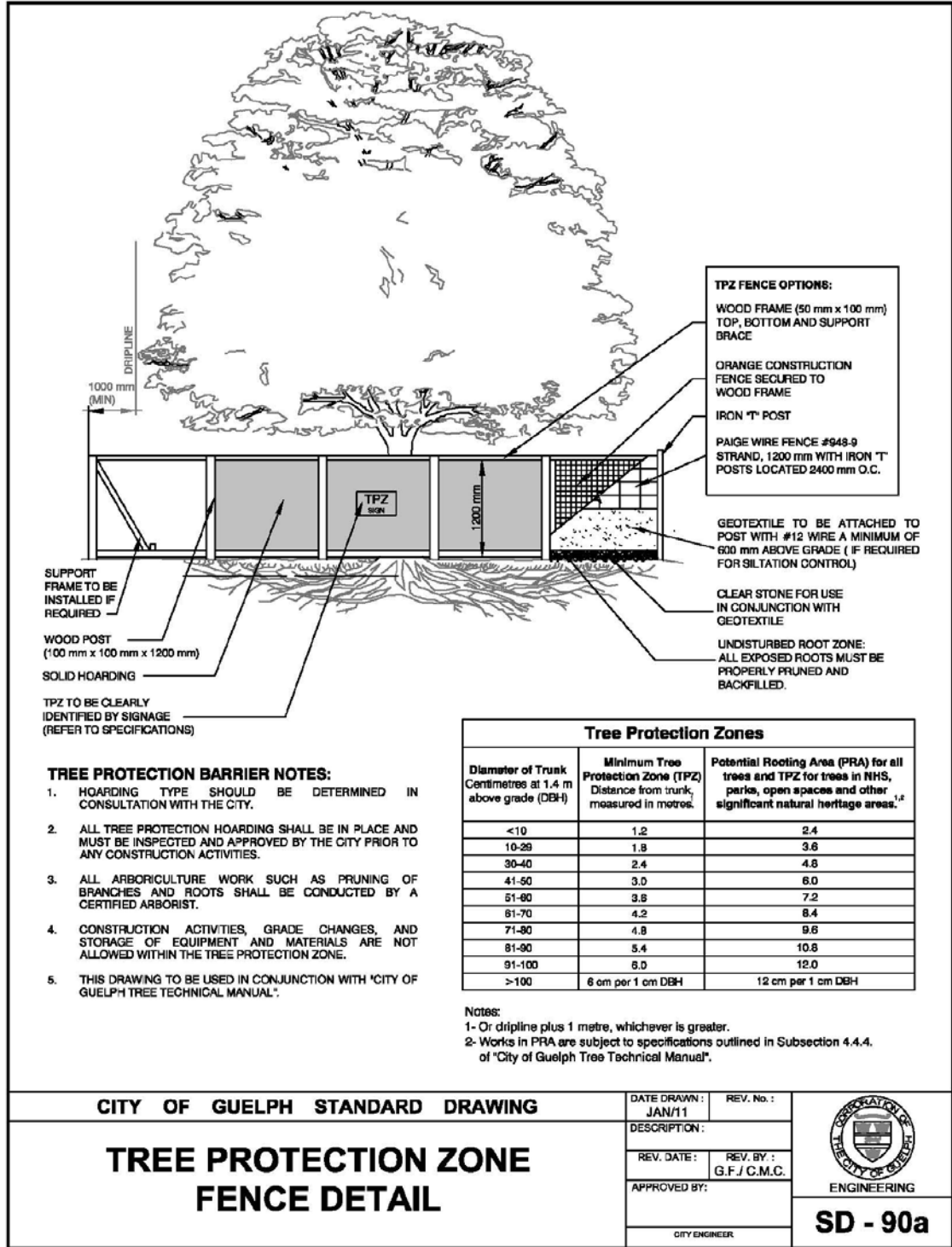
| Potential for Structural Failure Rating | Overall Condition | | | | | | Total |
|-----------------------------------------------|-------------------|------------|------------|-----------|-----------|----------|------------|
| | Excellent | Good | Fair | Poor | Very Poor | Dead | |
| Improbable | 8 | 103 | 126 | 2 | 0 | 0 | 239 |
| Possible | 0 | 7 | 48 | 28 | 1 | 4 | 88 |
| Probable | 0 | 0 | 1 | 2 | 4 | 5 | 12 |
| Imminent | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 8 | 110 | 175 | 32 | 5 | 9 | 339 |

Maps

| Arkell Road Properties Tree Inventory Data, Individual Trees | | | | | | | | | | | | | | | Arkell Road Properties Tree Inventory Data, Individual Trees | | | | | | | | | | | | |
|--------------------------------------------------------------|---------------------|----------------------|-------------------|----------|------------|-------------------|-----------------------------------------|-------------------|-----------------|----------------------|-----------------------|-----------------------------------------------------------------------------------------------------------|-------------|--------------|--------------------------------------------------------------|-------------------|----------|------------|-------------------|-----------------------------------------|-------------------|-----------------|----------------------|-----------------------|-----------------------------------------------------------------------------------|--|--|
| Tree Number | Common Name | Scientific Name | Native/Non-native | DBH (in) | Stem Count | Crown Spread (ft) | Potential for Structural Failure Rating | Overall Condition | Proposed Action | Rationale for Action | Compensation Required | Comments | Tree Number | Common Name | Scientific Name | Native/Non-native | DBH (in) | Stem Count | Crown Spread (ft) | Potential for Structural Failure Rating | Overall Condition | Proposed Action | Rationale for Action | Compensation Required | Comments | | |
| 47 | Common Pear | Pyrus communis | Non-Native | 26.3 | 2 | 4.0 | Possible | Fair | Remove | Development | No | 2 dead branches, some foliar necrosis, small section shedding bark, minor crown thinning, some fruit set. | 255 | Scots Pine | Pinus sylvestris | Non-Native | 29.1 | 1 | 3.0 | Possible | Fair | Remove | Development | Yes | Crooked stem, sapwood holes. | | |
| 48 | Freemantle Maple | Acer x freemantle | Native | 40.8 | 3 | 7.0 | Possible | Fair | Remove | Development | Yes | Basal sprouting, history of branch failure, minor dieback. | 256 | White Spruce | Picea glauca | Native | 20.4 | 1 | 2.5 | Probable | Poor | Remove | Development | No | Shedding bark, showing insect galleries and stem cracks, no leaves. | | |
| 50 | White Birch | Betula papyrifera | Native | 28.2 | 2 | 3.0 | Impossible | Good | Remove | Development | Yes | Codominant stems with included bark. | 257 | White Spruce | Picea glauca | Native | 11.4 | 1 | 1.5 | Impossible | Good | Remove | Development | No | Codominant stems with included bark, 1 stem topped, other has codominant leaders. | | |
| 51 | Eastern White Cedar | Thuja occidentalis | Native | 23.8 | 4 | 2.5 | Impossible | Good | Remove | Development | Yes | Small broken branches, small basal cavity, near existing driveway. | 258 | White Spruce | Picea glauca | Native | 24.1 | 1 | 4.0 | Impossible | Excellent | Remove | Development | Yes | Broken branches in lower crown. | | |
| 52 | Pitch Cherry | Prunus pennsylvanica | Native | 11.8 | 2 | 2.5 | Impossible | Fair | Retain | No | No | Photographic growth, nest to cedar hedge at terrace, thin crown, light insect debilitation. | 259 | White Spruce | Picea glauca | Native | 23.0 | 1 | 4.0 | Impossible | Fair | Remove | Development | Yes | Healed bark cracks, gutters. | | |
| 53 | Freemantle Maple | Acer x freemantle | Native | 16 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Minor crown thinning, poor branch structure. | 260 | White Spruce | Picea glauca | Native | 16.8 | 1 | 2.0 | Possible | Good | Remove | Development | No | Shedding bark, insect galleries, no leaves. | | |
| 54 | Scots Pine | Pinus sylvestris | Non-Native | 16.4 | 1 | 2.0 | Impossible | Fair | Remove | Development | Yes | Minor crown thinning, poor branch structure. | 261 | White Spruce | Picea glauca | Native | 24.4 | 1 | 4.0 | Impossible | Good | Remove | Development | Yes | Unbalanced crown. | | |
| 55 | White Birch | Betula papyrifera | Native | 28.1 | 2 | 3.0 | Impossible | Fair | Remove | Development | Yes | Minor crown thinning, poor branch structure. | 262 | White Spruce | Picea glauca | Native | 28.7 | 1 | 3.0 | Impossible | Good | Remove | Development | Yes | Codominant stems with included bark, 1 stem topped, other has codominant leaders. | | |
| 56 | White Birch | Betula papyrifera | Native | 20.3 | 1 | 3.0 | Possible | Fair | Remove | Development | Yes | 1 stem dead, other has dead leader, 10% dieback. | 263 | White Spruce | Picea glauca | Native | 28.2 | 1 | 3.0 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 57 | White Spruce | Picea glauca | Native | 10.2 | 2 | 2.5 | Impossible | Good | Remove | Development | Yes | Codominant stems. | 264 | White Spruce | Picea glauca | Native | 22.3 | 1 | 3.0 | Impossible | Good | Remove | Development | No | Narrow, thin crown, strong layer. | | |
| 58 | Scots Pine | Pinus sylvestris | Non-Native | 15.2 | 2 | 2.5 | Impossible | Good | Remove | Development | Yes | Codominant stems. | 265 | White Spruce | Picea glauca | Native | 20.8 | 1 | 3.0 | Impossible | Fair | Remove | Development | Yes | Narrow crown. | | |
| 59 | Scots Pine | Pinus sylvestris | Non-Native | 15.2 | 2 | 2.5 | Impossible | Good | Remove | Development | Yes | Codominant stems. | 266 | White Spruce | Picea glauca | Native | 12.4 | 1 | 1.0 | Possible | Dead | Remove | Development | No | No bark, no leaves. | | |
| 60 | Scots Pine | Pinus sylvestris | Non-Native | 14.1 | 1 | 1.5 | Impossible | Good | Remove | Development | Yes | Codominant stems. | 267 | White Spruce | Picea glauca | Native | 23.8 | 2 | 3.5 | Impossible | Fair | Remove | Development | Yes | Codominant stems with included bark, 1 stem topped, other has codominant leaders. | | |
| 61 | Scots Pine | Pinus sylvestris | Non-Native | 14.1 | 1 | 1.5 | Impossible | Good | Remove | Development | Yes | Codominant stems. | 268 | White Spruce | Picea glauca | Native | 22.7 | 2 | 3.5 | Impossible | Fair | Remove | Development | Yes | Mildly crooked stem, 2nd stem dead. | | |
| 62 | Scots Pine | Pinus sylvestris | Non-Native | 14.1 | 1 | 1.5 | Impossible | Good | Remove | Development | Yes | Codominant stems. | 269 | White Spruce | Picea glauca | Native | 22.3 | 1 | 3.0 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 63 | Scots Pine | Pinus sylvestris | Non-Native | 14.0 | 1 | 2.0 | Impossible | Excellent | Remove | Development | Yes | Codominant stems. | 270 | White Spruce | Picea glauca | Native | 21.3 | 1 | 2.5 | Impossible | Good | Remove | Development | Yes | Thin crown. | | |
| 64 | Scots Pine | Pinus sylvestris | Non-Native | 10.5 | 1 | 1.5 | Impossible | Good | Remove | Development | Yes | Very normal, dead, landscape tree. | 271 | White Spruce | Picea glauca | Native | 15.0 | 1 | 2.0 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 65 | Manitoba Maple | Acer negundo | Native | 19.8 | 3 | 3.5 | Possible | Fair | Remove | Development | Yes | Minor crown thinning, poor branch structure. | 272 | White Spruce | Picea glauca | Native | 15.0 | 1 | 2.0 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 66 | Manitoba Maple | Acer negundo | Native | 21.8 | 4 | 4.0 | Possible | Fair | Remove | Development | Yes | Minor crown thinning, poor branch structure. | 273 | White Spruce | Picea glauca | Native | 14.2 | 1 | 3.0 | Impossible | Good | Remove | Development | Yes | Lower branches dead. | | |
| 67 | Black Walnut | Juglans nigra | Native | 15.1 | 2 | 6.0 | Impossible | Good | Remove | Development | Yes | Minor crown thinning, poor branch structure. | 274 | White Spruce | Picea glauca | Native | 23.1 | 1 | 3.0 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 68 | Black Walnut | Juglans nigra | Native | 13.7 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Minor crown thinning, poor branch structure. | 275 | White Spruce | Picea glauca | Native | 36.2 | 1 | 4.0 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 69 | Black Walnut | Juglans nigra | Native | 13.7 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Minor crown thinning, poor branch structure. | 276 | White Spruce | Picea glauca | Native | 26.9 | 1 | 3.0 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 70 | Sweet Cherry | Prunus avium | Non-Native | 12.1 | 1 | 1.0 | Probable | Very Poor | Remove | Development | No | Most of crown dead with 1 living limb. | 277 | White Spruce | Picea glauca | Native | 26.9 | 1 | 3.0 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 71 | Eastern White Cedar | Thuja occidentalis | Native | 24.3 | 2 | 2.3 | Impossible | Good | Remove | Development | Yes | Healthy full, healthy crown, undisturbed and pruned into compartmentalized. | 278 | White Spruce | Picea glauca | Native | 28.4 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 72 | Eastern White Cedar | Thuja occidentalis | Native | 15.0 | 1 | 3.0 | Impossible | Fair | Remove | Development | Yes | Minor crown thinning, poor branch structure. | 279 | White Spruce | Picea glauca | Native | 28.4 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 73 | Eastern White Cedar | Thuja occidentalis | Native | 20.3 | 2 | 2.0 | Possible | Fair | Remove | Development | Yes | Minor crown thinning, poor branch structure. | 280 | White Spruce | Picea glauca | Native | 28.4 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 74 | Eastern White Cedar | Thuja occidentalis | Native | 20.3 | 2 | 2.0 | Possible | Fair | Remove | Development | Yes | Minor crown thinning, poor branch structure. | 281 | White Spruce | Picea glauca | Native | 28.4 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 75 | Eastern White Cedar | Thuja occidentalis | Native | 23.7 | 2 | 2.0 | Impossible | Good | Remove | Development | Yes | Minor crown thinning, poor branch structure. | 282 | White Spruce | Picea glauca | Native | 28.4 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 76 | Eastern White Cedar | Thuja occidentalis | Native | 24.2 | 2 | 2.5 | Impossible | Good | Remove | Development | Yes | Minor crown thinning, poor branch structure. | 283 | White Spruce | Picea glauca | Native | 28.4 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 77 | Eastern White Cedar | Thuja occidentalis | Native | 15.9 | 2 | 2.0 | Possible | Poor | Remove | Development | No | Codominant stems with included bark, upper crown dead. | 284 | White Spruce | Picea glauca | Native | 28.4 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 78 | Eastern White Cedar | Thuja occidentalis | Native | 17.5 | 2 | 2.3 | Possible | Fair | Remove | Development | Yes | Minor crown thinning, poor branch structure. | 285 | White Spruce | Picea glauca | Native | 28.4 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 79 | Eastern White Cedar | Thuja occidentalis | Native | 22.8 | 2 | 2.0 | Possible | Good | Remove | Development | Yes | Minor crown thinning, poor branch structure. | 286 | White Spruce | Picea glauca | Native | 28.4 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 80 | Eastern White Cedar | Thuja occidentalis | Native | 22.8 | 2 | 2.0 | Possible | Good | Remove | Development | Yes | Minor crown thinning, poor branch structure. | 287 | White Spruce | Picea glauca | Native | 28.4 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 81 | Eastern White Cedar | Thuja occidentalis | Native | 22.8 | 2 | 2.0 | Possible | Good | Remove | Development | Yes | Minor crown thinning, poor branch structure. | 288 | White Spruce | Picea glauca | Native | 28.4 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 82 | Eastern White Cedar | Thuja occidentalis | Native | 21.4 | 1 | 2.0 | Possible | Poor | Remove | Development | No | Minor crown thinning, poor branch structure. | 289 | White Spruce | Picea glauca | Native | 28.4 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 83 | Eastern White Cedar | Thuja occidentalis | Native | 21.4 | 1 | 2.0 | Possible | Poor | Remove | Development | No | Minor crown thinning, poor branch structure. | 290 | White Spruce | Picea glauca | Native | 28.4 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 84 | Eastern White Cedar | Thuja occidentalis | Native | 18.6 | 1 | 2.3 | Possible | Poor | Remove | Development | No | Minor crown thinning, poor branch structure. | 291 | White Spruce | Picea glauca | Native | 28.4 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 85 | Eastern White Cedar | Thuja occidentalis | Native | 18.6 | 1 | 2.3 | Possible | Poor | Remove | Development | No | Minor crown thinning, poor branch structure. | 292 | White Spruce | Picea glauca | Native | 28.4 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 86 | Eastern White Cedar | Thuja occidentalis | Native | 18.6 | 1 | 2.3 | Possible | Poor | Remove | Development | No | Minor crown thinning, poor branch structure. | 293 | White Spruce | Picea glauca | Native | 28.4 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 87 | Eastern White Cedar | Thuja occidentalis | Native | 18.6 | 1 | 2.3 | Possible | Poor | Remove | Development | No | Minor crown thinning, poor branch structure. | 294 | White Spruce | Picea glauca | Native | 28.4 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 88 | Eastern White Cedar | Thuja occidentalis | Native | 18.6 | 1 | 2.3 | Possible | Poor | Remove | Development | No | Minor crown thinning, poor branch structure. | 295 | White Spruce | Picea glauca | Native | 28.4 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 89 | Eastern White Cedar | Thuja occidentalis | Native | 18.6 | 1 | 2.3 | Possible | Poor | Remove | Development | No | Minor crown thinning, poor branch structure. | 296 | White Spruce | Picea glauca | Native | 28.4 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 90 | Eastern White Cedar | Thuja occidentalis | Native | 18.6 | 1 | 2.3 | Possible | Poor | Remove | Development | No | Minor crown thinning, poor branch structure. | 297 | White Spruce | Picea glauca | Native | 28.4 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 91 | Eastern White Cedar | Thuja occidentalis | Native | 22.8 | 2 | 2.3 | Possible | Fair | Remove | Development | Yes | One-sided crown due to competition, some crown dead. | 298 | White Spruce | Picea glauca | Native | 28.4 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 92 | Eastern White Cedar | Thuja occidentalis | Native | 18.6 | 1 | 2.3 | Possible | Poor | Remove | Development | No | Minor crown thinning, poor branch structure. | 299 | White Spruce | Picea glauca | Native | 28.4 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 93 | Eastern White Cedar | Thuja occidentalis | Native | 18.6 | 1 | 2.3 | Possible | Poor | Remove | Development | No | Minor crown thinning, poor branch structure. | 300 | White Spruce | Picea glauca | Native | 28.4 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 94 | Eastern White Cedar | Thuja occidentalis | Native | 23.5 | 2 | 2.5 | Impossible | Good | Remove | Development | Yes | Minor crown thinning, poor branch structure. | 301 | White Spruce | Picea glauca | Native | 28.4 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 95 | Eastern White Cedar | Thuja occidentalis | Native | 23.5 | 2 | 2.5 | Impossible | Good | Remove | Development | Yes | Minor crown thinning, poor branch structure. | 302 | White Spruce | Picea glauca | Native | 28.4 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 96 | Eastern White Cedar | Thuja occidentalis | Native | 23.5 | 2 | 2.5 | Impossible | Good | Remove | Development | Yes | Minor crown thinning, poor branch structure. | 303 | White Spruce | Picea glauca | Native | 28.4 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 97 | Eastern White Cedar | Thuja occidentalis | Native | 23.5 | 2 | 2.5 | Impossible | Good | Remove | Development | Yes | Minor crown thinning, poor branch structure. | 304 | White Spruce | Picea glauca | Native | 28.4 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 98 | Eastern White Cedar | Thuja occidentalis | Native | 23.5 | 2 | 2.5 | Impossible | Good | Remove | Development | Yes | Minor crown thinning, poor branch structure. | 305 | White Spruce | Picea glauca | Native | 28.4 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 99 | Eastern White Cedar | Thuja occidentalis | Native | 23.5 | 2 | 2.5 | Impossible | Good | Remove | Development | Yes | Minor crown thinning, poor branch structure. | 306 | White Spruce | Picea glauca | Native | 28.4 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 100 | Eastern White Cedar | Thuja occidentalis | Native | 23.5 | 2 | 2.5 | Impossible | Good | Remove | Development | Yes | Minor crown thinning, poor branch structure. | 307 | White Spruce | Picea glauca | Native | 28.4 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 101 | Eastern White Cedar | Thuja occidentalis | Native | 23.5 | 2 | 2.5 | Impossible | Good | Remove | Development | Yes | Minor crown thinning, poor branch structure. | 308 | White Spruce | Picea glauca | Native | 28.4 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 102 | Eastern White Cedar | Thuja occidentalis | Native | 23.5 | 2 | 2.5 | Impossible | Good | Remove | Development | Yes | Minor crown thinning, poor branch structure. | 309 | White Spruce | Picea glauca | Native | 28.4 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 103 | Eastern White Cedar | Thuja occidentalis | Native | 23.5 | 2 | 2.5 | Impossible | Good | Remove | Development | Yes | Minor crown thinning, poor branch structure. | 310 | White Spruce | Picea glauca | Native | 28.4 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 104 | Eastern White Cedar | Thuja occidentalis | Native | 23.5 | 2 | 2.5 | Impossible | Good | Remove | Development | Yes | Minor crown thinning, poor branch structure. | 311 | White Spruce | Picea glauca | Native | 28.4 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 105 | Eastern White Cedar | Thuja occidentalis | Native | 23.5 | 2 | 2.5 | Impossible | Good | Remove | Development | Yes | Minor crown thinning, poor branch structure. | 312 | White Spruce | Picea glauca | Native | 28.4 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 106 | Eastern White Cedar | Thuja occidentalis | Native | 23.5 | 2 | 2.5 | Impossible | Good | Remove | Development | Yes | Minor crown thinning, poor branch structure. | 313 | White Spruce | Picea glauca | Native | 28.4 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 107 | Eastern White Cedar | Thuja occidentalis | Native | 23.5 | 2 | 2.5 | Impossible | Good | Remove | Development | Yes | Minor crown thinning, poor branch structure. | 314 | White Spruce | Picea glauca | Native | 28.4 | 1 | 3.5 | Impossible | Good | Remove | Development | Yes | Good full set. | | |
| 108 | Eastern White Cedar | Thuja occidentalis | Native</ | | | | | | | | | | | | | | | | | | | | | | | | |

| Arkell Road Properties Tree Preservation Plan | | | | | | | | | | | | |
|-----------------------------------------------|---------------------|-------------------------------|--------------------|----------|------------|------------------|-----------------------------------------|-------------------|------------------|-----------------|-----------------------|----------------------------------------------------------------------------------------------|
| Tree Inventory Data, Individual Trees | | | | | | | | | | | | |
| Tree Number | Common Name | Scientific Name | Native/ Non-native | DBH (cm) | Stem Count | Crown Radius (m) | Potential for Structural Failure Rating | Overall Condition | Location | Proposed Action | Compensation Required | Comments |
| 57 | Pink Cherry | <i>Prunus pennsylvanica</i> | Native | 11.3 | 2.2 | 2.0 | Improbable | Good | Hedge-row | Retain | No | Phototropic growth, next to cedar hedge at fence-line, thin crown, light insect defoliation. |
| 58 | Scotts Pine | <i>Pinus sylvestris</i> | Non-Native | 15.7 | 1 | 2.0 | Improbable | Good | Development Area | Retain | No | Slightly crooked stem. |
| 157 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 13.3 | 1 | 2.0 | Improbable | Fair | Thicket | Retain | No | Some klar chionosis, crooked stem. |
| 158 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 17.9 | 1 | 2.0 | Improbable | Fair | Thicket | Retain | No | Slightly unbalanced crown due to competition, minimal dieback. |
| 159 | White Birch | <i>Betula papyrifera</i> | Native | 24.5 | 1 | 2.5 | Possible | Dead | Thicket | Retain | No | No leaves, catkins retained, died within last year. |
| 160 | White Birch | <i>Betula papyrifera</i> | Native | 24.1 | 1 | 3.0 | Possible | Dead | Thicket | Retain | No | Some some holes up main stem, looks like it died recently. |
| 161 | Balsam Poplar | <i>Populus balsamifera</i> | Native | 10.8 | 1 | 1.5 | Improbable | Good | Thicket | Retain | No | 2 dead lower branches. |
| 162 | Balsam Poplar | <i>Populus balsamifera</i> | Native | 10.9 | 1 | 1.3 | Possible | Fair | Thicket | Retain | No | Wound on main stem with some staining, narrow crown with minimal dieback. |
| 163 | Balsam Poplar | <i>Populus balsamifera</i> | Native | 12.7 | 1 | 1.3 | Improbable | Good | Thicket | Retain | No | Small amount of included bark in upper branch union, full crown. |
| 166 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 12.8 | 1 | 1.5 | Improbable | Fair | Woodland | Retain | No | Codominant leaders with included bark, healthy crown. |
| 167 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 11.7 | 1 | 2.0 | Improbable | Fair | Woodland | Retain | No | Thin crown, strong leader. |
| 168 | Balsam Poplar | <i>Populus balsamifera</i> | Native | 11.5 | 1 | 2.0 | Improbable | Fair | Woodland | Retain | No | Unbalanced crown, 3 dead branches, minor leaf chlorosis. |
| 169 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 12.7 | 1 | 2.0 | Improbable | Fair | Woodland | Retain | No | Dead lower branches, healthy firm and canopy. |
| 170 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 13.8 | 2 | 3.0 | Improbable | Fair | Woodland | Retain | No | Thin crown. |
| 171 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 15.2 | 2 | 1.5 | Improbable | Fair | Woodland | Retain | No | Included bark, dead lower branches, minor dieback. |
| 172 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 10.9 | 1 | 1.5 | Improbable | Fair | Woodland | Retain | No | Dead branches, dieback, debris around base. |
| 173 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 15.3 | 1 | 2.5 | Improbable | Good | Woodland | Retain | No | Good health. |
| 174 | Green Ash | <i>Fraxinus pennsylvanica</i> | Native | 13.4 | 1 | 1.5 | Improbable | Fair | Woodland | Retain | No | D-shaped exit holes, minor dieback; minor epicormic growth. |
| 175 | Balsam Poplar | <i>Populus balsamifera</i> | Native | 13.7 | 1 | 1.5 | Improbable | Fair | Woodland | Retain | No | Dieback, dead branches, minor damage at base. |
| 176 | Balsam Poplar | <i>Populus balsamifera</i> | Native | 13.4 | 1 | 2.0 | Possible | Fair | Woodland | Retain | No | Stem wound, bark discoloration, minor leaf chlorosis; 1 dead branch. |
| 177 | Balsam Poplar | <i>Populus balsamifera</i> | Native | 12.2 | 1 | 2.0 | Improbable | Poor | Woodland | Retain | No | 30% dieback, asymmetrical crown to southeast. |
| 178 | Balsam Poplar | <i>Populus balsamifera</i> | Native | 10.3 | 1 | 1.5 | Possible | Fair | Woodland | Retain | No | Leaving minor dieback. |
| 179 | Balsam Poplar | <i>Populus balsamifera</i> | Native | 13.6 | 1 | 1.5 | Improbable | Fair | Woodland | Retain | No | 15% dieback, minor pisto butt. |
| 180 | Balsam Poplar | <i>Populus balsamifera</i> | Native | 10.1 | 1 | 1.5 | Improbable | Fair | Woodland | Retain | No | Minor pisto butt, minor lean south. |
| 181 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 11.0 | 1 | 1.5 | Improbable | Fair | Woodland | Retain | No | Open stem near base, good reaction wood, healthy crown. |
| 182 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 12.6 | 1 | 2.0 | Improbable | Fair | Woodland | Retain | No | Exposed roots, 1 grinding, bark rubbing, codominant leaders. |
| 183 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 13.6 | 1 | 1.5 | Improbable | Fair | Woodland | Retain | No | 20% dieback, minor dead branches. |
| 184 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 12.2 | 1 | 2.0 | Possible | Poor | Woodland | Retain | No | Stem cancer, sawwood rot, sunken lesion. |
| 185 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 14.7 | 1 | 2.5 | Improbable | Fair | Woodland | Retain | No | Minor dieback, thin canopy. |
| 186 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 13.2 | 1 | 2.5 | Improbable | Fair | Woodland | Retain | No | Small cankers, slight lean south, minor dieback. |
| 187 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 18.2 | 1 | 3.0 | Improbable | Fair | Woodland | Retain | No | Bark lesion in crown, dead lower branches. |
| 188 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 12.9 | 1 | 1.5 | Improbable | Fair | Woodland | Retain | No | Minor dieback. |
| 189 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 10.9 | 1 | 1.5 | Improbable | Good | Woodland | Retain | No | Leaning, phototropic growth. |
| 190 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 18.2 | 1 | 1.5 | Improbable | Good | Woodland | Retain | No | Minor dieback of lower branches. |
| 191 | Green Ash | <i>Fraxinus pennsylvanica</i> | Native | 12.3 | 1 | 1.5 | Improbable | Fair | Woodland | Retain | No | Vines in canopy, minor dieback. |
| 192 | White Elm | <i>Ulmus americana</i> | Native | 11.1 | 1 | 2.0 | Improbable | Good | Woodland | Retain | No | Very minor insect defoliation. |
| 193 | Balsam Poplar | <i>Populus balsamifera</i> | Native | 20.9 | 1 | 2.0 | Possible | Poor | Woodland | Retain | No | Open cankers, sawwood rot, 30% dieback. |
| 194 | Eastern White Birch | <i>Betula papyrifera</i> | Native | 29.9 | 1 | 3.5 | Possible | Poor | Woodland | Retain | No | 40% dieback, crooked stem. |
| 195 | Green Ash | <i>Fraxinus pennsylvanica</i> | Native | 17.7 | 1 | 1.5 | Improbable | Good | Woodland | Retain | No | Healthy crown, minor exfoliating bark. |
| 196 | Green Ash | <i>Fraxinus pennsylvanica</i> | Native | 13.0 | 1 | 2.5 | Improbable | Good | Woodland | Retain | No | Excurrent growth with strong leader, minor crown thinning. |
| 197 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 20.9 | 1 | 2.0 | Possible | Poor | Woodland | Retain | No | Sawwood rot, open canker, poor reaction wood, dieback. |
| 198 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 11.3 | 1 | 2.0 | Possible | Fair | Woodland | Retain | No | Leaning south. |
| 199 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 25.5 | 1 | 2.5 | Improbable | Fair | Woodland | Retain | No | Open wounds, poor reaction wood, dieback. |
| 200 | Balsam Poplar | <i>Populus balsamifera</i> | Native | 24.1 | 1 | 2.5 | Possible | Fair | Woodland | Retain | No | Vines along stem, minor dieback, asymmetrical crown to south. |
| 201 | Green Ash | <i>Fraxinus pennsylvanica</i> | Native | 14.0 | 1 | 2.5 | Improbable | Good | Woodland | Retain | No | No exit holes observed. |
| 202 | Trembling Aspen | <i>Populus tremuloides</i> | Native | 14.7 | 1 | 2.0 | Improbable | Fair | Woodland | Retain | No | Dead lower branches, healthy canopy. |
| 203 | White Ash | <i>Fraxinus americana</i> | Native | 10.6 | 1 | 1.5 | Possible | Poor | Woodland | Retain | No | 30% dieback, epicormic growth, vines in crown. |
| 204 | Manitoba Maple | <i>Acer negundo</i> | Native | 25.5 | 1 | 4.0 | Possible | Fair | Woodland | Retain | No | Leaning, chlorosis, minor thinning, vine in crown. |
| 205 | White Ash | <i>Fraxinus americana</i> | Native | 22.9 | 1 | 3.0 | Improbable | Dead | Woodland | Retain | No | Recently dead. |
| 206 | Silver Maple | <i>Acer saccharinum</i> | Native | 11.9 | 1 | 2.5 | Improbable | Fair | Woodland | Retain | No | Heavy lean, weighed by other branches, minor leaf necrosis and some pustules. |
| 207 | Green Ash | <i>Fraxinus pennsylvanica</i> | Native | 11.4 | 1 | 1.0 | Improbable | Fair | Woodland | Retain | No | Dieback, dead lower branches. |
| 208 | Green Ash | <i>Fraxinus pennsylvanica</i> | Native | 13.3 | 1 | 1.5 | Improbable | Fair | Woodland | Retain | No | Minor dieback, dead lower branches. |
| 209 | White Ash | <i>Fraxinus americana</i> | Native | 25.0 | 1 | 3.5 | Improbable | Fair | Woodland | Retain | No | Epicormic growth. |
| 210 | White Ash | <i>Fraxinus americana</i> | Native | 10.8 | 1 | 2.0 | Improbable | Fair | Woodland | Retain | No | Minor dieback. |

Migratory Birds Convention Act
1. The destruction of migratory birds and their nests is prohibited under the federal *Migratory Birds Convention Act*, 1994.
2. 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.
3. Vegetation clearing is recommended to occur outside the bird nesting season (May 1-July 31) so as to limit disturbances to nesting activities of birds within the proposed work zone.
4. Specific to non-woodland areas, if vegetation clearing cannot be avoided during the bird nesting season, a qualified biologist will be retained to carry out a nest search ahead of clearing activities within the work zone.
5. Nest areas will be identified in the field. There shall be no construction activity in identified nesting areas until sign-off is obtained from the biologist.
6. Areas identified as having no bird nesting activity can be cleared; however, clearing must occur within 48 hours of nest searching if vegetation clearing is not performed within 48 hours, additional nest searches must be conducted.



Map 2

Arkell Road Properties

Tree Protection Fencing

Legend

- Subject Property
- Limit of Construction
- Proposed Grading
- Proposed Development
- Proposed Contour
- Existing Conditions
- Wetland Buffer (15m)
- Wetland Buffer (30m)
- Tree Protection Fencing
- Tree Protection Fencing Signage
- Inventoried Tree to be Retained (Crown to Scale)
- Cedar Hedge row to be Retained

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Map Produced by Natural Resource Solutions Inc. This map is proprietary and confidential and must not be duplicated, copied, or distributed by any means without express written permission of NRS. Data provided by MNRPS Copyright, Queen's Printer Ontario.

Project: 1771 Date: October 12, 2018 NAD83 - UTM Zone 17 Zone 2450° 1.37%

0 5 10 15 20 25 30 Meters

APPENDIX V Ecological Land Classification Datasheets

Page 1 of 3

| | |
|--------------|----------------------------------|
| Site: | (5771) Arkell Road |
| Polygon: | |
| UTM: | |
| Date: | May 15, 2017 |
| Time: | 0945 |
| Surveyor(s): | PWD, TMB |
| Weather: | 7°C, wind 2/NW, 0%CC, no precip. |

| | |
|------------------|---------------------------------|
| Vegetation Type: | SWD4 Mineral Dec. Swamp Fcosite |
| Inclusion: | |
| Complex: | |

| System | | Substrate | | Topo Feature | | Community | | | | | |
|-------------------------------------|-------------|-------------------------------------|----------------|-------------------------------------|---------------|-------------------------------------|--------------|-------------------------------------|------------|--------------------------|------------|
| <input type="checkbox"/> | Terrestrial | <input type="checkbox"/> | Organic | <input type="checkbox"/> | Lacustrine | <input type="checkbox"/> | Talus | <input type="checkbox"/> | Lake | <input type="checkbox"/> | Barren |
| <input checked="" type="checkbox"/> | Wetland | <input checked="" type="checkbox"/> | Mineral Soil | <input type="checkbox"/> | Riverine | <input type="checkbox"/> | Crevice/Cave | <input type="checkbox"/> | Pond | <input type="checkbox"/> | Meadow |
| <input type="checkbox"/> | Aquatic | <input type="checkbox"/> | Parent Min. | <input checked="" type="checkbox"/> | Bottomland | <input type="checkbox"/> | Alvar | <input type="checkbox"/> | River | <input type="checkbox"/> | Prairie |
| | | <input type="checkbox"/> | Acidic Bedrock | <input type="checkbox"/> | Terrace | <input type="checkbox"/> | Rockland | <input type="checkbox"/> | Stream | <input type="checkbox"/> | Thicket |
| History | | <input type="checkbox"/> | Basic Bedrock | <input type="checkbox"/> | Valley Slope | <input type="checkbox"/> | Beach/Bar | <input type="checkbox"/> | Marsh | <input type="checkbox"/> | Savannah |
| <input checked="" type="checkbox"/> | Natural | <input type="checkbox"/> | Carb. Bedrock | <input type="checkbox"/> | Tableland | <input type="checkbox"/> | Sand Dune | <input checked="" type="checkbox"/> | Swamp | <input type="checkbox"/> | Woodland |
| <input type="checkbox"/> | Cultural | | | <input type="checkbox"/> | Roll. Upland | <input type="checkbox"/> | Bluff | <input type="checkbox"/> | Fen | <input type="checkbox"/> | Forest |
| | | Site | | <input type="checkbox"/> | Cliff | | | <input type="checkbox"/> | Bog | <input type="checkbox"/> | Plantation |
| Cover | | <input type="checkbox"/> | Open Water | Plant Form | | | | | | | |
| <input type="checkbox"/> | Open | <input type="checkbox"/> | Shallow Water | <input type="checkbox"/> | Plankton | <input type="checkbox"/> | Forb | <input type="checkbox"/> | Coniferous | | |
| <input type="checkbox"/> | Shrub | <input checked="" type="checkbox"/> | Surficial Dep. | <input type="checkbox"/> | Submerged | <input type="checkbox"/> | Lichen | <input type="checkbox"/> | Mixed | | |
| <input checked="" type="checkbox"/> | Treed | <input type="checkbox"/> | Bedrock | <input type="checkbox"/> | Floating-Lvd. | <input type="checkbox"/> | Bryophyte | | | | |
| | | | | <input type="checkbox"/> | Graminoid | <input checked="" type="checkbox"/> | Deciduous | | | | |

| Layer | HT | Cover | Species |
|---------------|----|-------|-----------------------------------------|
| 1 Canopy | 2 | 4 | Trembling Aspen > Green Ash |
| 2 Sub-canopy | 3 | 2 | Trembling Aspen > Green Ash > White Elm |
| 3 Understorey | 4 | 4 | European Buckthorn > Glossy Buckthorn |
| 4 Groundcover | 5 | 2 | European Buckthorn |

Cover Codes: 0:none 1: 0 - 10% 2: 10 - 25 3: 25 - 60% 4: >60%

| | | | | |
|---------------------|--------|-----------|-----------|--------|
| Size Class Analysis | O < 10 | O 10 - 24 | R 25 - 50 | N > 50 |
| Snags | N < 10 | N 10 - 24 | N 25 - 50 | N > 50 |
| Deadfall/Logs | O < 10 | O 10 - 24 | R 25 - 50 | N > 50 |

Abundance Codes: N: None R: Rare O: Occasional A: Abundant

| | | | | | |
|---------------|---------|-------|---------------------------------------------|--------|------------|
| Community Age | Pioneer | Young | <input checked="" type="checkbox"/> Mid-age | Mature | Old Growth |
|---------------|---------|-------|---------------------------------------------|--------|------------|

Page 2 of 3

| | |
|----------|--------------|
| Site: | UTM: |
| Polygon: | Surveyor(s): |
| Date: | Weather: |
| Time: | |

| Soils | 1 | 2 | 3 |
|------------------------|---------------|---|---|
| Position: | 5 | | |
| Aspect: | N/A | | |
| % | 8 | | |
| Type: | S | | |
| Class: | A | | |
| Strata: Texture | SiCL (5) | | |
| Depth | 23 | | |
| Strata: Texture | fSCL (4) | | |
| Depth | 42 | | |
| Strata: Texture | Si (5) | | |
| Depth | 80 | | |
| Strata: Texture | | | |
| Depth | | | |
| Effective Texture | fSCL | | |
| Surface Stoniness | ø | | |
| Surface Rockiness | ø | | |
| Depth to: | | | |
| Mottles | 24 | | |
| Gley | Not obs. | | |
| Bedrock | Not obs. | | |
| Water table | 49 | | |
| Carbonates | Not conducted | | |
| Depth of Organics | ø | | |
| Pore Size Disc #1 | — | | |
| Pore Size Disc #2 | — | | |
| Pore Size Disc #3 | — | | |
| Moisture Regime | 6 | | |

[illegible]

lucer 1: stony fragments of 80 cm
↳ 17T 565101 48/8887

PLANT SPECIES LIST

Page 3 of 3

Layers: 1=canopy 2=sub-canopy 3=understorey 4=ground layer
Abundance Codes: R=rare O=occasional A=abundant D=dominant

[illegible]

PLANT SPECIES LIST

Page ____ of ____

Layers: 1=canopy 2=sub-canopy 3=understorey 4=ground layer
Abundance Codes: R=rare O=occasional A=abundant D=dominant

[illegible]

Modified ELC Community Description

Page 1 of 3

Community Classification

Polygon Description

| Cover | | Plant Form | | | | | | | |
|-------------------------------------|-------|-------------------------------------|----------------|--------------------------|---------------|-------------------------------------|-----------|--------------------------|------------|
| <input type="checkbox"/> | Open | <input type="checkbox"/> | Open Water | <input type="checkbox"/> | Plankton | <input type="checkbox"/> | Forb | <input type="checkbox"/> | Coniferous |
| <input checked="" type="checkbox"/> | Shrub | <input checked="" type="checkbox"/> | Shallow Water | <input type="checkbox"/> | Submerged | <input type="checkbox"/> | Lichen | <input type="checkbox"/> | Mixed |
| <input type="checkbox"/> | Treed | <input type="checkbox"/> | Surficial Dep. | <input type="checkbox"/> | Floating-Lvd. | <input type="checkbox"/> | Bryophyte | | |
| | | <input type="checkbox"/> | Bedrock | <input type="checkbox"/> | Graminoid | <input checked="" type="checkbox"/> | Deciduous | | |

Stand Description

| | | | | | | | |
|--------------|---------|-------------|------------|-------------|-------------|---------------|----------|
| HT Codes: | 1: >25m | 2: 25 - 10m | 3: 10 - 2m | 4: 2 - 1m | 5: 1 - 0.5m | 6: 0.5 - 0.2m | 7: <0.2m |
| Cover Codes: | 0: none | 1: 0 - 10% | 2: 10 - 25 | 3: 25 - 60% | 4: >60% | | |

Abundance Codes: N: None R: Rare O: Occasional A: Abundant

| | | | | | |
|---------------|---------|-------------------------------------------|---------|--------|------------|
| Community Age | Pioneer | <input checked="" type="checkbox"/> Young | Mid-age | Mature | Old Growth |
|---------------|---------|-------------------------------------------|---------|--------|------------|

Page 2 of 3

| | | | |
|-------------------|------------|--|--|
| Effective Texture | SCL | | |
| Surface Stoniness | Ø | | |
| Surface Rockiness | Ø | | |
| Depth to: | | | |
| Mottles | 31 | | |
| Gley | Not obs. | | |
| Bedrock | Not obs | | |
| Water table | 55 | | |
| Carbonates | Not taken. | | |
| Depth of Organics | Ø | | |
| Pore Size Disc #1 | — | | |
| Pore Size Disc #2 | — | | |
| Pore Size Disc #3 | — | | |
| Moisture Regime | 5 | | |

[illegible]

NOTES:

Auger 1: stony fragments at 55cm.
↳ 17T 565132 4818858

[illegible]

Modified ELC Community Description

Modified ELC Community Description

Page 2 of 3

Community Classification

Polygon Description

Stand Description

| | | | | | | | |
|--------------|---------|-------------|------------|-------------|-------------|---------------|----------|
| HT Codes: | 1: >25m | 2: 25 - 10m | 3: 10 - 2m | 4: 2 - 1m | 5: 1 - 0.5m | 6: 0.5 - 0.2m | 7: <0.2m |
| Cover Codes: | 0: none | 1: 0 - 10% | 2: 10 - 25 | 3: 25 - 60% | 4: >60% | | |

Abundance Codes: N: None R: Rare O: Occasional A: Abundant

Tree Tally

NOTES:

Auger 1: stony fragments at 32 cm
↳ 17T 565182 4818858

PLANT SPECIES LIST

Page 3 of 3

| | |
|--------------------------------------------|------------|
| Site: (1771) Arkell Road | |
| Polygon: CUM | |
| UTM: | |
| Date: May 15, 2017 | Time: 1050 |
| Surveyor(s): PWD, TMB | |
| Weather: 13°C, wind 2/E. 0% cc. no precip. | |

Layers: 1=canopy 2=sub-canopy 3=understorey 4=ground layer
Abundance Codes: R=rare O=occasional A=abundant D=dominant

[illegible]

NATURAL RESOURCE SOLUTIONS INC

Modified ELC Community Description

PLANT SPECIES LIST

Page ____ of ____

| | |
|--------------|-------|
| Site: | |
| Polygon: | |
| UTM: | |
| Date: | Time: |
| Surveyor(s): | |
| Weather: | |

Layers: 1=canopy 2=sub-canopy 3=understorey 4=ground layer
Abundance Codes: R=rare O=occasional A=abundant D=dominant

[illegible]

APPENDIX VI Species Lists

Arkell Road Properties EIS

Vascular Plant Species Reported From the Study Area

| Scientific Name | Common Name | CC | CW | Weed | SRANK ¹ | SARO ² | COSEWIC ³ | SARA Schedule ⁴ | Wellington County ⁵ | Wellington/ Dufferin County ⁶ | NHIC Data ⁷ | NRSI Observed 2017 | | | | |
|-------------------------------------------------------------|----------------------------------|----|----|------|--------------------|-------------------|----------------------|----------------------------|--------------------------------|------------------------------------------|------------------------|--------------------|--------|------|-----|-----|
| | | | | | | | | | | | | SWD3-2 | SWM1-1 | SWD4 | CUM | CUT |
| Pteridophytes | Ferns & Allies | | | | | | | | | | | | | | | |
| Dryopteridaceae | Wood Fern Family | | | | | | | | | | | | | | | |
| <i>Dryopteris carthusiana</i> | Spinulose Wood Fern | 5 | -2 | | S5 | | | | | X | | | | X | | |
| Gymnosperms | Conifers | | | | | | | | | | | | | | | |
| Cupressaceae | Cypress Family | | | | | | | | | | | | | | | |
| <i>Thuja occidentalis</i> | White Cedar | 4 | -3 | | S5 | | | | | X | | | X | | | |
| Pinaceae | Pine Family | | | | | | | | | | | | | | | |
| <i>Picea glauca</i> | White Spruce | 6 | 3 | | S5 | | | | | X | | | | | | X |
| <i>Picea pungens</i> | Colorado Spruce | | | NA | SE1 | | | | | | | | | | | X |
| <i>Pinus strobus</i> | Eastern White Pine | 4 | 3 | | S5 | | | | | X | | | | | | X |
| <i>Pinus sylvestris</i> | Scot's Pine | | 5 | -3 | SE5 | | | | | X | | | | | | X |
| Dicotyledons | Dicots | | | | | | | | | | | | | | | |
| Aceraceae | Maple Family | | | | | | | | | | | | | | | |
| <i>Acer ginnala</i> | Amur Maple | | 5 | -2 | SE1 | | | | | | | | | | | X |
| <i>Acer negundo</i> | Manitoba Maple | 0 | -2 | | S5 | | | | | X | | | | X | | |
| <i>Acer saccharinum</i> | Silver Maple | 5 | -3 | | S5 | | | | | X | | X | | | | |
| <i>Acer X freemanii</i> | Freeman's Maple | | | | | | | | | | | | X | X | | |
| Anacardiaceae | Sumac or Cashew Family | | | | | | | | | | | | | | | |
| <i>Rhus hirta</i> | Staghorn Sumac | 1 | 5 | | S5 | | | | | X | | | | | | X |
| Apiaceae | Carrot or Parsley Family | | | | | | | | | | | | | | | |
| <i>Daucus carota</i> | Wild Carrot | | 5 | -2 | SE5 | | | | | X | | | | | X | X |
| Asclepiadaceae | Milkweed Family | | | | | | | | | | | | | | | |
| <i>Asclepias syriaca</i> | Common Milkweed | 0 | 5 | | S5 | | | | | X | | | | | X | |
| Asteraceae | Composite or Aster Family | | | | | | | | | | | | | | | |
| <i>Achillea millefolium</i> ssp. <i>millefolium</i> | Common Yarrow | | 3 | -1 | SE? | | | | | X | | | | X | | |
| <i>Achillea millefolium</i> ssp. <i>borealis</i> | Yarrow | | | | SU | | | | | | | | | | | X |
| <i>Ambrosia artemisiifolia</i> | Common Ragweed | 0 | 3 | | S5 | | | | | X | | | | X | | |
| <i>Arctium minus</i> ssp. <i>minus</i> | Common Burdock | | 5 | -2 | SE5 | | | | | X | | | | X | | |
| <i>Centaurea maculosa</i> | Spotted Knapweed | | 5 | -3 | SE5 | | | | | | | | | | X | |
| <i>Cirsium arvense</i> | Canada Thistle | | 3 | -1 | SE5 | | | | | X | | | | X | | |
| <i>Cirsium vulgare</i> | Bull Thistle | | 4 | -1 | SE5 | | | | | X | | | | X | X | X |
| <i>Conyza canadensis</i> | Horseweed | 0 | 1 | | S5 | | | | | X | | | | X | | |
| <i>Erigeron annuus</i> | Daisy Fleabane | 0 | 1 | | S5 | | | | | X | | | | | X | X |
| <i>Erigeron pulchellus</i> | Robin's Plantain | 7 | 3 | | S5 | | | | | X | | | | | X | X |
| <i>Eupatorium perfoliatum</i> | Perfoliate Thoroughwort | 2 | -4 | | S5 | | | | | X | | X | | | | |
| <i>Euthamia graminifolia</i> | Flat-topped Bushy Goldenrod | 2 | -2 | | S5 | | | | | X | | | | | X | X |
| <i>Inula helenium</i> | Elecampane | | 5 | -2 | SE5 | | | | | X | | | | X | | |
| <i>Leucanthemum vulgare</i> | Ox-eye Daisy | | 5 | -1 | SE5 | | | | | X | | | | | X | X |
| <i>Solidago altissima</i> var. <i>altissima</i> | Tall Goldenrod | 1 | 3 | | S5 | | | | | X | | | X | X | X | X |
| <i>Solidago canadensis</i> | Canada Goldenrod | 1 | 3 | | S5 | | | | | X | | | | X | | |
| <i>Solidago juncea</i> | Early Goldenrod | 3 | 5 | | S5 | | | | | X | | | | | X | X |
| <i>Solidago nemoralis</i> ssp. <i>nemoralis</i> | Gray Goldenrod | 2 | 5 | | S5 | | | | | X | | | | X | | |
| <i>Solidago rugosa</i> ssp. <i>rugosa</i> | Rough Goldenrod | 4 | -1 | | S5 | | | | | X | | | | X | X | X |
| <i>Symphyotrichum ericoides</i> var. <i>ericoides</i> | White Heath Aster | | | | S5 | | | | | X | | | | X | | |
| <i>Symphyotrichum lateriflorum</i> var. <i>lateriflorum</i> | Calico Aster | 3 | -2 | | S5 | | | | | X | | | | X | | |
| <i>Symphyotrichum novae-angliae</i> | New England Aster | 2 | -3 | | S5 | | | | | X | | | | X | X | X |
| <i>Symphyotrichum pilosum</i> var. <i>pilosum</i> | Hairy Aster | 4 | 2 | | S5 | | | | | R | | | | X | | |
| <i>Taraxacum officinale</i> | Common Dandelion | | 3 | -2 | SE5 | | | | | X | | X | X | X | X | X |

| Scientific Name | Common Name | CC | CW | Weed | SRANK ¹ | SARO ² | COSEWIC ³ | SARA Schedule ⁴ | Wellington County ⁵ | Wellington/ Dufferin County ⁶ | NHIC Data ⁷ | NRSI Observed 2017 | | | | |
|-------------------------------------------------|----------------------------------|----|----|------|--------------------|-------------------|----------------------|----------------------------|--------------------------------|------------------------------------------|------------------------|--------------------|--------|------|-----|-----|
| | | | | | | | | | | | | SWD3-2 | SWM1-1 | SWD4 | CUM | CUT |
| Betulaceae | Birch Family | | | | | | | | | | | | | | | |
| <i>Betula papyrifera</i> | White Birch | | 2 | | S5 | | | | | X | | | X | | | X |
| Brassicaceae | Mustard Family | | | | | | | | | | | | | | | |
| <i>Alliaria petiolata</i> | Garlic Mustard | | 0 | -3 | SE5 | | | | | | | | | X | | |
| <i>Hesperis matronalis</i> | Dame's Rocket | | 5 | -3 | SE5 | | | | | X | | | | X | | |
| Caprifoliaceae | Honeysuckle Family | | | | | | | | | | | | | | | |
| <i>Lonicera tatarica</i> | Tartarian Honeysuckle | | 3 | -3 | SE5 | | | | | X | | | | X | | |
| <i>Sambucus canadensis</i> | Common Elderberry | 5 | -2 | | S5 | | | | | X | | X | X | | | |
| <i>Viburnum opulus</i> | Guelder Rose | | 0 | -1 | SE4 | | | | | | | | | X | | |
| <i>Viburnum trilobum</i> | High Bush Cranberry | 5 | -3 | | S5 | | | | | X | | | | X | | |
| Cornaceae | Dogwood Family | | | | | | | | | | | | | | | |
| <i>Cornus stolonifera</i> | Red-osier Dogwood | 2 | -3 | | S5 | | | | | X | | | | X | X | X |
| Cucurbitaceae | Gourd Family | | | | | | | | | | | | | | | |
| <i>Echinocystis lobata</i> | Prickly Cucumber | 3 | -2 | | S5 | | | | | X | | | | X | | |
| Fabaceae | Pea Family | | | | | | | | | | | | | | | |
| <i>Lotus corniculatus</i> | Bird's-foot Trefoil | | 1 | -2 | SE5 | | | | | X | | | | | | X |
| <i>Medicago lupulina</i> | Black Medick | | 1 | -1 | SE5 | | | | | X | | | | | X | X |
| <i>Medicago sativa</i> ssp. <i>sativa</i> | Alfalfa | | 5 | -1 | SE5 | | | | | X | | | | | X | |
| <i>Trifolium pratense</i> | Red Clover | | 2 | -2 | SE5 | | | | | X | | | | X | X | X |
| <i>Trifolium repens</i> | White Clover | | 2 | -1 | SE5 | | | | | X | | | | X | | |
| <i>Vicia cracca</i> | Tufted Vetch | | 5 | -1 | SE5 | | | | | X | | | | | | X |
| Grossulariaceae | Currant Family | | | | | | | | | | | | | | | |
| <i>Ribes americanum</i> | Wild Black Currant | 4 | -3 | | S5 | | | | | X | | X | | | | |
| Guttiferae | St. John's-wort Family | | | | | | | | | | | | | | | |
| <i>Hypericum perforatum</i> | Common St. John's-wort | | 5 | -3 | SE5 | | | | | X | | | | | X | X |
| Lamiaceae | Mint Family | | | | | | | | | | | | | | | |
| <i>Nepeta cataria</i> | Catnip | | 1 | -2 | SE5 | | | | | X | | | | X | | |
| <i>Origanum vulgare</i> | Wild Marjoram | | 5 | -2 | SE5 | | | | | X | | | | X | | X |
| <i>Prunella vulgaris</i> ssp. <i>lanceolata</i> | Heal-all | 5 | 5 | | S5 | | | | | | | | | X | X | X |
| Oleaceae | Olive Family | | | | | | | | | | | | | | | |
| <i>Fraxinus americana</i> | White Ash | 4 | 3 | | S5 | | | | | X | | | | | | X |
| <i>Fraxinus pennsylvanica</i> | Green Ash | 3 | -3 | | S5 | | | | | X | | X | X | X | X | |
| Onagraceae | Evening-primrose Family | | | | | | | | | | | | | | | |
| <i>Circaea alpina</i> | Smaller Enchanter's Nightshade | 6 | -3 | | S5 | | | | | X | | | | X | | |
| <i>Circaea lutea</i> ssp. <i>canadensis</i> | Yellowish Enchanter's Nightshade | 3 | 3 | | S5 | | | | | X | | | | X | | |
| <i>Oenothera biennis</i> | Common Evening-primrose | 0 | 3 | | S5 | | | | | X | | | | X | | X |
| Papaveraceae | Poppy Family | | | | | | | | | | | | | | | |
| <i>Chelidonium majus</i> | Celandine | | 5 | -3 | SE5 | | | | | X | | | | X | | |
| Ranunculaceae | Buttercup Family | | | | | | | | | | | | | | | |
| <i>Ranunculus acris</i> | Tall Buttercup | | -2 | -2 | SE5 | | | | | X | | | | X | | X |
| Rhamnaceae | Buckthorn Family | | | | | | | | | | | | | | | |
| <i>Rhamnus cathartica</i> | Common Buckthorn | | 3 | -3 | SE5 | | | | | X | | X | X | X | X | X |
| <i>Fragula alnus</i> | Glossy Buckthorn | | -1 | -3 | SE5 | | | | | X | | X | X | X | X | X |

| Scientific Name | Common Name | CC | CW | Weed | SRANK ¹ | SARO ² | COSEWIC ³ | SARA Schedule ⁴ | Wellington County ⁵ | Wellington/Dufferin County ⁶ | NHIC Data ⁷ | NRSI Observed 2017 | | | | |
|---------------------------------------------------------|----------------------------|----|----|------|--------------------|-------------------|----------------------|----------------------------|--------------------------------|-----------------------------------------|------------------------|--------------------|-----------|-----------|-----------|-----------|
| | | | | | | | | | | | | SWD3-2 | SWM1-1 | SWD4 | CUM | CUT |
| Rosaceae | Rose Family | | | | | | | | | | | | | | | |
| <i>Agrimonia gryposepala</i> | Tall Hairy Agrimony | 2 | 2 | | S5 | | | | | X | | | | X | | |
| <i>Agrimonia striata</i> | Grooved Agrimony | | | | S4? | | | | | | | | | | X | |
| <i>Filipendula ulmaria</i> ssp. <i>ulmaria</i> | Meadow-sweet | | | | SE1 | | | | | | | | | | | X |
| <i>Fragaria virginiana</i> | Wild Strawberry | | | | S5 | | | | | X | | | | X | X | X |
| <i>Geum canadense</i> | White Avens | 3 | 0 | | S5 | | | | | X | | | | X | | |
| <i>Malus domestica</i> | Apple | | | | | | | | | | | | | | X | |
| <i>Prunus virginiana</i> ssp. <i>virginiana</i> | Choke Cherry | 2 | 1 | | S5 | | | | | X | | | | X | | |
| <i>Spiraea alba</i> | Narrow-leaved Meadow-sweet | 3 | -4 | | S5 | | | | | X | | | | | | X |
| Salicaceae | Willow Family | | | | | | | | | | | | | | | |
| <i>Populus balsamifera</i> ssp. <i>balsamifera</i> | Balsam Poplar | 4 | -3 | | S5 | | | | | X | | | | X | | X |
| <i>Populus tremuloides</i> | Trembling Aspen | 2 | 0 | | S5 | | | | | X | | X | X | X | X | X |
| <i>Salix discolor</i> | Pussy Willow | 3 | -3 | | S5 | | | | | X | | | | | | X |
| Saxifragaceae | Saxifrage Family | | | | | | | | | | | | | | | |
| <i>Tiarella cordifolia</i> | False Mitrewort | 6 | 1 | | S5 | | | | | X | | | | X | X | |
| Scrophulariaceae | Figwort Family | | | | | | | | | | | | | | | |
| <i>Verbascum thapsus</i> | Common Mullein | | 5 | -2 | SE5 | | | | | X | | | | | X | X |
| <i>Veronica serpyllifolia</i> ssp. <i>serpyllifolia</i> | Thyme-leaved Speedwell | 0 | -3 | | SE5 | | | | | X | | | | | X | |
| Solanaceae | Nightshade Family | | | | | | | | | | | | | | | |
| <i>Solanum dulcamara</i> | Bitter Nightshade | | 0 | -2 | SE5 | | | | | X | | X | X | X | | |
| Ulmaceae | Elm Family | | | | | | | | | | | | | | | |
| <i>Ulmus americana</i> | White Elm | 3 | -2 | | S5 | | | | | X | | | | X | | |
| Violaceae | Violet Family | | | | | | | | | | | | | | | |
| <i>Viola labradorica</i> | Alpine Violet | | | | S4S5 | | | | | | | | | | X | |
| <i>Viola sororia</i> | Woolly Blue Violet | 4 | 1 | | S5 | | | | | X | | | | X | X | |
| Vitaceae | Grape Family | | | | | | | | | | | | | | | |
| <i>Parthenocissus vitacea</i> | Woodbine | 3 | 3 | | S5 | | | | | X | | | X | | | X |
| <i>Vitis riparia</i> | Riverbank Grape | 0 | -2 | | S5 | | | | | X | | | X | X | X | X |
| Monocotyledons | Monocots | | | | | | | | | | | | | | | |
| Cyperaceae | Sedge Family | | | | | | | | | | | | | | | |
| <i>Carex species</i> | Sedge species | | | | | | | | | | | X | | | | |
| Liliaceae | Lily Family | | | | | | | | | | | | | | | |
| <i>Convallaria majalis</i> | Lily-of-the-valley | | 5 | -2 | SE5 | | | | | | | | | X | | |
| Poaceae | Grass Family | | | | | | | | | | | | | | | |
| <i>Agrostis stolonifera</i> | Redtop | | -3 | | S5 | | | | | X | | | | X | | |
| <i>Bromus inermis</i> ssp. <i>inermis</i> | Awnless Brome | | 5 | -3 | SE5 | | | | | X | | | | | X | |
| <i>Dactylis glomerata</i> | Orchard Grass | | 3 | -1 | SE5 | | | | | X | | | | | X | X |
| <i>Phleum pratense</i> | Timothy | | 3 | -1 | SE5 | | | | | X | | | | | X | |
| <i>Poa compressa</i> | Canada Blue Grass | 0 | 2 | | S5 | | | | | X Int | | | | X | | |
| <i>Poa pratensis</i> ssp. <i>pratensis</i> | Kentucky Bluegrass | 0 | 1 | | S5 | | | | | X | | | | | X | X |
| Total | | | | | | | | | | | 0 | 11 | 13 | 53 | 35 | 43 |

¹MNRF 2017; ²MNRF 2016; ³COSEWIC 2018; ⁴Government of Canada 2018; ⁵Dougan and Associates. 2009; ⁶Riley 1989; ⁷MNRF 2018

| LEGEND | |
|----------------------|----------------------------|
| SRANK | Wellington/Dufferin |
| S2 Imperiled | X Significant |
| S3 Vulnerable | |
| S4 Apparently Secure | |
| S5 Secure | |
| SU Unrankable | |

Arkell Road EIS
Bird Species Reported From the Study Area

| Scientific Name | Common Name | SRANK ¹ | SARO ² | COSEWIC ³ | SARA Schedule ⁴ | City of Guelph Status ⁵ | OBBA ⁶ | NHIC Data ⁷ | NRSI Observed |
|----------------------------------|-----------------------------------------|--------------------|-------------------|----------------------|-------------------------------|------------------------------------------|-------------------|------------------------|------------------|
| | | | | | | | 17NJ61 | | |
| Anatidae | Ducks, Geese & Swans | | | | | | | | |
| <i>Branta canadensis</i> | Canada Goose | S5 | | | | | CO | | |
| <i>Aix sponsa</i> | Wood Duck | S5 | | | | | CO | | |
| <i>Anas rubripes</i> | American Black Duck | S4 | | | | | CO | | |
| <i>Anas platyrhynchos</i> | Mallard | S5 | | | | | CO | | |
| | | | | | | | | | |
| Phasianidae | Partridges, Grouse & Turkeys | | | | | | | | |
| <i>Bonasa umbellus</i> | Ruffed Grouse | S4 | | | | | CO | | |
| <i>Meleagris gallopavo</i> | Wild Turkey | S5 | | | | | PO | | |
| | | | | | | | | | |
| Podicipediformes | Grebes | | | | | | | | |
| <i>Podilymbus podiceps</i> | Pied-billed Grebe | S4B, S4N | | | | | PO | | |
| | | | | | | | | | |
| Columbidae | Pigeons & Doves | | | | | | | | |
| <i>Columba livia</i> | Rock Pigeon | SNA | | | | | CO | | |
| <i>Zenaidura macroura</i> | Mourning Dove | S5 | | | | | CO | | |
| | | | | | | | | | |
| Cuculiformes | Cuckoos & Anis | | | | | | | | |
| <i>Coccyzus erythrophthalmus</i> | Black-billed Cuckoo | S5B | | | | X | PO | | |
| | | | | | | | | | |
| Caprimulgidae | Goatsuckers | | | | | | | | |
| <i>Chordeiles minor</i> | Common Nighthawk | S4B | SC | SC | Schedule 1 | | PO | | |
| | | | | | | | | | |
| Apodidae | Swifts | | | | | | | | |
| <i>Chaetura pelagica</i> | Chimney Swift | S4B, S4N | THR | T | Schedule 1 | | PO | | |
| | | | | | | | | | |
| Trochilidae | Hummingbirds | | | | | | | | |
| <i>Archilochus colubris</i> | Ruby-throated Hummingbird | S5B | | | | | CO | | PO |
| | | | | | | | | | |
| Rallidae | Railes, Gallinules & Coots | | | | | | | | |
| <i>Rallus limicola</i> | Virginia Rail | S5B | | | | | PR | | |
| <i>Porzana carolina</i> | Sora | S4B | | | | | PR | | |
| | | | | | | | | | |
| Charadriidae | Plovers | | | | | | | | |
| <i>Charadrius vociferus</i> | Killdeer | S5B, S5N | | | | | CO | | PO |
| | | | | | | | | | |
| Scolopacidae | Waders | | | | | | | | |
| <i>Gallinago delicata</i> | Wilson's Snipe | S5B | | | | | PO | | |
| <i>Scolopax minor</i> | American Woodcock | S4B | | | | | PR | | |
| <i>Actitis macularia</i> | Spotted Sandpiper | S5 | | | | | PR | | |
| | | | | | | | | | |
| Laridae | Gulls, Terns & Skimmers | | | | | | | | |
| <i>Larus delawarensis</i> | Ring-billed Gull | S5B, S4N | | | | | | | X |

Bird Species Reported From the Study Area

[illegible]

Bird Species Reported From the Study Area

| Scientific Name | Common Name | SRANK ¹ | SARO ² | COSEWIC ³ | SARA Schedule ⁴ | City of Guelph Status ⁵ | OBBA ⁶ | NHIC Data ⁷ | NRSI Observed |
|-----------------------------------|---------------------------------------------|--------------------|-------------------|----------------------|----------------------------|------------------------------------|-------------------|------------------------|---------------|
| | | | | | | | 17NJ61 | | |
| Corvidae | Crows & Jays | | | | | | | | |
| <i>Cyanocitta cristata</i> | Blue Jay | S5 | | | | | CO | | PR |
| <i>Corvus brachyrhynchos</i> | American Crow | S5B | | | | | CO | | PR |
| | | | | | | | | | |
| Alaudidae | Larks | | | | | | | | |
| <i>Eremophila alpestris</i> | Horned Lark | S5B | | | | | PR | | |
| | | | | | | | | | |
| Hirundinidae | Swallows | | | | | | | | |
| <i>Tachycineta bicolor</i> | Tree Swallow | S4B | | | | | CO | | |
| <i>Stelgidopteryx serripennis</i> | Northern Rough-winged Swallow | S4B | | | | | PR | | |
| <i>Riparia riparia</i> | Bank Swallow | S4B | THR | T | | X | CO | | |
| <i>Petrochelidon pyrrhonota</i> | Cliff Swallow | S4B | | | | X | PR | | |
| <i>Hirundo rustica</i> | Barn Swallow | S4B | THR | T | | | CO | | |
| | | | | | | | | | |
| Paridae | Chickadees & Titmice | | | | | | | | |
| <i>Poecile atricapillus</i> | Black-capped Chickadee | S5 | | | | | CO | | PR |
| | | | | | | | | | |
| Sittidae | Nuthatches | | | | | | | | |
| <i>Sitta canadensis</i> | Red-breasted Nuthatch | S5 | | | | X | CO | | PO |
| <i>Sitta carolinensis</i> | White-breasted Nuthatch | S5 | | | | | PO | | |
| | | | | | | | | | |
| Certhiidae | Creepers | | | | | | | | |
| <i>Certhia americana</i> | Brown Creeper | S5B | | | | X | PO | | |
| | | | | | | | | | |
| Troglodytidae | Wrens | | | | | | | | |
| <i>Troglodytes aedon</i> | House Wren | S5B | | | | | CO | | |
| <i>Troglodytes hiemalis</i> | Winter Wren | S5B | | | | X | CO | | |
| <i>Cistothorus platensis</i> | Sedge Wren | S4B | NAR | NAR | | X | PO | | |
| <i>Cistothorus palustris</i> | Marsh Wren | S4B | | | | | PO | | |
| | | | | | | | | | |
| Muscicapidae | Old world Flycatchers | | | | | | | | |
| Turdidae | Thrushes | | | | | | | | |
| <i>Sialia sialis</i> | Eastern Bluebird | S5B | NAR | NAR | | | CO | | |
| <i>Catharus fuscescens</i> | Veery | S4B | | | | X | CO | | |
| <i>Hylocichla mustelina</i> | Wood Thrush | S4B | SC | T | | X | CO | | |
| <i>Turdus migratorius</i> | American Robin | S5B | | | | | CO | | PO |
| | | | | | | | | | |
| Mimidae | Mockingbirds, Thrashers & Allies | | | | | | | | |
| <i>Dumetella carolinensis</i> | Gray Catbird | S4B | | | | | CO | | PO |
| <i>Toxostoma rufum</i> | Brown Thrasher | S4B | | | | X | PR | | |
| <i>Mimus polyglottos</i> | Northern Mockingbird | S4 | | | | X | PR | | |
| | | | | | | | | | |
| Sturnidae | Starlings | | | | | | | | |
| <i>Sturnus vulgaris</i> | European Starling | SNA | | | | | CO | | PR |
| | | | | | | | | | |
| Bombycillidae | Waxwings | | | | | | | | |
| <i>Bombycilla cedrorum</i> | Cedar Waxwing | S5B | | | | | PR | | PO |

Bird Species Reported From the Study Area

| Scientific Name | Common Name | SRANK ¹ | SARO ² | COSEWIC ³ | SARA Schedule ⁴ | City of Guelph Status ⁵ | OBBA ⁶ | NHIC Data ⁷ | NRSI Observed |
|----------------------------------|------------------------------------------|--------------------|-------------------|----------------------|----------------------------|------------------------------------|-------------------|------------------------|---------------|
| | | | | | | | 17NJ61 | | |
| Passeridae | Old World Sparrows | | | | | | | | |
| <i>Passer domesticus</i> | House Sparrow | SNA | | | | | CO | | |
| Fringillidae | Finches & Allies | | | | | | | | |
| <i>Carpodacus mexicanus</i> | House Finch | SNA | | | | | CO | | |
| <i>Carpodacus purpureus</i> | Purple Finch | S4B | | | | | PO | | |
| <i>Spinus pinus</i> | Pine Siskin | S4B | | | | X | CO | | |
| <i>Spinus tristis</i> | American Goldfinch | S5B | | | | | PR | | PO |
| Parulidae | Wood Warblers | | | | | | | | |
| <i>Seiurus aurocapillus</i> | Ovenbird | S4B | | | | X | PR | | |
| <i>Parkesia noveboracensis</i> | Northern Waterthrush | S5B | | | | | PR | | |
| <i>Vermivora chrysoptera</i> | Golden-winged Warbler | S4B | SC | T | Schedule 1 | | PR | | |
| <i>Vermivora cyanoptera</i> | Blue-winged Warbler | S4B | | | | X | CO | | |
| <i>Mniotilta varia</i> | Black-and-white Warbler | S5B | | | | X | PR | | |
| <i>Oreothlypis ruficapilla</i> | Nashville Warbler | S5B | | | | | PO | | |
| <i>Geothlypis philadelphia</i> | Mourning Warbler | S4B | | | | | PO | | |
| <i>Geothlypis trichas</i> | Common Yellowthroat | S5B | | | | | PR | | |
| <i>Setophaga ruticilla</i> | American Redstart | S5B | | | | X | PO | | PO |
| <i>Setophaga petechia</i> | Yellow Warbler | S5B | | | | | CO | | |
| <i>Setophaga pensylvanica</i> | Chestnut-sided Warbler | S5B | | | | | PR | | |
| <i>Setophaga pinus</i> | Pine Warbler | S5B | | | | X | CO | | |
| <i>Setophaga coronata</i> | Yellow-rumped Warbler | S5B | | | | | PO | | |
| <i>Setophaga virens</i> | Black-throated Green Warbler | S5B | | | | X | CO | | |
| Emberizidae | New World Sparrows & Allies | | | | | | | | |
| <i>Pipilo erythrophthalmus</i> | Eastern Towhee | S4B | | | | X | PR | | |
| <i>Spizella passerina</i> | Chipping Sparrow | S5B | | | | | CO | | PO |
| <i>Spizella pallida</i> | Clay-colored Sparrow | S4B | | | | | CO | | |
| <i>Spizella pusilla</i> | Field Sparrow | S4B | | | | X | CO | | |
| <i>Poocetes gramineus</i> | Vesper Sparrow | S4B | | | | X | PO | | |
| <i>Passerculus sandwichensis</i> | Savannah Sparrow | S4B | | | | X | CO | | |
| <i>Ammodramus savannarum</i> | Grasshopper Sparrow | S4B | SC | SC | | X | PR | | |
| <i>Melospiza melodia</i> | Song Sparrow | S5B | | | | | CO | | PO |
| <i>Melospiza georgiana</i> | Swamp Sparrow | S5B | | | | | CO | | |
| <i>Zonotrichia albicollis</i> | White-throated Sparrow | S5B | | | | | PR | | |
| Cardinalidae | Cardinals, Grosbeaks & Allies | | | | | | | | |
| <i>Piranga olivacea</i> | Scarlet Tanager | S4B | | | | X | PO | | |
| <i>Cardinalis cardinalis</i> | Northern Cardinal | S5 | | | | | CO | | PO |
| <i>Pheucticus ludovicianus</i> | Rose-breasted Grosbeak | S4B | | | | X | CO | | PO |
| <i>Passerina cyanea</i> | Indigo Bunting | S4B | | | | | CO | | PO |
| Icteridae | Blackbirds | | | | | | | | |
| <i>Dolichonyx oryzivorus</i> | Bobolink | S4B | THR | T | No Schedule | | CO | | |
| <i>Agelaius phoeniceus</i> | Red-winged Blackbird | S4 | | | | | CO | | PO |

Bird Species Reported From the Study Area

| Scientific Name | Common Name | SRANK ¹ | SARO ² | COSEWIC ³ | SARA Schedule ⁴ | City of Guelph Status ⁵ | OBBA ⁶ | NHIC Data ⁷ | NRSI Observed |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|--------------------|-------------------|----------------------|----------------------------|------------------------------------|-------------------|------------------------|---------------|
| | | | | | | | 17NJ61 | | |
| <i>Sturnella magna</i> | Eastern Meadowlark | S4B | THR | T | No Schedule | | CO | | |
| <i>Quiscalus quiscula</i> | Common Grackle | S5B | | | | | CO | | PR |
| <i>Molothrus ater</i> | Brown-headed Cowbird | S4B | | | | | CO | | PO |
| <i>Icterus spurius</i> | Orchard Oriole | S4B | | | | X | CO | | |
| <i>Icterus galbula</i> | Baltimore Oriole | S4B | | | | X | CO | | PO |
| ¹ MNRF 2017; ² MNRF 2016; ³ COSEWIC 2018; ⁴ Government of Canada 2018; ⁵ City of Guelph 2012; ⁶ Cadman et al. 2007; ⁷ OMNR 2018 | | | | | | | Total | 113 | 0 |
| | | | | | | | | | 27 |

| LEGEND | |
|-------------------------------------|-----------------------------------------------|
| SRANK | Wellington County |
| S1 Critically Imperiled | √ Significant and rare |
| S2 Imperiled | √* Significant but not rare |
| S3 Vulnerable | ** Only habitats that support/recently |
| S4 Apparently Secure | supported active nests considered significant |
| S5 Secure | |
| SU Unrankable | City of Guelph |
| SNA Unranked | X Significant |
| SX Presumed Extirpated | Breeding Evidence Codes |
| SH Possibly Extirpated (Historical) | OB Observed |
| S#? Rank Uncertain | PO Possible |
| COSSARO | PR Probable |
| END Endangered | CO Confirmed |
| THR Threatened | SARA Schedule |
| SC Special Concern | Schedule 1 Officially Protected under SARA |
| NAR Not at Risk | |
| DD Data Deficient | |
| COSEWIC | |
| E Endangered | |
| T Threatened | |
| SC Special Concern | |
| NAR Not at Risk | |
| DD Data Deficient | |

Arnell Road Properties EIS

Butterfly Species Reported From the Study Area

| Scientific Name | Common Name | SRANK ¹ | SARO ² | COSEWIC ³ | SARA Schedule ⁴ | City of Guelph Status ⁵ | TEA Atlas ⁶ (17NJ61) | NHIC Data ⁷ | NRSI Observed |
|---------------------------------|------------------------------------------------|--------------------|-------------------|----------------------|-------------------------------|------------------------------------------|------------------------------------|------------------------|------------------|
| Hesperiidae | Skippers | | | | | | | | |
| <i>Anatrytone logan</i> | Delaware Skipper | S4 | | | | X | X | | |
| <i>Carterocephalus palaemon</i> | Arctic Skipper | S5 | | | | | X | | |
| <i>Erynnis baptisiae</i> | Wild Indigo Duskywing | S4 | | | | X | | | X |
| <i>Erynnis juvenalis</i> | Juvenal's Duskywing | S5 | | | | | | | X |
| <i>Euphyes vestris</i> | Dun Skipper | S5 | | | | | X | | |
| <i>Poanes hobomok</i> | Hobomok Skipper | S5 | | | | | X | | |
| <i>Polites peckius</i> | Peck's Skipper | S5 | | | | | X | | |
| <i>Polites themistocles</i> | Tawny-edged Skipper | S5 | | | | | X | | |
| <i>Thymelicus lineola</i> | European Skipper | SNA | | | | | X | | |
| Papilionidae | Swallowtails | | | | | | | | |
| <i>Papilio cressphontes</i> | Giant Swallowtail | S4 | | | | | X | | |
| <i>Papilio glaucus</i> | Eastern Tiger Swallowtail | S5 | | | | | X | | X |
| <i>Papilio polyxenes</i> | Black Swallowtail | S5 | | | | | X | | |
| Pieridae | Whites and Sulphurs | | | | | | | | |
| <i>Colias eurytheme</i> | Orange Sulphur | S5 | | | | | X | | |
| <i>Colias philodice</i> | Clouded Sulphur | S5 | | | | | X | | |
| <i>Pieris oleracea</i> | Mustard White | S4 | | | | | X | | |
| <i>Pieris rapae</i> | Cabbage White | SNA | | | | | X | | X |
| Lycaenidae | Harvesters, Coppers, Hairstreaks, Blues | | | | | | | | |
| <i>Callophrys augustinus</i> | Brown Elfin | S5 | | | | | X | | |
| <i>Cupido comyntas</i> | Eastern Tailed Blue | S5 | | | | | | | X |
| <i>Feniseca tarquinius</i> | Harvester | S4 | | | | | X | | |
| <i>Lycaena hyllus</i> | Bronze Copper | S5 | | | | | X | | |
| <i>Satyrrium calanus</i> | Banded Hairstreak | S4 | | | | | X | | |
| Nymphalidae | Brush-footed Butterflies | | | | | | | | |
| <i>Aglais milberti</i> | Milbert's Tortoiseshell | S5 | | | | | X | | |
| <i>Asterocampa clyton</i> | Tawny Emperor | S2S3 | | | | | X | | |
| <i>Boloria bellona</i> | Meadow Fritillary | S5 | | | | | X | | |
| <i>Cercyonis pegala</i> | Common Wood-Nymph | S5 | | | | | X | | X |
| <i>Coenonympha tullia</i> | Common Ringlet | S5 | | | | | X | | X |
| <i>Danaus plexippus</i> | Monarch | S2N, S4B | SC | SC | Schedule 1 | | X | | X |
| <i>Euphydryas phaeton</i> | Baltimore Checkerspot | S4 | | | | | X | | |
| <i>Lethe anthedon</i> | Northern Pearly-Eye | S5 | | | | | X | | |
| <i>Limenitis archippus</i> | Viceroy | S5 | | | | | X | | X |

Arkell Road Properties EIS

Butterfly Species Reported From the Study Area

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|------------------------------------|-----------------------------|--------------------|-------------------|----------------------|----------------------------|------------------------------------|---------------------------------|------------------------|---------------|
| <i>Limenitis arthemis arthemis</i> | White Admiral/Banded Purple | S5 | | | | | X | | |
| <i>Limentis arthemis astyanax</i> | Red-spotted Purple | S5 | | | | | X | | |
| <i>Megisto cymela</i> | Little Wood-Satyr | S5 | | | | | X | | |
| <i>Nymphalis antiopa</i> | Mourning Cloak | S5 | | | | | X | | |
| <i>Nymphalis l-album</i> | Compton Tortoiseshell | S5 | | | | | X | | |
| <i>Phyciodes cocyta</i> | Northern Crescent | S5 | | | | | X | | |
| <i>Phyciodes tharos</i> | Pearl Crescent | S4 | | | | | X | | |
| <i>Polygonia comma</i> | Eastern Comma | S5 | | | | | X | | |
| <i>Speyeria idalia</i> | Regal Fritillary | SNA | | | | | X | | |
| <i>Vanessa atalanta</i> | Red Admiral | S5 | | | | | X | | |
| <i>Vanessa virginiensis</i> | American Lady | S5 | | | | | X | | |
| | | | | | | | Total | 38 | 0 |
| | | | | | | | | 9 | |

¹MNRF 2017; ²MNRF 2016; ³COSEWIC 2018; ⁴Government of Canada 2018; ⁵City of Guelph 2012; ⁶Jones et al: 2018; ⁷OMNR 2018

| LEGEND | |
|-------------------------------------|--------------------------------------------|
| SRANK | COSEWIC |
| S1 Critically Imperiled | NAR Not at Risk |
| S2 Imperiled | SC Special Concern |
| S3 Vulnerable | T Threatened |
| S4 Apparently Secure | E Endangered |
| S5 Secure | XT Extirpated |
| SU Unrankable | DD Data Deficient |
| SNA Unranked | SARA Schedule |
| SX Presumed Extirpated | Schedule 1 Officially Protected under SARA |
| SH Possibly Extirpated (Historical) | Wellington County Status |
| S#? Rank Uncertain | X Rare |
| COSSARO | X* Significant only within City of Guelph |
| NAR Not at Risk | City of Guelph Status |
| SC Special Concern | X Significant |
| THR Threatened | |
| END Endangered | |
| EXP Extirpated | |
| DD Data Deficient | |

Arkell Road Environmental Impact Study

Dragonfly and Damselfly Species Reported From the Study Area

| Scientific Name | Common Name | SRANK ¹ | SARO ² | COSEWIC ³ | SARA Schedule ⁴ | City of Guelph Status ⁶ | Odonate Atlas ⁷ | NRSI Observed 2017 |
|----------------------------------|----------------------------------|--------------------|-------------------|----------------------|----------------------------|------------------------------------|----------------------------|--------------------|
| Calopterygidae | Broadwinged Damselflies | | | | | | | |
| <i>Calopteryx aequabilis</i> | River Jewelwing | S5 | | | | | X | |
| <i>Calopteryx maculata</i> | Ebony Jewelwing | S5 | | | | | X | |
| <i>Hetaerina americana</i> | American Rubyspot | S4 | | | | | X | |
| | | | | | | | | |
| Lestidae | Spreadwings | | | | | | | |
| <i>Lestes congener</i> | Spotted Spreadwing | S5 | | | | | X | |
| <i>Lestes disjunctus</i> | Common Spreadwing | S5 | | | | | X | |
| <i>Lestes dryas</i> | Emerald Spreadwing | S5 | | | | | X | |
| <i>Lestes eurinus</i> | Amber-winged Spreadwing | S3 | | | | | X | |
| <i>Lestes rectangularis</i> | Slender Spreadwing | S5 | | | | | X | |
| <i>Lestes unguiculatus</i> | Lyre-tipped Spreadwing | S5 | | | | | X | |
| | | | | | | | | |
| Coenagrionidae | Narrow-winged Damselflies | | | | | | | |
| <i>Argia apicalis</i> | Blue-fronted Dancer | S4 | | | | | X | |
| <i>Argia fumipennis violacea</i> | Violet Dancer | S5 | | | | | X | |
| <i>Argia moesta</i> | Powdered Dancer | S5 | | | | | X | |
| <i>Enallagma annexum</i> | Northern Bluet | S4 | | | | | X | |
| <i>Enallagma antennatum</i> | Rainbow Bluet | S4 | | | | | X | |
| <i>Enallagma aspersum</i> | Azure Bluet | S3 | | | | | X | |
| <i>Enallagma carunculatum</i> | Tule Bluet | S5 | | | | | X | |
| <i>Enallagma civile</i> | Familiar Bluet | S5 | | | | | X | |
| <i>Enallagma ebrium</i> | Marsh Bluet | S5 | | | | | X | |
| <i>Enallagma exsulans</i> | Stream Bluet | S5 | | | | | X | |
| <i>Enallagma signatum</i> | Orange Bluet | S4 | | | | | X | |
| <i>Ischnura posita</i> | Fragile Forktail | S4 | | | | | X | |
| <i>Ischnura verticalis</i> | Eastern Forktail | S5 | | | | | X | X |
| <i>Nehalennia irene</i> | Sedge Sprite | S5 | | | | | X | |
| | | | | | | | | |
| Aeshnidae | Darners | | | | | | | |
| <i>Aeshna canadensis</i> | Canada Darner | S5 | | | | | X | |
| <i>Aeshna constricta</i> | Lance-tipped Darner | S5 | | | | | X | X |
| <i>Aeshna interrupta</i> | Variable Darner | S5 | | | | | X | |
| <i>Aeshna tuberculifera</i> | Black-tipped Darner | S4 | | | | | X | |
| <i>Aeshna umbrosa</i> | Shadow Darner | S5 | | | | | X | |
| <i>Aeshna verticalis</i> | Green-striped Darner | S3 | | | | | X | |
| <i>Anax junius</i> | Common Green Darner | S5 | | | | | X | X |
| <i>Basiaeschna janata</i> | Springtime Darner | S5 | | | | | X | |
| <i>Boyeria vinosa</i> | Fawn Darner | S5 | | | | | X | |
| <i>Rhionaeschna mutata</i> | Spatterdock Darner | S1 | | | | | X | |
| | | | | | | | | |
| Gomphidae | Clubtails | | | | | | | |
| <i>Argomphus villosipes</i> | Unicorn Clubtail | S2S3 | | | | | X | |
| <i>Gomphus exilis</i> | Lancet Clubtail | S5 | | | | | X | |
| <i>Gomphus graslinellus</i> | Pronghorn Clubtail | S3 | | | | | X | |

Arkell Road Environmental Impact Study

Dragonfly and Damselfly Species Reported From the Study Area

| Scientific Name | Common Name | SRANK ¹ | SARO ² | COSEWIC ³ | SARA Schedule ⁴ | City of Guelph Status ⁶ | Odonate Atlas ⁷ | NRSI Observed 2017 |
|-----------------------------------|-----------------------------------|--------------------|-------------------|----------------------|----------------------------|------------------------------------|----------------------------|--------------------|
| <i>Gomphus lividus</i> | Ashy Clubtail | S4 | | | | | X | |
| <i>Gomphus spicatus</i> | Dusky Clubtail | S5 | | | | | X | |
| <i>Ophiogomphus rupinsulensis</i> | Rusty Snaketail | S4 | | | | | X | |
| | | | | | | | | |
| Corduliidae | Emeralds | | | | | | | |
| <i>Cordulia shurtleffii</i> | American Emerald | S5 | | | | | X | |
| <i>Dorocordulia libera</i> | Racket-tailed Emerald | S5 | | | | | X | |
| <i>Epiheca canis</i> | Beaverpond Baskettail | S5 | | | | | X | |
| <i>Epiheca cynosura</i> | Common Baskettail | S5 | | | | | X | |
| <i>Epiheca pinceps</i> | Prince Baskettail | S5 | | | | | X | |
| <i>Somatochlora tenebrosa</i> | Clamp-tipped Emerald | S2S3 | | | | | X | |
| <i>Somatochlora williamsoni</i> | Williamson's Emerald | S4 | | | | X | X | |
| | | | | | | | | |
| Libellulidae | Skimmers | | | | | | | |
| <i>Celithemis elisa</i> | Calico Pennant | S5 | | | | | X | |
| <i>Erythemis simplicicollis</i> | Eastern Pondhawk | S5 | | | | | X | |
| <i>Ladona julia</i> | Chalk-fronted Corporal | S5 | | | | X | X | |
| <i>Leucorrhinia frigida</i> | Frosted Whiteface | S5 | | | | X | X | |
| <i>Leucorrhinia intacta</i> | Dot-tailed Whiteface | S5 | | | | | X | |
| <i>Leucorrhinia proxima</i> | Red-waisted (Belted) Whiteface | S5 | | | | X | X | |
| <i>Libellula luctuosa</i> | Widow Skimmer | S5 | | | | | X | |
| <i>Libellula pulchella</i> | Twelve-spotted Skimmer | S5 | | | | | X | X |
| <i>Libellula quadrimaculata</i> | Four-spotted Skimmer | S5 | | | | | X | |
| <i>Pachydiplax longipennis</i> | Blue Dasher | S5 | | | | | X | |
| <i>Pantala flavescens</i> | Wandering Glider | S4 | | | | | X | |
| <i>Pantala hymenaea</i> | Spot-winged Glider | S4 | | | | | X | |
| <i>Perithemis tenera</i> | Eastern Amberwing | S4 | | | | X | X | |
| <i>Plathemis lydia</i> | Common Whitetail | S5 | | | | | X | X |
| <i>Sympetrum internum</i> | Cherry-faced Meadowhawk | S5 | | | | | X | X |
| <i>Sympetrum obtrusum</i> | White-faced Meadowhawk | S5 | | | | | X | X |
| <i>Sympetrum semicinctum</i> | Band-winged Meadowhawk | S4 | | | | | X | |
| <i>Sympetrum vicinum</i> | Yellow-legged (Banded) Meadowhawk | S5 | | | | | X | X |
| <i>Tramea lacerata</i> | Black Saddlebags | S4 | | | | | X | |
| | | | | | Total | 13 | 65 | 8 |

¹MNRF 2017; ²MNRF 2016; ³COSEWIC 2018; ⁴Government of Canada 2018; ⁵City of Guelph 2012; ⁶OMNR 2005

| LEGEND | |
|----------------------|--------------------------|
| SRANK | Wellington County Status |
| S2 Imperiled | X Significant |
| S3 Vulnerable | R Rare |
| S4 Apparently Secure | City of Guelph Status |
| S5 Secure | X Significant |
| SU Unrankable | |
| SNA Unranked | |

Arkell Road Properties EIS

Reptile and Amphibian Species Reported From the Study Area

| Scientific Name | Common Name | SRANK ¹ | SARO ² | COSEWIC ³ | SARA Schedule ⁴ | City of Guelph Status ⁶ | Ontario Reptile and Amphibian Atlas (17NJ61) ⁷ | NHIC Data (17NJ61) ⁸ | NRSI Observed |
|---------------------------------------------------|--------------------------------------------------------------------------------------|--------------------|-------------------|----------------------|----------------------------|------------------------------------|-----------------------------------------------------------|---------------------------------|---------------|
| Turtles | | | | | | | | | |
| <i>Chelydra serpentina serpentina</i> | Snapping Turtle | S3 | SC | SC | Schedule 1 | | X | | |
| <i>Chrysemys picta marginata</i> | Midland Painted Turtle | S5 | | | | | X | | |
| <i>Emydoidea blandingii</i> | Blanding's Turtle (<i>Great Lakes/St Lawrence population</i>) | S3 | THR | T | Schedule 1 | | X | | |
| <i>Graptemys geographica</i> | Northern Map Turtle | S3 | SC | SC | Schedule 1 | | X | | |
| <i>Trachemys scripta elegans</i> | Red-eared Slider | SNA | | | | | X | | |
| | | | | | | | | | |
| Snakes | | | | | | | | | |
| <i>Lampropeltis taylori triangulum</i> | Eastern Milksnake | S4 | NAR | SC | | | X | | |
| <i>Nerodia sipedon sipedon</i> | Common Watersnake | S5 | NAR | NAR | | X | X | | |
| <i>Storeria dekayi dekayi</i> | Northern Brownsnake | S5 | NAR | NAR | | X | X | | |
| <i>Storeria occipitomaculata occipitomaculata</i> | Northern Red-bellied Snake | S5 | | | | X | X | | |
| <i>Thamnophis sauritus septentrionalis</i> | Eastern Ribbonsnake | S3 | SC | SC | Schedule 1 | | X | X | |
| <i>Thamnophis sirtalis sirtalis</i> | Eastern Gartersnake | S5 | | | | | X | | X |
| | | | | | | | | | |
| Salamanders | | | | | | | | | |
| <i>Ambystoma jeffersonianum</i> | Jefferson Salamander | S2 | END | E | Schedule 1 | | X | | |
| <i>Ambystoma</i> hybrid pop. 3 | Jefferson/Blue-spotted Salamander Complex | S2 | | | | | X | | |
| <i>Ambystoma maculatum</i> | Spotted Salamander | S4 | | | | X | X | | |
| <i>Hemidactylum scutatum</i> | Four-toed Salamander | S4 | NAR | NAR | | X | X | | |
| <i>Notophthalmus viridescens viridescens</i> | Red-spotted Newt | S5 | | | | X | X | | |
| <i>Plethodon cinereus</i> | Eastern Red-backed Salamander | S5 | | | | | X | | |
| | | | | | | | | | |
| Toads and Frogs | | | | | | | | | |
| <i>Anaxyrus americanus</i> | American Toad | S5 | | | | | X | | X |
| <i>Hyla chrysoscelis</i> | Cope's Gray Treefrog | SNA | | | | | X | | X |
| <i>Pseudacris triseriata</i> pop. 2 | Western Chorus Frog (<i>Great Lakes/St. Lawrence - Canadian Shield Population</i>) | S3 | NAR | T | Schedule 1 | | X | | |
| <i>Lithobates catesbeiana</i> | American Bullfrog | S4 | | | | X | X | | |
| <i>Lithobates clamitans melanota</i> | Northern Green Frog | S5 | | | | | X | | X |
| <i>Lithobates palustris</i> | Pickerel Frog | S4 | NAR | NAR | | X | X | | |
| <i>Lithobates pipiens</i> | Northern Leopard Frog | S5 | NAR | NAR | | | X | | |
| <i>Lithobates septentrionalis</i> | Mink Frog | S5 | | | | X | X | | |
| <i>Lithobates sylvatica</i> | Wood Frog | S5 | | | | | X | | |
| | | | | | | Total | 26 | 1 | 4 |

¹MNRF 2017; ²MNRF 2016; ³COSEWIC 2018; ⁴Government of Canada 2018; ⁵Ontario Nature 2018; ⁷OMNR 2018; OMNR 2018

| Legend | |
|----------------------|--------------------------------------------|
| SRANK | COSEWIC |
| S2 Imperiled | E Endangered |
| S3 Vulnerable | T Threatened |
| S4 Apparently Secure | SC Special Concern |
| S5 Secure | NAR Not at Risk |
| SNA Unranked | SARA Schedule |
| COSSARO | Schedule 1 Officially Protected under SARA |
| END Endangered | City of Guelph County Status |
| THR Threatened | X Significant |
| SC Special Concern | |
| NAR Not at Risk | |

Arkell Rd Properties EIS

Mammal Species Reported From the Study Area

| Scientific Name | Common Name | SRANK ¹ | SARO ² | COSEWIC ³ | SARA Schedule ⁴ | City of Guelph Status ⁵ | Ontario Mammal Atlas ⁶ | NHIC Data ⁷ | NRSI Observed |
|----------------------------------|-----------------------------|--------------------|-------------------|----------------------|----------------------------|------------------------------------|-----------------------------------|------------------------|---------------|
| <i>Didelphis virginiana</i> | Virginia Opossum | S4 | | | | | X | | |
| Insectivora | | | | | | | | | |
| <i>Blarina brevicauda</i> | Northern Short-tailed Shrew | S5 | | | | | X | | X |
| <i>Condylura cristata</i> | Star-nosed Mole | S5 | | | | | X | | |
| <i>Parascalops breweri</i> | Hairy-tailed Mole | S4 | | | | X | X | | |
| <i>Sorex cinereus</i> | Masked Shrew | S5 | | | | | X | | |
| <i>Sorex fumeus</i> | Smoky Shrew | S5 | | | | | X | | |
| Chiroptera | | | | | | | | | |
| <i>Eptesicus fuscus</i> | Big Brown Bat | S4 | | | | | X | | |
| <i>Lasionycteris noctivagans</i> | Silver-haired Bat | S4 | | | | | X | | |
| <i>Lasiurus borealis</i> | Eastern Red Bat | S4 | | | | | X | | |
| <i>Lasiurus cinereus</i> | Hoary Bat | S4 | | | | | X | | |
| <i>Myotis lucifugus</i> | Little Brown Myotis | S4 | END | E | Schedule 1 | | X | | |
| Lagomorpha | | | | | | | | | |
| <i>Lepus americanus</i> | Snowshoe Hare | S5 | | | | X | X | | |
| <i>Lepus europaeus</i> | European Hare | SNA | | | | | X | | |
| <i>Sylvilagus floridanus</i> | Eastern Cottontail | S5 | | | | | X | | X |
| Rodentia | | | | | | | | | |
| <i>Castor canadensis</i> | Beaver | S5 | | | | | X | | |
| <i>Erethizon dorsatum</i> | Porcupine | S5 | | | | | X | | |
| <i>Glaucomys sabrinus</i> | Northern Flying Squirrel | S5 | | | | X | X | | |
| <i>Marmota monax</i> | Woodchuck | S5 | | | | | X | | |
| <i>Microtus pennsylvanicus</i> | Meadow Vole | S5 | | | | | X | | |
| <i>Mus musculus</i> | House Mouse | SNA | | | | | X | | |
| <i>Napaeozapus insignis</i> | Woodland Jumping Mouse | S5 | | | | X | X | | |
| <i>Ondatra zibethicus</i> | Muskrat | S5 | | | | | X | | |
| <i>Peromyscus leucopus</i> | White-footed Mouse | S5 | | | | | X | | |
| <i>Peromyscus maniculatus</i> | Deer Mouse | S5 | | | | | X | | |
| <i>Rattus norvegicus</i> | Norway Rat | SNA | | | | | X | | |
| <i>Sciurus carolinensis</i> | Eastern Gray Squirrel | S5 | | | | | X | | |
| <i>Tamiasciurus hudsonicus</i> | Red Squirrel | S5 | | | | | X | | X |
| <i>Tamias striatus</i> | Eastern Chipmunk | S5 | | | | | X | | X |
| <i>Zapus hudsonius</i> | Meadow Jumping Mouse | S5 | | | | | X | | |
| Carnivora | | | | | | | | | |
| <i>Canis latrans</i> | Coyote | S5 | | | | | X | | X |
| <i>Mephitis mephitis</i> | Striped Skunk | S5 | | | | | X | | |
| <i>Mustela erminea</i> | Ermine | S5 | | | | | X | | |

| | | | | | | | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|----|--|--|--|---|--------------|----|---|
| <i>Mustela frenata</i> | Long-tailed Weasel | S4 | | | | X | X | | |
| <i>Mustela vison</i> | American Mink | S4 | | | | | X | | |
| <i>Procyon lotor</i> | Northern Raccoon | S5 | | | | | X | | X |
| <i>Vulpes vulpes</i> | Red Fox | S5 | | | | | X | | X |
| | | | | | | | | | |
| Artiodactyla | Deer and Bison | | | | | | | | |
| <i>Odocoileus virginianus</i> | White-tailed Deer | S5 | | | | | X | | X |
| ^a MNRF 2017; ^b MNRF 2016; ^c COSEWIC 2018; ^d Government of Canada 2018; ^e City of Guelph 2012; ^f Dobbyn 1994; ^g OMNR 2018 | | | | | | | Total | 37 | 0 |
| | | | | | | | | | 8 |

| Legend | |
|-------------------------------------|------------------------------------------------------|
| SRANK | COSEWIC |
| S1 Critically Imperiled | NAR Not at Risk |
| S2 Imperiled | SC Special Concern |
| S3 Vulnerable | T Threatened |
| S4 Apparently Secure | E Endangered |
| S5 Secure | XT Extirpated |
| SU Unrankable | DD Data Deficient |
| SNA Unranked | SARA Schedule |
| SX Presumed Extirpated | Schedule 1 Officially Protected under SARA |
| | Wellington County (Natural Heritage Strategy) |
| SH Possibly Extirpated (Historical) | |
| S#? Rank Uncertain | X Present |
| COSSARO | R Rare |
| NAR Not at Risk | City of Guelph Status |
| SC Special Concern | X Locally Significant |
| THR Threatened | |
| END Endangered | |
| EXP Extirpated | |
| DD Data Deficient | |

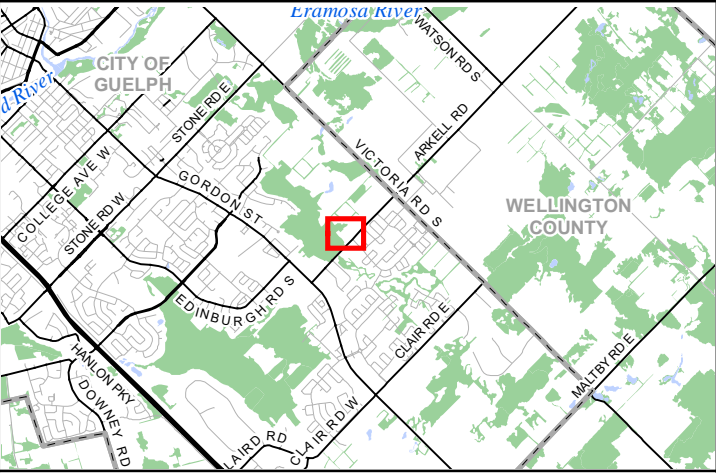
Maps



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Arkell Road Properties Environmental Impact Study

Study Area and Natural Heritage Features

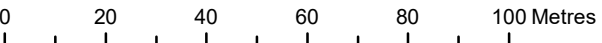


- Legend**
- Subject Property
 - Significant Natural Area (OPA42)**
 - Provincially Significant Wetland (PSW) - GRCA Reviewed (July 22, 2016)
 - Significant Woodland - City Reviewed (July 22, 2016)



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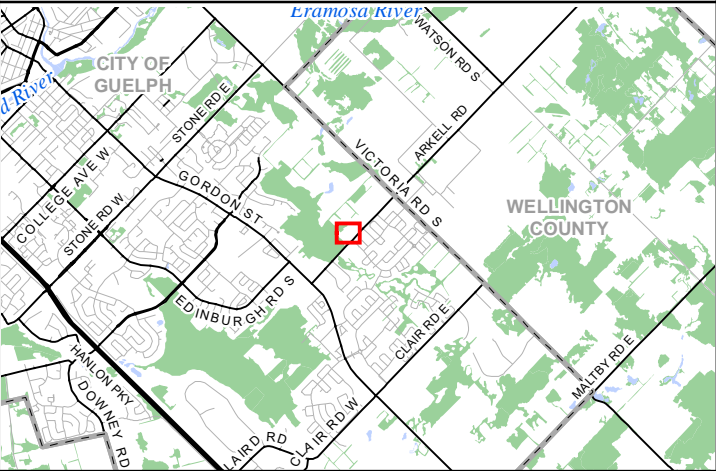
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|----------------------------------------|------------------------------------------------|
| Project: 1771 Date: August 23, 2018 | NAD83 - UTM Zone 17 Size: 11x17" 1:1,500 |
|----------------------------------------|------------------------------------------------|





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Arkell Road Properties Environmental Impact Study Monitoring Station Locations

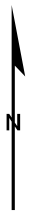


- Legend**
- Subject Property
 - Anuran Station
 - Anuran Station / Bird Breeding Monitoring (BMB)
 - Bird Breeding Monitoring (BMB) / Nocturnal Bird Monitoring (NOC)
 - Snakeboard Cover Location (SNK)



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| | |
|----------------------------------------|------------------------------------------------|
| Project: 1771 Date: August 23, 2018 | NAD83 - UTM Zone 17 Size: 11x17" 1:1,000 |
|----------------------------------------|------------------------------------------------|





Path: X:\1771_ArkellRoadPropertiesEIS\NRSI_1771_Map3_BatMonitoring_1K_2018_08_03_LEH.mxd

Map 3

Arkell Road Properties
Environmental Impact Study
Bat Monitoring Stations

Legend

Subject Property

Potential Maternity Roost Building

Potential Bat Cavity Tree

Bat Exit Survey Visual and Acoustic Monitoring Station

Camera Orientation

Bat Foraging Habitat Acoustic Monitoring Station

NRSI Biologist Visual Monitoring Station

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

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Project: 1771
Date: August 3, 2018

NAD83 - UTM Zone 17
Size: 11x17"
1:1,000

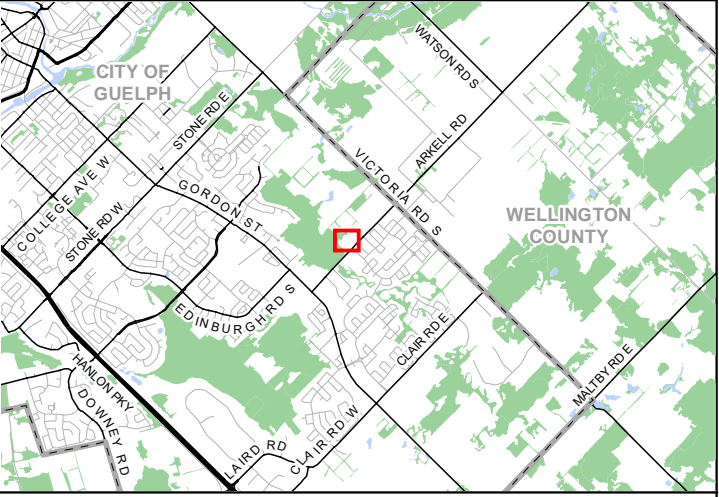
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Metres



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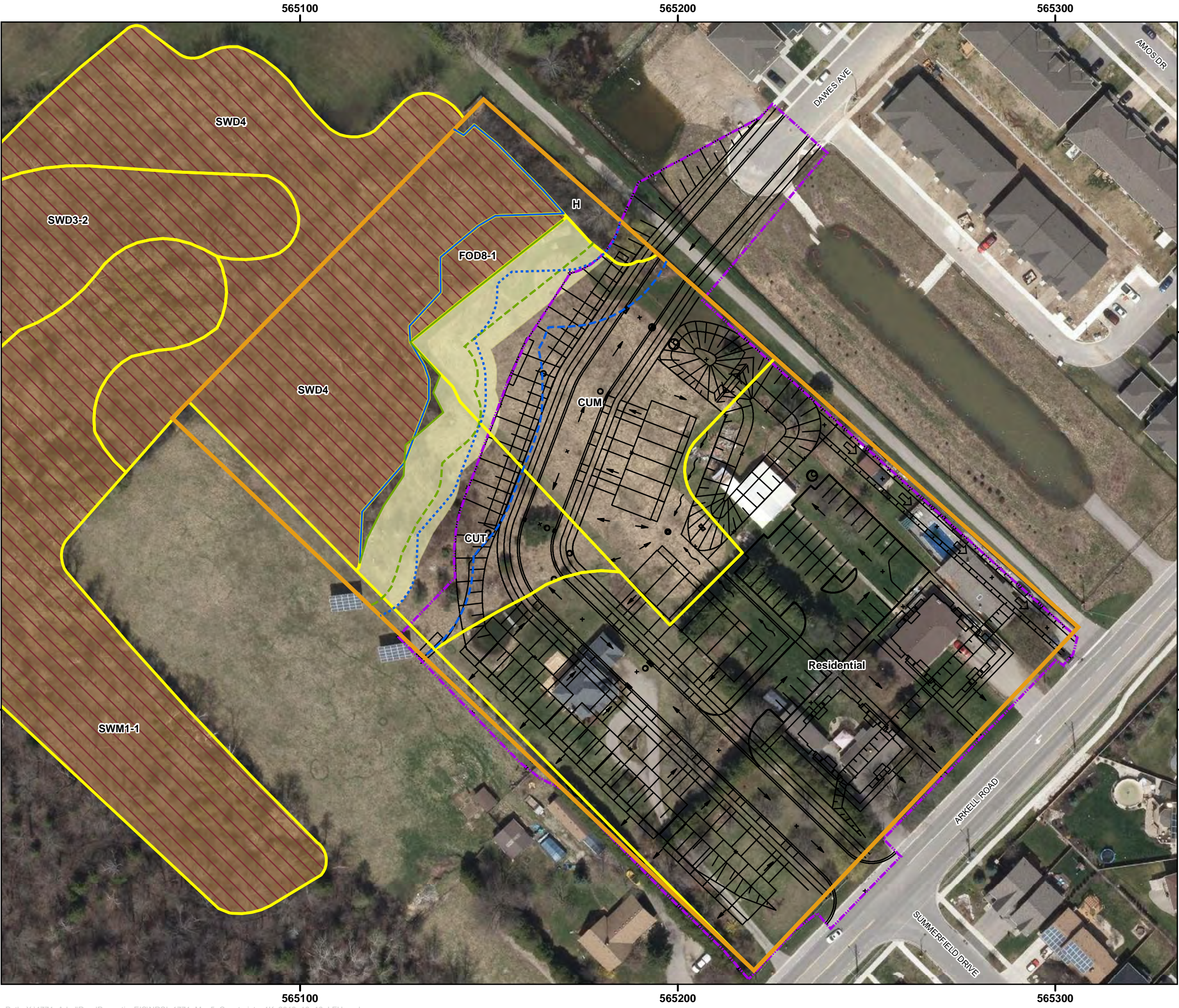
Arkell Road Properties Environmental Impact Study Vegetation Communities and Flagged Natural Features



- Legend**
- Subject Property
 - Dripline Boundary (NRSI Flagged, City Approved July 22, 2016)
 - Wetland Boundary (NRSI Flagged, GRCA Approved July 22, 2016)
 - Ecological Land Classification (ELC)
 - (CUM) Cultural Meadow
 - (CUT) Cultural Thicket
 - (FOD8-1) Fresh - Moist Poplar Deciduous Forest Type
 - (H) Hedgerow
 - (SWD3-2) Silver Maple Mineral Deciduous Swamp Type
 - (SWD4) Mineral Deciduous Swamp Ecosite
 - (SWM1-1) White Cedar Mineral Mixed Swamp Ecosite

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| | |
|--------------------------------------|------------------------------------------------|
| Project: 1771 Date: July 26, 2018 | NAD83 - UTM Zone 17 Size: 11x17" 1:1,000 |
|--------------------------------------|------------------------------------------------|



Path: X:\1771_ArkellRoadPropertiesEIS\NRSI_1771_Map5_Constraints_1K_2018_10_10_LEH.mxd

Map 5

Arkell Road Properties
Environmental Impact Study
Natural Heritage Constraints

Legend

- Subject Property
- Significant Woodland Dripline (NRSI Flagged, City Approved July 22, 2016)
- Significant Woodland Buffer (10m)
- Wetland Boundary (NRSI Flagged, GRCA Approved July 22, 2016)
- Wetland Buffer (15m)
- Wetland Buffer (30m)
- Limit of Construction
- Site Plan

Significant Wildlife Habitat

- Special Concern and Rare Wildlife (Eastern Wood-Pewee)
- Deer Winter Congregation Area

Species at Risk Habitat

- Little Brown Myotis - Candidate Foraging Habitat
- Ecological Land Classification (ELC)

(CUM) Cultural Meadow
(CUT) Cultural Thicket
(FOD8-1) Fresh - Moist Poplar Deciduous Forest Type
(H) Hedgerow
(SWD3-2) Silver Maple Mineral Deciduous Swamp Type
(SWD4) Mineral Deciduous Swamp Ecosite
(SWM1-1) White Cedar Mineral Mixed Swamp Ecosite

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|-----------------------------------------|------------------------------------------------|
| Project: 1771 Date: October 10, 2018 | NAD83 - UTM Zone 17 Size: 11x17" 1:1,000 |
|-----------------------------------------|------------------------------------------------|

0 10 20 30 40 50 60 Metres