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

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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 2021). However, the proposed residential redevelopment 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). Due to the presence of the PSW adjacent to the proposed redevelopment, a majority of the property is regulated by the Grand River Conservation Authority (GRCA) under Ontario Regulation 150/06.

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);
- Peto MacCallum Ltd. (geotechnical);
- MHBC Planning Urban Design & Landscape Architecture (planning), and
- NRSI (natural heritage).

As part of ongoing work since 2016, NRSI prepared an EIS for the subject property and proposed redevelopment in October 2018 (NRSI 2018). Agency comments were addressed in a revised EIS / TIPP and submitted in May 2020 (NRSI). The City of Guelph and GRCA provided the team with additional comments in December 2020 and January 2021 on the draft plan submission that included reports and mapping from the team members listed above.

The team has worked collaboratively to prepare a revised draft plan of development and supporting study reports to satisfy the City and GRCA. This revised EIS supersedes the May 2020 submission and addresses all City of Guelph and GRCA staff comments.

This EIS has been prepared in accordance with the GRCA wetland policy (2015) and GRCA's *EIS Guidelines and Submission Standards for Wetlands* document (GRCA 2005) as well as the City of Guelph's Guidelines for the Preparation of Environmental Impact Studies (City of Guelph 2020), and the City's Official Plan (OP) (2021).

2.0 Project Scoping

2.1 Proposed Undertaking

Crescent Homes is proposing to redevelop the property to construct 70 new residential units; 48 stacked townhouse units, and 22 cluster townhouse units. In addition to the proposed townhouse buildings, two surface parking areas are proposed for the stacked townhouse units. In total, 63 surface parking spaces are proposed (including two Type A and one Type B barrier free space). The cluster townhouse dwellings are proposed to have driveway parking. The development will also have a municipal right-of-way, a stormwater management block, and an open space block. 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. A detailed discussion of the proposed undertaking is provided in Sections 7.1 and 7.2.

2.2 Collection and Review of Background Information

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 (2021);
- GRCA Ontario Regulation 150/06 (Government of Ontario 2013);
- Ontario Ministry of Natural Resources and Forestry (MNRF), Guelph District;
- City of Guelph Official Plan (2021);
- City of Guelph's Guidelines for the Preparation of Environmental Impact Studies (2020);
- City of Guelph Locally Significant Species Lists;
- Natural Heritage Information Centre (NHIC) database (MNRF 2021);
- Guelph Natural Heritage System Report (Dougan & Associates 2009);
- Government of Canada SARA Registry (2021);
- Ontario Breeding Bird Atlas (OBBA) (Bird Studies Canada (BSC) et al. 2006);
- Ontario Reptile and Amphibian Atlas (Ontario Nature 2019);
- Atlas of the Mammals of Ontario (Dobbyn 1994);

- Ontario Butterfly Atlas (MacNaughton et al. 2021);
- Ontario Odonata Atlas (MNRF 2021);
- Rare Vascular Plants of Ontario, Fourth Version (Oldham and Brinker 2009)

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.

2.2.1 Significant Species 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 the study area. SAR are those listed on the Species at Risk in Ontario List (Ontario Ministry of Environment, Conservation and Parks (MECP) 2021). 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* (Government of Ontario 2020), 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.

Habitat for SCC is considered Significant Wildlife Habitat (SWH), which is afforded protection under the Provincial Policy Statement (Ontario Ministry of Municipal Affairs and Housing (OMMAH) 2020) and the City of Guelph OP (2021). The preferred habitats for reported SAR/SCC were cross-referenced against habitats within and adjacent to the subject property.

This was completed to ensure that the potential presence of all SAR and SCC was adequately assessed in the EIS.

Of the SAR and SCC that were identified as having records within the study area and surrounding 10km, three SAR and seven SCC were flagged during the preliminary screening as potentially having suitable habitat within the vicinity of the subject property. Field surveys conducted in 2016 and 2017 were designed to detect the presence of the above-listed SAR and SCC and their habitats. The final significant species screening, updated based on the results of the field surveys, is provided in Appendix II.

2.2.2 Significant Wildlife Habitat Screening

A screening exercise was also conducted to determine the presence of any SWH types within the study area. The Significant Wildlife Habitat Technical Guide (SWHTG) is a guideline document that outlines the types of habitats that the MNRF considers significant in Ontario (OMNR 2000), as well as criteria to identify these habitats within Ecoregion 6E where the study area is located (MNRF 2015a). The SWHTG groups SWH into four broad categories: i) seasonal concentration areas, ii) rare vegetation communities and specialized wildlife habitat, iii) habitats of SCC, and iv) animal movement corridors.

Based on background information review and desktop analysis, a preliminary screening for potential SWH was completed within the study area. This review compared site conditions with criteria set in the SWH Ecoregion 6E Criterion Schedule (MNRF 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 III.

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, 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 IV.

3.0 Relevant Policies, Legislation and Planning Studies

Natural features identified during the review of background information and field investigations were evaluated against relevant policies, legislation, and planning studies, summarized in **Error! Reference source not found.**, to help inform suitable land-use concepts, guide the layout of development, and identify areas to be protected. The PPS, federal protection, local regulations, relevant studies, and local Official Plans have specific policies that speak to development activities potentially impacting natural heritage features.

Table 1. Relevant Policies, Legislation, Planning Studies, Guidelines, and Manuals

Policy/Legislation/Study	Description	Project Relevance
Provincial Policy Statement (OMMAH 2020).	• Issued under the authority of Section 3 of the Planning Act and came into effect on May 1, 2020, replacing the 2014 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 (Ontario Ministry of Natural Resources (OMNR) 2010) and the Significant Wildlife Habitat Technical Guide (OMNR 2000) were prepared by the MNRF to provide guidance on identifying natural features and in interpreting the Natural Heritage sections of the PPS.	• The following natural features afforded consideration within the PPS were identified within the study area: ○ Significant Woodland, ○ Significant Wetland, and ○ Significant Wildlife Habitat.
Endangered Species Act (Government of Ontario 2007; 2020)	• 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. • Ontario Regulation 242/088 under the ESA applies to all species on the Species at Risk in Ontario List, as of June 2, 2017.	• Based on the background review and SAR/SCC screening, several SAR were identified as potentially occurring within the subject property (Appendix III).
Migratory Birds Convention Act, 1994 (Government of Canada 2017)	• 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 April 1 and August 31, however, this is a guideline,	• Species protected by the MBCA are known to occur and were observed within the subject property during the field surveys in 2016 and 2017. • The timing of construction activities, especially vegetation clearing and site grading, must have consideration for the MBCA.

Policy/Legislation/Study	Description	Project Relevance
	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).	
Canadian Fisheries Act, 1985 (Government of Canada 2019)	• Last amended in August 2019, the federal *Fisheries Act* provides for the protection of fish and fish habitat. • The Act prohibits the 'harmful alteration, disruption, and destruction' (HADD) of fish and their habitats. • 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.	• 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, 1997 (Government of Ontario 2019)	• The FWCA provides protection for certain bird species, not protected under the MBCA (e.g., raptors and owl), as well as furbearing mammals and their dens or habitual dwellings, aside from the Red Fox (*Vulpes vulpes*) and Striped Skunk (*Mephitis mephitis*).	• The timing of construction activities, especially vegetation clearing and site grading must have consideration for bird nesting (including nesting season for Raptors, Hawks and Owls) and den sites for furbearing mammals. • Wildlife sweeps by a qualified biologist are recommended in advance of any vegetation clearing and site grubbing during the bird active season to ensure no active nests/dens are present.
City of Guelph Official Plan (2021)	• Development is not permitted within the Natural Heritage System including minimum established buffers, with the exception of various restricted uses that may be permitted in some cases, as specified by other Official Plan policies (Section 4.1.1.11).	Natural Heritage System features are present within the study area. In general, development and site alteration are not permitted within the Natural Heritage System with the exception of permitted uses described in Section 4.1.1.11 of the OP • The following Significant Natural Area features of the Natural Heritage System are present within the subject property:

Policy/Legislation/Study	Description	Project Relevance
	• Section 4.1.1.11 states that minimum buffers have not been applied to lands containing existing development which may preclude achievement of the minimum buffers. An EIS is required for redevelopment of these sites where buffer widths are established and justified. • Consideration for Urban Forests that are <1 ha must be taken to determine opportunities for restoration and enhancement (Section 4.1.6).	○ **Provincially Significant Wetlands** ○ **Significant Woodlands** ○ **Significant Wildlife Habitat** • The following Natural Area features of the Natural Heritage System are present within the subject property: ○ **Habitat for Significant Species** Development or site alteration may be permitted within Habitat for Significant Species providing it can be demonstrated that there will be no negative impacts to form or function. • The proposed undertaking includes extending an existing municipal road from the adjacent development (Dawes Avenue). This extension of the municipally required road through the Arkell Road properties and associated 3:1 slope will encroach into the 30m buffer to the PSW; however, will be outside of the 10m buffer to the Significant Woodland. However, in accordance with Policy 4.1.1.11, this EIS identifies buffers adjacent to the Significant Natural Areas and the Dawes Road extension that will ensure the long-term protection of the natural features.
City of Guelph Tree By-law Number (2010) - 19058 (2010)	• 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.	• A Tree Inventory and Preservation Plan is required to demonstrate how trees on-site will be protected from injury during construction, while outlining a replanting and compensation strategy where appropriate • Grading and servicing works associated with the proposed redevelopment will result in the removal or potential injury to trees and their root systems • A TIPP report is appended to this EIS (Appendix V) that summarizes inventory information, identified potential impacts to trees and provides recommendations for tree protection, mitigation

Policy/Legislation/Study	Description	Project Relevance
		and suitable compensation measures to be considered at the Detailed Design stage.
City of Guelph Tree Technical Manual (2019a)	• Developed by the City of Guelph to support and supplement existing municipal policies (such as the Official Plan and By-law (2010)-19058). • Promotes best practices for tree management and the maintenance and enhancement of Guelph's tree canopy, and establishes standards for tree-related plans and reports.	• Sets out that a Tree Inventory and Preservation Plan is required to inform the draft plan and a detailed Tree Inventory and Preservation Plan and Vegetation Compensation Plan are required at the Detailed Design stage. • Establishes tree protection zones, and compensation approaches for loss of tree cover. • Provides standard drawings for tree protection measures and tree plantings. A TIPP report is appended to this EIS (Appendix V) that summarizes inventory information, identified potential impacts to trees and provides recommendations for tree protection, mitigation and suitable compensation measures to be considered at the Detailed Design stage.
GRCA Regulation 150/06 Under the Conservation Authorities Act (Government of Ontario 2013)	• Regulation issued under *Conservation Authorities Act,* R.S.O. 1990. • Through this regulation, the GRCA has the responsibility to regulate activities in natural and hazardous areas (i.e., areas in and near rivers, streams, floodplains, wetlands, and slopes). • GRCA requires that an EIS be undertaken in accordance with their *EIS Guidelines and Submission Standards for Wetlands* where development is proposed within 120m of PSW or 30m of non-PSW (GRCA 2005).	• Due to the presence of the Torrance Creek Provincially Significant Wetland Complex within the natural heritage area, more than half of the subject property is regulated by the GRCA. • In accordance with this policy, the proposed development must demonstrate no negative impacts to the regulated natural features or their ecological functions. • Permitting from the GRCA must be obtained for proposed works within regulated areas and adjacent lands.
Torrance Creek Subwatershed Study – Phase 1 (Totten Sims Hubicki Associates et al. 1999)	• The Torrance Creek Subwatershed Study (TCSWS) provides a management strategy to guide future development and ensure natural features within the subwatershed, including woodlots, wetlands, streams, and wildlife, are protected, enhanced, and rehabilitated.	• The stormwater management plan for the proposed development should meet the TCSWS's targets for control of water quantity and quality.

Policy/Legislation/Study	Description	Project Relevance
	• Serves to protect an aquifer in the subwatershed that provides drinking water for the City of Guelph. • Provides stormwater objectives for proposed developments in order to maintain existing surface and subsurface flows (water quantity) as well as to maintain water quality. • A Natural Heritage System within the subwatershed is mapped within the TCSWS and management approaches, including buffer guidelines, for individual natural heritage features are provided. • Fisheries and terrestrial management plans and monitoring strategies to implement within the subwatershed are provided.	• Significant natural heritage feature buffers within the subject property should consider the TCSWS buffer guidelines. • Restoration and planting plans and monitoring plans for the subject property should be developed at the Detailed Design stage with consideration of the management and monitoring strategies recommendations in the TCSWS.
Wetland Water Balance Risk Evaluation (Toronto and Region Conservation Authority (TRCA) 2017)	• This document provides step by step guidance to assess the sensitivity of vegetation communities, plant species, and wildlife in wetlands subject to changes in hydrology. • Guidance to assess the level of sensitivity and the magnitude of hydrological change is provided. • A flow chart is used to determine the overall risk the hydrological change has the wetland	• The proposed undertaking involves changes to the post-development catchment size, imperviousness, runoff and infiltration of the subject property. A stormwater pond and infiltration galleries are proposed that will alter the pre-development hydrology of the property. • The PSW on the subject property will receive discharge from the stormwater pond. • As such, a wetland water balance risk evaluation was undertaken to assess potential impacts to the PSW from the proposed undertaking.

4.0 Field Methods

A comprehensive, multi-season field program was developed and detailed in the revised TOR (Appendix IV), with the exception of bat surveys which are described in this report. To inform the due diligence process prior to the lands being purchased, the natural features boundaries were flagged by NRSI and reviewed by the City of Guelph and GRCA on July 22, 2016. Following the purchase of the properties, the full field program was initiated in February 2017. In total, 20 field visits were carried out between July 2016 and September 2017 to characterize the natural features within the subject property and complete a variety of field surveys which are described in detail within the revised TOR (Appendix IV) and summarized in Table 2. The locations of monitoring stations are shown on Maps 2 and 3.

4.1 Bat Species at Risk Surveys

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

4.1.1 Bat Habitat Assessment

An assessment of potential SAR 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* (Ontario Ministry of Natural Resources (OMNR 2011) and the Significant Wildlife Habitat Technical Guide (OMNR 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 Diameter at Breast Height (DBH) of ≥25cm, which may be suitable for roosting bats.

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
Staking Significant Woodland dripline (A. Nix, City of Guelph) and Wetland Boundary (N. Garland and R. Messier, GRCA)	MNRF (2014)	July 22, 2016	0815-1400	28	1	80	None	T. Brenton
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	City of Guelph By-Law (2010) No. 19058	July 11	0915-1700	23	1	40	None	T. Brenton J. Lance
		July 26	0800-1615	26	1	20	None	J. Lance J. Bannon
Breeding Bird Surveys	OBBA (2001)	June 6	0734-0814	12	2	100	None	K. Burrell

[1] See Terms of Reference in Appendix IV 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
		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
Winter Raptor Surveys	OMNR (2000)	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	MNRF (2011, 2017)	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

Survey Type	Protocol[1]	Date (2017)[2]	Start and End Time (24 hrs)	Temp. (°C)	Wind Speed (Beaufort Scale)	Cloud Cover (%)	Precipitation	Observers
		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
Bat SAR Roost Site Assessment (acoustic/exit surveys)	MNRF 2014	June 12	2127-2347	-	-	-	None	H. Fotherby, L. Hockley
		June 13	2130-0511	-	-	-	None	

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

[2] 2017 unless otherwise stated.

An inventory of all trees with a DBH of ≥25cm 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* (MNRF 2017) and (MNRF 2011). As per the guidelines outlined in MNRF (2017), *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 ≥10cm 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*).

4.1.2 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 two evenings in June, 2017 when weather conditions were suitable for bat activity (>10°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 and June 13, 2017. 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.

5.0 Existing Conditions

5.1 Soils, Terrain and Drainage

The subject property is located within the Speed River Subwatershed, while tributaries of the Eramosa River (Torrance Creek) are located 575m northwest of the subject property (MTE 2021a). The Eramosa River flows to the Speed River, which drains directly into the Grand River (MTE 2021). Topography on the subject property is gently sloping towards the northwest with elevations typically ranging between 333 to 335.5m (Soil Research Institute 1962, MTE 2021a). Surface water runoff drains from southeast to northwest, towards the PSW. The PSW forms the headwaters of Torrance Creek. Torrance Creek itself has been re-aligned and has undergone a natural channel design through the former Victoria Park West Golf Club. The channel design took an online pond offline and routed the channel around the pond. During field investigations, NRSI biologists did not observe any defined drainage channels, watercourses, or headwater drainage features within or adjacent to the subject property. Surface water appears to flow towards the wetland as sheet flow and dispersed runoff.

Background information indicates that the dominant soil type found within the study area is well-drained gravel (Hoffman et al. 1963) The Soil Map of Wellington County shows a moderately stony Burford Loam soil throughout the subject property (Soil Research Institute 1962). Peto MacCallum Ltd. completed a geotechnical investigation and gathered detailed information on the soils within the subject property (2018). A summary of the geotechnical investigation is provided below.

5.1.1 Soil Conditions

A Geotechnical Investigation was conducted by Peto MacCallum Ltd. in February and March 2017. Boreholes were drilled at six locations and groundwater monitoring wells were installed in four of the borehole locations. Based on the results of the investigation,, soils on the subject property generally consist of surficial topsoil, localized fill, and native soil deposits. The topsoil consists of both silt and fill material with traces of sand that was damp to moist during the investigation. The fill layer is variable in composition, consisting of either sand and gravel, or silt that was damp and moist during the investigation. The native soil deposits are cohesionless and are generally comprised of silt, sand, and a mix of sand and gravel. The native deposits are compact to very dense and had variable wetness from damp to saturated during the investigation (Peto McCallum Ltd. 2018).

MTE conducted in-situ infiltration testing in November 2021. Four test pits (TP101-21 through TP104-21) were advanced throughout the subject property. Details of this investigation are available in the Preliminary Stormwater Management Report and Hydrogeological Assessment Report (MTE 2021a, 2021b). Two test pits were located near the pond, and two others were located near Arkell Road. The average infiltration rate across the site (38.3mm/hr with a safety factor of 3) exceeds the 30mm/hr rate previously identified by Peto McCallum Ltd. in the Geotechnical Investigation Report (2018).

5.1.2 Groundwater Conditions

Groundwater monitoring wells were installed by Peto MacCallum Ltd, in four of the borehole locations on the subject property. Groundwater elevations monitored by MTE between March 2017 and August 2021 identified groundwater depths ranging from above the surface level, -0.71mbgs (May 2017) at MW4 near the wetland boundary, to 5.25mbgs (February 2021) at MW105-19 near Arkell Road. Based on the results of MTE's groundwater monitoring, the ground water level generally slopes down from north to south, away from the wetland area and is subject to seasonal fluctuations and precipitation patterns (Peto MacCallum 2018, MTE 2021b).

A Hydrogeological Investigation Report was completed by MTE for the Subject Lands, dated October 5, 2018 (MTE 2018). MTE also prepared a technical memo, dated January 9, 2020, to summarize groundwater monitoring in the PSW (SWD4 community) that occurred in late fall 2019 (MTE 2020b). An update to the Hydrogeological Investigation Report was completed by MTE in late 2021 to address comments from the City of Guelph and summarize further groundwater monitoring investigations in the PSW during 2020 and 2021 (MTE 2021b).

A mini-piezometer (MP1-19) was installed in the PSW (SWD4 community) near the northern property boundary close to groundwater monitoring well MW4 (MTE 2021b). A pressure transducer was installed to gather continuous groundwater level data. The purpose of this monitoring location was to assess the vertical gradient between the MW4 monitoring station located near the wetland boundary at the northern corner of the subject property and the mini-piezometer located just inside the PSW. Continuous and manual monitoring in the mini-piezometer occurred between October 9, 2019 and August 4, 2021. The mini piezometer was dry for the majority of this monitoring period, except for March and April 2020. When the groundwater table was high and below the ground surface. No standing water was observed outside of the mini piezometer during manual measurements. 2020 was the only year when observations and measurements were taken in March and April. As such, the results are

interpreted to be similar each spring. Based in the data collected in the mini piezometer and the adjacent monitoring well (MW4), the MTE determined that the hydroperiod of the wetland is controlled by seasonally high- water table conditions in the late winter and spring (MTE 2018).

A comparison of the groundwater levels observed within MP1-19 to those observed in MW4, located approximately 10 m south of MP1-19, found that the groundwater levels with MP1-19 were consistently above those within MW4. Based on the measurements collected at the mini-piezometer (MP1-19) and MW4, and the repeatedly observed absence of standing water in the vicinity of MP1-19, MTE interpreted that a downward vertical hydraulic gradient between the surface water and local groundwater is present in this area. Therefore, MTE interpreted that surface water infiltrates to the subsurface within the wetland, acting to recharge the groundwater (MTE 2021b).

5.2 Vegetation

5.2.1 Tree Inventory

Consistent with the City of Guelph's Tree By-law (2010 and Tree Technical Manual (2019a), a comprehensive tree inventory was undertaken documenting all trees that are ≥10cm 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 V.

5.2.2 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. The hedgerow feature shown on Map 4 was reviewed in the field with the City of Guelph on July 22, 2016 and was excluded from the adjacent significant woodland feature.

5.2.3 Vascular Flora

In total, 110 plant species were observed by NRSI biologists during the vascular flora inventories, ELC surveys and tree inventories in 2017. 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 IV). 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 TOR (Appendix V), 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.

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 (*Populus balsamifera*) and Trembling Aspen (*Populus tremuloides*) are abundant. Common Buckthorn (*Rhamnus cathartica*) 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 (*Acer saccharinum*) is dominant, with a lesser proportion of Green Ash (*Fraxinus pennsylvanica*) present. Within the subcanopy, Green Ash, Common Buckthorn, and Glossy Buckthorn (*Frangula alnus*) are occasional. Common Buckthorn, Glossy Buckthorn, Green Ash, and Common Elderberry (*Sambucus canadensis*) are present within the understorey, while Canada Enchanter's Nightshade (*Circaea canadensis* ssp*. canadensis*), Common Dandelion (*Taraxacum officinale*), Common Boneset (*Eupatorium perfoliatum*) and Wild Black Currant (*Ribes americana*) 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 American Elm (*Ulmus americana*). The understorey and ground cover layers are dominated by the invasive Common and Glossy Buckthorns.
SWM1-1	White Cedar Mineral Mixed Swamp Ecosite	Located off the subject property, this community is dominated by Eastern White Cedar (*Thuja occidentalis*), 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 Common Elderberry, Glossy Buckthorn, and Riverbank Grape (*Vitis riparia*), while the groundcover is

ELC Ecosite Type	ELC Description	Environmental Characteristics
		dominated by Thicket Creeper (*Parthenocissus vitacea*) 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 (*Betula papyrifera*) 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 (*Cornus sericea*) and Common and Glossy Buckthorn. The ground cover is comprised of Goldenrod species and, to a lesser degree, Wild Strawberry (*Fragaria virginiana*).
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 (*Poa pratensis* ssp. *pratensis*), followed by Goldenrod species and Smooth Brome (*Bromus inermis*) 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 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.

5.2.4 Wetland Conditions

The wetland adjacent to the proposed development is part of a large PSW complex known as the Torrance Creek Wetland Complex. The wetland forms the headwaters of a tributary to Torrance Creek. Adjacent to the proposed development the wetland slopes gently to the west. Surface runoff from the subject property, which slopes gently towards the wetland, contributes to the hydrology of the wetland. The Torrance Creek Wetland sits in a low area in the surrounding landscape and drains the surrounding area, which has become highly developed in recent years. Adjacent to the proposed development the wetland is composed of 3 swamp ecosites: SWD4, SWD3-2, and SWM1-1 as described in Table 3. The dominant species present in the wetland adjacent to the proposed development and the proposed SWM pond outlet include:

- American Elm (*Ulmus americana)*
- Common Buckthorn (*Rhamnus cathartica*)
- Glossy Buckthorn (*Frangula alnus*)
- Green Ash (*Fraxinus pennsylvanica*)
- Trembling Aspen (*Populus tremuloides*)
- Silver Maple (*Acer saccharinum*)
- White Cedar (*Thuja occidentalis*)

Based on MTE's groundwater level monitoring results and their hydraulic gradient analysis, the hydroperiod of the wetland is controlled by seasonally high groundwater conditions and periods of high surface water runoff directed towards the wetland from the subject property. During periods of low water table conditions, a downward gradient is present in the wetland, allowing for infiltration to the shallow groundwater table (MTE 2021b). These drier periods also correspond with periods of lower surface water runoff (Figure 5-4, MTE 2021a), which create the drier periods required to maintain a swamp wetland community.

A shallow groundwater divide appears to be present near the wetland boundary as MTE's groundwater monitoring in the developable area of the subject property indicates that the shallow groundwater flow is from north to south, away from the wetland. (MTE 2021a). NRSI's biologists noted a lack of groundwater indicator species and that there were no observable seepage features in the wetland. Infiltration throughout the remainder of the subject property contributes to the shallow groundwater table that moves north to south, away from the wetland, as discussed in the Stormwater Management Report (MTE 2021a).

Under existing conditions, the total surface runoff catchment area for the wetland on the subject property is 3.11ha, which is the entirety of the subject property and some adjacent lands that slope towards the wetland. The groundwater catchment area for the wetland is not located within the subject property, as infiltration occurring within the subject property contributes to shallow groundwater flows that are directed away from the wetland (MTE 2021a).

5.3 Wildlife

Lists of each fauna group observed and known to occur in the study area as described below are provided in Appendix VI.

5.3.1 Birds

In total, 114 species are reported from the 10 x 10km OBBA square that overlaps with the study area (BSC et al. 2006). 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. During the 2017 breeding bird surveys (including nocturnal bird surveys), NRSI biologists observed 32 bird species within the study area, of which 28 exhibited signs of breeding such as males singing, females carrying food or nest materials, and the presence of fledged young. NRSI biologists observed an additional 24 species during other surveys over the course of the 2017 field season, for an overall total of 56 bird species.

In total, 14 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. 2006, MNRF 2018, MNRF 2021). Based on results of the preliminary SAR and SCC screening, habitats within the study area were identified as potentially suitable for five of these bird species (Appendix III). Based on field work conducted, one of these species, a singing male Eastern Wood-Pewee (*Contopus virens*), 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 proposed development area. 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.

In total, 16 locally significant bird species (City of Guelph 2012) were observed within the study area during field surveys (Appendix VI). Of these species, the following six were observed by NRSI biologists as exhibiting signs of breeding:

- 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). Suitable breeding habitat for these 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 four 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.

5.3.2 Herpetofauna

According to the Ontario Amphibian and Reptile Atlas (ORAA) and other available background resources, 26 species of herpetofauna are reported from the vicinity (approximately 10km) of the subject property, including seven significant species (MNRF 2018, Ontario Nature 2019). Based on the results of the SAR and SCC screening (Appendix II), two herpetofauna species were identified as having suitable habitat within the study area: Western Chorus Frog (*Pseudacris triseriata*) and Northern 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*), Green Frog (*Lithobates clamitans*), and Gray Treefrog (*Hyla versicolor*).

Individual American Toads and Green Frogs were heard calling at one 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 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.

5.3.3 Insects

Bumble Bees

Based on background sources (MNRF 2018), 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 Eastern Common Bumble Bee (*Bombus impatiens*) and Two-spotted Bumble Bee (*B. bimaculatus*) were observed. Both of these Bumble Bee species are common and secure in Ontario.

Butterflies

According to the Ontario Butterfly Atlas and other background resources, 56 butterfly species are known to occur within the 10 x 10km atlas square that overlaps with the study area (MNRF 2018, Macnaughton et al. 2020). Based on results of the preliminary SAR and SCC screening, habitats within the study area were identified as potentially suitable for 3 of these butterfly species (Appendix III): Monarch (*Danaus plexippus*), Tawny Emperor (*Asterocampa clyton*), and

West Virginia White (*Pieris virginiensis*). NRSI biologists observed seven butterfly species during surveys completed within the study area, but did not detect any of the above-noted significant species. Of the species observed by NRSI during 2017 field surveys, Wild Indigo Duskywing (*Erynnis baptisiae*) is the only species considered significant in the City of Guelph (City of Guelph 2012). A complete list of species observed is provided in Appendix VI.

Odonata

According to the Ontario Odonata Atlas (MNRF 2021), 65 odonata (dragonfly and damselfly) species are known to occur within the 10 x 10km atlas square that overlaps with the study area. Based on results of the preliminary SAR and SCC screening, habitats within the study area were identified as potentially suitable for two dragonfly species (Appendix III): Unicorn Clubtail (*Arigomphus villosipes*) and Spatterdock Darner (*Rhionaeschna mutata*). NRSI biologists observed eight odonata species during surveys completed within the study area, but did not detect any of the above-noted significant species. No species were observed that are considered significant in the City of Guelph (City of Guelph 2012) (Appendix VI).

5.3.4 Mammals

According to the Mammal Atlas of Ontario and other background resources, 46 mammal species are reported from within 10km of the study area, including six significant species (Dobbyn 1994, MNRF 2018). Based on the results of the SAR and SCC screening (Appendix II), three SAR bats were identified as potentially having suitable habitat in the study area: Little Brown Myotis, Northern Myotis, and Tri-colored Bat. The results of SAR bat studies are summarized in the following sections.

During 2017 field studies, NRSI biologists observed 14 mammal species or evidence of these species such as tracks, scat, etc. These included species commonly found within urban and woodland environments such as 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 ≥25cm 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, 2017. 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 Passes
	North		East		South		West		
	Obs.	Cam	Obs.	Cam	Obs.	Cam	Obs.	Cam	
June 12, 2017	0	0	0	0	2	1	0	0	1
June 13, 2017	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 fourth 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 three species groupings and one species as shown in the following figure.

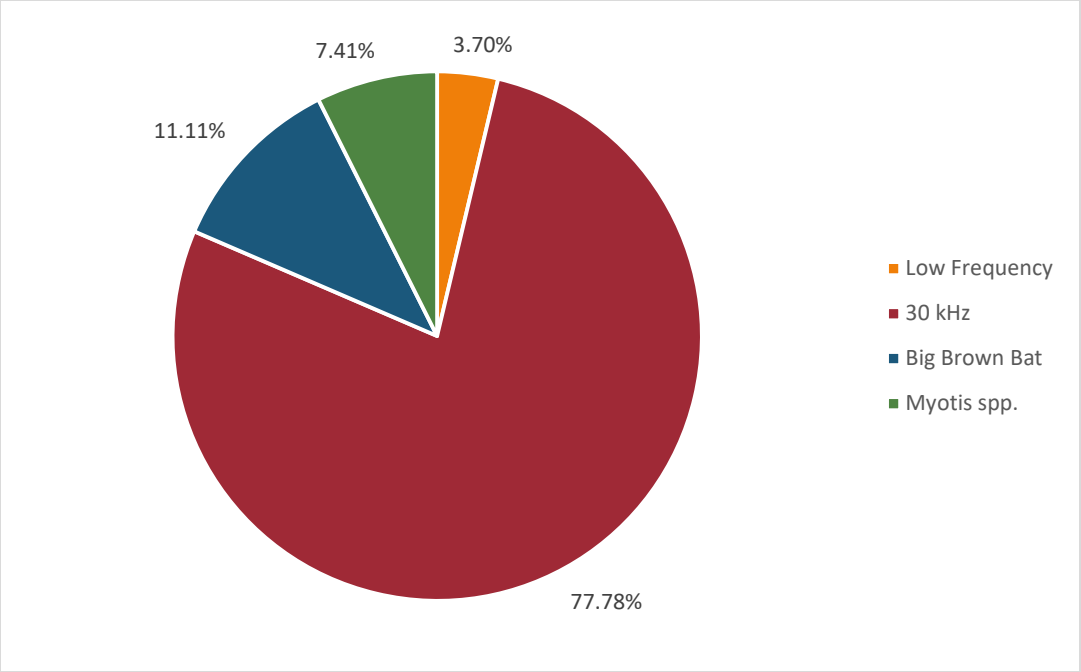

Figure 1. Bat Species Classification (Building 1)

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). Since only a maximum of two *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.

A total of four 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.

Table 5. Call Classification for Ontario Bat Species

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

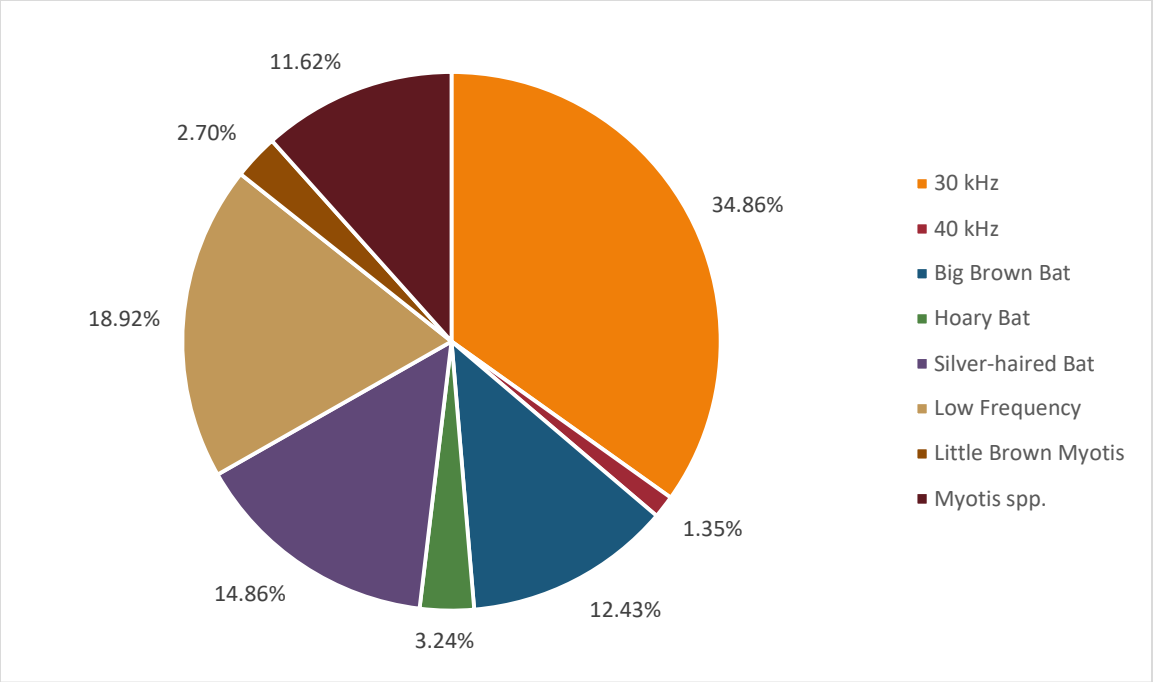

Figure 2. Bat Species Classification (BAT-001)

In total, 370 bat pass sequences were recorded on the evening of June 12, 2017. The majority of these bat pass sequences were attributed to non-SAR bats. This included the 30 kHz (Big Brown or Silver-haired Bats) and Low Frequency (Big Brown, Hoary, or Silver-haired Bat) groupings. A number of calls were also directly classified to the species level as Big Brown Bat, Hoary Bat, and Silver-haired Bat.

Bat SAR were also confirmed during these surveys. Ten of the 370 collected bat pass sequences were classified as Little Brown Myotis and 43 to the Myotis species grouping (Eastern Small-footed, Little Brown or Northern Myotis). Hence a total of approximately 14% of the bat calls were confirmed to be from SAR. 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.

In addition, a total of five calls were also classified 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.

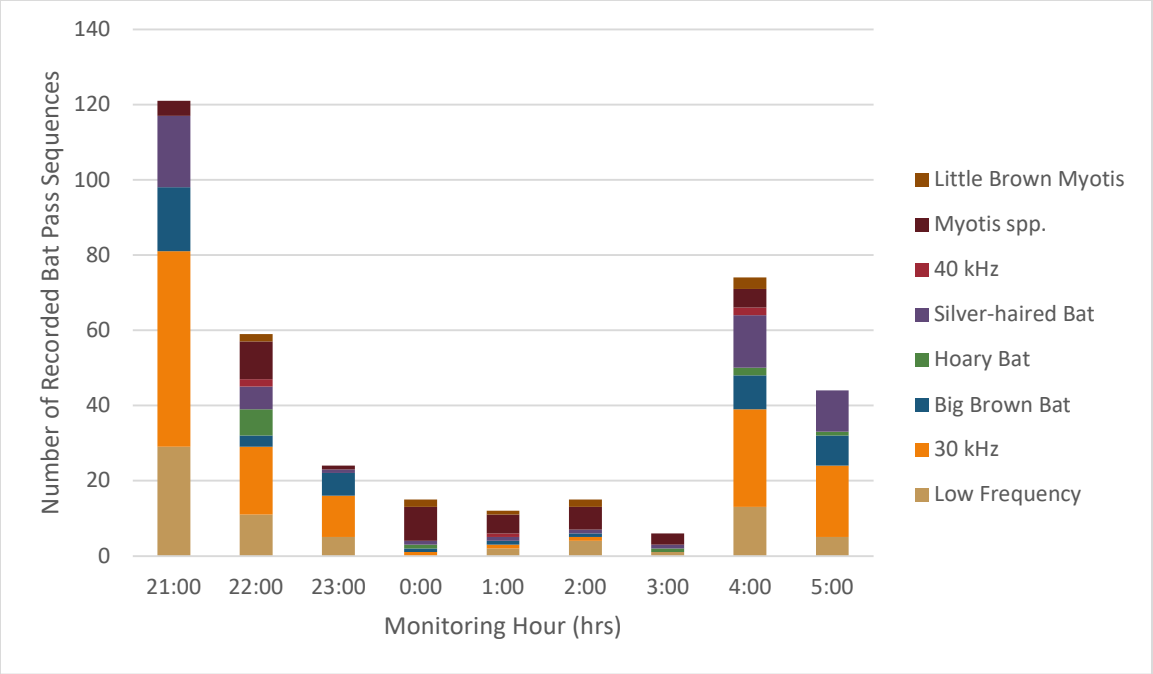

Figure 3. Bat Species Detected per Monitoring Hour at Acoustic Monitoring Station BAT-001

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 2013, MECP 2021).

6.0 Significance and Sensitivity of Natural Features

This section of the report provides an overview of the significant and sensitive natural heritage features in the study area. Many of these significant features are also considered part of the City of Guelph NHS, including the PSW, Significant Woodland, and Significant Wildlife Habitat, all of which are considered Significant Natural Areas (City of Guelph 2021). The City of Guelph provides minimum established buffers for Significant Natural Areas and Natural Areas within the NHS. These buffers are considered minimum widths and may be expanded on depending on the sensitivity of the habitats and species within these features as well as based on the nature of the proposed development and site. Buffer widths are described below along with necessary rationale. Necessary buffers for each of these features are discussed below along with policies related to the protection of their form and functions.

This section also includes a vegetation and wildlife sensitivity analysis that assesses the sensitivity and tolerance of the vegetation and anuran communities present in the PSW. The sensitivity analysis is used to complete a wetland water balance risk evaluation (TRCA 2017) and will feed into the water balance impacts assessment in Section 7.7.

6.1 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 (2021) (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).

6.1.1 Provincially Significant Wetland Buffers

Wetland buffers are necessary in order to reduce the potential for impacts to the form as well as the ecological and hydrological functions of these features.

The minimum buffer width for PSWs, as detailed within Section 4.1 of the City of Guelph OP (2021) is 30m. Similarly, the GRCA *Environmental Impact Study Guidelines and Submission Standards for Wetlands* (2005) states that buffer widths of between 15-30m in gently sloped areas are generally sufficient to protect wetlands from impacts (Castelle et al. 1994, Woodward and Rock 1995).

A 30m buffer has been provided for the PSW and is shown on Map 5 relative to the proposed development plan. A 30m buffer is anticipated to be sufficient to protect the significant species and habitats present, as well as the ecological and hydrological function, providing that the mitigation measures described in this impact analysis (Section 7.0) are applied. Grading required for Street A will encroach into this buffer within an area of old field cultural meadow that is lower quality habitat. A description of this encroachment and discussion of relevant City of Guelph policies is provided in Section 7.5.2.

6.2 Significant Woodlands

The City of Guelph Official Plan (2021) identifies significant woodlands in the study area that are closely associated with the limits of the PSW and extend into 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).

6.2.1 Significant Woodland Buffers

Woodland buffers are necessary to protect these features from various aspects of development, including preventing impacts to root zones that could occur as a result of grading or soil compaction.

The City of Guelph OP (2021) identifies minimum buffers for Significant Woodlands as 10m. A 10m buffer is likely sufficient to protect the root systems of the trees within this woodland, particularly as the adjacent lands have historically been disturbed and are comprised of old field cultural meadow. The woodland buffer is contained entirely within the larger 30m wetland buffer, providing additional protection to this feature.

6.3 Significant Wildlife Habitat

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

6.3.1 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 area.

6.3.2 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 (MNRF 2000). Based on the results of wildlife-specific field surveys, SWH for Eastern Wood-Pewee was confirmed within the study area. Further discussion is provided below.

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

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 and development area (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.

6.4 Habitat of Endangered and Threatened Species

Based on 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 two 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

≤15m 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 ≥15m from the significant woodland dripline boundary. Suitable foraging habitat may be present along the forested edge and cultural meadow habitat that is being retained and buffered as part of the proposed development plan (Map 5).

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). Correspondence from the MECP is provided in Appendix VII. As such, Crescent Homes will pursue the demolition of buildings on-site with the City outside of the bat active season.

6.5 Habitat of Significant Species

In addition to the SCC described above, a number of locally significant bird species were recorded during breeding bird surveys, as described in Section 5.3.1 above. Habitat of Significant Species, including locally significant species is considered a 'Natural Area' which is designated as part of the City of Guelph NHS (City of Guelph 2021). All of these breeding bird species were associated with the Significant Woodland and Wetlands, and their habitats will be protected within the respective buffers.

6.5.1 Significant Wildlife Habitat / Habitat of Significant Species Protection

Two SWH types were identified within the woodlands/wetlands within the subject property: Deer Winter Congregation Areas and Habitat for Species of Conservation Concern (Eastern Wood-Pewee). A number of locally significant bird species were identified to be 'probably' breeding within the Significant Woodland/PSW The wetland and woodland buffers described above are sufficient to protect the SWH and for significant species. None of these species are considered overly sensitive to adjacent development. Providing that the mitigation measures proposed within this impact analysis are adhered to, no negative impacts are anticipated.

6.6 Natural Feature Sensitivity Analysis

To fully evaluate the potential indirect impacts to the PSW from hydrologic changes proposed as part of the development, NRSI's Ecohydrologist undertook a sensitivity analysis following the Wetland Water Balance Risk Evaluation (TRCA 2017). This analysis focused on the wetland vegetation community, flora composition, and anuran species documented within the subject

property during field surveys conducted by NRSI in 2017. The Wetland Conditions and Herpetofauna sections of this report provide descriptions of the field survey results.

The risk of a proposed development to the hydrological and ecological integrity of a wetland is determined using a suite of criteria outlined in the Risk Evaluation document (TRCA 2017). The level of risk a proposed development has is based on the magnitude of change proposed and the sensitivity of the wetland to hydrological changes. The sensitivity analysis feeds into the risk evaluation and provides critical information for the assessment of impacts to the PSW.

6.6.1 Vegetation Sensitivity

The existing condition of the wetland vegetation communities is a good indicator of the overall health of the PSW. The vegetation communities also provide food and critical habitat for a wide variety of wildlife species. As such, assessing the sensitivity of the PSW vegetation communities is critical to determining the resilience of the wetland to hydrological changes proposed as part of the development. Changes in duration, depth, timing and frequency of water level fluctuations can all impact the vegetation communities and therefore the habitat for wildlife on and adjacent to the subject property, and downstream to Torrance Creek.

The analysis consisted of comparing the vegetation community data (based on Ecological Land Classification, Lee et al. 1998) and species lists collected by NRSI on October 25, 2017 and June 9, 2018 to information provided in the Toronto Region Conservation Authority (TRCA) "Wetland Water Balance Risk Evaluation" (2017) and the United States (U.S.) National Database of Wetland Plant Sensitivities (Adamus and Danielson 2002). The TRCA (2017) document includes tables that rank vegetation communities and individual species by their sensitivity to hydrologic change. The U.S. Database provides sensitivity rankings for individual species. The database is not a complete list of all wetland plants; however, it does provide information to augment the TRCA's document.

Table 6 includes a list of all vegetation species identified in the three ecosites of the PSW that have sensitivity information in Appendix 3 of the Wetland Water Balance Risk Evaluation (TRCA 2017) and the U.S. National Database of Wetland Plant Sensitivities (Adamus and Danielson 2002). The remaining species that are not listed in Table 6 are not included in these two sources. Of the dominant species listed above Glossy Buckthorn, a non-native species, is the only species lacking sensitivity data. The SWD3-2 and SWM1-1 communities are both listed as having 'Medium' sensitivity to hydrologic changes (TRCA 2017). SWD4 is not included in the

TRCA tables and no Trembling Aspen dominated communities are listed as a comparison. Other SWD4-# communities range from High to Low sensitivity so this was determined not to be a suitable comparison for the sensitivity of the SWD4 community.

Of the 61 vascular plant species documented within the wetland, data on hydrological sensitivity or tolerance was available for 35 species (Adamus and Danielson 2002, TRCA 2017). The U.S. National Database of Wetland Plant Sensitivities (Adamus and Danielson 2002) provided data for 34 of the plant species present, with one species (2.94%) listed as 'Tolerant', three (8.82%) as 'Moderately Tolerant', and 26 (76.47%) as 'Somewhat Tolerant', and two (5.88%) as 'Intolerant'. A range of tolerance (Somewhat Tolerant to Moderately Tolerant) was listed for two species (5.88%) (Woolly Blue Violet (*Viola sororia*) and Celandine (*Chelidonium majus*)), which results from differences identified in multiple sources. The two 'Intolerant' species are Redtop (*Agrostis stolonifera*) and Riverbank Grape (*Vitis riparia*), both of which were noted to be intolerant of flooding conditions lasting more than three days (Adamus and Danielson (2002). Given that the SWM pond is designed with a minimum detention time of 12 hours (22.5hrs for the 25mm-4hr event), and that the wetland gently slopes away from the development and towards Torrance Creek, flood conditions lasting more than three days are not anticipated to occur (MTE 2021a).

The TRCA's Wetland Water Balance Risk Assessment (2017) provided data for nine of the plant species present. Of these species, one species (11.11%) was listed as having 'Low' sensitivity, and seven (77.78%) were listed as having 'Medium' sensitivity to changes in hydrology (TRCA 2017). The vegetation species list noted one unidentified sedge species (*Carex species*) that was found in the SWD3-3 community. Sedge species have a wide range of tolerances to changes in hydrology. This species was noted in the sensitivity analysis as having a Low to High sensitivity depending on the specific species (11.11%); however more detailed analysis cannot be conducted.

Based on the sensitivity analysis and background review, the composition of the vegetation community is moderately sensitive to changes in hydrology. The dominant tree species in the wetland (Trembling Aspen, Silver Maple, and Green Ash) are known to inhabit locations with substantial fluctuations in water levels. Swamp communities tend to have fluctuating water levels with periods of inundation and dry periods. Swamp communities rely on both of these periods to maintain their vegetation communities and their ecological function. This vegetation community is tolerant of the proposed wetland water balance changes post-development. The

water balance will maintain the existing hydroperiods, allowing for periods of inundation in the spring and early summer (April-July), and dry periods in mid-summer to mid-autumn (August to October). Runoff volumes to the wetland will be higher than in the pre-development condition; however, the monthly distribution of excess runoff is well balanced and reflects the pre-development distribution of runoff volumes. Runoff depths to the wetland also increase in the post-development water balance. The increase in depth ranges from 0.7mm in March to 18.7mm in May. These depths are spread out across runoff events occurring during each month. The post-development distribution of runoff depths over each month closely reflects the pre-development runoff distribution. As such, the proposed changes to the water balance, and runoff to the wetland is not expected to have an impact on the wetland vegetation communities and the overall function of the wetland.

Table 6. Provincially Significant Wetland Community Vegetation Sensitivity

Scientific Name	Common Name	CC	CW	Weed	SRANK[1]	SARO[2]	COSEWIC[3]	SARA Schedule[4]	Wellington County[5]	Wellington/Dufferin County[6]	Wetland Water Balance Risk Assessment – Sensitivity[7]	U.S. National Database of Wetland Plant Sensitivities – Flood Duration Increase[8,9]
Acer negundo	Manitoba Maple	0	-2		S5					X	n/a	MT
Acer saccharinum	Silver Maple	5	-3		S5					X	Medium	T
Acer X freemanii	Freeman's Maple										Medium	n/a
Achillea millefolium ssp. millefolium	Common Yarrow		3	-1	SE?					X	n/a	n/a
Agrimonia gryposepala	Tall Hairy Agrimony	2	2		S5					X	n/a	n/a
Agrostis stolonifera	Redtop		-3		S5					X	n/a	IT to Flooding > 3 days
Alliaria petiolata	Garlic Mustard		0	-3	SE5						n/a	ST
Ambrosia artemisiifolia	Common Ragweed	0	3		S5					X	n/a	ST
Arctium minus ssp. minus	Common Burdock		5	-2	SE5					X	n/a	ST
Betula papyrifera	White Birch		2		S5					X	n/a	n/a
Carex species	Sedge species										Low to High depending on species	ST
Chelidonium majus	Celandine		5	-3	SE5					X	n/a	ST to MT
Circaea alpina	Smaller Enchanter's Nightshade	6	-3		S5					X	Medium	ST
Circaea lutetiana ssp. canadensis	Yellowish Enchanter's Nightshade	3	3		S5					X	n/a	ST
Cirsium arvense	Canada Thistle		3	-1	SE5					X	n/a	n/a
Cirsium vulgare	Bull Thistle		4	-1	SE5					X	n/a	n/a
Convallaria majalis	Lily-of-the-valley		5	-2	SE5						n/a	n/a
Conyza canadensis	Horseweed	0	1		S5					X	n/a	n/a
Cornus stolonifera	Red-osier Dogwood	2	-3		S5					X	n/a	ST
Dryopteris carthusiana	Spinulose Wood Fern	5	-2		S5					X	Medium	ST
Echinocystis lobata	Prickly Cucumber	3	-2		S5					X	n/a	n/a

Scientific Name	Common Name	CC	CW	Weed	SRANK[1]	SARO[2]	COSEWIC[3]	SARA Schedule[4]	Wellington County[5]	Wellington/Dufferin County[6]	Wetland Water Balance Risk Assessment – Sensitivity[7]	U.S. National Database of Wetland Plant Sensitivities – Flood Duration Increase[8,9]
Eupatorium perfoliatum	Perfoliate Thoroughwort	2	-4		S5					X	Low	ST
Fragaria virginiana	Wild Strawberry				S5					X	n/a	MT
Frangula alnus	Glossy Buckthorn		-1	-3	SE5					X	n/a	ST
Fraxinus pennsylvanica	Green Ash	3	-3		S5					X	n/a	n/a
Geum canadense	White Avens	3	0		S5					X	n/a	n/a
Hesperis matronalis	Dame's Rocket		5	-3	SE5					X	n/a	ST
Inula helenium	Elecampane		5	-2	SE5					X	n/a	n/a
Lonicera tatarica	Tartarian Honeysuckle		3	-3	SE5					X	n/a	n/a
Nepeta cataria	Catnip		1	-2	SE5					X	n/a	ST
Oenothera biennis	Common Evening-primrose	0	3		S5					X	n/a	ST
Origanum vulgare	Wild Marjarom		5	-2	SE5					X	n/a	ST
Parthenocissus vitacea	Woodbine	3	3		S5					X	n/a	n/a
Poa compressa	Canada Blue Grass	0	2		S5					X Int	n/a	
Populus balsamifera ssp. balsamifera	Balsam Poplar	4	-3		S5					X	n/a	ST
Populus tremuloides	Trembling Aspen	2	0		S5					X	n/a	n/a
Prunella vulgaris ssp. lanceolata	Heal-all	5	5		S5						n/a	ST
Prunus virginiana ssp. virginiana	Choke Cherry	2	1		S5					X	n/a	n/a
Ranunculus acris	Tall Buttercup		-2	-2	SE5					X	n/a	n/a
Rhamnus cathartica	Common Buckthorn		3	-3	SE5					X	n/a	ST
Ribes americanum	Wild Black Currant	4	-3		S5					X	n/a	ST
Sambucus canadensis	Common Elderberry	5	-2		S5					X	n/a	n/a
Solanum dulcamara	Bitter Nightshade		0	-2	SE5					X	n/a	ST
Solidago altissima var. altissima	Tall Goldenrod	1	3		S5					X	n/a	ST
Solidago canadensis	Canada Goldenrod	1	3		S5					X	n/a	ST
Solidago nemoralis ssp. nemoralis	Gray Goldenrod	2	5		S5					X	n/a	n/a

Scientific Name	Common Name	CC	CW	Weed	SRANK[1]	SARO[2]	COSEWIC[3]	SARA Schedule[4]	Wellington County[5]	Wellington/Dufferin County[6]	Wetland Water Balance Risk Assessment – Sensitivity[7]	U.S. National Database of Wetland Plant Sensitivities – Flood Duration Increase[8,9]
Solidago rugosa ssp. rugosa	Rough Goldenrod	4	-1		S5					X	n/a	n/a
Symphyotrichum ericoides var. ericoides	White Heath Aster				S5					X	n/a	n/a
Symphyotrichum lateriflorum var. lateriflorum	Calico Aster	3	-2		S5					X	n/a	n/a
Symphyotrichum novae-angliae	New England Aster	2	-3		S5					X	n/a	n/a
Symphyotrichum pilosum var. pilosum	Hairy Aster	4	2		S5					R	n/a	n/a
Taraxacum officinale	Common Dandelion		3	-2	SE5					X	n/a	n/a
Thuja occidentalis	White Cedar	4	-3		S5					X	Medium	ST
Tiarella cordifolia	False Mitrewort	6	1		S5					X	n/a	ST
Trifolium pratense	Red Clover		2	-2	SE5					X	n/a	ST
Trifolium repens	White Clover		2	-1	SE5					X	n/a	ST
Ulmus americana	White Elm	3	-2		S5					X	n/a	ST
Viburnum opulus	Guelder Rose		0	-1	SE4						Medium	MT
Viburnum trilobum	High Bush Cranberry	5	-3		S5					X	n/a	n/a
Viola sororia	Woolly Blue Violet	4	1		S5					X	Medium	ST to MT
Vitis riparia	Riverbank Grape	0	-2		S5					X	n/a	Intolerant to flooding > 3 days

N/A indicates data was not available or the species was not included in the list
[1]Oldham and Brinker 2009; [2,3]MNRF 2021; [4]Government of Canada 2021; [5,6]Dougan & Associates 2009; [7]TRCA 2017; [8]Adamus and Danielson 2002
[9]DEC= decrease, U= unaffected; IT= intolerant, ST= somewhat tolerant, MT= moderately tolerant, T= tolerant, VT= very tolerant.

6.6.2 Wildlife Sensitivity

Anurans require shallow aquatic habitats with suitable water depth and hydroperiod for breeding, egg deposition, and successful larval development (BSC 2009). Two species of anurans (frogs and toads) were documented in the PSW within the subject property by NRSI staff in 2017:

- Approximately five Gray Treefrogs (*Hyla versicolor*) were heard calling from the east side of the SWD4 community within the subject property on May 29, 2017 and three Gray Treefrogs were heard calling on June 15, 2017 in the SWD4 community in the subject property; and
- Two American Toad (*Anaxyrus americanus*) were heard calling in the SWD4 community at the northern edge of the subject property on June 15, 2017.

According to the TRCA (2017), Gray Treefrogs have a 'High' sensitivity to changes in wetland hydrology and American Toads have a 'Medium' sensitivity. Wood Frogs (*Lithobates sylvatica*) were heard calling from the isolated man-dug pond on the subject property during anuran breeding surveys in 2017; however, no Wood Frogs were heard calling from the main PSW wetland during any of the surveys. As such, Wood Frogs were not considered as part of the sensitivity analysis for the wetland.

Gray Treefrogs typically breed in May and June in Ontario and American Toads typically breed between April and June (BSC 2009). There are no specific depth thresholds reported for breeding habitats used by these species; however, they are known to breed in a variety of ephemeral or permanent wetlands or ponds at a range of depths. Gray Treefrogs' eggs are laid at the surface of the water, while American Toads have been reported to lay their eggs at a range of depths (Dodd 2013) (Table 7).

Tadpoles of these two species develop in breeding ponds for 2-4 months until they metamorphosize (Pfingsten et al. 2013). No specific water depth thresholds for larvae are reported in the literature (Table 7). Hydro-period, water temperatures, water chemistry, resource availability, and presence of predators are likely more important factors for tadpole development and survival compared to overall water depth (assuming it doesn't shorten the hydro-period) (Dodd 2013)

Additional information on the breeding habitat requirements for the anuran species documented within the Study Area is provided in Table 7.

The proposed water balance maintains the distribution of wet and dry periods throughout the year, which will maintain the existing hydroperiod of the wetland. A slight increase in the runoff volumes to the wetland will occur post-development; however, the volume and depths will not be sufficient to change the overall hydroperiod that Tree frogs and American toads rely on. As such, the proposed development is not anticipated to have a negative impact on the life cycle of these anuran species or other common anurans known to occur in the area.

Table 7. Breeding Habitat Requirements for Anuran Species Documented in Study Area

	Species	
	American Toad (*Anaxyrus americanus*)	**Tetraploid Gray Treefrog (*Hyla versicolor*)**
Adult Habitat*		
Habitat Description	Open deciduous forests and grasslands, as well as disturbed habitats such as plantations, urban areas, and farmland.	Moist hardwood forests in close proximity (<40m) to breeding ponds.
Breeding Habitat*		
Habitat Description	Seasonal temporary ponds, permanent wetlands (bogs, fens, marshes), stream and river backwaters, flooded meadows, small pools, beaver ponds, as well as ditches, road ruts, sinkhole ponds, storm water management ponds.	Small wetlands and woodland pools adjacent to, or within, woodlands, as well as ditches, pasture ponds, quarries, sand pit ponds. Breeding ponds typically have shrubs and/or emergent or floating vegetation.
Hydroperiod	>4 months, may also be permanent	>4 months, may also be permanent
Water Depth	• No specific water depth thresholds for egg deposition or larvae are reported in the literature. • Eggs are laid in shallow water 10-30 cm in depth. • Larvae prefer shallow water, but have been observed at a record 8m depth.	• No specific water depth thresholds for egg deposition or larvae are reported in the literature. • Eggs are laid at the surface of the water. • Hydro-period, water temperatures, water chemistry, resource availability, and presence of predators are likely more important factors for larvae.

* Dodd 2013

7.0 Impact Analysis and Recommendations

7.1 Proposed Undertaking

The redevelopment proposed on the subject property includes 70 new residential units; 48 stacked townhouse units and 22 cluster townhouse units. In addition to the proposed townhouse buildings, two surface parking areas are proposed for the stacked townhouse units. In total, 63 surface parking spaces are proposed (including two Type A and one Type B barrier free space). The proposed development also includes a 20m municipal right-of-way (Street 'A') that is required to connect the adjacent Dawes Road to Arkell Road (Appendix I).

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 the intersection of Arkell Road and Summerfield Drive. Dawes Avenue is currently 4m higher in elevation than the existing grades on the Subject Lands. As such, significant amounts of fill will be required to match existing grades to the adjacent subject property lines. The asphalt and curb and gutter portions of Dawes Avenue will extend along the 30m PSW buffer with exception of a very minor encroachment at the property boundary as shown on Map 5. To match existing grades, 3:1 side slopes from Dawes Avenue will be required to extend within the outer half of the PSW buffer (Map 5). Preliminary finished grades within the subject property were designed to minimize the cutting and filling required for road and lot construction, while maintaining serviceability (MTE 2021c).

7.2 Stormwater Management Plan Approach

MTE has developed a detailed Stormwater Management Plan (2021a) and Functional Servicing Report (2021c) that are provided under separate cover and are part of the draft plan submission. The information provided in this EIS report is a summary of those reports.

As detailed in the Stormwater Management Plan and Functional Servicing Report, storm drainage for the proposed development will be provided through a combination of minor (piped) and major (overland) drainage systems, with several catchments conveyed to the stormwater management facility (SWMF). The majority of the onsite conveyance will be collected via a storm sewer network. The proposed street-fronting townhouse units will have individual service connections to sump pumps. Blocks 1 and 2 will be connected to storm sewer pipes.

The stormwater management plan for the subject property includes water quality, quantity, and erosion and sedimentation control. Water quality and quantity control will be provided by a 2-cell SWMF, consisting of a wet cell and an infiltration cell, as well as infiltration galleries. During the summer months, the SWMF will primarily outlet into an infiltration cell, and ultimately into the Torrance Creek wetland. A bypass pipe has been provided for the winter months as soil conditions will not permit infiltration at this point in the year. During major storms, excess runoff will flow overland to the SWMF via road right-of-ways and designated overland flow routes. Roof areas from Blocks 1 and 2 will be directed to infiltration galleries prior to any overflow being released to the SWM facility. Blocks 1 and 2 will be developed through respective Site Plan Application processes and will require SWM Briefs, as well as grading and servicing designs in support of SPA. This information will identify the stormwater management criteria for the block and how the stormwater control measures will adhere to the Draft Plan of Subdivision SWM criteria as established in this report. .

The SWMF will consist of a wet pond, with a 1.2m permanent pool, followed by an infiltration cell. Carefully selected plantings will be used to stabilize banks, mitigate temperature increases, deter waterfowl from nesting in the area, and provide aesthetics and safety benefits. The wet cell is designed as a forebay to target smaller flows, prior to discharging into the infiltration cell. The forebay design is based on particle settling and flow dispersion, and will provide water quality treatment to MECP's Enhanced (Level 1) standards.

MTE's Stormwater Management Plan (2021c) provides details regarding water quality controls for the subject property. The plan includes adhering to the City of Guelph's Engineering Design Guidelines (City of Guelph 2019b) and the Torrance Creek Subwatershed Study (Totten Sims Hubicki Associates et al. 1999) targets and requirements. An OGS unit is proposed immediately upstream of the SWMF forebay to provide a 'treatment train' approach that will provide the required Enhanced (Level 1) quality treatment as set out by the Stormwater Management Planning and Design Manual (MOE, 2003) and as required by the City of Guelph and MECP. The stormwater management plan also meets or exceeds the following additional targets, as set out in the Torrance Creek Subwatershed Study:

- **Nutrients** – Total phosphorus should be 30ug/L or less; the use of the quality wet cell will reduce suspended solids and nutrients;

- **Dissolved Oxygen** – Dissolved oxygen (DO) concentration should not be less than 4mg/L during summer months. Reduction of temperature and nutrient concentrations will improve DO levels. Aeration of direct runoff may also be helpful; and
- **Temperature** – Temperatures within Torrance Creek should be below 25°C. New developments can mitigate temperature increases by maximizing infiltration and using underground drainage elements before discharging to surface water.

Discharge from the SWMF will be controlled via a multi-staged outlet. The infiltration cell downstream of the wet cell is sized to infiltrate the 25mm-4hr storm. Larger storms, up to and including the 100-year events, are infiltrated as much as possible up to the elevation of the overflow weir at the SWMF outlet. Any flows that cannot be infiltrated are discharged to the Torrance Creek Wetland. Table 5.6 in the Preliminary Stormwater Management Report (MTE 2021a) identifies pre- and post-development discharges to the Torrance Creek Wetland. Table 8 below summarizes this information. Post-development peak runoff to the the wetland will be slightly less than the existing condition. Further information regarding the wetland water balance is provided in Section 7.2.1 and 7.7.

Table 8. Pre- and Post-development Peak Runoff Rates (MTE 2021a)

	25mm	2-year	5-year	10-year	25-year	50-year	100-year	Regional
Pre-development								
Total Discharge to Wetland (m^3/s)	0.038	0.069	0.122	0.166	0.213	0.252	0.302	0.392
Post-development								
Total Discharge to Wetland (m^3/s)	0.027	0.046	0.083	0.119	0.184	0.237	0.292	0.362

Stormwater runoff will drain internally for the majority of the subject property through the use of constructed drainage swales and the proposed storm sewer network. However, runoff from a small portion of the developed area, consisting of sloped pervious areas, will flow uncontrolled elsewhere (MTE 2021a). A high point is present along Arkell Road near the entrance to 202 Arkell Road. East of the high point, flows are directed towards storm sewers that are connected to an existing infiltration gallery in the boulevard adjacent to the Arkell Meadows subdivision SWM facility. On the western side of the high point, flows will be directed to an existing side inlet catchbasin, through a stone energy dissipater, and eventually into the Torrance Creek wetland complex. As such, flow generated from uncontrolled portions of the subject lands will ultimately contribute to recharging surface water inputs to the wetland feature and subsurface

water inputs to the local groundwater table. These measures will provide quality and quantity control of runoff prior to discharge into the adjacent Torrance Creek wetland.

7.2.1 Monthly Water Balance for the Proposed Development

A detailed description of the monthly water balance is provided in MTE's Stormwater Management Plan report (2021a). The following provides a brief summary of the results.

Under pre-development conditions, the subject property infiltrates 7,580m^3/year. With the proposed stormwater management plan, which uses infiltration galleries and an end-of-pipe infiltration cell, the post-development total annual infiltration rate is 7,816m^3/year. This provides an annual 3% volume surplus (1,095m^3/year) over pre-development conditions. Infiltration from the subject property contributes to the shallow groundwater table that flows away from the wetland. As such, infiltration on the subject property does not contribute to the hydrology of the adjacent PSW.

Under pre-development conditions, runoff from the subject property drains to the northwest and provides surface water inputs to the Torrance Creek wetland complex. The subject property currently generates 5,595m^3/year in runoff, based on an imperviousness of 11.5%. Under post-development conditions, the catchment area draining to the wetland is smaller (a decrease in catchment size of nearly 1ha), and the imperviousness is higher (34.4%), which results in an increase in runoff. Approximately 7,347m^3/year of runoff is generated by the development area under post-development conditions, which equates to an annual surplus of 1,752m^3/year of surface runoff volume to the wetland complex. Figure 5.4 (pp. 29) from the Stormwater Management Plan (MTE 2021a) is provided below and illustrates that the distribution of excess runoff over the course of a year reflects the existing runoff conditions and patterns.

Figure 5.4 – Pre & Post-Development Monthly Runoff Volume to Wetland (m^3)

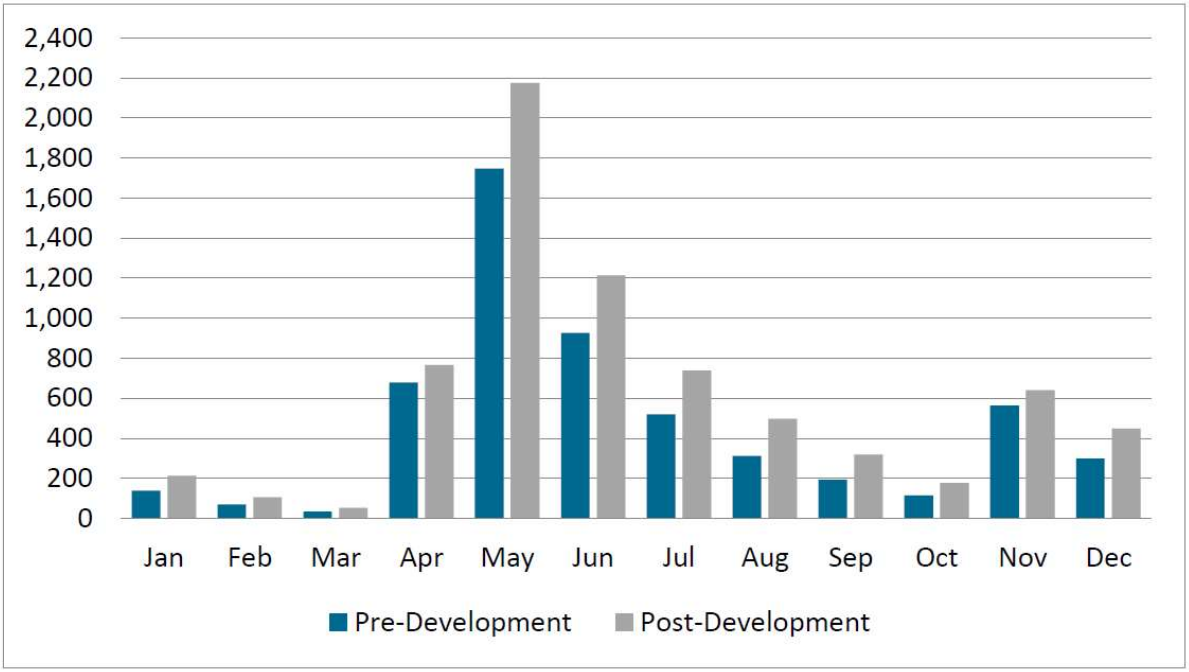

Figure 4. Pre & Post Development Monthly Runoff Volume to Wetland (MTE 2021a)

Throughout the year, May is estimated to have the highest runoff volumes and water depth change compared to pre-development levels, with an estimated 427m^3, equating to 18.7mm, of surplus runoff delivered to the wetland over the month. June has the second highest increase in runoff volumes, with an estimated surplus of 286m^3 (12mm). Based on groundwater monitoring conducted in the PSW, groundwater levels are below the depth of the mini piezometer (1.05mbgs) in May and June. No surface ponding was observed during the monitoring period for the mini piezometer (MTE 2021b). Table 1c from the Hydrogeological Investigation report (MTE 2021b) is provided below as Table 9. This summarizes the monitoring data from the mini piezometer in the wetland. The mini piezometer is located near the northern property boundary at the edge of the SWD4 community.

Table 9. MTE's Mini Piezometer Monitoring Data for MP1-19 (2021b)

Date	Location	MP1-19	
	TOC Elevation (mamsl)	334.48	
	GS Elevation (mamsl)	333.32	
		mbtoc	mamsl
8-Oct-19	Inside Level (IL)	DRY	-
	Outside Level (OL)	DRY	-
	Vertical Hydraulic Gradient (m/m)	-	
29-Oct-19	Inside Level (IL)	DRY	-
	Outside Level (OL)	DRY	-
	Vertical Hydraulic Gradient (m/m)	-	
12-Nov-19	Inside Level (IL)	DRY	-
	Outside Level (OL)	DRY	-
	Vertical Hydraulic Gradient (m/m)	-	
6-Dec-19	Inside Level (IL)	DRY	-
	Outside Level (OL)	DRY	-
	Vertical Hydraulic Gradient (m/m)	-	
12-Mar-20	Inside Level (IL)	1.46	333.02
	Outside Level (OL)	DRY	-
	Vertical Hydraulic Gradient (m/m)	-	
21-Apr-20	Inside Level (IL)	1.97	332.51
	Outside Level (OL)	DRY	-
	Vertical Hydraulic Gradient (m/m)	-	
1-Jun-20	Inside Level (IL)	DRY	-
	Outside Level (OL)	DRY	-
	Vertical Hydraulic Gradient (m/m)	-	
26-Aug-20	Inside Level (IL)	DRY	-
	Outside Level (OL)	DRY	-
	Vertical Hydraulic Gradient (m/m)	-	
3-Nov-20	Inside Level (IL)	DRY	-
	Outside Level (OL)	DRY	-
	Vertical Hydraulic Gradient (m/m)	-	
1-Feb-21	Inside Level (IL)	DRY	-
	Outside Level (OL)	DRY	-
	Vertical Hydraulic Gradient (m/m)	-	
4-May-21	Inside Level (IL)	DRY	-
	Outside Level (OL)	DRY	-
	Vertical Hydraulic Gradient (m/m)	-	
4-Aug-21	Inside Level (IL)	DRY	-
	Outside Level (OL)	DRY	-
	Vertical Hydraulic Gradient (m/m)	-	

Notes:

TOC = Top of Casing

GS = Ground Surface

mamsl = metres above mean sea level

IL = Inside Level (Groundwater)

OL = Outside Level (Surface Water)

Table 1c – Draft Hydrogeological Investigation (MTE 2021b)

7.3 Approach to Impact Analysis

The impact analysis presented here is based on the redevelopment details submitted as part of the Functional Servicing Report (2021c) and the Stormwater Management Report (2021a) prepared by MTE and the concept plan prepared by MHBC (Appendix I).

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. A wetland sensitivity analysis and risk evaluation to evaluate potential impacts to the wetland from the development and the proposed stormwater management plan. Necessary buffers are also discussed within this section;
- Induced impacts associated with impacts after the development is constructed such as increased use of natural areas.
- Cumulative impacts associated with continued development of the Torrance Creek Wetland Complex catchment.

The Impacts Analysis also includes a risk evaluation and discussion of potential impacts to the PSW from the proposed water balance. The impacts discussion in Sections 7.5.3 and 7.7 take into account the final stormwater management plan with all mitigation measures included.

7.4 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. Site Grading and Tree and Vegetation Removal are potential sources of direct impacts associate with the proposed development. Map 5 presents the proposed development layout over the delineated natural features showing the direct impacts. These impacts are discussed in more detail below.

7.4.1 Site Grading and Servicing

Several existing grading constraints influenced and/or governed the grading plans as outlined in the Functional Servicing (MTE 2021c) and Stormwater Management Reports (MTE 2021a). This included:

- Matching centerline elevations of existing road grades;
- Matching existing and proposed boundary grades around the perimeter of the subject property;
- Ensuring major storm event overland flows are directed towards the proposed stormwater management facility;
- Complying with municipal standards for minimum and maximum road and landscaped area grades;
- Ensuring adequate cover is provided, where feasible, over municipal services;
- Ensuring adequate groundwater separation with infiltration measures and basement floor elevations;
- Minimizing impacts to the surrounding natural environmentally sensitive features; and
- Minimizing the cut/fill deficit for the subject property.

Utilizing the proposed concept plan (Appendix I), the site grading was designed to satisfy the constraints outlined above (MTE 2021a, 2021c). The team worked collaboratively through the draft plan design stage to alter the development and grading plan where possible to minimize direct impacts and maintain permanent hard surface structures outside of the natural features and their buffers (to the greatest extent possible). The design strategy for the site grades was largely determined to minimize cut/fill and attempting to match the existing perimeter grades. The limit of site grading and earth removals will match the existing and proposed boundary grades around the perimeter of the subject property. Tree loss will be required to effectively grade and service the development area, which is discussed below and detailed in Appendix V. Grading will occur during the construction phase of the project and result in permanent cut/fills and vegetation clearing. For detailed grading plans the reader is referred to the Functional Servicing (MTE 2021c) and Stormwater Management Reports (MTE 2021a).

Mitigation

- *Heavy-duty ESC fencing should be installed at the limit of grading to protect the natural features and their buffers;*
- *The location and installation of ESC fencing and additional ESC measures is to be inspected by an Environmental Monitor or qualified biologist prior to any on-site works to confirm the limit of grading is adequately demarcated;*

- *ESC measures are to be monitored and maintained regularly throughout the construction phase of the project (i.e., once a week depending on construction schedule or following heavy precipitation events);*

- *Site grading will be maintained outside of the Torrance Creek PSW Complex and the 30m buffer with exception of the graded side slope to accommodate the Dawes Road extension through the property;*

- *The 3:1 slope encroaching into the 30m wetland buffer is to be revegetated with suitable native species known to occur in Wellington County;*

- *Site grading will be maintained outside of the Significant Woodland and the 10m buffer;*

- *Graded areas are to be revegetated with a suitable seed mix as soon as possible (i.e., within 30 days of being inactive) to minimize potential erosion. Where graded areas are adjacent to the natural features and their buffers (including the 3:1 slope that encroaches into the outer 30m wetland buffer), the seed mix is to be comprised of native species suitable to the soils and site conditions and an annual cover crop that will establish quickly (e.g., Annual Oats (Avena sativa), Annual Rye (Lolium multiflorum), or White Millet (Panicum miliaceumm), and;*

- *To avoid impacts to the wetland, the water balance of the wetland should be maintained during all construction activities and in the post development scenario.*

7.4.2 Tree and Vegetation Removal

A total of 339 trees were inventoried within the subject property. As detailed in the TIPP (Appendix V), 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 281 trees. This includes trees situated along the grading limit or in close proximity that may incur extensive root damage as a result of proposed grading, including a hedgerow of Eastern White Cedar along the southwest property margin. A majority of the trees identified for removal have been planted within the residential yard and are located outside the Natural Heritage System. Removals in this area include some larger White Cedar and White Spruce (*Picea glauca*); however, 79% of trees to be removed are <25cm DBH.

The Tree Technical Manual (City of Guelph 2019a) and the City's OP (2021, Section 4.1.6.4) require that a Vegetation Compensation Plan be developed to replace trees lost through the development and site alteration process. The TIPP report (Appendix V) recommends

compensation strategies; however, a detailed Vegetation Compensation Plan (Landscape Plan) will be developed at the detailed design stage.

Grading to allow for the alignment and construction of Street 'A', which is an extension of the municipally owned Dawes Road, will result in the removal of approximately 0.0251ha of the 30m wetland buffer that is currently old field cultural meadow.

Detailed restoration and planting plans (including tree compensation details) are required as part of the Environmental Implementation Report (see Section 8.1 for more details).

Mitigation

- *Tree protection fencing, that follows the City of Guelph's Tree Technical Manual (2019a) guidelines on placement, design and installation, will be required around the significant woodland, and retained isolated trees as identified in the TIPP (Appendix V);*
- *The limit of development and grading should be clearly delineated in the field with the Tree Protection Fence and/or ESC fence prior to any works on-site, including vegetation removal, clearing and grubbing;*
- *Any limbs or roots of trees to be retained which are damaged during construction should be pruned using appropriate arboricultural techniques. Hazard trees should be identified by a Certified Arborist/Forester or qualified other and removed as warranted just prior to development;*
- *TPF and ESC fence should be inspected regularly throughout the active construction phase of the project by an Environmental Monitor or qualified biologist/Certified Arborist/Forester to ensure fence is functioning as intended and vegetation identified to be retained is adequately protected;*
- *TPF and ESC fence are to be removed after construction and any exposed soils are stabilized to the satisfaction of an Environmental Monitor or qualified biologist;*
- *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 finalized at the Detailed Design approval stage;*
- *Detailed landscaping and Vegetation Compensation Plans will be required for the property at the Detailed Design stage. It is anticipated that compensation plantings will occur within the buffer of the NHS and along the graded side slopes in an effort to enhance the ecological value of these plantings;*
- *Trees identified for removal that require compensation (as per the TIPP, Appendix V) are to be compensated based on requirements and strategies outlined in the City's Tree Technical Manual (City of Guelph 2019a);*

- *Final compensation strategy, including appropriate species and potential use of trees, shrubs and herbaceous species is to be determined at the Detailed Design 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;*

- *Plantings should be maintained appropriately throughout the warranty period.*

7.4.3 Wildlife and Their Habitats

Species at Risk Bat Habitat

As shown on Map 1 in Appendix V, the proposed development is anticipated to require the removal of five candidate bat maternity roost trees that are associated with the existing residential yard. Although the observed candidate roost trees identified for removal have the potential to provide suitable habitat, it is anticipated that a majority of bat roosting opportunities exist within the larger Significant Woodland that is being retained and buffered. The following mitigation measures are recommended to avoid any unintended impacts to SAR bats.

Mitigation

- *Tree removals must occur between October 1 and March 31, which is the period outside of the active bat season (generally April 1 to September 30); and*
- *If tree removal is proposed within the bat active season, consultation with the MECP will be required.*

Other Wildlife Species

The Tree Inventory and Preservation Plan Report (Appendix V) 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. Removals within the development area will consist of the existing buildings, isolated trees and a small portion of Cultural Meadow as described above.

The proposed development may temporarily displace wildlife species that are currently using the subject property while the site is under construction. Species that use the subject property are common and well-adapted to relatively urban conditions and landscapes, and are expected

to return to the adjacent natural areas and protected buffer areas post-development provided that native tree, shrub and herbaceous plantings are incorporated in the NHS buffer.

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.

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 2017). During this period the CWS recommends that no clearing of vegetation within simple and/or complex habitats occur. The 1994 *Migratory Birds Convention Act* (MBCA, Government of Canada 2017) 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 ESC fencing erected. 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 V).

Mitigation

- *Vegetation removal is recommended to occur outside of the breeding and nesting season for migratory birds as established by the Canadian Wildlife Service and protected under the Migratory Birds Convention Act, 1994. The peak breeding period for birds in southern Ontario extends from approximately April 1 through August 31;*

- *Should vegetation removal be required during the breeding and nesting season for migratory birds, surveys for nesting birds in "simple habitats" may be undertaken by a qualified biologist to permit vegetation removal should breeding bird absence be confirmed;*

- *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. Areas identified as having no bird nesting activity can be cleared; however, clearing must occur within 48 hours of nest searching;

- *Due to the nature of the subject property and based on NRSI's observations during the 2017 field surveys, it is unlikely that bird species, such as raptors, hawks or owls are nesting within the proposed development area. However, timing of vegetation and removals should consider the timing windows for bird species protected under the Fish and Wildlife Conservation Act that are not afforded protection under the MBCA (November to March);*

- *Wildlife sweeps can be undertaken by qualified biologists in advance of any vegetation removal during this general bird active season to ensure no active nests or mammal dens to show due diligence;*

- *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.*

7.5 Indirect Impacts and Mitigation Measures

Buffers necessary to mitigate the indirect impacts in Sections 7.4.1 to 7.4.5are described in Section 6.0. These indirect impacts include:

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

7.5.1 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.

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

The following mitigation measures are recommended to avoid impacts to adjacent natural features from the effects of sedimentation.

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, that follow the City of Guelph's Tree Technical Manual (2019a) requirements, are recommended;*

- *Topsoil piles are to be located away from the natural features and their associated buffers and ESC measures are to be installed around the piles to prevent off-site migration of water-borne sediments;*

- *Disturbed areas should be kept to a minimum and re-vegetated with an approved seed mix in a reasonable timeframe (i.e., within 30 days of being inactive) 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.*

7.5.2 Encroachment into the PSW Buffer

The City of Guelph OP (2021) provides established buffers necessary to protect NHS components. In general, development and site alteration are not permitted within the NHS with the exception of permitted uses, as described within Section 4.1.2 of the OP. These permitted uses generally comprise passive or existing uses, restoration or scientific uses. Policy 4.1.1.11 indicates that minimum buffers have not been applied where existing development is present.

As shown on Map 5, a small portion the right-of-way and associated grading for Street A will encroach into the 30m PSW buffer. Since Street A is the extension of Dawes Road, an existing road where minimum buffers have not been applied based on Policy 4.1.1.11, the alignment on the subject property can only be altered so much. The alignment for Street A has been oriented to be as far from the wetland and significant woodland feature as possible. A small corner of the road right-of-way containing the sidewalk will encroach into the 30m buffer at its northern extent on the subject property. Grading to support the road, and the area of construction disturbance will extend into the 30m buffer and up to the 10m dripline buffer along the northern property boundary. The majority of grading and construction disturbance will be limited to the outer 15m of the PSW buffer. Policy 4.1.1.11 of the OP (2021) applies to the section of Dawes Road to the northeast. City of Guelph Engineering required that Dawes Road be continued through the subject property and as such requires that grading occurs within the PSW buffer.

The alignment of Street A was explored with the City of Guelph through the proposal of various alternative alignments/road widths and internal road connections, none of which were feasible. As shown on Map 5, the sidewalk on the north side of Street A, as well as associated grading are located within the outer 15m of the 30m wetland buffer that is currently old field cultural meadow. Removal of the sidewalk is not generally considered a safe alternative to removing Street A from the buffer since this would result in the sidewalk dead ending at Dawes Avenue on the north side which would direct pedestrian traffic to cross the road to the south side. Due to slopes in this location, a crosswalk is not considered a viable option. The grades will match the existing grade to the north. As part of the Landscape Plan, to be prepared as part of the EIR at the Detailed Design stage, it is recommended that the graded slope be planted with native species known from Wellington County to provide enhanced habitat for pollinators, increase presence of native vegetation in the area, and increase protection of the NHS and PSW buffer.

Given that this graded slope will be located within lands that are currently comprised of old field cultural meadow, no negative impacts are anticipated as a result of grading. Seeding with suitable native mixes will help to establish a meadow community that will support species that may have been using the old field meadow. Other indirect impacts as a result of the proposed development, including Street A, are described throughout Section 7.5.

In order to adhere to the policies within the OP described above and to ensure that encroachment within the 30m PSW buffer does not result in negative impacts to the form and function of this feature, various mitigation measures are to be applied prior to, during and following construction. Providing these measures are adhered to, no negative impacts are anticipated to the wetlands form or functions.

Mitigation

- *To ensure that works within the buffer are limited to the localized areas adjacent to the graded slope, a double-layer of heavy-duty 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 that will provide quick cover (e.g., Annual Rye, Annual Oats, White Millet) at a seeding rate to be determined once the disturbance has been evaluated;*

- *Seeding will follow the Landscape Plan, to be prepared as part of the EIR and the Detailed Design stage of this project.*

- *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 may be recommended;*

- *A Landscape Plan and Compensation Plan will be prepared as part of the EIR and Detailed Design for this development. The Plan's will be submitted to the City Guelph for review, comment and approval;*

- *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.*

7.5.3 Management of Stormwater Quantity

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 2021b), the Functional Servicing Report (MTE 2021c), and the Stormwater Management Report (MTE 2021a) for further details.

Under the proposed stormwater management strategy there will be an overall increase in the amount of infiltration within the development area. The infiltrated water will contribute to the shallow groundwater system, flowing away from the wetland, and no negative impacts to the wetland will occur based on the increased infiltration volumes.

The post-development monthly runoff volumes and rates reflect the existing runoff cycle to the wetland, with an overall increase in runoff volume occurring in all months (MTE 2021a). The overall runoff volumes represent a small component of the broader hydrology of the Torrance Creek Subwatershed area (1,060 ha), given that the subject property represents 0.24% of the Torrance Creek Subwatershed area (Totten Sims Hubicki et al. 1999, Dougan and Associates 2009). However, an analysis of local impacts to the wetland based on increases in runoff volumes is needed to fully assess impacts to the PSW. A sensitivity analysis was conducted for

the vegetation and herpetofauna communities in the wetland. This information is provided in Section 6.6 of this EIS. A wetland water balance risk evaluation was also conducted to assess the hydrological and ecological capacity of the wetland to assimilate the proposed changes. The risk evaluation is summarized in Section 7.7.

Mitigation

- *Stormwater management planning should follow the water balance associated with the adjacent wetland area with respect to pre-development run-off and appropriate water quantity controls;*
- *Contractors should develop a spill contingency plan and keep clean-up materials on-site and away from the natural features and their buffers;*
- *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 location 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 Detailed Design stage and implement post development.*

7.5.4 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, clearing and grubbing and on-site activity 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.

A detailed wetland water balance assessment was conducted to evaluate potential impacts to anurans and their habitats (breeding, over-wintering) from the post-development alterations to runoff delivered to the wetland from the subject property. This assessment is provided in Section 7.7, and states that no negative impacts to anurans and their habitat is anticipated to occur as a result of hydrological changes.

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 and will follow the City of Guelph's Lighting Guidelines for Lighting Plans (LEA Consulting 2019). 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 buffers;*

- *Daily timing of construction activities should be limited to between 0700 and 1900 to avoid noise-related impacts during construction;*

- *Any lighting equipment associated with construction activities should be turned off following cessation of daily construction activities, or at least turned away from the adjacent natural features so as to prevent 'light wash' of these areas.*

7.6 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 areas and graded side slopes be enhanced through the planting of trees and shrubs and where suitable, open meadow herbaceous species as shown on Map 6. 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;*

- *Incorporate native plantings throughout the natural area buffer and along the graded side slopes to enhance and screen from the adjacent residential development.*

- *Prepare a Landscape Plan and Compensation Plan for all plantings within the subject property, to be reviewed and approved by the City of Guelph through the Detailed Design process*

7.7 Wetland Water Balance Risk Evaluation and Impacts Assessment

A Wetland Water Balance Risk Evaluation (TRCA 2017) was completed for the proposed development. The Risk Evaluation uses information about the proposed development, proposed changes to the hydrology of the wetland, and natural heritage information about the wetland to assign a level of risk for 1) the potential magnitude of hydrological change, and 2) the sensitivity of the wetland to hydrological change. The assigned level of risk for these two factors are then evaluated together using a Wetland Risk Evaluation Decision Tree to assign an overall risk to the wetland from the proposed development and determine monitoring needs.

The criteria used to evaluate the probability and magnitude of hydrological change as a result of the proposed development are shown in Table 3. The criteria used to Evaluate the Sensitivity of the Wetland to Hydrological Change are provided in Table 4.

According to the completed Wetland Water Balance Risk Evaluation (TRCA 2017), the proposed development is considered to have an overall 'High' risk to the wetland. The stormwater management plan has been prepared to balance the pre- and post-development runoff to the wetland while infiltrating as much as possible to reduce the amount of runoff directed to the wetland. The stormwater management plan uses infiltration galleries throughout the development and an end-of-pipe infiltration cell in the SWMF to infiltrate as much surface water runoff as possible before discharging the remaining amount to the wetland.

While the risk to the wetland is considered 'High' the runoff delivered to the wetland throughout the year reflects pre-development conditions in terms of volumes and patterns of seasonal highs and lows.

Table 10. Criteria Used to Evaluate the Probability and Magnitude of Hydrological Change (TRCA 2017)

Wetland Water Balance Risk Evaluation Criteria and Thresholds				Magnitude of Hydrological Change for Arkell Road	
Criteria	**High magnitude**	**Medium magnitude**	**Low magnitude**	**Evaluation**	**Magnitude**
Impervious Cover Score[1] within wetland catchment	> 25 %	10-25 %	< 10 %	S = (IC x C_{dev})/C S = (34.4% x 2.576)/3.11 S = 28.49%	High
Increase or decrease in effective wetland catchment size	> 25 %	10-25 %	< 10 %	31.3% decrease in catchment size	High
Water taking or discharge	Water taking or discharge anticipated to result in >20 cm change in wetland water levels for a duration exceeding 3 months	Water taking or discharge anticipated to result in >20 cm change in wetland water levels for a duration of less than 3 months	Feature lies entirely outside cone of depression, or water taking anticipated to result in ≤20 cm change in wetland water levels at any time	Water taking may be required during construction; however, details are not yet available as to the extent of dewatering required. Extensive dewatering is not anticipated to be required (i.e., no EASR registration required). Any dewatering of the shallow groundwater table is not anticipated to impact the PSW hydrology given that groundwater flows away from the wetland	n/a
Impact to recharge areas*	Impact (e.g., replacement with impervious cover) to >25% of locally significant recharge areas[2]	Impact (e.g., replacement with impervious cover) to 10-25% of locally significant recharge areas	No impact, or impact to <10% of locally significant recharge areas	N/a, there are no locally significant recharge areas present.	n/a
Overall Magnitude of Hydrological Change for the Proposed Arkell Road Development[3]					**High**

1 – Impervious Cover Score (S) is calculated: S = (IC x C_{dev})/C, where IC = Impervious Cover proposed for the development, C_{dev} = Total Potentially Developable Area, and C = Pre-development Wetland Catchment Size.
2 – Locally significant recharge areas are defined as areas within the wetland catchment covered by sand, gravel, or otherwise having high hydraulic conductivity.
3 – The highest magnitude category with one or more criteria is used to determine the overall magnitude of hydrological change.

Table 11. Criteria Used to Evaluate the Sensitivity of the Wetland to Hydrological Change (TRCA 2017)

Wetland Water Balance Risk Evaluation Criteria and Thresholds				Magnitude of Wetland Sensitivity for Arkell Road	
Criteria	**High Sensitivity**	**Medium Sensitivity**	**Low Sensitivity**	**Rationale**	**Magnitude**
Vegetation Community Type (ELC)[1]	Presence of a high sensitivity vegetation community	Presence of a medium sensitivity vegetation community*	No high or medium sensitivity criteria satisfied	Silver Maple Mineral Deciduous Swamp (SWD3-2) and White Cedar – Hardwood Mineral Mixed Swamp (SWM1-1) wetlands have 'medium' sensitivities to changes in hydrology. Mineral Deciduous Swamp Ecosites (SWD4) are not listed in the TRCA ELC Sensitivity Table	Medium
High Sensitivity Fauna Species[2]	Presence of a high sensitivity species OR Presence of a Species at Risk	Presence of a medium sensitivity species**	No high or medium sensitivity species	Gray Treefrog has a 'high' sensitivity to changes in hydrology, while American Toad has a 'medium' sensitivity.	High
High Sensitivity Flora Species[2]	Presence of multiple high sensitivity species OR Presence of Species at Risk	Presence of multiple medium sensitivity species **	No high or medium sensitivity species	Multiple 'medium' sensitivity species present. No 'high' Sensitivity Species and no Species at Risk are present.	Medium
Significant Wildlife Habitat	Presence of SWH for high sensitivity species as defined by MNRF (OMNR 2000 and MNRF 2014)	N/A	No high or medium sensitivity criteria satisfied	No SWH for high sensitivity species are present.	Low
Hydrological Classification Considering Ecology	Isolated/palustrine AND Presence of medium sensitivity vegetation communities* OR Medium sensitivity species**	Isolated/palustrine	No high or medium sensitivity criteria satisfied	Isolated/palustrine, with 'medium' sensitivity vegetation community and 'medium' sensitivity species present.	High
Overall Wetland Sensitivity[3]					**High**

1 – Hydrological sensitivity of the vegetation community was determined based on Appendix 2 of the Wetland Water Balance Risk Evaluation (TRCA 2017).
2 – Hydrological sensitivity of fauna and flora species was determined based on Appendix 3 of the Wetland Water Balance Risk Evaluation (TRCA 2017).
3 – Overall wetland sensitivity is determined by the highest magnitude category with one or more criteria.

MTE's monthly water balance estimates that the proposed development, and associated stormwater management design, will result in a 31.3% increase in annual runoff volume, contributing to an estimated 73.3 mm increase in the annual depth of runoff discharged to the wetland. The distribution of runoff to the wetland over the course of the year closely matches pre-development conditions. The gentle slope of the wetland, towards Torrance Creek, and the permeability and hydraulic conductivity of the local soils will prevent the surplus runoff from ponding for extended periods. As a result, changes to the wetland hydroperiod and composition of the vegetation community are not anticipated to occur post development. MTE's Hydrogeological Assessment (2021b) provides details on the hydraulic conductivity of local soils and in-situ infiltration testing.

A surplus of runoff will be delivered to the wetland throughout the year; however, this is not anticipated to impact the duration of ponding in the PSW, as indicated above. Based on the results of MTE's groundwater monitoring in the PSW, surface ponding does not occur at the PSW boundary near the northern property boundary. Groundwater levels in the mini piezometer (MP1-19) were close to the ground surface in March and April. By May, groundwater levels were below the depth of the mini piezometer (see Table 9), which was installed to a depth of 1.05mbgs (MTE 2020b). Although data was not collected at other locations within the PSW, the results of MTE's monitoring can be extrapolated to the rest of the PSW. Some surface ponding may occur in pockets throughout the PSW based on local topography; however the hydraulic conductivitiy and infiltration rates of local soils will prevent ponding from occurring for excessive durations. The peak of surplus runoff delivered to the PSW may enhance anuran habitat by providing additional water in localized areas. A couple vegetation species (Riverbank Grape (*Vitis riparia*) and Redtop (*Agrostis stolonifera*)) in the wetland observed by NRSI biologists in 2017 are sensitive to flood conditions lasting greater than 3 months. Based on MTE's groundwater elevation observations in the wetland (see Table 9), hydraulic conductivity tests, and in-situ infiltration testing, ponding greater than three months is not anticipated to occur, since the groundwater table drops by over 1m following early spring (March and April) freshet conditions. As such, the vegetation species that are at highest risk of impact are not anticipated to be affected. It is anticipated that the duration of additional ponding will be temporary and will not impact the ecological or hydrological function of the wetland or the vegetation composition.

It is anticipated that the wetland vegetation community, vascular plant species, and the two anuran species documented within the wetland will not be negatively impacted as a result of the proposed development.

Figure 5.4 from MTE's Stormwater Management Plan (2021a), included in Section 7.2.1 of this EIS shows the distribution of runoff to the wetland during pre- and post-development. May, which is an important month for breeding anurans, is estimated to have the greatest estimated change in wetland water levels. A 24.4% increase in monthly runoff volume is anticipated, which will result in an estimated 18.7 mm increase in runoff discharged to the wetland from the subject property compared to pre-development levels. These differences, while not inconsequential, are considered tolerable for the wetland community and anuran species present. The hydrologic changes are not anticipated to negatively impact breeding anurans based on available data on their life cycle requirements (Table 2). Any increases in wetland water level in the month of May will benefit breeding amphibians, and the overall hydroperiod of the wetland is not anticipated to change post-development.

The project team has reviewed and carefully considered the comments provided from the City of Guelph. The feature-based monthly water balance analysis completed by MTE demonstrates that the changes to annual runoff volumes contributing to the adjacent wetland will closely match pre-development conditions.

The detailed monthly runoff volumes were used to determine whether the proposed changes in local hydrology will significantly alter the form or function of the Torrance Creek Wetland Complex from its pre-development condition. According to the sensitivity analysis completed, which focused on the wetland vegetation community and anuran species documented within the Study Area, it is anticipated that no negative impact will occur due to the proposed development and resulting changes in local hydrology.

It is recommended that wetland water level monitoring, anuran call survey monitoring, and vegetation monitoring is implemented before and after construction of the proposed development to determine whether the stormwater management design is functioning as anticipated.

7.8 Cumulative Impacts

The Torrance Creek Wetland Complex catchment has been under development for many years. The pace of development has increased substantially since about 2016, with approximately six

sites under construction. Several more properties in the catchment area are undergoing development approvals and construction is anticipated to commence over the course of the next few years as shown on Map 7. There is no Secondary Plan for the Torrance Creek Wetland Complex catchment, and the storm sewers have no additional capacity to receive flows from new development areas (L. Lefler, City of Guelph, pers. comm, 2021). The Torrance Creek Subwatershed Study Management Strategy (Totten Sims Hubicki Associates et al. 1999) is the only watershed management guidance for the PSW. It is critical to understand and evaluate the overall impact that development has on the Torrance Creek Wetland Complex, and the portion that the 190 – 216 Arkell Road property development contributes to potential impacts.

Development on the northwest side of the Torrance Creek Wetland Complex occurred prior to 2006. Environmental Impact Studies and Hydrology studies have changed significantly since then and did not require more rigorous assessments of hydrological and ecological impact to adjacent natural features. As such, it is unlikely that these developments included an ecological review of water balance. Since these developments have been in place for over 15 years, it is expected that the wetland has begun to adapt to the runoff and infiltration inputs. The wetland may continue to change and adapt over time as the vegetation community adjusts to hydrological inputs and effluent received from these developments.

The east side of the Torrance Creek Wetland Complex is currently undergoing development. Previous land uses for the lands east of the PSW were agriculture, and a golf course. Construction on the agricultural lands began at some point between 2006 and 2009, and is ongoing. The development consists of townhouses, semi-detached and detached houses, Jubilee Park, a Public School, and stormwater management ponds. Construction on the golf course lands began in 2017, with a substantial portion of the area yet to be developed. Development on the golf course lands currently includes townhouses, a re-aligned section of watercourse and a pond that was converted to a stormwater management pond. A substantial portion of the property has been graded to near final grades; however, construction of homes and roads has not yet begun.

A small area of development has occurred at the southwest corner of the PSW complex at the Gordon Street and Arkell Road intersection. Construction began in 2013, converting vacant / idle lands to townhouse and low rise residential. In addition, a small infill type development occurred north of the Gordon Street and Arkell intersection on the southwest side of the Torrance Creek Wetland Complex. The development consists of several detached homes,

supporting roads, and a small park. The lands were converted from vacant / idle lands with construction occurring between.

NRSI staff reviewed Google Earth historic aerial imagery, and several documents to inform an analysis of cumulative impacts. These documents included:

- 388 Arkell Road Scoped EIS Addendum Report (Aboud & Associates Inc. 2021)
- 220 Arkell Road EIR (Stantec Consulting Ltd. 2019)
- Gallery Towns: 60 Arkell Road, City of Guelph, Environmental Implementation Report (NRSI 2015)
- 1242, 1250, 1260, 1270 Gordon Street and 9 Valley Road, Guelph, ON – Environmental Impact Study Addendum (Stantec Consulting Ltd. 2021)
- Functional Servicing and Stormwater Management Design Report for: 33-37 Arkell Road and 1408 Gordon Street City of Guelph (GM BluePlan Engineering 2021)

Through a review of these documents by NRSI's Ecohydrologist, it was noted that the sources above all indicate that the groundwater level surrounding the Torrance Creek Wetland Complex is close to the surface (within 1m) for at least part of the year, which restricts groundwater infiltration during this time. Each development was required to address the stormwater management targets and objectives outlined in the Torrance Creek Subwatershed Management Strategy (Totten Sims Hubicki Associates et al. 1999). The developments within the Torrance Creek Wetland Complex catchment area all employ a variety of Low Impact Design stormwater management systems to capture, infiltrate, and treat runoff and stormwater, including:

- Infiltration galleries and trenches
- Rear-yard soak-away pits
- Bio-retention swales
- End-of-pipe infiltration areas within stormwater management ponds

These systems intercept runoff and direct it to the shallow groundwater table throughout the Torrance Creek PSW catchment. Water quality controls are described in each of the reports identified above, to reduce pollutants, total suspended solids, and thermal impacts. Since there is no additional capacity in the storm sewers in this area of Guelph, each development has been required to control stormwater generated on site and balance pre- and post-development runoff and infiltration. Cumulatively, the post-development water balance of these developments

appears to balance out. Some developments have a surplus of runoff and infiltration from the development, while others have deficits. Each water balance has been managed to reduce the surplus and deficits as much as possible to reflect pre-development conditions. As a whole, there appears to be a surplus of runoff occurring in the month of April that could extend into March or May depending on snow melt conditions each year. This is due to the high groundwater table at this time of the year and reduced infiltration capacity of soils. The overall annual distribution of infiltration and runoff from the development area is difficult to assess due to the large number of reports and variations in the information provided.

Based on review of the stormwater management plans and water balance analysis for developments in the Torrance Creek Wetland Complex catchment area, groundwater infiltration rates will increase and surface water runoff to the wetland will generally be balanced across the catchment. While local impacts to vegetation species may occur, it is likely that the overall hydroperiod of the wetland will be maintained, allowing for wet and dry periods that will maintain the swamp community. The water balance for the wetland will support wildlife present, specifically anuran species that rely heavily on standing water and saturated conditions in the spring for breeding. The developments within the wetland catchment appear to be well balanced and limited cumulative impacts are anticipated as a result of the existing and proposed development applications.

The proposed development has been designed to minimize potential cumulative impacts to the Torrance Creek Wetland Complex using a wide variety of mitigation measures, including the low impact development stormwater management strategies and water quality controls. No negative impact to the PSW is anticipated as long as the mitigation measures in this report are implemented and function as designed.

Mitigation

- *Heavy-duty ESC fencing should be installed at the limit of grading prior to any works on-site, including vegetation removal, clearing and grubbing to protect the natural features and their buffers for sedimentation;*
- *Topsoil piles are to be located away from the natural features and their associated buffers and ESC measures are to be installed around the piles to prevent off-site migration of water-borne sediments;*
- *ESC measures are to be monitored and maintained regularly throughout the construction phase of the project (i.e., once a week depending on construction schedule or following heavy precipitation events);*

- *Tree Protection Fencing and ESC fence are to be removed after construction and any exposed soils to be stabilized to the satisfaction of an Environmental Monitor or qualified biologist;*

- *Site grading will be maintained outside of the Torrance Creek PSW Complex and the 30m buffer with exception of the graded side slope to accommodate the Dawes Road extension through the property;*

- *Site grading will be maintained outside of the Significant Woodland and the 10m buffer;*

- *Graded areas are to be revegetated with a suitable seed mix as soon as possible (i.e., within 30 days of being inactive) to minimize potential erosion and sedimentation of adjacent natural features. Where graded areas are adjacent to the natural features and their buffers (including the 3:1 slope that encroaches into the outer 30m wetland buffer), the seed mix is to be comprised of native species suitable to the soils and site conditions and an annual cover crop that will establish quickly (e.g., Annual Oats (Avena sativa), Annual Rye (Lolium multiflorum), or White Millet (Panicum miliaceumm);*

- *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 may be recommended;*

- *Plantings should be maintained appropriately throughout the warranty period;*

- *Detailed landscaping and Vegetation Compensation Plans will be required for the property at the Detailed Design stage and will be prepared as part of the EIR. It is anticipated that compensation plantings will occur within the buffer of the NHS and along the graded side slopes in an effort to enhance the ecological value of these plantings;*

- *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;*

- *Equipment storage, maintenance, and refueling areas to occur at a designated location away from the natural features and their buffers;*

- *Contractors should develop a spill contingency plan and keep clean-up materials on-site and away from the natural features and their buffers;*

- *To avoid impacts to the wetland, the subject property water balance (both runoff and infiltration) should be maintained during all construction activities and in the post development scenario;*

- *Should groundwater dewatering be required during construction, a dewatering plan should be developed by the contractor. Should a Permit to Take Water be required,*

a qualified Biologist or Ecohydrologist should be consulted to ensure the discharge of water does not impact the adjacent natural features and wildlife;

- *Implement a post-construction monitoring and maintenance program for the stormwater management system to ensure the system functions as designed and the water balance is maintained;*

- *Develop Best Management Practices for salt and snow at the Detailed Design stage and implement post development.*

7.9 Summary of Impacts and Mitigation Measures

Table 12. Summary of Significant Natural Features, Potential Impacts and Recommended Mitigation

Significant Natural Feature	Relevant Policies	Potential Impacts	Recommended Mitigation
Significant Wetland	• Provincial Policy Statement (OMMAH 2020) • City of Guelph Official Plan (2021) • Grand River Conservation Authority Ontario Regulation 150/06 (2013) • (Government of Ontario 2020)	**Direct Impacts:** • The overall function of the wetland will be maintained. **Indirect Impacts**: • Changes to surface runoff and the subject property water balance • Sedimentation and erosion • Indirect impacts to wildlife **Induced Impacts**: • 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.	**Direct and Indirect Impacts** • Minimum 30m buffers around the wetland are recommended with permitted uses within the outer 15m as per OP policy 4.1.1.11 • Buffers should be delineated in the field prior to any construction activities **Indirect Impacts**: • 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 ESC 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 and their buffers. • Should groundwater dewatering be required during construction, a dewatering plan is to be prepared and a qualified Biologist or Ecohydrologist consulted to ensure discharge from dewatering activities does not impact the wetland • Implement a post-construction monitoring plan • Prepare and implement a salt management plan **Induced Impacts:** • 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 to be incorporated into the NHS buffer and along

Significant Natural Feature	Relevant Policies	Potential Impacts	Recommended Mitigation
			graded side slope that encroaches into the 30m wetland buffer.
Significant Woodland	• Provincial Policy Statement (OMMAH 2020) • City of Guelph Official Plan (2021) • City of Guelph Tree Bylaw (2010) No. 19058	**Direct Impacts:** • Direct impacts to the deciduous forest have been avoided through the proposed development design which is completely outside the dripline buffers. The overall function of this woodland will be maintained. **Indirect Impacts**: • Sedimentation and erosion • Indirect impacts to wildlife **Induced Impacts**: • 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.	**Direct Impacts:** • Dripline buffers (10 m) are required around the woodland. • Site-specific tree protection measures should be identified at Detailed Design stage. • A detailed Tree Inventory and Preservation Plan (TIPP), and a Vegetation Compensation Plan are required as part of the Detailed Design and should follow the guidelines set out by the City of Guelph's Tree Technical Manual (2019a). **Indirect Impacts**: • A detailed ESC Plan should be developed at the Detailed Design stage. **Induced Impacts:** • Signage should be used to direct community members or other recreational users not to trespass into sensitive natural areas.
Significant Species	• Endangered Species Act (2007)	**Direct Impacts:** • The development plan will result in the removal of five candidate bat maternity roost trees **Indirect Impacts**: • Indirect impacts to wildlife	**Direct Impacts:** • The five candidate bat maternity roost trees within the development area are to be removed outside of the active roosting season (October 1 – March 30). • Correspondence with the MECP may be required if removal of these trees is anticipated during the active season (April 1 – September 30)

Significant Natural Feature	Relevant Policies	Potential Impacts	Recommended Mitigation
Significant Wildlife Habitat	• Provincial Policy Statement (OMMAH 2020) • City of Guelph Official Plan (2021) • Grand River Conservation Authority Ontario Regulation 150/06 (2013) • (Government of Ontario 2020)	**Direct Impacts:** • 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. **Indirect Impacts**: • Sedimentation and erosion • Indirect impacts to wildlife **Induced Impacts**: • 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.	**Direct and Indirect Impacts:** • Minimum 10m Dripline and 30m wetland buffers are recommended around the woodland/wetland community. • Buffers should be delineated in the field prior to any construction activities. **Indirect Impacts**: • To avoid impacts to the wetland, the water balance should be maintained during all construction activities and in the post-development scenario. • A detailed ESC 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. **Induced Impacts:** • Signage should be used to direct community members or other recreational users not to trespass into sensitive natural areas.
Urban Forest and Wildlife Habitat	• City of Guelph Official Plan (2021) • City of Guelph Tree Technical Manual (2019a) • Migratory Birds Convention Act (Government of Canada 1994) • Fish and Wildlife Conservation Act (Government of Ontario 1997)	**Direct Impacts:** • Removal of 282 isolated trees within the developed portion of the subject property. • Removal of manicured lawn, residential home, isolated trees and old field cultural meadow that may provide marginal habitat for wildlife **Indirect Impacts**: • Potential indirect impacts to wildlife in the retained natural	**Direct Impacts:** • Final details of the vegetation to be removed from the subject property will be included at the Detailed Design 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 by a biologist to

Significant Natural Feature	Relevant Policies	Potential Impacts	Recommended Mitigation
		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. **Induced impacts**: • Increased use of a natural area by residents or users of the property, feral domestic wildlife, and unauthorized trail/pathway construction.	permit vegetation removal should breeding bird absence be confirmed. • Where trees are to be retained, tree protection fencing that follow the *City of Guelph's Tree Technical Manual (2019a) guidelines,* should be installed along the limit of grading (i.e., the buffer edge). • Trees identified for removal are to be compensated in accordance with the City's Tree Technical Manual (2019a) as outlined in the TIPP (Appendix V) • A vegetation compensation plan will be prepared at the Detailed Design stage that outlines the location where replacement vegetation will be planted. • It is recommended that planting of new native trees and shrubs and where suitable, herbaceous species be incorporated into the Landscape Plan to compensate for the loss of urban tree cover. **Indirect Impacts**: • 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. • Lighting plans should follow the City of Guelph's Lighting Guidelines (LEA Consulting 2019)

Significant Natural Feature	Relevant Policies	Potential Impacts	Recommended Mitigation
			• All machinery, storage and refueling to be maintained outside of the natural features and their demarcated buffers. **Induced Impacts:** • Signage should be used to direct community members or other recreational users not to trespass into sensitive natural areas.

8.0 Recommendations

8.1 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) for the natural area buffer that incorporates native species is required to be a part of the Detailed Design;
- Detailed educational signage and environmental outreach;
- Preparation of Landscape Plans complete with details addressing demarcation and removal of hazard trees (where applicable);
- Specific requirements which need to be addressed for a Tree Cutting Permit (e.g., landowner permission letters for boundary trees);
- Detailed buffer management plan;
- A review of the final development details (e.g., final stormwater management report, detailed grading plans, sediment and erosion control details, etc.) and an updated impact assessment, where necessary.

9.0 Summary and Conclusions

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 Wetland Complex. Identified natural feature constraints were used to guide the layout of the Concept Plan and to avoid the direct displacement of this identified feature.

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 (2021c, 2021a). 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 a detailed sensitivity analysis for vegetation and wildlife within the PSW that may be impacted by changes in hydrology as proposed. Details for the subject property water balance are provided in the Hydrological Investigation Report (MTE 2021 b). This EIS evaluated the proposed water balance and sensitivity of the wetland using the Wetland Water Balance Risk Evaluation (TRCA 2017) guidance document. Based on this evaluation and the proposed water balance, no negative impacts are anticipated as a result of hydrological changes to the subject property.

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 (MHBC 2021)

DRAFT PLAN OF SUBDIVISON

Legal Description

PART OF LOT 6, CONCESSION 8, GEOGRAPHICAL TOWNSHIP OF PUSLINCH.
CITY OF GUELPH

Owner's Certificate

I HEREBY AUTHORIZE MACNAUGHTON HERMSEN BRITTON CLARKSON PLANNING LIMITED TO SUBMIT THIS PLAN FOR APPROVAL.

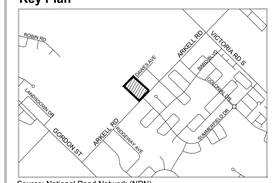
DATE:_____

Surveyor's Certificate

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED ON THIS PLAN AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN.

DATE:_____

Key Plan



Additional Information Required Under Section 51(17) of the Planning Act R.S.O. 1990, c.P.13 as Amended

A. AS SHOWN	B. AS SHOWN	C. AS SHOWN
D. MULTIPLE RESIDENTIAL, OPEN SPACE		
E. AS SHOWN	F. AS SHOWN	G. AS SHOWN
H. MUNICIPAL WATER SUPPLY	I. LOAM	J. AS SHOWN
K. ALL SERVICES AS REQUIRED	L. AS SHOWN	

Area Schedule **61T_____**

Description	Lots/Blocks	Units	Area (ha)
Multiple Residential	1-5	70	1.062
Open Space	6		0.862
Stormwater Management	7		0.242
Road Widening	8		0.063
Roads			0.348
Total	**8**	**70**	**2.577**

Notes
1. All dimensions are in metres unless otherwise shown
2. Dripline Limits - Natural Resource Solutions Inc. (NRSI) June, 2016
3. Wetland Limits - Natural Resource Solutions Inc. (NRSI) August, 2016
4. Property boundary is approximate, based on MTE Existing Conditions Plan and Wellington County Survey plans 61R-773, 61R-2819
5. Surrounding parcel boundaries are approximate/ taken from Vumap (First Base Solutions) aerial imagery
6. Unit yield based on Conceptual Site Plan prepared by MHBC Planning
7. Building footprints outside of subject lands gathered from City of Guelph open data

Revision No.	Date	Issued / Revision	By
12.	April 28, 2021	Adjust Stormwater, Residential Blocks;	G.C.
11.	January 28, 2021	Stacked Townhouse Orientation;	G.C.
10.	March 18, 2020	SWM revision;	G.C.
9.	January 6, 2020	Update/ Issued for Review;	G.C.
8.	December 11, 2019	Update/ Issued for Review;	G.C.
7.	October 9, 2019	Update/ Issued for Review;	G.C.
6.	July 8, 2019	Update/ Issued for Review;	G.C.
5.	December 6, 2018	Update/ Issued for Review;	G.C.
3.	September 12, 2018	Update/ Issued for Review;	G.C.
2.	July 4, 2017	Update/ Issued for Review;	G.C.
1.	March 13, 2017	Issued for Review;	G.C.

MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE
200-540 BINGEMANS CENTRE DR. KITCHENER, ON. N2B 3X9 | P: 519.576.3650 F: 519.576.0121 | WWW.MHBCPLAN.COM

Approval Stamp

Date April 28, 2021

File No. 15246A

Plan Scale 1:400 (36x24)

Drawn By G.C.

Project Arkell Road - Guelph

Checked By D.A.

Applicant
Crescent Homes
151 Curzon Crescent
Guelph, ON. N1K OB3
P: 647.523.6487

Other

north

File Name Draft Plan of Subdivision

Dwg No. 1 of 1

Scale Bar 2.5 0 5 10 25m

K:\15246A-Crescent Homes-Arkell Road-Guelph\DP\Draft Plan April 29 2021.dwg

Appendix II
Significant Species Screening

Significant Species Screening - Arkell Road Properties EIS (Project #1771)

Scientific Name	Common Name	S-RANK[1]	SARO[1]	COSEWIC[2]	SARA[2]	SARA Schedule[2]	Background Source	Habitat Requirements	Suitable Habitats within Subject Property?	Rationale	Observed by NRSI?
Birds											
Ammodramus savannarum	Grasshopper Sparrow	S4B	SC	SC	SC	Schedule 1	BSC et al. 2006	Well-drained grassland or prairie with low cover of grasses, taller weeds or sandy soil; hayfields or weedy fallow fields; uplands with ground vegetation of various densities. Requires perches for singing and tracts of grassland generally >5ha.[3,4]	No	Grassland habitat of a suitable size is not present. Open habitats on the subject property (CUM and CUT communities) are <0.5ha.	No
Cardellina canadensis	Canada Warbler	S5B	SC	SC	T	Schedule 1	MNRF 2018	Moist, mixed coniferous and deciduous forests with well-developed, dense shrub layer and closed canopy; wet bottomlands of cedar or alder; shrubby undergrowth in cool moist mature woodlands; riparian habitat. Most often found in large forest tracks.[3,4]	No	Suitable habitat may be present in the Torrence Creek PSW, the majority of which is off-property. However, the species was not observed by NRSI biologists during 2017 field surveys.	No
Chaetura pelagica	Chimney Swift	S3B	THR	T	T	Schedule 1	BSC et al. 2006; MNRF 2018	Commonly found in urban areas near buildings; nests in chimneys, hollow trees,and crevices of rock cliffs. Feeds over open water.[3,4]	No	Suitable habitat is not present; chimneys on the residential dwellings are capped.	No
Chordeiles minor	Common Nighthawk	S4B	SC	SC	T	Schedule 1	BSC et al. 2006; MNRF 2018	Open ground; clearings in dense forests (including burns and logged areas); rock barrens; peat bogs; ploughed fields; gravel beaches or barren areas with rocky soils; open woodlands; flat gravel roofs.[3,4]	No	Open areas on the subject property may provide suitable habtiat. However, the species was not observed by NRSI biologists during 2017 field surveys.	No
Contopus virens	Eastern Wood-pewee	S4B	SC	SC	SC	Schedule 1	BSC et al. 2006; MNRF 2018	Mid-canopy layer of forest clearings and edges of deciduous and mixed forest. Abundant in intermediate-age mature forest stands with little understory vegetation.[3,4]	Yes	The deciduous forest communities within and adjacent to the subject property provide suitable habitat. The species was observed by NRSI biologists during 2017 field surveys, exhibiting evidence of probable breeding in the above-noted communities.	Yes
Dolichonyx oryzivorus	Bobolink	S4B	THR	T	T	Schedule 1	BSC et al. 2006; MNRF 2018; MNRF 2021b	Large (>10 ha), open expansive grasslands, pastures, hayfields, meadows or fallow fields with dense ground cover. Occassionally nest in large (>50 ha) fields of winter wheat and rye in southwestern Ontario. [3,4]	No	Grassland habitat of a suitable size is not present. Open habitats on the subject property (CUM and CUT communities) are <0.5ha.	No
Haliaeetus leucocephalus	Bald Eagle	S4	SC	NAR	NS	No Schedule	MNRF 2018	A variety of mature forest types adjacent to large lakes or rivers. Generally nest in tall supercanopy trees, a short distance from shore.[3,4]	No	Forest communities adjacent to large lakes or rivers are not present.	No
Hirundo rustica	Barn Swallow	S4B	THR	SC	T	Schedule 1	BSC et al. 2006; MNRF 2018	Farmlands, rural areas and other open or semi-open areas near body of water. Nests almost exclusively on human-made structures such as open barns, buildings, bridges and culverts.[3,4]	No	Structures on the subject property are not accessible to the species, and other suitable nesting habitat is not present. Although the open areas on the property may provide suitable foraging habitat, the species was not observed by NRSI biologists during 2017 field surveys.	No
Hylocichla mustelina	Wood Thrush	S4B	SC	T	T	Schedule 1	BSC et al. 2006; MNRF 2018	Carolinian and Great Lakes-St. Lawrence forest zones. Undisturbed moist mature deciduous or mixed forest with deciduous sapling growth. Near pond or swamp. Must have some trees higher than 12 m.[3,4]	No	Suitable habitat may be present in the Torrence Creek PSW, the majority of which is off-property. However, the species was not observed by NRSI biologists during 2017 field surveys.	No
Icteria virens	Yellow-breasted Chat	S1B	END	E	E	Schedule 1	MNRF 2018	Thickets and scrub, tall tangles of shrubbery beside streams and ponds, overgrown bushy clearings with deciduous thickets.[3,4]	No	A small thicket (CUT) is present on the subject property, but does not represent preferred, overgrown habitat. The species was not observed by NRSI biologists during 2017 field surveys.	No
Melanerpes erythrocephalus	Red-headed Woodpecker	S3	SC	E	E	Schedule 1	BSC et al. 2006; MNRF 2018	Open, deciduous forest with little understory; fields, parks or pasture lands with scattered large trees; wooded swamps; orchards, small woodlots or forest edges; groves of dead or dying trees. Requires cavity trees with at least 40 cm dbh.[3,4]	No	Suitable habitat may be present in the Torrence Creek PSW, the majority of which is off-property. However, the species was not observed by NRSI biologists during 2017 field surveys.	No
Riparia riparia	Bank Swallow	S4B	THR	T	T	Schedule 1	BSC et al. 2006; MNRF 2018	Nests in burrows in natural and human-made settings with vertical faces in silt and sand deposits. Ususally on banks of river and lakes, but also found in sand and gravel pits.[3,4]	No	Suitable sand and silt deposits with vertical faces are not present.	No

Significant Species Screening - Arkell Road Properties EIS (Project #1771)

Scientific Name	Common Name	S-RANK[1]	SARO[1]	COSEWIC[2]	SARA[2]	SARA Schedule[2]	Background Source	Habitat Requirements	Suitable Habitats within Subject Property?	Rationale	Observed by NRSI?
Sturnella magna	Eastern Meadowlark	S4B, S3N	THR	T	T	Schedule 1	BSC et al. 2006; MNRF 2018; MNRF 2021b	Open pastures, hayfields, grasslands or grassy meadows with elevated singing perches (small trees, shrubs or fence posts). Also weedy borders of croplands, roadsides, orchards, airports, shrubby overgrown fields or other open areas. Generally prefers larger tracts of habitat >10 ha, but will sometimes use smaller tracts.[3,4]	No	Grassland habitat of a suitable size is not present. Open habitats on the subject property (CUM and CUT communities) are <0.5ha.	No
Vermivora chrysoptera	Golden-winged Warbler	S3B	SC	T	T	Schedule 1	MNRF 2018	Areas with young shrubs surrounded by mature forest, including locations that have recently been disturbed, such as abandoned fields, field edges, hydo or utility right-of-ways, or logged areas with saplings and grasses.[3,4]	No	Recently disturbed areas on the subject property are not considered preferred habitat for the species. The species was not observed by NRSI biologists during 2017 field surveys.	No
Herpetofauna											
Turtles											
Chelydra serpentina	Snapping Turtle	S4	SC	SC	SC	Schedule 1	MNRF 2018; ORAA 2019; MNRF 2021b	Slow-flowing rivers and streams, lakes, and permanent or semi-permanent wetlands with soft substrates and vegetation. Key habitat requirements: open areas with structures for basking, open sand or gravel areas for nesting, shallow areas with soft substrates to bury in, soft banks or substrates for hibernation.[3]	No	The small pond on the subject property is too shallow to provide turtle overwintering habitat. The species was not observed by NRSI biologists during 2017 field surveys.	No; targeted surveys not completed
Emydoidea blandingii	Blanding's Turtle (Great Lakes / St. Lawrence population)	S3	THR	E	T	Schedule 1	MNRF 2018; ORAA 2019	Eutrophic, shallow wetlands such as marshes, ponds, swamps, bogs, fens, or coastal wetlands, with soft, muddy substrates, abundant aquatic vegetation, and basking structures (logs, stumps, hummocks). Large overland movements occur between aquatic habitats and to open sandy or gravelly areas for nesting. Forest habitat is important for upland movements. Overwintering typically occurs in permanent wetlands.[5]	No	The small pond on the subject property is too shallow to provide turtle overwintering habitat. The species was not observed by NRSI biologists during area searches completed as part of 2017 field surveys.	No; targeted surveys not completed
Graptemys geographica	Northern Map Turtle	S3	SC	SC	SC	Schedule 1	ORAA 2019	Large bodies of water such as rivers and lakes with soft bottoms, aquatic vegetation, abundant mollusc prey, and basking structures such as logs or rocks. Nesting occurrs in open areas with soft substrates such as sand or gravel. Hibernate on the bottom of deep areas of lakes or deep, slow-moving sections of rivers.[3]	No	The small pond on the subject property is too small and does not represent suitable habitat fo the species. The species was not observed by NRSI biologists during area searches completed as part of 2017 field surveys.	No; targeted surveys not completed
Snakes											
Thamnophis sauritus septentrionalis	Northern Ribbonsnake	S4	SC	SC	SC	Schedule 1	MNRF 2018; ORAA 2019	Sunny grassy areas with low dense vegetation near bodies of shallow permanent quiet water; wet meadows, marshes, borders of ponds, lakes or streams.[3]	No	Suitable habitat may be present in the Torrence Creek PSW, the majority of which is off-property. However, the species was not observed by NRSI biologists during 2017 field surveys.	No
Salamanders											
Ambystoma jeffersonianum	Jefferson Salamander	S2	END	E	E	Schedule 1	MNRF 2018; ORAA 2019	Large deciduous or mixed forest containing, or in close proximity to, suitable breeding ponds which include fishless vernal pools or wetlands with suitable hydroperiod for larval development. Habitats must contain shelter features including leaf litter, woody debris, rocks, logs, or stumps. Hibernation sites are underground in mammal burrows, root systems, or crevices or fissures in rocks.[6]	No	Suitable habitat may be present in the Torrence Creek PSW, the majority of which is off-property. Suitable breeding ponds are not present on the subject property, and previous correspondence with the MNRF in 2016 did not indicate that the species has any nearby records.	No; targeted surveys not completed
Ambystoma laterale - (2) jeffersonianum	Unisexual Ambystoma (Jefferson Salamander dependent population)	S2	END	E	NS	No Schedule	MNRF 2018	Large deciduous or mixed forest containing, or in close proximity to, suitable breeding ponds which include fishless vernal pools or wetlands with suitable hydroperiod for larval development. Habitats must contain shelter features including leaf litter, woody debris, rocks, logs, or stumps. Hibernation sites are underground in mammal burrows, root systems, or crevices or fissures in rocks.[6]	No	Suitable habitat may be present in the Torrence Creek PSW, the majority of which is off-property. Suitable breeding ponds are not present on the subject property, and previous correspondence with the MNRF in 2016 did not indicate that the species has any nearby records.	No; targeted surveys not completed
Pseudacris triseriata pop.1	Western Chorus Frog (Great Lakes - St. Lawrence - Canadian Shield population)	S4	NAR	T	T	Schedule 1	ORAA 2019	Moist forest, prairie, meadows, cultural meadows, or marshes. Breeds in shallow, temporary, fishless wetlands, including flooded ditches, marshes, flooded fields, pastures, temporary ponds, pools, and swamps. Hibernates in terrestrial habitats under rocks, logs, leaf litter, loose soil, or in animal burrows.[7]	No	The small pond on the subject property and the Torrence Creek PSW may provide suitable breeding habitat. However, targeted anuran call surveys completed by NRSI biologists in 2017 did not detect the species.	No

Significant Species Screening - Arkell Road Properties EIS (Project #1771)

Scientific Name	Common Name	S-RANK[1]	SARO[1]	COSEWIC[2]	SARA[2]	SARA Schedule[2]	Background Source	Habitat Requirements	Suitable Habitats within Subject Property?	Rationale	Observed by NRSI?
Mammals											
Microtus pinetorum	Woodland Vole	S3?	SC	SC	SC	Schedule 1	Dobbyn 1994	Mature deciduous forest in the Carolinian region where there is a deep litter layer that allows it to burrow.[3,4]	No	Mature decidious Carolinian forests with deep leaf litter are not present.	No; targeted surveys not completed
Myotis leibii	Eastern Small-footed Myotis	S2S3	END				Dobbyn 1994; MNRF 2018	Roosts on ground level rock roosts in talus slopes, rock fields and vertical cliff faces in the summer. Hibernates in cold dry caves or mines. Maternity colonies in caves or buildings. Hunts in forests.[3,4]	No	Talus slopes and other vertical rocky habitats are not present. Bat acoustic monitoring and exit surveys completed by NRSI biologists in 2017 did not detect the species.	No
Myotis lucifungus	Little Brown Myotis	S3	END	E	E	Schedule 1	Dobbyn 1994; MNRF 2018	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 and forest edges.[3,4]	Yes	During acoustic monitoring and exit surveys conducted by NRSI biologists in 2017, the species was documented roosting in a building (although no maternity colony was documented) and using foraging habitat within the subject property.	Yes
Myotis septentrionalis	Northern Myotis	S3	END	E	E	Schedule 1	Dobbyn 1994; MNRF 2018	Roosts in houses and man-made structures but prefers hollow trees or under loose bark. Hibernates in mines or caves. Hunts within forest, below the canopy.[3,4]	No	Suitable habitat may be present on the subject property, however acoustic monitoring and exit surveys completed by NRSI biologists in 2017 did not detect the species.	No
Perimyotis subflavus	Tri-colored Bat	S3?	END	E	E	Schedule 1	Dobbyn 1994; MNRF 2018	Roosts and maternity colonies in older forests and occassionally in barns or other sturctures. Forage over water and along streams in the forest. Hibernate in caves.[3,4]	No	Suitable habitat may be present on the subject property, however acoustic monitoring and exit surveys completed by NRSI biologists in 2017 did not detect the species.	No
Taxidea taxus jacksoni	American Badger (Southwestern Ontario population)	S2	END	E	E	Schedule 1	Dobbyn 1994; MNRF 2018	Open grasslands, oak savannahs, sand barrens and farmland.[3,4]	No	Open habitats on the subject property do not represent preferred habitat for the species. No candidate den sites were observed by NRSI biologists during 2017 field surveys.	No
Insects											
Butterflies											
Danaus plexippus	Monarch	S2N, S4B	SC	END	SC	Schedule 1	MNRF 2018; Macnaughton et al. 2020	Adults found in a diversity of habitats with a variety of wildflowers. Caterpillars are confined to meadows and open areas where milkweeds grow (larval food plants).[3]	No	Open habitats on the subject property were almost devoid of milkweeds. The species was not observed by NRSI biologists during 2017 field surveys.	No
Asterocampa clyton	Tawny Emperor	S3	-	-	-	-	Macnaughton et al. 2020	Densely wooded riparian areas, dry woods, open woods, cities, fencerows, parks. Host plant are trees in the genus *Celtis*.	No	Suitable woodland habitat with the species' larval food plant (treees of the genus *Celtis*) is not present. The species was not observed by NRSI biologists during 2017 field surveys.	No
Pieris virginiensis	West Virginia White	S3	SC	-	-	-	Macnaughton et al. 2020	Rich, moist, deciduous woods with populations of Two-leaved Toothwort (*Cardimine diphylla*; larval food plant).[3]	No	Suitable woodland habitat with the species' larval food plan is not present. The species was not observed by NRSI biologists during 2017 field surveys.	No
Odonates											
Arigomphus villosipes	Unicorn Clubtail	S3	-	-	-	-	OOAD 2021	Ponds and lakes with muddy substrates. Occurs in degraded urban habitats.[8]	No	The small pond on the subject property may provide suitable habitat. However, the species was not observed by NRSI biologists during 2017 field surveys.	No
Phanogomphus graslinellus	Pronghorn Clubtail	S3	-	-	-	-	OOAD 2021	Slow-flowing sandy or muddy streams. Also occurs in medium to large lakes in their northern range.[8]	No	Streams are not present on the subject property.	No
Rhionaeschna mutata	Spatterdock Darner	S3	-	-	-	-	OOAD 2021	Fishless, vegetated ponds and pools, open marshes and bogs, often with spatterdock.[8]	No	The small pond on the subject property may provide suitable habitat. However, the species was not observed by NRSI biologists during 2017 field surveys.	No
Somatochlora tenebrosa	Clamp-tipped Emerald	S3	-	-	-	-	OOAD 2021	Small, shaded forest streams with rapids, pools abundant leaf litter.[8]	No	Streams are not present on the subject property.	No
Bumblebees											
Bombus affinis	Rusty-patched Bumble Bee	S1	END	E	E	Schedule 1	MNRF 2018	Mixed farmland, sand dunes, marshes, urban and wooded areas. Nests in abandoned rodent burrows.[3]	No	Open habitats with abandoned rodent burrows may be present. However, the species was not observed by NRSI biologists during 2017 field surveys, and has not been documented outside of the Pinery Provincial Park area since 2002.	No
Bombus terricola	Yellow-banded Bumble Bee	S3S5	SC	SC	SC	Schedule 1	MNRF 2018	Mixed woodlands and a variety of open habitats: native grasslands, farmlands, and urban areas, where abandoned rodent burrows or decomposing logs are prevalent.[3]	No	Open habitats with abandoned rodent burrows may be present. However, the species was not observed by NRSI biologists during 2017 field surveys	No

Significant Species Screening - Arkell Road Properties EIS (Project #1771)

Scientific Name	Common Name	S-RANK[1]	SARO[1]	COSEWIC[2]	SARA[2]	SARA Schedule[2]	Background Source	Habitat Requirements	Suitable Habitats within Subject Property?	Rationale	Observed by NRSI?
Plants											
Juglans cinerea	Butternut	S2?	END	E	E	Schedule 1	MNRF 2018	Stream banks and swamps, as well as upland beech-maple, oak-hickory, and mixed hardwood stands.[9]	No	Woodlands on the subject property may provide suitable habitat for Butternut; however, the species was not observed by NRSI biologists during 2017 field surveys	No

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Appendix III
Significant Wildlife Habitat Screening

Significant Wildlife Habitat Assessment Tables

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

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Waterfowl Stopover and Staging Areas (Terrestrial)					
Rationale: Habitat important to migrating waterfowl.	American Black Duck Wood Duck Green-winged Teal Blue-winged Teal Mallard Northern Pintail Northern Shoveler American Wigeon Gadwall	CUM1 CUT1 - Plus evidence of annual spring flooding from melt water or run-off within these Ecosites.	Fields with sheet water during Spring (mid March to May). • Fields flooding during spring melt and run-off provide important invertebrate foraging habitat for migrating waterfowl. • Agricultural fields with waste grains are commonly used by waterfowl, these are not considered SWH unless they have spring sheet water available[cxlviii]. Information Sources • Anecdotal information from the landowner, adjacent landowners or local naturalist clubs may be good information in determining occurrence. • Reports and other information available from Conservation Authorities (CAs) • Sites documented through waterfowl planning processes (eg. EHJV implementation plan) • Field Naturalist Clubs • Ducks Unlimited Canada • Natural Heritage Information Centre (NHIC) Waterfowl Concentration Area	Studies carried out and verified presence of an annual concentration of any listed species, evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • Any mixed species aggregations of 100 or more individuals required. • The area of the flooded field ecosite habitat plus a 100-300m radius buffer dependent on local site conditions and adjacent land use is the significant wildlife habitat[cxlviii]. • Annual use of habitat is documented from information sources or field studies (annual use can be based on studies or determined by past surveys with species numbers and dates). • SWHMiST[cxlix] Index #7 provides development effects and mitigation measures.	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[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					
Rationale: High quality shorebird stopover habitat is extremely rare and typically has a long history of use.	Greater Yellowlegs Lesser Yellowlegs Marbled Godwit Hudsonian Godwit Black-bellied Plover American Golden-Plover Semipalmated Plover Solitary Sandpiper Spotted Sandpiper Semipalmated Sandpiper Pectoral Sandpiper White-rumped Sandpiper Baird's Sandpiper Least Sandpiper Purple Sandpiper Stilt Sandpiper Short-billed Dowitcher Red-necked Phalarope Whimbrel Ruddy Turnstone Sanderling Dunlin Whimbrel	BBO1 BBO2 BBS1 BBS2 BBT1 BBT2 SDO1 SDS2 SDT1 MAM1 MAM2 MAM3 MAM4 MAM5	Shorelines of lakes, rivers and wetlands, including beach areas, bars and seasonally flooded, muddy and un-vegetated shoreline habitats. Great Lakes coastal shorelines, including groynes and other forms of armour rock lakeshores, are extremely important for migratory shorebirds in May to mid-June and early July to October. Sewage treatment ponds and storm water ponds do not qualify as a SWH. Information Sources • Western hemisphere shorebird reserve network. • Canadian Wildlife Service (CWS) Ontario Shorebird Survey. • Bird Studies Canada • Ontario Nature • Local birders and naturalist clubs • Natural Heritage Information Center (NHIC) Shorebird Migratory Concentration Area	Studies confirming: • Presence of 3 or more of listed species and > 1000 shorebird use days during spring or fall migration period. (shorebird use days are the accumulated number of shorebirds counted per day over the course of the fall or spring migration period) • Whimbrel stop briefly (<24hrs) during spring migration, any site with >100 Whimbrel used for 3 years or more is significant. • The area of significant shorebird habitat includes the mapped ELC shoreline ecosites plus a 100m radius area[cxlviii] • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[cclxi] • 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					
Rational: Sites used by multiple species, a high number of individuals and used annually are most significant	Rough-legged Hawk Red-tailed Hawk Northern Harrier American Kestrel Snowy Owl Special Concern: Short-eared Owl Bald Eagle	Hawks/Owls: Combination of ELC Community Series; need to have present one Community Series from each land class: Forest: FOD, FOM, FOC Upland: CUM, CUT, CUS, CUW	The habitat provides a combination of fields and woodlands that provide roosting, foraging and resting habitats for wintering raptors. Raptor wintering sites need to be > 20 ha[cxlviii, cxlix] with a combination of forest and upland.[xvi, xvii, xviii, xix, xx, xxi]. Least disturbed sites, idle/fallow or lightly grazed field/meadow (>15ha) with adjacent woodlands[cxlix] Field area of the habitat is to be wind swept with limited snow depth or accumulation. Eagle sites have open water, large trees and snags available for roosting Information Sources • OMNRF Ecologist or Biologist • Field Natural Clubs • Natural Heritage Information Center (NHIC) Raptor Winter Concentration Area • Data from Bird Studies Canada • Reports and other information available from Conservation Authorities CAs.	Studies confirm the use of these habitats by: • One or more Short-eared Owls or; One or more Bald Eagles or; At least 10 individuals and two listed hawk/owl species • To be significant a site must be used regularly (3 in 5 years)[cxlix] for a minimum of 20 days by the above number of birds • The habitat area for an Eagle winter site is the shoreline forest ecosites directly adjacent to the prime hunting area • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[cclxi] • 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. 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
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Bat Hibernacula					
Rationale Bat hibernacula are rare habitats in Ontario landscapes.	Big Brown Bat Tri-coloured Bat	Bat Hibernacula may be found in these ecosites: CCR1 CCR2 CCA1 CCA2 (Note: buildings are not considered to be SWH)	• Hibernacula may be found in caves, mine shafts, underground foundations and Karsts. • Active mine sites should not be considered as SWH • The locations of bat hibernacula are relatively poorly known. Information Sources • OMNRF for possible locations and contact for local experts • Natural Heritage Information Center (NHIC) Bat Hibernaculum • Ministry of Northern Development and Mines for location of mine shafts. • Clubs that explore caves (eg. Sierra Club) • University Biology Departments with bat experts.	• All sites with confirmed hibernating bats are SWH. • The habitat area includes a 200m radius around the entrance of the hibernaculum[cxlviii, ccvii] for most. • Studies are to be conducted during the peak swarming period (Aug. – Sept.). Surveys should be conducted following methods outlined in the "Bats and Bat Habitats: Guidelines for Wind Power Projects"[ccv] • SWHMiST[cxlix] Index #1 provides development effects and mitigation measures.	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, xxviii, xxxi] (buildings are not considered to be SWH). • Maternity roosts are not found in caves and mines in Ontario[xxii] • Maternity colonies located in Mature deciduous or mixed forest stands[ccix, ccx] with >10/ha large diameter (>25cm dbh) wildlife trees[ccvii] • Female Bats prefer wildlife tree (snags) in early stages of decay, class 1-3[ccxiv] or class 1 or 2[ccxii] • Silver-haired Bats prefer older mixed or deciduous forest and form maternity colonies in tree cavities and small hollows. Older forest areas with at least 21 snags/ha are preferred[ccx] Information Sources • OMNRF for possible locations and contact for local experts • University Biology Departments with bat experts.	• Maternity Colonies with confirmed use by: • >10 Big Brown Bats • >5 Adult Female Silver-haired Bats • The area of the habitat includes the entire woodland or a forest stand ELC Ecosite or an Ecoelement containing the maternity colonies. • Evaluation methods for maternity colonies should be conducted following methods outlined in the "Bats and Bat Habitats: Guidelines for wind Power Projects[ccv] • SWHMiS T[cxlix] Index #12 provides development effects and mitigation measures.	Suitable habitat was not documented during a review of roost trees within the SWD4 community witin 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. Information Sources • OMNR for possible locations and contact for local experts • University of Waterloo, Biology Department	Long Point has been identified as a significant stopover habitat for fall migrating Silver-haired Bats, due to significant increases in abundance, activity and feeding that was documented during fall migration[ccxv] • The confirmation criteria and habitat areas for this SWH are still being determined. • SWHDSS[cxlix] Index #38 provides development effects and mitigation measures	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
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Turtle Wintering Area					
Rationale: Generally sites are the only known sites in the area. Sites with the highest number of individuals are most significant	Midland Painted Turtle Special Concern: Northern Map Turtle Snapping Turtle	Snapping and Midland Painted Turtles - ELC Community Classes: SW, MA, OA and SA; ELC Community Series: FEO and BOO Northern Map Turtle - Open Water areas such as deeper rivers or streams and lakes with current can also be used as over-wintering habitat.	For most turtles, wintering areas are in the same general area as their core habitat. Water has to be deep enough not to freeze and have soft mud substrates. • Over-wintering sites are permanent water bodies, large wetlands, and bogs or fens with adequate Dissolved Oxygen[cix, cx, cxi, cxviii]. • Man-made ponds such as sewage lagoons or storm water ponds should not be considered SWH. Information Sources • EIS studies carried out by Conservation Authorities. • Local field naturalists and experts, as well as university herpetologists may also know where to find some of these sites. • OMNRF ecologist or biologist • Natural Heritage Information Center (NHIC)	• Presence of 5 over-wintering Midland Painted Turtles is significant. • One or more Northern Map Turtle or Snapping Turtle over-wintering within a wetland is significant. • The mapped ELC ecosite area with the over wintering turtles is the SWH. If the hibernation site is within a stream or river, the deep-water pool where the turtles are over wintering is the SWH. • Over wintering areas may be identified by searching for congregations (Basking Areas) of turtles on warm, sunny days during the fall (Sept. – Oct.) or spring (Mar. – May)[cvii] • Congregation of turtles is more common where wintering areas are limited and therefore significant[cix, cx, cxi, cxii]. • SWHMiST[cxiix] 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	Snakes: Eastern Gartersnake Northern Watersnake Northern Red-bellied Snake Northern Brownsnake Smooth Green Snake Northern Ring-necked Snake Special Concern: Milksnake Eastern Ribbonsnake Lizard: Special Concern (Southern Shield population): Five-lined Skink	For all snakes, habitat may be found in any ecosite other than very wet ones. Talus, Rock Barren, Crevice and Cave, and Alvar sites may be directly related to these habitats. Observations of congregations of snakes on sunny warm days in the spring or fall is a good indicator. For Five-lined Skink, ELC Community Series of FOD and FOM and Ecosites: FOC1 FOC3	• For snakes, hibernation takes place in sites located below frost lines in burrows, rock crevices and other natural locations. The existence of features that go below the frost line; such as rock piles or slopes, old stone fences, and abandoned crumbling foundations assist in identifying candidate SWH. • Areas of broken and fissured rock are particularly valuable since they provide access to subterranean sites below the frost line[xliv, l, li, liii, cxii]. • Wetlands can also be important over-wintering habitat in conifer or shrub swamps and swales, poor fens, or depressions in bedrock terrain with sparse trees or shrubs with sphagnum moss or sedge hummock ground cover. • Five-lined skink prefer mixed forests with rock outcrop openings providing cover rock overlaying granite bedrock with fissures cciii. Information Sources • In spring, local residents or landowners may have observed the emergence of snakes on their property (e.g. old dug wells). • Reports and other information from CAs. • Local Field naturalists and experts, as well as university herpetologists may also know where to find some of these sites. clubs • Natural Heritage Information Center (NHIC) • OMNRF ecologist or biologist may be aware of locations of wintering skinks	Studies confirming: • Presence of snake hibernacula used by a minimum of five individuals of a snake sp. or; individuals of two or more snake spp. • Congregations of a minimum of five individuals of a snake sp. or; individuals of two or more snake spp. near potential hibernacula (eg. foundation or rocky slope) on sunny warm days in Spring (Apr/May) and Fall (Sept/Oct). • Note: If there are Special Concern Species present, then site is SWH • Note: Sites for hibernation possess specific habitat parameters (e.g. temperature, humidity, etc.) and consequently are used annually, often by many of the same individuals of a local population [i.e. strong hibernation site fidelity]. Other critical life processes (e.g. mating) often take place in close proximity to hibernacula. The feature in which the hibernacula is located plus a 30m buffer is the SWH[l] • SWHMiST[cxiix] Index #13 provides development effects and mitigation measures for snake hibernacula. • Presence of any active hibernaculum for skink is significant. • SWHMiST[cxiix] 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]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Colonially - Nesting Bird Breeding Habitat (Bank and Cliff)					
Rationale: Historical use and number of nests in a colony make this habitat significant. An identified colony can be very important to local populations. All swallow populations are declining in Ontario.	Cliff Swallow Northern Rough-winged Swallow (this species is not colonial but can be found in Cliff Swallow colonies)	Eroding banks, sandy hills, borrow pits, steep slopes, and sand piles Cliff faces, bridge abutments, silos, barns Habitat found in the following ecosites: CUM1 CUT1 CUS1 BLO1 BLS1 BLT1 CLO1 CLS1 CLT1	• Any site or areas with exposed soil banks, undisturbed or naturally eroding that is not a licensed/permitted aggregate area. • Does not include man-made structures (bridges or buildings) or recently (2 years) disturbed soil areas, such as berms, embankments, soil or aggregate stockpiles. • Does not include a licensed/permitted Mineral Aggregate Operation. Information Sources • Reports and other information available from CAs • Ontario Breeding Bird Atlas [ccv] • Bird Studies Canada; *NatureCounts* http://www.birdscanada.org/birdmon/ • Field Naturalist clubs	Studies confirming: • Presence of 1 or more nesting sites with 8[cxlvix] or more cliff swallow pairs and/or rough-winged swallow pairs during the breeding season. • A colony identified as SWH will include a 50m radius habitat area from the peripheral nests[ccvii] • Field surveys to observe and count swallow nests are to be completed during the breeding season Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWHMiST[cxlix] Index #4 provides development effects and mitigation measures	Banks and 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	• Nests in live or dead standing trees in wetlands, lakes, islands, and peninsulas. Shrubs and occasionally emergent vegetation may also be used. • Most nests in trees are 11 to 15m from ground, near the top of the tree. Information Sources • Ontario Breeding Bird Atlas[ccv], colonial nest records. • Ontario Heronry Inventory 1991 available from Bird Studies Canada or NHIC (OMNR). • NHIC Mixed Wader Nesting Colony • Aerial photographs can help identify large heronries • Reports and other information available from CAs • MNRF District Offices • Local naturalist clubs	Studies confirming: • Presence of 5[i] or more active nests of Great Blue Heron or other listed species. • The habitat extends from the edge of the colony and a minimum 300m radius or extent of the Forest Ecosite containing the colony or any island <15.0ha with a colony is the SWH [cc, ccvii] • Confirmation of active heronries are to be achieved through site visits conducted during the nesting season (April to August) or by evidence such as the presence of fresh guano, dead young and/or eggshells • SWHMiST[cxlix] Index #5 provides development effects and mitigation measures.	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	• Nesting colonies of gulls and terns are on islands or peninsulas associated with open water or in marshy areas. • Brewers Blackbird colonies are found loosely on the ground in or in low bushes in close proximity to streams and irrigation ditches within farmlands. Information Sources • Ontario Breeding Bird Atlas[ccv], rare/colonial species records. • Canadian Wildlife Service • Reports and other information available from CAs • Natural Heritage Information Center (NHIC) Colonial Waterbird Nesting Area • MNRF District Offices • Field naturalist clubs	Studies confirming: • Presence of >25 active nests for Herring Gulls or Ring-billed Gulls, >5 active nests for Common Tern or >2 active nests for Caspian Tern[i]. • 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.	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
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Migratory Butterfly Stopover Areas					
Rationale: Butterfly stopovers areas are extremely rare habitats and are biologically important for butterfly species that migrate south for the winter.	Painted Lady Red Admiral Special Concern: Monarch	Combination of ELC Community Series: Need to have present one Community Series from each landclass: Field: CUM CUS CUT Forest: FOC FOM FOD CUP Anecdotally, a candidate sight for butterfly stopover will have a history of butterflies being observed.	A butterfly stopover area will be a minimum of 10 ha in size with a combination of field and forest habitat present, and will be located within 5 km of Lake Ontario[cxlix]. • The habitat is typically a combination of field and forest, and provides the butterflies with a location to rest prior to their long migration south[xxxii, xxxiii, xxxiv, xxxv, xxxvi]. • The habitat should not be disturbed, fields/meadows with an abundance of preferred nectar plants and woodland edge providing shelter are requirements for this habitat cxlviii, cxlix. • Staging areas usually provide protection from the elements and are often spits of land or areas with the shortest distance to cross the Great Lakes[xxxvii, xxxviii, xxxix, xl, xli]. Information Sources • OMNRF (NHIC) • Agriculture Canada in Ottawa may have list of butterfly experts. • Field Naturalist Clubs • Toronto Entomologists Association • Conservation Authorities	Studies confirm: • The presence of Monarch Use Days (MUD) during fall migration (Aug/Oct)[xliii]. MUD is based on the number of days a site is used by Monarchs, multiplied by the number of individuals using the site. Numbers of butterflies can range from 100-500/day[xxxvii], significant variation can occur between years and multiple years of sampling should occur [xl, xlii]. • Observational studies are to be completed and need to be done frequently during the migration period to estimate MUD • MUD of >5000 or >3000 with the presence of Painted Ladies or Red Admiral's is to be considered significant. • SWHMiST[cxlix] Index #16 provides development effects and mitigation measures.	Study area not located within 5 km of Lake Ontario. **Not SWH**
Wildlife Habitat: Landbird Migratory Stopover Areas					
Rationale: Sites with a high diversity of species as well as high number are most significant	All migratory songbirds. Canadian Wildlife Service Ontario website: http://www.on.ec.gc.ca/wildlife_e.html All migrant raptors species: Ontario Ministry of Natural Resources: Fish and Wildlife Conservation Act, 1997. Schedule 7: Specially Protected Birds (Raptors)	All Ecosites associated with these ELC Community Series: FOC FOM FOD SWC SWM SWD	Woodlots need to be >10 ha[i] in size and within 5km [iv, v, vi, vii, viii, ix, x, xi, xii, xiii, xiv, xv] of Lake Ontario. • If multiple woodlands are located along the shoreline, those woodlands <2km from Lake Ontario are more significant[cxlix] • Sites have a variety of habitats; forest, grassland and wetland complexes[cxlix]. • The largest sites are more significant[cxlix] • Woodlots and forest fragments are important habitats to migrating birds[ccxviii], these features located along the shore and located within 5km of Lake Ontario are Candidate SWH[cxlviii]. Information Sources • Bird Studies Canada • Ontario Nature • Local birders and naturalist club • Ontario Important Bird Areas (IBA) Program	Studies confirm: • Use of the woodlot by >200 birds/day and with >35 spp. with at least 10 bird spp. recorded on at least 5 different survey dates. This abundance and diversity of migrant bird species is considered above average and significant. • Studies should be completed during spring (Apr/May) and fall (Aug/Oct) migration using standardized assessment techniques. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[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
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Deer Yarding Areas					
Rationale: Winter habitat for deer is considered to be the main factor for northern deer populations. In winter, deer congregate in "yards" to survive severe winter conditions. Deer yards typically have a long history of annual use by deer, yards typically represent 10-15% of an areas summer range.	White-tailed Deer	Note: OMNRF to determine this habitat. ELC Community Series providing a thermal cover component for a deer yard would include: FOM, FOC, SWM and SWC. Or these ELC Ecosites: CUP2 CUP3 FOD3 CUT	• Deer yarding areas or winter concentration areas (yards) are areas deer move to in response to the onset of winter snow and cold. This is a behavioural response and deer will establish traditional use areas. The yard is composed of two areas referred to as Stratum I and Stratum II. Stratum II covers the entire winter yard area and is usually a mixed or deciduous forest with plenty of browse available for food. Agricultural lands can also be included in this area. Deer move to these areas in early winter and generally, when snow depths reach 20cm, most of the deer will have moved here. If the snow is light and fluffy, deer may continue to use this area until 30cm snow depth. In mild winters, deer may remain in the Stratum II area the entire winter. • The Core of a deer yard (Stratum I) is located within the Stratum II area and is critical for deer survival in areas where winters become severe. It is primarily composed of coniferous trees (pine, hemlock, cedar, spruce) with a canopy cover of more than 60%[cxciv]. • OMNRF determines deer yards following methods outlined in "Selected Wildlife and Habitat Features: Inventory Manual"[cxcv] • Woodlots with high densities of deer due to artificial feeding are not significant.	No Studies Required: • Snow depth and temperature are the greatest influence on deer use of winter yards. Snow depths > 40cm for more than 60 days in a typically winter are minimum criteria for a deer yard to be considered as SWH[lvi, lvii, lviii, lix, lx, i]. • Deer Yards are mapped by OMNRF District offices. Locations of Core or Stratum 1 and Stratum 2 Deer yards considered significant by OMNRF will be available at local MNRF offices or via Land Information Ontario (LIO). • Field investigations that record deer tracks in winter are done to confirm use (best done from an aircraft). Preferably, this is done over a series of winters to establish the boundary of the Stratum I and Stratum II yard in an "average" winter. MNRF will complete these field investigations[cxcv]. • If a SWH is determined for Deer Wintering Area or if a proposed development is within Stratum II yarding area then Movement Corridors are to be considered as outlined in Table 1.4.1 of this Schedule. • SWHMiST[cxlix] Index #2 provides development effects and mitigation measures.	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. **Not SWH**
Wildlife Habitat: Deer Winter Congregation Areas					
Rationale: Deer movement during winter in the southern areas of Ecoregion 6E are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands to reduce or avoid the impacts of winter conditions[cxlviii]	White-tailed Deer	All Forested Ecosites with these ELC Community Series: FOC FOM FOD SWC SWM SWD Conifer plantations much smaller than 50ha may also be used.	• Woodlots will typically be >100 ha in size. Woodlots <100ha may be considered as significant based on MNRF studies or assessment. • Deer movement during winter in the southern areas of Eco-region 6E are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands[cxlviii]. • If deer are constrained by snow depth refer to the Deer Yarding Area habitat within Table 1.1 of this Schedule. • Large woodlots > 100ha and up to 1500 ha are known to be used annually by densities of deer that range from 0.1-1.5 deer/ha[ccxxiv]. • Woodlots with high densities of deer due to artificial feeding are not significant. Information Sources • MNRF District Offices • LIO/NRVIS	Studies confirm: • Deer management is an MNRF responsibility, deer winter congregation areas considered significant will be mapped by MNRF[cxlviii]. • Use of the woodlot by white-tailed deer will be determined by MNRF, all woodlots exceeding the area criteria are significant, unless determined not to be significant by MNR[i]. • Studies should be completed during winter (Jan/Feb) when >20cm of snow is on the ground using aerial survey techniques[ccxxiv], ground or road surveys, or a pellet count deer density survey[ccxxv]. • If a SWH is determined for Deer Wintering Area of if a proposed development is within Stratum II yarding area then Movement Corridors are to be considered as outlined in Table 1.4.1 of this Schedule. • SWHMiST[cxlix] Index #2 provides development effects and mitigation measures.	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
	ELC Ecosite Codes[1]	Habitat Description[1]	Detailed Information and Sources[1]	Defining Criteria[1]	Assessment Details
Cliff and Talus Slopes					
Rationale: Cliffs and Talus Slopes are extremely rare habitats in Ontario.	Any ELC Ecosite within Community Series: TAO CLO TAS CLS TAT CLT	A Cliff is vertical to near vertical bedrock >3m in height. A Talus Slope is rock rubble at the base of a cliff made up of coarse rocky debris.	Most cliff and talus slopes occur along the Niagara Escarpment. Information Sources • The Niagara Escarpment Commission has detailed information on location of these habitats. • OMNRF District • Natural Heritage Information Center (NHIC) has location information on their website • Local naturalist clubs • Conservation Authorities	• Confirm any ELC Vegetation Type for Cliffs or Talus Slopes[lxxviii] • SWHMiST[cxlix] Index #21 provides development effects and mitigation measures.	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. Information Sources • OMNRF Districts. • Natural Heritage Information Center (NHIC) has location information on their website • Field naturalist clubs • Conservation Authorities	• Confirm any ELC Vegetation Type for Sand Barrens[lxxviii] • Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics)[f]. • SWHMiST[cxlix] 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
	ELC Ecosite Codes[1]	Habitat Description[1]	Detailed Information and Sources[1]	Defining Criteria[1]	Assessment Details
Alvar					
Rationale: Alvars are extremely rare habitats in Ecoregion 6E. Most alvars in Ontario are in Ecoregion 6E and 7E. Alvars in 6E are small and highly localized just north of the Palaeozoic-Precambrian contact.	ALO1 ALS1 ALT1 FOC1 FOC2 CUM2 CUS2 CUT2-1 CUW2 Five Alvar Indicator Species: 1) Carex crawei 2) Panicum philadelphicum 3) Eleochairs compressa 4) Scutellaria parvula 5) Trichostema branchiatum These indicator species are very specific to Alvars within Ecoregion 6E	An alvar is typically a level, mostly unfractured calcareous bedrock feature with a mosaic of rock pavements and bedrock overlain by a thin veneer of soil. The hydrology of alvars is complex, with alternating periods of inundation and drought. Vegetation cover varies from sparse lichen-moss associations to grasslands and shrublands and comprising a number of characteristic or indicator plant. Undisturbed alvars can be phyto- and zoo geographically diverse, supporting many uncommon or are relict plant and animals species. Vegetation cover varies from patchy to barren with a less than 60% tree cover[lxxviii].	An Alvar site > 0.5 ha in size[lxxv]. Information Sources • Alvars of Ontario (2000), Federation of Ontario Naturalists[lxxvi]. • Ontario Nature – Conserving Great Lakes Alvars[ccviii]. • Natural Heritage Information Center (NHIC) has location information on their website • Field Naturalist clubs • Conservation Authorities	Field studies identify four of the five Alvar indicator species[lxxv, cxlix] at a Candidate Alvar site is Significant. • Site must not be dominated by exotic or introduced species (<50% vegetative cover are exotics sp.). • The alvar must be in excellent condition and fit in with surrounding landscape with few conflicting land uses[lxxv]. • SWHMiST[cxlix] Index #17 provides development effects and mitigation measures.	ELC surveys confirm that vegetation type is not present within the study area. **Not SWH**
Old Growth Forest					
Rationale: Due to historic logging practices, extensive old growth forest is rare in the Ecoregion. Interior habitat provided by old growth forests is required by many wildlife species.	Forest Community Series: FOD FOC FOM SWD SWC SWM	Old Growth forests are characterized by heavy mortality or turnover of over-storey trees resulting in a mosaic of gaps that encourage development of a multi-layered canopy and an abundance of snags and downed woody debris.	Woodland Stands areas 30ha or greater in size or with at least 10 ha interior habitat assuming 100m buffer at edge of forest Í. Information Sources • OMNRF Forest Resource Inventory mapping • OMNRF Forester, Ecologist or Biologist • Field Local naturalist clubs • Conservation Authorities • Sustainable Forestry License (SFL) companies will possibly know locations through field operations. • Municipal forestry departments	Field Studies will determine: • If dominant trees species of the ecosite are >140 years old, then stand is Significant Wildlife Habitat[cxlviii] • The stand will have experienced no recognizable forestry activities[cxlviii] • The area of Forest Ecosites combined to make up the stand is the SWH. • Determine ELC Vegetation Type for forest stand[lxxviii] • SWHDSS[cxlix] Index #23 provides development effects and mitigation measures.	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
Savannah					
Rationale: Savannahs are extremely rare habitats in Ontario.	TPS1 TPS2 TPW1 TPW2 CUS2	A Savannah is a tallgrass prairie habitat that has tree cover between 25 – 60%.	• No minimum size to site Site must be restored or a natural site. Remnant sites such as railway right of ways are not considered to be SWH. Information Sources • Natural Heritage Information Center (NHIC) has location information on their website • OMNRF Ecologists • Field naturalists clubs • Conservation Authorities	Field studies confirm one or more of the Savannah indicator species listed in[lxxv] Appendix N should be present. Note: Savannah plant spp. list from Ecoregion 6E should be used[cxlviii]. • Area of the ELC Ecosite is the SWH. • Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics sp.). • SWHMiST[cxlix] Index #18 provides development effects and mitigation measures.	ELC surveys confirm that vegetation type is not present within the study area. **Not SWH**
Tallgrass Prairie					
Rationale: Tallgrass Prairies are extremely rare habitats in Ontario.	TPO1 TPO2	A Tallgrass Prairie has ground cover dominated by prairie grasses. An open Tallgrass Prairie habitat has < 25% tree cover.	• No minimum size to site Site must be restored or a natural site. Remnant sites such as railway right of ways are not considered to be SWH. Information Sources • OMNR Districts • Natural Heritage Information Center (NHIC) has location information available on their website • Field naturalists clubs • Conservation Authorities	Field studies confirm one or more of the Prairie indicator species listed in[lxxv] Appendix N should be present. Note: Prairie plant spp. list from Ecoregion 6E should be used[cxlviii]. • Area of the ELC Ecosite is the SWH • Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics). • SWHMiST[cxlix] Index #19 provides development effects and mitigation measures.	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					
Rationale: Plant communities that often contain rare species which depend on the habitat for survival.	Provincially Rare S1, S2 and S3 vegetation communities are listed in Appendix M of the SWHTG[cxlviii]. Any ELC Ecosite Code that has a possible ELC Vegetation Type that is Provincially Rare is Candidate SWH.	Rare Vegetation Communities may include beaches, fens, forest, marsh, barrens, dunes and swamps.	ELC Ecosite codes that have the potential to be a rare ELC Vegetation Type as outlined in appendix M[cxlviii] The OMNR/NHIC will have up to date listing for rare vegetation communities. Information Sources • Natural Heritage Information Center (NHIC) has location information available on their website • OMNRF Districts • Field naturalists clubs • Conservation Authorities	Field studies should confirm if an ELC Vegetation Type is a rare vegetation community based on listing within Appendix M of SWHTG[cxlviii]. • Area of the ELC Vegetation Type polygon is the SWH. • SWHMiST[cxlix] Index #37 provides development effects and mitigation measures.	ELC surveys confirm that other rare vegetation types are not present within the study area. **Not SWH**

Significant Wildlife Habitat Assessment Tables

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

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Waterfowl Nesting Area					
Rationale: Important to local waterfowl populations, sites with greatest number of species and highest number of individuals are significant.	American Black Duck Northern Pintail Northern Shoveler Gadwall Blue-winged Teal Green-winged Teal Wood Duck Hooded Merganser Mallard	All upland habitats located adjacent to these wetland ELC Ecosites are Candidate SWH: MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 SWT1 SWT2 SWD1 SWD2 SWD3 SWD4 Note: includes adjacency to Provincially Significant Wetlands	A waterfowl nesting area extends 120m[cxlix] from a wetland (> 0.5 ha) or a wetland (>0.5ha) and any small wetlands (0.5ha) within 120m or a cluster of 3 or more small (<0.5 ha) wetlands within 120m of each individual wetland where waterfowl nesting is known to occur[cxlix]. • Upland areas should be at least 120m wide so that predators such as raccoons, skunks, and foxes have difficulty finding nests. • Wood Ducks and Hooded Mergansers utilize large diameter trees (>40cm dbh) in woodlands for cavity nest sites. Information Sources • Ducks Unlimited staff may know the locations of particularly productive nesting sites. • OMNRF Wetland Evaluations for indication of significant waterfowl nesting habitat. • Reports and other information available from CAs	Studies confirmed: • Presence of 3 or more nesting pairs for listed species excluding Mallards, or • Presence of 10 or more nesting pairs for listed species including Mallards. • Any active nesting site of an American Black Duck is considered significant. • Nesting studies should be completed during the spring breeding season (April - June). Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • A field study confirming waterfowl nesting habitat will determine the boundary of the waterfowl nesting habitat for the SWH, this may be greater or less than 120m[cxlviii] from the wetland and will provide enough habitat for waterfowl to successfully nest. • SWHMiST[cxlix] Index #25 provides development effects and mitigation measures.	Suitable habitat not present within the 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 Special Concern: Bald Eagle	ELC Forest Community Series: FOD, FOM, FOC, SWD, SWM and SWC directly adjacent to riparian areas – rivers, lakes, ponds and wetlands	• Nests are associated with lakes, ponds, rivers or wetlands along forested shorelines, islands, or on structures over water. • Osprey nests are usually at the top a tree whereas Bald Eagle nests are typically in super canopy trees in a notch within the tree's canopy. • Nests located on man-made objects are not to be included as SWH (e.g. telephone poles and constructed nesting platforms). Information Sources • Natural Heritage Information Center (NHIC) compiles all known nesting sites for Bald Eagles in Ontario. • MNRF values information (LIO/NRVIS) will list known nesting locations. Note: data from NRVIS is provided as a point and does not represent all the habitat. • Nature Counts, Ontario Nest Records Scheme data. • OMNRF Districts • Sustainable Forestry License (SFL) companies will identify additional nesting locations through field operations. • Check the Ontario Breeding Bird Atlas[ccv] or Rare Breeding Birds in Ontario for species documented • Reports and other information available from CAs. • Field naturalists clubs	Studies confirm the use of these nests by: • One or more active Osprey or Bald Eagle nests in an area[cxlviii]. • Some species have more than one nest in a given area and priority is given to the primary nest with alternate nests included within the area of the SWH. • For an Osprey, the active nest and a 300m radius around the nest or the contiguous woodland stand is the SWHccvii, maintaining undisturbed shorelines with large trees within this area is important[cxlviii]. • For a Bald Eagle the active nest and a 400-800m radius around the nest is the SWH[cvi], ccvii. Area of the habitat from 400-800m is dependent on site lines from the nest to the development and inclusion of perching and foraging habitat[cvi]. • To be significant a site must be used annually. When found inactive, the site must be known to be inactive for >3 years or suspected of not being used for >5 years before being considered not significant[ccvii] • Observational studies to determine nest site use, perching sites and foraging areas need to be done from mid March to mid August. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWHMiST[cxlix] Index #26 provides development effects and mitigation measures	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.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Woodland Raptor Nesting Habitat					
Rationale: Nests sites for these species are rarely identified; these area sensitive habitats and are often used annually by these species.	Northern Goshawk Cooper's Hawk Sharp-shinned Hawk Red-shouldered Hawk Barred Owl Broad-winged Hawk	May be found in all forested ELC Ecosites. May also be found in SWC, SWM, SWD and CUP3.	All natural or conifer plantation woodland/forest stands >30ha with >10ha of interior habitat[lxxxviiii, lxxxix, xc, xci, xciii, xciv, xcv, xcvi, cxxxiii]. Interior habitat determined with a 200m buffer[cxlviii]. • Stick nests found in a variety of intermediate-aged to mature conifer, deciduous or mixed forests within tops or crotches of trees. Species such as Cooper's hawk nest along forest edges sometimes on peninsulas or small off-shore islands. • In disturbed sites, nests may be used again, or a new nest will be in close proximity to old nest. Information Sources • OMNRF • Check the Ontario Breeding Bird Atlas[ccv] or Rare Breeding Birds in Ontario for species documented. • Check data from Bird Studies Canada • Reports and other information available from CAs	Studies confirm: • Presence of 1 or more active nests from species list is considered significant[cxlviii]. • Red-shouldered Hawk and Northern Goshawk – a 400m radius around the nest or 28ha area of habitat is the SWH[ccvii]. • Barred Owl – a 200m radius around the nest is the SWH[ccvii]. • Broad-winged Hawk and Coopers Hawk – a 100m radius around the nest is the SWH[ccvii]. • Sharp-shinned Hawk – a 50m radius around the nest is the SWH[ccvii]. • Conduct field investigations from mid-March to end of May. The use of call broadcasts can help in locating territorial (courting/nesting) raptors and facilitate the discovery of nests by narrowing down the search area. • SWHMiST[cxlix] Index #27 provides development effects and mitigation measures.	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 Special Concern: Northern Map Turtle Snapping Turtle	Exposed mineral soil (sand or gravel) areas adjacent (<100m)[cxlviii] or within the following ELC Ecosites: MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 BOO1 FEO1	• Best nesting habitat for turtles are close to water and away from roads and sites less prone to loss of eggs by predation from skunks, raccoons or other animals. • For an area to function as a turtle-nesting area, it must provide sand and gravel that turtles are able to dig in and are located in open, sunny areas. Nesting areas on the sides of municipal or provincial road embankments and shoulders are not SWH. • Sand and gravel beaches adjacent to undisturbed shallow weedy areas of marshes, lakes, and rivers are most frequently used. Information Sources • Use Ontario Soil Survey reports and maps to help find suitable substrate for nesting turtles (well-drained sands and fine gravels). • Check the Ontario Herpetofaunal Summary Atlas records or other similar atlases for uncommon turtles; location information may help to find potential nesting habitat for them. • Natural Heritage Information Center (NHIC) • Field Naturalist clubs and landowners	Studies confirm: • Presence of 5 or more nesting Midland Painted Turtles • One or more Northern Map Turtle or Snapping Turtle nesting is a SWH[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[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.	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]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Seeps and Springs					
Rationale: Seeps/Springs are typical of headwater areas and are often at the source of coldwater streams.	Wild Turkey Ruffed Grouse Spruce Grouse White-tailed Deer Salamander spp.	Seeps/Springs are areas where ground water comes to the surface. Often they are found within headwater areas within forested habitats. Any forested Ecosite within the headwater areas of a stream could have seeps/springs.	Any forested area (with <25% meadow/field/pasture) within the headwaters of a stream or river system[cxvii, cxlix]. • Seeps and springs are important feeding and drinking areas especially in the winter will typically support a variety of plant and animal species[cxix, cxx, cxxi, cxxii, cxiii, cxiv] Information Sources • Topographical Map • Thermography • Hydrological surveys conducted by CAs and MOE • Field naturalists clubs and landowners • Municipalities and Conservation Authorities may have drainage maps and headwater areas mapped.	Field Studies confirm: • Presence of a site with 2 or more seeps/springs should be considered SWH. • The area of a ELC forest ecosite containing the seeps/springs is the SWH. The protection of the recharge area considering the slope, vegetation, height of trees and groundwater condition need to be considered in delineation the habitat[cxlviii] • SWHMiST[cxlix] Index #30 provides development effects and mitigation measures	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) [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] Information Sources • Ontario Herpetofaunal Summary Atlas (or other similar atlases) for records • Local landowners may also provide assistance as they may hear spring-time choruses of amphibians on their property. • OMNRF District • OMNRF wetland evaluations • Field naturalist clubs • Canadian Wildlife Service Amphibian Road Call Survey • Ontario Vernal Pool Association: http://www.ontariovernalpools.org	Studies confirm: • Presence of breeding population of 1 or more of the listed newt/salamander species or 2 or more of the listed frog species with at least 20 individuals (adults or eggs masses)[lxxi] or 2 or more of the listed frog species with Call Level Codes of 3. • A combination of observational study and call count surveys[cviii] will be required during the spring March-June when amphibians are concentrated around suitable breeding habitat within or near the woodland/wetlands. • The habitat is the woodland area plus a 230m radius of woodland area[lxiii,lxv, lxvi, lxvii, lxviii, lxix, lxx, lxxi] if a wetland area is adjacent to a woodland, a travel corridor connecting the wetland to the woodland is the be included in the habitat. • SWHMiST[cxlix] Index #14 provides development effects and mitigation measures.	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]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Amphibian Breeding Habitat (Wetland)					
Rationale: These habitats are extremely important to amphibian biodiversity within a landscape and often represent the only breeding habitat for local amphibian populations	Eastern Newt American Toad Spotted Salamander Four-toed Salamander Blue-spotted Salamander Gray Tree frog Western Chorus Frog Northern Leopard Frog Pickerel Frog Green Frog Mink Frog Bullfrog	ELC Community Classes SW, MA, FE, BO, OA and SA. Typically these wetland ecosites will be isolated (>120m) from woodland ecosites, however larger wetlands containing predominantly aquatic species (e.g. Bull Frog) may be adjacent to woodlands.	• Wetlands >500m2 (about 25m diameter)[ccvii] supporting high species diversity are significant; some small or ephemeral habitats may not be identified on MNRF mapping and could be important amphibian breeding habitats[cbxxxiv]. • Presence of shrubs and logs increase significance of pond for some amphibian species because of available structure for calling, foraging, escape and concealment from predators. • Bullfrogs require permanent water bodies with abundant emergent vegetation. Information Sources • Ontario Herpetofaunal Summary Atlas (or other similar atlases) • Canadian Wildlife Service Amphibian Road Surveys and Backyard Amphibian Call Count. • OMNRF Districts and wetland evaluations • Reports and other information available from CAs.	Studies confirm: • Presence of breeding population of 1 or more of the listed newt/salamander species or 2 or more of the listed frog/toad species and with at least 20 individuals (adults or eggs masses)[bxxi, bxxiii], 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.	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	• Habitats where interior forest breeding birds are breeding, typically large mature (>60 yrs old) forest stands or woodlots >30 ha.[cv, cxxxd, cxxxii, cxxxiii, cxxxiv, cxxv, cxxvi, cxxxvii, cxxxviii, cxxxix, cxl, cxli, cxlii, cxliii, cxliv, cxlv, cxlvi, cl, cli, clii, cliii, cliv, clv, clvii, clviii, clix] • Interior forest habitats are at least 200m from forest edge habitat. Information Sources • Local bird clubs • Canadian Wildlife Service (CWS) for the location of forest bird monitoring. • Bird studies Canada conducted a 3-year study of 287 woodlands to determine the effects of forest fragmentation on forest birds and to greatest value to interior species • Reports and other information available from CAs.	• Presence of nesting or breeding pairs of 3 or more of the listed wildlife species. • Note: any site with breeding Cerulean Warblers or Canada Warblers is to be considered SWH. • Conduct field investigations in spring and early summer when birds are singing and defending their territories. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWHMiST[cxlix] Index #34 provides development effects and mitigation measures.	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]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Marsh Bird Breeding Habitat					
Rationale: Wetlands for these bird species are typically productive and fairly rare in Southern Ontario landscapes.	American Bittern Virginia Rail Sora Common Gallinule American Coot Pied-billed Grebe Marsh Wren Sedge Wren Common Loon Sandhill Crane Green Heron Trumpeter Swan Special Concern: Black Tern Yellow Rail	MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 SAS1 SAM1 SAF1 FEO1 BOO1 For Green Heron: All SW, MA and CUM1 sites.	• Nesting occurs in wetlands • All wetland habitat is to be considered as long as there is shallow water with emergent aquatic vegetation present[cxxiv]. • For Green Heron, habitat is at the edge of water such as sluggish streams, ponds and marshes sheltered by shrubs and trees. Less frequently, it may be found in upland shrubs or forest a considerable distance from water. Information Sources • Contact OMNRF, wetland evaluations are a good source of information. • Field naturalist clubs • Natural Heritage Information Center (NHIC) Records • Reports and other information available from CAs. • Ontario Breeding Bird Atlas[ccv]	Studies confirm: • Presence of 5 or more nesting pairs of Sedge Wren or Marsh Wren or 1 pair of Sandhill Cranes; or breeding by any combination of 5 or more of the listed species[i]. • Note: any wetland with breeding of 1 or more Black Terns, Trumpeter Swan, Green Heron or Yellow Rail is SWH[i]. • 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					
Rationale: This wildlife habitat is declining throughout Ontario and North America. Species such as the Upland Sandpiper have declined significantly the past 40 years based on CWS (2004) trend records.	Upland Sandpiper Grasshopper Sparrow Vesper Sparrow Northern Harrier Savannah Sparrow Special Concern: Short-eared Owl	CUM1 CUM2	Large grassland areas (includes natural and cultural fields and meadows) >30 ha [clx, clxi, clxii, clxiii, clxiv, clxv, clxvi, clxvii, clxviii, clxix]. Grasslands not Class 1 or 2 agricultural lands, and not being actively used for farming (i.e. no row cropping or intensive hay or livestock pasturing in the last 5 years)[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. Information Sources • Agricultural land classification maps, Ministry of Agriculture. • Ask local birders • Ontario Breeding Bird Atlas[ccv] • Reports and other information available from CAs.	Field Studies confirm: • Presence of nesting or breeding of 2 or more of the listed species. • A field with 1 or more breeding Short-eared Owl is to be considered SWH. • The area of SWH is the contiguous ELC ecosite field areas. • Conduct field investigations of the most likely areas in spring and early summer when birds are singing and defending their territories. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi]. • SWHMiST[cxlix] Index #32 provides development effects and mitigation measures.	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					
Rationale: This wildlife habitat is declining throughout Ontario and North America. The Brown Thrasher has declined significantly over the past 40 years based on CWS (2004) trend records cxcix.	Indicator spp.: Brown Thrasher Clay-coloured Sparrow Common spp.: Field Sparrow Black-billed Cuckoo Eastern Towhee Willow Flycatcher Special Concern: Yellow-breasted Chat Golden-winged Warbler	CUT1 CUT2 CUS1 CUS2 CUW1 CUW2 Patches of shrub ecosites can be complexed into a larger habitat for some bird species.	Large field areas succeeding to shrub and thicket habitats>10ha[clxiv] in size. • Shrub land or early successional fields, not class 1 or 2 agricultural lands, not being actively used for farming (i.e. no row-cropping, haying or live-stock pasturing in the last 5 years)[j]. Shrub thicket habitats (>10 ha) are most likely to support and sustain a diversity of these species [clxxiii]. Shrub and thicket habitat sites considered significant should have a history of longevity, either abandoned fields or pasturelands. Information Sources • Agricultural land classification maps Ministry of Agriculture Local bird clubs • Ontario Breeding Bird Atlas[ccv] • Reports and other information available from CAs	Field Studies confirm: • Presence of nesting or breeding of 1 of the indicator species and at least 2 of the common species[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					
Rationale: Terrestrial Crayfish are only found within SW Ontario in Canada and their habitats are very rare.[ccii]	Chimney or Digger Crayfish: (*Fallicambarus fodiens*) Devil Crawfish or Meadow Crayfish: (*Cambarus Diogenes*)	MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 MAS1 MAS2 MAS3 SWD SWT SWM	Wet meadow and edges of shallow marshes (no minimum size) identified should be surveyed for terrestrial crayfish. • Constructs burrows in marshes, mudflats, meadows, the ground can't be too moist. Can often be found far from water. • Both species are a semi-terrestrial burrower which spends most of its life within burrows consisting of a network of tunnels. Usually the soil is not too moist so that the tunnel is well formed. Information Sources • Information sources from "Conservation Status of Freshwater Crayfishes" by Dr. Premek Hamr for the WWF and CNF March 1998	Studies Confirm: • Presence of 1 or more individuals of species listed or their chimneys (burrows) in suitable marsh meadow or terrestrial sites[cci] • Area of ELC Ecosite or an ecoelement area of meadow marsh or swamp within the larger ecosite area is the SWH • Surveys should be done April to August during in temporary or permanent water Note the presence of burrows or chemistry are often the only indicator of presence, observance or collection of individuals is very difficult[cci] • SWHMiST[cxlix] Index #36 provides development effects and mitigation measures.	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[boxviii]. Information Sources • Natural Heritage Information Centre (NHIC) will have the Special Concern and Provincially Rare (S1-S3, SH) species lists with element occurrences data. • NHIC Website: "Get Information": http://nhic.mnr.gov.on.ca • Ontario Breeding Bird Atlas[ccv] • Expert advice should be sought as many of the rare spp. have little information available about their requirements.	Studies Confirm: • Assessment/inventory of the site for the identified special concern or rare species needs to be completed during the time of year when the species is present or easily identifiable. • The area of the habitat to the finest ELC scale that protects the habitat form and function is the SWH, this must be delineated through detailed field studies. The habitat needs to be easily mapped and cover an important life stage component for a species e.g. specific nesting habitat or foraging habitat. • SWHMiST[cxlix] Index #37 provides development effects and mitigation measures.	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 [cboxiv, cboxv, cboxvi, cboxvii, cboxviii, cboxix, cboxx, cboxxi]. Movement corridors must be determined when Amphibian breeding habitat is confirmed as SWH from Table 1.2.2 (Amphibian Breeding Habitat – Wetland) of this Schedule[i]. Information Sources • MNRF District Office • Natural Heritage Information Center NHIC • Reports and other information available from CAs • Field Naturalist Clubs	• Field Studies must be conducted at the time of year when species are expected to be migrating or entering breeding sites. • Corridors should consist of native vegetation, with several layers of vegetation. Cooridors unbroken by roads, waterways or bodies, and undeveloped areas are most significant[cxlix]. • Corridors should have at least 15m of vegetation on both sides of waterway [cxlix] or be up to 200m wide[cxlix] of woodland habitat and with gaps <20m [cxlix]. • Shorter corridors are more significant than longer corridors, however amphibians must be able to get to and from their summer and breeding habitat[cxlix]. • SWHMiST[cxlix] Index #40 provides development effects and mitigation measures.	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 [cbooii, cbooiii, cxlix, cxciv]. • Corridors typically follow riparian areas, woodlots, areas of physical geography (ravines, or ridges). Information Sources • MNRF District Office • Natural Heritage Information Center (NHIC) • Reports and other information available from CAs • Field Naturalist Clubs	• Studies must be conducted at the time of year when deer are migrating or moving to and from winter concentration areas. • Corridors that lead to a deer wintering yard should be unbroken by roads and residential areas. • Corridors should be at least 200m wide[cxlix] with gaps <20m[cxlix] and if following riparian area with at least 15m of vegetation on both sides of waterway[cxlix]. Shorter corridors are more significant than longer corridors[cxlix] • SWHMiST[cxlix] Index #39 provides development effects and mitigation measures.	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 IV
EIS Terms of Reference

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

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 exsisting 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.

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 traill 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 backgrounds 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 ≥10cm 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 inconjunction 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 ≥10cm 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 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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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 MNRF 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. MNRF 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,

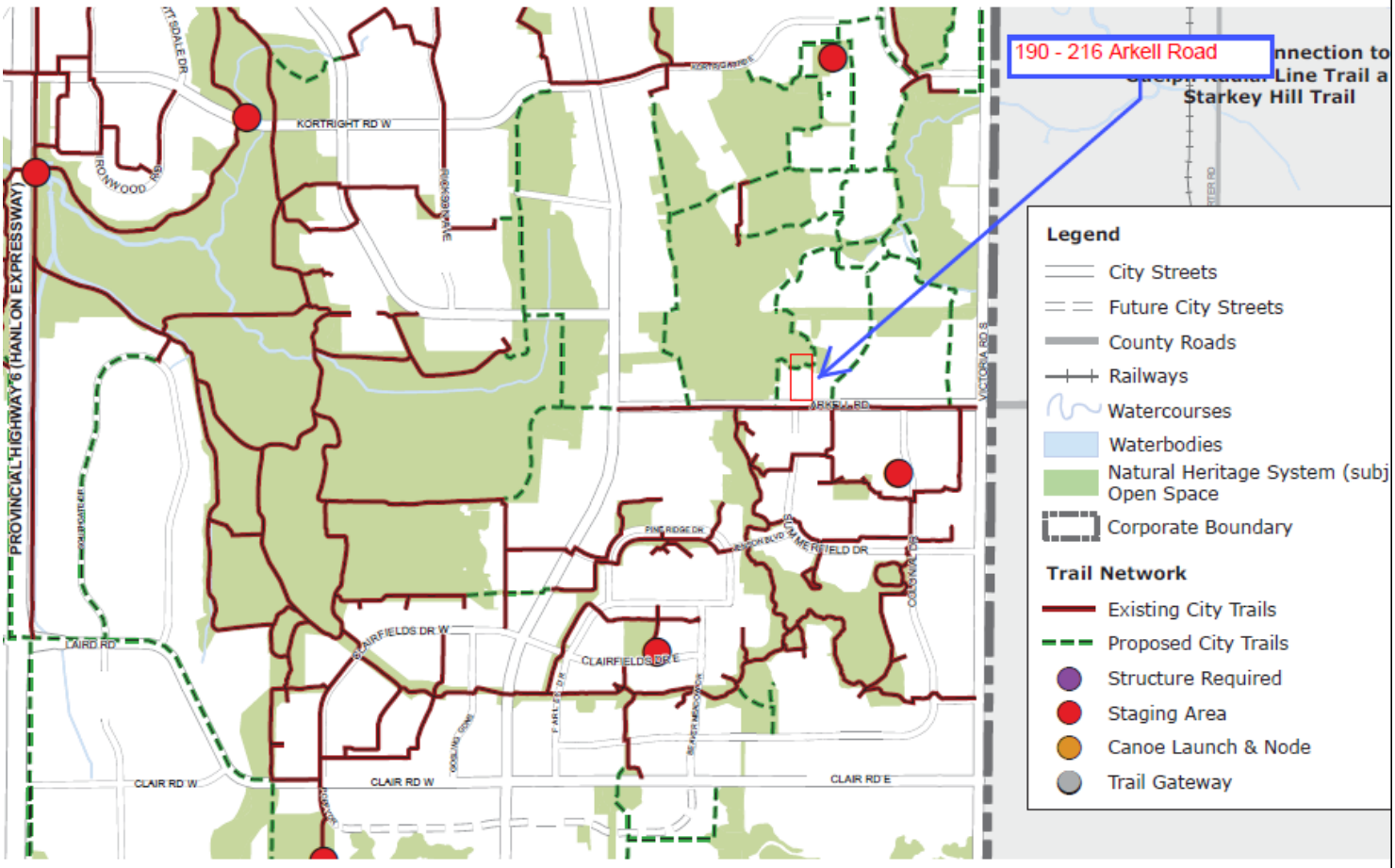
April Nix, BES MCIP RPP
Environmental Planner

Planning, Urban Design and Building Services
Infrastructure, Development and Enterprise
City of Guelph
1 Carden St Guelph
T 519-822-1260 x 2718
F 519-822-4632
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

ATTACHMENT -1



ATTACHMENT - 2

190 - 216 Arkell Road Property
Trail Concept Plan

400 Clyde Road, P.O. Box 729 Cambridge, ON N1R 5W6

Phone: 519.621.2761 **Toll free:** 866.900.4722 **Fax:** 519.621.4844 **Online:** www.grandriver.ca

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 Bingemans Centre Drive, Suite 200, Kitchener, ON N2B 3X9

Maps

565000 565100 565200 565300

4818900 4818800 4818700

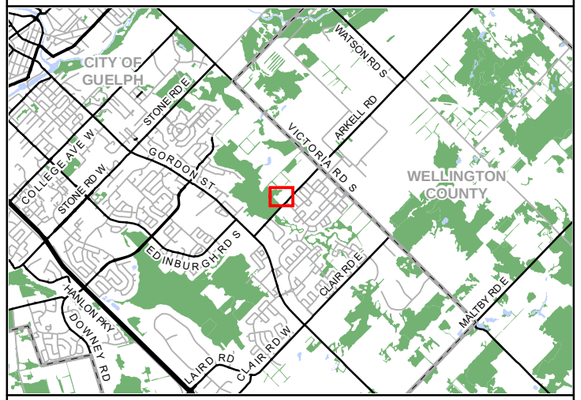
ANR-001/BMB-001
BMB-003/NOC-002
SNK-004
SNK-005
SNK-003
SNK-002
BMB-001/NOC-001
SNK-001
ANR-001
ARKELL ROAD
SUMMERFIELD DRIVE

Path: X:\1771_ArkellRoadPropertiesEIS\NRSI_1771_Map1_StudyArea_NaturalFeatures_1K_2017_02_17_OL.mxd

Map 1

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

Project: 1771
Date: February 17, 2017

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

0 10 20 30 40 50 60 Metres

N

Preliminary Concept Plan

Arkell Road Properties
City of Guelph
County of Wellington

LEGEND

Subject Lands

	Proposed
Gross Area	25,443 m² (2.54 ha)
Net Area	12,410 m² (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:
1. Net Area excludes: NRSI wetland limit, 30m buffer from NRSI wetland, 20m wide right of way and 5m road widening.
2. Standards for Residential Townhouse (R.3) Zone used for Concept Plan.
3. Parking Required includes 1 space/unit and 20% visitor parking requirement.
4. Site Boundary is approximate and should be verified by Survey.
5. Natural feature limits from NRSI (July 28, 2016) and verified by GRCA and City of Guelph staff.
6. 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

north

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

MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE
200-540 BINGEMANS CENTRE DR. KITCHENER, ON, N2B 3X9
P: 519.576.3650 F: 519.576.0121 | WWW.MHBCPLAN.COM

Appendix V
Tree Inventory and Preservation Plan

Arkell Road Properties

Tree Inventory and Preservation Plan

Prepared for:

Nitin Jain
Crescent Homes
3-180 Frobisher Drive
Waterloo Ontario
N2V 2A2

Project No. 1771 | November 2021

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
Joseph Lance	Terrestrial & Wetland Biologist / Certified Arborist
Monica Varga	GIS Analyst, Mapping

Report submitted on November 15, 2021

Joseph Lance

Terrestrial & Wetland Biologist

Certified Arborist ON-1877A

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Appendix III Conditions of Tree Inventory Assessment
Appendix IV Tree Inventory Summary Tables

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Map 2. Tree Protection and Fencing Plan

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 lands to construct 70 new residential units: 48 stacked townhouse units and 22 cluster townhouse units along with two surface parking areas for the stacked townhouse units. In total, 63 surface parking spaces are proposed (including 2 Type A and 1 Type B barrier free space). The cluster townhouse dwellings are proposed to have driveway parking (Map 1).

It is noted that since the last submission of this TIPP (NRSI May 2020), the City of Guelph has implemented the Tree Technical Manual (2019) that establishes guidelines, standards and specifications for the preservation, protection and maintenance of trees during development and construction in the City. This TIPP was conducted in accordance with the Tree Technical Manual (2019) and the City of Guelph By-law (2010) -19058. That by-law states that if an owner wishes to destroy or injure a regulated tree and if none of the exemptions set out in the 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 (2021) 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 Diameter at Breast Height (DBH) and identify a Preservation Plan for healthy indigenous and non-invasive trees.

In compliance with the City's By-law (2010)-19058, the OP (2021) and Technical Tree Manual (2019), 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 ≥10cm DBH within and adjacent (where property access allowed) to 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 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) / alphabetic identifier (off-site trees and Cedar hedgerow);
- DBH (cm);
- Number of stems;
- Crown radius (m);
- General health (excellent, good, fair, poor, very poor, dead);
- Potential for structural failure (improbable, possible, probable, imminent);
- Potential maternity roost habitat (i.e., cavities, loose barks, etc.) that could be used for Species at Risk (SAR) bats; 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

Two bat species, the Little Brown Myotis (*Myotis lucifugus*) and Northern Myotis (*Myotis septentrionalis*), are known from the area and listed as Endangered provincially, therefore are afforded general habitat protection under the *Endangered Species Act* (2007). These species are 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 suitable roost trees included tree species, location, DBH, canopy cover, tree height, decay class according to Watt and Caceres (1999), and number of potentially suitable roost features (i.e., cavities, loose bark). 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 the Arkell Road Properties Environmental Impact Study (NRSI 2021).

3.0 Summary of Tree Inventory

The tree inventory included the assessment of 339 trees within and adjacent to the subject property, comprising 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, though some information was collected for individual trees prior to the group approach being taken. 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 were identified within the subject property in either isolated trees or treed hedgerows: these are trees #49, 150, 153, 251, and 286. Two buildings within the subject property were identified as providing potential habitat for bat SAR. For more information about bat habitat assessment and monitoring, refer to the Arkell Road Properties Environmental Impact Study (NRSI 2021).

4.0 Tree Preservation Plan

4.1 Tree Removal and Retention Analysis

Several trees require removal based on the extent of proposed site grading and servicing as prepared by MTE (October 2021). The tree removal and retention analysis in this report is based on the following considerations:

1. Trees identified as being dead, very poor / poor condition or with a probable potential for structural failure within the project limits may be identified for removal where they may pose a safety risk to the adjacent development.
2. Trees that require removal based on the proposed development plan. This was determined by comparing the trees and their potential root systems to the location of components of the draft plan of development as shown on plans prepared by MHBC (October 2021) and MTE (October 2021).

Of the 339 trees inventoried, 281 are anticipated to be removed 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, and all of the trees in the cedar hedgerow at the southwest property margin. 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.

One additional fencerow tree (#211) is recommended for removal because of its poor condition and proximity to the proposed Street A and related grading activities. Retention of its stump will ensure that the root systems and trunks of the adjacent trees being retained are not impacted and soil disturbance is minimized.

4.2 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. Methods for achieving compensation for tree loss are presented in the Tree Technical Manual (2019). The Tree Technical Manual (2019) and the City's OP (2021, Section 4.1.6.4) require that a Vegetation Compensation Plan be developed to replace trees lost through the development and site alteration process. This TIPP report recommends compensation strategies; however, a detailed Vegetation Compensation Plan (Landscape Plan) will be developed at the detailed design stage.

According to City of Guelph Tree By-law (2010)-19058, trees exempt from compensation include:

- *"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 umbellate *(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 a probable 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. Since information was collected for a small number of individual Cedar trees in the southwest hedgerow, 5 of these trees in poor health or dead are exempt from compensation requirements. 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.

For individual trees and hedgerows, the Tree Technical Manual (2019) uses the *Aggregate Caliper Formula* to achieve compensation, whereby the summed caliper of replacement trees must equal the summed diameters of trees to be removed. The diameters of trees in the Cedar hedgerow were simply recorded as being between 10-25cm, the mid-point being 17.5cm. The aggregate caliper presented in Table 1 includes the DBH of each inventoried tree, as well as a diameter of 17.5cm for each of the 74 Cedar trees from the hedgerow requiring compensation.

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	282
Tree Compensation	
Trees exempt from compensation (very poor, poor conditions, and/or have a probable potential for structural failure; dead; hazardous; fruit trees)	43
Trees requiring compensation	238
Aggregate caliper of trees requiring compensation	4,967cm

Detailed landscaping plans will be required for the property at the detailed design stage. With City approval, the aggregate caliper approach may be combined with a mass planting approach to combine replacement trees with shrubs and herbaceous plants where they are used to restore or enhance the City's NHS. It is anticipated that many of the compensation plantings can be incorporated into the NHS buffer, as well as along the graded slope adjacent to the Street A, to increase the ecological value of the plantings and provide added protection to the NHS from adjacent land uses.

Street tree plantings will not be acceptable as compensation plantings, as these are required by the City of Guelph through *Planning Act* approvals. In the event that the accepted number of compensation plantings cannot be accommodated on the subject property, off-site plantings or cash-in-lieu will be required by 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 be determined prior to the development of detailed landscaping plans.

Species used for replacement/enhancement plantings, with the possible exception of street trees, should be native to Wellington County. The use of hardy species will ensure the successful early establishment and minimize the potential for invasive species proliferation. During the development of the detailed landscaping plans to be submitted at the detailed design stage, if is recommended that the following criteria be considered:

- Plantings to be limited to native, non-invasive tree and shrub species indigenous to Wellington County that complement the surrounding natural features;
- A variety of species should be identified on the landscape plans so as to avoid a monoculture;
- Any plantings within the NHS buffer should be comprised of a mix of native tree and shrub species in an attempt to naturalize the area, increase presence of native

species, provide wildlife habitat and protect the natural feature from adjacent development encroachment (i.e., human foot traffic, dumping);

- Tree and shrub species to be situated in close proximity to roads should be salt and drought tolerant. Recommended street trees can be found in Schedule D of the Tree Technical Manual (2019);
- According to section 5 of the Tree Technical Manual (2019), coniferous trees shall not account for more than one-quarter of proposed compensation trees;
- Avoid Ash (*Fraxinus spp.*) 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 buildings; and,
- Ensure that there is sufficient soil volume for all plantings.

5.0 Tree Protection Measures and Recommended Mitigation

5.1 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 Erosion and Sediment Control (ESC) fence (i.e. silt fence) and TPF is recommended where trees are situated adjacent to the limit of disturbance. Since the wetland buffer provides a substantial setback from most trees to be retained, sufficient TPF may take the form of 1200mm high paige-wire fencing secured to iron T-bar posts at 2400mm on centre, in accordance with the Tree Technical Manual (section 4.3 and Tree Protection Zone Fence Detail UF1.1).

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 as shown on Map 2 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.

Prior to works commencing on-site, fence installation and location is to be inspected by a Certified Arborist/Forester and/or the on-site Environmental Monitor. Signage, as per the City of Guelph Tree Protection Zone Information Signage (UF1.2), indicating the purpose of protection fencing will be attached to the paige-wire fencing every 20m. Recommended fencing locations and sign layout as per the Tree Technical Manual (2019) are shown on Map 2.

The TIPP is to be reviewed and approved by the City of Guelph. Upon approval of the TIPP, 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 TIPP.

5.1.1 Timing Windows

Migratory Birds Convention Act

The removal of trees and all vegetated areas (i.e., meadow) within the subject property has the potential to disrupt nesting birds. The 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) (Government of Canada 2018), 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.

Bat Maternity Roosting

Five candidate bat maternity roost trees were inventoried within the subject site (trees #49, 150, 153, 251, and 286 on Map 1 and Appendix I). Each of these trees are proposed to be removed for site grading. Correspondence with the Ministry of Environment, Conservation and Parks (MECP) may be required prior to the removal of these trees if they are to be removed within the active bat season (April 1 – September 30).

Fish and Wildlife Conservation Act Timing Windows

Due to the nature of the Arkell Road site and based on NRSI's observations in support of the EIS (2021), it is unlikely that bird species, such as raptors, hawk or owls are nesting within the area proposed to be developed. However, the timing of vegetation and tree removals should consider the timing windows for bird species protected under the Fish and Wildlife Conservation

Act that are not afforded protection under the MBCA (i.e. raptors, hawks, owls), during the period of November to March. Wildlife sweeps by a qualified biologist are recommended in advance of any vegetation clearing during this general bird active season to ensure that no active nests are present.

5.2 During Construction

An 'Arborist', as defined in the City's By-law (2010)-19058, is to be on-site during any excavation and vegetation removal activities to ensure that trees identified for retention are not removed or damaged. It will be especially important for an Arborist to be on-site during any removals that are adjacent to the protected natural features, or where the main stem is being felled, but stump retained (Tree #211). The Arborist should be on-site to ensure that the TPF is functioning as intended and that tree and vegetation removal is in accordance with this TIPP and the timing windows described above. The TPF should be inspected on a regular basis throughout the construction period (i.e., once a month) or depending on frequency of works adjacent to fencing.

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/Forester. Watering and pruning of newly planted trees will be carried out by the owner/contractor as required during the warranty period (approximately 2 years).

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

5.3 Post Construction

As trees being retained are situated along the boundaries of the Torrance Creek Swamp PSW Complex, it is recommended that the temporary TPF be removed upon completion of construction activities and adjacent areas be stabilized with a vegetative cover (i.e. native vegetation along buffer edge) to the satisfaction of the Environmental Monitor, Certified Arborist/Forester, City or qualified biologist. 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. The detailed landscape plans should outline suitable seed mixes for exposed soils and where treatment is not identified for areas during the active construction phase, it is recommended that exposed soils be treated with a suitable cover crop of annual oats, rye or white millet.

6.0 References

City of Guelph. 2008. Strategic Urban Forest Management Plan Recommendations – Status Report. (http://guelph.ca/wp-content/uploads/UFMP_staffRecomendations_2008.pdf).

City of Guelph. 2010. The Corporation of the City of Guelph By-law Number (2010) – 19058.

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Appendix I
Tree Inventory Data

Arkell Road Properties Tree Preservation Plan
Tree Inventory Data

* Tree numbers marked with an asterisk are candidate bat maternity roost 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	*Pyrus communis*	Non-Native	2	20.3	4.00	Possible	Fair	Remove	Development	No	2 dead branches; some foliar necrosis; small section shedding bark; minor crown thinning; some fruit set.
48	Manitoba Maple	*Acer negundo*	Native	1	14.2	3.00	Improbable	Good	Remove	Development	Yes	Codominant leaders; exposed root; slight lean; branch over driveway with injury.
49*	Freeman's Maple	*Acer X freemanii*	Native	3	45.6	7.00	Possible	Fair	Remove	Development	Yes	Basal sprouting; history of branch failure; minor dieback; candidate wildlife/bat cavity. Candidate bat maternity roost tree.
50	White Birch	*Betula papyrifera*	Native	2	28.2	5.00	Improbable	Good	Remove	Development	Yes	Codominant stems with included bark.
51	Eastern White Cedar	*Thuja occidentalis*	Native	4	23.8	2.50	Improbable	Good	Remove	Development	Yes	Few small broken branches; small basal cavity; near existing driveway.
52	Pin Cherry	*Prunus pensylvanica*	Native	1	11.8	2.50	Improbable	Fair	Remove	Development	Yes	Phototrophic growth, next to cedar hedge at fenceline; thin crown; light insect defoliation.
53	Freeman's Maple	*Acer X freemanii*	Native	6	16.1	3.50	Improbable	Fair	Remove	Development	Yes	1 stem dead; minor dieback.
54	Scots Pine	*Pinus sylvestris*	Non-Native	1	16.4	2.00	Improbable	Fair	Remove	Development	Yes	Minor crown thinning; poor branch structure.
55	Scots Pine	*Pinus sylvestris*	Non-Native	1	15.6	2.00	Possible	Poor	Remove	Development	No	Significant dieback; stunted needles, swollen stem.
56	White Birch	*Betula papyrifera*	Native	2	20.3	3.00	Possible	Fair	Retain		No	1 stem dead; other has dead leader; 10% dieback.
57	White Spruce	*Picea glauca*	Native	2	10.2	2.50	Improbable	Good	Retain		No	Codominant stems.
58	Scots Pine	*Pinus sylvestris*	Non-Native	1	15.7	2.00	Improbable	Good	Retain		No	Slightly crooked stem.
59	Eastern White Pine	*Pinus strobus*	Native	1	15.2	2.50	Improbable	Good	Remove	Development	Yes	Crooked stem; broken top.
60	Scots Pine	*Pinus sylvestris*	Non-Native	1	35.4	3.50	Improbable	Good	Remove	Development	Yes	Top broke at some point and new leader took over.
61	Scots Pine	*Pinus sylvestris*	Non-Native	1	14.1	1.50	Improbable	Good	Remove	Development	Yes	Lower crown thinning; vine in lower crown.
62	Scots Pine	*Pinus sylvestris*	Non-Native	1	18.0	2.00	Improbable	Excellent	Remove	Development	Yes	Vines in lower crown.
63	Scots Pine	*Pinus sylvestris*	Non-Native	1	14.0	2.00	Improbable	Excellent	Remove	Development	Yes	Vines throughout.
64	Scots Pine	*Pinus sylvestris*	Non-Native	1	10.5	1.50	Improbable	Good	Remove	Development	Yes	Very minimal dieback; landscape tree.
65	Manitoba Maple	*Acer negundo*	Native	1	21.8	3.50	Improbable	Fair	Remove	Development	Yes	Minor crown thinning.
66	Manitoba Maple	*Acer negundo*	Native	1	21.8	4.00	Possible	Fair	Remove	Development	Yes	Some crown dieback and insect feeding in foliage.
67	Black Walnut	*Juglans nigra*	Native	2	55.8	8.00	Improbable	Good	Remove	Development	Yes	Included bark; woundwood at base of 1 limb.
68	Black Walnut	*Juglans nigra*	Native	1	13.7	3.50	Improbable	Good	Remove	Development	Yes	Minimal light pruning; relatively healthy crown.
69	Black Walnut	*Juglans nigra*	Native	2	19.5	3.50	Improbable	Good	Remove	Development	Yes	Old pruning cuts low in crown.
70	Sweet Cherry	*Prunus avium*	Non-Native	1	12.1	1.00	Probable	Very Poor	Remove	Development	No	Most of crown dead with 1 living limb.
71	Eastern White Cedar	*Thuja occidentalis*	Native	2	24.3	2.30	Improbable	Good	Remove	Development	Yes	Relatively full, healthy crown; wound and prune cuts compartmentalizing.
72	Eastern White Cedar	*Thuja occidentalis*	Native	1	28.1	3.00	Improbable	Fair	Remove	Development	Yes	Main stem topped and bark stripped.
73	Eastern White Cedar	*Thuja occidentalis*	Native	2	15.0	2.00	Possible	Fair	Remove	Development	Yes	Reduced crown due to competition; wounds compartmentalized.
74	Eastern White Cedar	*Thuja occidentalis*	Native	1	20.5	2.00	Possible	Good	Remove	Development	Yes	Reduced crown due to competition, otherwise healthy.
75	Eastern White Cedar	*Thuja occidentalis*	Native	2	23.7	2.00	Improbable	Good	Remove	Development	Yes	Somewhat narrow crown, phototrophic growth.
76	Eastern White Cedar	*Thuja occidentalis*	Native	1	34.2	2.50	Improbable	Good	Remove	Development	Yes	Relatively healthy, full crown.
77	Eastern White Cedar	*Thuja occidentalis*	Native	2	15.9	2.00	Possible	Poor	Remove	Development	No	Codominant stems with included bark; upper crown dead.
78	Eastern White Cedar	*Thuja occidentalis*	Native	2	17.5	2.30	Possible	Fair	Remove	Development	Yes	Some crown dieback, stem still relatively solid.
79	Eastern White Cedar	*Thuja occidentalis*	Native	1	11.6		Probable	Dead	Remove	Development	No	Basal rot; slight lean; dead crown, no leaves.
80	Eastern White Cedar	*Thuja occidentalis*	Native	2	22.8	2.00	Improbable	Good	Remove	Development	Yes	Some bark missing from root.
81	Eastern White Cedar	*Thuja occidentalis*	Native	1	30.2	0.50	Probable	Dead	Remove	Development	No	Missing bark; insect feeding; hedgerow tree.
82	Eastern White Cedar	*Thuja occidentalis*	Native	2	21.4	2.00	Possible	Poor	Remove	Development	No	Dieback on main stem; stem still relatively solid.
83	Eastern White Cedar	*Thuja occidentalis*	Native	1	25.1	2.00	Possible	Good	Remove	Development	Yes	Codominant stems with included bark in long vertical crack.
84	Eastern White Cedar	*Thuja occidentalis*	Native	1	18.5	1.30	Possible	Poor	Remove	Development	No	Minimal crown due to competition; dieback.
85	Eastern White Cedar	*Thuja occidentalis*	Native	1	32.8	2.50	Possible	Good	Remove	Development	Yes	Codominant stems with included bark; tight branch angles.
86	Eastern White Cedar	*Thuja occidentalis*	Native	1	21.3	2.00	Possible	Poor	Remove	Development	No	Reduced crown due to competition; wound on upper stem; crown dieback.
87	Eastern White Cedar	*Thuja occidentalis*	Native	1	18.9	2.00	Improbable	Good	Remove	Development	Yes	Tight branch angles with included bark.
88	Eastern White Cedar	*Thuja occidentalis*	Native	1	20.7	2.00	Improbable	Fair	Remove	Development	Yes	Codominant leaders; exfoliating bark.
89	Eastern White Cedar	*Thuja occidentalis*	Native	1	28.8	1.50	Possible	Fair	Remove	Development	Yes	Some squirrel damage on main stem; larger open cavity with compartmentalization; crown relatively healthy.
90	Eastern White Cedar	*Thuja occidentalis*	Native	2	14.7	2.50	Possible	Fair	Remove	Development	Yes	Unbalanced crowns, leaning away from one another; minor crown thinning.
91	Eastern White Cedar	*Thuja occidentalis*	Native	2	22.8	2.30	Possible	Fair	Remove	Development	Yes	One-sided crown due to competition; some crown dieback.
92	Eastern White Cedar	*Thuja occidentalis*	Native	1	16.0	2.50	Improbable	Fair	Remove	Development	Yes	Lower crown thinning; strong taper.

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
93	Eastern White Cedar	*Thuja occidentalis*	Native	2	17.4	2.50	Improbable	Fair	Remove	Development	Yes	Included bark; secondary stem has laterals as leaders.
94	Eastern White Cedar	*Thuja occidentalis*	Native	2	23.5	2.50	Improbable	Good	Remove	Development	Yes	Minimal dieback; narrow crown due to competition.
95	Eastern White Cedar	*Thuja occidentalis*	Native	1	24.5	2.50	Possible	Good	Remove	Development	Yes	Codominant leaders with included bark.
96	Eastern White Cedar	*Thuja occidentalis*	Native	1	21.2	0.80	Possible	Fair	Remove	Development	Yes	Narrow crown due to competition; some crown dieback.
97	Eastern White Cedar	*Thuja occidentalis*	Native	2	14.2	2.50	Improbable	Good	Remove	Development	Yes	Tight branch angle.
98	Eastern White Cedar	*Thuja occidentalis*	Native	6	23.0	3.50	Improbable	Good	Remove	Development	Yes	Relatively healthy crown; solid stems.
99	Eastern White Cedar	*Thuja occidentalis*	Native	2	20.5	2.50	Improbable	Good	Remove	Development	Yes	Each stem with 1 dead branch; exfoliating bark.
100	Eastern White Cedar	*Thuja occidentalis*	Native	2	19.3	2.00	Possible	Fair	Remove	Development	Yes	Some crown dieback due to competition; minimal included bark.
101	Eastern White Cedar	*Thuja occidentalis*	Native	6	20.9	3.00	Improbable	Good	Remove	Development	Yes	
102	Eastern White Cedar	*Thuja occidentalis*	Native	1	28.0	1.50	Possible	Poor	Remove	Development	No	Squirrel damage; upper stems intertwining; bark cracks; narrow crown due to competition; dieback.
103	Eastern White Cedar	*Thuja occidentalis*	Native	2	22.5	2.50	Improbable	Fair	Remove	Development	Yes	Poor branch structure.
104	Eastern White Cedar	*Thuja occidentalis*	Native	1	18.2	2.50	Improbable	Good	Remove	Development	Yes	Unbalanced crown, stout laterals; codominant leaders.
105	Eastern White Cedar	*Thuja occidentalis*	Native	1	38.0	2.50	Improbable	Good	Remove	Development	Yes	Relatively healthy, full crown.
106	Eastern White Cedar	*Thuja occidentalis*	Native	3	18.3	2.50	Possible	Fair	Remove	Development	Yes	Some included bark; bark damage from squirrel; narrow crown due to competition.
107	Eastern White Cedar	*Thuja occidentalis*	Native	1	21.6	2.50	Possible	Good	Remove	Development	Yes	Codominant leaders with included bark in very tight branch angle.
108	Eastern White Cedar	*Thuja occidentalis*	Native	1	33.1	3.00	Possible	Fair	Remove	Development	Yes	Some crown dieback; minor bark cracks.
109	Eastern White Cedar	*Thuja occidentalis*	Native	1	30.3	3.00	Improbable	Good	Remove	Development	Yes	Tight branch angles.
110	Eastern White Cedar	*Thuja occidentalis*	Native	1	28.1	4.00	Improbable	Fair	Remove	Development	Yes	One-sided crown with majority leaning away from driveway; some crown dieback.
111	Eastern White Cedar	*Thuja occidentalis*	Native	3	30.0	3.00	Possible	Fair	Remove	Development	Yes	1 stem with long crack; tight branch angles with included bark.
112	Eastern White Cedar	*Thuja occidentalis*	Native	1	19.4	2.30	Probable	Poor	Remove	Development	No	Crack up main stem with hollow; crown dieback; insect holes on main stem.
113	Eastern White Cedar	*Thuja occidentalis*	Native	1	10.3	1.50	Improbable	Fair	Remove	Development	Yes	Thin crown.
114	Eastern White Cedar	*Thuja occidentalis*	Native	2	24.1	3.00	Improbable	Fair	Remove	Development	Yes	Broken branch on 1 stem.
115	Eastern White Cedar	*Thuja occidentalis*	Native	1	12.5	2.30	Possible	Fair	Remove	Development	Yes	Slight lean toward driveway; narrow crown due to competition.
116	Eastern White Cedar	*Thuja occidentalis*	Native	1	15.5	1.80	Possible	Fair	Remove	Development	Yes	Lean toward driveway; one-sided crown with dieback.
117	Eastern White Cedar	*Thuja occidentalis*	Native	2	28.0	3.00	Improbable	Good	Remove	Development	Yes	Tight branch angle.
118	Eastern White Cedar	*Thuja occidentalis*	Native	1	15.9	1.50	Possible	Poor	Remove	Development	No	One-sided crown with dieback; some evidence of rot on main stem.
119	Eastern White Cedar	*Thuja occidentalis*	Native	1	16.1	2.00	Possible	Fair	Remove	Development	Yes	Stems twist around each other, poor structure.
120	Eastern White Cedar	*Thuja occidentalis*	Native	2	23.9	3.00	Possible	Fair	Remove	Development	Yes	One-sided crown away from driveway with some dieback; split on 1 stem with staining.
121	Eastern White Cedar	*Thuja occidentalis*	Native	2	18.4	2.50	Improbable	Fair	Remove	Development	Yes	Unbalanced crown, phototrophic; smaller stem with much dieback.
122	Eastern White Cedar	*Thuja occidentalis*	Native	2	11.4	2.00	Improbable	Fair	Remove	Development	Yes	Slight lean; improper pruning cuts; unbalanced crown.
123	Eastern White Cedar	*Thuja occidentalis*	Native	1	12.8	1.50	Possible	Poor	Remove	Development	No	One-sided crown with dieback.
124	Eastern White Cedar	*Thuja occidentalis*	Native	1	14.3	3.00	Possible	Fair	Remove	Development	Yes	Heavy bend likely from ice/snow load; codominant leaders; exfoliating bark.
125	Eastern White Cedar	*Thuja occidentalis*	Native	3	18.4	2.30	Possible	Poor	Remove	Development	No	1 stem with crown snapped off; split between larger stems.
126	Eastern White Cedar	*Thuja occidentalis*	Native	2	11.2	1.50	Improbable	Fair	Remove	Development	Yes	Unbalanced crown, phototrophic growth.
127	Eastern White Cedar	*Thuja occidentalis*	Native	1	16.3	2.00	Possible	Fair	Remove	Development	Yes	One-sided crown with lean toward driveway.
128	Eastern White Cedar	*Thuja occidentalis*	Native	1	19.2	2.00	Improbable	Good	Remove	Development	Yes	Codominant leaders.
129	Eastern White Cedar	*Thuja occidentalis*	Native	3	18.2	1.30	Possible	Fair	Remove	Development	Yes	Narrow crown due to competition; some crown dieback.
130	Eastern White Cedar	*Thuja occidentalis*	Native	1	16.0	2.00	Possible	Fair	Remove	Development	Yes	Crown thinning; 1 leader dead.
131	Eastern White Cedar	*Thuja occidentalis*	Native	1	13.7	2.00	Possible	Poor	Remove	Development	No	Reduced crown; dieback; one-sided crown.
132	Eastern White Cedar	*Thuja occidentalis*	Native	1	12.2	2.00	Improbable	Good	Remove	Development	Yes	Lower crown thinning.
133	Eastern White Cedar	*Thuja occidentalis*	Native	1	17.3	1.50	Possible	Fair	Remove	Development	Yes	Narrow crown due to competition; some crown dieback.
134	Eastern White Cedar	*Thuja occidentalis*	Native	2	13.3	2.00	Possible	Fair	Remove	Development	Yes	Codominant stems with included bark; unbalanced crown, phototrophic growth.
135	Eastern White Cedar	*Thuja occidentalis*	Native	1	16.5	0.80	Improbable	Fair	Remove	Development	Yes	Narrow crown due to competition; some crown dieback; main stem still relatively solid.
136	Eastern White Cedar	*Thuja occidentalis*	Native	2	17.6	2.50	Improbable	Good	Remove	Development	Yes	Good condition but for codominant leaders.
137	Eastern White Cedar	*Thuja occidentalis*	Native	1	10.1	2.30	Possible	Poor	Remove	Development	No	One-sided crown with dieback.
138	Eastern White Cedar	*Thuja occidentalis*	Native	2	18.4	2.00	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	*Thuja occidentalis*	Native	4	18.5	2.00	Possible	Fair	Remove	Development	Yes	One-sided crown due to competition; stems relatively solid; some crown dieback.
140	Eastern White Cedar	*Thuja occidentalis*	Native	1	16.8	2.00	Improbable	Fair	Remove	Development	Yes	Exfoliating bark; lower crown thinning.
141	Eastern White Cedar	*Thuja occidentalis*	Native	4	24.0	3.00	Improbable	Fair	Remove	Development	Yes	Narrow crown due to competition; some crown dieback.
142	Eastern White Cedar	*Thuja occidentalis*	Native	4	21.4	2.00	Possible	Fair	Remove	Development	Yes	Some included bark; minimal dieback.
143	Eastern White Cedar	*Thuja occidentalis*	Native	1	18.0	2.00	Possible	Fair	Remove	Development	Yes	Codominant leaders with included bark.
144	Eastern White Pine	*Pinus strobus*	Native	1	29.0	2.00	Possible	Fair	Remove	Development	Yes	Narrow crown due to competition with some dieback; stem relatively solid.
145	Eastern White Cedar	*Thuja occidentalis*	Native	1	20.3	2.00	Improbable	Fair	Remove	Development	Yes	Improper pruning cuts.
146	Eastern White Cedar	*Thuja occidentalis*	Native	1	17.8	1.50	Possible	Poor	Remove	Development	No	Crown dieback; split up main stem.
147	Eastern White Cedar	*Thuja occidentalis*	Native	2	13.7	2.00	Improbable	Good	Remove	Development	Yes	Slightly narrow crown due to competition, otherwise relatively healthy; solid stem.
148	Eastern White Cedar	*Thuja occidentalis*	Native	2	13.8	1.50	Possible	Fair	Remove	Development	Yes	Wound from old failed branch.
149	Eastern White Cedar	*Thuja occidentalis*	Native	1	14.5	1.00	Improbable	Good	Remove	Development	Yes	Slightly one-sided crown due to competition, otherwise relatively healthy.
150*	Golden Weeping Willow	*Salix alba var. vitellina*	Non-Native	1	118.0	5.30	Probable	Very Poor	Remove	Development	No	Large cavity with rot in main stem; dieback in large scaffold branches. Candidate bat maternity roost tree.
151	Common Apple	*Malus domestica*	Non-Native	4	61.6	4.00	Possible	Fair	Remove	Development	No	Open crown, crown thinning; 2 dead branches; minor leaf necrosis; water sprouts; tree declining.
152	Freeman's Maple	*Acer X freemanii*	Native	2	26.1	4.00	Possible	Fair	Remove	Development	Yes	Some included bark in upper scaffold; epicormic growth; full, vigourous crown.
153*	Common Apple	*Malus domestica*	Non-Native	2	38.4	4.00	Possible	Poor	Remove	Development	No	Spreading crown; lower crown dead; centre rot in both stems; shedding some bark. Candidate bat maternity roost tree.
154	Plum species	*Prunus sp.*	Non-Native	1	16.0	2.00	Possible	Poor	Remove	Development	No	Sparse crown with dieback.
155	Black Walnut	*Juglans nigra*	Native	1	17.9	3.00	Improbable	Good	Remove	Development	Yes	Codominant leaders; crown extends to ground.
156	Green Ash	*Fraxinus pennsylvanica*	Native	1	29.9	3.00	Probable	Fair	Remove	Development	Yes	Some crown dieback; minimal woodpecker damage in upper stem.
157	Trembling Aspen	*Populus tremuloides*	Native	1	13.3	2.00	Improbable	Fair	Retain		No	Some foliar chlorosis; crooked stem.
158	Trembling Aspen	*Populus tremuloides*	Native	1	17.9	2.30	Improbable	Fair	Retain		No	Slightly unbalanced crown due to competition; minimal dieback.
159	White Birch	*Betula papyrifera*	Native	1	24.5	2.50	Possible	Dead	Retain		No	No leaves, catkins retained; died within last year.
160	White Birch	*Betula papyrifera*	Native	1	24.1	3.00	Possible	Dead	Retain		No	Some borer holes up main stem; looks like it died recently.
161	Balsam Poplar	*Populus balsamifera*	Native	1	10.8	1.50	Improbable	Good	Retain		No	2 dead lower branches.
162	Balsam Poplar	*Populus balsamifera*	Native	1	10.9	1.30	Possible	Fair	Retain		No	Wound on main stem with some staining; narrow crown with minimal dieback.
163	Balsam Poplar	*Populus balsamifera*	Native	1	12.7	1.30	Improbable	Good	Retain		No	Small amount of included bark in upper branch union; full crown.
164	Trembling Aspen	*Populus tremuloides*	Native	1	13.3	2.00	Possible	Fair	Retain		No	Discolored, sunken canker on stem; some chlorosis.
165	White Spruce	*Picea glauca*	Native	1	10.5	1.00	Improbable	Excellent	Retain		No	Full, vigourous tree; some competition with dogwood.
166	Trembling Aspen	*Populus tremuloides*	Native	1	12.8	1.50	Improbable	Fair	Retain		No	Codominant leaders with included bark; healthy crown.
167	Trembling Aspen	*Populus tremuloides*	Native	1	11.7	2.00	Improbable	Fair	Retain		No	Thin crown; strong leader.
168	Balsam Poplar	*Populus balsamifera*	Native	1	11.5	2.00	Improbable	Fair	Retain		No	Unbalanced crown; 3 dead branches; minor leaf chlorosis.
169	Trembling Aspen	*Populus tremuloides*	Native	1	12.7	2.00	Improbable	Fair	Retain		No	Dead lower branches; healthy form and canopy.
170	Trembling Aspen	*Populus tremuloides*	Native	2	13.8	3.00	Improbable	Fair	Retain		No	Thin crown.
171	Trembling Aspen	*Populus tremuloides*	Native	2	15.2	1.50	Improbable	Fair	Retain		No	Included bark; dead lower branches; minor dieback.
172	Trembling Aspen	*Populus tremuloides*	Native	1	10.9	1.50	Improbable	Fair	Retain		No	Dead branches; dieback; debris around base.
173	Trembling Aspen	*Populus tremuloides*	Native	1	15.3	2.50	Improbable	Good	Retain		No	Good health.
174	Green Ash	*Fraxinus pennsylvanica*	Native	1	13.4	1.50	Improbable	Fair	Retain		No	D-shaped exit holes; minor dieback; minor epicormic growth.
175	Balsam Poplar	*Populus balsamifera*	Native	1	13.7	1.50	Improbable	Fair	Retain		No	Dieback; dead branches; minor damage at base.
176	Balsam Poplar	*Populus balsamifera*	Native	1	13.4	2.00	Possible	Fair	Retain		No	Stem wound, bark discoloration; minor leaf chlorosis; 1 dead branch.
177	Balsam Poplar	*Populus balsamifera*	Native	1	12.2	2.00	Improbable	Poor	Retain		No	30% dieback; asymetrical crown to southeast.
178	Balsam Poplar	*Populus balsamifera*	Native	1	10.3	1.50	Possible	Fair	Retain		No	Leaning; minor dieback.
179	Balsam Poplar	*Populus balsamifera*	Native	1	13.6	1.50	Improbable	Fair	Retain		No	15% dieback; minor pistol butt.
180	Balsam Poplar	*Populus balsamifera*	Native	1	10.1	1.50	Improbable	Fair	Retain		No	Minor pistol butt; minor lean south.
181	Trembling Aspen	*Populus tremuloides*	Native	1	11.0	1.50	Improbable	Fair	Retain		No	Open seam near base, good reaction wood; healthy crown.
182	Trembling Aspen	*Populus tremuloides*	Native	1	12.6	2.00	Improbable	Fair	Retain		No	Exposed roots, 1 girdling; bark rubbing; codominant leaders.
183	Trembling Aspen	*Populus tremuloides*	Native	1	13.8	1.50	Improbable	Fair	Retain		No	20% dieback; minor dead branches.
184	Trembling Aspen	*Populus tremuloides*	Native	1	12.2	2.00	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	*Populus tremuloides*	Native	1	14.7	2.50	Improbable	Fair	Retain		No	Minor dieback; thin canopy.
186	Trembling Aspen	*Populus tremuloides*	Native	1	13.2	2.50	Improbable	Fair	Retain		No	Small cankers; slight lean south; minor dieback.
187	Trembling Aspen	*Populus tremuloides*	Native	1	18.2	3.00	Improbable	Fair	Retain		No	Bark lesion in crown; dead lower branches.
188	Trembling Aspen	*Populus tremuloides*	Native	1	12.9	1.50	Improbable	Fair	Retain		No	Minor dieback.
189	Trembling Aspen	*Populus tremuloides*	Native	1	10.9	2.00	Improbable	Good	Retain		No	Leaning, phototrophic growth.
190	Trembling Aspen	*Populus tremuloides*	Native	1	18.2	1.50	Improbable	Good	Retain		No	Minor dieback of lower branches.
191	Green Ash	*Fraxinus pennsylvanica*	Native	1	12.3	1.50	Improbable	Fair	Retain		No	Vines in canopy; minor dieback.
192	White Elm	*Ulmus americana*	Native	1	11.1	2.00	Improbable	Good	Retain		No	Very minor insect defoliation.
193	Balsam Poplar	*Populus balsamifera*	Native	1	20.9	2.00	Possible	Poor	Retain		No	Open cankers; sapwood rot; 30% dieback.
194	Eastern Cottonwood	*Populus deltoides*	Native	1	29.8	3.50	Possible	Poor	Retain		No	40% dieback; crooked stem.
195	Green Ash	*Fraxinus pennsylvanica*	Native	1	17.7	1.50	Improbable	Good	Retain		No	Healthy crown; minor exfoliating bark.
196	Green Ash	*Fraxinus pennsylvanica*	Native	1	13.0	2.50	Improbable	Good	Retain		No	Excurrent growth with strong leader; minor crown thinning.
197	Trembling Aspen	*Populus tremuloides*	Native	1	29.6	2.00	Possible	Poor	Retain		No	Sapwood rot; open canker; poor reaction wood; dieback.
198	Trembling Aspen	*Populus tremuloides*	Native	1	11.3	2.00	Possible	Fair	Retain		No	Leaning south.
199	Trembling Aspen	*Populus tremuloides*	Native	1	25.6	2.50	Improbable	Fair	Retain		No	Open wounds, poor reaction wood; dieback.
200	Balsam Poplar	*Populus balsamifera*	Native	1	24.1	2.50	Possible	Fair	Retain		No	Vines along stem; minor dieback; asymetrical crown to south.
201	Green Ash	*Fraxinus pennsylvanica*	Native	1	14.0	2.50	Improbable	Good	Retain		No	No exit holes observed.
202	Trembling Aspen	*Populus tremuloides*	Native	1	24.7	2.00	Improbable	Fair	Retain		No	Dead lower branches; healthy canopy.
203	White Ash	*Fraxinus americana*	Native	1	10.6	1.50	Possible	Poor	Retain		No	30% dieback; epicormic growth; vines in crown.
204	Manitoba Maple	*Acer negundo*	Native	1	29.5	4.00	Possible	Fair	Retain		No	Leaning; chlorosis; minor thinning,; vine in crown.
205	White Ash	*Fraxinus americana*	Native	1	22.8		Probable	Dead	Retain		No	Recently dead.
206	Silver Maple	*Acer saccharinum*	Native	1	11.9	2.50	Improbable	Fair	Retain		No	Heavy lean, weighed by other branches; minor leaf necrosis and some pustules.
207	Green Ash	*Fraxinus pennsylvanica*	Native	1	11.4	1.00	Improbable	Fair	Retain		No	Dieback; dead lower branches.
208	Green Ash	*Fraxinus pennsylvanica*	Native	1	13.3	1.50	Improbable	Fair	Retain		No	Minor dieback; dead lower branches.
209	White Ash	*Fraxinus americana*	Native	1	25.0	3.50	Improbable	Fair	Retain		No	Epicormic growth; no EAB exit holes observed.
210	White Ash	*Fraxinus americana*	Native	1	10.8	2.00	Improbable	Fair	Retain		No	Minor dieback.
211	White Ash	*Fraxinus americana*	Native	1	57.8	6.00	Possible	Poor	Remove / Retain Stump	Road grading/safety	No	Vines in crown; 30% dieback; no EAB exit holes observed.
212	Manitoba Maple	*Acer negundo*	Native	2	55.1	7.00	Possible	Poor	Remove	Road grading	No	Codominant leaders with included bark; dieback and dead branches; poor structure; epicormic growth.
213	Golden Weeping Willow	*Salix alba var. vitellina*	Non-Native	1	80.7	5.50	Improbable	Good	Remove	Road grading	Yes	2 instances of past branch failure.
214	Norway Maple	*Acer platanoides*	Non-Native	1	25.6	2.50	Possible	Poor	Remove	Development	No	Large vertical open wound; exit holes; dead branches; poor reaction wood.
215	Colorado Spruce	*Picea pungens*	Non-Native	1	28.3	2.50	Improbable	Excellent	Remove	Development	Yes	No apparent problems.
216	Trembling Aspen	*Populus tremuloides*	Native	2	30.5	4.50	Possible	Fair	Remove	Development	Yes	Codominant stems with included bark; minor crown thinning.
217	Eastern Cottonwood	*Populus deltoides*	Native	4	47.4	6.00	Improbable	Fair	Remove	Development	Yes	Small witch's broom; minor dieback; codominant leaders with included bark.
218	Chanticleer Pear	*Pyrus calleryana 'Chanticleer'*	Non-Native	1	17.2	2.50	Improbable	Fair	Remove	Development	Yes	Minor dieback; minor wounds with good reaction wood; minor included bark.
219	Common Apple	*Malus domestica*	Non-Native	1	13.8	4.50	Improbable	Poor	Remove	Development	No	80% dieback; epicormic growth; large dying branches.
220	Eastern Red Cedar	*Juniperus virginiana*	Native	1	11.2	2.00	Improbable	Good	Remove	Development	Yes	Heavy fruit set.
221	Eastern Red Cedar	*Juniperus virginiana*	Native	1	10.7	2.00	Improbable	Good	Remove	Development	Yes	Heavy fruit set; 1 subordinate branch with tight angle.
222	Alaska Yellow Cedar	*Cupressus nootkatensis*	Non-Native	1	11.4	1.50	Improbable	Excellent	Remove	Development	Yes	No apparent problems.
223	Norway Maple	*Acer platanoides*	Non-Native	2	57.2	7.00	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	*Cupressus nootkatensis*	Non-Native	1	13.6	2.00	Improbable	Good	Remove	Development	Yes	Suppressed by nearby Norway Maple.
225	Flowering Crab Apple	*Malus baccata*	Non-Native	1	14.9	1.50	Improbable	Fair	Remove	Development	Yes	Pruned to spreading, umbrella-shaped crown; healed stem wound.
226	Common Apple	*Malus domestica*	Non-Native	1	29.3	3.00	Possible	Poor	Remove	Development	No	Major bark wound, sapwood and heartwood rot; water sprouts; thin crown.
227	Crimson King Norway Map	*Acer platanoides 'Crimson King'*	Non-Native	3	29.4	4.00	Possible	Fair	Remove	Development	Yes	Codominant leaders; rotting at base; vertical crack with good reaction wood; open wound.
228	Common Apple	*Malus domestica*	Non-Native	1	24.0	3.00	Improbable	Fair	Remove	Development	No	Dense interior crown.
229	Common Apple	*Malus domestica*	Non-Native	1	15.1	2.50	Improbable	Fair	Remove	Development	No	Stem wound nearly compartmentalized.
230	Common Apple	*Malus domestica*	Non-Native	1	25.9	2.00	Improbable	Fair	Remove	Development	No	Epicormic growth; dieback.
231	Common Pear	*Pyrus communis*	Non-Native	3	13.3	1.50	Possible	Very Poor	Remove	Development	No	Crown mostly dead; epicormic growth along stem.
232	Common Apple	*Malus domestica*	Non-Native	1	27.3	3.00	Possible	Fair	Remove	Development	No	Epicormic growth; dieback; wounds with some reaction wood.
233	Common Apple	*Malus domestica*	Non-Native	1	29.9	3.50	Possible	Fair	Remove	Development	No	Open wound; epicormic growth; dieback.
234	White Spruce	*Picea glauca*	Native	1	24.7	3.50	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	*Picea glauca*	Native	1	15.2	2.00	Improbable	Fair	Remove	Development	Yes	Suppressed; minor dieback; minor vines along stem.
236	Silver Maple	*Acer saccharinum*	Native	1	66.8	4.00	Possible	Poor	Remove	Development	No	Large split along stem, 2m tall; broken top; healthy remaining crown.
237	White Spruce	*Picea glauca*	Native	1	14.2		Probable	Dead	Remove	Development	No	Hazardous snag.
238	White Spruce	*Picea glauca*	Native	1	18.2	2.00	Possible	Poor	Remove	Development	No	Strong taper; crown thinning; dead leader.
239	White Spruce	*Picea glauca*	Native	1	13.2	2.00	Improbable	Fair	Remove	Development	Yes	Leaning stem; bark crack; thin, narrow crown.
240	White Spruce	*Picea glauca*	Native	1	27.8	3.00	Improbable	Fair	Remove	Development	Yes	Minor thinning; cone production.
241	White Spruce	*Picea glauca*	Native	1	20.5	3.00	Improbable	Fair	Remove	Development	Yes	Strong taper; minor dieback; bark stem wound.
242	White Spruce	*Picea glauca*	Native	1	23.2	2.50	Improbable	Fair	Remove	Development	Yes	Minor thinning; seed production.
243	Silver Maple	*Acer saccharinum*	Native	4	58.1	8.00	Possible	Good	Remove	Development	Yes	Codominant stems; 1 limb dying; minor dieback.
244	Silver Maple	*Acer saccharinum*	Native	1	56.6	6.50	Improbable	Fair	Remove	Development	Yes	Codominant stems with included bark; minor leaf necrosis; exposed roots with lawnmower injuries.
245	Silver Maple	*Acer saccharinum*	Native	2	37.1	5.00	Possible	Poor	Remove	Development	No	Unbalanced crown; 40% dieback; epicormic growth; sooty lesions; vine in crown.
246	Tamarack	*Larix laricina*	Native	1	36.4	4.00	Improbable	Good	Remove	Development	Yes	Minor broken branches.
247	Tamarack	*Larix laricina*	Native	1	22.4	3.00	Improbable	Fair	Remove	Development	Yes	Bark wounds; epicormic growth; bent top.
248	Tamarack	*Larix laricina*	Native	1	30.1	3.00	Possible	Fair	Remove	Development	Yes	Bent top/crooked stem; vertical crack closed.
249	Silver Maple	*Acer saccharinum*	Native	1	72.5	8.00	Possible	Fair	Remove	Development	Yes	Open crack in 1 limb; another limb dead and pruned; bark discoloration; history of branch failure.
250	White Ash	*Fraxinus americana*	Native	1	48.8	5.00	Probable	Very Poor	Remove	Development	No	Dead crown; sprouting from base; EAB exit holes; broken branches.
251*	Red Pine	*Pinus resinosa*	Non-Native	1	15.3	1.50	Improbable	Fair	Remove	Development	Yes	Crooked stem; unbalanced crown; thin crown. Candidate bat maternity roost tree.
252	Red Pine	*Pinus resinosa*	Non-Native	1	20.8	2.50	Improbable	Good	Remove	Development	Yes	Lower branches dead.
253	Scots Pine	*Pinus sylvestris*	Non-Native	1	22.3	2.50	Improbable	Fair	Remove	Development	Yes	Compartmentalized stem wound; crooked stem.
254	Scots Pine	*Pinus sylvestris*	Non-Native	1	29.1	4.50	Improbable	Fair	Remove	Development	Yes	Unbalanced crown; 10% dieback.
255	Scots Pine	*Pinus sylvestris*	Non-Native	1	29.5	5.00	Possible	Fair	Remove	Development	Yes	Crooked stem; sapsucker holes.
256	White Spruce	*Picea glauca*	Native	1	20.4	2.50	Probable	Dead	Remove	Development	No	Shedding bark, showing insect galleries and stem crack; no leaves.
257	White Spruce	*Picea glauca*	Native	1	11.4	1.50	Improbable	Good	Remove	Development	Yes	Narrow crown.
258	White Spruce	*Picea glauca*	Native	1	24.1	4.00	Improbable	Excellent	Remove	Development	Yes	
259	White Spruce	*Picea glauca*	Native	1	23.0	4.00	Improbable	Fair	Remove	Development	Yes	Healed bark cracks; gumosis.
260	White Spruce	*Picea glauca*	Native	1	16.8	2.00	Possible	Dead	Remove	Development	No	Shedding bark; insect galleries; no leaves.
261	White Spruce	*Picea glauca*	Native	1	24.4	4.00	Improbable	Good	Remove	Development	Yes	Unbalanced crown.
262	White Spruce	*Picea glauca*	Native	1	28.7	3.00	Improbable	Good	Remove	Development	Yes	Broken branches in lower crown.
263	White Spruce	*Picea glauca*	Native	1	26.2	3.00	Improbable	Good	Remove	Development	Yes	Good fruit set.
264	White Spruce	*Picea glauca*	Native	1	26.5	4.00	Improbable	Fair	Remove	Development	Yes	Narrow, thin crown; strong taper.
265	White Spruce	*Picea glauca*	Native	1	20.8	3.00	Improbable	Fair	Remove	Development	Yes	Narrow crown.
266	White Spruce	*Picea glauca*	Native	1	12.4	1.00	Possible	Dead	Remove	Development	No	No bark, no leaves.
267	White Spruce	*Picea glauca*	Native	2	23.8	3.50	Possible	Fair	Remove	Development	Yes	Codominant stems with included bark; 1 stem topped, other has codominant leaders.
268	White Spruce	*Picea glauca*	Native	2	22.7	3.50	Improbable	Fair	Remove	Development	Yes	Mildly crooked stem; 2nd stem dead.
269	White Spruce	*Picea glauca*	Native	1	22.3	3.50	Improbable	Good	Remove	Development	Yes	
270	White Spruce	*Picea glauca*	Native	1	21.3	2.50	Improbable	Good	Remove	Development	Yes	Thin crown.
271	White Spruce	*Picea glauca*	Native	1	15.0	2.00	Improbable	Good	Remove	Development	Yes	
272	Norway Spruce	*Picea abies*	Non-Native	1	41.0	4.00	Improbable	Good	Remove	Development	Yes	
273	White Spruce	*Picea glauca*	Native	1	24.2	3.00	Improbable	Good	Remove	Development	Yes	Lower branches dead.
274	White Spruce	*Picea glauca*	Native	1	25.7	3.00	Improbable	Good	Remove	Development	Yes	
275	White Spruce	*Picea glauca*	Native	1	36.2	4.00	Improbable	Good	Remove	Development	Yes	
276	White Spruce	*Picea glauca*	Native	1	30.6	3.50	Improbable	Good	Remove	Development	Yes	Dead lower branch.
277	White Spruce	*Picea glauca*	Native	1	26.8	3.00	Improbable	Good	Remove	Development	Yes	Dead lower branch.
278	White Spruce	*Picea glauca*	Native	1	28.4	3.50	Improbable	Good	Remove	Development	Yes	
279	Norway Spruce	*Picea abies*	Non-Native	1	42.5	5.00	Improbable	Excellent	Remove	Development	Yes	
280	Norway Spruce	*Picea abies*	Non-Native	1	32.7	4.00	Improbable	Excellent	Remove	Development	Yes	
281	Norway Spruce	*Picea abies*	Non-Native	1	29.7	4.50	Possible	Fair	Remove	Development	Yes	Sap running; topped, lateral has become leader.
282	White Spruce	*Picea glauca*	Native	1	32.3	3.50	Improbable	Good	Remove	Development	Yes	
283	Common Apple	*Malus domestica*	Non-Native	1	21.5	3.00	Possible	Poor	Remove	Development	No	Open crown; history of branch failure; foliar necrosis; basal bark wounds.
284	Common Apple	*Malus domestica*	Non-Native	1	16.0	2.50	Probable	Poor	Remove	Development	No	Heavy lean; missing much bark; fruiting bodies.
285	Common Pear	*Pyrus communis*	Non-Native	1	25.5	1.50	Probable	Very Poor	Remove	Development	No	Major stem crack with heartwood rot; 1 broken scaffold limb; 20% dieback; still bearing fruit.
286*	Common Pear	*Pyrus communis*	Non-Native	3	27.4	2.50	Possible	Poor	Remove	Development	No	1 stem broken; heartwood rot; frass at base; 10% dieback; history of branch failure; bearing fruit. Candidate bat maternity roost tree.
287	Eastern White Cedar	*Thuja occidentalis*	Native	2	27.1	2.00	Improbable	Fair	Remove	Development	Yes	Closely planted; codominant leaders.
288	Eastern White Cedar	*Thuja occidentalis*	Native	2	13.0	2.00	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
289	Eastern White Cedar	*Thuja occidentalis*	Native	2	17.6	2.00	Improbable	Fair	Remove	Development	Yes	Closely planted; codominant leaders.
290	Eastern White Cedar	*Thuja occidentalis*	Native	2	22.9	2.00	Improbable	Fair	Remove	Development	Yes	Closely planted; codominant leaders.
291	Eastern White Cedar	*Thuja occidentalis*	Native	2	17.3	2.00	Improbable	Fair	Remove	Development	Yes	Closely planted; codominant leaders.
292	Eastern White Cedar	*Thuja occidentalis*	Native	1	14.5	2.00	Improbable	Fair	Remove	Development	Yes	Closely planted.
293	Eastern White Cedar	*Thuja occidentalis*	Native	3	13.4	2.00	Improbable	Fair	Remove	Development	Yes	Closely planted.
294	Eastern White Cedar	*Thuja occidentalis*	Native	3	15.2	2.00	Improbable	Fair	Remove	Development	Yes	Closely planted; codominant leaders.
295	Eastern White Cedar	*Thuja occidentalis*	Native	2	17.2	2.00	Improbable	Fair	Remove	Development	Yes	Closely planted; codominant leaders.
296	Eastern White Cedar	*Thuja occidentalis*	Native	2	17.3	1.00	Improbable	Fair	Remove	Development	Yes	Closely planted.
297	Eastern White Cedar	*Thuja occidentalis*	Native	1	14.7	2.00	Improbable	Fair	Remove	Development	Yes	Closely planted.
298	Eastern White Cedar	*Thuja occidentalis*	Native	1	15.8	2.00	Improbable	Fair	Remove	Development	Yes	Closely planted.
299	Eastern White Cedar	*Thuja occidentalis*	Native	2	15.6	2.00	Improbable	Fair	Remove	Development	Yes	Closely planted; codominant leaders.
300	Eastern White Cedar	*Thuja occidentalis*	Native	2	16.1	2.00	Improbable	Fair	Remove	Development	Yes	Closely planted; codominant leaders.
624	Eastern White Cedar	*Thuja occidentalis*	Native	1	12.7	1.50	Improbable	Fair	Remove	Development	Yes	Closely planted; next to shed.
625	Eastern White Cedar	*Thuja occidentalis*	Native	1	11.8	1.50	Improbable	Fair	Remove	Development	Yes	Closely planted; near shed.
626	Eastern White Cedar	*Thuja occidentalis*	Native	1	15.9	1.50	Improbable	Fair	Remove	Development	Yes	Closely planted; near shed.
627	Eastern White Cedar	*Thuja occidentalis*	Native	3	13.7	1.50	Improbable	Fair	Remove	Development	Yes	Closely planted; near shed; codominant leaders.
628	Freeman's Maple	*Acer X freemanii*	Native	4	44.3	7.00	Possible	Good	Remove	Development	Yes	4 large, codominant stems with included bark.
A	Eastern White Cedar	*Thuja occidentalis*	Native	5	25.0	3.50	Improbable	Good	Remove	Development	Yes	Included bark; near fence and hydro wire; located off property.
B	Eastern White Cedar	*Thuja occidentalis*	Native	79	10-25	2-2.5	Improbable	Dead-Good	Remove	Development	Yes	Hedgerow of Eastern White Cedars planted closely to one another along the fence. 4 trees were noted as Dead and 1 in Poor health.

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.

[1]Dunster 2009

Tree Risk Assessment Criteria

Assessment Criteria*	Definition[2]
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 2 years will be used when assessing potential for structural failure.	

[2]Dunster 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 by Natural Resource Solutions Inc. (NRSI) as they existed at the time of the site inspection(s) of the Client's properties at 190-216 Arkell Road, Guelph, Ontario (the Property") and the trees situated thereon, and upon information provided by the Client to NRSI. The opinions in this assessment are based on observations made and using professional judgment, however, because trees are living organisms and subject to change, damage and disease, the analysis and recommendations as set out in this assessment are valid only at the date any such observations and analysis took place. As a result, the Client shall not rely upon this assessment, save and except for representing the circumstances and observations at the date of site inspection(s), and the analysis and recommendations made in relation to the proposed undertaking. It is recommended that the inventoried trees discussed in this assessment should be re-assessed periodically, where required (i.e. after 2 years).

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 including, without limitation, acting 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 providing payment of the Assessor's regular hourly billing fees.

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

Assumptions

The Client is hereby notified that where any of the information set out and referenced in this assessment are based on assumptions, facts or information provided to NRSI, NRSI

will in no way be responsible for the veracity or accuracy of any such information. Further, the Client acknowledges and agrees that NRSI has, for the purposes of preparing their assessment, assumed that the Property 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.

Restriction of Assessment

The assessment carried out was restricted to the Property as described in this report. No assessment of any other trees has been undertaken by NRSI. NRSI is not legally liable for any other trees 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. 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.

No guarantees are offered, or implied, that trees recommended for retention, 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 extreme 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 with 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 for the Client. The data collected reflect NRSI's best assessment of the inventoried trees situated on the Property with the information available at the time of observation. Data analysis and the assessment of potential impacts to inventoried trees is specific to the proposed undertaking as described in this report. 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 of this assessment for purposes unrelated to the proposed undertaking.

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	*Populus balsamifera*		2	8	2			12
Black Walnut	*Juglans nigra*		4					4
Eastern Cottonwood	*Populus deltoides*			1	1			2
Eastern Red Cedar	*Juniperus virginiana*		2					2
Eastern White Cedar	*Thuja occidentalis*		59	99	13		6	177
Eastern White Pine	*Pinus strobus*		1	1				2
Freeman's Maple	*Acer X freemanii*		1	3				4
Green Ash	*Fraxinus pennsylvanica*		3	5				8
Manitoba Maple	*Acer negundo*		1	3	1			5
Pin Cherry	*Prunus pensylvanica*			1				1
Silver Maple	*Acer saccharinum*		1	3	2			6
Tamarack	*Larix laricina*		1	2				3
Trembling Aspen	*Populus tremuloides*		3	20	2			25
White Ash	*Fraxinus americana*			2	2	1	1	6
White Birch	*Betula papyrifera*		1	1			2	4
White Elm	*Ulmus americana*		1					1
White Spruce	*Picea glauca*	2	15	11	1		4	33
Total		**2**	**102**	**158**	**23**	**1**	**9**	**295**
Non-Native Species								
Alaska Yellow Cedar	*Cupressus nootkatensis*	1	1					2
Chanticleer Pear	*Pyrus calleryana* 'Chanticleer'			1				1
Colorado Spruce	*Picea pungens*	1						1
Common Apple	*Malus domestica*			6	5			11
Common Pear	*Pyrus communis*			1	1	2		4
Crimson King Norway Maple	*Acer platanoides* 'Crimson King'			1				1
Flowering Crab Apple	*Malus baccata*			1				1
Golden Weeping Willow	*Salix alba* var. *vitellina*		1			1		2
Norway Maple	*Acer platanoides*			1	1			2
Norway Spruce	*Picea abies*	2	1	1				4
Plum species	*Prunus* sp.				1			1
Red Pine	*Pinus resinosa*		1	1				2
Scots Pine	*Pinus sylvestris*	2	4	4	1			11
Sweet Cherry	*Prunus avium*					1		1
Total		6	8	17	9	4		44
Overall Total		**8**	**103**	**177**	**33**	**5**	**13**	**339**

Overall Condition of Trees Inventoried

Potential for Structural Failure Rating	Overall Condition						Total
	Excellent	Good	Fair	Poor	Very Poor	Dead	
Improbable	8	96	128	3	0	0	235
Possible	0	7	48	28	1	8	92
Probable	0	0	1	2	4	5	12
Imminent	0	0	0	0	0	0	0
Total	**8**	**103**	**177**	**33**	**5**	**13**	**339**

Maps

Tree Number	Common Name	Scientific Name	Native / Non-native	DBH (cm)	Stem Count	Crown Radius (m)	Potential for Structural Failure Rating	Overall Condition	Proposed Action	Rationale for Removal	Compensation Required	Comments
47	Common Pear	*Pyrus communis*	Non-Native	20.3	2	4.0	Possible	Fair	Remove	Development	No	2 dead branches; some foliar necrosis; small section shedding bark; minor crown thinning; some fruit set.
48	Manitoba Maple	*Acer negundo*	Native	14.2	1	3.0	Improbable	Fair	Remove	Development	Yes	Codominant leaders; exposed root; slight lean; branch over driveway with injury.
49	Freeman's Maple	*Acer X freemanii*	Native	45.6	3	7.0	Possible	Fair	Remove	Development	Yes	Basal sprouting; history of branch failure; minor dieback; candidate wildlife/bat cavity. Candidate bat maternity roost tree.
50	White Birch	*Betula papyrifera*	Native	28.2	2	5.0	Improbable	Good	Remove	Development	Yes	Codominant stems with included bark.
51	Eastern White Cedar	*Thuja occidentalis*	Native	23.8	4	2.5	Improbable	Good	Remove	Development	Yes	Few small broken branches; small basal cavity; near existing driveway.
52	Pin Cherry	*Prunus pensylvanica*	Native	11.8	1	2.5	Improbable	Fair	Remove	Development	Yes	Phototrophic growth, next to cedar hedge at fenceline; thin crown; light insect defoliation.
53	Freeman's Maple	*Acer X freemanii*	Native	16.1	6	3.5	Improbable	Fair	Remove	Development	Yes	1 stem dead; minor dieback.
54	Scots Pine	*Pinus sylvestris*	Non-Native	16.4	1	2.0	Improbable	Fair	Remove	Development	Yes	Minor crown thinning; poor branch structure.
55	Scots Pine	*Pinus sylvestris*	Non-Native	15.6	1	2.0	Possible	Poor	Remove	Development	No	Significant dieback; stunted needles, swollen stem.
56	White Birch	*Betula papyrifera*	Native	20.3	2	3.0	Possible	Fair	Retain		No	1 stem dead; other has dead leader; 10% dieback.
57	White Spruce	*Picea glauca*	Native	10.2	2	2.5	Improbable	Good	Retain		No	Codominant stems.
58	Scots Pine	*Pinus sylvestris*	Non-Native	15.7	1	2.0	Improbable	Good	Retain		No	Slightly crooked stem.
59	Eastern White Pine	*Pinus strobus*	Native	15.2	1	2.5	Improbable	Good	Remove	Development	Yes	Crooked stem; broken top.
60	Scots Pine	*Pinus sylvestris*	Non-Native	35.4	1	3.5	Improbable	Good	Remove	Development	Yes	Top broke at some point and new leader took over.
61	Scots Pine	*Pinus sylvestris*	Non-Native	14.1	1	1.5	Improbable	Good	Remove	Development	Yes	Lower crown thinning; vine in lower crown.
62	Scots Pine	*Pinus sylvestris*	Non-Native	18.0	1	2.0	Improbable	Excellent	Remove	Development	Yes	Vines in lower crown.
63	Scots Pine	*Pinus sylvestris*	Non-Native	14.0	1	2.0	Improbable	Excellent	Remove	Development	Yes	Vines throughout.
64	Scots Pine	*Pinus sylvestris*	Non-Native	10.5	1	1.5	Improbable	Good	Remove	Development	Yes	Very minimal dieback; landscape tree.
65	Manitoba Maple	*Acer negundo*	Native	21.8	1	3.5	Improbable	Fair	Remove	Development	Yes	Minor crown thinning.
66	Manitoba Maple	*Acer negundo*	Native	21.8	1	4.0	Possible	Fair	Remove	Development	Yes	Some crown dieback and insect feeding in foliage.
67	Black Walnut	*Juglans nigra*	Native	55.8	2	8.0	Improbable	Good	Remove	Development	Yes	Included bark; woundwood at base of 1 limb.
68	Black Walnut	*Juglans nigra*	Native	13.7	1	3.5	Improbable	Good	Remove	Development	Yes	Minimal light pruning; relatively healthy crown.
69	Black Walnut	*Juglans nigra*	Native	19.5	2	3.5	Improbable	Good	Remove	Development	Yes	Old pruning cuts low in crown.
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.
71	Eastern White Cedar	*Thuja occidentalis*	Native	24.3	2	2.3	Improbable	Good	Remove	Development	Yes	Relatively full, healthy crown; wound and prune cuts compartmentalizing.
72	Eastern White Cedar	*Thuja occidentalis*	Native	28.1	1	3.0	Improbable	Fair	Remove	Development	Yes	Main stem topped and bark stripped.
73	Eastern White Cedar	*Thuja occidentalis*	Native	15.0	2	2.0	Possible	Fair	Remove	Development	Yes	Reduced crown due to competition; wounds compartmentalized.
74	Eastern White Cedar	*Thuja occidentalis*	Native	20.5	1	2.0	Possible	Good	Remove	Development	Yes	Reduced crown due to competition, otherwise healthy.
75	Eastern White Cedar	*Thuja occidentalis*	Native	23.7	2	2.0	Improbable	Good	Remove	Development	Yes	Somewhat narrow crown, phototrophic growth.
76	Eastern White Cedar	*Thuja occidentalis*	Native	34.2	1	2.5	Improbable	Good	Remove	Development	Yes	Relatively healthy, full crown.
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.
78	Eastern White Cedar	*Thuja occidentalis*	Native	17.5	2	2.3	Possible	Fair	Remove	Development	Yes	Some crown dieback, stem still relatively solid.
79	Eastern White Cedar	*Thuja occidentalis*	Native	11.6	1		Probable	Dead	Remove	Development	No	Basal rot; slight lean; dead crown, no leaves.
80	Eastern White Cedar	*Thuja occidentalis*	Native	22.8	2	2.0	Improbable	Good	Remove	Development	Yes	Some bark missing from root.
81	Eastern White Cedar	*Thuja occidentalis*	Native	30.2	1	0.5	Probable	Dead	Remove	Development	No	Missing bark; insect feeding; hedgerow tree.
82	Eastern White Cedar	*Thuja occidentalis*	Native	21.4	2	2.0	Possible	Poor	Remove	Development	No	Dieback on main stem; stem still relatively solid.
83	Eastern White Cedar	*Thuja occidentalis*	Native	25.1	1	2.0	Possible	Good	Remove	Development	Yes	Codominant stems with included bark in long vertical crack.
84	Eastern White Cedar	*Thuja occidentalis*	Native	18.5	1	1.3	Possible	Poor	Remove	Development	No	Minimal crown due to competition; dieback.
85	Eastern White Cedar	*Thuja occidentalis*	Native	32.8	1	2.5	Possible	Good	Remove	Development	Yes	Codominant stems with included bark; tight branch angles.
86	Eastern White Cedar	*Thuja occidentalis*	Native	21.3	1	2.0	Possible	Poor	Remove	Development	No	Reduced crown due to competition; wound on upper stem; crown dieback.
87	Eastern White Cedar	*Thuja occidentalis*	Native	18.9	1	2.0	Improbable	Good	Remove	Development	Yes	Tight branch angles with included bark.
88	Eastern White Cedar	*Thuja occidentalis*	Native	20.7	1	2.0	Improbable	Fair	Remove	Development	Yes	Codominant leaders; exfoliating bark.
89	Eastern White Cedar	*Thuja occidentalis*	Native	28.8	1	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	*Thuja occidentalis*	Native	14.7	2	2.5	Possible	Fair	Remove	Development	Yes	Unbalanced crowns, leaning away from one another; minor crown thinning.
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 dieback.
92	Eastern White Cedar	*Thuja occidentalis*	Native	16.0	1	2.5	Improbable	Fair	Remove	Development	Yes	Lower crown thinning; strong taper.
93	Eastern White Cedar	*Thuja occidentalis*	Native	17.4	2	2.5	Improbable	Fair	Remove	Development	Yes	Included bark; secondary stem has laterals as leaders.
94	Eastern White Cedar	*Thuja occidentalis*	Native	23.5	2	2.5	Improbable	Good	Remove	Development	Yes	Minimal dieback; narrow crown due to competition.
95	Eastern White Cedar	*Thuja occidentalis*	Native	24.5	1	2.5	Possible	Good	Remove	Development	Yes	Codominant leaders with included bark.
96	Eastern White Cedar	*Thuja occidentalis*	Native	21.2	1	0.8	Possible	Fair	Remove	Development	Yes	Narrow crown due to competition; some crown dieback.
97	Eastern White Cedar	*Thuja occidentalis*	Native	14.2	2	2.5	Improbable	Good	Remove	Development	Yes	Tight branch angle.
98	Eastern White Cedar	*Thuja occidentalis*	Native	23.0	6	3.5	Improbable	Good	Remove	Development	Yes	Relatively healthy crown; solid stems.
99	Eastern White Cedar	*Thuja occidentalis*	Native	20.5	2	2.5	Improbable	Good	Remove	Development	Yes	Each stem with 1 dead branch; exfoliating bark.
100	Eastern White Cedar	*Thuja occidentalis*	Native	19.3	2	2.0	Possible	Fair	Remove	Development	Yes	Some crown dieback due to competition; minimal included bark.
101	Eastern White Cedar	*Thuja occidentalis*	Native	20.9	6	3.0	Improbable	Good	Remove	Development	Yes	
102	Eastern White Cedar	*Thuja occidentalis*	Native	28.0	1	1.5	Possible	Poor	Remove	Development	No	Squirrel damage; upper stems intertwining; bark cracks; narrow crown due to competition; dieback.
103	Eastern White Cedar	*Thuja occidentalis*	Native	22.5	2	2.5	Improbable	Fair	Remove	Development	Yes	Poor branch structure.
104	Eastern White Cedar	*Thuja occidentalis*	Native	18.2	1	2.5	Improbable	Good	Remove	Development	Yes	Unbalanced crown, stout laterals; codominant leaders.
105	Eastern White Cedar	*Thuja occidentalis*	Native	38.0	1	2.5	Improbable	Good	Remove	Development	Yes	Relatively healthy, full crown.
106	Eastern White Cedar	*Thuja occidentalis*	Native	18.3	3	2.5	Possible	Fair	Remove	Development	Yes	Some included bark; bark damage from squirrel; narrow crown due to competition.
107	Eastern White Cedar	*Thuja occidentalis*	Native	21.6	1	2.5	Improbable	Good	Remove	Development	Yes	Codominant leaders with included bark in very tight branch angle.
108	Eastern White Cedar	*Thuja occidentalis*	Native	33.1	1	3.0	Possible	Fair	Remove	Development	Yes	Some crown dieback; minor bark cracks.
109	Eastern White Cedar	*Thuja occidentalis*	Native	30.3	1	3.0	Improbable	Good	Remove	Development	Yes	Tight branch angles.
110	Eastern White Cedar	*Thuja occidentalis*	Native	28.1	1	4.0	Improbable	Fair	Remove	Development	Yes	One-sided crown with majority leaning away from driveway; some crown dieback.
111	Eastern White Cedar	*Thuja occidentalis*	Native	30.0	3	3.0	Possible	Fair	Remove	Development	Yes	1 stem with long crack; tight branch angles with included bark.
112	Eastern White Cedar	*Thuja occidentalis*	Native	19.4	1	2.3	Probable	Poor	Remove	Development	No	Crack up main stem with hollow; crown dieback; insect holes on main stem.
113	Eastern White Cedar	*Thuja occidentalis*	Native	10.3	1	1.5	Improbable	Fair	Remove	Development	Yes	Thin crown.
114	Eastern White Cedar	*Thuja occidentalis*	Native	24.1	2	3.0	Improbable	Fair	Remove	Development	Yes	Broken branch on 1 stem.
115	Eastern White Cedar	*Thuja occidentalis*	Native	12.5	1	2.3	Possible	Fair	Remove	Development	Yes	Slight lean toward driveway; narrow crown due to competition.
116	Eastern White Cedar	*Thuja occidentalis*	Native	15.5	1	1.8	Possible	Fair	Remove	Development	Yes	Lean toward driveway; one-sided crown with dieback.
117	Eastern White Cedar	*Thuja occidentalis*	Native	28.0	2	3.0	Improbable	Good	Remove	Development	Yes	Tight branch angle.
118	Eastern White Cedar	*Thuja occidentalis*	Native	15.9	1	1.5	Possible	Poor	Remove	Development	No	One-sided crown with dieback; some evidence of rot on main stem.
119	Eastern White Cedar	*Thuja occidentalis*	Native	16.1	1	2.0	Possible	Fair	Remove	Development	Yes	Stems twist around each other, poor structure.
120	Eastern White Cedar	*Thuja occidentalis*	Native	23.9	2	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	*Thuja occidentalis*	Native	18.4	2	2.5	Improbable	Fair	Remove	Development	Yes	Unbalanced crown, phototrophic; smaller stem with much dieback.
122	Eastern White Cedar	*Thuja occidentalis*	Native	11.4	2	2.0	Improbable	Fair	Remove	Development	Yes	Slight lean; improper pruning cuts; unbalanced crown.
123	Eastern White Cedar	*Thuja occidentalis*	Native	12.8	1	1.5	Possible	Poor	Remove	Development	No	One-sided crown with dieback.
124	Eastern White Cedar	*Thuja occidentalis*	Native	14.3	1	3.0	Possible	Fair	Remove	Development	Yes	Heavy bend likely from ice/snow load; codominant leaders; exfoliating bark.
125	Eastern White Cedar	*Thuja occidentalis*	Native	18.4	3	2.3	Possible	Poor	Remove	Development	No	1 stem with crown snapped off; split between larger stems.
126	Eastern White Cedar	*Thuja occidentalis*	Native	11.2	2	1.5	Improbable	Fair	Remove	Development	Yes	Unbalanced crown, phototrophic growth.
127	Eastern White Cedar	*Thuja occidentalis*	Native	16.3	1	2.0	Possible	Fair	Remove	Development	Yes	One-sided crown with lean toward driveway.
128	Eastern White Cedar	*Thuja occidentalis*	Native	19.2	1	2.0	Improbable	Good	Remove	Development	Yes	Codominant leaders.
129	Eastern White Cedar	*Thuja occidentalis*	Native	18.2	3	1.3	Possible	Fair	Remove	Development	Yes	Narrow crown due to competition; some crown dieback.
130	Eastern White Cedar	*Thuja occidentalis*	Native	16.0	1	2.0	Possible	Fair	Remove	Development	Yes	Crown thinning; 1 leader dead.
131	Eastern White Cedar	*Thuja occidentalis*	Native	13.7	1	2.0	Possible	Poor	Remove	Development	No	Reduced crown; dieback; one-sided crown.
132	Eastern White Cedar	*Thuja occidentalis*	Native	12.2	1	2.0	Improbable	Good	Remove	Development	Yes	Lower crown thinning.
133	Eastern White Cedar	*Thuja occidentalis*	Native	17.3	1	1.5	Possible	Fair	Remove	Development	Yes	Narrow crown due to competition; some crown dieback.
134	Eastern White Cedar	*Thuja occidentalis*	Native	13.3	2	2.0	Possible	Fair	Remove	Development	Yes	Codominant stems with included bark; unbalanced crown, phototrophic growth.
135	Eastern White Cedar	*Thuja occidentalis*	Native	16.5	1	0.8	Improbable	Fair	Remove	Development	Yes	Narrow crown due to competition; some crown dieback; main stem still relatively solid.
136	Eastern White Cedar	*Thuja occidentalis*	Native	17.6	2	2.5	Improbable	Good	Remove	Development	Yes	Good condition but for codominant leaders.
137	Eastern White Cedar	*Thuja occidentalis*	Native	10.1	1	2.3	Possible	Poor	Remove	Development	No	One-sided crown with dieback.
138	Eastern White Cedar	*Thuja occidentalis*	Native	18.4	2	2.0	Possible	Fair	Remove	Development	Yes	Exfoliating bark; codominant leaders; secondary stem dead.
139	Eastern White Cedar	*Thuja occidentalis*	Native	18.5	4	2.0	Possible	Fair	Remove	Development	Yes	One-sided crown due to competition; stems relatively solid; some crown dieback.
140	Eastern White Cedar	*Thuja occidentalis*	Native	16.8	1	2.0	Improbable	Fair	Remove	Development	Yes	Exfoliating bark; lower crown thinning.
141	Eastern White Cedar	*Thuja occidentalis*	Native	24.0	4	3.0	Improbable	Fair	Remove	Development	Yes	Narrow crown due to competition; some crown dieback.
142	Eastern White Cedar	*Thuja occidentalis*	Native	21.4	4	2.0	Possible	Fair	Remove	Development	Yes	Some included bark; minimal dieback.
143	Eastern White Cedar	*Thuja occidentalis*	Native	18.0	1	2.0	Possible	Fair	Remove	Development	Yes	Codominant leaders with included bark.
144	Eastern White Pine	*Pinus strobus*	Native	29.0	1	2.0	Possible	Fair	Remove	Development	Yes	Narrow crown due to competition with some dieback; stem relatively solid.
145	Eastern White Cedar	*Thuja occidentalis*	Native	20.3	1	2.0	Improbable	Fair	Remove	Development	Yes	Improper pruning cuts.
146	Eastern White Cedar	*Thuja occidentalis*	Native	17.8	1	1.5	Possible	Poor	Remove	Development	No	Crown dieback; split up main stem.
147	Eastern White Cedar	*Thuja occidentalis*	Native	13.7	2	2.0	Improbable	Good	Remove	Development	Yes	Slightly narrow crown due to competition, otherwise relatively healthy; solid stem.
148	Eastern White Cedar	*Thuja occidentalis*	Native	13.8	2	1.5	Possible	Fair	Remove	Development	Yes	Wound from old failed branch.
149	Eastern White Cedar	*Thuja occidentalis*	Native	14.5	1	1.0	Improbable	Good	Remove	Development	Yes	Slightly one-sided crown due to competition, otherwise relatively healthy.
150	Golden Weeping Willow	*Salix alba var. vitellina*	Non-Native	118.0	1	5.3	Probable	Very Poor	Remove	Development	No	Large cavity with rot in main stem; dieback in large scaffold branches. Candidate bat maternity roost tree.
151	Common Apple	*Malus domestica*	Non-Native	61.6	4	4.0	Possible	Fair	Remove	Development	No	Open crown, crown thinning; 2 dead branches; minor leaf necrosis; water sprouts; tree declining.
152	Freeman's Maple	*Acer X freemanii*	Native	26.1	2	4.0	Possible	Fair	Remove	Development	Yes	Some included bark in upper scaffold; epicormic growth; full, vigourous crown.
153	Common Apple	*Malus domestica*	Non-Native	38.4	2	4.0	Possible	Poor	Remove	Development	No	Spreading crown; lower crown dead; centre rot in both stems; shedding some bark. Candidate bat maternity roost tree.
154	Plum species	*Prunus sp.*	Non-Native	16.0	1	2.0	Possible	Poor	Remove	Development	No	Sparse crown with dieback.
155	Black Walnut	*Juglans nigra*	Native	17.9	1	3.0	Improbable	Good	Remove	Development	Yes	Codominant leaders; crown extends to ground.
156	Green Ash	*Fraxinus pennsylvanica*	Native	29.9	1	3.0	Probable	Fair	Remove	Development	Yes	Some crown dieback; minimal woodpecker damage in upper stem.
157	Trembling Aspen	*Populus tremuloides*	Native	13.3	1	2.0	Improbable	Fair	Retain		No	Some foliar chlorosis; crooked stem.
158	Trembling Aspen	*Populus tremuloides*	Native	17.9	1	2.3	Improbable	Fair	Retain		No	Slightly unbalanced crown due to competition; minimal dieback.
159	White Birch	*Betula papyrifera*	Native	24.5	1	2.5	Possible	Dead	Retain		No	No leaves, catkins retained; died within last year.
160	White Birch	*Betula papyrifera*	Native	24.1	1	3.0	Possible	Dead	Retain		No	Some borer holes up main stem; looks like it died recently.
161	Balsam Poplar	*Populus balsamifera*	Native	10.8	1	1.5	Improbable	Good	Retain		No	2 dead lower branches.
162	Balsam Poplar	*Populus balsamifera*	Native	10.9	1	1.3	Possible	Fair	Retain		No	Wound on main stem with some staining; narrow crown with minimal dieback.
163	Balsam Poplar	*Populus balsamifera*	Native	12.7	1	1.3	Improbable	Good	Retain		No	Small amount of included bark in upper branch union; full crown.
164	Trembling Aspen	*Populus tremuloides*	Native	13.3	1	2.0	Possible	Fair	Retain		No	Discolored, sunken canker on stem; some chlorosis.
165	White Spruce	*Picea glauca*	Native	10.5	1	1.0	Improbable	Excellent	Retain		No	Full, vigourous tree; some competition with dogwood.
166	Trembling Aspen	*Populus tremuloides*	Native	12.8	1	1.5	Improbable	Fair	Retain		No	Codominant leaders with included bark; healthy crown.
167	Trembling Aspen	*Populus tremuloides*	Native	11.7	1	2.0	Improbable	Fair	Retain		No	Thin crown; strong leader.
168	Balsam Poplar	*Populus balsamifera*	Native	11.5	1	2.0	Improbable	Fair	Retain		No	Unbalanced crown; 3 dead branches; minor leaf chlorosis.
169	Trembling Aspen	*Populus tremuloides*	Native	12.7	1	2.0	Improbable	Fair	Retain		No	Dead lower branches; healthy form and canopy.
170	Trembling Aspen	*Populus tremuloides*	Native	13.8	2	3.0	Improbable	Fair	Retain		No	Thin crown.
171	Trembling Aspen	*Populus tremuloides*	Native	15.2	2	1.5	Improbable	Fair	Retain		No	Included bark; dead lower branches; minor dieback.
172	Trembling Aspen	*Populus tremuloides*	Native	10.9	1	1.5	Improbable	Fair	Retain		No	Dead branches; dieback; debris around base.
173	Trembling Aspen	*Populus tremuloides*	Native	15.3	1	2.5	Improbable	Good	Retain		No	Good health.
174	Green Ash	*Fraxinus pennsylvanica*	Native	13.4	1	1.5	Improbable	Fair	Retain		No	D-shaped exit holes; minor dieback; minor epicormic growth.
175	Balsam Poplar	*Populus balsamifera*	Native	13.7	1	1.5	Improbable	Fair	Retain		No	Dieback; dead branches; minor damage at base.
176	Balsam Poplar	*Populus balsamifera*	Native	13.4	1	2.0	Possible	Fair	Retain		No	Stem wound, bark discoloration; minor leaf chlorosis; 1 dead branch.
177	Balsam Poplar	*Populus balsamifera*	Native	12.2	1	2.0	Improbable	Poor	Retain		No	30% dieback; asymetrical crown to southeast.
178	Balsam Poplar	*Populus balsamifera*	Native	10.3	1	1.5	Possible	Fair	Retain		No	Leaning; minor dieback.
179	Balsam Poplar	*Populus balsamifera*	Native	13.6	1	1.5	Improbable	Fair	Retain		No	15% dieback; minor pistol butt.
180	Balsam Poplar	*Populus balsamifera*	Native	10.1	1	1.5	Improbable	Fair	Retain		No	Minor pistol butt; minor lean south.
181	Trembling Aspen	*Populus tremuloides*	Native	11.0	1	1.5	Improbable	Fair	Retain		No	Open seam near base, good reaction wood; healthy crown.
182	Trembling Aspen	*Populus tremuloides*	Native	12.6	1	2.0	Improbable	Fair	Retain		No	Exposed roots, 1 girdling; bark rubbing; codominant leaders.
183	Trembling Aspen	*Populus tremuloides*	Native	13.8	1	1.5	Improbable	Fair	Retain		No	20% dieback; minor dead branches.
184	Trembling Aspen	*Populus tremuloides*	Native	12.2	1	2.0	Possible	Poor	Retain		No	Stem canker; sapwood rot; sunken lesion.
185	Trembling Aspen	*Populus tremuloides*	Native	14.7	1	2.5	Improbable	Fair	Retain		No	Minor dieback; thin canopy.
186	Trembling Aspen	*Populus tremuloides*	Native	13.2	1	2.5	Improbable	Fair	Retain		No	Small cankers; slight lean south; minor dieback.
187	Trembling Aspen	*Populus tremuloides*	Native	18.2	1	3.0	Improbable	Fair	Retain		No	Bark lesion in crown; dead lower branches.
188	Trembling Aspen	*Populus tremuloides*	Native	12.9	1	1.5	Improbable	Fair	Retain		No	Minor dieback.
189	Trembling Aspen	*Populus tremuloides*	Native	10.9	1	2.0	Improbable	Good	Retain		No	Leaning, phototrophic growth.
190	Trembling Aspen	*Populus tremuloides*	Native	18.2	1	1.5	Improbable	Good	Retain		No	Minor dieback of lower branches.
191	Green Ash	*Fraxinus pennsylvanica*	Native	12.3	1	1.5	Improbable	Fair	Retain		No	Vines in canopy; minor dieback.
192	White Elm	*Ulmus americana*	Native	11.1	1	2.0	Improbable	Good	Retain		No	Very minor insect defoliation.
193	Balsam Poplar	*Populus balsamifera*	Native	20.9	1	2.0	Possible	Poor	Retain		No	Open cankers; sapwood rot; 30% dieback.
194	Eastern Cottonwood	*Populus deltoides*	Native	29.8	1	3.5	Possible	Poor	Retain		No	40% dieback; crooked stem.
195	Green Ash	*Fraxinus pennsylvanica*	Native	17.7	1	1.5	Improbable	Good	Retain		No	Healthy crown; minor exfoliating bark.
196	Green Ash	*Fraxinus pennsylvanica*	Native	13.0	1	2.5	Improbable	Good	Retain		No	Excurrent growth with strong leader; minor crown thinning.
197	Trembling Aspen	*Populus tremuloides*	Native	29.6	1	2.0	Possible	Poor	Retain		No	Sapwood rot; open canker; poor reaction wood; dieback.
198	Trembling Aspen	*Populus tremuloides*	Native	11.3	1	2.0	Possible	Fair	Retain		No	Leaning south.
199	Trembling Aspen	*Populus tremuloides*	Native	25.6	1	2.5	Improbable	Fair	Retain		No	Open wounds, poor reaction wood; dieback.
200	Balsam Poplar	*Populus balsamifera*	Native	24.1	1	2.5	Possible	Fair	Retain		No	Vines along stem; minor dieback; asymetrical crown to south.
201	Green Ash	*Fraxinus pennsylvanica*	Native	14.0	1	2.5	Improbable	Good	Retain		No	No exit holes observed.
202	Trembling Aspen	*Populus tremuloides*	Native	24.7	1	2.0	Improbable	Fair	Retain		No	Dead lower branches; healthy canopy.
203	White Ash	*Fraxinus americana*	Native	10.6	1	1.5	Possible	Poor	Retain		No	30% dieback; epicormic growth; vines in crown.
204	Manitoba Maple	*Acer negundo*	Native	29.5	1	4.0	Possible	Fair	Retain		No	Leaning; chlorosis; minor thinning,; vine in crown.
205	White Ash	*Fraxinus americana*	Native	22.8	1		Probable	Dead	Retain		No	Recently dead.
206	Silver Maple	*Acer saccharinum*	Native	11.9	1	2.5	Improbable	Fair	Retain		No	Heavy lean, weighed by other branches; minor leaf necrosis and some pustules.
207	Green Ash	*Fraxinus pennsylvanica*	Native	11.4	1	1.0	Improbable	Fair	Retain		No	Dieback; dead lower branches.
208	Green Ash	*Fraxinus pennsylvanica*	Native	13.3	1	1.5	Improbable	Fair	Retain		No	Minor dieback; dead lower branches.
209	White Ash	*Fraxinus americana*	Native	25.0	1	3.5	Improbable	Fair	Retain		No	Epicormic growth; no EAB exit holes observed.
210	White Ash	*Fraxinus americana*	Native	10.8	1	2.0	Improbable	Fair	Retain		No	Minor dieback.
211	White Ash	*Fraxinus americana*	Native	57.8	1	6.0	Possible	Poor	Remove / Retain Stump	Road grading/safety	No	Vines in crown; 30% dieback; no EAB exit holes observed.
212	Manitoba Maple	*Acer negundo*	Native	55.1	2	7.0	Possible	Poor	Remove	Road grading	No	Codominant leaders with included bark; dieback and dead branches; poor structure; epicormic growth.
213	Golden Weeping Willow	*Salix alba var. vitellina*	Non-Native	80.7	1	5.5	Improbable	Good	Remove	Road grading	Yes	2 instances of past branch failure.
214	Norway Maple	*Acer platanoides*	Non-Native	25.6	1	2.5	Possible	Poor	Remove	Development	No	Large vertical open wound; exit holes; dead branches; poor reaction wood.
215	Colorado Spruce	*Picea pungens*	Non-Native	28.3	1	2.5	Improbable	Excellent	Remove	Development	Yes	No apparent problems.
216	Trembling Aspen	*Populus tremuloides*	Native	30.5	2	4.5	Possible	Fair	Remove	Development	Yes	Codominant stems with included bark; minor crown thinning.
217	Eastern Cottonwood	*Populus deltoides*	Native	47.4	4	6.0	Improbable	Fair	Remove	Development	Yes	Small witch's broom; minor dieback; codominant leaders with included bark.
218	Chanticleer Pear	*Pyrus calleryana 'Chanticleer'*	Non-Native	17.2	1	2.5	Improbable	Fair	Remove	Development	Yes	Minor dieback; minor wounds with good reaction wood; minor included bark.
219	Common Apple	*Malus domestica*	Non-Native	13.8	1	4.5	Improbable	Poor	Remove	Development	No	80% dieback; epicormic growth; large dying branches.
220	Eastern Red Cedar	*Juniperus virginiana*	Native	11.2	1	2.0	Improbable	Good	Remove	Development	Yes	Heavy fruit set.
221	Eastern Red Cedar	*Juniperus virginiana*	Native	10.7	1	2.0	Improbable	Good	Remove	Development	Yes	Heavy fruit set; 1 subordinate branch with tight angle.
222	Alaska Yellow Cedar	*Cupressus nootkatensis*	Non-Native	11.4	1	1.5	Improbable	Excellent	Remove	Development	Yes	No apparent problems.
223	Norway Maple	*Acer platanoides*	Non-Native	57.2	2	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	*Cupressus nootkatensis*	Non-Native	13.6	1	2.0	Improbable	Good	Remove	Development	Yes	Suppressed by nearby Norway Maple.
225	Flowering Crab Apple	*Malus baccata*	Non-Native	14.9	1	1.5	Improbable	Fair	Remove	Development	Yes	Pruned to spreading, umbrella-shaped crown; healed stem wound.
226	Common Apple	*Malus domestica*	Non-Native	29.3	1	3.0	Possible	Poor	Remove	Development	No	Major bark wound, sapwood and heartwood rot; water sprouts; thin crown.
227	Crimson King Norway Maple	*Acer platanoides 'Crimson King*	Non-Native	29.4	3	4.0	Possible	Fair	Remove	Development	Yes	Codominant leaders; rotting at base; vertical crack with good reaction wood; open wound.
228	Common Apple	*Malus domestica*	Non-Native	24.0	1	3.0	Improbable	Fair	Remove	Development	No	Dense interior crown.
229	Common Apple	*Malus domestica*	Non-Native	15.1	1	2.5	Improbable	Fair	Remove	Development	No	Stem wound nearly compartmentalized.
230	Common Apple	*Malus domestica*	Non-Native	25.9	1	2.0	Improbable	Fair	Remove	Development	No	Epicormic growth; dieback.
231	Common Pear	*Pyrus communis*	Non-Native	13.3	3	1.5	Possible	Very Poor	Remove	Development	No	Crown mostly dead; epicormic growth along stem.
232	Common Apple	*Malus domestica*	Non-Native	27.3	1	3.0	Possible	Fair	Remove	Development	No	Epicormic growth; dieback; wounds with some reaction wood.
233	Common Apple	*Malus domestica*	Non-Native	29.9	1	3.5	Possible	Poor	Remove	Development	No	Open wound; epicormic growth; dieback.
234	White Spruce	*Picea glauca*	Native	24.7	1	3.5	Improbable	Fair	Remove	Development	Yes	Asymmetrical crown to south; minor dieback.
235	White Spruce	*Picea glauca*	Native	15.2	1	2.0	Improbable	Fair	Remove	Development	Yes	Suppressed; minor dieback; minor vines along stem.
236	Silver Maple	*Acer saccharinum*	Native	66.8	1	4.0	Possible	Poor	Remove	Development	No	Large split along stem, 2m tall; broken top; healthy remaining crown.
237	White Spruce	*Picea glauca*	Native	14.2	1		Probable	Dead	Remove	Development	No	Hazardous snag.
238	White Spruce	*Picea glauca*	Native	18.2	1	2.0	Possible	Poor	Remove	Development	No	Strong taper; crown thinning; dead leader.
239	White Spruce	*Picea glauca*	Native	13.2	1	2.0	Improbable	Fair	Remove	Development	Yes	Leaning stem; bark crack; thin, narrow crown.
240	White Spruce	*Picea glauca*	Native	27.8	1	3.0	Improbable	Fair	Remove	Development	Yes	Minor thinning; cone production.
241	White Spruce	*Picea glauca*	Native	20.5	1	3.0	Improbable	Fair	Remove	Development	Yes	Strong taper; minor dieback; bark stem wound.
242	White Spruce	*Picea glauca*	Native	23.2	1	2.5	Improbable	Fair	Remove	Development	Yes	Minor thinning; seed production.
243	Silver Maple	*Acer saccharinum*	Native	58.1	4	8.0	Possible	Good	Remove	Development	Yes	Codominant stems; 1 limb dying; minor dieback.
244	Silver Maple	*Acer saccharinum*	Native	56.6	1	6.5	Improbable	Fair	Remove	Development	Yes	Codominant stems with included bark; minor leaf necrosis; exposed roots with lawnmower injuries.
245	Silver Maple	*Acer saccharinum*	Native	37.1	2	5.0	Possible	Poor	Remove	Development	No	Unbalanced crown; 40% dieback; epicormic growth; sooty lesions; vine in crown.
246	Tamarack	*Larix laricina*	Native	36.4	1	4.0	Improbable	Good	Remove	Development	Yes	Minor broken branches.
247	Tamarack	*Larix laricina*	Native	22.4	1	3.0	Improbable	Fair	Remove	Development	Yes	Bark wounds; epicormic growth; bent top.
248	Tamarack	*Larix laricina*	Native	30.1	1	3.0	Possible	Fair	Remove	Development	Yes	Bent top/crooked stem; vertical crack closed.
249	Silver Maple	*Acer saccharinum*	Native	72.5	1	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	*Fraxinus americana*	Native	48.8	1	5.0	Probable	Very Poor	Remove	Development	No	Dead crown; sprouting from base; EAB exit holes; broken branches.

Tree Number	Common Name	Scientific Name	Native / Non-native	DBH (cm)	Stem Count	Crown Radius (m)	Potential for Structural Failure Rating	Overall Condition	Proposed Action	Rationale for Removal	Compensation Required	Comments
251	Red Pine	*Pinus resinosa*	Non-Native	15.3	1	1.5	Improbable	Fair	Remove	Development	Yes	Crooked stem; unbalanced crown; thin crown. Candidate bat maternity roost tree.
252	Red Pine	*Pinus resinosa*	Non-Native	20.8	1	2.5	Improbable	Good	Remove	Development	Yes	Lower branches dead.
253	Scots Pine	*Pinus sylvestris*	Non-Native	22.3	1	2.5	Improbable	Fair	Remove	Development	Yes	Compartmentalized stem wound; crooked stem.
254	Scots Pine	*Pinus sylvestris*	Non-Native	29.1	1	4.5	Improbable	Fair	Remove	Development	Yes	Unbalanced crown; 10% dieback.
255	Scots Pine	*Pinus sylvestris*	Non-Native	29.5	1	5.0	Possible	Fair	Remove	Development	Yes	Crooked stem; sapsucker holes.
256	White Spruce	*Picea glauca*	Native	20.4	1	2.5	Probable	Dead	Remove	Development	No	Shedding bark, showing insect galleries and stem crack; no leaves.
257	White Spruce	*Picea glauca*	Native	11.4	1	1.5	Improbable	Good	Remove	Development	Yes	
258	White Spruce	*Picea glauca*	Native	24.1	1	4.0	Improbable	Excellent	Remove	Development	Yes	
259	White Spruce	*Picea glauca*	Native	23.0	1	4.0	Improbable	Fair	Remove	Development	Yes	Healed bark cracks; gumosis.
260	White Spruce	*Picea glauca*	Native	16.8	1	2.0	Possible	Dead	Remove	Development	No	Shedding bark; insect galleries; no leaves.
261	White Spruce	*Picea glauca*	Native	24.4	1	4.0	Improbable	Good	Remove	Development	Yes	Unbalanced crown.
262	White Spruce	*Picea glauca*	Native	28.7	1	3.0	Improbable	Good	Remove	Development	Yes	Broken branches in lower crown.
263	White Spruce	*Picea glauca*	Native	26.2	1	3.0	Improbable	Good	Remove	Development	Yes	Good fruit set.
264	White Spruce	*Picea glauca*	Native	26.5	1	4.0	Improbable	Fair	Remove	Development	Yes	Narrow, thin crown; strong taper.
265	White Spruce	*Picea glauca*	Native	20.8	1	3.0	Improbable	Fair	Remove	Development	Yes	Narrow crown.
266	White Spruce	*Picea glauca*	Native	12.4	1	1.0	Possible	Dead	Remove	Development	No	No bark, no leaves.
267	White Spruce	*Picea glauca*	Native	23.8	2	3.5	Possible	Fair	Remove	Development	Yes	Codominant stems with included bark; 1 stem topped, other has codominant leaders.
268	White Spruce	*Picea glauca*	Native	22.7	2	3.5	Improbable	Fair	Remove	Development	Yes	Mildly crooked stem; 2nd stem dead.
269	White Spruce	*Picea glauca*	Native	22.3	1	3.5	Improbable	Good	Remove	Development	Yes	
270	White Spruce	*Picea glauca*	Native	21.3	1	2.5	Improbable	Good	Remove	Development	Yes	Thin crown.
271	White Spruce	*Picea glauca*	Native	15.0	1	2.0	Improbable	Good	Remove	Development	Yes	
272	Norway Spruce	*Picea abies*	Non-Native	41.0	1	4.0	Improbable	Good	Remove	Development	Yes	
273	White Spruce	*Picea glauca*	Native	24.2	1	3.0	Improbable	Good	Remove	Development	Yes	Lower branches dead.
274	White Spruce	*Picea glauca*	Native	25.7	1	3.0	Improbable	Good	Remove	Development	Yes	
275	White Spruce	*Picea glauca*	Native	36.2	1	4.0	Improbable	Good	Remove	Development	Yes	
276	White Spruce	*Picea glauca*	Native	30.6	1	3.5	Improbable	Good	Remove	Development	Yes	Dead lower branch.
277	White Spruce	*Picea glauca*	Native	26.8	1	3.0	Improbable	Good	Remove	Development	Yes	Dead lower branch.
278	White Spruce	*Picea glauca*	Native	28.4	1	3.5	Improbable	Good	Remove	Development	Yes	
279	Norway Spruce	*Picea abies*	Non-Native	42.5	1	5.0	Improbable	Excellent	Remove	Development	Yes	
280	Norway Spruce	*Picea abies*	Non-Native	32.7	1	4.0	Improbable	Excellent	Remove	Development	Yes	
281	Norway Spruce	*Picea abies*	Non-Native	29.7	1	4.5	Possible	Fair	Remove	Development	Yes	Sap running; topped, lateral has become leader.
282	White Spruce	*Picea glauca*	Native	32.3	1	3.5	Improbable	Good	Remove	Development	Yes	
283	Common Apple	*Malus domestica*	Non-Native	21.5	1	3.0	Possible	Poor	Remove	Development	No	Open crown; history of branch failure; foliar necrosis; basal bark wounds.
284	Common Apple	*Malus domestica*	Non-Native	16.0	1	2.5	Probable	Poor	Remove	Development	No	Heavy lean; missing much bark; fruiting bodies.
285	Common Pear	*Pyrus communis*	Non-Native	25.5	1	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	*Pyrus communis*	Non-Native	27.4	3	2.5	Possible	Poor	Remove	Development	No	1 stem broken; heartwood rot; frass at base; 10% dieback; history of branch failure; bearing fruit. Candidate bat maternity roost tree.
287	Eastern White Cedar	*Thuja occidentalis*	Native	27.1	2	2.0	Improbable	Fair	Remove	Development	Yes	Closely planted; codominant leaders.
288	Eastern White Cedar	*Thuja occidentalis*	Native	13.0	2	2.0	Improbable	Fair	Remove	Development	Yes	Closely planted; codominant leaders.
289	Eastern White Cedar	*Thuja occidentalis*	Native	17.6	2	2.0	Improbable	Fair	Remove	Development	Yes	Closely planted; codominant leaders.
290	Eastern White Cedar	*Thuja occidentalis*	Native	22.9	2	2.0	Improbable	Fair	Remove	Development	Yes	Closely planted; codominant leaders.
291	Eastern White Cedar	*Thuja occidentalis*	Native	17.3	2	2.0	Improbable	Fair	Remove	Development	Yes	Closely planted; codominant leaders.
292	Eastern White Cedar	*Thuja occidentalis*	Native	14.5	1	2.0	Improbable	Fair	Remove	Development	Yes	Closely planted.
293	Eastern White Cedar	*Thuja occidentalis*	Native	13.4	3	2.0	Improbable	Fair	Remove	Development	Yes	Closely planted.
294	Eastern White Cedar	*Thuja occidentalis*	Native	15.2	3	2.0	Improbable	Fair	Remove	Development	Yes	Closely planted; codominant leaders.
295	Eastern White Cedar	*Thuja occidentalis*	Native	17.2	2	2.0	Improbable	Fair	Remove	Development	Yes	Closely planted; codominant leaders.
296	Eastern White Cedar	*Thuja occidentalis*	Native	17.3	2	1.0	Improbable	Fair	Remove	Development	Yes	Closely planted.
297	Eastern White Cedar	*Thuja occidentalis*	Native	14.7	1	2.0	Improbable	Fair	Remove	Development	Yes	Closely planted.
298	Eastern White Cedar	*Thuja occidentalis*	Native	15.8	1	2.0	Improbable	Fair	Remove	Development	Yes	Closely planted.
299	Eastern White Cedar	*Thuja occidentalis*	Native	15.6	2	2.0	Improbable	Fair	Remove	Development	Yes	Closely planted; codominant leaders.
300	Eastern White Cedar	*Thuja occidentalis*	Native	16.1	2	2.0	Improbable	Fair	Remove	Development	Yes	Closely planted; codominant leaders.
624	Eastern White Cedar	*Thuja occidentalis*	Native	12.7	1	1.5	Improbable	Fair	Remove	Development	Yes	Closely planted; next to shed.
625	Eastern White Cedar	*Thuja occidentalis*	Native	11.8	1	1.5	Improbable	Fair	Remove	Development	Yes	Closely planted; near shed.
626	Eastern White Cedar	*Thuja occidentalis*	Native	15.9	1	1.5	Improbable	Fair	Remove	Development	Yes	Closely planted; near shed.
627	Eastern White Cedar	*Thuja occidentalis*	Native	13.7	3	1.5	Improbable	Fair	Remove	Development	Yes	Closely planted; near shed; codominant leaders.
628	Freeman's Maple	*Acer X freemanii*	Native	44.3	4	7.0	Possible	Good	Remove	Development	Yes	4 large, codominant stems with included bark.
A	Eastern White Cedar	*Thuja occidentalis*	Native	25.0	5	3.5	Improbable	Good	Remove	Development	Yes	Included bark; near fence and hydro wire; located off property.
B	Eastern White Cedar	*Thuja occidentalis*	Native	10-25	79	2-2.5	Improbable	Dead-Good	Remove	Development	Yes	Hedgerow of Eastern White Cedars planted closely to one another along the fence. 4 trees were noted as Dead and 1 in Poor health.

Map 1

Arkell Road Properties

Tree Inventory and Preservation Plan

Legend

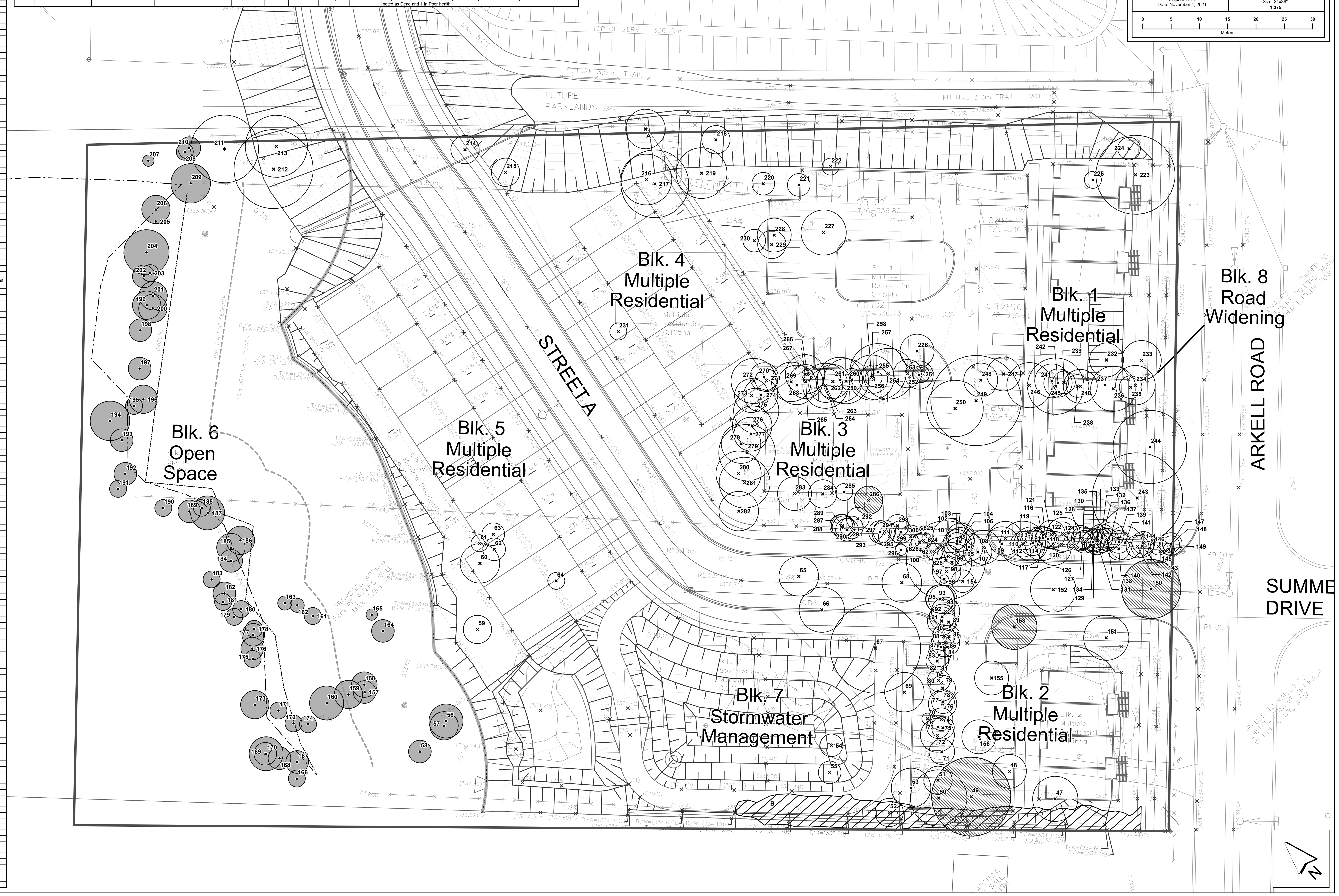
- Subject Property
- Inventoried Tree to be Retained (Crown to Scale)
- Inventoried Tree to be Removed / Retain Stump (Crown to Scale)
- Inventoried Tree to be Removed (Crown to Scale)
- Candidate Bat Maternity Roost Tree to be Removed (Crown to Scale)
- Cedar Hedgerow to be Removed
- Proposed Grading
- Proposed Development
- Proposed Contour
- Existing Conditions
- Wetland Boundary (NRSI Flagged, GRCA Approved July 22, 2016)
- Wetland Buffer (30m)
- Significant Woodland Dripline (NRSI Flagged, City Approved July 22, 2016)
- Dripline Buffer (10m)

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project: 1771
Date: November 4, 2021

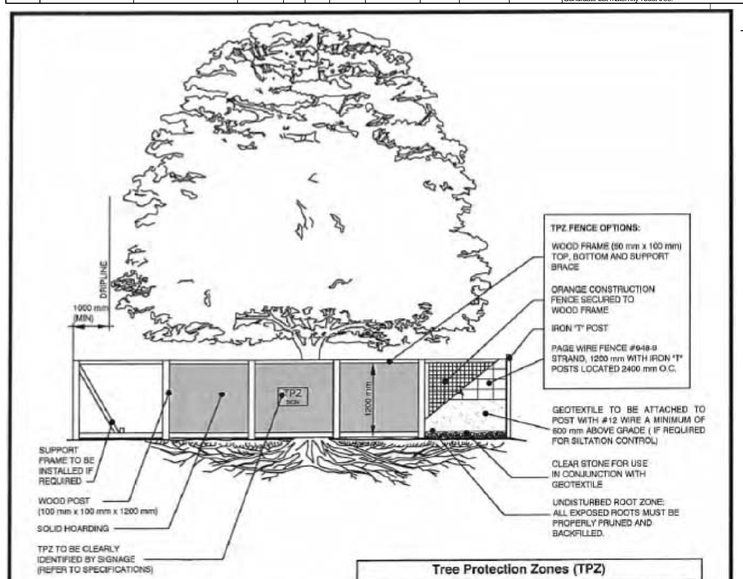
NAD83 - UTM Zone 17
Size: 24x36"
1:375

0 5 10 15 20 25 30
Meters



Path: X:\1771_ArkellRoadPropertiesEIS\NRSI_1771_Map1_TIPP_1K_24x36_2021_11_04_MV.mxd

Tree Number	Common Name	Scientific Name	Native / Non-native	DBH (cm)	Stem Count	Crown Radius (m)	Potential for Structural Failure Rating	Overall Condition	Proposed Action	Compensation Required	Comments
49	Freeman's Maple	*Acer X freemanii*	Native	45.6	3	7.0	Possible	Fair	Remove	Yes	Basal sprouting; history of branch failure; minor dieback; candidate wildlife/bat cavity. Candidate bat maternity roost tree.
56	White Birch	*Betula papyrifera*	Native	20.3	2	3.0	Possible	Fair	Retain	No	1 stem dead; other has dead leader; 10% dieback.
57	White Spruce	*Picea glauca*	Native	10.2	2	2.5	Improbable	Good	Retain	No	Codominant stems.
58	Scots Pine	*Pinus sylvestris*	Non-Native	15.7	1	2.0	Improbable	Good	Retain	No	Slightly crooked stem.
150	Golden Weeping Willow	*Salix alba var. vitellina*	Non-Native	118.0	1	5.3	Probable	Very Poor	Remove	No	Large cavity with rot in main stem; dieback in large scaffold branches. Candidate bat maternity roost tree.
153	Common Apple	*Malus domestica*	Non-Native	38.4	2	4.0	Possible	Poor	Remove	No	Spreading crown; lower crown dead; centre rot in both stems; shedding some bark. Candidate bat maternity roost tree.
157	Trembling Aspen	*Populus tremuloides*	Native	13.3	1	2.0	Improbable	Fair	Retain	No	Some foliar chlorosis; crooked stem.
158	Trembling Aspen	*Populus tremuloides*	Native	17.9	1	2.3	Improbable	Fair	Retain	No	Slightly unbalanced crown due to competition; minimal dieback.
159	White Birch	*Betula papyrifera*	Native	24.5	1	2.5	Possible	Dead	Retain	No	No leaves, catkins retained; died within last year.
160	White Birch	*Betula papyrifera*	Native	24.1	1	3.0	Possible	Dead	Retain	No	Some borer holes up main stem; looks like it died recently.
161	Balsam Poplar	*Populus balsamifera*	Native	10.8	1	1.5	Improbable	Good	Retain	No	2 dead lower branches.
162	Balsam Poplar	*Populus balsamifera*	Native	10.9	1	1.3	Possible	Fair	Retain	No	Wound on main stem with some staining; narrow crown with minimal dieback.
163	Balsam Poplar	*Populus balsamifera*	Native	12.7	1	1.3	Improbable	Good	Retain	No	Small amount of included bark in upper branch union; full crown.
164	Trembling Aspen	*Populus tremuloides*	Native	13.3	1	2.0	Possible	Fair	Retain	No	Discolored, sunken canker on stem; some chlorosis.
165	White Spruce	*Picea glauca*	Native	10.5	1	1.0	Improbable	Excellent	Retain	No	Full, vigourous tree; some competition with dogwood.
166	Trembling Aspen	*Populus tremuloides*	Native	12.8	1	1.5	Improbable	Fair	Retain	No	Codominant leaders with included bark; healthy crown.
167	Trembling Aspen	*Populus tremuloides*	Native	11.7	1	2.0	Improbable	Fair	Retain	No	Thin crown; strong leader.
168	Balsam Poplar	*Populus balsamifera*	Native	11.5	1	2.0	Improbable	Fair	Retain	No	Unbalanced crown; 3 dead branches; minor leaf chlorosis.
169	Trembling Aspen	*Populus tremuloides*	Native	12.7	1	2.0	Improbable	Fair	Retain	No	Dead lower branches; healthy form and canopy.
170	Trembling Aspen	*Populus tremuloides*	Native	13.8	2	3.0	Improbable	Fair	Retain	No	Thin crown.
171	Trembling Aspen	*Populus tremuloides*	Native	15.2	2	1.5	Improbable	Fair	Retain	No	Included bark; dead lower branches; minor dieback.
172	Trembling Aspen	*Populus tremuloides*	Native	10.9	1	1.5	Improbable	Fair	Retain	No	Dead branches; dieback; debris around base.
173	Trembling Aspen	*Populus tremuloides*	Native	15.3	1	2.5	Improbable	Good	Retain	No	Good health.
174	Green Ash	*Fraxinus pennsylvanica*	Native	13.4	1	1.5	Improbable	Fair	Retain	No	D-shaped exit holes; minor dieback; minor epicormic growth.
175	Balsam Poplar	*Populus balsamifera*	Native	13.7	1	1.5	Improbable	Fair	Retain	No	Dieback; dead branches; minor damage at base.
176	Balsam Poplar	*Populus balsamifera*	Native	13.4	1	2.0	Possible	Fair	Retain	No	Stem wound, bark discoloration; minor leaf chlorosis; 1 dead branch.
177	Balsam Poplar	*Populus balsamifera*	Native	12.2	1	2.0	Improbable	Poor	Retain	No	30% dieback; asymetrical crown to southeast.
178	Balsam Poplar	*Populus balsamifera*	Native	10.3	1	1.5	Possible	Fair	Retain	No	Leaning; minor dieback.
179	Balsam Poplar	*Populus balsamifera*	Native	13.6	1	1.5	Improbable	Fair	Retain	No	15% dieback; minor pistol butt.
180	Balsam Poplar	*Populus balsamifera*	Native	10.1	1	1.5	Improbable	Fair	Retain	No	Minor pistol butt; minor lean south.
181	Trembling Aspen	*Populus tremuloides*	Native	11.0	1	1.5	Improbable	Fair	Retain	No	Open seam near base, good reaction wood; healthy crown.
182	Trembling Aspen	*Populus tremuloides*	Native	12.6	1	2.0	Improbable	Fair	Retain	No	Exposed roots, 1 girdling; bark rubbing; codominant leaders.
183	Trembling Aspen	*Populus tremuloides*	Native	13.8	1	1.5	Improbable	Fair	Retain	No	20% dieback; minor dead branches.
184	Trembling Aspen	*Populus tremuloides*	Native	12.2	1	2.0	Possible	Poor	Retain	No	Stem canker; sapwood rot; sunken lesion.
185	Trembling Aspen	*Populus tremuloides*	Native	14.7	1	2.5	Improbable	Fair	Retain	No	Minor dieback; thin canopy.
186	Trembling Aspen	*Populus tremuloides*	Native	13.2	1	2.5	Improbable	Fair	Retain	No	Small cankers; slight lean south; minor dieback.
187	Trembling Aspen	*Populus tremuloides*	Native	18.2	1	3.0	Improbable	Fair	Retain	No	Bark lesion in crown; dead lower branches.
188	Trembling Aspen	*Populus tremuloides*	Native	12.9	1	1.5	Improbable	Fair	Retain	No	Minor dieback.
189	Trembling Aspen	*Populus tremuloides*	Native	10.9	1	2.0	Improbable	Good	Retain	No	Leaning, phototrophic growth.
190	Trembling Aspen	*Populus tremuloides*	Native	18.2	1	1.5	Improbable	Good	Retain	No	Minor dieback of lower branches.
191	Green Ash	*Fraxinus pennsylvanica*	Native	12.3	1	1.5	Improbable	Fair	Retain	No	Vines in canopy; minor dieback.
192	White Elm	*Ulmus americana*	Native	11.1	1	2.0	Improbable	Good	Retain	No	Very minor insect defoliation.
193	Balsam Poplar	*Populus balsamifera*	Native	20.9	1	2.0	Possible	Poor	Retain	No	Open cankers; sapwood rot; 30% dieback.
194	Eastern Cottonwood	*Populus deltoides*	Native	29.8	1	3.5	Possible	Poor	Retain	No	40% dieback; crooked stem.
195	Green Ash	*Fraxinus pennsylvanica*	Native	17.7	1	1.5	Improbable	Good	Retain	No	Healthy crown; minor exfoliating bark.
196	Green Ash	*Fraxinus pennsylvanica*	Native	13.0	1	2.5	Improbable	Good	Retain	No	Excurrent growth with strong leader; minor crown thinning.
197	Trembling Aspen	*Populus tremuloides*	Native	29.6	1	2.0	Possible	Poor	Retain	No	Sapwood rot; open canker; poor reaction wood; dieback.
198	Trembling Aspen	*Populus tremuloides*	Native	11.3	1	2.0	Possible	Fair	Retain	No	Leaning south.
199	Trembling Aspen	*Populus tremuloides*	Native	25.6	1	2.5	Improbable	Fair	Retain	No	Open wounds, poor reaction wood; dieback.
200	Balsam Poplar	*Populus balsamifera*	Native	24.1	1	2.5	Possible	Fair	Retain	No	Vines along stem; minor dieback; asymetrical crown to south.
201	Green Ash	*Fraxinus pennsylvanica*	Native	14.0	1	2.5	Improbable	Good	Retain	No	No exit holes observed.
202	Trembling Aspen	*Populus tremuloides*	Native	24.7	1	2.0	Improbable	Fair	Retain	No	Dead lower branches; healthy canopy.
203	White Ash	*Fraxinus americana*	Native	10.6	1	1.5	Possible	Poor	Retain	No	30% dieback; epicormic growth; vines in crown.
204	Manitoba Maple	*Acer negundo*	Native	29.5	1	4.0	Possible	Fair	Retain	No	Leaning; chlorosis; minor thinning,; vine in crown.
205	White Ash	*Fraxinus americana*	Native	22.8	1		Probable	Dead	Retain	No	Recently dead.
206	Silver Maple	*Acer saccharinum*	Native	11.9	1	2.5	Improbable	Fair	Retain	No	Heavy lean, weighed by other branches; minor leaf necrosis and some pustules.
207	Green Ash	*Fraxinus pennsylvanica*	Native	11.4	1	1.0	Improbable	Fair	Retain	No	Dieback; dead lower branches.
208	Green Ash	*Fraxinus pennsylvanica*	Native	13.3	1	1.5	Improbable	Fair	Retain	No	Minor dieback; dead lower branches.
209	White Ash	*Fraxinus americana*	Native	25.0	1	3.5	Improbable	Fair	Retain	No	Epicormic growth; no EAB exit holes observed.
210	White Ash	*Fraxinus americana*	Native	10.8	1	2.0	Improbable	Fair	Retain	No	Minor dieback.
211	White Ash	*Fraxinus americana*	Native	57.8	1	6.0	Possible	Poor	Remove / Retain Stump	No	Vines in crown; 30% dieback; no EAB exit holes observed.
251	Red Pine	*Pinus resinosa*	Non-Native	15.3	1	1.5	Improbable	Fair	Remove	Yes	Crooked stem; unbalanced crown; thin crown. Candidate bat maternity roost tree.
286	Common Pear	*Pyrus communis*	Non-Native	27.4	3	2.5	Possible	Poor	Remove	No	1 stem broken; heartwood rot; frass at base; 10% dieback; history of branch failure; bearing fruit. Candidate bat maternity roost tree.



TREE PROTECTION BARRIER NOTES:

1. ALL TREE PROTECTION TO BE IN ACCORDANCE WITH THE 'TREE TECHNICAL MANUAL'.
2. REFER TO SPECIFICATION FOR ADDITIONAL DETAILS AND REQUIREMENTS RELATED TO THIS DETAIL.
3. HOARDING TYPE SHOULD BE DETERMINED IN CONSULTATION WITH THE CITY.
4. ALL TREE PROTECTION HOARDING SHALL BE IN PLACE AND MUST BE INSPECTED AND APPROVED BY THE CITY PRIOR TO ANY CONSTRUCTION ACTIVITIES.
5. ALL ARBORICULTURE WORK SUCH AS PRUNING OF BRANCHES AND ROOTS SHALL BE CONDUCTED BY OR UNDER THE SUPERVISIONS OF AN ARBORIST.
6. CONSTRUCTION ACTIVITIES, GRADE CHANGES, AND STORAGE OF EQUIPMENT AND MATERIALS ARE NOT ALLOWED WITHIN THE TREE PROTECTION ZONE.

Tree Protection Zones (TPZ)

Diameter of Trunk Centimetres at 1.4 m above grade (DBH)	Minimum Tree Protection Zone (TPZ) Distance from trunk, measured in metres.[1]	Potential Rooting Area (PRA) for all trees and TPZ for trees in NHS,[2] parks, open spaces and other significant natural heritage areas.[1]
<10	1.2	2.4
10-20	1.8	3.6
30-40	2.4	4.8
41-50	3.0	6.0
51-60	3.6	7.2
61-70	4.2	8.4
71-80	4.8	9.6
81-90	5.4	10.8
91-100	6.0	12.0
>100	6 cm per 1 cm DBH	12 cm per 1 cm DBH

Note:
1- Or dripline plus 1 metre, whichever is greater.
2- Natural Heritage System

CITY OF GUELPH STANDARD DRAWING

TREE PROTECTION ZONE (TPZ) FENCE DETAIL

DATE DRAWN: MAY/19	REV. No.: -	Guelph
DESCRIPTION: N.T.S.		
REV. DATE: -	REV. BY: T.F.	PARKS OPERATIONS AND FORESTRY
APPROVED BY: MANAGER PARKS, OPERATIONS AND FORESTRY		UF 1.1

TREE PROTECTION ZONE (TPZ)

NO GRADE CHANGE
DUMPING
STORAGE OF MATERIALS
STORAGE OF EQUIPMENT
UNAUTHORIZED ENTRY
TREE INJURY OR REMOVAL
DISTURBANCE OF ANY KIND

THIS FENCING MUST NOT BE DAMAGED OR MOVED

CONTACT: Contractor name and telephone number of contact

City of Guelph: Forestry 519-837-5626 (parks@guelph.ca)
Planning 519-837-5616 (planning@guelph.ca)

40 CM MIN.

60 CM MIN.

Sign Design, Installation and Maintenance: TPZ information signs shall be constructed from metal, corrugated plastic, Gatorboard or wood, and shall be installed in an appropriate manner such that it will be able to withstand inclement weather conditions. Signage shall be maintained in good condition and in the original location throughout the duration of site development works. Signage shall be clearly legible, with black text on a white background being the preferred design.

Sign Content: The TPZ information sign shall, at minimum, provide a list of activities prohibited within the TPZ. Such activities shall include, but not be limited to: grade change, dumping, storage of equipment and materials, unauthorized entry by personnel, tree injury or removal, or other disturbance of any kind. The signage shall also note that TPZ fencing shall not be damaged or removed. The signage shall also provide the contact information for the City of Guelph. A City of Guelph corporate logo shall be displayed on the TPZ information sign.

Sign Placement: TPZ information signs shall be affixed no more than 20 m apart on each side of tree protection fencing, at a height of no less than 100 cm.

Sign Size: TPZ information signs shall be a minimum of 40 cm × 60 cm in size

CITY OF GUELPH STANDARD DRAWING

TREE PROTECTION ZONE (TPZ) INFORMATION SIGNAGE DETAIL

DATE DRAWN: MAY/19	REV. No.: -	Guelph
DESCRIPTION: N.T.S.		
REV. DATE: -	REV. BY: -	PARKS OPERATIONS AND FORESTRY
APPROVED BY: MANAGER PARKS, OPERATIONS AND FORESTRY		UF 1.2

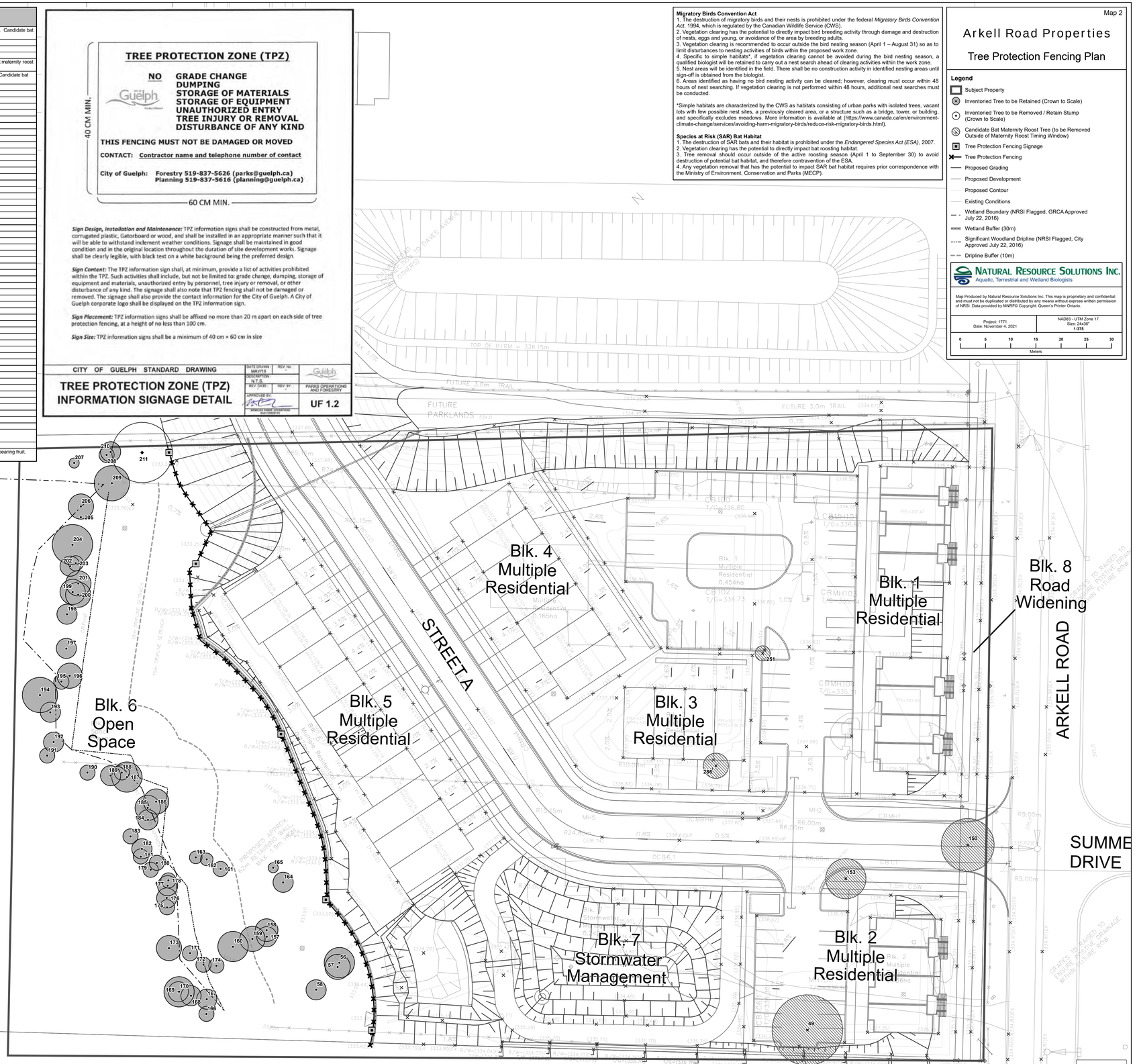
Migratory Birds Convention Act

1. The destruction of migratory birds and their nests is prohibited under the federal *Migratory Birds Convention Act*, 1994, which is regulated by the Canadian Wildlife Service (CWS).
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 (April 1 – August 31) so as to limit disturbances to nesting activities of birds within the proposed work zone.
4. Specific to simple habitats*, 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.

*Simple habitats are characterized by the CWS as habitats consisting of urban parks with isolated trees, vacant lots with few possible nest sites, a previously cleared area, or a structure such as a bridge, tower, or building, and specifically excludes meadows. More information is available at (https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/reduce-risk-migratory-birds.html).

Species at Risk (SAR) Bat Habitat

1. The destruction of SAR bats and their habitat is prohibited under the *Endangered Species Act (ESA)*, 2007.
2. Vegetation clearing has the potential to directly impact bat roosting habitat.
3. Tree removal should occur outside of the active roosting season (April 1 to September 30) to avoid destruction of potential bat habitat, and therefore contravention of the ESA.
4. Any vegetation removal that has the potential to impact SAR bat habitat requires prior correspondence with the Ministry of Environment, Conservation and Parks (MECP).



Map 2

Arkell Road Properties

Tree Protection Fencing Plan

Legend

- Subject Property
- Inventoried Tree to be Retained (Crown to Scale)
- Inventoried Tree to be Removed / Retain Stump (Crown to Scale)
- Candidate Bat Maternity Roost Tree (to be Removed Outside of Maternity Roost Timing Window)
- Tree Protection Fencing Signage
- Tree Protection Fencing
- Proposed Grading
- Proposed Development
- Proposed Contour
- Existing Conditions
- Wetland Boundary (NRSI Flagged, GRCA Approved July 22, 2016)
- Wetland Buffer (30m)
- Significant Woodland Dripline (NRSI Flagged, City Approved July 22, 2016)
- Dripline Buffer (10m)

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project: 1771
Date: November 4, 2021

NAD83 - UTM Zone 17
Size: 24x36"
1:375

0 5 10 15 20 25 30
Meters

Appendix VI
Species Lists

Plant Species Reported from the Study Area - Arkell Road Properties EIS (Project #1771)

Scientific Name	Common Name	CC	CW	Weed	SRANK	SARO	COSEWIC	SARA	SARA Schedule	City of Guelph	City of Guelph SAR	NHIC Data*	NRSI Observed	NRSI Tree Inventory Data	SWD3-2	SWM1-1	SWD4 / FOD8-1	CUM	CUT
		Oldham et al. 1995	Oldham et al. 1995	Oldham et al. 1995	MNRF 2021a	MNRF 2021a	Government of Canada 2021	Government of Canada 2021	Government of Canada 2021	Dougan 2009	MNRF 2018	MNRF 2021b	Results from 2017						
Pteridophytes	**Ferns & Allies**																		
Dryopteridaceae	**Wood Fern Family**																		
Dryopteris carthusiana	Spinulose Wood Fern	5	-3		S5								X				X		
Gymnosperms	**Conifers**																		
Cupressaceae	**Cypress Family**																		
Callitropsis nootkatensis	Yellow-cypress																		
Juniperus virginiana	Eastern Red Cedar	4	3		S5								X	X					
Thuja occidentalis	Eastern White Cedar	4	-3		S5								X	X		X			
Pinaceae	**Pine Family**																		
Larix laricina	Tamarack	7	-3		S5								X	X					
Picea abies	Norway Spruce	0	5	-1	SE3								X	X					
Picea glauca	White Spruce	6	3		S5								X	X					X
Picea pungens	Blue Spruce	0	3	NA	SE1								X	X					X
Pinus resinosa	Red Pine	8	3		S5								X	X					
Pinus strobus	Eastern White Pine	4	3		S5								X	X					X
Pinus sylvestris	Scots Pine	0	3	-3	SE5								X	X					
Pinus sylvestris var. sylvestris	Scots Pine	0	3	0	SE5								X						X
Dicotyledons	**Dicots**																		
Aceraceae	**Maple Family**																		
Acer ginnala	Amur Maple	0	5	0	SE1								X						X
Acer negundo	Manitoba Maple	0	0		S5								X	X			X		
Acer platanoides	Norway Maple	0	5	-3	SE5								X	X					
Acer saccharinum	Silver Maple	5	-3		S5								X	X	X				
Acer x freemanii	Freeman's Maple	6	-5		SNA								X	X		X	X		
Anacardiaceae	**Sumac or Cashew Family**																		
Rhus typhina	Staghorn Sumac	1	3		S5								X						X
Apiaceae	**Carrot or Parsley Family**																		
Daucus carota	Wild Carrot	0	5	-2	SE5								X					X	X
Asclepiadaceae	**Milkweed Family**																		
Asclepias syriaca	Common Milkweed	0	5		S5								X					X	
Asteraceae	**Composite or Aster Family**																		
Achillea millefolium	Common Yarrow	0	3	-1	SE5?								X				X		X
Ambrosia artemisiifolia	Common Ragweed	0	3		S5								X				X		
Arctium minus	Common Burdock	0	3	-2	SE5								X				X		
Centaurea stoebe ssp. micranthos	Spotted Knapweed	0	5	0	SE5								X					X	
Cirsium arvense	Creeping Thistle	0	3	-1	SE5								X				X		
Cirsium vulgare	Bull Thistle	0	3	-1	SE5								X				X	X	X
Erigeron annuus	Annual Fleabane	0	3		S5								X					X	X
Erigeron canadensis	Canada Horseweed	0	3		S5								X				X		
Erigeron pulchellus	Robin's-plantain Fleabane	7	3		S5								X					X	X
Eupatorium perfoliatum	Common Boneset	2	-3		S5								X		X				
Euthamia graminifolia	Grass-leaved Goldenrod	2	0		S5								X					X	X
Inula helenium	Elecampane	0	3	-2	SE5								X				X		
Leucanthemum vulgare	Oxeye Daisy	0	5	-1	SE5								X					X	X
Solidago altissima var. altissima	Eastern Tall Goldenrod	1	3		S5								X			X	X	X	X
Solidago canadensis	Canada Goldenrod	1	3		S5								X				X		
Solidago juncea	Early Goldenrod	3	5		S5								X					X	X
Solidago nemoralis ssp. nemoralis	Gray-stemmed Goldenrod	2	5		S5								X				X		
Solidago rugosa ssp. rugosa	Northern Rough-stemmed Goldenrod	4	0		S5								X				X	X	X
Symphyotrichum ericoides var. ericoides	White Heath Aster	4	3		S5								X				X		
Symphyotrichum lateriflorum var. lateriflorum	Calico Aster	3	0		S5								X				X		
Symphyotrichum novae-angliae	New England Aster	2	-3		S5								X				X	X	X
Symphyotrichum pilosum var. pilosum	Old Field Aster	1	3		S5								X				X		
Taraxacum officinale	Common Dandelion	0	3	-2	SE5								X		X	X	X	X	X
Betulaceae	**Birch Family**																		
Betula papyrifera	Paper Birch	2	3		S5								X	X		X			X
Brassicaceae	**Mustard Family**																		
Alliaria petiolata	Garlic Mustard	0	0	-3	SE5								X				X		
Hesperis matronalis	Dame's Rocket	0	3	-3	SE5								X				X		
Caprifoliaceae	**Honeysuckle Family**																		
Lonicera tatarica	Tatarian Honeysuckle	0	3	-3	SE5								X				X		
Sambucus canadensis	Common Elderberry	5	-3		S5								X		X	X			
Viburnum opulus	Cranberry Viburnum	5	-3	-1	S5								X				X		
Viburnum opulus var. americanum	Highbush Cranberry	5	-3		S5								X				X		
Clusiaceae	**St. John's-wort Family**																		
Hypericum perforatum	Common St. John's-wort	0	5	-3	SE5								X					X	X
Cornaceae	**Dogwood Family**																		
Cornus sericea	Red-osier Dogwood	2	-3		S5								X				X	X	X
Cucurbitaceae	**Gourd Family**																		
Echinocystis lobata	Wild Mock-cucumber	3	-3		S5								X				X		

Plant Species Reported from the Study Area - Arkell Road Properties EIS (Project #1771)

Scientific Name	Common Name	CC	CW	Weed	SRANK	SARO	COSEWIC	SARA	SARA Schedule	City of Guelph	City of Guelph SAR	NHIC Data*	NRSI Observed	NRSI Tree Inventory Data	SWD3-2	SWM1-1	SWD4 / FOD8-1	CUM	CUT
		Oldham et al. 1995	Oldham et al. 1995	Oldham et al. 1995	MNRF 2021a	MNRF 2021a	Government of Canada 2021	Government of Canada 2021	Government of Canada 2021	Dougan 2009	MNRF 2018	MNRF 2021b	Results from 2017						
Fabaceae	**Pea Family**																		
Lotus corniculatus	Garden Bird's-foot Trefoil	0	3	-2	SE5								X						X
Medicago lupulina	Black Medic	0	3	-1	SE5								X					X	X
Medicago sativa ssp. sativa	Alfalfa	0	5	-1	SE5								X					X	
Trifolium pratense	Red Clover	0	3	-2	SE5								X				X	X	X
Trifolium repens	White Clover	0	3	-1	SE5								X				X		
Vicia cracca	Tufted Vetch	0	5	-1	SE5								X						X
Grossulariaceae	**Currant Family**																		
Ribes americanum	Wild Black Currant	4	-3		S5								X		X				
Juglandaceae	**Walnut Family**																		
Juglans cinerea	Butternut	6	3		S2?	END	E	E	Schedule 1	SG	X								
Juglans nigra	Black Walnut	5	3		S4?								X	X					
Lamiaceae	**Mint Family**																		
Nepeta cataria	Catnip	0	3	-2	SE5								X				X		
Origanum vulgare	Wild Marjoram	0	5	-2	SE5								X				X		X
Prunella vulgaris ssp. lanceolata	Lance-leaved Self-heal	0	0		S5								X				X	X	X
Oleaceae	**Olive Family**																		
Fraxinus americana	White Ash	4	3		S4								X	X					X
Fraxinus pennsylvanica	Green Ash	3	-3		S4								X	X	X	X	X	X	
Onagraceae	**Evening-primrose Family**																		
Circaea alpina	Small Enchanter's Nightshade	6	-3		S5								X				X		
Circaea canadensis ssp. canadensis	Canada Enchanter's Nightshade	2	3	0	S5								X				X		
Oenothera biennis	Common Evening-primrose	0	3		S5								X				X		X
Papaveraceae	**Poppy Family**																		
Chelidonium majus	Greater Celandine	0	5	-3	SE5								X				X		
Ranunculaceae	**Buttercup Family**																		
Ranunculus acris	Tall Buttercup	0	0	-2	SE5								X				X		X
Rhamnaceae	**Buckthorn Family**																		
Frangula alnus	Glossy Buckthorn	0	0	-3	SE5								X		X	X	X		X
Rhamnus cathartica	Common Buckthorn	0	0	-3	SE5								X		X	X	X	X	X
Rosaceae	**Rose Family**																		
Agrimonia gryposepala	Hooked Agrimony	2	3		S5								X				X		
Agrimonia striata	Woodland Agrimony	3	3		S4								X					X	
Filipendula ulmaria	Queen-of-the-meadow	0	0		SE1								X						X
Fragaria virginiana	Wild Strawberry	2	3		S5								X				X	X	X
Geum canadense	White Avens	3	0		S5								X				X		
Malus baccata	Siberian Crabapple	0	5		SE1								X	X					
Malus pumila	Common Apple	0	5	-1	SE4								X	X				X	
Prunus sp.	Plum sp.																		
Prunus avium	Sweet Cherry	0	5	-2	SE4								X	X					
Prunus pensylvanica	Pin Cherry	3	3		S5								X	X					
Prunus virginiana var. virginiana	Choke Cherry	2	3	0	S5								X				X		
Pyrus calleryana 'Chanticleer'	Chanticleer Pear																		
Pyrus communis	Common Pear	0	5	-1	SE4								X	X					
Spiraea alba	White Meadowsweet	3	-3		S5								X						X
Salicaceae	**Willow Family**																		
Populus balsamifera	Balsam Poplar	4	-3		S5								X	X			X		X
Populus deltoides	Eastern Cottonwood	4	0	0	S5								X	X					
Populus tremuloides	Trembling Aspen	2	0		S5								X	X	X	X	X	X	X
Salix discolor	Pussy Willow	3	-3		S5								X						X
Salix x sepulcralis	*(Salix alba X Salix babylonica)*	0	0		SNA								X	X					
Saxifragaceae	**Saxifrage Family**																		
Tiarella cordifolia	Heart-leaved Foam-flower	6	3		S5								X				X	X	
Scrophulariaceae	**Figwort Family**																		
Verbascum thapsus	Common Mullein	0	5	-2	SE5								X					X	x
Veronica serpyllifolia	Thyme-leaved Speedwell	0	0		SU								X					X	
Solanaceae	**Nightshade Family**																		
Solanum dulcamara	Bittersweet Nightshade	0	0	-2	SE5								X		X	X	X		
Ulmaceae	**Elm Family**																		
Ulmus americana	American Elm	3	-3		S5								X	X			X		
Violaceae	**Violet Family**																		
Viola labradorica	Labrador Violet	3	0		S5								X					X	
Viola sororia	Woolly Blue Violet	4	0		S5								X				X	X	
Vitaceae	**Grape Family**																		
Parthenocissus vitacea	Thicket Creeper	4	3		S5								X			X			X
Vitis riparia	Riverbank Grape	0	0		S5								X			X	X	X	X
Monocotyledons	**Monocots**																		
Cyperaceae	**Sedge Family**																		
Carex sp.	Sedge sp.																		
Liliaceae	**Lily Family**																		
Convallaria majalis	European Lily-of-the-valley	0	5	-2	SE5								X				X		

Plant Species Reported from the Study Area - Arkell Road Properties EIS (Project #1771)

Scientific Name	Common Name	CC	CW	Weed	SRANK	SARO	COSEWIC	SARA	SARA Schedule	City of Guelph	City of Guelph SAR	NHIC Data*	NRSI Observed	NRSI Tree Inventory Data	SWD3-2	SWM1-1	SWD4 / FOD8-1	CUM	CUT
		Oldham et al. 1995	Oldham et al. 1995	Oldham et al. 1995	MNRF 2021a	MNRF 2021a	Government of Canada 2021	Government of Canada 2021	Government of Canada 2021	Dougan 2009	MNRF 2018	MNRF 2021b	Results from 2017						
Poaceae	**Grass Family**																		
Agrostis stolonifera	Creeping Bentgrass	0	-3		SE5								X				X		
Bromus inermis	Smooth Brome	0	5	-3	SE5								X					X	
Dactylis glomerata	Orchard Grass	0	3	-1	SE5								X					X	X
Phleum pratense	Common Timothy	0	3	-1	SE5								X					X	
Poa compressa	Canada Bluegrass	0	3		SE5								X				X		
Poa pratensis	Kentucky Bluegrass	0	3	0	S5								X						X
Poa pratensis ssp. pratensis	Kentucky Bluegrass	0	3		SE5								X					X	
Total											**1**	**0**	**110**	**30**	**11**	**13**	**53**	**35**	**43**

*NHIC Atlas Square(s): 17NJ6518

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Bird Species Reported from the Study Area - Arkell Road Properties EIS (Project #1771)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	City of Guelph Status	City of Guelph SAR	OBBA*	NHIC Data**	NRSI Observed: Highest Level of Breeding Evidence	BMB-001	BMB-002	BMB-003	NOC-001	NOC-002	Other Observations
		MNRF 2021a	MNRF 2021a	Government of Canada 2021	Government of Canada 2021	Government of Canada 2021	City of Guelph 2012	MNRF 2018	BSC et al. 2006	MNRF 2021b	Results from 2017						
Anatidae	**Ducks, Geese & Swans**																
Aix sponsa	Wood Duck	S5B, S3N							CO								
Anas platyrhynchos	Mallard	S5							CO		**PO**					PO	OB
Anas rubripes	American Black Duck	S4							CO								
Branta canadensis	Canada Goose	S5							CO		**PO**				PO		OB
Phasianidae	**Partridges, Grouse & Turkeys**																
Bonasa umbellus	Ruffed Grouse	S5							CO								
Meleagris gallopavo	Wild Turkey	S5							PO		**PO**					PO	
Podicipediformes	**Grebes**																
Podilymbus podiceps	Pied-billed Grebe	S4B, S2N							PO								
Columbidae	**Pigeons & Doves**																
Columba livia	Rock Pigeon	SNA							CO		**OB**						OB
Zenaida macroura	Mourning Dove	S5							CO		**PO**				PO		OB
Cuculiformes	**Cuckoos & Anis**																
Coccyzus erythropthalmus	Black-billed Cuckoo	S4S5B					X		PO								
Coccyzus sp.	Black/Yellow-billed Cuckoo	NP							PO								
Caprimulgidae	**Goatsuckers**																
Chordeiles minor	Common Nighthawk	S4B	SC	SC	T	Schedule 1		X	PO								
Apodidae	**Swifts**																
Chaetura pelagica	Chimney Swift	S3B	THR	T	T	Schedule 1		X	PO								
Trochilidae	**Hummingbirds**																
Archilochus colubris	Ruby-throated Hummingbird	S5B							CO		**PO**		PO				
Rallidae	**Rails, Gallinules & Coots**																
Porzana carolina	Sora	S5B							PR								
Rallus limicola	Virginia Rail	S4S5B							PR								
Charadriidae	**Plovers & Lapwings**																
Charadrius vociferus	Killdeer	S4B							CO		**PO**	PO	OB	PO			OB
Scolopacidae	**Sandpipers & Allies**																
Actitis macularia	Spotted Sandpiper	S5B							PR								
Gallinago delicata	Wilson's Snipe	S5B							PO								
Scolopax minor	American Woodcock	S4B							PR								
Laridae	**Gulls, Terns & Skimmers**																
Larus delawarensis	Ring-billed Gull	S5					X				**OB**	OB					OB
Ardeidae	**Herons & Bitterns**																
Ardea herodias	Great Blue Heron	S4					X		PO								
Botaurus lentiginosus	American Bittern	S5B					X		PR								
Butorides virescens	Green Heron	S4B					X		PR								
Cathartidae	**Vultures**																
Cathartes aura	Turkey Vulture	S5B, S3N							PR		**OB**						OB
Accipitridae	**Hawks, Kites, Eagles & Allies**																
Accipiter cooperii	Cooper's Hawk	S4	NAR	NAR	NS	No schedule	X		CO								
Accipiter striatus	Sharp-shinned Hawk	S5	NAR	NAR	NS	No schedule	X		PO								
Buteo jamaicensis	Red-tailed Hawk	S5	NAR	NAR	NS	No schedule			CO		**OB**						OB
Buteo platypterus	Broad-winged Hawk	S5B					X		PR								
Haliaeetus leucocephalus	Bald Eagle	S4	SC	NAR	NS	No schedule		X									
Strigidae	**Typical Owls**																
Asio otus	Long-eared Owl	S4					X		PR								
Bubo virginianus	Great Horned Owl	S4							CO								
Megascops asio	Eastern Screech-Owl	S4	NAR	NAR	NS	No schedule			PR								
Alcedinidae	**Kingfishers**																
Megaceryle alcyon	Belted Kingfisher	S5B, S4N					X		PR								
Picidae	**Woodpeckers**																
Colaptes auratus	Northern Flicker	S5					X		CO		**PO**	PO		PO			OB
Dryobates pubescens	Downy Woodpecker	S5							CO		**PR**	PR					OB
Dryobates villosus	Hairy Woodpecker	S5					X		PR		**OB**						OB
Dryocopus pileatus	Pileated Woodpecker	S5					X		CO		**OB**						OB
Melanerpes carolinus	Red-bellied Woodpecker	S5					X		PR								
Melanerpes erythrocephalus	Red-headed Woodpecker	S3	SC	E	E	Schedule 1		X	PR								
Sphyrapicus varius	Yellow-bellied Sapsucker	S5B, S3N					X				**OB**						OB
Falconidae	**Caracaras & Falcons**																
Falco sparverius	American Kestrel	S4					X		CO								
Tyrannidae	**Tyrant Flycatchers**																
Contopus virens	Eastern Wood-Pewee	S4B	SC	SC	SC	Schedule 1	X	X	PR		**PR**		PR		PO		OB
Empidonax alnorum	Alder Flycatcher	S5B							PR								
Empidonax minimus	Least Flycatcher	S5B					X		PO								
Empidonax traillii	Willow Flycatcher	S4B					X		PR		**OB**						OB
Myiarchus crinitus	Great Crested Flycatcher	S5B							CO		**PO**	PO					OB
Sayornis phoebe	Eastern Phoebe	S5B							CO		**OB**						OB
Tyrannus tyrannus	Eastern Kingbird	S4B					X		CO		**OB**						OB

Bird Species Reported from the Study Area - Arkell Road Properties EIS (Project #1771)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	City of Guelph Status	City of Guelph SAR	OBBA*	NHIC Data**	NRSI Observed: Highest Level of Breeding Evidence	BMB-001	BMB-002	BMB-003	NOC-001	NOC-002	Other Observations
		MNRF 2021a	MNRF 2021a	Government of Canada 2021	Government of Canada 2021	Government of Canada 2021	City of Guelph 2012	MNRF 2018	BSC et al. 2006	MNRF 2021b	Results from 2017						
Vireonidae	**Vireos**																
Vireo gilvus	Warbling Vireo	S5B							CO		**OB**						OB
Vireo olivaceus	Red-eyed Vireo	S5B							CO		**PR**		PR	PO			OB
Vireo philadelphicus	Philadelphia Vireo	S5B									**OB**						OB
Vireo solitarius	Blue-headed Vireo	S5B					X		PR								
Corvidae	**Crows & Jays**																
Corvus brachyrhynchos	American Crow	S5							CO		**PR**	PO	PR	PO	PO		OB
Cyanocitta cristata	Blue Jay	S5							CO		**PR**	PO	PO	PR			OB
Alaudidae	**Larks**																
Eremophila alpestris	Horned Lark	S4							PR								
Hirundinidae	**Swallows**																
Hirundo rustica	Barn Swallow	S4B	THR	SC	T	Schedule 1		X	CO								
Petrochelidon pyrrhonota	Cliff Swallow	S4S5B					X		PR								
Riparia riparia	Bank Swallow	S4B	THR	T	T	Schedule 1	X	X	CO								
Stelgidopteryx serripennis	Northern Rough-winged Swallow	S4B							PR								
Tachycineta bicolor	Tree Swallow	S4S5B							CO		**OB**						OB
Paridae	**Chickadees & Titmice**																
Poecile atricapillus	Black-capped Chickadee	S5							CO		**PR**	PO	PR	PR			OB
Sittidae	**Nuthatches**																
Sitta canadensis	Red-breasted Nuthatch	S5					X		CO		**PO**		PO				
Sitta carolinensis	White-breasted Nuthatch	S5							PO		**OB**						OB
Certhiidae	**Creepers**																
Certhia americana	Brown Creeper	S5					X		PO								
Troglodytidae	**Wrens**																
Cistothorus palustris	Marsh Wren	S4B, S3N							PO								
Cistothorus platensis	Sedge Wren	S4B	NAR	NAR	NS	No schedule	X		PO								
Thryothorus ludovicianus	Carolina Wren	S4					X				**OB**						OB
Troglodytes aedon	House Wren	S5B							CO		**OB**						OB
Troglodytes hiemalis	Winter Wren	S5B, S4N					X		CO								
Turdidae	**Thrushes**																
Catharus fuscescens	Veery	S5B					X		CO								
Hylocichla mustelina	Wood Thrush	S4B	SC	T	T	Schedule 1	X	X	CO								
Sialia sialis	Eastern Bluebird	S5B, S4N	NAR	NAR	NS	No schedule			CO								
Turdus migratorius	American Robin	S5							CO		**PR**	PR	PR	PR	PR	PO	OB
Mimidae	**Mockingbirds, Thrashers & Allies**																
Dumetella carolinensis	Gray Catbird	S5B, S3N							CO		**PO**	PO		PO			OB
Mimus polyglottos	Northern Mockingbird	S4					X		PR								
Toxostoma rufum	Brown Thrasher	S4B					X		PR								
Sturnidae	**Starlings**																
Sturnus vulgaris	European Starling	SNA							CO		**PR**	PO		PR	PO		OB
Bombycillidae	**Waxwings**																
Bombycilla cedrorum	Cedar Waxwing	S5							PR		**PO**			PO			OB
Passeridae	**Old World Sparrows**																
Passer domesticus	House Sparrow	SNA							CO								
Fringillidae	**Finches & Allies**																
Haemorhous mexicanus	House Finch	SNA							CO		**OB**						OB
Haemorhous purpureus	Purple Finch	S5							PO		**OB**						OB
Spinus pinus	Pine Siskin	S5					X		CO								
Spinus tristis	American Goldfinch	S5							PR		**PR**	PO	PO	PR			OB
Emberizidae	**New World Sparrows & Allies**																
Ammodramus savannarum	Grasshopper Sparrow	S4B	SC	SC	SC	Schedule 1	X		PR								
Junco hyemalis	Dark-eyed Junco	S5					X				**OB**						OB
Melospiza georgiana	Swamp Sparrow	S5B, S4N							CO								
Melospiza melodia	Song Sparrow	S5							CO		**PR**	PR	PR	PR	PO		OB
Passerculus sandwichensis	Savannah Sparrow	S5B, S3N					X		CO								
Pipilo erythrophthalmus	Eastern Towhee	S4B, S3N					X		PR								
Pooecetes gramineus	Vesper Sparrow	S4B					X		PO								
Spizella pallida	Clay-colored Sparrow	S4B							CO								
Spizella passerina	Chipping Sparrow	S5B, S3N							CO		**PR**	PO		PR			OB
Spizella pusilla	Field Sparrow	S4B, S3N					X		CO								
Zonotrichia albicollis	White-throated Sparrow	S5							PR								
Icteriidae	**Chats**																
Icteria virens	Yellow-breasted Chat	S1B	END	E	E	Schedule 1		X									
Icteridae	**Troupials & Allies**																
Agelaius phoeniceus	Red-winged Blackbird	S5							CO		**PO**	PO	PO	PO	PO		OB
Dolichonyx oryzivorus	Bobolink	S4B	THR	T	T	Schedule 1		X	CO	X	**OB**						OB
Icterus galbula	Baltimore Oriole	S4B					X		CO		**PO**			PO			OB
Icterus spurius	Orchard Oriole	S4B					X		CO								
Molothrus ater	Brown-headed Cowbird	S5							CO		**PO**		PO				OB
Quiscalus quiscula	Common Grackle	S5							CO		**PR**	PR	PR	PO			OB

Bird Species Reported from the Study Area - Arkell Road Properties EIS (Project #1771)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	City of Guelph Status	City of Guelph SAR	OBBA*	NHIC Data**	NRSI Observed: Highest Level of Breeding Evidence	BMB-001	BMB-002	BMB-003	NOC-001	NOC-002	Other Observations
		MNRF 2021a	MNRF 2021a	Government of Canada 2021	Government of Canada 2021	Government of Canada 2021	City of Guelph 2012	MNRF 2018	BSC et al. 2006	MNRF 2021b	Results from 2017						
Sturnella magna	Eastern Meadowlark	S4B, S3N	THR	T	T	Schedule 1		X	CO	X							
Parulidae	**Wood Warblers**																
Cardellina canadensis	Canada Warbler	S5B	SC	SC	T	Schedule 1		X									
Geothlypis philadelphia	Mourning Warbler	S5B							PO								
Geothlypis trichas	Common Yellowthroat	S5B, S3N							PR								
Leiothlypis ruficapilla	Nashville Warbler	S5B							PO		**OB**						OB
Mniotilta varia	Black-and-white Warbler	S5B					X		PR								
Parkesia noveboracensis	Northern Waterthrush	S5B							PR								
Seiurus aurocapilla	Ovenbird	S5B					X		PR								
Setophaga coronata	Yellow-rumped Warbler	S5B, S4N							PO								
Setophaga fusca	Blackburnian Warbler	S5B					X				**OB**						OB
Setophaga pensylvanica	Chestnut-sided Warbler	S5B							PR		**OB**						OB
Setophaga petechia	Yellow Warbler	S5B							CO		**OB**						OB
Setophaga pinus	Pine Warbler	S5B, S3N					X		CO								
Setophaga ruticilla	American Redstart	S5B					X		PO		**PO**	PO	PO	PO			
Setophaga striata	Blackpoll Warbler	S5B									**OB**						OB
Setophaga virens	Black-throated Green Warbler	S5B					X		CO		**OB**						OB
Vermivora chrysoptera	Golden-winged Warbler	S3B	SC	T	T	Schedule 1		X									
Vermivora cyanoptera	Blue-winged Warbler	S4B					X		CO								
Vermivora sp.	Blue-winged/Golden-winged Warbler	NP							PR								
Cardinalidae	**Cardinals, Grosbeaks & Allies**																
Cardinalis cardinalis	Northern Cardinal	S5							CO		**PO**			PO	PO		OB
Passerina cyanea	Indigo Bunting	S5B							CO		**PO**		PO	PO			
Pheucticus ludovicianus	Rose-breasted Grosbeak	S5B					X		CO		**PO**		PO				OB
Piranga olivacea	Scarlet Tanager	S5B					X		PO								
Total								**13**	**114**	**2**	**56**	**17**	**17**	**19**	**9**	**3**	**51**

*OBBA Atlas Square: 17NJ61
**NHIC Atlas Square: 17NJ6518

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Reptile and Amphibian Species Reported from the Study Area - Arkell Road Properties EIS (Project #1771)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	City of Guelph Status	City of Guelph SAR	ORAA*	NHIC Data**	NRSI Observed	Anuran Call Survey	Snake Cover Board Survey	Other Observations
		MNRF 2021a	MNRF 2021a	Government of Canada 2021	Government of Canada 2021	Government of Canada 2021	City of Guelph 2012	MNRF 2018	Ontario Nature 2019	MNRF 2021b	Results from 2017			
Turtles														
Chelydra serpentina	Snapping Turtle	S4	SC	SC	SC	Schedule 1		X	X	X				
Chrysemys picta marginata	Midland Painted Turtle	S4		SC	SC	Schedule 1			X					
Emydoidea blandingii	Blanding's Turtle (Great Lakes / St. Lawrence population)	S3	THR	E	E	Schedule 1		X	X					
Graptemys geographica	Northern Map Turtle	S3	SC	SC	SC	Schedule 1			X					
Trachemys scripta	Pond Slider	SNA							X					
Snakes														
Lampropeltis triangulum	Milksnake	S4	NAR	SC	SC	Schedule 1			X					
Nerodia sipedon sipedon	Northern Watersnake	S5	NAR	NAR	NS	No schedule	X		X					
Storeria dekayi	Dekay's Brownsnake	S5	NAR	NAR	NS	No schedule	X		X					
Storeria occipitomaculata	Red-bellied Snake	S5					X		X					
Thamnophis sauritus septentrionalis	Northern Ribbonsnake	S4	SC	SC	SC	Schedule 1		X	X					
Thamnophis sirtalis sirtalis	Eastern Gartersnake	S5							X		**X**		**X**	**X**
Salamanders														
Ambystoma sp.	Jefferson/Blue-spotted Salamander Complex	NP							X					
Ambystoma jeffersonianum	Jefferson Salamander	S2	END	E	E	Schedule 1		X						
Ambystoma laterale - (2) jeffersonianum	Unisexual Ambystoma (Jefferson Salamander-dependent population)	S2	END	E	E	Schedule 1		X						
Ambystoma laterale	Blue-spotted Salamander	S4					X		X					
Ambystoma maculatum	Spotted Salamander	S4					X		X					
Notophthalmus viridescens viridescens	Red-spotted Newt	S5					X		X					
Plethodon cinereus	Eastern Red-backed Salamander	S5							X					
Frogs and Toads														
Anaxyrus americanus	American Toad	S5							X		**X**			**X**
Hyla versicolor	Gray Treefrog	S5							X		**X**	**X**		
Pseudacris triseriata pop. 2	Western Chorus Frog (Great Lakes / St. Lawrence - Canadian Shield population)	S4	NAR	T	T	Schedule 1			X					
Pseudacris crucifer	Spring Peeper	S5							X					
Lithobates catesbeianus	American Bullfrog	S4					X		X					
Lithobates clamitans	Green Frog	S5							X		**X**	**X**		**X**
Lithobates palustris	Pickerel Frog	S4	NAR	NAR	NS	No schedule	X		X					
Lithobates pipiens	Northern Leopard Frog	S5	NAR	NAR	NS	No schedule			X					
Lithobates sylvaticus	Wood Frog	S5							X					
Total								**5**	**25**	**1**	**4**	**2**	**1**	**3**

*ORAA Atlas Square: 17NJ61
**NHIC Atlas Square: 17NJ6518

References

Ministry of Natural Resources and Forestry (MNRF). 2021a. Natural Heritage Information Centre (NHIC): Species List for Ontario. Published: 2014-07-17. All Species List Updated: 2021-03-18. Available: https://www.ontario.ca/page/get-natural-heritage-information

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Butterfly Species Reported from the Study Area - Arkell Road Properties EIS (Project #1771)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	City of Guelph Status	City of Guelph SAR	Ontario Butterfly Atlas*	NHIC Data**	NRSI Observed
		MNRF 2021a	MNRF 2021a	Government of Canada 2021	Government of Canada 2021	Government of Canada 2021	City of Guelph 2012	MNRF 2018	Macnaughton et al. 2020	MNRF 2021b	Results from 2017
Hesperiidae	**Skippers**										
Anatrytone logan	Delaware Skipper	S4					X		X		
Ancyloxypha numitor	Least Skipper	S5							X		
Carterocephalus palaemon	Arctic Skipper	S5							X		
Erynnis baptisiae	Wild Indigo Duskywing	S4					X		X		X
Erynnis juvenalis	Juvenal's Duskywing	S5							X		
Erynnis lucilius	Columbine Duskywing	S4							X		
Euphyes vestris	Dun Skipper	S5							X		
Pholisora catullus	Common Sootywing	S4					X		X		
Poanes hobomok	Hobomok Skipper	S5							X		
Poanes viator	Broad-winged Skipper	S4							X		
Polites mystic	Long Dash Skipper	S5							X		
Polites peckius	Peck's Skipper	S5							X		
Polites themistocles	Tawny-edged Skipper	S5							X		
Pompeius verna	Little Glassywing	S4					X		X		
Thymelicus lineola	European Skipper	SNA							X		
Wallengrenia egeremet	Northern Broken Dash	S5							X		
Papilionidae	**Swallowtails**										
Papilio canadensis	Canadian Tiger Swallowtail	S5							X		
Papilio cresphontes	Giant Swallowtail	S4					X		X		
Papilio glaucus	Eastern Tiger Swallowtail	S5							X		X
Papilio polyxenes	Black Swallowtail	S5							X		
Pieridae	**Whites and Sulphurs**										
Colias eurytheme	Orange Sulphur	S5							X		
Colias philodice	Clouded Sulphur	S5							X		
Pieris oleracea	Mustard White	S4							X		
Pieris rapae	Cabbage White	SNA							X		X
Pieris virginiensis	West Virginia White	S3	SC				X	X			
Lycaenidae	**Harvesters, Coppers, Hairstreaks, Blues**										
Callophrys augustinus	Brown Elfin	S5							X		
Celastrina sp.	Azure species	SNA							X		
Cupido comyntas	Eastern Tailed Blue	S5							X		X
Feniseca tarquinius	Harvester	S4							X		
Glaucopsyche lygdamus	Silvery Blue	S5							X		
Lycaena hyllus	Bronze Copper	S5							X		
Satyrium acadica	Acadian Hairstreak	S4							X		
Satyrium calanus	Banded Hairstreak	S4							X		
Nymphalidae	**Brush-footed Butterflies**										
Aglais milberti	Milbert's Tortoiseshell	S5							X		
Asterocampa clyton	Tawny Emperor	S3					X		X		
Boloria bellona	Meadow Fritillary	S5							X		
Boloria selene	Silver-bordered Fritillary	S5							X		
Cercyonis pegala	Common Wood-Nymph	S5							X		X
Coenonympha tullia	Common Ringlet	S5							X		X
Danaus plexippus	Monarch	S2N,S4B	SC	E	SC	Schedule 1	X	X	X		
Euphydryas phaeton	Baltimore Checkerspot	S4							X		
Lethe anthedon	Northern Pearly-Eye	S5							X		
Lethe eurydice	Eyed Brown	S5							X		
Limenitis archippus	Viceroy	S5							X		X
Limenitis arthemis arthemis	White Admiral	S5							X		
Limenitis arthemis astyanax	Red-spotted Purple	S5							X		
Megisto cymela	Little Wood-Satyr	S5							X		
Nymphalis antiopa	Mourning Cloak	S5							X		
Nymphalis l-album	Compton Tortoiseshell	S5							X		
Phyciodes cocyta	Northern Crescent	S5							X		
Phyciodes tharos	Pearl Crescent	S4							X		

Butterfly Species Reported from the Study Area - Arkell Road Properties EIS (Project #1771)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	City of Guelph Status	City of Guelph SAR	Ontario Butterfly Atlas*	NHIC Data**	NRSI Observed
		MNRF 2021a	MNRF 2021a	Government of Canada 2021	Government of Canada 2021	Government of Canada 2021	City of Guelph 2012	MNRF 2018	Macnaughton et al. 2020	MNRF 2021b	Results from 2017
Polygonia comma	Eastern Comma	S5							X		
Polygonia interrogationis	Question Mark	S5							X		
Speyeria cybele	Great Spangled Fritillary	S5							X		
Vanessa atalanta	Red Admiral	S5B							X		
Vanessa cardui	Painted Lady	S5B							X		
Vanessa virginiensis	American Lady	S5							X		
Total								**2**	**56**	**0**	**7**

*Ontario Butterfly Atlas Square: 17NJ61
**NHIC Atlas Square: 17NJ6518

References

Ministry of Natural Resources and Forestry (MNRF). 2021a. Natural Heritage Information Centre (NHIC): Species List for Ontario. Published: 2014-07-17. All Species List Updated: 2021-03-18. Available: https://www.ontario.ca/page/get-natural-heritage-information

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Odonate Species Reported from the Study Area - Arkell Road Properties EIS (Project #1771)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	City of Guelph Status	Odonate Atlas*	NHIC Data**	NRSI Observed
		MNRF 2021a	MNRF 2021a	Government of Canada 2021	Government of Canada 2021	Government of Canada 2021	City of Guelph 2012	OOAD 2021	MNRF 2021b	Results from 2017
Calopterygidae	**Broadwinged Damselflies**									
Calopteryx aequabilis	River Jewelwing	S5						X		
Calopteryx maculata	Ebony Jewelwing	S5						X		
Hetaerina americana	American Rubyspot	S4						X		
Lestidae	**Spreadwings**									
Lestes congener	Spotted Spreadwing	S5						X		
Lestes disjunctus	Northern Spreadwing	S5						X		
Lestes dryas	Emerald Spreadwing	S5						X		
Lestes eurinus	Amber-winged Spreadwing	S4						X		
Lestes rectangularis	Slender Spreadwing	S5						X		
Lestes unguiculatus	Lyre-tipped Spreadwing	S5						X		
Coenagrionidae	**Narrow-winged Damselflies**									
Argia apicalis	Blue-fronted Dancer	S4						X		
Argia fumipennis violacea	Violet Dancer	S5						X		
Argia moesta	Powdered Dancer	S5						X		
Enallagma annexum	Northern Bluet	S4						X		
Enallagma antennatum	Rainbow Bluet	S4						X		
Enallagma aspersum	Azure Bluet	S4						X		
Enallagma carunculatum	Tule Bluet	S5						X		
Enallagma civile	Familiar Bluet	S5						X		
Enallagma ebrium	Marsh Bluet	S5						X		
Enallagma exsulans	Stream Bluet	S5						X		
Enallagma signatum	Orange Bluet	S4						X		
Ischnura posita	Fragile Forktail	S4						X		
Ischnura verticalis	Eastern Forktail	S5						X		X
Nehalennia irene	Sedge Sprite	S5						X		
Aeshnidae	**Darners**									
Aeshna canadensis	Canada Darner	S5						X		
Aeshna constricta	Lance-tipped Darner	S5						X		X
Aeshna interrupta interrupta	Variable (Interrupted) Darner	S5						X		
Aeshna tuberculifera	Black-tipped Darner	S4						X		
Aeshna umbrosa	Shadow Darner	S5						X		
Aeshna verticalis	Green-striped Darner	S4						X		
Anax junius	Common Green Darner	S5						X		X
Basiaeschna janata	Springtime Darner	S5						X		
Boyeria vinosa	Fawn Darner	S5						X		
Rhionaeschna mutata	Spatterdock Darner	S3						X		
Gomphidae	**Clubtails**									
Arigomphus villosipes	Unicorn Clubtail	S3						X		
Ophiogomphus rupinsulensis	Rusty Snaketail	S4						X		
Phanogomphus exilis	Lancet Clubtail	S5						X		
Phanogomphus graslinellus	Pronghorn Clubtail	S3						X		
Phanogomphus lividus	Ashy Clubtail	S4						X		
Phanogomphus spicatus	Dusky Clubtail	S5						X		
Corduliidae	**Emeralds**									
Cordulia shurtleffii	American Emerald	S5						X		
Dorocordulia libera	Racket-tailed Emerald	S5						X		
Epitheca canis	Beaverpond Baskettail	S5						X		
Epitheca cynosura	Common Baskettail	S5						X		
Epitheca princeps	Prince Baskettail	S5						X		
Somatochlora tenebrosa	Clamp-tipped Emerald	S3						X		
Somatochlora williamsoni	Williamson's Emerald	S4					X	X		

Odonate Species Reported from the Study Area - Arkell Road Properties EIS (Project #1771)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	City of Guelph Status	Odonate Atlas*	NHIC Data**	NRSI Observed
		MNRF 2021a	MNRF 2021a	Government of Canada 2021	Government of Canada 2021	Government of Canada 2021	City of Guelph 2012	OOAD 2021	MNRF 2021b	Results from 2017
Libellulidae	**Skimmers**									
Celithemis elisa	Calico Pennant	S5						X		
Erythemis simplicicollis	Eastern Pondhawk	S5						X		
Ladona julia	Chalk-fronted Corporal	S5					X	X		
Leucorrhinia frigida	Frosted Whiteface	S5					X	X		
Leucorrhinia intacta	Dot-tailed Whiteface	S5						X		
Leucorrhinia proxima	Belted Whiteface	S5					X	X		
Libellula luctuosa	Widow Skimmer	S5						X		
Libellula pulchella	Twelve-spotted Skimmer	S5						X		X
Libellula quadrimaculata	Four-spotted Skimmer	S5						X		
Pachydiplax longipennis	Blue Dasher	S5						X		
Pantala flavescens	Wandering Glider	S4						X		
Pantala hymenaea	Spot-winged Glider	S4						X		
Perithemis tenera	Eastern Amberwing	S4					X	X		
Plathemis lydia	Common Whitetail	S5						X		X
Sympetrum internum	Cherry-faced Meadowhawk	S5						X		X
Sympetrum obtrusum	White-faced Meadowhawk	S5						X		X
Sympetrum semicinctum	Band-winged Meadowhawk	S4						X		
Sympetrum vicinum	Autumn Meadowhawk	S5						X		X
Tramea lacerata	Black Saddlebags	S4						X		
Total								**65**	**0**	**8**

*OOAD Square Number: 17NJ61
**NHIC Atlas Square: 17NJ6518

References

Ministry of Natural Resources and Forestry (MNRF). 2021a. Natural Heritage Information Centre (NHIC): Species List for Ontario. Published: 2014-07-17. All Species List Updated: 2021-03-18. Available: https://www.ontario.ca/page/get-natural-heritage-information

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Mammal Species Reported from the Study Area - Arkell Road Properties EIS (Project #1771)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	City of Guelph Status	City of Guelph SAR	Ontario Mammal Atlas	NHIC Data**	NRSI Observed
		MNRF 2021a	MNRF 2021a	Government of Canada 2021	Government of Canada 2021	Government of Canada 2021	City of Guelph 2012	MNRF 2018	Dobbyn 1994	MNRF 2021b	Results from 2017
Didelphimorphia	**Opossums**										
Didelphis virginiana	Virginia Opossum	S4							X		
Eulipotyphla	**Shrews, Moles, Hedgehogs, and Allies**										
Blarina brevicauda	Northern Short-tailed Shrew	S5							X		X
Condylura cristata	Star-nosed Mole	S5							X		
Parascalops breweri	Hairy-tailed Mole	S4					X		X		
Sorex cinereus	Masked Shrew	S5							X		
Sorex fumeus	Smoky Shrew	S5							X		
Sorex palustris	Water Shrew	S5					X		X		
Chiroptera	**Bats**										
Eptesicus fuscus	Big Brown Bat	S4							X		X
Lasionycteris noctivagans	Silver-haired Bat	S4							X		X
Lasiurus borealis	Eastern Red Bat	S4							X		
Lasiurus cinereus	Hoary Bat	S4							X		X
Myotis leibii	Eastern Small-footed Myotis	S2S3	END					X	X		
Myotis lucifugus	Little Brown Myotis	S3	END	E	E	Schedule 1		X	X		X
Myotis septentrionalis	Northern Myotis	S3	END	E	E	Schedule 1		X	X		
Perimyotis subflavus	Tri-colored Bat	S3?	END	E	E	Schedule 1		X	X		
Lagomorpha	**Rabbits and Hares**										
Lepus americanus	Snowshoe Hare	S5					X		X		
Lepus europaeus	European Hare	SNA							X		
Sylvilagus floridanus	Eastern Cottontail	S5							X		X
Rodentia	**Rodents**										
Castor canadensis	Beaver	S5							X		
Erethizon dorsatum	Porcupine	S5							X		
Glaucomys sabrinus	Northern Flying Squirrel	S5					X		X		
Marmota monax	Woodchuck	S5							X		
Microtus pennsylvanicus	Meadow Vole	S5							X		
Microtus pinetorum	Woodland Vole	S3?	SC	SC	SC	Schedule 1			X		
Mus musculus	House Mouse	SNA							X		
Napaeozapus insignis	Woodland Jumping Mouse	S5					X		X		
Ondatra zibethicus	Muskrat	S5							X		
Peromyscus leucopus	White-footed Mouse	S5							X		
Peromyscus maniculatus	Deer Mouse	S5							X		
Rattus norvegicus	Norway Rat	SNA							X		
Sciurus carolinensis	Eastern Gray Squirrel	S5							X		X
Synaptomys cooperi	Southern Bog Lemming	S4					X		X		
Tamias striatus	Eastern Chipmunk	S5							X		X
Tamiasciurus hudsonicus	Red Squirrel	S5							X		X
Zapus hudsonius	Meadow Jumping Mouse	S5							X		X
Canidae	**Canines**										
Canis latrans	Coyote	S5							X		X
Vulpes vulpes	Red Fox	S5							X		X
Felidae	**Felines**										
Lynx rufus	Bobcat	S4					X		X		
Mephitidae	**Skunks and Stink Badgers**										
Mephitis mephitis	Striped Skunk	S5							X		
Mustelidae	**Weasels and Allies**										
Mustela erminea	Ermine	S5							X		
Mustela frenata	Long-tailed Weasel	S4					X		X		
Neovison vison	American Mink	S4							X		
Taxidea taxus jacksoni	American Badger (Southwestern Ontario population)	S1	END	E	E	Schedule 1		X	X		
Procyonidae	**Raccoons and Allies**										
Procyon lotor	Northern Raccoon	S5							X		X

Mammal Species Reported from the Study Area - Arkell Road Properties EIS (Project #1771)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	City of Guelph Status	City of Guelph SAR	Ontario Mammal Atlas	NHIC Data**	NRSI Observed
		MNRF 2021a	MNRF 2021a	Government of Canada 2021	Government of Canada 2021	Government of Canada 2021	City of Guelph 2012	MNRF 2018	Dobbyn 1994	MNRF 2021b	Results from 2017
Ursidae	**Bears**										
Ursus americanus	American Black Bear	S5	NAR	NAR	NS	No schedule	X		X		
Artiodactyla	**Deer and Bison**										
Odocoileus virginianus	White-tailed Deer	S5							X		X
Total								**5**	**46**	**0**	**14**

*Mammal Atlas Square Number: NU
**NHIC Atlas Square: 17NJ6518

References

Ministry of Natural Resources and Forestry (MNRF). 2021a. Natural Heritage Information Centre (NHIC): Species List for Ontario. Published: 2014-07-17. All Species List Updated: 2021-03-18. Available: https://www.ontario.ca/page/get-natural-heritage-information

Government of Canada. 2021. Species at Risk Public Registry: Species Search. COSEWIC Last Assessment Date: 2021-05-05. Available: https://species-registry.canada.ca/index-en.html#/species?sortBy=commonNameSort&sortDirection=asc&pageSize=10

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Appendix VII
MECP Correspondence

Subject: Fwd: Re: Building removal, Guelph, ON (proj1771)
From: Ken Burrell <kburrell@nrsi.on.ca>
Date: 1/10/2020, 9:40 AM
To: Nathan Miller <nmiller@nrsi.on.ca>

Ken Burrell M.E.S.
Terrestrial and Wetland Biologist
Natural Resource Solutions Inc.
415 Phillip Street, Unit C
Waterloo, ON N2L 3X2
(p) 519-725-2227 Ext. 403 (f) 519-725-2575
(w) www.nrsi.on.ca (e) kburrell@nrsi.on.ca
@nrsinews

-------- Forwarded Message --------
Subject: Re: Building removal, Guelph, ON (proj1771)
Date: Mon, 16 Sep 2019 16:02:11 -0400
From: Ken Burrell <kburrell@nrsi.on.ca>
To: Karam, Michelle (MECP) <Michelle.Karam@ontario.ca>

Thanks Michelle. Yes, we've indicated to the client (per below) that demolition should not occur within the bat active season and they are aware of this.

Ken

Ken Burrell M.E.S.
Terrestrial and Wetland Biologist
Natural Resource Solutions Inc.
415 Phillip Street, Unit C
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(w) www.nrsi.on.ca (e) kburrell@nrsi.on.ca
@nrsinews

On 9/16/2019 4:00 PM, Karam, Michelle (MECP) wrote:

> Hi Ken,
> I see, as long as you have done all of the checks you are able to and you are confident there is no use by SAR bats, avoiding active season is also a good idea.

Thanks,

Michelle Karam
Management Biologist

Permissions and Compliance, Species at Risk Branch
Ministry of Environment, Conservation and Parks
(905) 321-5736 phone
(905) 562-1154 fax
michelle.karam@ontario.ca

From: Ken Burrell <kburrell@nrsi.on.ca>
Sent: September 16, 2019 3:48 PM
To: Species at Risk (MECP) <SAROntario@ontario.ca>
Cc: Tara Brenton <tbrenton@nrsi.on.ca>
Subject: Re: Building removal, Guelph, ON (proj1771)

Hi Michelle,

We had conducted a bat habitat assessment and found that there were suitable entrances/exits for bats within the house, which led us to do the bat exit surveys.

Ken Burrell M.E.S.
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(w) www.nrsi.on.ca (e) kburrell@nrsi.on.ca
@nrsinews

On 9/16/2019 3:40 PM, Species at Risk (MECP) wrote:

> Can you provide background information on why this building was previously identified as a potential bat roosting structure?
>
> Michelle Karam
> Management Biologist
> Permissions and Compliance, Species at Risk Branch
> Ministry of Environment, Conservation and Parks
> (905) 321-5736 phone
> (905) 562-1154 fax
> michelle.karam@ontario.ca
>
> ---
>
> **From:** Ken Burrell <kburrell@nrsi.on.ca>
> **Sent:** August 21, 2019 3:36 PM

To: Species at Risk (MECP) <SAROntario@ontario.ca>
Cc: Tara Brenton <tbrenton@nrsi.on.ca>
Subject: Building removal, Guelph, ON (proj1771)

Good afternoon,

A client I am working for in Guelph, Ontario is developing a site that will require a building to be demolished that we had previously identified as having the potential for bat maternity habitat to be present (see building 1 in the attached map).

We conducted bat exit surveys on June 12 and 13, 2017 at this building. Based on our surveys we identified that the building is not a bat maternity roost site.

The client is planning to demolish this building outside of the bat active season, and as such, we wanted to advise the MECP of our approach.

Please feel free to contact me if you require any additional information.

Kind regards,

Ken
--

Ken Burrell M.E.S.
Terrestrial and Wetland Biologist
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415 Phillip Street, Unit C
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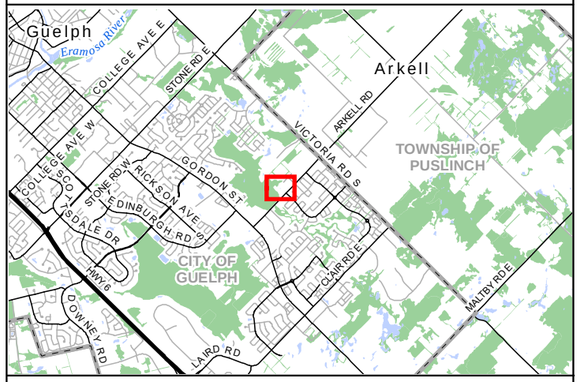
Maps

Map 1

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)

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project: 1771 Date: October 28, 2021	NAD83 - UTM Zone 17 Size: 11x17" **1:1,500**

0 20 40 60 80 100 Metres

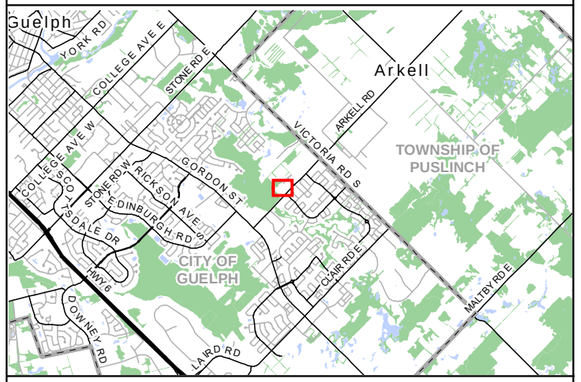
N

Path: X:\1771_ArkellRoadPropertiesEIS\NRSI_1771_Map1_StudyArea_NaturalFeatures_1K_2021_10_28_LEH.mxd

Map 2

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: October 28, 2021

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

0 10 20 30 40 50 60 Metres

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Path: X:\1771_ArkellRoadPropertiesEIS\NRSI_1771_Map2_MonitoringStations_1K_2021_10_28_LEH.mxd

565050 565100 565150 565200 565250 565300

4819950 4818900 4818850 4818800 4818750

B

2

1

D = 251

E = 286

C = 153

B = 150

A = 49

ARKELL ROAD

SUMMERFIELD DRIVE

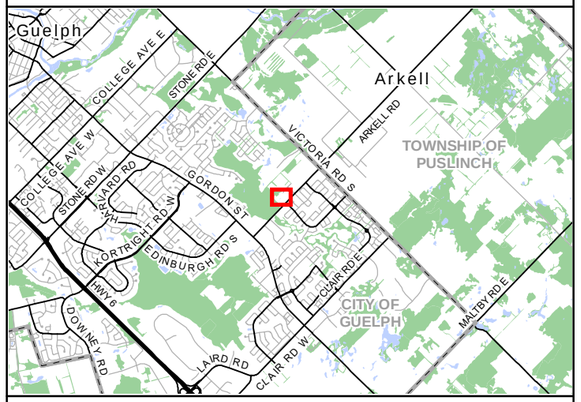
565050 565100 565150 565200 565250 565300

Path: X:\1771_ArkellRoadPropertiesEIS\NRSI_1771_Map3_BatMonitoring_1K_2021_11_03_MV.mxd

Map 3

Arkell Road Properties Environmental Impact Study

Bat Monitoring Stations



Legend

- Subject Property
- Potential Maternity Roost Building
- Candidate Bat Maternity Roost Tree
- Bat Exit Survery Visual and Acousitic Monitoring Station
- Camera Orientation
- B — Bat Foraging Habitat Acoustic Monitoring Station
- NRSI Biologist Visual Monitoring Station

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Project: 1771
Date: November 3, 2021

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

N

0 10 20 30 40 50 60 Metres

565100 565200 565300

4819900

4818800

SWD4

SWD3-2

H

FOD8-1

SWD4

CUM

CUT

SWM1-1

Residential

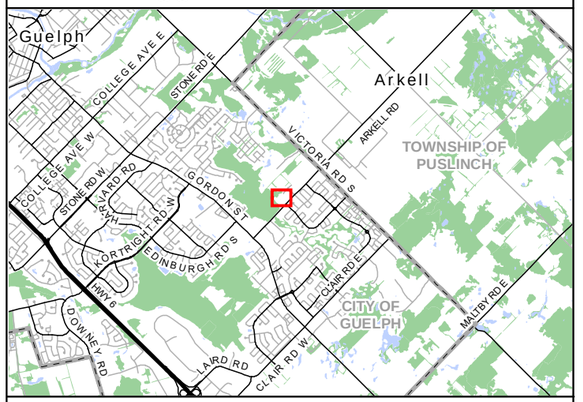
ARKELL ROAD

SUMMERFIELD DRIVE

Map 4

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: October 28, 2021

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

0 10 20 30 40 50 60 Metres

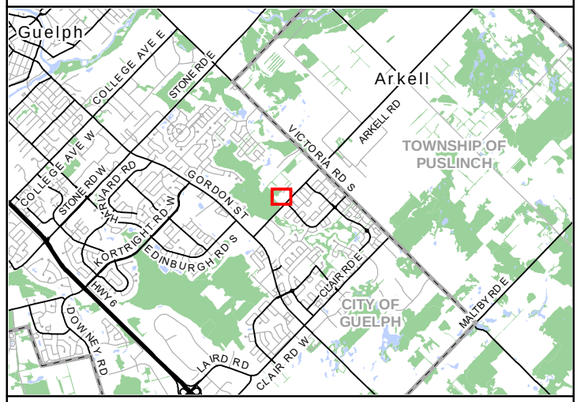
N

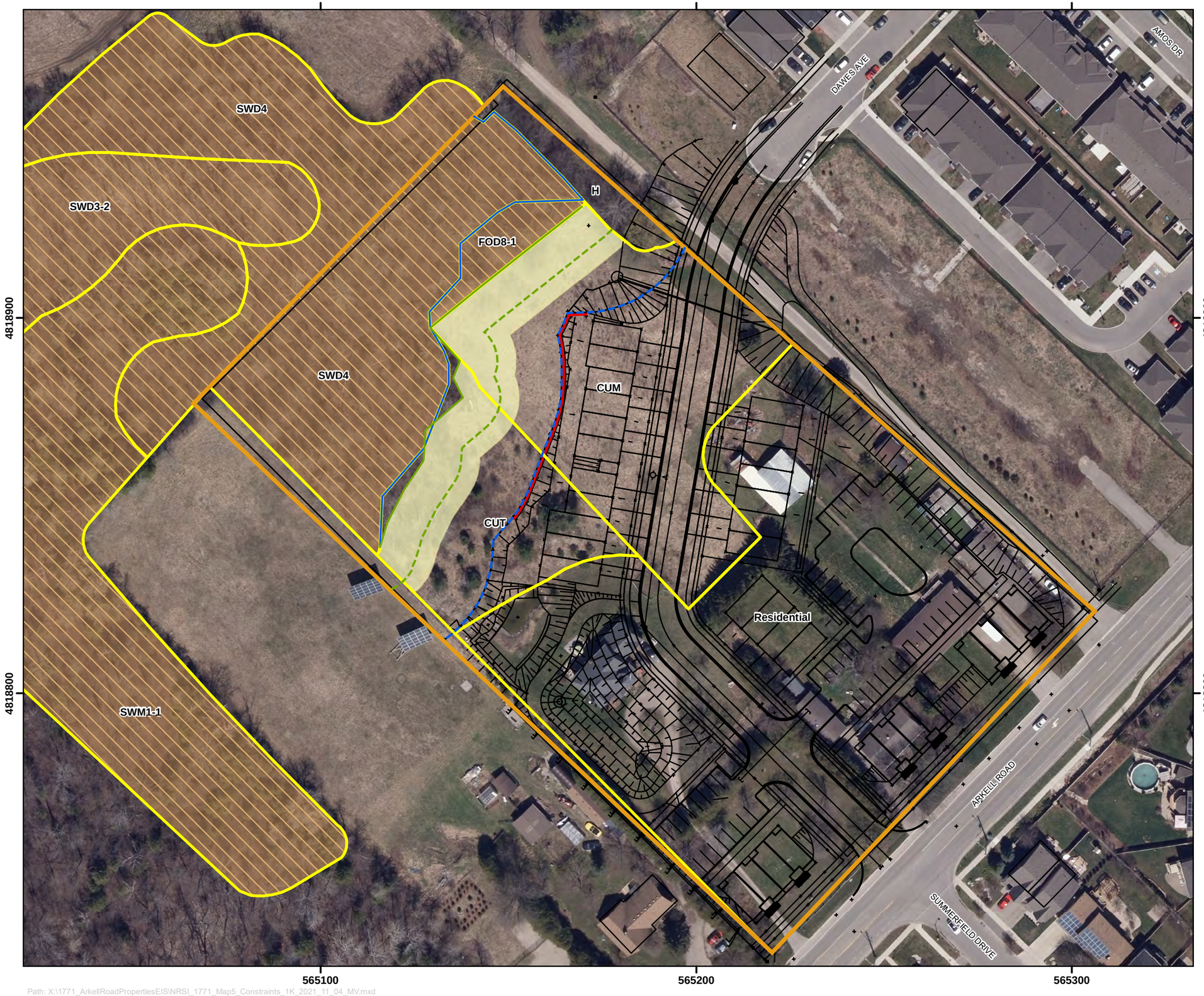
Path: X:\1771_ArkellRoadPropertiesEIS\NRSI_1771_Map4_ELC_NatFeatures_1K_2021_10_28_LEH.mxd

Map 5

Arkell Road Properties Environmental Impact Study

Natural Heritage Constraints





Legend

- Subject Property
- Proposed Development
- Proposed Retaining Wall
- 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 (30m)

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: November 4, 2021

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

0 10 20 30 40 50 60 Metres

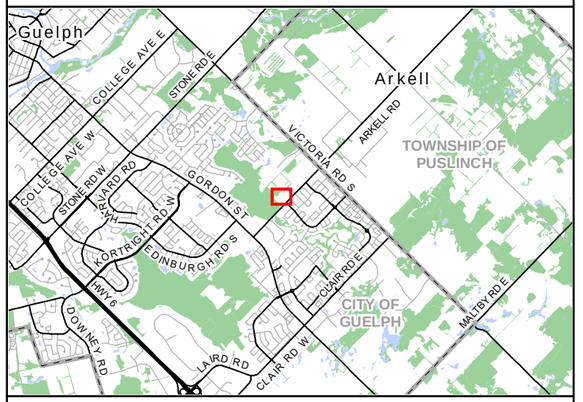
N

Path: X:\1771_ArkellRoadPropertiesEIS\NRSI_1771_Map5_Constraints_1K_2021_11_04_MV.mxd

Map 6

Arkell Road Properties Environmental Impact Study

Habitat Stewardship Plan



Legend

- Subject Property
- Proposed Development
- Proposed Retaining Wall
- 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 (30m)
- NHS and Buffer Enhancement Area
- 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: November 8, 2021

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

0 10 20 30 40 50 60 Metres

N

565100 565200 565300

4819900 4818800

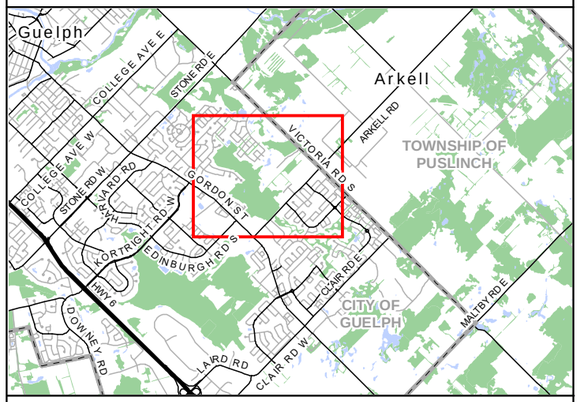
SWD4 SWD3-2 Torrence Creek Provincially Significant Wetland Complex SWD4 SWM1-1 H FOD8-1 CUM CUT Residential DAWES AVE AMOS DR ARKELL ROAD SUMMERFIELD DRIVE

Path: X:\1771_ArkellRoadPropertiesEIS\NRSI_1771_Map6_HabitatStewardshipPlan_1K_2021_11_08_MV.mxd

Map 7

Arkell Road Properties Environmental Impact Study

Ongoing and Future Development in the PSW Catchment



Legend

- 190-219 Arkell Road Subject Property
- Ongoing Development
- Future Development
- Primary Road
- Secondary Road
- Permanent Watercourse
- Provincially Significant Wetland (PSW)

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Project: 1771
Date: November 10, 2021

NAD83 - UTM Zone 17
Size: 11x17"
1:8,000

0 100 200 300 400 500 Metres

N

Path: X:\1771_ArkellRoadPropertiesEIS\NRSI_1771_Map7_Development_8K_2021_11_10_GCS.mxd