



Final

River Mill – Phases 4 and 5, Cambridge

Environmental Impact Study

Prepared for:

River Mill Development Corporation
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NATURAL RESOURCE SOLUTIONS INC.

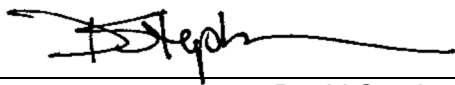
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Table of Contents

1.0	Introduction	1
1.1	Proposed Undertaking	2
1.2	Project Scoping	3
1.2.1	Collection and Review of Background Information	3
1.2.2	Preliminary Field Investigations	4
1.2.3	Significant Species Screening	4
1.2.4	Significant Wildlife Habitat Screening	5
1.2.5	Terms of Reference and Agency Input	6
1.3	Background Site Conditions	6
1.3.1	Central Parcel Conditions	7
1.3.2	Northern Parcel Conditions	7
2.0	Relevant Policies, Legislation and Planning Studies	9
3.0	Field Methods	14
4.0	Existing Conditions	18
4.1	Soil, Terrain and Drainage	18
4.2	Vegetation	19
4.2.1	Vegetation Communities	19
4.2.2	Vascular Flora	26
4.2.3	Tree Inventory	27
4.3	Wildlife	27
4.3.1	Birds	27
4.3.2	Herpetofauna	29
4.3.3	Mammals	31
4.3.4	Butterflies	32
4.3.5	Odonates	33
4.3.6	Bumblebees	34
4.3.7	Terrestrial Crayfish	34
4.4	Aquatic Habitat and Fish Community	35
4.4.1	Aquatic Habitat	35
4.4.2	Water Temperature Monitoring	36
4.4.3	Fish Community	38
5.0	Significance of Natural Features	40
5.1	Provincially Significant Wetlands	40

5.1.1	Wetland Hydrology.....	40
5.2	Significant Woodlands.....	41
5.3	Watercourse and Floodplain	42
5.4	Habitat of Threatened and Endangered Species.....	43
5.5	Significant Wildlife Habitat	44
5.5.1	Confirmed Significant Wildlife Habitat	44
5.5.2	Candidate Significant Wildlife Habitat	47
5.6	Fish Habitat.....	48
5.7	Locally Significant Species	49
5.8	Buffers	49
5.8.1	Provincially Significant Wetland Buffers	50
5.8.2	Woodlands Buffers	50
5.8.3	Watercourse Buffers	51
5.9	Linkages.....	51
5.9.1	Middle Creek Corridor.....	51
5.9.2	Wetland/Woodland Linkage	52
6.0	Habitat Creation and Restoration.....	55
6.1	Proposed Wetland and Forest Habitat Creation Plan	55
6.1.1	Forest Habitat Restoration	56
6.1.2	Wetland Creation and Restoration	57
6.2	Plantation Management	58
6.3	Benefits to Plants and Animals	59
7.0	Impact Analysis	61
7.1	Approach to Impact Analysis	61
7.2	Phase 4 Impact Analysis.....	62
7.2.1	Direct Impacts and Mitigations	62
7.2.2	Indirect Impacts and Mitigations.....	64
7.2.3	Induced Impacts and Mitigations.....	69
7.2.4	Phase 4 Impact Assessment Summary.....	69
7.3	Phase 5 Impact Analysis.....	75
7.3.1	Direct Impacts and Mitigations	75
7.3.2	Indirect Impacts and Mitigations.....	77
7.3.3	Induced Impacts and Mitigations.....	81
7.3.4	Phase 5 Impact Assessment Summary.....	82
7.4	Cumulative Impacts.....	88

7.5	Monitoring Plan	90
7.5.1	Pre-Construction Monitoring	90
7.5.2	During Construction Monitoring.....	90
7.5.3	Post-Construction Monitoring.....	91
7.5.4	Restoration and Enhancement Areas	91
8.0	Summary and Conclusions	92
9.0	References.....	94

List of Tables

Table 1.	Relevant Policies, Legislation and Planning Studies.....	10
Table 2.	Field Survey Summary	15
Table 3.	Vegetation Community Descriptions.....	20
Table 4.	Anuran Call Survey Results from 2019.....	30
Table 5.	Aquatic Habitat Assessment Results.....	35
Table 6.	Water Quality Parameters and Sampling Conditions During Fish Sampling in Middle Creek on July 29 2019	38
Table 7.	Fish Capture Results for Middle Creek in 2019	39
Table 8.	Summary of the Candidate and Confirmed SWH within the Subject Lands	48
Table 9.	Summary of Significant Natural Features within the Subject Lands	53
Table 10.	Summary of Potential Development Impacts and Mitigation for Phase 4	70
Table 11.	Summary of Potential Development Impacts and Mitigation for Phase 5.....	83

List of Figures

Figure 1.	Middle Creek Water Temperature Monitoring (April-November 2019)	37
Figure 2.	Thermal Nomogram for Thermal Regime Determination Middle Creek 2019.....	37

Maps

- Map 1. Study area and Designated Significant Natural Features
- Map 2. Monitoring Station Locations
- Map 3. Vegetation Communities
- Map 4. Significant Natural Features
- Map 5. River Mill Natural Heritage System
- Map 6. Significant Natural Features and Phase 4 Proposed Concept Plan

List of Appendices

Appendix I Proposed Concept Plan for the Development

Appendix II Species at Risk and Species of Special Concern Screening Tables

Appendix III Significant Wildlife Habitat Screening Tables

Appendix IV Terms of Reference and Agency Comments

Appendix V Detailed Vegetation Management Plans

Appendix VI Vascular Flora Species Reported from the Study Area

Appendix VII Bird Species Reported from the Study Area

Appendix VIII Herpetofauna Species Reported from the Study Area

Appendix IX Mammal Species Reported from the Study Area

Appendix X Butterflies Species Reported from the Study Area

Appendix XI Odonate Species Reported from the Study Area

Appendix XII Bumblebee Species Reported from the Study Area

Appendix XIII Aquatic Habitat Photo Log

Appendix XIV Fish and Mussel Species Reported from the Study Area

Appendix XV Evaluation of Candidate Significant Wildlife Habitat for Monarch

Appendix XVI Wetland and Forest Habitat Creation Plan

1.0 Introduction

Natural Resource Solutions Inc. (NRSI) was retained by River Mill Development Corporation to complete an Environmental Impact Study (EIS) for a proposed mixed-use development, referred to as the “River Mill Community” in Cambridge, Ontario.

The approximately 49.4 ha area, hereafter referred to as the ‘Subject Lands’, is comprised of five separate parcels, and is generally bounded by Speedsville Road to the west, Maple Grove Road to the north, Briardean Road to the east (with the exception of one parcel, 875 Briardean Road, which is east of Briardean Road) and Equestrian Way to the south (Map 1).

The designation for these lands in the City of Cambridge Official Plan (2018a) is Future Urban Reserve, Natural Open Space, and Low/Medium and High Density residential. The zoning classifications of the Subject Lands are currently OS1 (environmentally significant and conservation areas), A1 (agricultural farm), RM3 (apartment house), and RR1 (rural non-farm-related dwellings outside settlements) (City of Cambridge 2018a). Therefore, the proposed development will require Official Plan and Zoning By-law amendments.

The large central parcel and the areas of the Subject Lands south of Briardean Road, were previously included in the approved Hunt Club - Phase 3 Draft Plan of Subdivision (30T-12103 and 30T-12104). An EIS was prepared for these lands in support of the Hunt Club - Phase 3 development (Savanta Inc. 2012).

Information on designated natural areas was obtained from the GRCA (2019), MNRF (2014a), Regional Municipality of Waterloo (2010), and City of Cambridge (2018a). Natural features within and adjacent to the Subject Lands include wetlands that form part of the Maple Grove Road Provincially Significant Wetland (PSW) Complex, Middle Creek, floodplains, and woodlands (Map 1). In addition, the MNRF has mapped the southern and eastern woodlands within the Subject Lands as Significant Wildlife Habitat (SWH) - Stratum II deer wintering areas (MNRF 2018). The wetlands, creek, and floodplain are regulated by the GRCA under Ontario Regulation 150/06 (2006). Collectively, these natural features are identified as Core Environmental Features by the Region of Waterloo (2015) and by the City of Cambridge as being within the Natural Open Space System (2018a) (Map 1). Development Applications for lands adjacent to these natural features trigger the requirement for an EIS by the GRCA, Region of Waterloo, and City of Cambridge.

Technical studies, relevant to other aspects of the development such as planning, stormwater management (SWM), engineering etc. have been prepared by the consulting team and have been used to supplement the natural feature characterization and assess potential impacts to natural features. The consulting team is comprised of:

- T. Johns Consulting Group (Planning),
- MTE (Surveying and Topography, Hydrogeologic Characterization, SWM Planning, Servicing),
- Englobe and Landtek (Geotechnical Report)
- NRSI (Natural Heritage).

Additional team members have been retained to undertake studies related to archeology, noise assessment, traffic, etc.

1.1 Proposed Undertaking

The proposed River Mill Community will be an approximately 49.7ha residential and mixed-use development, which will be an extension of the Hunt Club Estates development subdivision currently under construction to the south and east. The River Mill Community will include a mix of residential densities, with single detached, medium, and high-density residential blocks, as well as a mixed-use block, a neighbourhood park block, stormwater management facility blocks, and the NHS. A trail system will run throughout the neighbourhood and connect the development with the NHS, via trails in the natural heritage feature buffers and the floodplain. The development will include a new municipal right-of-way connecting Speedsville Road and Equestrian Way. Municipal water and sanitary services will also be installed for the development.

The proposed development, includes two separate Draft Plans: River Mill West (Phase 4) (Draft Plan DP1-1) and River Mill East (Phase 5) (Draft Plan DP2-1), on the east side of Middle Creek. The concept plans prepared by T. Johns Consulting Group (dated October 2020) for both the River Mill Community's Draft Plans (Phase 4 'West' and Phase 5 'East') are provided in Appendix I. This EIS is being prepared and submitted in support of both proposed Draft Plans. The Natural Heritage Characterization and assessment of Significant Natural features in this report (sections 3.0, 4.0, and 5.0) are presented for the Subject Lands as a whole (i.e. both Draft Plan areas), while the Impact Assessment (Section 7.0) is presented for the two Draft Plan areas separately.

1.2 Project Scoping

1.2.1 Collection and Review of Background Information

For the purposes of this report, the term “Subject Lands” refers to the lands owned by the proponent including the area where the River Mill Community development is proposed to occur. The term “Study area” refers to the Subject Lands plus the surrounding area (approximately 120m) for which additional information was collected and reviewed (as could be gathered without direct access to these areas). The broader Study area ensures that natural features beyond the Subject Lands are considered. Aside from the Middle Creek corridor and portions of the Maple Grove Road PSW to the north and south of the Subject Lands, the surrounding lands are largely already developed as residential, commercial, or agricultural lands, or are currently in development. Legacy data collected from agencies and wildlife atlases was also collected from an area of approximately 1km around the Subject Lands to ensure that all surrounding natural features were considered.

In order to determine a study approach for the EIS, existing natural heritage information was first gathered and reviewed to identify key natural heritage features and species that are known or have potential to occur within the Study area. NRSI collected existing background information on the biological features for the Subject Lands and Study area. This included rare species/community information from the following sources:

- City of Cambridge Official Plan (2018a);
- Region of Waterloo Official Plan (2015);
- Hespeler West Subwatersheds Study (HWSS) Summary Report (HWSS Working Committee 2004) and the HWSS Study (PEIL 2004)
- Environmental Impact Study for the Hunt Club Inc. and Arriscraft Lands (Savanta Inc. 2012);
- MNRF Species at Risk (SAR) List for Waterloo Region (2018);
- MNRF SAR list for the City of Cambridge (2019a);
- GRCA – Grand River Conservation Network: Interactive Mapping Tool (2019);
- MNRF Make A Map: Natural Heritage Areas online mapping tool (MNRF 2014a);
- Government of Canada Species at Risk Act (SARA) Registry (2019);
- Ontario Breeding Bird Atlas (BSC et al. 2008);
- Ontario Reptile and Amphibian Atlas (ORAA) (Ontario Nature 2019);
- Atlas of the Mammals of Ontario (Dobbyn 1994);

- Fisheries and Oceans Canada - Aquatic SAR Mapping (2019);
- Ontario Butterfly Atlas (MacNaughton et al. 2019);
- Ontario Odonata Atlas (MNRF 2019d).

Species lists were compiled to provide information on species reported from within the vicinity of the Study area based on data available from the wildlife atlases listed above. These atlases provide data based on 10x10 km survey squares. Information on species from the survey squares that overlap with the Study area were compiled.

In addition, specific natural heritage background information was requested from the MNRF Guelph District Office and the GRCA. NRSI received background information confirming the absence of regulated Species at Risk (SAR) habitat on the northern parcel from the MNRF on July 25, 2018 (G. Buck, pers. comm. 2018). NRSI received additional background information for the Study area from the MNRF on March 10, 2019. The background information and these initial species lists were used to guide the scope and type of wildlife field surveys required.

1.2.2 Preliminary Field Investigations

NRSI completed a natural information background review as well as preliminary field investigations on the northern parcel of the Subject Lands in 2018 to support the then Hunt Club Valley Inc.'s due diligence studies and ultimate purchase of that property for inclusion in the proposed River Mill Community. The information gathered during these preliminary field investigations on the northern parcel is included in this report, and informed the screenings for significant species and habitats, described below.

1.2.3 Significant Species Screening

Based on the compiled species lists for the Study area, a screening exercise was completed to assess the potential for reported SAR and Species of Conservation Concern (SCC) to occur in the Study area. This involved cross-referencing the preferred habitat for reported SAR and SCC (MNRF 2000) against habitats known to occur in the Study area. This exercise was completed to ensure that the potential presence of all SAR and SCC within the Study area was adequately assessed in this study.

Species at Risk are those listed on the SAR in Ontario List (SARO) (MNRF 2019b). 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, 2007*

(ESA), which includes protection of their habitat, and are referred to as regulated SAR. Species listed as Special Concern are included in the definition of SCC, which comprises 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 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.

Based on the preliminary background review, suitable habitats for SAR and SCC were identified as potentially present within the Study area. Full SAR/SCC screening results are provided in Appendix II.

1.2.4 Significant Wildlife Habitat Screening

A screening exercise was completed to assess the presence of SWH within the Study area. SWH is protected under the Ontario Provincial Policy Statement (PPS) (OMMAH 2020) and is described in the MNRF Significant Wildlife Habitat Technical Guide (SWHTG) (MNRF 2000) as being comprised of four major categories of habitat:

- Seasonal concentration areas;
- Rare vegetation communities and specialized wildlife habitat;
- Habitats of species of conservation concern; and
- Animal movement corridors.

Specific criteria defining wildlife habitat significance for Ecoregion 6E are described in the SWHTG Addendum (MNRF 2015). Individual SWH types within these four broad categories were assessed as either not present, candidate, or confirmed for the Study area based on a comparison of significance criteria against relevant background information.

Based on the preliminary background review, one SWH type was identified as confirmed and 12 SWH types were identified as candidate within the Subject Lands. Full SWH screening results are provided in Appendix III.

1.2.5 Terms of Reference and Agency Input

Based on the findings described above, a Terms of Reference (TOR) for the EIS was prepared by NRSI and submitted to the GRCA, City of Cambridge, Region of Waterloo, and Ministry of Natural Resources and Forestry (MNRF) on April 9, 2019 for review and comment. The TOR was also sent to the Ministry of Environment, Conservation, and Parks (MECP) on October 18, 2019. Agency comments were provided to NRSI on the study approach (GRCA on May 8, City of Cambridge on May 13, Region of Waterloo on July 9, MNRF on May 13, MECP on October 18, 2019). Subsequently, NRSI amended the TOR and provided an updated version to all agencies on October 7, 2019. The final TOR and agency comments are appended to this report (Appendix IV).

1.3 Background Site Conditions

The majority of the northern parcel is characterized as active row crop agricultural lands. The large central parcel and the areas south of Briardean Road were formerly licensed mineral aggregate resource extraction areas (License #: 5537 and 46162; active until August 14, 2017). The small parcel at the corner of Speedsville and Briardean Roads (1285 Speedsville Road) was previously the site of a commercial concrete business; however, this building has recently been removed. The small parcel east of Briardean Road (875 Briardean Road) is an existing single residential dwelling. The west-east portion of the existing municipal right-of-way, Briardean Road, which runs through the Subject Lands, has been permanently closed and is being restored to wetland as part of an agreement for the Hunt Club – Phase 3 Draft Plan of Subdivision 30T-12103 and Hunt Club - Phase 3 (Arriscraft) Draft Plan of Subdivision (30T-12104). The remainder of the Subject Lands consists of natural and cultural areas including wetlands that form part of the Maple Grove Road PSW Complex, Middle Creek, floodplains, cultural meadows, and woodlands. The existing upland woodlands on the Subject Lands are approximately 50% plantation. Natural woodlands within the Subject Lands are associated with the watercourse and wetlands.

Alterations to natural features within the Subject Lands have occurred in recent years, prior to the NRSI's field investigations for this EIS. These alterations, which occurred as a result of aggregate extraction activities (central parcel) and ongoing agricultural activities (northern parcel), are described, below. The current conditions for the Subject Lands, as documented by NRSI and described in Section 4.0, reflect these changes.

1.3.1 Central Parcel Conditions

Within the central parcel, vegetation clearing and grading, permitted under the former aggregate extraction license, led to the removal of four Locally Significant Natural Areas (west-east hedgerows), as well as a portion of an isolated wetland within the Maple Grove Road PSW. The portion of the wetland, mapped and described by Savanta in their 2012 EIS as Common Reed Mineral Shallow Marsh (Savanta Inc. 2012), was removed up to the northern limit of the aggregate extraction license area. As seen through available Google Earth aerial imagery for the Subject Lands, these activities appear to have occurred between September, 2016 and May, 2017, prior to the August 21, 2017 closure of aggregate extraction operations and therefore were permitted under the aggregate extraction license under the *Aggregate Resources Act* (Government of Ontario 1990).

A Proposed Wetland and Forest Habitat Creation Plan for the Subject Lands, which will mitigate for vegetation removals, and provide habitat enhancements, is discussed in Section 6.0.

1.3.2 Northern Parcel Conditions

Within the northern parcel, vegetation removal was completed by the farmer in the fall or winter of 2018-2019 (following NRSI's 2018 preliminary field investigations) to expand the area available for row crop agriculture. Google Earth aerial imagery for the Subject Lands indicates that the activities in the northern parcel, described in further detail below, occurred sometime after July, 2018 and before June, 2019.

The remainder of the isolated PSW, the south portion of which was removed through aggregate activities, as described above, was cleared and put into agricultural production. The HWSS identified this wetland as Mineral Meadow Marsh (HWSS Working Committee 2004), although in 2018 NRSI's preliminary field investigations determined it to be largely treed swamp with a small portion of meadow marsh. NRSI did not delineate the boundary of this wetland prior to its removal, however, based on an assessment of soils in the area of this wetland conducted by NRSI on April 24, 2020, the wetland appeared to be approximately 0.55ha in size.

The wooded area running along the south side of Maple Grove Road, identified by NRSI in preliminary surveys as Fresh-Moist Lowland Deciduous Forest, and identified as a Core Environmental Feature, was largely cleared, with approval from the City (Padgett pers. comm., 2019). This expanded the agricultural field further to the north and left a narrow hedgerow along the road. During a site walk with the City and Region to review natural feature boundaries

within the Subject Lands, Region of Waterloo staff confirmed that the remaining trees in this new hedgerow do not meet the woodland definition in the Region's tree conservation By-law 08-026 (Regional Municipality of Waterloo 2008) and would not be included in the woodlands feature (Hovingh pers. comm., 2019). The City also confirmed that the remaining trees would not constitute a Locally Significant Natural Area (LSNA) under the City's Official Plan (Padgett pers. comm., 2019).

Portions of the Maple Grove Road PSW and woodlands were also cleared along both the west and east sides of the Middle Creek Corridor. Impacted vegetation communities included a 0.06ha Forb Mineral Meadow Marsh and Fresh-moist Willow Lowland Deciduous Forest.

A Proposed Wetland and Forest Habitat Creation Plan for the Subject Lands, which will mitigate for vegetation removals, and provide habitat enhancements, is discussed in Section 6.0.

2.0 Relevant Policies, Legislation and Planning Studies

For the purposes of this report, information on the natural heritage features within the Subject Lands was collected and assessed for significance. To help inform suitable land-use concepts, guide the layout of development, and identify areas to be protected, these features were evaluated against relevant policies, legislation, and planning studies. The specific implications of these policies to the study are discussed in further detail later on in the report. Table 1 provides an overview of policies that were considered and which informed the field program and analysis.

Table 1. Relevant Policies, Legislation and Planning Studies

Policy/Legislation	Description	Project Relevance
Provincial Policy Statement (PPS) (OMMAH 2020)	<ul style="list-style-type: none"> • Issued under the authority of Section 3 of the Planning Act, the current PPS came into effect on May 1, 2020, replacing the PPS issued April 30, 2014 (OMMAH 2005). • Section 2.1 of the PPS – Natural Heritage establishes clear direction on the adoption of an ecosystem approach and the protection of resources that have been identified as ‘significant’. • The Natural Heritage Reference Manual (MNRF 2010) and the Significant Wildlife Habitat Technical Guide (SWHTG) (MNR 2000, MNRF 2015b) were prepared by the MNRF to provide guidance on identifying natural features and in interpreting the Natural Heritage sections of the PPS. 	<ul style="list-style-type: none"> • Several natural features were identified within the Subject Lands or on adjacent lands as having potential implications under the PPS: <ul style="list-style-type: none"> ○ Significant Wetlands; ○ Significant Woodland; ○ Candidate habitat for Endangered and Threatened species; ○ Confirmed SWH; and ○ Fish Habitat.
<i>Endangered Species Act</i> (ESA) (Government of Ontario 2007)	<ul style="list-style-type: none"> • The original ESA, written in 1971, underwent a year-long review which resulted in a number of changes which came into force in 2007. • The ESA prohibits killing, harming, harassing, or capturing SAR and protects their habitats from damage and destruction. • Ontario Regulation 242/08 under the ESA applies to all species on the Species at Risk in Ontario List, as of June 2, 2017. 	<ul style="list-style-type: none"> • Butternut (<i>Juglans cinerea</i>) was confirmed within the Subject Lands. • Candidate suitable habitat for Jefferson Salamander, Unisexual Ambystoma Jefferson dependent population, Little Brown Myotis (<i>Myotis lucifungus</i>), Northern Myotis (<i>Myotis septentrionalis</i>) and Tri-colored Bat (<i>Perimyotis subflavus</i>) are present within the Subject Lands.
<i>Migratory Birds Convention Act</i> (MBCA) (Government of Canada 1994)	<ul style="list-style-type: none"> • The MBCA protects migratory game birds, insectivorous birds, and several other migratory non-game birds from persecution in the form of harassment. • The schedule of on-site work must consider MBCA windows, with timing of breeding bird season typically occurring between May 1 and July 31; however, this is a guideline, since the MBCA applies to nesting bird species (CWS 2012) 	<ul style="list-style-type: none"> • Species protected by the MBCA were identified in background screening for the Subject Lands. • The timing of construction activities, especially vegetation clearing must have consideration for the MBCA.

Policy/Legislation	Description	Project Relevance
	<ul style="list-style-type: none"> “Incidental take” is considered illegal, with the exception of a permit obtained by the Canadian Wildlife Service (CWS 2012). 	
<i>Fish and Wildlife Conservation Act (FWCA)</i> (Government of Ontario 1997)	<ul style="list-style-type: none"> The FWCA provides protection for certain bird species, not protected under the MBCA (i.e. raptors), as well as furbearing mammals and their dens or habitual dwellings, aside from the Red Fox (<i>Vulpes vulpes</i>) and Striped Skunk (<i>Mephitis mephitis</i>). 	<ul style="list-style-type: none"> The timing of construction activities, especially vegetation clearing and site grading must have consideration for bird nesting and den sites for furbearing mammals.
<i>Fisheries Act</i> (Government of Canada 1985)	<ul style="list-style-type: none"> The Fisheries Act includes protections for fish and fish habitat in the form of standards, codes of practice, and guidelines for projects near water. Any proposed work, undertaking, or activity should aim to avoid causing the death of fish, or the harmful alteration, disruption or destruction of fish habitat through the course or as a result of any proposed undertaking. Fish habitat is defined as “spawning grounds and any other areas, including nursery, rearing, food supply and migration areas, on which fish depend directly or indirectly in order to carry out their life processes”. Manages threats to the sustainability and productivity of Canada’s commercial, recreational and Aboriginal fisheries. The Act prohibits “serious harm to fish” including destruction of habitat DFO has developed an online, self-assessment tool, where proponents can determine whether their projects require DFO review based on the type of water body the work is occurring in and the nature of the proposed activity. 	<ul style="list-style-type: none"> Middle Creek provides direct fish habitat. If there is any proposed work below the high-water mark or in the channel itself, a self-assessment screening will be required to determine whether a request for review by DFO is required.
Grand River Conservation	<ul style="list-style-type: none"> Regulation issued under <i>Conservation Authorities Act</i>, R.S.O. 1990 (Government of Ontario 1990b) 	<ul style="list-style-type: none"> Middle Creek and associated floodplain within the Subject Lands are regulated by the GRCA.

Policy/Legislation	Description	Project Relevance
<p>Authority Ontario Regulation 150/06 (Government of Ontario 2013)</p>	<ul style="list-style-type: none"> 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 <i>Standards for Wetlands</i> where development is proposed within 120m of PSW or 30m of non-PSW (GRCA 2005). 	<ul style="list-style-type: none"> Wetlands within the Subject Lands are identified as within the Maple Grove Road Provincially Significant Wetland (PSW) Complex and are regulated by the GRCA. In accordance with this policy, proposed developments 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 their regulation areas.
<p>Region of Waterloo Official Plan (Region of Waterloo 2015)</p>	<ul style="list-style-type: none"> The recently approved Region of Waterloo Official Plan includes policies related to the natural environment through the conservation and enhancement of the Region's sensitive natural areas and native biodiversity, and the promotion of informed stewardship. Core Environmental Features are identified on Map 4 – Greenlands Network within the Region of Waterloo Official Plan (2015) as environmental features which are considered provincially or regional significant. 	<ul style="list-style-type: none"> Core Environmental Features identified on Map 4 – Greenlands Network in the Region of Waterloo Official Plan (2015) are present within the Subject Lands. Candidate habitat for Endangered or Threatened species, which have been identified within the Subject Lands, if confirmed, are also considered Core Environmental Features (Region of Waterloo 2015). Fish habitat is also present within the Subject Lands.
<p>City of Cambridge Official Plan (2018a)</p>	<ul style="list-style-type: none"> The Region of Waterloo approved the Cambridge Official Plan in 2012. A consolidated Official Plan, including amendments and outstanding amendments, was published in September, 2018. The City of Cambridge Official Plan (2018a) outlines current policies for the protection of the City's natural heritage resources. 	<ul style="list-style-type: none"> The City of Cambridge Official Plan includes policies for the protection of regional Core Natural Heritage Features within the Subject Lands. Locally Significant Natural Areas are also present within the Subject Lands.
<p>City of Cambridge Private Tree Preservation By-law 124-18 (2018b)</p>	<ul style="list-style-type: none"> Aims to regulate tree protection within City limits, and to enhance tree canopy cover in the City. A permit is required to destroy, injure, or cause, the destruction or injuring of any $\geq 20\text{cm}$ diameter at breast height (DBH). 	<ul style="list-style-type: none"> A tree inventory and Detailed Vegetation Management Plan (DVMP) are required to demonstrate how isolated, and hedgerow trees remaining within the proposed development area will be protected from injury, while outlining a replanting and compensation plan for trees proposed for removal.

Policy/Legislation	Description	Project Relevance
<p>Hespeler West Subwatersheds Summary Report (HWSS Working Committee 2004) and the HWSS Study (PEIL 2004)</p>	<ul style="list-style-type: none"> • PEIL completed the Hespeler West Subwatersheds (HWSS) Study in October 2002, and updated the Study in September 2004. • The HWSS Summary Report, was produced by the HWSS Working Committee in response to concerns raised by landowners about the PEIL HWSS Study. The HWSS Summary Report relies on the updated HWSS Report (PEIL 2004) for background information, but incorporates key updates and supercedes the HWSS (PEIL) report. • The HSWW Summary Report outlines existing conditions in the East, Middle and West Creek subwatersheds and provides management objectives to ensure future urban development in the City of Cambridge proceeds in an environmentally sustainable manner. The Subwatershed Management Strategy provides an appropriate set of management strategies to achieve these objectives. 	<ul style="list-style-type: none"> • The HWSS Summary Report proposed the following buffers, which are applicable to natural features within the Subject Lands: <ul style="list-style-type: none"> ○ 30m buffers adjacent to the boundary of PSWs ○ 15 from the 'top of bank' for Middle Creek • Rather than prescribe buffers for Other High Constraint Areas (upland woodlots, plantations, steep slopes, and seepage areas), the HWSS Summary Report proposed that context sensitive buffers be developed for proposed urban developments within the HWSS (2004). • Enhancement areas were also identified within the Subject Lands in the HWSS Study (PEIL 2004).

3.0 Field Methods

Field surveys were undertaken within the Subject Lands to characterize natural features and identify significant and sensitive natural heritage features and species that have potential to be adversely affected by the proposed development. A total of 10 field visits were completed on the northern parcel in 2018, while another 31 field visits were completed within the Subject Lands between April 2019 and February, 2020. A variety of field surveys were undertaken which are described in detail below and summarized in Table 2.

Survey methods, undertaken in accordance with provincial and local guidance documents, are described in detail in the TOR appended to this report (Appendix IV).

Detailed methods for the tree inventory are provided in the Detailed Vegetation Management Plans (DVMPs) provided in Appendix V.

Table 2. Field Survey Summary

Survey Type	Protocol	Northern Parcel (2018)		All Parcels (2019)	
		Date	Observer(s) ¹	Date ²	Observer(s) ¹
Vegetation					
Vegetation Community Mapping	Lee et al. 1998	June 12	TMB	May 7	TMB
		-	-	May 13	TMB, AMD
		-	-	July 4	KRE, SLH
		-	-	September 30	PWD
Vascular Flora Inventories ³	Systematic search by ELC polygon	June 12	TMB	May 7	TMB
		-	-	May 13	TMB, AMD
		-	-	July 4	KRE, SLH
		-	-	August 13	DES, JIM
		-	-	August 14	DES, JIM
		-	-	September 30	PWD
Wetland Boundary and Dripline Flagging	MNRF 2014b	-	-	August 13	DES, JIM
		-	-	August 14	DES, JIM
Historical PSW Wetland Boundary Delineation	Mapped with soils using ELC (Lee et al. 1998)	-	-	April 24, 2020	DES, LEH
Wetland Boundary Review and Confirmation	N/A	-	-	August 19	JIM, NGH, GRCA
Dripline Review and Confirmation	N/A	-	-	August 19	JIM, NGH, City of Cambridge, Region of Waterloo
		-	-	September 23	NGH, City of Cambridge, Region of Waterloo
Tree Inventory	Systematic search of Subject Lands	-	-	April 24	JML, EY
		-	-	October 4	JML, KRE, JP
		-	-	October 17	JML, TMB, DLF
		-	-	May 19, 2020	JML
Bird Surveys					
Breeding Bird Survey	OBBA 2001	June 7	TMB	May 31	TMB, KLHM, OMMF

Survey Type	Protocol	Northern Parcel (2018)		All Parcels (2019)	
		Date	Observer(s) ¹	Date ²	Observer(s) ¹
		June 20	CT, JVT	June 17	KSR, JEP
		July 3	KDM	July 4	KRE, SLH
		May 31	CLH, JVT	June 26	KSR, MH
Common Nighthawk Survey	MNR Guelph District 2013	June 11	KDM, CMP	July 3	TMB, JMO
		June 20	GKM	July 5 ³	PWD, JAS
		Reptile and Amphibian Surveys			
Anuran Call Survey	BSC 2008	-	-	April 30	GKM, AER
		-	-	May 15	JKP, AER
		-	-	June 25	JMF, JMO
Salamander Breeding Habitat Assessment and Salamander Egg Mass Survey	Jefferson Salamander Recovery Team 2013	-	-	April 23	EGM, AER
Turtle Nesting Survey	MNRG Guelph District 2016a	May 31	CLH, JVT	June 19	SGB, AMC
		June 1	TMB	June 20	NA, JAS
		June 7	KDM	June 25	JMF, JMO
		June 13	PPA	June 26	KSR, MH
		June 14	TNL, CMP	July 3	TMB, JMO
		-	-	July 5	PWD, JAS
Artificial Cover Object Snake Survey	MNRG 2016b	June 7 (Boards Placed)	KDM	April 23 (Boards Placed)	EGM, AER
		June 11	KDM, CMP	May 7	TMB, AER
		June 20	GKM	May 31	TMB, KLHM, OMMF
		July 3	KDM	June 17	KRE, JEP
		July 5	CT, EGM	July 4	KRE, SLH
Mammal Surveys					
Winter Wildlife Survey	Systematic search by ELC polygon	-	-	January 17, 2020	NGM, AER
		-	-	February 1, 2020	NGM, AMD
		-	-	February 15, 2020	NGM, AER

Survey Type	Protocol	Northern Parcel (2018)		All Parcels (2019)	
		Date	Observer(s) ¹	Date ²	Observer(s) ¹
American Badger Burrow Survey	Diemer pers. comm. 2016, Sayers 2017	May 31	CLH, JVT	April 22 ⁴	EGM, AER
		July 3	KDM	May 13 ⁴	TMB, AMD
		June 1 ⁴	TMB	July 4 ⁴	KRE, SLH
Bat Habitat Assessment	MNR 2011, MNRF 2017	-	-	May 7	EGM, JAS
Insect Surveys					
Insect Survey	Colla and Taylor-Pindar 2011, and systematic search by ELC polygon	July 5	CT, EGM	June 18	CT
		-	-	July 2	CT
		-	-	July 24	KMH, OMMF
		-	-	August 12	DLF, JKP
Aquatic Surveys					
Aquatic Habitat Characterization	Modified Stanfield 2013	-	-	July 29	GKM, MAZ, MH
Fish Community Sampling	Stanfield 2013	-	-	July 29	GKM, MAZ, MH
Temperature Data Loggers	N/A	-	-	April 1	NGH, JIM
		-	-	July 29	GKM, MAZ, MH
		-	-	November 19	JIM, JMP

¹AMC = Ashley Cantwell, AMD = Andrew Dean, AER = Amy Reinert, CLH = Christy Humphrey, CMP = Cara Poulson, CT = Charlotte Teat, DES = David Stephenson, DLF = Desta Frey, EGM = Elizabeth Milne, EY = Erica Youngblut, GKM = Gina MacVeigh, JAS = Jason Sousa, JIM = Jennifer McCarter, JKP = Josh Pickering, JMF = Jessica Ferguson, JML = Joseph Lance, JMO = Janet Ozaruk, JP = Jenna Phillips, JVT = Jenna Turgeon, KDM = Kayla Martin, KLHM = Kayla MacLellan, KRE = Kayla Ellis, KSR = Katharina Richter, LEH = Laura Hockley, MAZ = Marissa Zago, MH = Mike Heyming, NA = Nick Allen, NGH = Nyssa Hardie, NGM = Nathan Miller, OMMF = Olyvia Foster, PPA = Phil Anderson, PWD = Pat Deacon, SGB = Steve Burgin, SLH = Shelby Hofstetter, TMB = Tara Brenton

²Surveys completed in 2019, unless otherwise noted.

³NRSI staff were onsite for a turtle nesting survey on this date, under the correct conditions for a Common Nighthawk survey.

⁴American Badger Burrow Surveys were conducted in conjunction with other surveys.

4.0 Existing Conditions

4.1 Soil, Terrain and Drainage

The Subject Lands are located within the Guelph Drumlin physiographic region (MTE 2020a). Shale and stream deposits are present due to the Speed River located south of the property (PEIL 2004).

The surficial geology of the southern half of the Subject Lands consists of Pleistocene glaciofluvial deposits (Ontario Geological Survey 2010). The northern half consists of till on Paleozoic terrain (Ontario Geological Survey 2010). The bedrock ranges from 30m deep in the northern property to 2m in the southern area where bedrock has become exposed as a result of surface water flow and aggregate extraction (PEIL 2004).

The subsoil layer is characterized by various compositions of sand, gravel, silt, and clay throughout the Subject Lands. For example, in the north the subsoil is composed of native sand and silty sand, while in the northeast it is characterized as sandy gravel/ gravelly sand, in the east it is characterized as sand, in the west it is characterized as sand and silt, and in the center of the Subject Lands (in the area of the historical isolated wetland) it is characterized by clayey sandy silt (MTE 2020a).

NRSI field soil sampling found a diversity of effective textures in the topsoil layer throughout the Subject Lands. In the northern portion of the Subject Lands (just south of Maple Grove Road) topsoil was characterized by fine sand. In the forest community along Middle Creek, the effective texture of the topsoil was silty loam, while the large eastern plantation had an effective texture of fine sand. In the southern portion of the Subject Lands, the effective texture of the topsoil was found to be sandy clay loam in the forest community around Wetland 2 and medium sand in the forest community around Wetland 3. Wetland 3 itself was found to have mesic organic soils to a depth of 77cm.

The general topography of the Study area is sloping southeast towards the Speed River. The aggregate extraction in the center of the Subject Lands has caused significant levelling out, while grade changes also occurred due to aggregate extraction in the south (PEIL 2004).

According to MTE (2020a), groundwater levels in the Subject Lands are likely subject to seasonal fluctuations, with seasonal high levels expected during the early spring snow melt. The Subject Lands contain a groundwater divide, with shallow surface groundwater in the

northern portion draining towards Middle Creek, and the groundwater in the southern portion of the Subject Lands drains to the south towards the Speed River (MTE 2020a). Middle Creek runs through the northeast corner of the Subject Lands, flowing east along Maple Grove Road and the northern edge of the Subject Lands, then southeast through the Subject Lands towards Briardean Road, and southeast to the Speed River.

NRSI soil sampling conducted on May 13, 2019, found the water table depth in the northern portion of the Subject Lands (just south of Maple Grove Road) was 54cm. In the forest community along Middle Creek, the depth to water table was 78cm, while in the large eastern plantation the depth to water table was 28cm. In the southern portion of the Subject Lands, the depth to water table was found to be 48cm in the forest community around Wetland 2 and 69cm in the forest community around Wetland 3.

For more detailed information on the soil, terrain and drainage of the Subject Lands, refer to MTE's Hydrogeologic Characterization Report (MTE 2020a).

4.2 Vegetation

4.2.1 Vegetation Communities

A summary of existing vegetation communities identified within the Subject Lands is provided in Table 4. All existing vegetation communities are shown on Map 3.

Table 3. Vegetation Community Descriptions

ELC Ecosite Type	ELC Description	Environmental Characteristics
Forest Communities		
FOD7-3	Fresh-moist Willow Lowland Deciduous Forest	<p>This young to mid-age, riparian deciduous forest follows the Middle Creek corridor in the north-central portion of the Subject Lands from Maple Grove Road to Briardean Road.</p> <p>Although this riparian area was previously mapped as wetland within the Maple Grove Road Provincially Significant Wetland (PSW) (PEIL 2004, GRCA 2019), NRSI's characterization of the community in 2019, based on soil samples and vascular plant community assemblage, found that it is not wetland. The soil sample from this community had an effective texture of silty loam to 78cm, and a moisture regime of 3.</p> <p>This Fresh-moist Willow Lowland Deciduous Forest (FOD7-3) is characterized by the following stand description:</p> <p><u>Canopy</u>: Crack Willow (<i>Salix fragilis</i>), Green Ash (<i>Fraxinus pennsylvanica</i>), Manitoba Maple (<i>Acer negundo</i>)</p> <p><u>Sub-canopy</u>: Manitoba Maple, Trembling Aspen (<i>Populus tremuloides</i>), Black Walnut (<i>Juglans nigra</i>)</p> <p><u>Understory</u>: Glossy Buckthorn (<i>Frangula alnus</i>), Choke Cherry (<i>Prunus virginiana</i> ssp. <i>virginiana</i>), Wild Black Currant (<i>Ribes americanum</i>)</p> <p><u>Groundcover</u>: Avens species (<i>Geum</i> sp.), Jack-in-the-Pulpit (<i>Arisaema triphyllum</i>), Star-flowered Solomon's Seal (<i>Maianthemum stellatum</i>)</p>
FOD7-a <i>Inclusions:</i> <ul style="list-style-type: none"> • CUM1 • CUP3 • FOD6 	Fresh – Moist Lowland Deciduous Forest <i>Inclusions:</i> <ul style="list-style-type: none"> • Mineral Cultural Meadow • Coniferous Plantation • Fresh – Moist Sugar Maple Deciduous Forest 	<p>This mid-age, bottomland, Fresh – Moist Lowland Deciduous Forest (FOD7) is the habitat block located in the southern portion of the Subject Lands north of the former Briardean Road right-of-way, and which contains Wetland 3.</p> <p>This Fresh – Moist Lowland Deciduous Forest (FOD7) is characterized by the following stand description:</p> <p><u>Canopy</u>: Green Ash, White Elm (<i>Ulmus americana</i>), Eastern White Cedar (<i>Thuja occidentalis</i>), Trembling Aspen</p> <p><u>Sub-canopy</u>: Manitoba Maple, Black Cherry (<i>Prunus serotina</i>), Alternate-leaved Dogwood (<i>Cornus alternifolia</i>)</p> <p><u>Understory</u>: Glossy Buckthorn, European Buckthorn (<i>Rhamnus cathartica</i>), Choke Cherry</p>

ELC Ecosite Type	ELC Description	Environmental Characteristics
		<p>Groundcover: White Avens (<i>Geum canadense</i>), Garlic Mustard (<i>Alliaria petiolata</i>), Dame's Rocket (<i>Hesperis matronalis</i>)</p> <p>Nine Butternut (<i>Juglans cinerea</i>), a SAR, and several regionally-rare species were observed within this community: Marsh Horsetail (<i>Equisetum palustre</i>), Rough Sedge (<i>Carex scabrata</i>), and Moonseed (<i>Menispermum canadense</i>).</p> <p>Several distinct habitat inclusions exist within or immediately adjacent: Mineral Cultural Meadow (CUM1), Coniferous Plantation (CUP3), and Fresh – Moist Sugar Maple Deciduous Forest (FOD6).</p> <p>The Mineral Cultural Meadow (CUM1) community is dominated by Awnless Brome (<i>Bromus inermis</i> ssp. <i>inermis</i>), Canada Goldenrod (<i>Solidago canadensis</i>), and Orchard Grass (<i>Dactylis glomerata</i>).</p> <p>The Coniferous Plantation (CUP3) community is dominated by Eastern White Pine (<i>Pinus strobus</i>), Red Pine (<i>Pinus resinosa</i>), European Buckthorn, Glossy Buckthorn, and Herb Robert (<i>Geranium robertianum</i>).</p> <p>The Fresh – Moist Sugar Maple Deciduous Forest (FOD6) community is dominated by Sugar Maple (<i>Acer saccharum</i> ssp. <i>saccharum</i>), Choke Cherry, and Trout-lily (<i>Erythronium americanum</i> ssp. <i>americanum</i>).</p>
<p>FOD7-b</p> <p><i>Inclusions:</i></p> <ul style="list-style-type: none"> • CUM1 • CUP3 • SWD3-3 	<p>Fresh – Moist Lowland Deciduous Forest</p> <p><i>Inclusions:</i></p> <ul style="list-style-type: none"> • Mineral Cultural Meadow • Coniferous Plantation • Swamp Maple Mineral Deciduous Swamp 	<p>This mid-age, bottomland, Fresh – Moist Lowland Deciduous Forest (FOD7) is the habitat block located on the western side of the Subject Lands adjacent to Speedsville Road, and it contains the Wetland 2 habitat inclusion. These communities have a high proportion of non-native species. A small wet depression, created through previous grading activities on site, is present on the north side of this community.</p> <p>This Fresh – Moist Lowland Deciduous Forest (FOD7) is characterized by the following stand description:</p> <p><u>Canopy:</u> Crack Willow, White Elm, Green Ash <u>Sub-canopy:</u> Manitoba Maple, Black Walnut, Green Ash <u>Understory:</u> Glossy Buckthorn, European Buckthorn, Choke Cherry <u>Groundcover:</u> White Avens, Garlic Mustard, Dame's Rocket</p>

ELC Ecosite Type	ELC Description	Environmental Characteristics
		<p>One regionally-rare species was observed on the edge of this community: Common Hackberry (<i>Celtis occidentalis</i>).</p> <p>Several distinct habitat inclusions exist within or immediately adjacent: Mineral Cultural Meadow (CUM1), Coniferous Plantation (CUP3), Swamp Maple Mineral Deciduous Swamp (SWD3-3).</p> <p>The Mineral Cultural Meadow (CUM1) community is dominated by Awnless Brome, Canada Goldenrod, and Orchard Grass.</p> <p>The Coniferous Plantation (CUP3) community is dominated by Scot's Pine (<i>Pinus sylvestris</i>), European Buckthorn, and Garlic Mustard.</p> <p>The Swamp Maple Mineral Deciduous Swamp (SWD3-3) community is dominated by Freeman's Maple (<i>Acer X freemanii</i>), Glossy Buckthorn, and False Nettle (<i>Boehmeria cylindrica</i>).</p>
Wetland Communities		
SWD4-1	Willow Mineral Deciduous Swamp	<p>This mid-aged deciduous swamp community (Wetland 1a) is located in the north central portion of the Subject Lands adjacent to Maple Grove Road and is associated with the Middle Creek channel.</p> <p>This Willow Mineral Deciduous Swamp (SWD4-1) is characterized by the following stand description:</p> <p><u>Canopy:</u> Crack Willow, Trembling Aspen, Manitoba Maple <u>Sub-canopy:</u> Green Ash, White Elm, Glossy Buckthorn <u>Understory:</u> Common Elderberry (<i>Sambucus canadensis</i>), Glossy Buckthorn, Wild Black Currant <u>Groundcover:</u> Sensitive Fern (<i>Onoclea sensibilis</i>), Marsh-Marigold (<i>Caltha palustris</i>), Tall Meadow-rue (<i>Thalictrum pubescens</i>)</p> <p>Several regionally-rare species were observed within this community: Bulbous Cress (<i>Cardamine bulbosa</i>) and Meadow Horsetail (<i>Equisetum pratense</i>).</p>
SWD6-3	Swamp Maple Organic Deciduous Swamp	<p>This mid-aged organic deciduous swamp community (Wetland 3) is located in the southern portion of the Subject Lands north of the former Briardean Road right-of-way. Organic soils were documented to 77cm depth within this community, and appeared to be groundwater fed based on presence of indicator species.</p>

ELC Ecosite Type	ELC Description	Environmental Characteristics
		<p>This Swamp Maple Organic Deciduous Swamp (SWD6-3) is characterized by the following stand description:</p> <p><u>Canopy</u>: Freeman's Maple, Yellow Birch (<i>Betula alleghaniensis</i>), White Elm <u>Sub-canopy</u>: Eastern White Cedar, Yellow Birch, Glossy Buckthorn <u>Understory</u>: Glossy Buckthorn, Red-osier Dogwood (<i>Cornus stolonifera</i>), Bebb's Willow (<i>Salix bebbiana</i>) <u>Ground cover</u>: Skunk-cabbage (<i>Symplocarpus foetidus</i>), Sensitive Fern, Spotted Jewelweed (<i>Impatiens capensis</i>)</p>
MAM2-9	Jewelweed Mineral Meadow Marsh	<p>This young-aged meadow marsh community (Wetland 1c) is located in the northeast portion of the Subject Lands and is associated with low-lying area between the active farmland and the creek corridor.</p> <p>This sparsely vegetated area is a Jewelweed Mineral Meadow Marsh (MAM2-9) characterized by the following stand description:</p> <p><u>Sub-canopy</u>: Silver Maple (<i>Acer saccharinum</i>), Crack Willow <u>Understory</u>: Common Elderberry, Nannyberry (<i>Viburnum lentago</i>), Glossy Buckthorn <u>Groundcover</u>: Spotted Jewelweed, Rice Cutgrass (<i>Leersia oryzoides</i>), Purple-stemmed Aster (<i>Symphotrichum puniceum</i>)</p> <p>One regionally-rare species, Cardinal-flower (<i>Lobelia cardinalis</i>), was observed in this community.</p>
MAM2-10	Forb Mineral Meadow Marsh	<p>This young-aged meadow marsh community (Wetland 1b) is located in the northeast portion of the Subject Lands and is associated with the Middle Creek channel</p> <p>This Forb Mineral Meadow Marsh (MAM2-10) is characterized by the following stand description:</p> <p><u>Groundcover</u>: Lake-bank Sedge (<i>Carex lacustris</i>), Sensitive Fern, Spotted Water Hemlock (<i>Cicuta maculata</i>)</p>

ELC Ecosite Type	ELC Description	Environmental Characteristics
Culturally-Influenced Communities		
CUM1	Cultural Meadow	<p>This Cultural Meadow (CUM1) community on the west side of the Subject Lands is anthropogenically created, following the aggregate extraction, and consists of a vegetated topsoil pile. Typical non-native and native meadow species which are quick to colonize disturbed areas dominate the groundcover in this community, including Timothy Grass (<i>Phleum pratense</i>), Awnless Brome, Wild Teasel (<i>Dipsacus fullonum</i> ssp. <i>sylvestris</i>), Red Clover (<i>Trifolium pratense</i>), Bird's-foot Trefoil (<i>Lotus corniculatus</i>), Alfalfa (<i>Medicago sativa</i> ssp. <i>sativa</i>), Canada Goldenrod, Black Medick (<i>Medicago lupulina</i>), Butter-and-Eggs (<i>Linaria vulgaris</i>), Common Ragweed (<i>Ambrosia artemisiifolia</i>), etc.</p> <p>No SAR or regionally-rare species were observed within this community.</p>
CUP3 <i>Inclusions:</i> <ul style="list-style-type: none"> • CUP1-7 • FOD7-2 • SWD4 	Coniferous Plantation <i>Inclusions:</i> <ul style="list-style-type: none"> • Green Ash Deciduous Plantation • Fresh – Moist Ash Lowland Deciduous Forest • Mineral Deciduous Swamp 	<p>This mid-aged, cultural coniferous plantation community is located in the eastern portion of the Subject Lands and is associated with tableland habitats. Middle Creek flows through this community, which is reflected by the wetland and lowland forest communities occurring along the riparian areas. The plantation community is regenerating well with hardwood species, although invasive species such as European Buckthorn are present throughout.</p> <p>This Coniferous Plantation (CUP3) is characterized by the following stand description:</p> <p><u>Canopy:</u> Red Pine, Scot's Pine, White Spruce (<i>Picea glauca</i>), Eastern White Pine <u>Sub-canopy:</u> White Ash (<i>Fraxinus americana</i>), Black Cherry, Alternate-leaved Dogwood <u>Understory:</u> European Buckthorn, Choke Cherry, White Ash <u>Groundcover:</u> Herb Robert, Garlic Mustard, Heal-all (<i>Prunella vulgaris</i>)</p> <p>One SAR, Butternut and one regionally-rare species, Common Hackberry, were observed within this community.</p> <p>Several distinct habitat inclusions exist within: Green Ash Deciduous Plantation (CUP1-7), Fresh-Moist Ash Lowland Deciduous Forest (FOD7-2), and Mineral Deciduous Swamp (SWD4).</p> <p>The Green Ash Deciduous Plantation (CUP1-7) community is dominated by Green Ash, Choke Cherry, and Dame's Rocket.</p>

ELC Ecosite Type	ELC Description	Environmental Characteristics
		<p>The Fresh-Moist Ash Lowland Deciduous Forest (FOD7-2) community is dominated by Green Ash, Wild Black Currant, and Jack-in-the-pulpit.</p> <p>The Mineral Deciduous Swamp (SWD4) community is dominated by Marsh-Marigold, American Wild Mint (<i>Mentha arvensis ssp. borealis</i>), Rough-leaved Goldenrod (<i>Solidago rugosa</i>), and Broad-leaved Cattail (<i>Typha latifolia</i>).</p>

4.2.2 Vascular Flora

Detailed vegetation surveys resulted in the identification of 282 vascular plant species within the Subject Lands. A complete list of all observed species within the Subject Lands and species reported from the vicinity of the Study area is provided in Appendix VI.

Species at Risk and Species of Special Concern

Based on available background information, three SAR vascular plants and one SCC vascular plant are reported from the vicinity of the Study area (Savanta 2012, MNRF 2018d, MNRF 2019a). Appendix II provides a summary of significant species reported from the vicinity of the Study area, including their current status ranks and preferred habitats.

NRSI biologists observed one SAR plant, Butternut (*Juglans cinerea*), within the Subject Lands. Butternut is listed as Endangered both federally and provincially (MNRF 2019b, Government of Canada 2019). Eight naturally occurring Butternuts were observed in the southern woodland around Wetland 3, and one Butternut was observed in the Fresh-Moist Ash Lowland Deciduous Forest (FOD7-2) along Middle Creek in the center of the Subject Lands (Map 4). Another three Butternuts were recorded outside the Subject Lands, but within the Study area, in the adjacent lands for which a different application is being submitted (270, 280 and 290 Equestrian Way, also known as 'River Mill Phase 3a'). A hybridity field test conducted on five of the nine trees within the Subject Lands (JUG-003 to JUG-007) determined that these individuals are pure Butternuts. Given that the remaining four Butternuts are all located within woodlands that will be protected and buffered, they were not tested for hybridity. Butternut Health Assessments conducted on these trees determined that seven of the trees (JUG-003, -004, -005, -008, -009, 011, and -012) are Category 1, or affected by Butternut canker to such a degree that they are considered 'non-retainable'. The remaining three trees (JUG-006, -007, and -010) are Category 2, meaning that they are not affected by the Butternut Canker, or are affected but not to an advanced degree, such that the tree is considered 'retainable'.

No SCC were observed.

Locally-Significant Species

Eleven regionally-rare species were observed within the Subject Lands: Marsh Horsetail (*Equisetum palustre*), Meadow Horsetail (*Equisetum pratense*), Bulbous Cress (*Cardamine bulbosa*), Cardinal-flower (*Lobelia cardinalis*), Hobblebush (*Viburnum lantanoides*), Long-leaved Chickweed (*Stellaria longifolia*), Moonseed (*Menispermum canadense*), Thimbleweed

(*Anemone cylindrica*), Common Hackberry (*Celtis occidentalis*), Virginia-creeper (*Parthenocissus quinquefolia*), and Rough Sedge (*Carex scabrata*). The locations of these species are shown on Map 4.

Another three species were observed within the Subject Lands, White Spruce (*Picea glauca*), Black Walnut (*Juglans nigra*), and Eastern Cottonwood (*Populus deltoides ssp. deltoides*), that are considered regionally-rare if demonstrably indigenous. Given that most populations in Waterloo Region are thought to be of non-indigenous origin (Richardson and Martin 1999), and that all the trees within the Subject Lands are growing in hedgerows or in conditions where they were likely planted, these species are not treated as rare and are not shown on Map 4.

4.2.3 Tree Inventory

A total of 335 trees were documented during the tree inventory. A complete list of the trees that were assessed and their overall health and potential for structural failure is included in the DVMPs for Phase 4 and 5 in Appendix V.

4.3 Wildlife

4.3.1 Birds

A total of 129 bird species is reported from the Study area or vicinity based on available background information (BSC et al. 2008, Savanta 2012, MNRF 2018, MNRF 2019a, MNRF 2014a). The data documented by the OBBA includes all species that have been observed during the breeding period or have exhibited evidence of nesting in the 10x10 km square that includes the property.

In total, 72 species were observed by NRSI biologists within the Subject Lands during breeding bird surveys and other surveys in 2018 and 2019.

A complete list of all observed species and species reported from the vicinity of the Study area is provided in Appendix VII.

Species at Risk and Species of Special Concern

Based on available background information, 14 SAR birds and 11 SCC birds are reported from the vicinity of the Study area (BSC et al. 2008, Savanta 2012, MNRF 2018, MNRF 2019a, MNRF 2014a). Appendix II provides a summary of significant species reported from the vicinity of the Study area, including their current status ranks and preferred habitats.

NRSI biologists observed two SAR, Bank Swallow (*Riparia riparia*) and Barn Swallow (*Hirundo rustica*), and one SCC, Eastern Wood-Pewee (*Contopus virens*), within the Subject Lands during surveys in 2018 and 2019, each of which are described in detail below.

Bank Swallow is listed as a Threatened species both provincially and federally (MNRF 2019b, Government of Canada 2019). This species requires sand, clay or gravel river banks or steep riverbank cliffs, lakeshore bluffs of easily crumbled sand or gravel, gravel pits or road-cuts for nesting and use grassland or cultivated fields that are close to water for foraging (MNRF 2000). Several individuals were observed in the central open area (at BMB-004) and northwestern agricultural field (at BMB-006) within the Subject Lands during breeding bird surveys. A Bank Swallow habitat assessment confirmed that no suitable Bank Swallow breeding habitat is present within the Subject Lands; a fill pile was inspected and found to be unsuitable due to the high amount of vegetation cover. In addition, no Bank Swallow nests were observed. Open areas within the Subject Lands, such as cultural meadow (CUM1) communities, may provide suitable foraging habitat for this species. The presence of Bank Swallows during consecutive surveys suggests that the species is nesting nearby, outside of the Subject Lands.

Barn Swallow is listed as a Threatened species both provincially and federally (MNRF 2019b, Government of Canada 2019). In Ontario, Barn Swallows are found almost exclusively in close association with humans and use human-made structures such as open barns, bridges, wharves and road culverts for nesting (Heagy et al. 2014). Although rare, they have also been documented to nest in cliffs, caves and rock niches. This species forages in areas with high concentrations of flying insects within a wide range of open and semi-open habitats including farmland, lakeshore and riparian habitats, road right-of ways, clearings in wooded areas, open wetlands and tundra (Heagy et al. 2014). Barn Swallow was observed flying over the Subject Lands in the northwestern agricultural field (at BMB-006) during a breeding bird survey and during other surveys. No breeding evidence was observed. As there are no structures within the Subject Lands, there is no suitable Barn Swallow breeding habitat. Open areas within the Subject Lands, such as cultural meadow (CUM1) communities, may provide suitable foraging habitat for this species.

Eastern Wood-Pewee is listed as Special Concern both provincially and federally (MNRF 2019b, Government of Canada 2019). This species uses open, deciduous, mixed or coniferous forest that is dominated by oak with little understory, forest clearings, edges, farm woodlots and parks (MNRF 2000). Several individuals were observed during breeding bird surveys. Probable

breeding evidence was observed in the southern woodland/Wetland 3 (at BMB-002) and in the central coniferous plantation (CUP3) (at BMB-005), and possible breeding evidence was observed in the southwestern woodland/Wetland 2 (at BMB-003). Based on the breeding evidence documented, the forest, plantation, and swamp communities in the south (around Wetland 3) and center (along Middle Creek) of the Subject Lands are considered confirmed breeding habitat for Eastern Wood-Pewee (Map 4).

Although Common Nighthawk (*Chordeiles minor*) is reported from the vicinity of the Study area (BSC et al. 2008, Savanta 2012, MNRF 2018, MNRF 2019a, MNRF 2014a), no Common Nighthawks were observed within the Subject Lands during targeted Common Nighthawk surveys in either 2018 or 2019.

Locally-Significant Species

A total of 18 regionally-rare species was observed within the Subject Lands, however only three of these species, American Redstart (*Setophaga ruticilla*), Blue-gray Gnatcatcher (*Poliioptila caerulea*), and Red-bellied Woodpecker (*Melanerpes carolinus*), exhibited evidence of breeding. The American Redstart exhibited possible breeding evidence at in the willow lowland deciduous forest (FOD7-3) community along Middle Creek (at BMB-007). The Blue-gray Gnatcatcher exhibited probable breeding evidence in the southern woodland/Wetland 3 (at BMB-002). The Red-bellied Woodpecker was observed exhibiting probable breeding evidence eastern Coniferous Plantation (CUP3) (at BMB-004 and BMB-005). The locations of these three species are shown on Map 4.

4.3.2 Herpetofauna

In total, 30 herpetofauna species were reported from the Study area or vicinity based on available background information (Savanta 2012, Ontario Nature 2019, MNRF 2018).

Eight of these species were observed by NRSI biologists within the Subject Lands during targeted herpetofauna and other surveys in 2018 and 2019.

A complete list of all observed species and species reported from the vicinity of the Study area is provided in Appendix VIII.

Species at Risk and Species of Special Concern

Based on available background information, four herpetofauna SAR and four herpetofauna SCC are reported from the vicinity of the Study area (Savanta 2012, Ontario Nature 2019, MNRF

2018). Appendix II includes a summary of significant species reported from the vicinity of the Study area, including their current status ranks and preferred habitats.

NRSI did not observe any SAR or SCC herpetofauna during field surveys in 2018 or 2019.

Locally-Significant Species

NRSI did not observe any regionally rare herpetofauna during field surveys in 2018 or 2019.

Anuran Call Surveys

Two common species of anurans (frogs and toads) were recorded during call surveys in 2019: American Toad (*Anaxyrus americanus*) and Tetraploid Gray Treefrog (*Hyla versicolor*). Of the five anuran call survey stations monitored, three had calling anurans (Table 4). None of the habitats surveyed met the criteria for Amphibian Breeding Habitat (Woodland) SWH.

Table 4. Anuran Call Survey Results from 2019

Anuran Call Station ¹	Species ²	Anuran Call Survey ³			Number of Species	Total Number of Individuals ⁴	Confirmed Significant Wildlife Habitat?
		1	2	3			
ANR-001	None				0		No
ANR-002	Gray Treefrog			Code 3	1	20	No
ANR-003	Gray Treefrog			Code 3	1	20	No
ANR-004	American Toad		Code 1 (1)		1	1	No
ANR-005	None				0		No

¹See Map 2 for monitoring station locations.

²Common and scientific names of species documented during surveys: American Toad (*Anaxyrus americanus*) and Tetraploid Gray Treefrog (*Hyla versicolor*).

³Marsh Monitoring protocol (BSC 2008) anuran call code with estimated number of individuals in brackets.

⁴This assumes that a Call Code 3 is 20 or more individuals.

Salamander Breeding Habitat

No Ambystomatid (mole) salamander egg masses or other amphibian eggs were observed in wetlands within the Subject Lands during the habitat assessment in April, 2019. Given the presence of predatory fish, and the lack shallow, calm pools with egg attachment sites, none of the riparian wetlands (Wetlands 1a, b, c, and Wetland 5) are suitable for amphibian breeding. Wetland 4 was also found to be unsuitable as it is too shallow for amphibian breeding. Wetland 2, a Swamp Maple Mineral Deciduous Swamp community (SWD3-3) (Map 3), has a high number of egg attachment sites, no predatory fish, and, at the time of the habitat assessment in April, 2019, had water pools from 10-50cm deep, however, Wetland 2 is unlikely to provide

salamander breeding habitat. Ponds or wetlands containing water in most years until mid-July are most likely to be used as amphibian breeding habitats (MNRF 2015b). This wetland was dry by August 1, 2019 (NRSI) and by July 20, 2020 (see MTE's Hydrogeologic Characterization Report (2020a)). In addition, there is not enough suitable upland woodland habitat to support Ambystomatid salamanders around this wetland, nor within the Subject Lands in general (the largest woodland within the Subject Lands is unsuitable Coniferous Plantation (CUP3)).

Turtle Nesting Surveys

No turtles were observed during turtle nesting surveys conducted within the Subject Lands. In addition, no suitable habitat for turtles is present within the Subject Lands (and no turtles were observed), and the highly compacted soils throughout the former aggregate extraction area is not ideal for nesting.

Snake Cover Board Surveys

Two common snake species, Dekay's Brownsnake (*Storeria dekayi dekayi*) and Eastern Gartersnake (*Thamnophis sirtalis sirtalis*), were observed on multiple dates under snake cover boards along the woodland edges in Subject Lands, and were observed during other surveys conducted by NRSI.

4.3.3 Mammals

In total, 41 mammal species were reported from the Study area or vicinity based on available background information (Dobbyn 1994, Savanta 2012, MNRF 2018). Fourteen of these species were observed by NRSI biologists within the Subject Lands during targeted winter wildlife surveys and other surveys in 2018 and 2019. A complete list of all observed mammal species and species reported from the vicinity of the Study area is provided in Appendix IX.

Species at Risk and Species of Special Concern

Based on available background information, five mammal SAR were reported from the vicinity of the Study area (Dobbyn 1994, Savanta 2012, MNRF 2018d). Appendix II provides a summary of significant species reported from the vicinity of the Study area, including their current status ranks and preferred habitats.

Although American Badger (*Taxidea taxus jacksoni*) was reported from the vicinity of the Study area (MNRF 2018d), NRSI biologists did not find any evidence of American Badgers occupying

the Subject Lands in either 2018 or 2019. NRSI biologists did not observe any other SAR or SCC mammals during field surveys in 2019.

Locally-Significant Species

NRSI biologists did not observe any regionally-rare mammal species in 2018 or 2019.

Winter Wildlife Surveys

Heavy White-tailed Deer (*Odocoileus virginianus*) movement was observed within the eastern Coniferous Plantation (CUP3) within the Subject Lands, with especially high use observed along Middle Creek. Several White-tailed Deer bedding areas, and areas heavily browsed, were also observed within this community. Limited evidence of White-tailed Deer was observed within the woodland in the southern portion of the Subject Lands and none was observed within the southwestern woodland area. During the three winter wildlife surveys, only one White-tailed Deer track was observed, on January 17, 2019, between the central coniferous plantation (CUP3) and the woodland/Wetland 3 in the southern portion of the Subject Lands. These results are discussed further in the context of SWH in Section 5.5.

Bat Habitat Assessment

Seven candidate bat roosting trees were documented within the Subject Lands during the bat habitat assessment and tree inventory. The locations of these trees are shown on Map 4. These trees contained cavities, loose bark, cracks and/or crevices that may provide suitable roosting habitat for bats. The use of these habitats by bats is not confirmed as exit surveys were not completed. Therefore, candidate habitat for bat SAR is present within the Subject Lands. Bat Maternity Colony SWH is discussed further in the context of SWH in Section 5.5.

4.3.4 Butterflies

In total, 82 butterfly species were reported from the Study area or vicinity based on available background information (Savanta 2012, Macnaughton et al. 2018, MNRF 2018). NRSI biologists observed 27 butterfly species within the Subject Lands during insect surveys and other field surveys in 2018 and 2019. A complete list of all observed species and species reported from the vicinity of the Study area is provided in Appendix IX.

Species at Risk and Species of Special Concern

Based on available background information, four butterfly SCC were reported from the vicinity of the Study area (Savanta 2012, Macnaughton et al. 2018, MNRF 2018). Appendix II provides a

summary of significant species reported from the vicinity of the Study area, including their current status ranks and preferred habitats.

NRSI biologists observed one butterfly SCC, Monarch (*Danaus plexippus*), during field surveys in 2019. Monarch is listed as Special Concern both provincially and federally (MNRF 2019b, Government of Canada 2019). They are found primarily where wildflowers for nectaring occur and where their larval host food plants exist (e.g., *Asclepias* spp.). This can include abandoned farmland, roadsides and other open spaces (MNRF 2000). Several Monarchs were observed throughout the cultural meadow (CUM1) vegetation communities and open areas within the Subject Lands (Map 4). Three Monarch caterpillars were also observed along the Middle Creek corridor just south of Maple Grove Road in a location where no Common Milkweed (*Asclepias syriaca*) was observed (Map 4). Monarch is discussed further in the context of SWH (Section 5.5).

Locally-Significant Species

NRSI biologists observed one regionally rare butterfly species, Common Sootywing (*Pholisora catullus*), during field surveys in 2019. This species was observed along the western edge of the large eastern Coniferous Plantation (CUP3) and in the cultural meadow community (CUM1) just north of Wetland 3 on August 12, 2019 (Map 4).

4.3.5 Odonates

A total of 33 odonate species were reported from the Study area or vicinity based on available background information (MNRF 2019d, MNRF2018). Fourteen odonate species were observed by NRSI biologists within the Subject Lands during insect surveys and other surveys in 2018 and 2019. A complete list of all observed species and species reported from the vicinity of the Study area is provided in Appendix XI.

Species at Risk and Species of Special Concern

Based on available background information, three odonate SCC were reported from the vicinity of the Study area (MNRF 2019d, MNRF 2018). Appendix II provides a summary of significant species reported from the vicinity of the Study area, including their current status ranks and preferred habitats.

NRSI did not observe any SAR or SCC dragonflies or damselflies during field surveys in 2018 or 2019.

Locally-Significant Species

NRSI did not observe any regionally-rare dragonflies or damselflies during field surveys in 2018 or 2019.

4.3.6 Bumblebees

Two bumblebee species were reported from the Study area or vicinity based on available background information (MNRF 2019a, MNRF2018). Neither of these species were observed within the Subject Lands during insect surveys and other surveys. NRSI biologists observed four bumblebee species during insect surveys. A complete list of all observed species and species reported from the vicinity of the Study area is provided in Appendix XII.

Species at Risk and Species of Special Concern

Based on available background information, one bumblebee SAR and one bumblebee SCC were reported from the vicinity of the Study area (MNRF 2019a, MNRF 2018). Appendix II provides a summary of significant species reported from the vicinity of the Study area, including their current status ranks and preferred habitats.

NRSI did not observe any bumblebee SAR or SCC during field surveys in 2018 or 2019.

Locally-Significant Species

NRSI did not observe any bumblebee regionally-rare species during field surveys in 2018 or 2019.

4.3.7 Terrestrial Crayfish

Three terrestrial crayfish chimneys were observed in the Fresh – Moist Sugar Maple Deciduous Forest (SWD6-3) community (Wetland 3) in the southern portion of the Subject Lands.

Terrestrial crayfish chimneys were also observed on the western edge of the Coniferous Plantation (CUP3) in the eastern portion of the Subject Lands. These results are discussed further in the context of SWH in Section 5.5.

4.4 Aquatic Habitat and Fish Community

4.4.1 Aquatic Habitat

The aquatic habitat assessment was completed by NRSI staff at three different reaches of Middle Creek within the Subject Lands (Map 2). Descriptions of each reach at the time of the assessment are provided in Table 5, below. An aquatic photo log is presented in Appendix XIII.

Table 5. Aquatic Habitat Assessment Results

	Aquatic Habitat Sampling Reach		
	AHY-001	AHY-002	AHY-003
General Description	This reach of Middle Creek has erosion along the banks, moderate gradient changes and access to the floodplain. This reach has good flow, clear water, and lots of woody debris and emergent vegetation species.	This reach of Middle Creek has gentle to moderate sloping banks and a lower gradient, uniform depth, and is confined by agricultural land. This reach has clear water, lots of muck, and is heavily vegetated with emergent species and algae.	This reach of Middle Creek is channelized, with moderate sloping, a limited flood plain, and defined banks. This reach has clear water with some emergent species.
Flowing	Yes	Limited	Limited
Bank Full Width (m)	2.6 – 3.5	2.6 – 5.5	1.8 – 3.9
Bank Height (m)	0.3 – 0.6	0.1 – 0.4	0.2 – 0.6
Wetted Width (m)	1.5 – 2.4	1.2 – 2.6	0.5 – 1.7
Morphology	Meander	Meander	Straight
Average Water Depth (cm)	12.0	16.7	15.6
Minimum Water Depth (cm)	4.2	4.9	3.2
Maximum Water Depth (cm)	32.5	60.0	31.4
Substrate	Sand with some silt in pools and larger cobble substrates.	Sand/silt with lots of muck, detritus, and larger cobble substrates.	Sand with silt and lots of muck, detritus, and larger cobble substrates.
Water Temperature (°C)	21.2 (Air temperature = 28.0)	23.2 (Air temperature = 28.0)	23.4 (Air temperature = 30.0)
pH	7.9	7.5	7.4

	Aquatic Habitat Sampling Reach		
	AHY-001	AHY-002	AHY-003
Instream Habitat and Cover Present	Vegetated with emergent species including watercress (<i>Nasturtium sp.</i>).	Densely vegetated with emergent species including watercress (<i>Nasturtium sp.</i>) and some plantain (<i>Alisma sp.</i>).	Densely vegetated with emergent species including watercress (<i>Nasturtium sp.</i>) and some plantain (<i>Alisma sp.</i>). Some overhanging shrub vegetation is present along the banks and provides shade.
Fish Present	No fish were observed.	Sunfish (<i>Lepomis sp.</i>) were more abundant in this stretch.	Fish were abundant in this stretch.

4.4.2 Water Temperature Monitoring

Water temperatures in Middle Creek were monitored from April 1st to November 29th, 2019 at three monitoring stations as shown on Map 2.

Water temperatures throughout Middle Creek within the Subject Lands were observed to be highly reflective of the recorded air temperatures with corresponding peaks in temperatures following elevations in air temperatures as show in Figure 1. Similar patterns in surface water temperatures were observed following corresponding rain events throughout 2019, suggesting a smaller system that is temporarily influenced by surface water runoff, but primarily maintained by groundwater. There was no significant variation between monitoring stations during 2019.

Thermal regime determination was completed following the revised thermal nomogram methods described in Chu et al. (2009). The results of the 2019 analysis of the Middle Creek thermal regimes at the three monitoring stations suggest a fairly consistent warm/coolwater thermal regime throughout Middle Creek within the Subject Lands (Figure 2). This thermal regime is consistent with a relatively small system influenced by groundwater inputs through groundwater seepage/upwelling, as suggested by the abundance of Watercress sp. (*Nasturtium sp.*). The groundwater inputs would provide the cool baseflow, which is why on Figure 2, the temperature curve is gradual with daily increases and decreases, but is still primarily below 25°C.

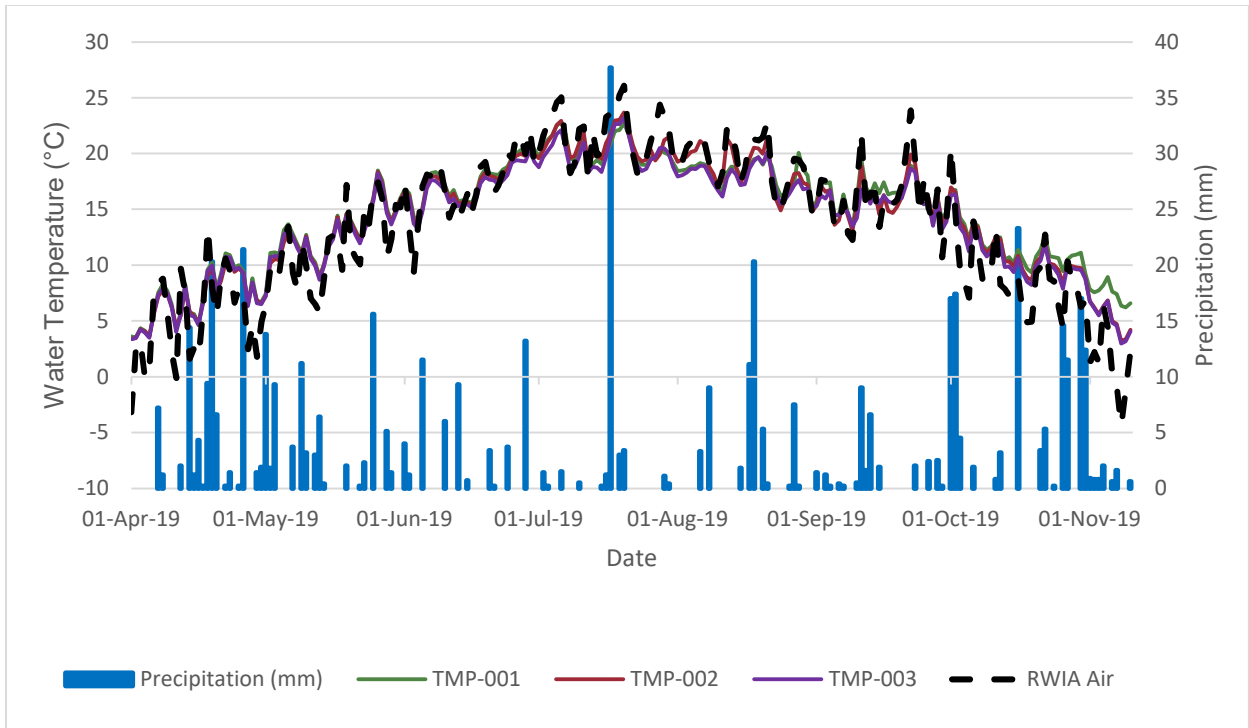


Figure 1. Middle Creek Water Temperature Monitoring (April-November 2019)

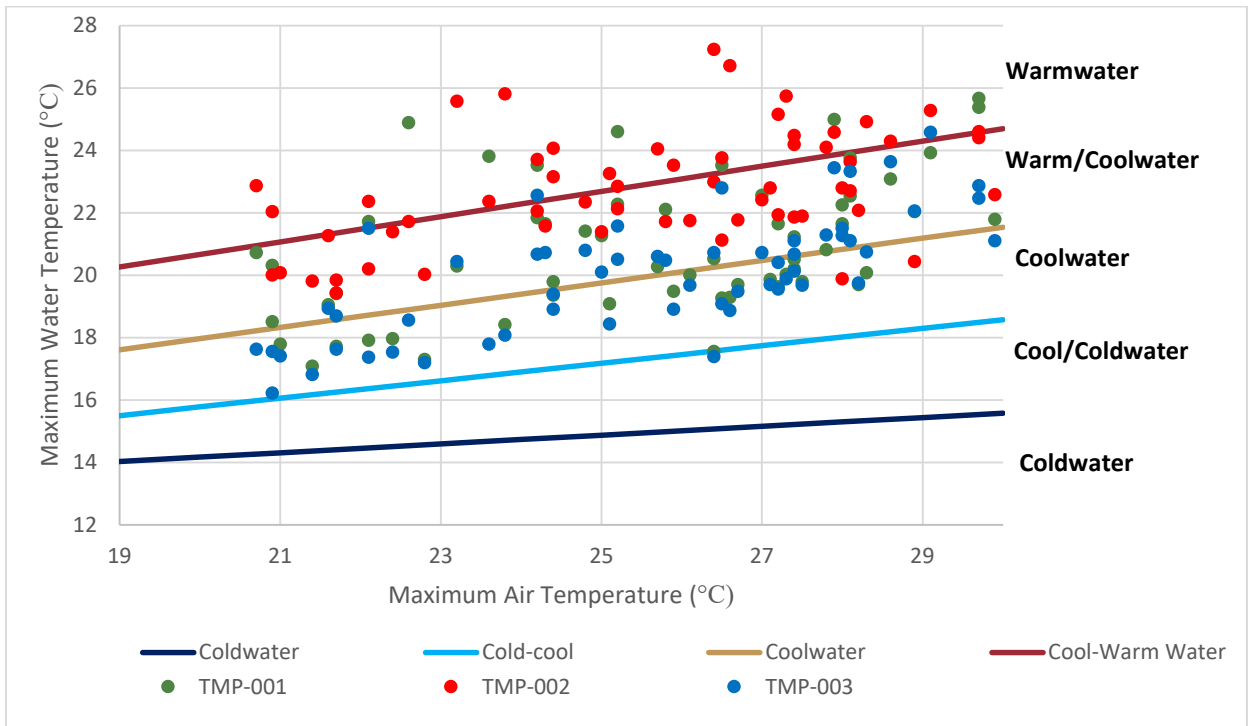


Figure 2. Thermal Nomogram for Thermal Regime Determination Middle Creek 2019

4.4.3 Fish Community

Fish community sampling in 2019, was completed throughout Middle Creek within the Subject Lands (Map 2), over the course of 1,579 sampling seconds between 12:30 and 15:30 on July 29, 2019. Table 6 outlines the site conditions at the time of sampling. The recorded water quality parameters fall within the ranges typically seen in a natural surface water system (CCME 2003).

Table 6. Water Quality Parameters and Sampling Conditions During Fish Sampling in Middle Creek on July 29 2019

Water Quality Parameter	Sampling Conditions in Middle Creek (between 12:30 and 15:30 on July 29, 2019)
Water Temperature (°C)	21.2-23.4
Air Temperature (°C)	28.0-30.0
pH	7.41-7.92
Conductivity (µs/cm)	1128-1175
Total Dissolved Solids (ppm)	567-587

NRSI's 2019 fish sampling in Middle Creek resulted in the capture of 324 fish belonging to eight common species (Table 7). Four species, Common Shiner (*Luxilus cornutus*), Fathead Minnow (*Pimephales promelas*), White Sucker (*Catostomus commersonii*), and Northern Redbelly Dace (*Chrosomus eos*), have not previously been observed within the Subject Lands. Another common species, Central Mudminnow (*Umbra limi*), was observed during sampling, but not captured. A complete list of all observed species and species reported from the vicinity of the Study area is provided in Appendix XIV.

The fish species identified throughout the sampling reaches of Middle Creek represent a moderately diverse fish community comprising a combination of coolwater (77.5%) and warmwater (22.5%) species. The species assemblage observed supports the results of the 2019 water temperature monitoring, which concluded that Middle Creek is coolwater/ warmwater.

All fish captured as part of the 2019 fish community sampling are Tolerant and Intermediately Tolerant species. No Sensitive or Intolerant fish species were observed.

Species at Risk and Species of Special Concern

None of the fish captured during the 2019 fish sampling, or known from the vicinity of the Subject Lands, are SAR or SCC.

Locally-Significant Species

None of the fish species observed by NRSI, or known from the vicinity of the Subject Lands, are considered regionally-rare.

Table 7. Fish Capture Results for Middle Creek in 2019

Common Name	Scientific Name	Species Thermal Regime ¹	Species Tolerance ¹	Total Catch
Blacknose Dace	<i>Rhinichthys obtusus</i>	Coolwater	Intermediate	97
Creek Chub	<i>Semotilus atromaculatus</i>	Coolwater	Intermediate	101
White Sucker	<i>Catostomus commersonii</i>	Coolwater	Tolerant	5
Pumpkinseed	<i>Lepomis gibbosus</i>	Warmwater	Intermediate	70
Brook Stickleback	<i>Culaea inconstans</i>	Coolwater	Intermediate	41
Common Shiner	<i>Luxilus cornutus</i>	Coolwater	Intermediate	1
Fathead Minnow	<i>Pimephales promelas</i>	Warmwater	Tolerant	3
Northern Redbelly Dace	<i>Chrosomus eos</i>	Coolwater	Intermediate	6

¹Coker et al. 2001

5.0 Significance of Natural Features

An analysis of the significance of existing natural features within the Subject Lands was completed. This analysis is based on the rarity or significance of features and/or associated functions/processes and/or current policies, legislation, or planning related studies. This information helped to inform the proposed River Mill Community concept plan so as to avoid or minimize impacts to significant natural features and their ecological functions. This analysis also contributed to the identification of a network of natural features and functions, as well as habitat restoration and creation. Identified significant natural features are described in detail, below, are summarized in Table 9, and are shown on Map 4.

5.1 Provincially Significant Wetlands

Wetlands are important for many reasons including collecting and storing surface water and groundwater and providing habitat for plants, wildlife, and fish. Wetlands operate on a water budget, where the hydrologic character of the wetland is determined by the combination of water inflow/outflow, topography, and groundwater conditions (Mitsch and Gosselink 1993). Wetlands receive water through precipitation, surface inflow, groundwater inflow, and lose water through evapotranspiration, surface and groundwater outflow. Four wetlands within the Maple Grove Road PSW Complex are present within the Subject Lands (Map 4). A fifth part of the PSW is also within the Study area, just south of the Subject Lands southern boundary.

All wetlands and their associated areas of interference (120m) are regulated by GRCA under Ontario Regulation 150/06 (2015). Any development or interference within a wetland or development within an area of interference requires a permit from GRCA.

The PPS (OMMAH 2020) states that development and site alteration shall not be permitted in significant wetlands (PSW) and development and site alteration shall not be permitted on adjacent lands to significant wetlands unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions.

5.1.1 Wetland Hydrology

Based on field observations and analyses completed by MTE, the water regime of wetlands in the area fall into two general categories: wetlands associated with flows in Middle Creek and wetlands associated with surface water subcatchments.

Wetlands Associated with Flows in Middle Creek

Wetlands 1a, 1c, and 5 are associated with the channel of Middle Creek. For the most part these wetlands are found in the base of the channel and extend up the banks as a reflection of fluctuations in creek flows through the year. Wetland 5 also receives groundwater inputs, especially along the north bank of the channel

Wetlands Associated with Surface Water Subcatchments

According to MTE's hydrogeological studies within the Subject Lands (2020a), Wetland 1b, is in an area where surface water and groundwater are close in elevation, so it is likely sustained by a combination of surface water and groundwater inputs.

The two southwestern wetlands (Wetlands 2 and 3), receive surface water inputs from the catchment basins surrounding them and they recharge the shallow groundwater table (MTE 2020a).

5.2 Significant Woodlands

The Natural Heritage Reference Manual (MNRF 2010) provides guidance for assessing the ecological function of woodlands. It outlines criteria for determining the significance of woodlands within Ontario considering four broad categories: woodland size, ecological function, uncommon characteristics, and economic and social values. Woodlands identified as 'significant' according to the criteria outlined in the Natural Heritage Reference Manual are considered within the PPS (OMMAH 2020). This manual and the policies of the PPS can also be used by municipalities to further refine local policies, objectives, and evaluation criteria for woodlands.

According to the Region of Waterloo Official Plan (2015) policies, all woodlands within areas identified as Core Environmental Features that are (a) greater than 4ha in size, excluding any adjoining hedgerows; (b) consisting primarily of native tree species; and (c) meet the criteria of a woodland in accordance with the provisions of the Regional Woodland Conservation By-law 08-026 (i.e. at least 1ha, not a cultivated fruit or nut orchard, or Christmas tree plantation, and meeting minimum prescribed tree densities) are considered significant woodlands.

The eastern Cultural Plantation (CUP3) within the Subject Lands meets the criteria for a significant woodland (Map 4). It is greater than 4ha in size and, although it is a cultural

plantation with some non-native species (i.e. Scot's Pine (*Pinus sylvestris*)), it is dominated by native tree species.

Both the small western woodland, (containing Wetland 2), and the southern woodland (containing Wetland 3) (Map 4) are not large enough (at approximately 1.2ha and 3.1ha, respectively) to meet the criteria to be significant woodlands.

The PPS states that development and site alteration shall not be permitted in significant woodlands and development and site alteration shall not be permitted on adjacent lands to significant woodlands unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions (OMMAH 2020).

Significant woodlands are also Core Environmental Features within the Region of Waterloo Official Plan (2015) and City of Cambridge Official Plan (2018a). Development or site alteration is not permitted within Core Environmental Features, unless approved by the Region and City through the development review process and the submission of an EIS which outlines mitigation measures to be implemented (Region of Waterloo 2015, City of Cambridge 2018a).

5.3 Watercourse and Floodplain

Middle Creek, which flows east along Maple Grove Road and the northern edge of the Subject Lands, then southeast out of the Subject Lands (Map 4), falls under the jurisdiction of the GRCA according to Ontario Regulation 150/06 (2015) and the federal the Department of Fisheries and Oceans Canada (DFO) or its delegate under the federal *Fisheries Act* (Government of Canada 1985).

The GRCA can prohibit or regulate the straightening, changing, diverting or interfering in any way with the existing channel the creek and its shorelines (GRCA 2015). Development, interference or alterations within the GRCA regulation limit may be permitted if, in the opinion of the GRCA, the development will not affect the control of flooding, erosion, dynamic beaches, pollution or the conservation of land.

No development or site alteration is proposed within watercourses (and their associated fish habitat), and no activities that result in harmful alteration, disruption, or destruction of habitat are proposed (prohibited under the federal *Fisheries Act* (Government of Canada 1985). Limiting works in and around water will limit the potential need for a *Fisheries Act* Authorization. These

works do not solely concern activities within the watercourse but can include changes to surface water timing or flow patterns, changes to temperature regime and shading, introduction of sediment and other deleterious substances. There is no proposed work below the high-water mark or in the channel itself.

As shown on (Map 4), the Middle Creek floodplain extends south into the Subject Lands from the creek along Maple Grove Road, as well as on either side of the creek where it flows southeast through the Subject Lands. Floodplains are regulated by the GRCA and, in accordance with GRCA Ontario Regulation 150/06, Section 2(1), development is not permitted in a regulated floodplain (GRCA 2015). Development within the GRCA-regulated area will also require prior permission from GRCA in the form of a permit pursuant to Ontario Regulation 150/06 (GRCA 2015).

5.4 Habitat of Threatened and Endangered Species

The PPS states that development and site alteration shall not be permitted in habitat of threatened and endangered species and development and site alteration shall not be permitted on adjacent lands, unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions (OMMAH 2020). The Official Plans of the Region (2015) and City (2018) also protect the habitats of Threatened and Endangered Species through their designation as Core Environmental Features.

Confirmed Habitat - Butternut

Butternut is listed as Endangered both federally and provincially (MNRF 2019b, Government of Canada 2019). Nine naturally occurring Butternuts were observed by NRSI biologists within the Subject Lands, including five pure Butternuts (determined through a field hybridity test). All nine Butternuts are located in woodlands which are to be protected and buffered from the proposed development (eight are in the southern woodland around Wetland 3 and one is in the Fresh-Moist Ash Lowland Deciduous Forest (FOD7-2) along Middle Creek) (Map 4).

Candidate Habitat – Species at Risk Bats

Suitable roosting habitat for three SAR bats, Little Brown Myotis (*Myotis lucifungus*), Northern Myotis (*Myotis septentrionalis*) and Tri-colored Bat (*Perimyotis subflavus*), has been identified within the Subject Lands. These species are listed as Endangered both provincially and federally (MNRF 2019b, Government of Canada 2019).

Suitable roosting habitat for these SAR bat species may be present in all treed vegetation communities within the Subject Lands (Map 4). Suitable foraging habitat for Little Brown Myotis may be present within open and semi-open vegetation communities and along the edges of all treed vegetation communities within the Subject Lands. Suitable foraging habitat for Northern Myotis may be present in all treed vegetation communities within the Subject Lands. Habitats along Middle Creek may provide suitable foraging habitat for Tri-colored Bat. Suitable habitats for these species within the Subject Lands are considered 'candidate', since no bat cavity surveys or targeted bat exit surveys were completed in these habitats. Surveys were not completed because the woodlands and the Middle Creek corridor will be protected and buffered from the proposed development, thereby protecting the 'candidate' SAR bat habitat.

Seven candidate bat roosting trees were documented within the Subject Lands during the bat habitat assessment and tree inventory, including five outside of the woodlands (i.e. in the hedgerow along Briardean Road, and in the residential block of Phase 5). The MECP should be consulted regarding any candidate SAR bat roosting trees that are within the proposed development area. The MECP may require that the trees are removed outside the bat active season (outside of April 1 to September 30) or request that acoustic bat surveys are completed to determine what (if any) bat species are using the trees during the roosting period.

5.5 Significant Wildlife Habitat

Development or site alteration within SWH is not permitted under the PPS unless it has been demonstrated that there will be no negative impacts on the habitat or its ecological functions (OMMAH 2020).

Based on NRSI's field studies, three SWH types were confirmed for the Subject Lands and three were maintained as candidate SWH (Appendix III). These SWH types are discussed further in the sections below. Confirmed SWH types are shown on Map 4.

5.5.1 Confirmed Significant Wildlife Habitat

Seasonal Concentration: Deer Yarding Areas

Deer yarding areas or winter concentration areas are areas deer move to year after year in response to the onset of winter snow and cold (MNR 2000). The yard is composed of two areas referred to as Stratum I and Stratum II (MNRF 2015b). Stratum II covers the entire winter yard area and is usually a mixed or deciduous forest with plenty of browse available for food (MNRF 2015b). 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 (MNRF 2015b). 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 (MNRF 2015b). It is primarily composed of coniferous trees (pine, hemlock, cedar, spruce) with a canopy cover of more than 60% (MNR 2000).

The MNRF identified the central and southern woodland communities within the Subject Lands as Stratum II Deer Wintering Areas (Map 1). NRSI's winter wildlife surveys in the winter of 2019, and the observations of deer bedding areas and documentation of heavy vegetation browsing by deer, found the central plantation woodland (CUP3) to be good quality habitat for White-tailed Deer. There was limited evidence of White-tailed Deer use in the southern and southwestern woodland areas within the Subject Lands. Therefore, the eastern Coniferous Plantation (CUP3) within the Subject Lands is, confirmed SWH-Deer Yarding (Map 4). This confirmed SWH will be protected from the proposed development through the protection and buffering of the Coniferous Plantation (CUP3).

Habitat for Species of Conservation Concern: Terrestrial Crayfish

SWH for Terrestrial Crayfish is defined by the presence of one or more individuals of either the Chimney or Digger Crayfish (*Fallicambarus fodiens*) or the Devil Crawfish or Meadow Crayfish (*Cambarus Diogenes*) (MNR 2000; MNRF 2015b). These are the only two terrestrial crayfish species which occur in Ontario (Government of Canada 2017). Both species are semi-terrestrial and create networks of underground tunnels in moist soils, typically around shallow marshes and/or swamps (Hamr 1998). Terrestrial crayfish burrows were documented in the Swamp Maple Organic Deciduous Swamp (SWD6-3) community (Wetland 3) in the southern portion of the Subject Lands. According to the Significant Wildlife Habitat Technical Guide (SWHTG) (MNR 2000), the area of ELC Ecosite is the area of SWH for Terrestrial Crayfish. Therefore, this wetland is confirmed SWH for Terrestrial Crayfish (Map 4). This confirmed SWH will be protected from the proposed development through the protection and buffering of the Swamp Maple Organic Deciduous Swamp (SWD6-3) community (Wetland 3).

Although crayfish burrows were also observed on the western edge of the Coniferous Plantation (CUP3) in the center of the Subject Lands, given that this area is anthropogenically-disturbed (having been cleared for agriculture, and planted as cultural plantation) and is not characterized

as wetland, there is no wetland ELC Ecosite present to delineated the SWH for Terrestrial Crayfish. Therefore, this area is not considered SWM.

Habitat for Species of Conservation Concern: Special Concern and Rare Wildlife

These species are quite rare or have experienced significant population declines in Ontario. According to the MNRF guidelines, to inventory a site for the identified special concern or rare species, studies need to be completed during the time of year when the species is present or easily identifiable, and for SCC habitat to qualify as SWH it needs to be easily mapped and cover an important life stage component for the species (e.g. specific nesting habitat, foraging habitat, etc.) (MNRF 2015b).

Eastern Wood-Pewee

Based on the results of wildlife field surveys, Eastern Wood-Pewee was confirmed using habitats within the Subject Lands for an important life stage component. Based on the results of breeding bird surveys, Eastern Wood-Pewee was confirmed to be breeding within the Subject Lands. The deciduous forest (Fresh-moist Willow Lowland Deciduous Forest (FOD7-3), Fresh – Moist Lowland Deciduous Forest (FOD7), Fresh – Moist Ash Lowland Deciduous Forest (FOD7-2), Fresh – Moist Sugar Maple Deciduous Forest (FOD6), and Green Ash Deciduous Plantation (CUP1-7)) and swamp (Swamp Maple Mineral Deciduous Swamp (SWD3-3), Willow Mineral Deciduous Swamp (SWD4-1), Swamp Maple Organic Deciduous Swamp (SWD6-3), and Mineral Deciduous Swamp (SWD4)) vegetation communities are all high quality breeding habitats for this species. These habitats are therefore considered confirmed SWH for Eastern Wood-pewee (Map 4). This confirmed SWH will be protected from the proposed development through the protection and buffering of all deciduous forest and swamp communities within the Subject Lands.

Monarch (not SWH)

Although Monarch adults and caterpillars were observed within the Subject Lands, a review of the criteria included in Appendix Q of the SWHTG (MNRF 2000) for the determination of significance of habitat for SCC indicates that the habitat for Monarch is limited, and the development area is neither a good source of breeding or foraging habitat for the species (for full review details, see Appendix XV). Therefore, SWH for Monarch is not considered present within the Subject Lands.

5.5.2 Candidate Significant Wildlife Habitat

Seasonal Concentration: Bat Maternity Colonies

Known locations of forested maternity colonies for Big Brown Bat (*Eptesicus fuscus*) and Silver-haired Bat (*Lasionycteris noctivagans*) are extremely rare in all Ontario landscapes (MNR 2000). Maternity colonies can be found in tree cavities, vegetation and often in buildings, however buildings are not considered to be SWH (MNR 2015b). Maternity colonies are often located in mature deciduous or mixed forest stands with greater than 10/ha large diameter (>25cm Diameter at Breast Height) cavity trees (MNR 2015b). 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 (MNR 2000). Given that all woodlands within the Subject Lands are to be protected and buffered, no bat habitat assessments were conducted within the deciduous forest communities. Therefore, all deciduous forest and swamp communities (Dry-fresh Sugar Maple Deciduous Forest (FOD5), Fresh-Moist Sugar Maple Deciduous Forest (FOD6), Fresh-Moist Lowland Deciduous Forest (FOD7), and Fresh-Moist Ash Lowland Deciduous Forest (FOD7-2), Swamp Maple Mineral Deciduous Swamp (SWD3-3), Willow Mineral Deciduous Swamp (SWD4-1), Swamp Maple Organic Deciduous Swamp (SWD6-3), and Mineral Deciduous Swamp (SWD4)), within the Subject Lands may provide suitable maternity roosting habitat for Big Brown Bat and/or Silver-haired Bat, and are considered candidate SWH for bat maternity colonies. This candidate SWH will be protected from the proposed development through the protection and buffering of the Swamp Maple Organic Deciduous Swamp (SWD6-3) community (Wetland 3).

Seasonal Concentration: Snake Hibernaculum

The ability of reptiles to overwinter successfully in cold climates can have a large impact on population persistence (MNR 2014). For snakes, hibernation takes place underground, beneath the frost line. Access to such sites may be through fissures in rock, along tree roots, or through mammal burrows. For a number of snake species, the necessary characteristics for hibernacula are not well known and it is therefore not possible to predict with certainty where snakes will overwinter (MNR 2014). Given that targeted spring emergence or fall congregation surveys were not completed, all woodland and wetland communities within the Subject Lands, which would potentially provide suitable overwintering sites for snakes through tree roots, mammal burrows, etc., are considered candidate SWH - snake hibernaculum. This candidate SWH will be protected from the proposed development through the protection and buffering of all woodland and wetland communities within the Subject Lands.

Animal Movement Corridors: Deer Movement Corridor

Corridors are 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. Deer wintering habitat will have corridors that the deer use during fall migration and spring dispersion (MNR 2000). Corridors typically follow riparian areas, woodlots, and areas of physical geography (ravines, or ridges). A corridor may be present along the Middle Creek riparian area where deer may travel from habitats north of Maple Grove Road to the Deer Wintering Area within the Subject Lands. Deer may continue to follow the riparian corridor to other identified wintering areas southeast of the Subject Lands. Therefore, the large eastern Coniferous Plantation (CUP3) community, and its inclusions, in the northeast portion of the Subject Lands is considered candidate Deer Movement Corridor SWH. This candidate SWH will be protected from the proposed development through the protection and buffering of all woodland and wetland communities along the Middle Creek corridor within the Subject Lands.

Table 8, below, provides a summary of the SWH within the Subject Lands as determined by background information and 2018 and 2019 field investigations.

Table 8. Summary of the Candidate and Confirmed SWH within the Subject Lands

Confirmed SWH		Candidate SWH	
SWH Type	Project Consideration	SWH Type	Project Consideration
Seasonal Concentration: Deer Yarding Areas	Protected and Buffered	Seasonal Concentration: Bat Maternity Colonies	Protected and Buffered
Habitat for SCC: Terrestrial Crayfish	Protected and Buffered	Seasonal Concentration: Snake Hibernaculum	Protected and Buffered
Habitat for SCC: Special Concern and Rare Wildlife Species (Eastern Wood-Pewee)	Protected and Buffered	Animal Movement Corridors: Deer Movement Corridor	Protected and Buffered

5.6 Fish Habitat

Middle Creek provides direct fish habitat for coolwater and warmwater species within the Subject Lands. Fish habitat is defined in the *Fisheries Act* (Government of Canada 1985) as spawning grounds and any other areas, including nursery, rearing, foraging or migration areas, on which fish depend directly or indirectly in order to carry out their life processes.

Development or site alteration will not be permitted within fish habitat, except in accordance with Provincial and Federal requirements to the satisfaction of the federal the Department of

Fisheries and Oceans Canada (DFO) or its delegate. Specifically, development and site alteration within watercourses and their associated fish habitat, and activities that contribute the harmful alteration, disruption, or destruction of habitat are prohibited unless permitted by the GRCA and DFO. Limiting works in and around water will limit the potential need for a *Fisheries Act* Authorization. These works do not solely concern activities within the watercourse but can include changes to surface water timing or flow patterns, changes to temperature regime and shading, introduction of sediment and other deleterious substances. If there is any proposed work below the high-water mark or in the channel itself, a self-assessment screening will be required to determine whether a request for review by DFO is required.

5.7 Locally Significant Species

In total, 16 regionally-rare species were observed within the Subject Lands, including 12 vascular plant species, three bird species, which showed evidence of breeding within the Subject Lands, and one butterfly species (Map 4). All regionally-rare species were observed in the natural features which are to be protected and buffered from the proposed development.

5.8 Buffers

Buffers are mitigation measures required around natural heritage features such as woodlands, wetlands, significant wildlife habitats, and watercourses to provide protection to such features and their associated functions from potential impacts as a result of development and/or site alteration. Properly functioning buffers protect natural features against sedimentation, erosion, provide attenuation of precipitation and run-off, protect against human disturbances, serve as habitat transition zones, and contribute to the protection of the natural feature through, for example, maintaining microclimate conditions and limiting the spread of invasive species to within the sensitive natural feature.

The area beyond the boundaries of the significant natural features within the Subject Lands, where a buffer would be recommended to be applied, is highly anthropogenically influenced. This area, characterized by row-crop agricultural fields, lands graded for aggregate extraction, and small cultural meadow communities (CUM1), currently provides little attenuation of run-off and affords little function as a natural buffer. Furthermore, the cultural meadow communities have relatively low plant species diversity and are comprised largely of non-native species in comparison to a healthy buffer. Therefore, the small meadow communities adjacent to the natural feature boundaries offer little in terms of wildlife habitat and do not support a high diversity of wildlife species.

A buffer is required to be applied to the PSW, Significant Woodlands, and Middle Creek within the Subject Lands in order to protect these features and their ecological functions. In determining an appropriate buffer width to be applied to each of these natural features, the area and nature of the feature being protected was considered as well as the nature of the anticipated adjacent land use, the functions that the buffer is expected to perform, and the local biophysical context (e.g., slopes, soils, surface drainage, groundwater conditions and flows). The local biophysical context of the Subject Lands is provided in Section 4.1 of this report. Based on the direction of surface water drainage and topography of the Subject Lands, a buffer to the natural features is expected to provide protection against sedimentation and erosion and provide attenuation of precipitation, run-off and nutrients. The buffer will further provide a hazard mitigation zone for large branch or tree fall and protection against human disturbances, including noise, light, and encroachment, as a result of the proposed development.

5.8.1 Provincially Significant Wetland Buffers

According to GRCA Wetlands Policies 6.2.11 and 6.2.12, an EIS is required for developments within the area of influence around wetlands (30m around non-provincially significant wetlands and 120m around PSWs) to determine the wetland boundaries and appropriate buffers and setbacks (GRCA 2003). The GRCA typically requires a standard 30m buffer around PSWs. Vegetated buffers of 30m are recommended for PSWs in the Hespeler West Subwatershed to protect them from the impacts of adjacent developments (HWSS Working Committee 2004). Standard 30m buffers are recommended for all PSWs within the Subject Lands (Map 4).

5.8.2 Woodlands Buffers

Rather than prescribe buffers for upland woodlots and plantations, the HWSS Summary Report proposed that context sensitive buffers be developed for proposed urban developments within the HWSS (HWSS Working Committee 2004). Policy 7.C.11 of the Region of Waterloo Official Plan (2015) and Policy 3.A.3.7 of the City of Cambridge Official Plan (2018a), recommends that a minimum 10m buffer is applied to Core Environmental Features. Given that the lands adjacent to the woodlands within the Subject Lands are already significantly anthropogenically-influenced, a 10m buffer applied to the surveyed/confirmed woodland dripline within the Subject Lands (Map 4), will provide enhanced protection to the Significant Woodlands, as well as the wetlands and Middle Creek within the woodlands.

As discussed in Section 4.2.1, the Fresh-moist Willow Lowland Deciduous Forest (FOD7-3) community along Middle Creek, was previously mapped as wetland within the Maple Grove

Road PSW (PEIL 2004, GRCA 2019). Although NRSI has characterized this community as forest rather than, wetland, it is protected within the enhanced 30m watercourse buffer described below.

5.8.3 Watercourse Buffers

The HWSS Summary Report recommends minimum 15m stream buffers (HWSS Working Committee 2004). In consideration of the important ecological functions the Middle Creek corridor provides, in connecting habitats north of the Subject Lands to habitats within and to the south of the Subject Lands, in addition to the presence of coolwater habitat indicators (see section 4.4), an enhanced 30m buffer on either side of Middle Creek within the Subject Lands is recommended (Map 4).

5.9 Linkages

Maintaining connectivity among natural features across the landscape is important to allow for the dispersal of otherwise isolated populations, as well as to allow for the movement of species which require access to multiple habitat types to carry out their life processes. Watercourses, such as Middle Creek, and their associated riparian habitats can provide a corridor and/or linkage for plant and animal movement between natural features, contributing to the overall ecological integrity, connectivity and long-term sustainability of a natural heritage system.

Under the PPS (OMMAH 2020), City of Cambridge Official Plan (2018a) and Region of Waterloo Official Plan (2015), the location of corridors and the maintenance of the connectivity among natural heritage features must be considered in the development review process of any proposed development or site alteration.

5.9.1 Middle Creek Corridor

The Middle Creek riparian corridor provides a connection between natural heritage features located to the north of the Subject Lands, such as the Maple Grove Wetland Complex, to the Speed River to the south. In addition, the HWSS Study discusses the importance of Middle Creek in providing an opportunity to connect the Grand River/Chilligo Creek systems with the Speed River (PEIL 2004). For the Middle Creek corridor between Maple Grove Road and the Speed River, the HWSS recommends a corridor width of approximately 100m to sustain movements of interior-edge species, and mitigate the effects of urban developments and human presence on the movements of plants and animals (PEIL 2004).

5.9.2 Wetland/Woodland Linkage

The City of Cambridge Official Plan (2018a) shows a Natural Open Space connection between the woodlands and wetlands (Wetlands 2 and 3) in the southwest of the Subject Lands.

However, this area has been a very active haul road and does not currently include a vegetated connection.

Table 9. Summary of Significant Natural Features within the Subject Lands

Significant Natural Feature	Description	Policy Requirements and/or Planning Study Recommendations
Provincially Significant Wetlands	<ul style="list-style-type: none"> Four wetlands, included in the Maple Grove Road Provincially Significant Wetland (PSW) complex, are currently present within the Subject Lands. 	<ul style="list-style-type: none"> Typically, 30m buffers from PSWs are recommended. The HWSS also recommends 30m buffers from Natural Heritage Features.
Significant Woodlands	<ul style="list-style-type: none"> According to the Region of Waterloo Official Plan (2015) policies, all woodlands within areas identified as Core Environmental Features that are (a) greater than four hectares in size, excluding any adjoining hedgerows; (b) consisting primarily of native species of trees; and (c) meet the criteria of a woodland in accordance with the provisions of the Regional Woodland Conservation By-law are considered significant woodlands. Therefore, the eastern Coniferous Plantation (CUP3) is a Significant Woodland. 	<ul style="list-style-type: none"> Policy 7.C.11 of the Region of Waterloo Official Plan (2015) and Policy 3.A.3.7 of the City of Cambridge Official Plan (2018a), recommend that a minimum 10m buffer is applied to Core Environmental Features. The HWSS recommends 30m buffers from Natural Heritage Features, but notes that 15m buffers could be used adjacent to upland habitats.
Watercourse and Floodplain	<ul style="list-style-type: none"> Middle Creek, a warm/coolwater watercourse, and its associated floodplain are present within the Subject Lands 	<ul style="list-style-type: none"> Typically, a 15m buffer from top of bank of watercourses is recommended. The HWSS also recommends a 15m buffer from streams.
Habitat of Endangered or Threatened Species	<p>Confirmed SAR:</p> <ul style="list-style-type: none"> Endangered Butternut trees were confirmed within the Subject Lands. <p>Candidate SAR:</p> <ul style="list-style-type: none"> Candidate habitat for three species at risk (SAR) bats was documented within the Subject Lands: <ul style="list-style-type: none"> Seven trees with cavities suitable for Little Brown Myotis (<i>Myotis lucifugus</i>) and Northern Myotis (<i>Myotis septentrionalis</i>) were observed. Deciduous forest communities within the Subject Lands may provide suitable roosting habitat for the three SAR bat species. Suitable foraging habitat may be present for all SAR bats in open and semi-open areas, as well as along Middle Creek. 	<ul style="list-style-type: none"> Pure Butternuts that are Category 2 (retainable) or Category 3 (archivable) are protected under the <i>ESA</i> (Government of Ontario 2007). Butternuts protected under the <i>ESA</i> require buffers, as determined by the Ministry of Environment, Conservation, and Parks (MECP). SAR bat habitat is protected under the <i>ESA</i>.

Significant Natural Feature	Description	Policy Requirements and/or Planning Study Recommendations
Significant Wildlife Habitat (SWH)	Confirmed SWH: <ul style="list-style-type: none"> ○ Deer Yarding Areas (Stratum II) ○ Terrestrial Crayfish ○ Special Concern and Rare Wildlife: Eastern Wood-Pewee Candidate SWH: <ul style="list-style-type: none"> ○ Bat Maternity Colonies ○ Snake Hibernaculum ○ Deer Movement Corridor 	<ul style="list-style-type: none"> • Development or site alteration within SWH is not permitted under the PPS unless it has been demonstrated that there will be no negative impacts on the habitat or its ecological functions (OMMAH 2020).
Fish Habitat	<ul style="list-style-type: none"> • Middle Creek provides direct fish habitat within the Subject Lands. 	<ul style="list-style-type: none"> • Development and site alteration within watercourses and their associated fish habitat, and activities that contribute the harmful alteration, disruption, or destruction of habitat are prohibited unless permitted by the GRCA and DFO. • If there is any proposed work below the high-water mark or in the channel itself, a self-assessment screening will be required to determine whether a request for review by DFO is required.
Locally-Significant Species	<ul style="list-style-type: none"> • Sixteen regionally-rare species were observed within the Subject lands, including: <ul style="list-style-type: none"> ○ 11 vascular plant species, ○ three bird species that displayed evidence of breeding within the Subject Lands, ○ one butterfly species (Common Sootywing (<i>Pholisora catullus</i>)). 	<ul style="list-style-type: none"> • Adverse environmental impacts, according to both the Region of Waterloo (2015) and City of Cambridge (2018a) Official Plans include the alteration of the structure, function or ecological interrelationships of the natural habitats, or reductions in the populations or reproductive capacity, of significant species. • The MBCA protects migratory birds from persecution in the form of harassment and “incidental take”.
Linkages	<ul style="list-style-type: none"> • The Middle Creek corridor provides an important connection between natural heritage features to the north and south of the Subject Lands, including the Speed River. • An important habitat linkage exists between the southwestern wetlands (Wetlands 2 and 3) and woodlands within the Subject Lands. 	<ul style="list-style-type: none"> • Under the PPS (OMMAH 2020), City of Cambridge Official Plan (2018a) and Region of Waterloo Official Plan (2015), the location of corridors and the maintenance of the connectivity among natural heritage features must be considered. • The HWSS recommends a Middle Creek corridor width of approximately 100m (PEIL 2004).

6.0 Habitat Creation and Restoration

6.1 Proposed Wetland and Forest Habitat Creation Plan

As discussed in Section 1.3, there has been some historical removal of upland and wetland vegetation; some, but not all, of which, had been approved. Along the north portion of the Subject Lands and on the east side of Middle Creek there are large areas of floodplain that are currently being used for agriculture. Given that agricultural use of these lands will cease upon the development of the lands, these areas provide a very valuable opportunity to create additional natural habitat and widen and enhance the creek corridor.

A Proposed Wetland and Forest Habitat Creation Plan has been prepared for these lands, which includes the restoration of forest along the Middle Creek corridor, the creation of a new wetland, restoration of an existing wetland, and invasive species management. In addition, a 5-year monitoring and maintenance schedule has been proposed to ensure that the habitat creation is successful and the plan's objectives are achieved. The detailed Proposed Wetland and Forest Habitat Creation Plan is provided in Appendix XVI.

This plan will enhance the natural heritage system (NHS) within the River Mill community, creating a diverse, sustainable, and resilient, ecologically functional NHS. This widened, revegetated riparian corridor will reduce runoff and sedimentation into Middle Creek, provide additional flood mitigation (through enhanced water retention by vegetation), thermal protection and buffering for Middle Creek, as well as provide a habitat linkage for plants and animals between the woodlands and wetlands of the Subject Lands and the woodlands and wetlands to the north, and the Speed River to the southeast.

In the broader context, this plan will create habitat corridor through the Subject Lands, helping to promote viable habitat connections across the landscape. The HWSS recommends a 200m corridor along Middle Creek (HWSS Working Committee 2004). Although historical anthropogenic use reduced the Middle Creek corridor within the Subject Lands to approximately 30m in areas, this plan will widen the Middle Creek corridor to an average width of 220.3m, with a minimum width of 90.2m and a maximum width of 350.4m.

The River Mill NHS, including the created wetland and restored habitats, in context of the natural habitats of the Study area and the surrounding landscape of the Hespeler West Subwatershed, is shown on Map 5.

The topography of the floodplain area is relatively flat and gently sloping towards Middle Creek. Soil samples analyzed throughout the floodplain area indicate that the soil Moisture Regime is '5', or 'very moist'. Given the topography and the soil Moisture Regime, the flood plain area can support both moist upland and wetland vegetation communities. The specific forest and wetland vegetation communities proposed to be created were developed by assessing several factors. These included soil conditions, historical vegetation mapping, species moisture tolerances, and communities and species still found within the Subject Lands and Study area. Details about the two types of created habitats are provided in the Sections 6.1.1 and 6.1.2, below.

6.1.1 Forest Habitat Restoration

There are two proposed forest communities, one south of Maple Grove Road in the west, around the proposed created 0.87ha wetland, and one on the east side of Middle Creek. Combined, these forest communities will comprise an area of 2.26ha. The forest community type for both areas was selected based on the plant species that would thrive in the 'very moist' soils, bordering on wetland conditions, and on plant species that could tolerate the somewhat variable water levels typical of a flood plain. The proposed forest community type will be Fresh-Moist Sugar Maple Hardwood Deciduous Forest (FOD6-5).

The dominant tree species planted will include Sugar Maple (*Acer saccharum ssp. saccharum*) (35% of all tree species planted), with lesser amounts of Bur Oak (*Quercus macrocarpa*) (15%), American Basswood (*Tilia americana*), Black Cherry (*Prunus serotina*), Black Maple (*Acer saccharum ssp. nigrum*) (all 10% each), and small numbers of Black Willow (*Salix nigra*), Eastern White Cedar (*Thuja occidentalis*), Eastern White Pine (*Pinus strobus*), and Red Oak (*Quercus rubra*) (all 5% each).

Shrub species planted in the upland areas will include a relatively even mixture of Choke Cherry (*Prunus virginiana*) (25% of all shrub species planted), Alternate-leaved Dogwood (*Cornus alternifolia*) (20%), Grey Dogwood (*Cornus racemosa*) (20%), Staghorn Sumac (*Rhus typhina*) (20%), and Purple-flowering Raspberry (*Rubus odoratus*) (15%).

Together, the trees and shrubs will be planted at densities of 1000 individuals/ha.

Native understorey vegetation will be seeded throughout the forest planting areas at an approximate density of 6kg/ha, in conjunction with an annual nurse crop of White Proso Millet (*Panicum miliaceum*), or an alternate mix approved by a qualified biologist. Species will include

an approximately equal amount of Foxglove Beardtongue (*Penstemon digitalis*), Bebb's Sedge (*Carex bebbii*), Nodding/Fringed Sedge (*Carex crinata*), Fowl Bluegrass (*Poa palustris*), Showy Tick Trefoil (*Desmodium canadensis*), Fowl Mannagrass (*Glyceria striata*), Spotted Joe Pye Weed (*Eupatorium maculatum*), Canada Anemone (*Anemone canadensis*), and White Avens (*Geum canadense*).

6.1.2 Wetland Creation and Restoration

The proposed Wetland and Forest Habitat Creation Plan will create a wetland approximately 0.83ha in area, which will include a mixture of thicket swamp and marsh wetland vegetation, within the floodplain south of Maple Grove Road (see the location on the plan in Appendix XVI). The wetland in this location will be contiguous with the NHS, the Middle Creek corridor and the associated natural habitats around the creek.

In addition to the created wetland, the historically degraded 0.095ha Wetland 1b will be restored by augmenting the existing native plant community with appropriate shrubs, trees, and herbaceous plants.

A variety of Dogwoods (*Cornus* sp.) and Willows (*Salix* sp.) were observed adjacent to both wetland areas, and were selected to form the basis of each wetland planting area. Therefore, the proposed wetland community type for both the created wetland and Wetland 1b will be a Willow Swamp Thicket (SWT2-2) and Red-osier Dogwood Swamp Thicket (SWT2-5) complex. Additional species for the wetlands were selected based on those that could tolerate variable water levels, including some standing water. Selecting a thicket community over a more sensitive swamp community avoids the risk of drowning trees, which is often observed in areas with variable water levels associated with developed areas.

Shrub species in both wetland areas will be composed of, Red-osier Dogwood (*Cornus stolonifera*) (20% of all shrub species planted), Grey Dogwood (*Cornus racemosa*) (20%), Pussy Willow (*Salix discolor*) (15%), Common Elderberry (*Sambucus canadensis*) (15%), Red Panicked Dogwood (*Cornus foemina* ssp. *racemosa*) (10%), Bebb's Willow (*Salix bebbiana*) (10%), and Sandbar Willow (*Salix exigua*) (10%).

Planting native trees throughout the wetlands, in addition to shrubs, is expected to increase the overall resilience of the wetlands. The tree species within the created wetland will be dominated by Freeman's Maple (*Acer X freemanii*) (which will be 60% of the tree species planted in the wetlands), with some Eastern White Cedar (*Thuja occidentalis*) (20%), and lesser amounts of

Peach-leaved Willow (*Salix amygdaloides*) (10%), and White Elm (*Ulmus americana*) (10%). Based on information available about historical wetland conditions north of Wetland 1b, this swamp thicket community will be augmented largely with Eastern White Cedar trees (*Thuja occidentalis*) (which will be 70% of the tree species planted in the wetlands), with small amounts of Freeman's Maple (15%), Peach-leaved Willow (10%), and White Elm (5%).

Together, the trees and shrubs will be planted at densities of 1000 individuals/ha.

Native understorey vegetation will be seeded throughout the wetland at an approximate density of 4kg/ha, in conjunction with an annual nurse crop of White Proso Millet (*Panicum miliaceum*), or an alternate mix approved by a qualified biologist. Species will include an approximately equal amount of Awn-fruited Sedge (*Carex stipata*), Common Boneset (*Eupatorium perfoliatum*), Fox Sedge (*Carex vulpinoidea*), Fringed Sedge, Dark-green Bulrush (*Scirpus atrovirens*), Hard-stemmed Bulrush (*Schoenoplectus acutus*), Sallow Sedge (*Carex lurida*), Nodding Beggarticks (*Bidens cernua*), Swamp Aster (*Symphotrichum puniceum*), Rice Cutgrass (*Leersia oryzoides*), Spotted Joe Pye Weed, Swamp Milkweed (*Asclepias incarnata*), Tall Mannagrass (*Glyceria grandis*), and Virginia Wildrye (*Elymus virginicus*).

6.2 Plantation Management

Approximately 50% of the existing upland woodlands are plantations, with non-native and invasive species such as Scot's Pine (*Pinus sylvestris*), European Buckthorn (*Rhamnus cathartica*), and Garlic Mustard (*Alliaria petiolata*) present throughout. The future management of these plantations in an urbanizing context will be an important consideration for upland habitat creation and management. It is recommended that plantations are managed in alignment with "good forestry practices", as described in the *Forestry Act* (Government of Ontario 1990). Prior to the execution of forest management activities within the plantations, a Forest Management and Silvicultural Prescription should be developed to guide management activities on the site. Invasive species management strategies such as chemical or mechanical removal should be implemented in order to allow conifer and deciduous species regeneration to occur with limited competition. Based on the current conditions of the coniferous plantations, it is recommended that, following invasive species management, a light thinning be pursued in order to promote the regeneration of deciduous species currently found within the stands. Management efforts will be focused on retaining conifer trees of acceptable growing stock (AGS) and removing those of unacceptable growing stock (UGS), while retaining a minimum of six cavity, UGS trees per hectare, to ensure the retention of wildlife habitat within the stand. This

will allow for sufficient structure to remain and allow the conifer plantation to continue to support the regeneration of mixed wood species, while removing clusters of UGS conifers observed to be in decline. Tree marking should be completed prior to the thinning in order to ensure that all management activities conducted strictly adhere to those outlined within the forest management plan and silvicultural prescription. Thinning shall not occur during bird nesting season.

By managing the plantations within the Subject Lands, these communities will become more diverse (with higher abundances of native plant species), more resilient, and will provide higher quality habitats for the native plants and animals.

6.3 Benefits to Plants and Animals

The Proposed Wetland and Forest Habitat Creation Plan, which will widen the Middle Creek corridor through native wetland and forest vegetation plantings and augmentation, create a new 0.87ha wetland, and manage invasive species, as well as the management of the coniferous plantations within the Subject Lands, will provide many benefits to plants and animals within the Subject Lands, including providing:

- Additional suitable habitat for wetland plants, including regionally-rare species documented within the Subject Lands such as Bulbous Cress, Cardinal-flower, Marsh Horsetail, Meadow Horsetail, and Rough Sedge;
- Additional suitable habitat for wetland birds within the Subject Lands;
- Foraging habitat for the Threatened Bank Swallow and Barn Swallow, which were both documented foraging within the Subject Lands;
- New habitat opportunities for turtles in the created wetland (since none were documented within the Subject Lands);
- A new wetland breeding habitat for toads and frogs (American Toad Tetraploid Gray Treefrog), which were documented to be breeding in relatively low numbers within the Subject Lands;
- Suitable open foraging habitats for bat species, including SAR species (Little Brown Myotis, Northern Myotis and Tri-colored Bat);
- Enhanced movement opportunities for all wildlife to the natural heritage features beyond the Subject Lands, including portions of the Maple Grove Road PSW to the north, and the Speed River to the southeast;
- Enhanced movement opportunities for White-tailed Deer to access winter concentration areas in the eastern Coniferous Plantation (CUP3);

- Additional suitable habitat for Butterflies in the open upland habitats in the floodplain, including for the SCC Monarch, and the regionally-rare butterfly, Common Sootywing;
- Additional suitable habitat for Odonates in the created wetland as well as the upland habitats in the floodplain;
- Additional suitable habitat for rare Terrestrial crayfish in the created wetland; and
- Protection of fish habitat in Middle Creek through reduced runoff and siltation and maintenance of the watercourse thermal regime (through reduced runoff and increased vegetation cover).

7.0 Impact Analysis

7.1 Approach to Impact Analysis

Potential impacts arising from the proposed undertaking were determined by comparing the details of the proposed undertaking, including the site plan, grading details, SWM plans, geotechnical information, the hydrogeological assessment, and any other components of the development such as proposed trails, with the characteristics of the existing natural features and their functions. Where the development proposal overlaps with the natural features, impacts may arise. NRSI worked closely with the River Mill Development Corporation and the study team to refine the proposed development to avoid important natural features (e.g. the wetlands, woodlands, and Middle Creek), reduce the level of impact to the ecological function of the Study area, and identify areas where natural habitat enhancements would be most beneficial. Further details of the proposed development are included in the Chloride Impact Assessment (MTE 2020b), Functional Servicing Report (MTE 2020d, e), the Hydrogeological Characterization (MTE 2020a), and the SWM Report (MTE 2020c).

Consistent with the City of Cambridge (2018a) and Region of Waterloo (2015) definition of 'adverse impact' the Impact Analysis presented here examines: *"changes likely to arise directly or indirectly from development or site alteration within or contiguous to an element of the... Natural Heritage System or Greenlands Network ...that result in widespread, long-term, or irreversible degradation of the significant features or impairment of the natural functions of the designated area"*.

The following is a description of the types of impacts which will be discussed.

- Direct impacts to the natural features on the Subject Lands associated with disruption or displacement caused by the actual proposed 'footprint' of the undertaking.
- Indirect impacts associated with changes in site conditions such as drainage and water quantity/quality.
- Induced impacts associated with impacts after the development is constructed such as subsequent demand on the resources created by increased habitation/use of the area and vicinity.
- Cumulative impacts associated with the changes to the environment resulting from the proposed development in combination with incremental impacts caused by other past, present, and future activities in the Study area.

The impact analysis is presented separately for each of the proposed development phases (Phases 4 and 5), below. Cumulative impacts for the proposed River Mill development as a whole (both Phases 4 and 5) are discussed in Section 7.4.

7.2 Phase 4 Impact Analysis

The potential impacts to natural features within and adjacent to the Phase 4 development area (shown in Appendix I) is detailed below. A detailed discussion of significant natural feature buffers is provided below, in the indirect impacts section (Section 7.2.2).

7.2.1 Direct Impacts and Mitigations

The approach to identifying and delineating the natural features and associated buffers was aimed at avoiding direct impacts from development on important natural features. Tree and Vegetation Removal and Site Grading are potential sources of direct impacts associated with Phase 4.

Tree and Vegetation Removal

The existing wetlands, woodlands, and Middle Creek and its associated floodplain within the Subject Lands will be buffered and protected (Map 6). The following areas of vegetation communities or features require removal to accommodate the proposed Phase 4 development, or may be impacted:

- 3.9ha of Cultural Meadow (CUM1) community vegetation;
- Four candidate SAR bat roosting trees (RST-002, RST-005, RST-006, and RST-007);
- The right of way of a proposed road (street 'E'), will be within the 25m buffer of one Category 2 Butternut (JUG-006), which constitutes 'harm' under the *ESA* (2007)
- Nine trees, including seven individual trees ≥ 20 cm diameter at breast height (DBH), and
- Roadside and property line vegetation.

No provincially or regionally significant plant species were observed along the roadside or property lines of the Subject Lands and the removal of a selection of individual trees will not negatively impact the form or function of the woodlands within the Subject Lands.

Mitigations:

- *The limit of development should be clearly delineated in the field prior to construction beginning.*

- *Prior to construction work starting examination of work area by qualified biologist and relocation of any wildlife.*
- *Permanent fencing should be erected along the back of units backing onto the woodlands within the Subject Lands to demarcate the boundary of the residential lots, outside the 10m woodland buffer.*
- *Tree protection fencing should be installed along the woodland dripline. Fencing must be installed and inspected by a Certified Arborist prior to construction and maintained during construction.*
- *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 or tree professional and removed as warranted.*
- *Tree Protection Fencing should be inspected on a regular basis by an Environmental Inspector or qualified biologist and should be inspected by a Certified Arborist or qualified other to ensure no roots or limbs are damaged during installation.*
- *The limit of construction should be inspected by a qualified biologist on a regular basis to document any potential negative impacts to the woodland (e.g. construction garbage, ineffective boundary markings, erosion, etc.).*
- *Final details of the vegetation to be removed, vegetation to be retained, and specific mitigation strategies (e.g. tree protection fencing) should be included in the Detailed Vegetation Plan at the time of Detailed Design.*
- *Vegetation removal is recommended to occur outside of the breeding and nesting season for migratory birds as established by the Canadian Wildlife Service. The peak breeding period for birds in southern Ontario extends from approximately April 1 through August 31 (CWS 2012).*
- *Should vegetation removal be required during the nesting season for migratory birds, surveys for nesting birds may be undertaken to permit vegetation removal should breeding bird absence be confirmed.*
- *The MECP should be consulted regarding the removal of the candidate bat maternity roosting trees prior to their removal. The MECP may require bat exit/acoustic surveys be completed prior to the removals, following the MNRF's guidance documents (2011, 2017).*

- *It is recommended that planting of new trees be incorporated into the Detailed Design phase in order to compensate for any tree loss.*
- *Suitable regionally-native species should be selected for planting and these should be maintained appropriately.*

Site Grading

A preliminary site grading plan with finished grade contours has been prepared by MTE Consultants as part of the Functional Servicing Report (2020e). The grading design of the site was controlled by many factors including servicing constraints (both sanitary and storm), matching existing and proposed boundary grades, protection of existing environmental features, ensuring major storm event overland flows are directed to existing road right-of-way, where applicable, or towards the proposed SWM facilities, as well as maintaining a cut/fill balance for the development (MTE 2020e). Site grading will occur outside significant natural features within the Subject Lands.

Mitigations:

- *The limit of grading should be protected with heavy duty silt fencing in areas around wetland and watercourse features.*

7.2.2 Indirect Impacts and Mitigations

The following outlines potential sources of indirect impacts associated with the proposed development:

- Encroachment into buffers
- Changes to surface flow, groundwater balance and water quality
- Sedimentation and erosion
- Indirect impacts to wildlife

Encroachment into Buffers

Recommended buffers are shown on Map 4 and are shown overlaid with Phase 4 on Map 6 and in Appendix I. The Phase 4 development adheres to the recommended minimum buffers, with the following minor exceptions:

- Block 3, a SWM facility for Phase 4, has a small 0.1ha encroachment into the elective 30m Middle Creek corridor buffer. It should be emphasized that Block 3

adheres to the required minimum 15m watercourse buffer and 10m dripline buffer.

- The ROW for Street 'E', in the southwest portion of the proposed Phase 4 development, encroaches by:
 - 0.014ha into the dripline buffers of the two southern woodlots,
 - 0.005ha into the 30m buffer around Wetland 3.

It was important to place the SWM facility in Block 3 in close proximity to the Middle Creek corridor in order to allow captured stormwater to be released to the creek. The location of these blocks will mimic the existing pattern of catchments and flows to the creek.

Street 'E', intended to service Block 20 (high density mixed use) and Block 21 (mixed use), while connecting these blocks to the rest of the proposed development, passes through the old haul road area between the two southwestern wetlands and woodlands. To accommodate the standard 20m road width, the ROW for Street 'E' encroaches by these small areas into the wetland and woodland buffers.

Given that the majority of required buffers are adhered to, and that encroachments discussed above are relatively small, it is not anticipated that there will be any adverse impacts to the structure or function of the significant wetlands, woodlands, or Middle Creek.

Mitigations:

- *The limit of development should be clearly delineated in the field prior to construction beginning.*
- *The limit of grading should be protected with heavy duty silt fencing in areas around wetland and creek features.*
- Prior to construction work starting examination of work area by qualified biologist and relocation of any wildlife.

Surface Flow, Groundwater Water Balance and Water Quality

This section of the impact analysis focuses on the potential changes to the flow patterns, quality and quantity of groundwater and surface water flows to the wetlands and the watercourse (Middle Creek) within the Subject Lands as a result of the proposed development. The project team worked closely to develop a stormwater strategy that avoids significant changes to the pre-development water balance such as notable increases or decreases in the runoff volume to the wetlands or Creek that would adversely impact these features.

The approach to SWM for the proposed development is presented in the MTE SWM Report (2020c). The proposed SWM plan was designed in accordance with the HWSS Summary Report (HWSS Working Committee 2004) and includes at-source roof infiltration facilities throughout the proposed development, block level infiltration facilities, and the use of one existing and one new stormwater management facilities (MTE 2020c).

The majority of the Phase 4 lands will drain to SWM Facility 1, located west of Middle Creek in Block 3 (MTE 2020c). This facility will discharge to Middle Creek. Stormwater from the remaining portion of the Phase 4 lands, generally located south of Wetlands 2 and Wetland 3, will be directed to an existing facility in the Hunt Club South SWM facility at the south corner of the Hunt Club and Arriscraft Subdivision (MTE 2020c). Infiltration facilities for the blocks and lots south of the floodplain in the northwest portion of the Subject Lands will also drain into the proposed created wetland.

The proposed SWM plan was designed to meet the following criteria:

Water Balance:

Surface Water - Maintain existing surface water volume and hydroperiod inputs into significant environmental features. Annual runoff pre- and post-development runoff volumes for wetlands within the Subject Lands are presented in the MTE report (2020c) for further information.

Infiltration – Maintain or current average annual volumes for the proposed development: implementation of the proposed infiltration measures results in an annual average infiltration depth of 233.6mm, which exceeds the pre-development value of 214.4mm.

MTE provides a detailed analysis of the pre versus post water budget for Wetlands 1 through 5 (2020c). This includes changes in runoff during winter and non-winter months, as well as groundwater.

The modelling completed by MTE (2020c) demonstrates the following:

- Wetlands 1a, 1c and 5 have water regimes that are driven by flows in Middle Creek. Maintenance of the flows in the creek will ensure these wetlands are sustained.
- The pre- versus post development modelling shows that water budgets for all wetlands, with the exception of Wetland 1b, will be within a few percent. As such, no substantial impacts to these wetlands are anticipated.

- Wetland 1b is discussed further under Phase 5 in Section 7.3.2.

Water Quality:

Provide an Enhanced level of stormwater quality treatment prior to discharge to surface or groundwater systems. Total groundwater chloride concentration resulting from the salt application on roads within the proposed development is 112mg/L, which meets the Reasonable Use Concept criteria of 126mg/L (MTE 2020b).

Water Quantity and Erosion Control:

Control the peak flow rates according to the unit flow rates established in the HWSS (PEIL 2004), to minimize flooding and preserve hydraulic and hydrologic functions. For a 25mm storm event, drawdown time will be over 48 hours. This has been provided by end-of-pipe SWM facilities (MTE 2020c).

Based on the study team reports and implementation of the recommended stormwater management engineering measures, it is not anticipated that there will be any significant adverse impacts to the water balance, water quality or thermal regime of the wetlands or Middle Creek from the proposed development.

Mitigations:

- *To avoid impacts to the wetlands adjacent to this development, the water balance of the wetlands should be maintained during all construction activities.*
- *The limit of grading should be protected with heavy duty silt fencing in areas around wetland and creek features.*
- *An Erosion and Sediment Control Plan should be developed to ensure the fencing is properly installed and functioning during construction.*
- *A Salt Management Plan should be implemented as part of the proposed development.*

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 on-site and off-site natural features from potential impacts due to sediment, a sediment and erosion control plan must be developed and implemented prior to any construction activities on the site.

During the site grading work, suitable sedimentation controls will be required to help control and reduce the turbidity of run-off water which may flow towards the surface water features. As construction work progresses at the site, regular maintenance and additional sedimentation measures may be required to limit the effect of siltation of run-off water in localized areas.

Mitigations:

- *Develop and implement an Erosion and Sediment Control Plan prior to construction. Siltation control measures such as silt fencing, a mud mat at the construction entrance, and tree protection fencing are recommended.*
- *Disturbed areas should be kept to a minimum and re-vegetated in a reasonable timeframe in order to minimize dust.*
- *Inspection and maintenance of the installed Erosion and Sediment measures throughout the duration of construction, to ensure they are functioning as originally intended.*
- *An environmental monitoring program is recommended and provided in Section 7.4 to ensure that the sediment and erosion control measures are installed, maintained and functioning as intended.*

Indirect Impacts to Wildlife

The proposed development will maintain and buffer the important natural features within the Subject Lands, thereby maintaining these important areas for wildlife. Potential indirect impacts to wildlife in the retained natural areas may arise from roads reducing the potential for movements between habitats. A wildlife eco-passage has been incorporated into the Phase 4 design to promote the movement of wildlife between the southwestern woodlands and wetlands. Noise and dust associated with construction activities and unnatural lighting resulting from the development may also be potential sources of indirect impacts to wildlife. Noise and dust associated with construction is anticipated to be temporary, therefore significant impacts to wildlife are not expected.

Mitigations:

- *To maintain a linkage for wildlife between the southwestern woodlands and wetlands (Wetlands 2 and 3) within the Subject Lands, as well as to those south of the Subject Lands (south of the now closed and restored Briardean Road), a wildlife eco-passage has been included in the proposed development design.*

The eco-passage is proposed to be a 26m long, 1.8x2.4m rectangular culvert that spans the width of Street E (MTE 2020e). This eco-passage was designed using the guidelines provided in the Ontario Ministry of Transportation's Environmental Guide for Mitigating Road Impacts to Wildlife (MTO 2017), to ensure it is suitable for the reptiles, amphibians and small- to medium- sized mammals that were documented within the Subject Lands.

- *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 Lands is reduced. Topsoil stockpile locations should be in areas of lesser wind exposure and away from natural features and their buffers.*
- *Detailed lighting designs will be provided at the detailed design stage. Lighting designs should include directional lighting for developments that are within 30m of natural features to eliminate lightwash.*

7.2.3 Induced Impacts and Mitigations

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.

Mitigations:

- *Use of the natural areas by community residents or other users is difficult to control. Education with respect to the values and implications of the neighbouring natural areas is one tool that can be used. Signage should be used to direct community members or other recreational users not to trespass into sensitive natural areas. A new home owners' brochure should be developed to educate new residents on the important natural features in their neighbourhood.*
- *Fencing should be erected to assist in preventing human induced impacts to natural areas.*

7.2.4 Phase 4 Impact Assessment Summary

A summary of the potential impacts and recommended mitigation measures for each significant natural feature within Phase 4 is provided in Table 10.

Table 10. Summary of Potential Development Impacts and Mitigation for Phase 4

Significant Natural Feature	Relevant Policies	Potential Impacts	Recommended Mitigation
Significant Wetlands	<ul style="list-style-type: none"> • Provincial Policy Statement (OMMAH 2020) • Grand River Conservation Authority (GRCA) Ontario Regulation 150/06 (Government of Ontario 2013) • Regional Municipality of Waterloo (RMOW) Official Plan (2015) • City of Cambridge Official Plan (2018a) • Hespeler West Subwatersheds (HWSS) Summary Report (HWSS Working Committee 2004) 	<p>Direct Impacts:</p> <ul style="list-style-type: none"> • None. All wetlands are buffered and protected. • The overall function of wetlands within the Subject Lands will be maintained. <p>Indirect Impacts:</p> <ul style="list-style-type: none"> • The ROW of Street 'E', in the southwest portion of the proposed Phase 4 development, encroaches by 0.005ha into the 30m buffer of Wetland 3 • Changes to surface flow, groundwater balance and water quality • The proposed SWM plan maintains water balance in all wetlands with the exception of Wetland 1b. Wetland 1b will experience a minor, non-significant reduction in runoff volume of 949m³ over the 8-month non-winter period. • Sedimentation and erosion • Indirect impacts to wildlife <p>Induced Impacts:</p> <ul style="list-style-type: none"> • Increased use of a natural area by residents or users of the property, feral domestic wildlife, and unauthorized trail/pathway construction. 	<p>Direct and Indirect Impacts:</p> <ul style="list-style-type: none"> • 30m buffers are recommended around all PSW within the Subject Lands. • Buffers should be delineated in the field prior to any construction activities. <p>Indirect Impacts:</p> <ul style="list-style-type: none"> • To avoid impacts to the wetlands, the water balance of the wetlands will be maintained during all construction activities and in the post-development scenario. • A detailed Sediment and Erosion Control Plan should be developed at the Detailed Design Stage. <p>Induced Impacts:</p> <ul style="list-style-type: none"> • Signage should be used to direct community members or other recreational users not to trespass into sensitive natural areas. • Fencing should be used to assist in preventing human induced impacts to natural areas.
Woodlands	<ul style="list-style-type: none"> • Provincial Policy Statement (OMMAH 2020) • Regional Municipality of Waterloo Official Plan (2015) • City of Cambridge Official Plan (2018a) 	<p>Direct Impacts:</p> <ul style="list-style-type: none"> • The overall function of woodland within the Subject Lands will be maintained. <p>Indirect Impacts:</p> <ul style="list-style-type: none"> • The ROW of Street 'E', in the southwest portion of the proposed Phase 4 development, encroaches by 0.014ha into the 10m woodland buffers • Sedimentation and erosion • Indirect impacts to wildlife 	<p>Direct Impacts:</p> <ul style="list-style-type: none"> • 10m buffers are recommended around woodlands within the Subject Lands • 30m buffer is provided around the Middle Creek riparian woodland • Site-specific tree protection measures should be identified through the Detailed Vegetation Plan at the time of Detailed Design. <p>Indirect Impacts:</p>

Significant Natural Feature	Relevant Policies	Potential Impacts	Recommended Mitigation
	<ul style="list-style-type: none"> • HWSS Summary Report (HWSS Working Committee 2004) 	<p>Induced Impacts:</p> <ul style="list-style-type: none"> • Induced impacts include increased use of a natural area by residents or users of the property, feral domestic wildlife, and unauthorized trail/pathway construction. 	<ul style="list-style-type: none"> • A detailed Sediment and Erosion Control Plan should be developed at the Detailed Design Stage. <p>Induced Impacts:</p> <ul style="list-style-type: none"> • Signage should be used to direct community members or other recreational users not to trespass into sensitive natural areas. • Fencing should be used to assist in preventing human induced impacts to natural areas.
Watercourse, Floodplain, and Fish Habitat	<ul style="list-style-type: none"> • Federal <i>Fisheries Act</i> (Government of Canada 1985) • Provincial Policy Statement (OMMAH 2020) • GRCA Ontario Regulation 150/06 (Government of Ontario 2013) • Regional Municipality of Waterloo Official Plan (2015) • City of Cambridge Official Plan (2018a) HWSS Summary Report (HWSS Working Committee 2004) 	<p>Direct Impacts:</p> <ul style="list-style-type: none"> • None <p>Indirect Impacts:</p> <ul style="list-style-type: none"> • Sedimentation and erosion • Indirect impacts to wildlife <p>Induced Impacts:</p> <ul style="list-style-type: none"> • Induced impacts include increased use of a natural area by residents or users of the property, feral domestic wildlife, and unauthorized trail/pathway construction. 	<p>Direct and Indirect Impacts:</p> <ul style="list-style-type: none"> • Middle Creek is protected and buffered • The Middle Creek floodplain is protected and will be enhanced through the Wetland and Forest Habitat Creation Plan. • Buffers should be delineated in the field prior to any construction activities. <p>Indirect Impacts:</p> <ul style="list-style-type: none"> • A detailed Sediment and Erosion Control Plan should be developed at the Detailed Design Stage. <p>Induced Impacts:</p> <ul style="list-style-type: none"> • Signage should be used to direct community members or other recreational users not to trespass into sensitive natural areas. • Fencing should be used to assist in preventing human induced impacts to natural areas.
Endangered or Threatened	<ul style="list-style-type: none"> • <i>Endangered Species Act</i> (Government of Ontario 2007) 	<p>Direct Impacts:</p> <ul style="list-style-type: none"> • Four candidate SAR bat roosting trees are to be removed (RST-002, RST-005, RST-006, and RST-007) 	<p>Direct Impacts:</p> <ul style="list-style-type: none"> • The MECP should be consulted regarding the removal of the candidate bat maternity roosting trees prior to their removal. The MECP may

Significant Natural Feature	Relevant Policies	Potential Impacts	Recommended Mitigation
Species and Their Habitat	<ul style="list-style-type: none"> Provincial Policy Statement (MMAH 2014) City of Cambridge Official Plan (2018a) Region of Waterloo Official Plan (2015) 	<ul style="list-style-type: none"> One Category 2 Butternut (JUG-006) will be impacted by the ROW of Street 'E', with the ROW being within the 25m buffer of the tree, which constitutes 'harm' under the ESA (Government of Ontario 2007) <p>Indirect Impacts:</p> <ul style="list-style-type: none"> Noise and dust associated with construction is anticipated to be temporary, therefore significant impacts to wildlife from noise and dust are not expected. <p>Induced Impacts:</p> <ul style="list-style-type: none"> None 	<p>require bat exit/acoustic surveys be completed prior to the removals, following guidance documents (MNR 2011, 2017).</p> <ul style="list-style-type: none"> As per Ontario Regulation 242/08 under the ESA (Government of Ontario 2007), a "Notice of Butternut Impact" must be filed with the MECP prior to any grading within the vicinity of the Butternut (JUG-006). A minimum of 10 Butternut seedlings and 10 other associated native trees will need to be planted to compensate for this harm. Additional details are available in the DVMP for Phase 4 (Appendix V). <p>Indirect Impacts:</p> <ul style="list-style-type: none"> In order to suppress dust, areas of bare soil can be moistened with water during construction activities to ensure that the amount of dust within the Subject Lands is reduced. Topsoil stockpile locations should be in areas of lesser wind exposure and away from natural features and their buffers. Detailed lighting designs will be provided at the detailed design stage. Lighting designs should include directional lighting for developments that are within 30m of natural features to eliminate lightwash. Tree protection fencing must be installed, maintained, and inspected by a certified arborist or other recognized professional prior to, and during, construction. Full details of recommended tree protection measures and mitigation measures are provided in the DVMP for Phase 4 (Appendix VI). <p>Induced Impacts: None</p>
Significant Wildlife Habitat (SWH)	<ul style="list-style-type: none"> Provincial Policy Statement (OMMAH 2020) 	<p>Direct Impacts:</p> <ul style="list-style-type: none"> Direct impacts to the SWH within the Subject Lands have been avoided through the Phase 4 design and through the 	<p>Direct and Indirect Impacts:</p> <ul style="list-style-type: none"> 30m buffers are recommended around all PSWs

Significant Natural Feature	Relevant Policies	Potential Impacts	Recommended Mitigation
	<ul style="list-style-type: none"> Regional Municipality of Waterloo Official Plan (2015) City of Cambridge Official Plan (2018a) 	<p>implementation of 30m and 10m buffers around the wetlands and woodlands.</p> <p>Indirect Impacts:</p> <ul style="list-style-type: none"> Sedimentation and erosion Indirect impacts to wildlife <p>Induced Impacts:</p> <ul style="list-style-type: none"> Induced impacts include increased use of a natural area by residents or users of the property, feral domestic wildlife, and unauthorized trail/pathway construction. 	<ul style="list-style-type: none"> 10m buffers are recommended around woodlands Buffers should be delineated in the field prior to any construction activities. <p>Indirect Impacts:</p> <ul style="list-style-type: none"> A detailed Sediment and Erosion Control Plan should be developed at the Detailed Design Stage. <p>Induced Impacts:</p> <ul style="list-style-type: none"> Signage should be used to direct community members or other recreational users not to trespass into sensitive natural areas. Fencing should be used to assist in preventing human induced impacts to natural areas.
Locally Significant Species	<ul style="list-style-type: none"> Regional Municipality of Waterloo Official Plan (2015) City of Cambridge Official Plan (2018a) Migratory Birds Convention Act (Government of Canada 1994) 	<p>Direct Impacts:</p> <ul style="list-style-type: none"> None. Direct impacts to the Locally Significant Species within the Subject Lands have been avoided through the Phase 4 design and through the implementation natural feature buffers. <p>Indirect Impacts:</p> <ul style="list-style-type: none"> Potential indirect impacts to wildlife in the retained natural areas may arise from noise and dust associated with construction activities and unnatural lighting resulting from the development. Noise and dust associated with construction is anticipated to be temporary, therefore significant impacts to wildlife from noise and dust are not expected. <p>Induced impacts:</p> <ul style="list-style-type: none"> Increased use of a natural area by residents or users of the property, feral domestic wildlife, and unauthorized trail/pathway construction. 	<p>Direct Impacts:</p> <ul style="list-style-type: none"> 30m buffers are recommended around all PSWs 10m buffers are recommended around woodlands Buffers should be delineated in the field prior to any construction activities. <p>Indirect Impacts:</p> <ul style="list-style-type: none"> In order to suppress dust, areas of bare soil can be moistened with water during construction activities to ensure that the amount of dust within the Subject Lands is reduced. Topsoil stockpile locations should be in areas of lesser wind exposure and away from natural features and their buffers. 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. <p>Induced Impacts:</p>

Significant Natural Feature	Relevant Policies	Potential Impacts	Recommended Mitigation
			<ul style="list-style-type: none"> • Signage should be used to direct community members or other recreational users not to trespass into sensitive natural areas. • Fencing should be used to assist in preventing human induced impacts to natural areas.
Individual Trees	<ul style="list-style-type: none"> • City of Cambridge Private Tree Preservation By-Law 124-18 (2018b) • Migratory Birds Convention Act (Government of Canada 1994) 	<p>Direct Impacts:</p> <ul style="list-style-type: none"> • Nine trees, including seven individual trees $\geq 20\text{cm}$ diameter at breast height (DBH), are proposed to be removed as a result of the Draft Plan. • Trees to be retained could be impacted by grading or construction activities. • Full details of the tree inventory, tree retention and removal analysis, and compensation analysis are provided in the DVMP for Phase 4 (Appendix VI). <p>Indirect Impacts:</p> <ul style="list-style-type: none"> • Potential indirect impacts to individual trees retained within the development area may include sedimentation, erosion, disturbance to the tree's roots through grading, or disturbance to the tree's trunk or crown by construction equipment. <p>Induced impacts:</p> <ul style="list-style-type: none"> • None 	<p>Direct Impacts:</p> <ul style="list-style-type: none"> • As per the City of Cambridge By-Law 124-18 (2018b), the DVMP (Appendix V) includes a Tree Compensation Fee based on the preliminary number of trees identified for removal. This will be updated at the Site Plan Stage. There is more than enough room in Proposed Wetland and Forest Habitat Creation areas and natural features buffers within the Subject Lands to accommodate all the compensation tree plantings. • The DVMP includes recommended mitigation measures and criteria for the development of a planting plan. • Time vegetation removal activities to occur outside the core bird breeding season (April 1 to August 31). • If vegetation removal must occur during the bird breeding season, retain an avian biologist to survey for active nests just prior to vegetation removal activities. <p>Indirect Impacts:</p> <ul style="list-style-type: none"> • Tree protection fencing must be installed, maintained, and inspected by a certified arborist or other recognized professional prior to, and during, construction. • Full details of recommended tree protection measures and mitigation measures are provided in the DVMP for Phase 4 (Appendix V). <p>Induced impacts:</p> <ul style="list-style-type: none"> • N/A

7.3 Phase 5 Impact Analysis

The potential impacts to natural features within and adjacent to the Phase 5 development area (shown in Appendix I) is detailed below.

The property limit of Phase 5 is designed to be outside of the buffer and floodplain limits, leaving no environmentally sensitive areas within the boundary of Subject Lands. The entirety of the buffer and floodplain is slated to be dedicated to the City for protection.

7.3.1 Direct Impacts and Mitigations

The approach to identifying and delineating the natural features and associated buffers was aimed at avoiding direct impacts from development on important natural features. Tree and Vegetation Removal and Site Grading are potential sources of direct impacts associated with Phase 5.

Tree and Vegetation Removal

The development area was designed to be entirely outside the existing wetlands, woodland, and Middle Creek floodplain (Map 6). The following areas of vegetation communities or features require removal to accommodate the proposed Phase 5 development:

- Two candidate SAR bat roosting trees (RST-003, RST-004),
- 47 individual trees, including 38 trees ≥ 20 cm DBH, and
- Roadside and property line vegetation.

No provincially or regionally significant plant species were observed along the roadside or property lines of the Subject Lands and the removal of a selection of individual trees will not negatively impact the form or function of the woodlands within the Subject Lands.

Mitigations:

- *The limit of development should be clearly delineated in the field prior to construction beginning.*
- *Prior to construction work starting examination of work area by qualified biologist and relocation of any wildlife.*
- *Permanent fencing should be erected along the back of units backing onto the woodlands within the Subject Lands to demarcate the boundary of the residential lots, outside the 10m woodland buffer.*

- *Tree protection fencing should be installed along the woodland dripline. Fencing must be installed and inspected by a Certified Arborist prior to construction and maintained during construction.*
- *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 or tree professional and removed as warranted.*
- *Tree Protection Fencing should be inspected on a regular basis by an Environmental Inspector or qualified biologist and should be inspected by a Certified Arborist or qualified other to ensure no roots or limbs are damaged during installation.*
- *The limit of construction should be inspected by a qualified biologist on a regular basis to document any potential negative impacts to the woodland (e.g. construction garbage, ineffective boundary markings, erosion, etc.).*
- *Final details of the vegetation to be removed, vegetation to be retained, and specific mitigation strategies (e.g. tree protection fencing) should be included in the Detailed Vegetation Plan at the time of Detailed Design.*
- *Vegetation removal is recommended to occur outside of the breeding and nesting season for migratory birds as established by the Canadian Wildlife Service. The peak breeding period for birds in southern Ontario extends from approximately April 1 through August 31 (CWS 2012).*
- *Should vegetation removal be required during the nesting season for migratory birds, surveys for nesting birds may be undertaken to permit vegetation removal should breeding bird absence be confirmed.*
- *The MECP should be consulted regarding the removal of the candidate bat maternity roosting trees prior to their removal. The MECP may require bat exit/acoustic surveys be completed prior to the removals, following the MNRF's guidance documents (2011, 2017).*
- *It is recommended that planting of new trees be incorporated into the Detailed Design phase in order to compensate for any tree loss.*
- *Suitable regionally-native species should be selected for planting and these should be maintained appropriately.*

Site Grading

A preliminary site grading plan with finished grade contours has been prepared by MTE Consultants as part of the Functional Servicing Report (2020d). The grading design of the site was controlled by many factors including servicing constraints (both sanitary and storm), matching existing and proposed boundary grades, protection of existing environmental features, ensuring major storm event overland flows are directed to existing road right-of-way, where applicable, or towards the proposed SWM facilities, as well as maintaining a cut/fill balance for the development (MTE 2020d).

Site grading will occur outside required wetland and woodland buffers, with the exception of the one very small encroachment, discussed in the Section 7.3.2, below.

During the site grading work, suitable sedimentation controls will be required to help control and reduce the turbidity of run-off water which may flow towards the surface water features. As construction work progresses at the site, regular maintenance and additional sedimentation measures may be required to limit the effect of siltation of run-off water in localized areas.

Mitigations:

- *The limit of grading should be protected with heavy duty silt fencing in areas around wetland and watercourse features.*

7.3.2 Indirect Impacts and Mitigations

The following outlines potential sources of indirect impacts associated with the proposed development:

- Encroachments into Buffers
- Changes to surface flow, groundwater balance and water quality
- Sedimentation and erosion
- Indirect impacts to wildlife

Encroachment into Buffers

The recommended wetland and woodland buffers are shown on Map 4 and are shown overlaid with the concept plan for Phase 5 on Map 6 and in Appendix I. The proposed Phase 5 development adheres to the recommended minimum buffers, with only one very minor exception:

- Block 3, a required Right-of-Way (ROW) widening for Briardean Road, has a small 0.005ha encroachment into the 10m dripline buffer.

Given that the required buffers are adhered to, aside from this very small encroachment, it is not anticipated that there will be any adverse impacts to the structure or function of the significant wetlands, woodlands, or Middle Creek from the proposed Phase 5 development.

Mitigations:

- *The limit of development should be clearly delineated in the field prior to construction beginning.*
- *The limit of grading should be protected with heavy duty silt fencing in areas around wetland and creek features.*
- *Prior to construction work starting examination of work area by qualified biologist and relocation of any wildlife.*

Surface Flow, Groundwater Water Balance and Water Quality

This section of the impact analysis focuses on the potential changes to the flow patterns, quality and quantity of groundwater and surface water flows to the wetlands and the watercourse (Middle Creek) within the Subject Lands as a result of the proposed development. These features are sensitive to alterations in seasonal runoff volumes and water quality. Any significant changes to the pre-development water balance causing a notable increase or decrease in the runoff volume to the wetlands or Creek would adversely impact these features.

The approach to SWM for the proposed development is presented in the MTE's SWM Report (2020c). The proposed SWM plan was designed in accordance with the HWSS Summary Report (HWSS Working Committee 2004) and includes at-source roof infiltration facilities throughout the proposed development, block level infiltration facilities, and the use of one new stormwater management facility (MTE 2020c). The Phase 5 lands will drain to SWM Facility 2, located east of Middle Creek in Block 1, which will discharge to Middle Creek (MTE 2020c).

The proposed SWM plan was designed to meet the following criteria:

Water Balance:

Surface Water - Maintain existing surface water volume and hydroperiod inputs into significant environmental features. Annual runoff pre- and post-development runoff volumes for wetlands within the Subject Lands are presented in the MTE report (2020c).

Infiltration – Maintain or current average annual volumes for the proposed development: implementation of the proposed infiltration measures results in an annual average infiltration depth of 233.6mm, which exceeds the pre-development value of 214.4mm.

As discussed in Section 7.2.2, MTE provides a detailed analysis of the pre versus post water budget, including changes in runoff during winter and non-winter months, as well as groundwater, for Wetlands 1 through 5 (MTE 2020c). Wetlands 1a, 1c and 5 have water regimes that are driven by flows in Middle Creek. Therefore, maintenance of the flows in the creek will ensure these wetlands are sustained. The pre- versus post development modelling shows that water budgets for all wetlands, with the exception of Wetland 1b, will be within a few percent. Although Wetland 1b and 1c are continuous, they have been separated in this study due to the different water regimes that sustain these wetlands.

The small, disturbed Wetland 1b has surface water and ground water inputs that fluctuate drastically though the growing season, based on field observations. As such, the vegetation in this area has established under fluctuating conditions and is dominated by vegetation that is tolerant to water level fluctuations. The non-winter changes to input to Wetland 1b are presented in MTE's report (2020c). Based on the modelling results, Wetland 1b will experience a reduction in runoff volume of 949m³ over the 8-month non-winter period. Based on an average typical of 10 rain events per month, this reduction would be approximately 12m³. Compared to the current fluctuations in water regime that this wetland experiences, this volume of reduction is not significant and if spread evenly over the surface of this wetland would be in the order of a few mm.

Water Quality:

Provide an Enhanced level of stormwater quality treatment prior to discharge to surface or groundwater systems. Total groundwater chloride concentration resulting from the salt application on roads within the proposed development is 112mg/L, which meets the Reasonable Use Concept criteria of 126mg/L (MTE 2020b).

Water Quantity and Erosion Control:

Control the peak flow rates according to the unit flow rates established in the HWSS (PEIL 2004), to minimize flooding and preserve hydraulic and hydrologic functions. For a 25mm storm event, drawdown time will be over 48 hours. This has been provided by end-of-pipe SWM facilities (MTE 2020c).

Based on the study team reports and implementation of the recommended stormwater management engineering measures, it is not anticipated that there will be any significant adverse impacts to the water balance, water quality or thermal regime of the wetlands or Middle Creek from the proposed development.

Mitigations:

- *To avoid impacts to the wetlands adjacent to this development, the water balance of the wetlands should be maintained during all construction activities.*
- *The limit of grading should be protected with heavy duty silt fencing in areas around wetland and creek features.*
- *An Erosion and Sediment Control Plan should be developed to ensure the fencing is properly installed and functioning during construction.*
- *A Salt Management Plan should be implemented as part of the proposed development.*

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 on-site and off-site natural features from potential impacts due to sediment, a sediment and erosion control plan must be developed and implemented prior to any construction activities on the site.

Mitigations:

- *Develop and implement an Erosion and Sediment Control Plan prior to construction. Siltation control measures such as silt fencing, a mud mat at the construction entrance, and tree protection fencing are recommended.*
- *Disturbed areas should be kept to a minimum and re-vegetated in a reasonable timeframe in order to minimize dust.*
- *Inspection and maintenance of the installed Erosion and Sediment measures throughout the duration of construction, to ensure they are functioning as originally intended.*
- *An environmental monitoring program is recommended and provided in Section 7.4 to ensure that the sediment and erosion control measures are installed, maintained and functioning as intended.*

Indirect Impacts to Wildlife

The proposed development will maintain and buffer the important natural features within the Subject Lands, 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.

Mitigations:

- *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 Lands is reduced. Topsoil stockpile locations should be in areas of lesser wind exposure and away from natural features and their buffers.*
- *Detailed lighting designs will be provided at the detailed design stage. Lighting designs should include directional lighting for developments that are within 30m of natural features to eliminate lightwash.*

7.3.3 Induced Impacts and Mitigations

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, recreational users, feral domestic wildlife, and unauthorized trail construction.

Mitigations:

- *Use of the natural areas by community residents or other users is difficult to control. Education regarding the value and sensitivity of the neighbouring natural areas is one tool that can be used. Signage should be used to direct community members and recreational users not to trespass into sensitive natural areas. A new home owners' brochure should be developed to educate residents on the important natural features in their neighbourhood.*
- *Fencing should be erected to help prevent human induced impacts to natural areas.*

7.3.4 Phase 5 Impact Assessment Summary

A summary of the potential impacts and recommended mitigation measures for each significant natural feature within Phase 5 is provided in Table 11.

Table 11. Summary of Potential Development Impacts and Mitigation for Phase 5

Significant Natural Feature	Relevant Policies	Potential Impacts	Recommended Mitigation
Significant Wetlands	<ul style="list-style-type: none"> Provincial Policy Statement (OMMAH 2020) Grand River Conservation Authority (GRCA) Ontario Regulation 150/06 (Government of Ontario 2013) Regional Municipality of Waterloo (RMOW) Official Plan (2015) City of Cambridge Official Plan (2018a) Hespeler West Subwatersheds (HWSS) Summary Report (HWSS Working Committee 2004) 	<p>Direct Impacts:</p> <ul style="list-style-type: none"> None. All wetlands are buffered and protected. The overall function of wetlands within the Subject Lands will be maintained. <p>Indirect Impacts:</p> <ul style="list-style-type: none"> Changes to surface flow, groundwater balance and water quality The proposed SWM plan maintains water balance in all wetlands with the exception of Wetland 1b. Wetland 1b will experience a minor, non-significant reduction in runoff volume of 949m³ over the 8-month non-winter period. Sedimentation and erosion Indirect impacts to wildlife <p>Induced Impacts:</p> <ul style="list-style-type: none"> Increased use of a natural area by residents or users of the property, feral domestic wildlife, and unauthorized trail/pathway construction. 	<p>Direct and Indirect Impacts:</p> <ul style="list-style-type: none"> 30m buffers are recommended around all PSW within the Subject Lands. Buffers should be delineated in the field prior to any construction activities. <p>Indirect Impacts:</p> <ul style="list-style-type: none"> To avoid impacts to the wetlands, the water balance of the wetlands will be maintained during all construction activities and in the post-development scenario. A detailed Sediment and Erosion Control Plan should be developed at the Detailed Design Stage. <p>Induced Impacts:</p> <ul style="list-style-type: none"> Signage should be used to direct community members or other recreational users not to trespass into sensitive natural areas. Fencing should be used to assist in preventing human induced impacts to natural areas.
Woodlands	<ul style="list-style-type: none"> Provincial Policy Statement (OMMAH 2020) Regional Municipality of Waterloo Official Plan (2015) City of Cambridge Official Plan (2018a) HWSS Summary Report (HWSS Working Committee 2004) 	<p>Direct Impacts:</p> <ul style="list-style-type: none"> None. The woodlands are to be protected and buffered. The overall function of the woodlands within the Subject Lands will be maintained. <p>Indirect Impacts:</p> <ul style="list-style-type: none"> Block 3, a required Right-of-Way (ROW) widening for Briardean Road, has a small 0.005ha encroachment into the 10m dripline buffer. Sedimentation and erosion Indirect impacts to wildlife 	<p>Direct Impacts:</p> <ul style="list-style-type: none"> 10m buffers are recommended around woodlands within the Subject Lands 30m buffer is provided around the Middle Creek riparian woodland Site-specific tree protection measures should be identified through the Detailed Vegetation Plan at the time of Detailed Design. <p>Indirect Impacts:</p> <ul style="list-style-type: none"> A detailed Sediment and Erosion Control Plan should be developed at the Detailed Design Stage.

Significant Natural Feature	Relevant Policies	Potential Impacts	Recommended Mitigation
		Induced Impacts: <ul style="list-style-type: none"> Induced impacts include increased use of a natural area by residents or users of the property, feral domestic wildlife, and unauthorized trail/pathway construction. 	Induced Impacts: <ul style="list-style-type: none"> Signage should be used to direct community members or other recreational users not to trespass into sensitive natural areas. Fencing should be used to assist in preventing human induced impacts to natural areas.
Watercourse, Floodplain, and Fish Habitat	<ul style="list-style-type: none"> Federal <i>Fisheries Act</i> (Government of Canada 1985) Provincial Policy Statement (OMMAH 2020) GRCA Ontario Regulation 150/06 (Government of Ontario 2013) Regional Municipality of Waterloo Official Plan (2015) City of Cambridge Official Plan (2018a) HWSS Summary Report (HWSS Working Committee 2004) 	Direct Impacts: <ul style="list-style-type: none"> None Indirect Impacts: <ul style="list-style-type: none"> Sedimentation and erosion Indirect impacts to wildlife Induced Impacts: <ul style="list-style-type: none"> Induced impacts include increased use of a natural area by residents or users of the property, feral domestic wildlife, and unauthorized trail/pathway construction. 	Direct and Indirect Impacts: <ul style="list-style-type: none"> Middle Creek is protected and buffered The Middle Creek floodplain is protected and will be enhanced through the Wetland and Forest Habitat Creation Plan. Buffers should be delineated in the field prior to any construction activities. Indirect Impacts: <ul style="list-style-type: none"> A detailed Sediment and Erosion Control Plan should be developed at the Detailed Design Stage. Induced Impacts: <ul style="list-style-type: none"> Signage should be used to direct community members or other recreational users not to trespass into sensitive natural areas. Fencing should be used to assist in preventing human induced impacts to natural areas.
Habitat of Endangered or Threatened Species: candidate SAR bat roost trees	<ul style="list-style-type: none"> <i>Endangered Species Act</i> (Government of Ontario 2007) Ontario Regulation 242/08 Provincial Policy Statement (MMAH 2014) City of Cambridge Official Plan (2018a) Region of Waterloo Official Plan (2015) 	Direct Impacts: <ul style="list-style-type: none"> Two candidate SAR bat roosting trees are to be removed (RST-003, RST-004) Indirect Impacts: <ul style="list-style-type: none"> Noise and dust associated with construction is anticipated to be temporary, therefore significant impacts to wildlife from noise and dust are not expected. 	Direct Impacts: <ul style="list-style-type: none"> The MECP should be consulted regarding the removal of the candidate bat maternity roosting trees prior to their removal. The MECP may require bat exit/acoustic surveys be completed prior to the removals, following guidance documents (MNR 2011, 2017). Indirect Impacts: <ul style="list-style-type: none"> In order to suppress dust, areas of bare soil can be moistened with water during construction activities to ensure that the amount of dust within the Subject Lands is reduced. Topsoil stockpile

Significant Natural Feature	Relevant Policies	Potential Impacts	Recommended Mitigation
		Induced Impacts: <ul style="list-style-type: none"> • None 	<p>locations should be in areas of lesser wind exposure and away from natural features and their buffers.</p> <ul style="list-style-type: none"> • Detailed lighting designs will be provided at the detailed design stage. Lighting designs should include directional lighting for developments that are within 30m of natural features to eliminate lightwash. <p>Induced Impacts:</p> <ul style="list-style-type: none"> • N/A
Significant Wildlife Habitat (SWH)	<ul style="list-style-type: none"> • Provincial Policy Statement (OMMAH 2020) • Regional Municipality of Waterloo Official Plan (2015) • City of Cambridge Official Plan (2018a) 	<p>Direct Impacts:</p> <ul style="list-style-type: none"> • None. Direct impacts to the SWH within the Subject Lands have been avoided through the Phase 5 design and through the implementation natural feature buffers. <p>Indirect Impacts:</p> <ul style="list-style-type: none"> • Sedimentation and erosion • Indirect impacts to wildlife <p>Induced Impacts:</p> <ul style="list-style-type: none"> • Induced impacts include increased use of a natural area by residents or users of the property, feral domestic wildlife, and unauthorized trail/pathway construction. 	<p>Direct and Indirect Impacts:</p> <ul style="list-style-type: none"> • 30m buffers are recommended around all PSWs • 10m buffers are recommended around woodlands • Buffers should be delineated in the field prior to any construction activities. <p>Indirect Impacts:</p> <ul style="list-style-type: none"> • A detailed Sediment and Erosion Control Plan should be developed at the Detailed Design Stage. <p>Induced Impacts:</p> <ul style="list-style-type: none"> • Signage should be used to direct community members or other recreational users not to trespass into sensitive natural areas. • Fencing should be used to assist in preventing human induced impacts to natural areas.
Locally Significant Species	<ul style="list-style-type: none"> • Regional Municipality of Waterloo Official Plan (2015) • City of Cambridge Official Plan (2018a) • Migratory Birds Convention Act (Government of Canada 1994) 	<p>Direct Impacts:</p> <ul style="list-style-type: none"> • None. Direct impacts to the Locally Significant Species within the Subject Lands have been avoided through the Phase 5 design and through the implementation natural feature buffers. <p>Indirect Impacts:</p> <ul style="list-style-type: none"> • Potential indirect impacts to wildlife in the retained natural areas may arise 	<p>Direct Impacts:</p> <ul style="list-style-type: none"> • None. Direct impacts to the Locally Significant Species within the Subject Lands have been avoided through the Phase 5 design and through the implementation natural feature buffers. <p>Indirect Impacts:</p> <ul style="list-style-type: none"> • Potential indirect impacts to wildlife in the retained natural areas may arise from noise and dust associated with construction activities and

Significant Natural Feature	Relevant Policies	Potential Impacts	Recommended Mitigation
		<p>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.</p> <p>Induced impacts:</p> <ul style="list-style-type: none"> Increased use of a natural area by residents or users of the property, feral domestic wildlife, and unauthorized trail/pathway construction. 	<p>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.</p> <p>Induced impacts:</p> <ul style="list-style-type: none"> Increased use of a natural area by residents or users of the property, feral domestic wildlife, and unauthorized trail/pathway construction.
<p>Individual Trees</p>	<ul style="list-style-type: none"> City of Cambridge Private Tree Preservation By-Law 124-18 (2018b) Migratory Birds Convention Act (Government of Canada 1994) 	<p>Direct Impacts:</p> <ul style="list-style-type: none"> 47 individual trees, including 38 trees \geq 20cm DBH have been, or are expected to be, removed within the Phase 5 development area. Trees to be retained could be impacted by grading or construction activities. Full details of the tree inventory, tree retention and removal analysis, and compensation analysis are provided in the DVMP for Phase 5 (Appendix VI). <p>Indirect Impacts:</p> <ul style="list-style-type: none"> Potential indirect impacts to individual trees retained within the development area may include sedimentation, erosion, disturbance to the tree's roots through grading, or disturbance to the tree's trunk or crown by construction equipment. <p>Induced impacts:</p> <ul style="list-style-type: none"> None 	<p>Direct Impacts:</p> <ul style="list-style-type: none"> As per the City of Cambridge By-Law 124-18 (2018b), the DVMP (Appendix V) includes a Tree Compensation Fee based on the preliminary number of trees identified for removal. This will be updated at the Site Plan Stage. There is more than enough room in Proposed Wetland and Forest Habitat Creation areas and natural features buffers within the Subject Lands to accommodate all the compensation tree plantings. The DVMP includes recommended mitigation measures and criteria for the development of a planting plan. Time vegetation removal activities to occur outside the core bird breeding season (April 1 to August 31). If vegetation removal must occur during the bird breeding season, retain an avian biologist to survey for active nests just prior to vegetation removal activities. <p>Indirect Impacts:</p> <ul style="list-style-type: none"> Tree protection fencing must be installed, maintained, and inspected by a certified arborist

Significant Natural Feature	Relevant Policies	Potential Impacts	Recommended Mitigation
			<p>or other recognized professional prior to, and during, construction.</p> <ul style="list-style-type: none"> • Full details of recommended tree protection measures and mitigation measures are provided in the DVMP for Phase 5 (Appendix V). <p>Induced impacts:</p> <ul style="list-style-type: none"> • N/A

7.4 Cumulative Impacts

The lands in the vicinity of the Subject Lands have historically undergone modification resulting from agricultural uses, aggregate extraction, and residential and commercial developments. In order to evaluate the potential for cumulative impacts resulting from this development, it is necessary to look beyond the boundaries of the Subject Lands to the neighbouring lands, especially within the Hespeler West Subwatershed. It is important to recognize the ecological significance of the natural features in the Subject Lands within this larger landscape context to identify potential cumulative effects from the proposed development. This approach looks at the character and potential changes that are occurring or may occur in the future on surrounding lands within the Hespeler West Subwatershed.

As described in Section 1.3, the Subject Lands have historically been altered as a result of aggregate extraction activities and ongoing agricultural activities. Vegetation clearing and grading, permitted under the former aggregate extraction license, led to the removal of hedgerows, and the southern portion of an isolated wetland within the Maple Grove Road PSW. The remainder of the isolated PSW was cleared and put into agricultural production. The wooded area running along the south side of Maple Grove Road was largely cleared, with approval from the City (Padgett pers. comm., 2019), to expand the agricultural field. Portions of the Maple Grove Road PSW and woodlands were also cleared for agricultural purposes along both the west and east sides of the Middle Creek Corridor. A 'haul road' between the two southwestern woodlands/wetlands (Wetlands 2 and 3) was also maintained for aggregate extraction activities within the Subject Lands. Currently, lands outside the existing natural features within the Subject Lands consist of large areas of bare, graded soil and tilled topsoil.

The proposed River Mill development represents an extension of recent and ongoing developments within this area of the City of Cambridge. West of the Subject Lands, on the west side of Speedsville Road, there are existing low-rise and mid-rise residential units, as well as employment and industrial lands. East of the Subject Lands, between Briardean Road and Beaverdale Road, there are existing detached residential units and estate dwellings. South and southeast of the Subject Lands are the ongoing Hunt Club and Arriscraft Subdivision developments. To the north of the Subject Lands, the lands are primarily agricultural, as well as natural, with woodlands and portions of the Maple Grove Road PSW extending northward.

Development proposals in the area include the Region's proposed expansion of Maple Grove Road to the north (which is currently undergoing the Environmental Assessment (EA) process).

A future expansion of Speedsville Road is also anticipated, for which Block 29 of the proposed River Mill development – Phase 4, including 0.04ha of Cultural Plantation (CUP3), is designated. This proposed road expansion would also go through the EA review process.

The PPS (OMMAH 2020), City of Cambridge Official Plan (2018) and Region of Waterloo Official Plan (2015) protect significant natural features, and require that proposed developments consider the maintenance of the connectivity among natural heritage features. The HWSS Summary Report (HWSS Working Committee 2004) and the HWSS Study (PEIL 2004) identifies significant natural features within the subwatershed, including PSWs, potential Regional Environmentally Sensitive Policy Areas, Locally Significant Wetlands, Other High Constraint Areas and regulatory floodplain (HWSS Working Committee 2004), and provides a framework to protect and enhance these features after urban development through the use of buffers, enhancement and stewardship programs. The report highlights the need to maintain habitat corridors and linkages after urban development to create connectedness among habitat patches, allow movements by plants and animals, consolidate forest interior habitat and successional meadows for breeding bird species, and reduce heat effects from urban development (HWSS Working Committee 2004). A 200m corridor is specifically recommended along Middle Creek. Recommended Enhancement Land Uses include active/passive recreation, SWM facilities, and other complimentary land uses, such as schoolyards or large landscaped features (HWSS Working Committee 2004).

The proposed River Mill Draft Plans (Phase 4 - DP2-1 and Phase 5 - DP1-1) adhere to the recommendations of the HWSS Summary Report (HWSS Working Committee 2004). Natural heritage features within the Subject Lands have been identified, delineated, protected and buffered. A linkage to connect portions of the Maple Grove Road PWS and woodlands north of the Subject Lands, across the Subject Lands to the identified NHS, and southeast to the Speed River, has been proposed. In order to further mitigate potential cumulative impacts, a Wetland and Forest Habitat Creation Plan has been developed (Section 6.0). This plan has been developed to consider and mitigate not only the potential impacts associated with the development of the Subject Lands, but also the potential cumulative impacts within the Study area, by ensuring that the Middle Creek corridor is widened and enhanced (to an approximate average width of 220.3m), through native vegetation plantings, plantation management, and wetland creation. A habitat linkage is also being maintained between woodlands and wetlands in the southwest portion of the Subject Lands with the installation of a wildlife eco-passage under proposed Street 'E'.

7.5 Monitoring Plan

Pre-, during-, and post-construction monitoring is recommended. The recommended monitoring program is described in more detail below.

7.5.1 Pre-Construction Monitoring

On-site inspections by an environmental inspector, Certified Arborist or qualified biologist of the following to ensure proper installation of:

- Sediment and erosion control measures,
- Tree protection measures, such as fences installed along dripline setbacks and trees to be retained.
- Exclusion fencing around the wetlands within the Subject Lands.

7.5.2 During Construction Monitoring

Construction monitoring is the responsibility of the proponent and is tied to the specific undertaking. Generally, construction monitoring must occur to ensure compliance with the conditions of various permits. Often, an environmental inspector is required to carry out construction monitoring during grading, servicing and building construction.

In addition to an environmental inspector, the following are recommended during construction:

- Pruning of any limbs or roots disrupted during construction (of trees to be retained) by a Certified Arborist,
- Maintenance of vegetated setbacks from wetlands and woodlands,
- Fueling of machinery to be done at designated locations away from the Core Natural Heritage Features,
- Storage of machinery and material, fill, etc. to be done in designated areas away from the Core Natural Heritage Features,
- Equipment movement through natural areas and associated buffers are controlled,
- Nest searches, if construction during the breeding bird season (April 1 to August 31).

7.5.3 Post-Construction Monitoring

In order to detect any potential negative impacts from development, post-construction monitoring is required. A monitoring program will ensure there are strategic procedures developed to react immediately to any negative effects resulting from the development.

The post-construction monitoring plan should be developed to ensure the water balance and water quality within the on-site wetlands, and Middle Creek is matched to pre-construction conditions. Water level monitoring should be conducted up to 90% buildout to ensure that groundwater conditions are not impacted. It is anticipated that after two years of post-construction monitoring, the monitoring frequency, if warranted, could be considered for reduction, subject to approval.

Maintaining the current water balance and water quality in the wetlands and Middle Creek is critical to preserving their current form and function. It is recommended that annual monitoring reports be prepared by a qualified consultant and submitted to the Region of Waterloo and GRCA for review. If monitoring results indicate there is the potential for adverse effects due to development activities, adaptive management should be employed to further protect the wetland features and/or Middle Creek. Mitigation will depend on the particular circumstances of the disturbance, but may include identifying and eliminating or reducing sources of contamination, and/or additional monitoring.

Monitoring efforts should also focus on the following:

- Success of restoration measures,
- Success of habitat creation,
- Stormwater management pond function,
- Slope stability.

7.5.4 Restoration and Enhancement Areas

A two-year warranty is recommended for all proposed planting material throughout the Subject Lands (shrubs, trees and herbaceous plants). All plants shall be inspected by an appropriate inspector at the end of the guarantee period. Plants which, at that time, are not in healthy vigorous growing condition, to the inspector's approval, shall be replaced at no extra charge. All tree staking is to be removed just prior to final inspection.

8.0 Summary and Conclusions

NRSI was retained by River Mill Development Corporation to complete an EIS for a proposed mixed-use development, referred to as the “River Mill Community” in Cambridge, Ontario.

This EIS report provides a detailed characterization of existing natural features based on compiled background information and NRSI’s 2018 and 2019 field investigations. An analysis of the significance and sensitivity of identified natural features, with consideration for applicable municipal and provincial policies and legislation, is provided. Significant natural features within the Subject Lands include wetlands within the Maple Grove Road PSW Complex, significant woodlands, Middle Creek, which provides habitat for coolwater and warmwater fish species, the Middle Creek floodplain, habitat for threatened and endangered species (Butternut), candidate SAR bat roosting trees, confirmed SWH, and regionally-significant species.

Significant natural feature and their recommended buffers were used to guide the layout of the proposed Phase 4 and Phase 5 developments to mitigate the potential for direct and indirect impacts on these identified features, where possible. Appropriate buffers around significant natural heritage features are recommended.

A Wetland and Forest Habitat Creation Plan is proposed, which will create a 0.87ha wetland and restore wetland and forest communities within the Middle Creek floodplain. This plan will enhance the natural heritage system (NHS) within the River Mill community, creating a diverse, sustainable, and resilient, ecologically functional NHS. This widened, revegetated riparian corridor will reduce runoff and sedimentation into Middle Creek, provide additional flood mitigation (through enhanced water retention by vegetation), thermal protection and buffering for Middle Creek, provide suitable habitat for plants and animals, as well as a habitat linkage between the woodlands and wetlands of the Subject Lands and the woodlands and wetlands to the north, and the Speed River to the southeast.

An analysis of impacts for Phase 4 and Phase 5 of the proposed development is provided. Direct impacts from both phases have largely been avoided through protection and buffering of the existing natural features, although one Category 2 Butternut is anticipated to be ‘harmed’ through the development of Phase 4, and some vegetation removal, including several candidate SAR bat roosting trees, will occur. Ontario Regulation 242/08 under the *ESA* (Government of Ontario 2007) will be followed with respect to compensating for the Butternut. The MECP should be consulted before candidate SAR bat roosting trees are removed.

Recommendations have been made for the timing of vegetation removal activities to mitigate or eliminate impacts to migratory birds. Indirect impacts and appropriate mitigation measures are discussed, which will avoid and minimize indirect impacts to natural features and wildlife.

Water quality and quantity impacts are addressed in the Functional Servicing Reports, Hydrogeologic Characterization, and SWM prepared by MTE (2020a, c, d, e).

This report provides recommendations to minimize direct, indirect, induced, and cumulative impacts that may arise during the proposed development and ensure that mitigation measures are implemented properly.

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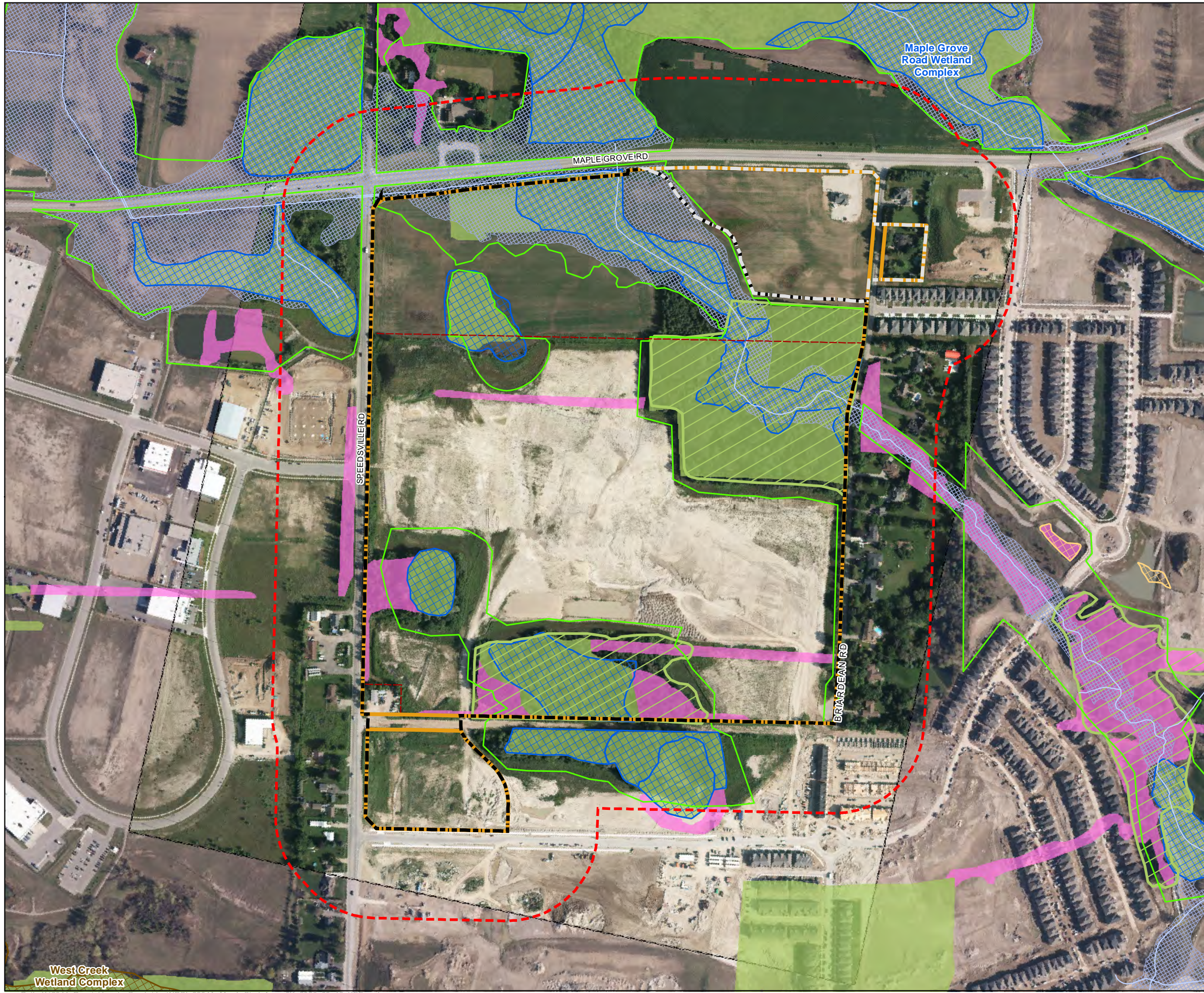
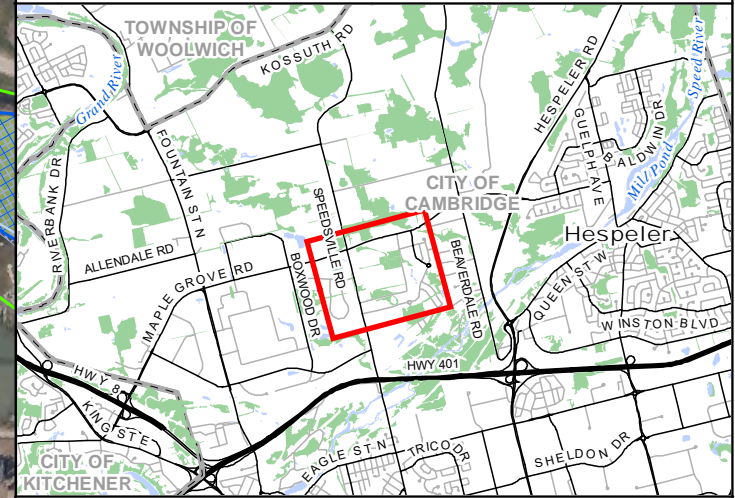
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Study Area and Significant Natural Features

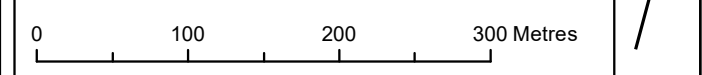


- Legend**
- Study Area
 - Subject Lands
 - Parcel Boundary
 - Phase 4 - New Community
 - Phase 5 - Annex
 - Watercourse (GRCA)
 - Provincially Significant Wetland (PSW)
 - Other Wetland (Non-PSW)
 - Unevaluated Wetland
 - Floodplain (GRCA)
 - Natural Heritage System (City of Cambridge 2014)
 - Core Environmental Features (Region of Waterloo 2015)
 - Locally Significant Natural Area (LSNA)
 - Stratum II Deer Wintering Areas (MNR 2018)



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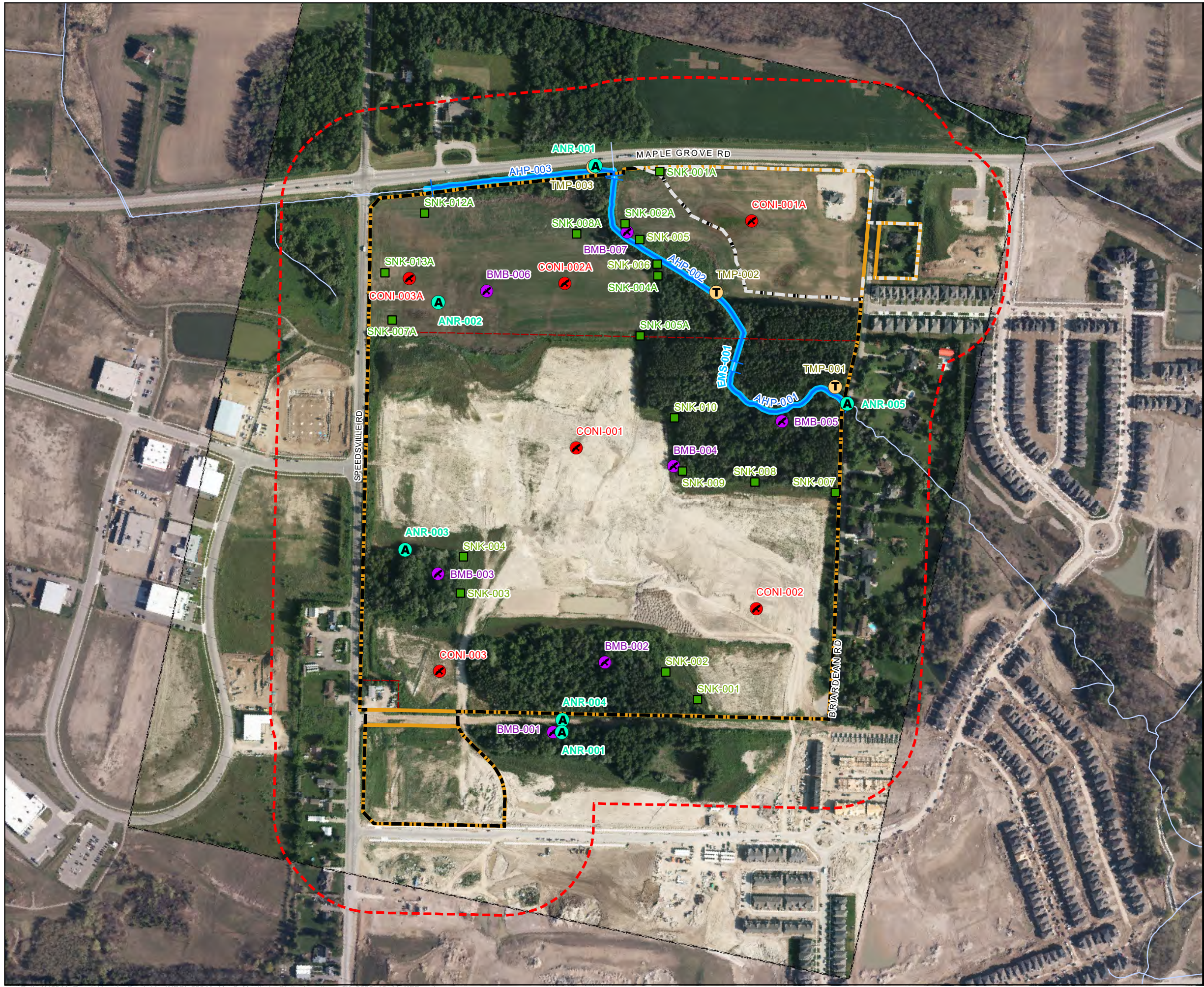
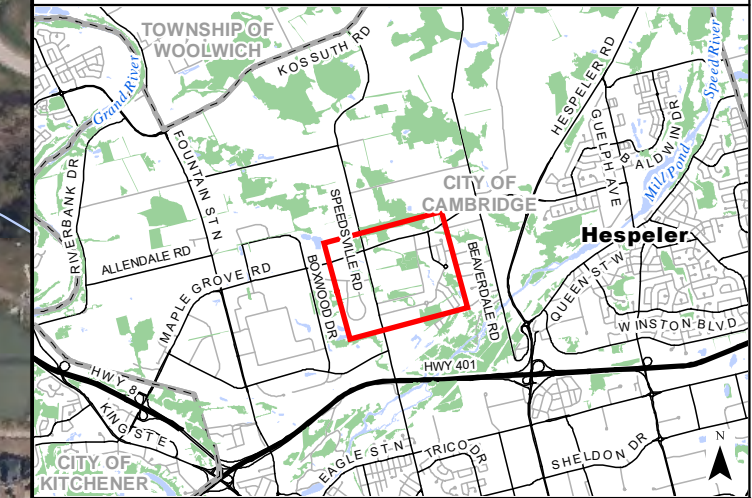
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West Creek Wetland Complex

River Mill EIS

Monitoring Station Locations



Legend

- Subject Lands
- Study Area
- Parcel Boundary
- Phase 4 - New Community
- Phase 5 - Annex
- Watercourse (GRCA)
- Monitoring Stations (2019)**
- Bird Breeding Monitoring (BMB)
- Common Nighthawk Monitoring (CONI)
- Snake Cover Board Monitoring (SNK)
- Aquatic Temperature Data Loggers (TMP)
- Anuran Call Survey Station (ANR)
- Aquatic Habitat Monitoring (AHY)
- Electroshock Monitoring (EMS)



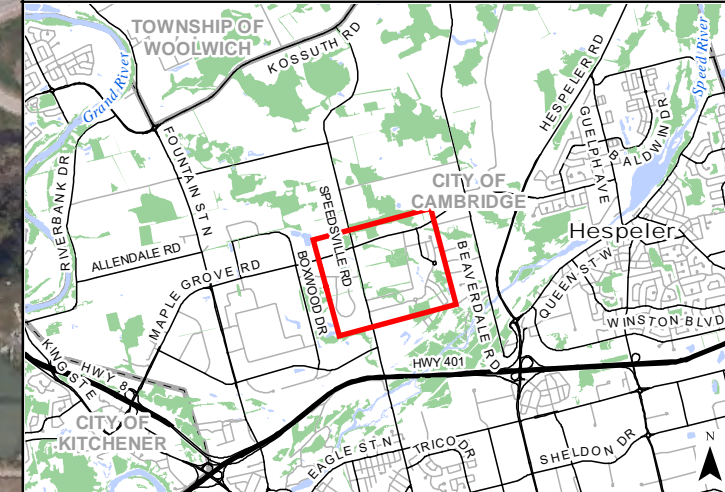
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River Mill EIS

Vegetation Communities

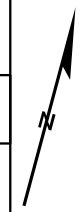
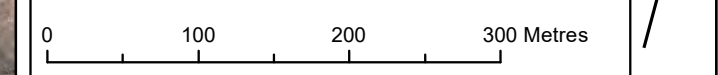


Legend	
	Study Area
	Subject Lands
	Parcel Boundary
	Phase 4 - New Community
	Phase 5 - Annex
	Surveyed Watercourse (MTE May 2019)
	Surveyed Dripline (MTE 2019)
	Floodplain (MTE 2019)
	Wetland Boundary (not surveyed)
	Wetland Boundary (NRSI 2019)
	Wetland Boundary (Savanta 2010)
	Wetland
	Ecological Land Classification (ELC)
(Ag)	Agriculture
(CUM1)	Mineral Cultural Meadow Ecosite
(CUP1-7)	Green Ash Deciduous Plantation Type
(CUP3)	Coniferous Plantations
(CUW1)	Mineral Cultural Woodland Ecosite
(FOD5)	Dry - Fresh Sugar Maple Deciduous Forest Ecosite
(FOD6)	Fresh - Moist Sugar Maple Deciduous Forest Ecosite
(FOD7)	Fresh - Moist Lowland Deciduous Forest Ecosite
(FOD7-2)	Fresh - Moist Ash Lowland Deciduous Forest Type
(FOD7-3)	Fresh-Moist Willow Lowland Deciduous Forest Type
(H)	Hedgerow
(MAM2)	Mineral Meadow Marsh Ecosite
(MAM2-10)	Forb Mineral Meadow Marsh Type
(MAM2-9)	Jewelweed Mineral Meadow Marsh Type
(Res)	Residential
(SAS1-3)	Stonewort Submerged Shallow Aquatic Type
(SWD3-2)	Silver Maple Mineral Deciduous Swamp Type
(SWD3-3)	Swamp Maple Mineral Deciduous Swamp Type
(SWD4)	Mineral Deciduous Swamp Ecosite
(SWD4-1)	Willow Mineral Deciduous Swamp Type
(SWD6-3)	Swamp Maple Organic Deciduous Swamp Type
(SWM1-1)	White Cedar Mineral Mixed Swamp Ecosite

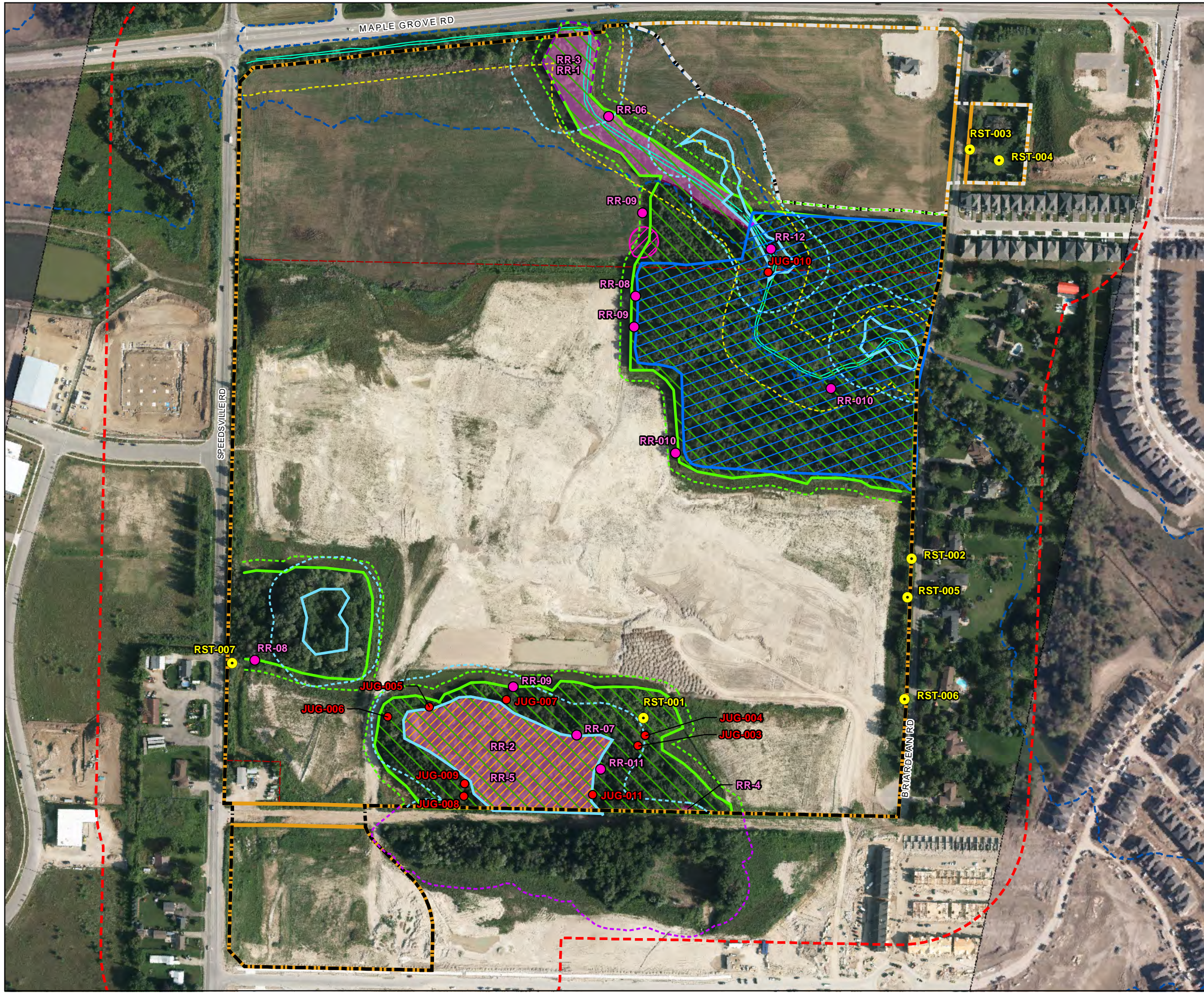
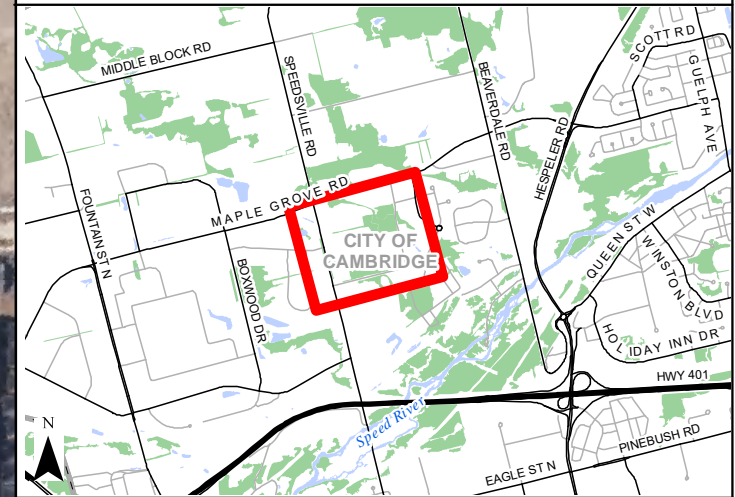


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River Mill EIS Significant Natural Features

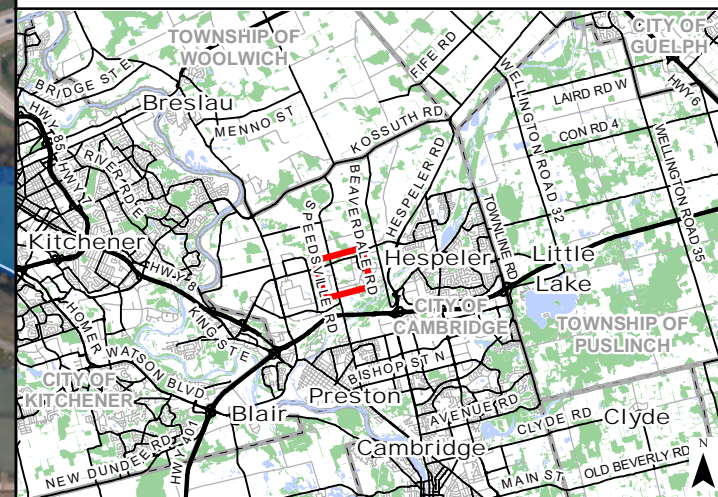


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River Mill EIS River Mill Natural Heritage System



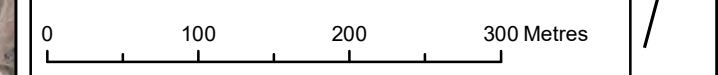
Legend

- Study Area
- Subject Lands
- Parcel Boundary
- Phase 4 - New Community
- Phase 5 - Annex
- Watercourse (GRCA)
- Water Body
- Wildlife Eco-passage
- Hespeler West Subwatershed
- Wetland
- Forest
- Created Wetland
- Wetland Restoration
- Forest Habitat Restoration
- Plantation Management

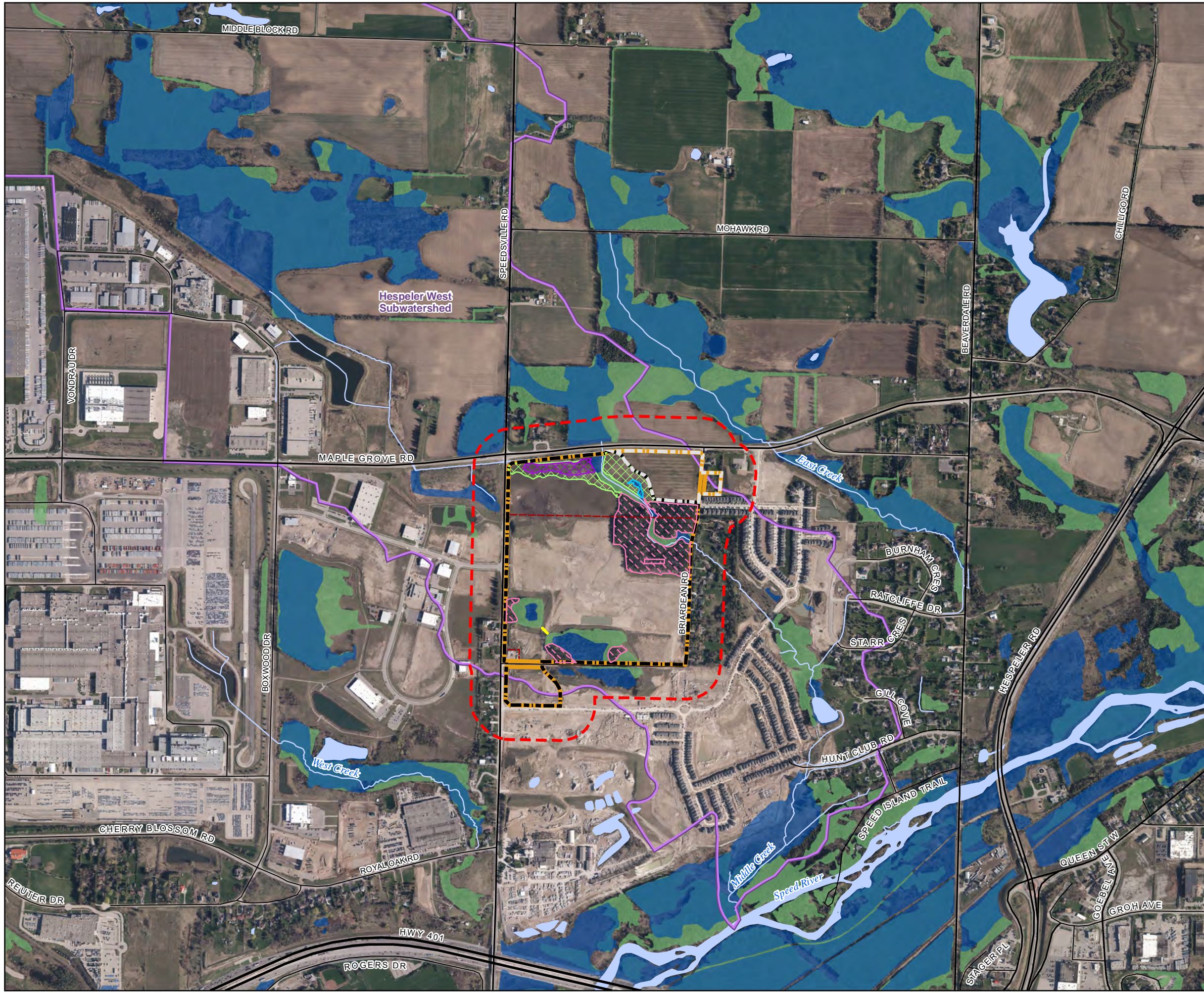
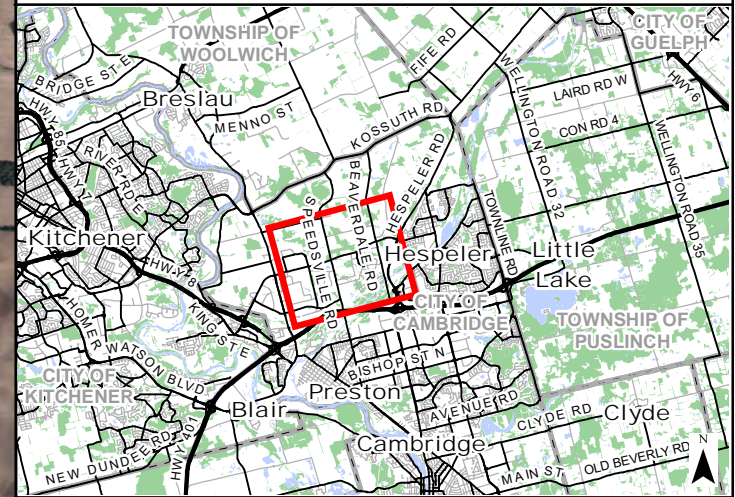
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River Mill EIS River Mill Natural Heritage System



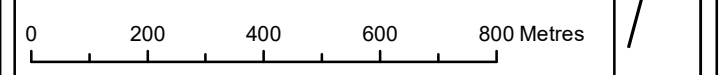
Legend

- Study Area
- Subject Lands
- Parcel Boundary
- Phase 4 - New Community
- Phase 5 - Annex
- Highway
- Primary Road
- Secondary Road
- Watercourse (GRCA)
- Water Body
- Wildlife Eco-passage
- Hespeler West Subwatershed
- Wetland
- Forest
- Created Wetland
- Wetland Restoration
- Forest Habitat Restoration
- Plantation Management



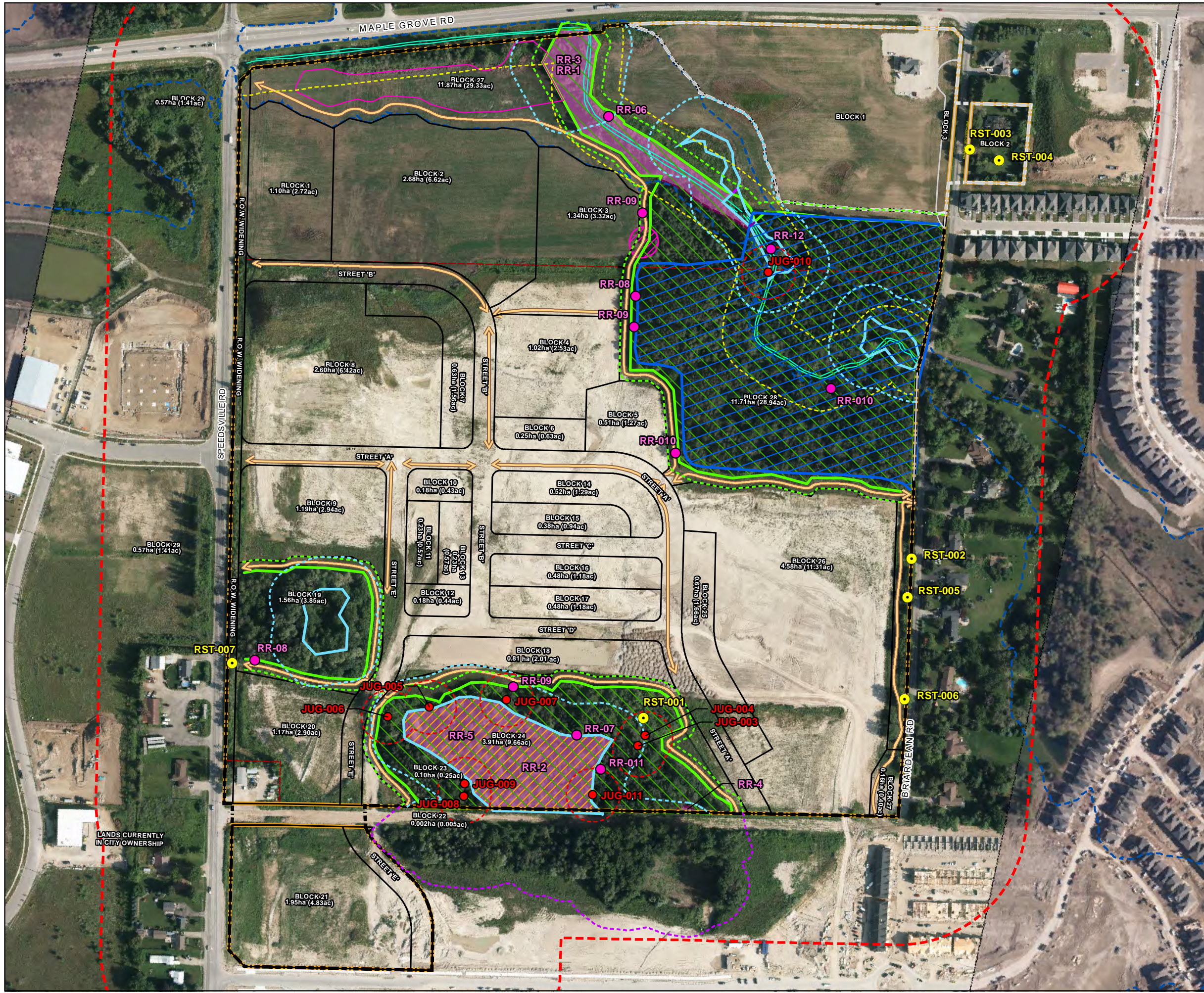
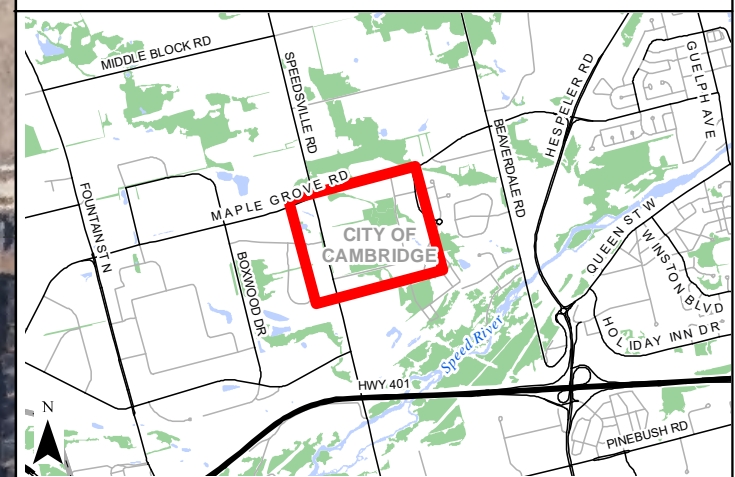
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Project: 2204 Date: October 30, 2020	NAD83 - UTM Zone 17 Size: 11x17" 1:13,000
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River Mill EIS

Significant Natural Features and Proposed Phase 4 & 5 Concept Plans

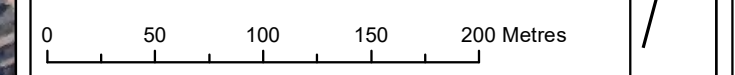


- Legend**
- Subject Lands
 - Study Area
 - Phase 4 - New Community
 - Phase 5 - Annex
 - Phase 4 Draft Plan
 - Phase 5 Draft Plan
 - Draft Plan Trail
 - Proposed Created Wetland
 - Parcel Boundary
 - Surveyed Watercourse (MTE May 2019) and Fish Habitat
 - Creek buffer (30m)
 - Wetland Boundary (not surveyed)
 - Wetland boundary (assumed from MTE 2019 surveyed dripline and confirmed 2020)
 - Provincially Significant Wetlands (confirmed with GRCA 2019)
 - Wetland Buffer (30m)
 - Natural Heritage Constraint Line
 - Surveyed Dripline (MTE 2019)
 - Dripline Buffer (10m)
 - Floodplain (MTE 2019)
- Candidate Species at Risk Habitat**
- Candidate Bat Roost Tree
- Confirmed Significant Wildlife Habitat**
- Terrestrial Crayfish
 - Terrestrial Crayfish Burrow Observation
 - Special Concern and Rare Wildlife Species (Eastern Wood-Pewee)
 - Stratum II Deer Wintering Areas (MNR 2018)
- Regionally Rare Species (RR) Habitat**
- Bulbous Cress
 - Marsh Horsetail
 - Meadow Horsetail
 - Moonseed
 - Rough Sedge
- Regionally Rare (RR) Species Observation**
- American Redstart
 - Blue-gray Gnatcatcher
 - Common Hackberry (location approximate)
 - Common Hackberry
 - Common Sootywing
 - Red-bellied Woodpecker
 - Virginia-creeper
 - Cardinal Flower
- Confirmed Species at Risk**
- Butternut (JUG)
 - Butternut Buffer (25m)

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

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Project: 2204
Date: November 5, 2020
NAD83 - UTM Zone 17
Size: 11x17"
1:3,500



Appendix I

Proposed Concept Plan for the Development



- LEGEND**
- DRAFT PLAN BOUNDARY
 - LOT/BLOCK LINE
 - EXISTING PROPERTY LINE
 - CREEK 30m BUFFER
 - CREEK 10m BUFFER
 - CREEK 5m BUFFER
 - WETLAND 10m BUFFER (2019)
 - WETLAND 30m BUFFER
 - FLOODPLAIN

NOTE:
SEE SUPPORTING ENVIRONMENTAL
IMPACT STATEMENT (EIS) REPORT
PREPARED BY NRSI FOR DETAILED
INFORMATION ON ENVIRONMENTAL
BUFFERS AND BOUNDARIES.

**APPROXIMATE UNIT COUNT
(PHASE 4 AND 5 ONLY)**
CONDOMINIUM TOWNHOMES

BUNGALOW	116
2-STORY	95
3-STORY	212
3-STORY BACK-TO-BACK	134
FREEHOLD @ 11m(36ft), 1.618m (5.308ft)	147
APARTMENT	690
MIXED USE	840
TOTAL	2,034

REVISIONS

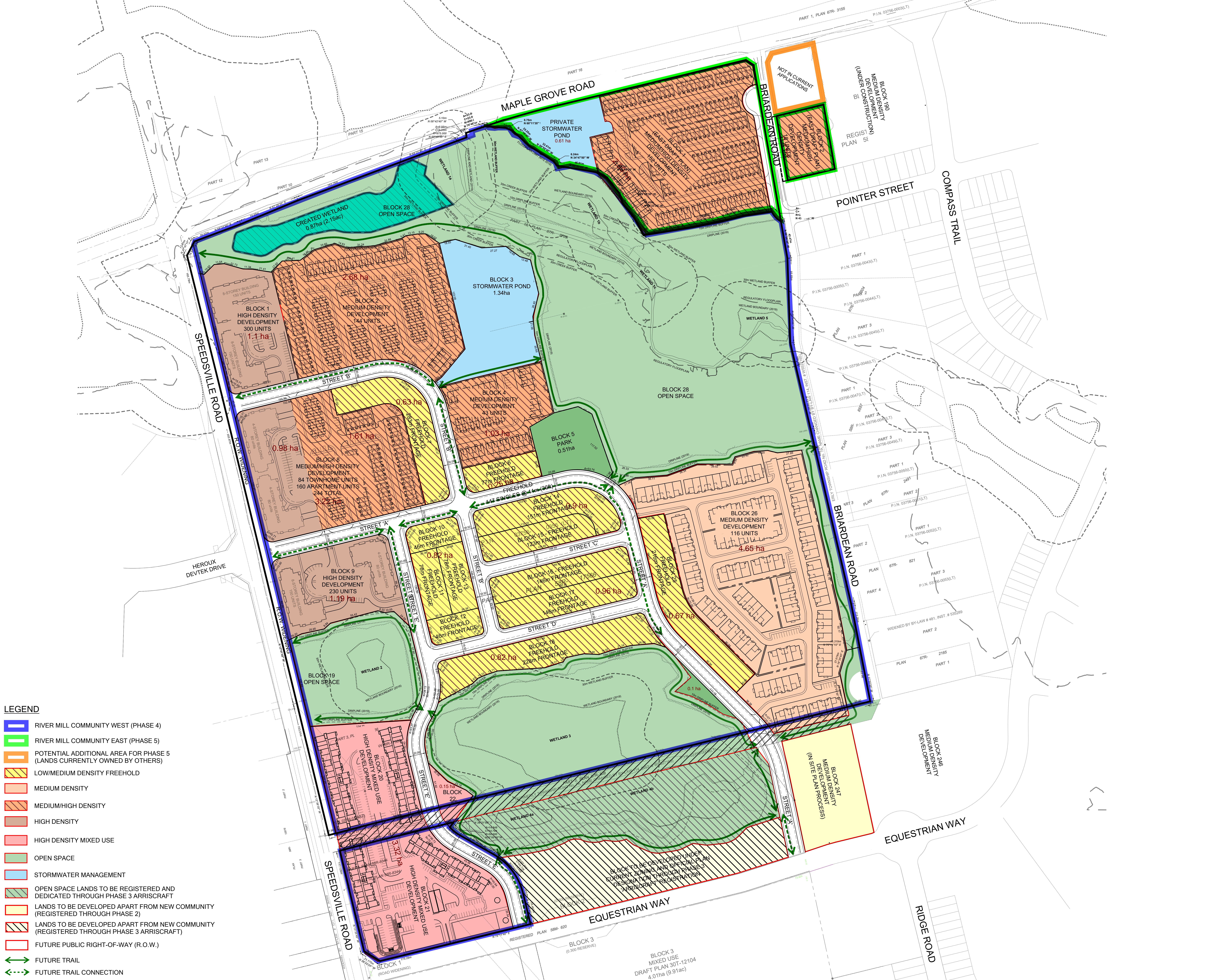
NO.	DESCRIPTION	DATE	INT.
A	SUBMISSION	28-OCT-2020	JW



RIVER MILL
CAMBRIDGE, ONTARIO

OVERALL DEVELOPMENT PLAN

DRAWN BY JW	DESIGNED BY JW
PRINT DATE 28-OCT-2020	PROJECT NUMBER 0706
REVISION A	DRAWING NUMBER ODP-1-1
SCALE 1:1250	



- LEGEND**
- RIVER MILL COMMUNITY WEST (PHASE 4)
 - RIVER MILL COMMUNITY EAST (PHASE 5)
 - POTENTIAL ADDITIONAL AREA FOR PHASE 5 (LANDS CURRENTLY OWNED BY OTHERS)
 - LOW/MEDIUM DENSITY FREEHOLD
 - MEDIUM DENSITY
 - MEDIUM/HIGH DENSITY
 - HIGH DENSITY
 - HIGH DENSITY MIXED USE
 - OPEN SPACE
 - STORMWATER MANAGEMENT
 - OPEN SPACE LANDS TO BE REGISTERED AND DEDICATED THROUGH PHASE 3 ARRISCRAFT
 - LANDS TO BE DEVELOPED APART FROM NEW COMMUNITY (REGISTERED THROUGH PHASE 2)
 - LANDS TO BE DEVELOPED APART FROM NEW COMMUNITY (REGISTERED THROUGH PHASE 3 ARRISCRAFT)
 - FUTURE PUBLIC RIGHT-OF-WAY (R.O.W.)
 - FUTURE TRAIL
 - FUTURE TRAIL CONNECTION

File Location: D:\projects\T. Johns Consulting\TJCS SERVER\Pages\0706 - River Mill Phase 5 - Cambridge\Drawings\Planning\River Mill Phase 4_5 Overall.dwg

Appendix II

Species at Risk and Species of Special Concern Screening Tables

Species at Risk and Species of Conservation Concern Screening

Scientific Name	Common Name	S-Rank ¹	COSSARO ²	COSEWIC ³	SARA ⁴	Background Source	Habitat Preference ^{2,3,5,6}	Rationale	Suitable Habitat Within Study Area?	NRSI Observed (2018 and 2019)
Plants										
<i>Castanea dentata</i>	American Chestnut	S1S2	END	E	Schedule 1	MNRF 2018d; MNRF 2019	Moist to well drained forests on sand, occasionally heavy soils.	Suitable habitat is present within the Maple Grove Road PSW Complex and adjacent woodland. This species was not documented during vegetation surveys.	Yes	No
<i>Juglans cinerea</i>	Butternut	S2?	END	E	Schedule 1	Savanta 2012; MNRF 2018d; MNRF 2019	Generally grows in rich, moist, and well-drained soils often found along streams. It may also be found on well-drained gravel sites, especially those made up of limestone. It is also found, though seldomly, on dry, rocky and sterile soils. In Ontario, the Butternut generally grows alone or in small groups in deciduous forests as well as in hedgerows.	Forests and hedgerows within the Study Area provide suitable habitat for this species. Several trees were documented within the Study Area.	Yes	Yes
<i>Panax quinquefolius</i>	Ginseng	S2	END	E	Schedule 1	MNRF 2018d; MNRF 2019	Deep leaf litter in rich, moist deciduous woods, especially on rocky, shaded cool slopes in sweet soil.	Suitable habitat is present within the Maple Grove Road PSW Complex and adjacent woodland. This species was not documented during vegetation surveys.	Yes	No
<i>Arisaema dracontium</i>	Green Dragon	S3	SC	SC	Schedule 3	MNRF 2018d	Somewhat wet to wet deciduous forests along streams, particularly maple forest and forest dominated by Red Ash and White Elm trees.	Suitable habitat is present within the Maple Grove Road PSW Complex. This species was not documented during vegetation surveys.	Yes	No
Birds										
<i>Empidonax virescens</i>	Acadian Flycatcher	S2S3B	END	E	Schedule 1	MNRF 2018d	Mature, shady, deciduous forests; heavily wooded ravines; creek bottoms or river swamps; availability of good quality habitat is limiting factor; needs at least 30 ha of forest.	Mature deciduous forest habitat of a suitable size (>30ha) is not present within the Study Area.	No	No
<i>Haliaeetus leucocephalus</i>	Bald Eagle	S2N, S4B	SC	NAR	-	MNRF 2018d; MNRF 2019	Require large continuous area of deciduous or mixed woods around large lakes, rivers; require area of 255 ha for nesting, shelter, feeding, roosting; prefer open woods with 30 to 50% canopy cover; nest in tall trees 50 to 200 m from shore; require tall, dead, partially dead trees within 400 m of nest for perching. Bald Eagles nest in a variety of habitats and forest types, almost always near a major lake or river where they do most of their hunting. They usually nest in large trees such as pine and poplar.	The Study Area are not near a major lake or river, and do not provide suitable habitat for this species.	No	No
<i>Riparia riparia</i>	Bank Swallow	S4B	THR	T	Schedule 1	BSC et al. 2008; Savanta 2012; MNRF 2018d; MNRF 2019	Sand, clay or gravel river banks or steep riverbank cliffs; lakeshore bluffs of easily crumbled sand or gravel; gravel pits, road-cuts, grassland or cultivated fields that are close to water; nesting sites are limiting factor for species presence.	Several Bank Swallows were observed exhibiting probable breeding evidence during Breeding Bird Surveys but results of the Bank Swallow habitat assessment suggest that no suitable breeding habitat is present within the Study Area.	No	Yes (foraging but no breeding habitat)
<i>Tyto alba</i>	Barn Owl	S1	END	E	Schedule 1	MNRF 2018d	Open areas such as fields, agricultural lands with scattered woodlots, buildings and/or orchards; grasslands, sedge meadows, marshes; snow-cover limits ability to catch prey; species has intolerance to severe cold; nests in hollow trees and live trees >46 cm dbh; also nests in barns, abandoned buildings.	The Study Area are on the City's boundary, adjacent to a rural area. The open fields and meadows may provide suitable foraging habitat, while treed area may provide suitable nesting habitat.	Yes	No

Species at Risk and Species of Conservation Concern Screening

Scientific Name	Common Name	S-Rank ¹	COSSARO ²	COSEWIC ³	SARA ⁴	Background Source	Habitat Preference ^{2,3,5,6}	Rationale	Suitable Habitat Within Study Area?	NRSI Observed (2018 and 2019)
<i>Hirundo rustica</i>	Barn Swallow	S4B	THR	T	Schedule 1	BSC et al. 2008; Savanta 2012; MNRF 2018d; MNRF 2019; NRSI 2018	Farmlands or rural areas; cliffs, caves, rock niches; buildings or other man-made structures for nesting; open country near body of water.	Suitable man-made structures for nesting may be present within the study area but not the Study Area; foraging habitat may be present within the Study Area.	Yes (Foraging Only)	Yes (foraging but no breeding habitat)
<i>Chlidonias niger</i>	Black Tern	S3B	SC	NAR	-	MNRF 2018d	Black Terns build floating nests in loose colonies in shallow marshes, coastal or inland marshes; large cattail marshes, marshy edges of rivers, lakes or ponds, wet open fens, wet meadows; returns to same area to nest each year in loose colonies; must have shallow (0.5 to 1 m deep) water and areas of open water near nests; requires marshes >20 ha in size; feeds over adjacent grasslands for insects; also feeds on fish, crayfish and frogs.	There are no large marshes within the Subject Lands.	No	No
<i>Dolichonyx oryzivorus</i>	Bobolink	S4B	THR	T	Schedule 1	BSC et al. 2008; Savanta 2012; MNRF 2018d; MNRF 2019	Large, open expansive grasslands with dense ground cover; hayfields, meadows or fallow fields; marshes; requires tracts of grassland >50 ha.	Suitable habitat may be present in agricultural fields and meadows within and surrounding the Study Area.	Yes	No
<i>Cardellina canadensis</i>	Canada Warbler	S4B	SC	T	Schedule 1	BSC et al. 2008; MNRF 2018d; MNRF 2019	Canada Warblers breed in mixed conifer and deciduous forest with a shrubby and mossy understory often near water. They frequent aspen and popular forests in Canada, and forested wetlands in the central part of their range. Nests on the ground, on logs or hummocks, and uses dense shrub layer to conceal the nest.	Interior forest habitat of a suitable size (>30ha) is not present within the Study Area.	No	No
<i>Setophaga cerulea</i>	Cerulean Warbler	S3B	THR	E	Schedule 1	MNRF 2018d; MNRF 2019	Mature deciduous woodland of Great Lakes- St. Lawrence and Carolinian forests, sometimes coniferous; swamps or bottomlands with large trees; area sensitive species needing extensive areas of forest (>100 ha)	Mature deciduous forest habitat of a suitable size (>100ha) is not present within the Study Area.	No	No
<i>Chaetura pelagica</i>	Chimney Swift	S4B,S4N	THR	T	Schedule 1	BSC et al. 2008; MNRF 2018d; MNRF 2019	Nest on cave walls and in hollow trees or tree cavities in old growth forests. Also likely to be found in and around urban settlements where they nest and roost (rest or sleep) in chimneys and other manmade structures. They also tend to stay close to water as this is where the flying insects they eat congregate.	Suitable habitat may be present within the study area but not the Study Area.	No	No
<i>Chordeiles minor</i>	Common Nighthawk	S4B	SC	T	Schedule 1	BSC et al. 2008; MNRF 2018d; MNRF 2019	Generally prefer open, vegetation-free habitats, including dunes, beaches, recently harvested forests, burnt-over areas, logged areas, rocky outcrops, rocky barrens, grasslands, pastures, peat bogs, marshes, lakeshores, and river banks. This species also inhabits mixed and coniferous forests. Can also be found in urban areas (nest on flat roof-tops).	Open ground, forest clearings, and ploughed fields are present within the Study Area.	Yes	No
<i>Sturnella magna</i>	Eastern Meadowlark	S4B	THR	T	Schedule 1	BSC et al. 2008; MNRF 2018d; MNRF 2019	Open, grassy meadows, farmland, pastures, hayfields or grasslands with elevated singing perches; cultivated land and weedy areas with trees; old orchards with adjacent, open grassy areas >10 ha in size.	Suitable habitat may be present in agricultural fields and meadows within and surrounding the Study Area.	Yes	No

Species at Risk and Species of Conservation Concern Screening

Scientific Name	Common Name	S-Rank ¹	COSSARO ²	COSEWIC ³	SARA ⁴	Background Source	Habitat Preference ^{2,3,5,6}	Rationale	Suitable Habitat Within Study Area?	NRSI Observed (2018 and 2019)
<i>Caprimulgus vociferus</i>	Eastern Whip-poor-will	S4B	THR	T	Schedule 1	MNRF 2018d; MNRF 2019	Dry, open, deciduous woodlands of small to medium trees; oak or beech with lots of clearings and shaded leaf litter; wooded edges, forest clearings with little herbaceous growth; pine plantations; associated with >100 ha forests; may require 500 to 1000 ha to maintain population.	Dry, deciduous woodlands of a suitable size (>100ha) is not present within the Study Area.	No	No
<i>Contopus virens</i>	Eastern Wood-Pewee	S4B	SC	SC	Schedule 1	BSC et al. 2008; Savanta 2012; MNRF 2014; MNRF 2018d; MNRF 2019; NRSI 2018	Lives in the mid-canopy layer of forest clearings and edges of deciduous and mixed forests. It is most abundant in intermediate-age mature forest stands with little understory vegetation.	Suitable habitat in the form of forest clearings and farm woodlots is present within the Study Area.	Yes	Yes
<i>Vermivora chrysoptera</i>	Golden-winged Warbler	S4B	SC	T	Schedule 1	BSC et al. 2008; MNRF 2018d	Generally prefer areas of early successional vegetation, found primarily on field edges, hydro or utility right-of-ways, or recently logged areas.	Suitable habitat is present within the Maple Grove Road PSW Complex and associated woodlands (within the Study Area, approximately 9.5ha of wetland/woodland are present).	Yes	No
<i>Ammodramus henslowii</i>	Henslow's Sparrow	SHB	END	E	Schedule 1	MNRF 2018d	It has been found in abandoned farm fields, pastures, and wet meadows. It tends to avoid fields that have been grazed or are crowded with trees and shrubs. It prefers extensive, dense, tall grasslands where it can more easily conceal its small ground nest.	There is no suitable habitat in the Study Area for this species; open habitats are too small or have been cleared of vegetation for the development.	No	No
<i>Podiceps auritus</i>	Horned Grebe	S1B, S4N	SC	SC	No Schedule	MNRF 2019	The Horned Grebe usually nests in small ponds, marshes and shallow bays that contain areas of open water and emergent vegetation. Nests are usually located within a few metres of open water.	There are no ponds or marshes with areas of open water suitable for this species within the Study Area.	No	No
<i>Ixobrychus exilis</i>	Least Bittern	S4B	THR	T	Schedule 1	MNRF 2018d	Generally located near pools of open water in relatively large marshes and swamps that are dominated by cattail and other robust emergent plants.	Although the Study Area are located within an area that is highly disturbed from a natural state, suitable habitat may be present within the Maple Grove Road PSW Complex	Yes	No
<i>Parkesia motacilla</i>	Louisiana Waterthrush	S3B	THR	T	Schedule 1	MNRF 2018d; MNRF 2019	Prefers wooded ravines with running streams; also woodlands swamps; large tracts of mature deciduous or mixed forests; canopy cover is essential; has strong affinity to nest sites; nests on ground.	Suitable habitat may be present within the Maple Grove Road PSW Complex and adjacent woodland	Yes	No
<i>Colinus virginianus</i>	Northern Bobwhite	S1	END	E	Schedule 1	MNRF 2018d	Grassland, prairie or hay fields with woody cover in form of thickets, tangles of vines, shrubs; fence rows or woodland edges; cropland growing corn, soybeans or small grains and clover or grass; well-drained sandy or loamy soil; pond edges.	Suitable habitat may be present within open meadows, hedgerows, or woodland edges within the Study Area.	Yes	No
<i>Falco peregrinus anatum/tundrius</i>	Peregrine Falcon	S3B	SC	SC	Schedule 1	MNRF 2018d; MNRF 2019	Breed in open landscapes with cliffs (or skyscrapers) for nest sites, as well as along rivers and coastlines or in cities.	Tall urban buildings within the study area may provide suitable habitat for this species, however none are present within the Study Area.	No	No
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	S4B	SC	T	Schedule 1	MNRF 2018d	Open, deciduous forest with little understory; fields or pasture lands with scattered large trees; wooded swamps; orchards, small woodlots or forest edges; groves of dead or dying trees; requires cavity trees with at least 40 cm dbh; require about 4 ha for a territory.	Forest and forest edges within the Study Area may provide suitable habitat for this species.	Yes	No

Species at Risk and Species of Conservation Concern Screening

Scientific Name	Common Name	S-Rank ¹	COSSARO ²	COSEWIC ³	SARA ⁴	Background Source	Habitat Preference ^{2,3,5,6}	Rationale	Suitable Habitat Within Study Area?	NRSI Observed (2018 and 2019)
<i>Asio flammeus</i>	Short-eared Owl	S2N, S4B	SC	SC	Schedule 1	MNRF 2018d; MNRF 2019	Grasslands, open areas or meadows that are grassy or bushy; marshes, bogs or tundra; both diurnal and nocturnal habits; ground nester; destruction of wetlands by drainage for agriculture is an important factor in the decline of this species; home range 25 -125 ha; requires 75-100 ha of contiguous open habitat.	Large, contiguous open areas of grassland or meadows are not present in the Study Area (all open habitats are too small or have been cleared of vegetation).	No	No
<i>Hylocichla mustelina</i>	Wood Thrush	S4B	SC	T	Schedule 1	BSC et al. 2008; MNRF 2018d; MNRF 2019	Mature deciduous and mixed forests. They seek moist stands of trees with well-developed undergrowth and tall trees for singing perches. These birds prefer large forests, but will also use smaller stands of trees. They build their nests in living saplings, trees or shrubs, usually in sugar maple or American beech.	Suitable habitat may be present within the Maple Grove Road PSW Complex and adjacent woodland	Yes	No
<i>Icteria virens</i>	Yellow-breasted Chat	S2B	END	E	Schedule 1	MNRF 2018d; MNRF 2019	Dense thickets around wood edges, riparian areas, tall tangles of shrubbery beside streams, ponds; overgrown bushy clearings with deciduous thickets; nests above ground in bush, vines etc. The Ontario population is very dependent on successional habitats of thick shrubbery.	Suitable habitat may be present within the riparian zone of Middle Creek within the Study Area.	Yes	No
Herpetofauna										
<i>Emydoidea blandingii</i>	Blanding's Turtle	S3	THR	END	Schedule 1	MNRF 2018d; MNRF 2019; Ontario Nature 2019	Shallow water marshes, bogs, ponds or swamps, or coves in larger lakes with soft muddy bottoms and aquatic vegetation; basks on logs, stumps, or banks; surrounding natural habitat is important in summer as they frequently move from aquatic habitat to terrestrial habitats; hibernates in bogs; not readily observed.	Suitable habitat may be present within the Maple Grove Road PSW Complex. Turtle nesting surveys did not document any turtle nests or turtle observations within the Study Area.	Yes	No
<i>Thamnophis sauritus</i>	Eastern Ribbonsnake (Great Lakes population)	S4	SC	SC	Schedule 1	MNRF 2018d; MNRF 2019; Ontario Nature 2019	Sunny grassy areas with low dense vegetation near bodies of shallow permanent quiet water; wet meadows grassy marshes or sphagnum bogs; borders of ponds, lakes or streams; hibernates in groups.	Suitable habitat may be present within Middle Creek and the Maple Grove Road PSW Complex. Snake coverboard surveys located in suitable habitat did not document this species.	Yes	No
<i>Ambystoma jeffersonianum</i>	Jefferson Salamander	S2	END	E	Schedule 1	MNRF 2018d; MNRF 2019; Ontario Nature 2019	Damp shady deciduous forest, swamps, moist pasture, lakeshores; temporary woodland pools for breeding; hides under leaf litter, stones or in decomposing logs.	Suitable habitat is present within the Maple Grove Road PSW Complex, specifically Wetland 2.	Yes	No
<i>Graptemys geographica</i>	Northern Map Turtle	S3	SC	SC	Schedule 1	MNRF 2018d; MNRF 2019	Rivers and lakeshores where it basks on emergent rocks and fallen trees throughout the spring and summer. In winter, the turtles hibernate on the bottom of deep, slow-moving sections of river. They require high-quality water that supports the female's mollusc prey. Their habitat must contain suitable basking sites, such as rocks and deadheads, with an unobstructed view from which a turtle can drop immediately into the water if startled.	Large bodies of water and suitable foraging or nesting habitat is not present within the Study Area	No	No

Species at Risk and Species of Conservation Concern Screening

Scientific Name	Common Name	S-Rank ¹	COSSARO ²	COSEWIC ³	SARA ⁴	Background Source	Habitat Preference ^{2,3,5,6}	Rationale	Suitable Habitat Within Study Area?	NRSI Observed (2018 and 2019)
<i>Regina septemvittata</i>	Queensnake	S2	END	E	Schedule 1	MNRF 2018d; MNRF 2019; Ontario Nature 2019	The Queensnake is an aquatic species that is seldom found more than a few metres from the water. It prefers rivers, streams and lakes with clear water, rocky or gravel bottoms, lots of places to hide, and an abundance of crayfish. Queensnakes will often hibernate in groups with other snakes, amphibians and even crayfish. Suitable hibernation sites (called hibernacula) include abutments of old bridges and crevices in bedrock.	Suitable habitat may be present within Middle Creek and the Maple Grove Road PSW Complex. Snake coverboard surveys located in suitable habitat did not document this species.	Yes	No
<i>Chelydra serpentina serpentina</i>	Snapping Turtle	S3	SC	SC	Schedule 1	Savanta 2012; MNRF 2018d; MNRF 2019; Ontario Nature 2019	Permanent or semi-permanent fresh water; marshes, swamps or bogs; rivers and streams with soft muddybanks or bottoms. The species often uses soft soil or clean dry sand on south-facing slopes for nest sites and may nest at some distance from water.	Suitable habitat may be present within Middle Creek and the Maple Grove Road PSW Complex. Turtle nesting surveys did not document any turtle nests or turtle observations within the Study Area.	Yes	No
<i>Ambystoma laterale</i> - (2) <i>jeffersonianum</i>	Unisexual <i>Ambystoma</i> Jefferson dependent population	S2	END	E	Schedule 1	MNRF 2018d; MNRF 2019; Ontario Nature 2019	Damp shady deciduous forest, swamps, moist pasture, lakeshores; temporary woodland pools for breeding; hides under leaf litter, stones or in decomposing logs	Suitable habitat is present within the Maple Grove Road PSW Complex, specifically Wetland 2.	Yes	No
<i>Pseudacris triseriata</i> pop. 2	Western Chorus Frog (<i>Great Lakes/St. Lawrence - Canadian Shield Population</i>)	S3	NAR	T	Schedule 1	Ontario Nature 2019	Roadside ditches or temporary ponds in fields; swamps or wet meadows; woodland or open country with cover and moisture; small ponds and temporary pools ponds and temporary pools	Suitable temporary pools and ditches, and suitable wetland habitat may be present within the Study Area. No Western Chorus Frogs were heard during frog call surveys within the Study Area.	Yes	No
Mammals										
<i>Taxidea taxus jacksoni</i>	American Badger	S1	END	E	Schedule 1	MNRF 2018d	Open grasslands and oak savannahs; dens in new hole or enlarged existing hole; sometimes makes food caches.	Suitable denning habitat may be present along forest edges adjacent to agricultural fields within the Study Area. Targeted surveys did not document any confirmed Badger dens within the Study Area.	Yes	No
<i>Myotis leibii</i>	Eastern Small-footed Myotis	S2S3	END	-	-	Dobbyn 1994, MNRF 2018d; MNRF 2019	Overwintering habitat: Caves and mines that remain above 0 degrees Celsius. Maternal Roosts: primarily under loose rocks on exposed rock outcrops, crevices and cliffs, and occasionally in buildings, under bridges and highway overpasses and under tree bark.	Suitable foraging habitat is present within the Maple Grove Road PSW Complex and adjacent woodland.	Yes (Foraging Only)	No
<i>Myotis lucifungus</i>	Little Brown Myotis	S4	END	E	Schedule 1	Dobbyn 1994, MNRF 2018d; MNRF 2019	Caves, quarries, tunnels, hollow trees or buildings for roosting; winters in humid caves; maternity sites in dark warm areas such as attics and barns; feeds primarily in wetlands, forest edges.	Suitable roosting and foraging habitat is present within the Maple Grove Road PSW Complex and adjacent woodland	Yes	No
<i>Myotis septentrionalis</i>	Northern Myotis	S3	END	E	Schedule 1	Dobbyn 1994, MNRF 2018d; MNRF 2019	Northern Myotis roosts within tree crevices, hollows and under the bark of live and dead trees, particularly when trees are located within a forest gap.	Suitable roosting and foraging habitat is present within the Maple Grove Road PSW Complex and adjacent woodland	Yes	No
<i>Perimyotis subflavus</i>	Tri-colored Bat	S3?	END	E	Schedule 1	Dobbyn 1994, MNRF 2018d; MNRF 2019	Open woods near water; roosts in trees, cliff crevices, buildings or caves; hibernates in damp, draft-free, warm caves, mines or rock crevices.	Suitable roosting and foraging habitat is present within the Maple Grove Road PSW Complex and adjacent woodland	Yes	No
Fish										

Species at Risk and Species of Conservation Concern Screening

Scientific Name	Common Name	S-Rank ¹	COSSARO ²	COSEWIC ³	SARA ⁴	Background Source	Habitat Preference ^{2,3,5,6}	Rationale	Suitable Habitat Within Study Area?	NRSI Observed (2018 and 2019)
<i>Moxostoma duquesnei</i>	Black Redhorse	S2	THR	T	-	MNRF 2018d; MNRF 2019	The Black Redhorse lives in pools and riffle areas of medium-sized rivers and streams that are usually less than two metres deep. These rivers usually have few aquatic plants, a moderate to fast current, and a sandy or gravel bottom. In the spring, it migrates to breeding habitat where eggs are laid on gravel in fast water. The winter is spent in deeper pools.	There are no medium-sized rivers or streams within the Study Area.	No	No
<i>Ichthyomyzon fossor</i>	Northern Brook Lamprey (GL-USL Pop.)	S3	SC	SC	Schedule 1	MNRF 2018d	The Northern brook lamprey inhabits clear, coolwater streams. The larval stage requires soft substrates such as silt and sand for burrowing which are often found in the slow-moving portions of a stream. Adults are found in areas associated with spawning, including fast flowing riffles comprised of rock or gravel. Spawning occurs in May and June. The males construct small, often inconspicuous, nests by picking up pebbles with their mouths and moving them to form the rims of shallow depressions. The sticky eggs are deposited in the nest and adhere to the substrate.	There are no streams within the Study Area.	No	No
<i>Notropis photogenis</i>	Silver Shiner	S2S3	THR	T	Schedule 3	MNRF 2018d; MNRF 2019	Silver shiners prefer moderate to large size streams with swift currents that are free of weeds and have clean gravel or boulder bottoms. They live in schools and feed on crustaceans and adult flies that fall in the water or fly just above the surface. In June or July, they spawn by scattering their eggs over gravel riffles.	There are no moderate to large streams within the Study Area.	No	No
Molluscs										
<i>Villosa iris</i>	Rainbow	S2S3	SC	SC	Schedule 1	MNRF 2019	The Rainbow mussel prefers small to medium-sized rivers with a moderate to strong current and sand, rocky, or gravel bottoms. It is found in or near riffle areas and along the edges of vegetation in water less than one metre deep. The Rainbow mussel uses a variety of fish hosts in Ontario, including Striped shiner, Smallmouth bass, Largemouth bass, Green sunfish, Greenside darter, Rainbow darter, and Yellow perch.	There are no small to medium sized rivers within the Study Area	No	No
<i>Lampsilis fasciola</i>	Wavy-rayed Lampmussel	S1	THR	SC	Schedule 1	MNRF 2014; MNRF 2018d; MNRF 2019	The Wavy-rayed lampmussel is usually found in small to medium rivers with clear water. It lives in shallow riffle areas with clean gravel or sand bottoms. The Wavy-rayed lampmussel's fish hosts are the Largemouth bass and Smallmouth bass.	There are no small to medium-sized rivers or streams within the Study Area.	No	No
Butterflies										
<i>Euphyes conspicua</i>	Black Dash	S3	-	-	-	MacNaughton et al. 2019	Wet sedge meadows; also, open shrubby or partially-wooded wetlands with red maple	This species could be present in the wooded wetlands within the Study Area.	Yes	No
<i>Danaus plexippus</i>	Monarch	S2N, S4B	SC	E	Schedule 1	MNRF 2018d; MNRF 2019; NRSI 2018; MacNaughton et al. 2019	Monarch caterpillars feed on milkweed plants and are confined to meadows and open areas where milkweed grows. Adult butterflies can be found in more diverse habitats where they feed on nectar from a variety of wildflowers.	Suitable open areas with milkweed are present within the study area	Yes	Yes

Species at Risk and Species of Conservation Concern Screening

Scientific Name	Common Name	S-Rank ¹	COSSARO ²	COSEWIC ³	SARA ⁴	Background Source	Habitat Preference ^{2,3,5,6}	Rationale	Suitable Habitat Within Study Area?	NRSI Observed (2018 and 2019)
<i>Asterocampa clyton</i>	Tawny Emperor	S3	-	-	-	Macnaughton et al. 2019	Most typical in edge or riparian areas where hackberry trees are present. Less tolerant of suburbia compared to <i>A. celtis</i> , as hibernating larvae may be destroyed when leaves are raked	Suitable habitat is present within the study area	Yes	No
<i>Pieris virginiensis</i>	West Virginia White	S3	SC	-	-	MNRF 2018d; MNRF 2019	Generally prefer moist, deciduous woodlands. The larvae feed only on the leaves of the two-leaved toothwort (<i>Cardamine diphylla</i>), which is a small, spring-blooming plant of the forest floor. It avoids edges and open fields in fragmented landscapes.	The woodlands within the Study Area may provide suitable habitat for this species.	Yes	No
Odonates										
<i>Enallagma anna</i>	River Bluet	S2				Ontario Odonata Atlas Database 2019	Occurs in streams and small rivers, mostly in open country but often with riparian borders; also flowing irrigation canals. Much more of a lotic species than any of its near relatives. Larvae live in aquatic vegetation.	There are no streams or small rivers within the Study Area.	No	No
<i>Rhionaeschna mutata</i>	Spatterdock Darner	S1				Ontario Odonata Atlas Database 2019	Typically restricted to fishless ponds, which may or may not be covered with water lilies. It is one of the more ecologically restricted species among North American aeshnids. Larvae live in aquatic vegetation.	There are no fishless ponds with water lilies within the Study Area.	No	No
<i>Epiaeschna heros</i>	Swamp Darner	S2S3				Ontario Odonata Atlas Database 2019	Habitat consists of swamps and slow streams for breeding, it is more confined to woodland than many other aeshnids. Larvae may develop in very shallow pools, even seasonal ones, and have been found emerging from low areas that had dried up previously. Roams widely away from breeding sites to feed, often in swarms, and has been suspected of migratory movements (Paulson 2011). Larvae live among detritus, not up in the vegetation like many other aeshnids.	Suitable habitat may be present within the Maple Grove Road PSW Complex	Yes	No
Other Insects										
<i>Bombus affinis</i>	Rusty-patched Bumble Bee	S1	END	E	Schedule 1	MNRF 2018d; MNRF 2019	Open habitat such as mixed farmland, urban settings, savannah, open woods and sand dunes. The most recent sightings have been in oak savannah, which contains both woodland and grassland flora and fauna.	While suitable foraging habitat is present within the study area in the form of farmlands and wooded areas, this species is currently only known from the Pinery Provincial Park region (approximately 150km from the study area)	No	No
<i>Bombus terricola</i>	Yellow-banded Bumble Bee	S3S5	SC	SC	Schedule 1	MNRF 2019	Mixed woodlands and open habitat such as native grasslands, farmlands and urban areas. Close to or within wooded areas or wetlands.	The wooded areas and wetlands within the Study Area may provide suitable habitat for this species.	Yes	No

¹MNRF 2016a, ²MNRF 2017a, ³Government of Canada 2017, ⁴OMNR 2000, ⁵Oldham and Brinker 2009, ⁶Reznicek et al. 2011

Appendix III

Significant Wildlife Habitat Screening Tables

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

	Wildlife Species ¹	Candidate SWH		Confirmed SWH	Study Area	Subject Lands
		ELC Ecosite Codes ¹	Habitat Criteria and Information Sources ¹	Defining Criteria ¹	Assessment Details	NRSI Observed (2018 and 2019)
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 ^{en.viii} . <u>Information Sources</u> • Anecdotal information from the landowner, adjacent landowners or local naturalist clubs may be good information in determining occurrence. • Reports and other information available from Conservation Authorities (CAs) • Sites documented through waterfowl planning processes (eg. EHJV implementation plan) • Field Naturalist Clubs • Ducks Unlimited Canada • Natural Heritage Information Centre (NHIC) Waterfowl Concentration Area	Studies carried out and verified presence of an annual concentration of any listed species, evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" ^{ccdi} • 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 ^{en.viii} . • Annual use of habitat is documented from information sources or field studies (annual use can be based on studies or determined by past surveys with species numbers and dates). • SWHMIST ^{cdix} Index #7 provides development effects and mitigation measures.	Fields with sheet water are not present within the Study Area Not SWH	Fields with sheet water are not present within the Subject Lands. 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). <u>Information Sources</u> • Environment Canada • Naturalist clubs often are aware of staging/stopover areas. • OMNRF Wetland Evaluations indicate presence of locally and regionally significant waterfowl staging. • Sites documented through waterfowl planning processes (eg. EHJV implementation plan) • Ducks Unlimited projects • Element occurrence specification by Nature Serve: http://www.natureserve.org • Natural Heritage Information Centre (NHIC) Waterfowl Concentration Area	Studies carried out and verified presence of: • Aggregations of 100' or more of listed species for 7 days ⁱ , results in > 700 waterfowl use days. • Areas with annual staging of ruddy ducks, canvasbacks, and redheads are SWH ^{cdix} • The combined area of the ELC ecosites and a 100m radius area is the SWH ^{en.viii} • Wetland area and shorelines associated with sites identified within the SWHTG ^{cdviii} Appendix K ^{cdix} are significant wildlife habitat. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" ^{ccdi} • Annual Use of Habitat is Documented from Information Sources or Field Studies (Annual can be based on completed studies or determined from past surveys with species numbers and dates recorded). • SWHMIST ^{cdix} Index #7 provides development effects and mitigation measures.	The wetlands and watercourses within the Study Area are not large enough to support 100 or more of the listed species. Not SWH	The wetlands and watercourses on the Subject Lands are not large enough to support 100 or more of the listed species. Not SWH

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

	Wildlife Species ¹	Candidate SWH		Confirmed SWH	Study Area	Subject Lands
		ELC Ecosite Codes ¹	Habitat Criteria and Information Sources ¹	Defining Criteria ¹	Assessment Details	NRSI Observed (2018 and 2019)
Wildlife Habitat: Shorebird Migratory Stopover Area						
<p>Rationale: High quality shorebird stopover habitat is extremely rare and typically has a long history of use.</p>	<p>Greater Yellowlegs Lesser Yellowlegs Marbled Godwit Hudsonian Godwit Black-bellied Plover American Golden-Plover Semipalmated Plover Solitary Sandpiper Spotted Sandpiper Semipalmated Sandpiper Pectoral Sandpiper White-rumped Sandpiper Baird's Sandpiper Least Sandpiper Purple Sandpiper Stilt Sandpiper Short-billed Dowitcher Red-necked Phalarope Ruddy Turnstone Sanderling Dunlin Whimbrel</p>	<p>BBO1 BBO2 BBS1 BBS2 BBT1 BBT2 SDO1 SDS2 SDT1 MAM1 MAM2 MAM3 MAM4 MAM5</p>	<p>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.</p> <p><u>Information Sources</u></p> <ul style="list-style-type: none"> • 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 	<p>Studies confirming:</p> <ul style="list-style-type: none"> • 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^{cxviii} • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"^{ccxi} • SWHMIST^{cdix} Index #8 provides development effects and mitigation measures. 	<p>There are no large bodies of water such as lakes, rivers or large wetlands within the Study Area.</p> <p>Not SWH</p>	<p>There are no large bodies of water such as lakes, rivers or large wetlands within the Subject Lands.</p> <p>Not SWH</p>
Wildlife Habitat: Raptor Wintering Area						
<p>Rational: Sites used by multiple species, a high number of individuals and used annually are most significant</p>	<p>Rough-legged Hawk Red-tailed Hawk Northern Harrier American Kestrel Snowy Owl</p> <p><u>Special Concern:</u> Short-eared Owl Bald Eagle</p>	<p>Hawks/Owls: Combination of ELC Community Series; need to have present one Community Series from each land class: Forest: FOD, FOM, FOC</p> <p>Upland: CUM, CUT, CUS, CUW</p>	<p>The habitat provides a combination of fields and woodlands that provide roosting, foraging and resting habitats for wintering raptors.</p> <p>Raptor wintering sites need to be > 20 ha^{cxviii, cdix} 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^{cdix}</p> <p>Field area of the habitat is to be wind swept with limited snow depth or accumulation.</p> <p>Eagle sites have open water, large trees and snags available for roosting</p> <p><u>Information Sources</u></p> <ul style="list-style-type: none"> • 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. 	<p>Studies confirm the use of these habitats by:</p> <ul style="list-style-type: none"> • One or more Short-eared Owls or; One or more Bald Eagles or; At least 10 individuals and two listed hawk/owl species • To be significant a site must be used regularly (3 in 5 years)^{cdix} for a minimum of 20 days by the above number of birds • The habitat area for an Eagle winter site is the shoreline forest ecosites directly adjacent to the prime hunting area • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"^{ccxi} • SWHMIST^{cdix} Index #10 and #11 provides development effects and mitigation measures. 	<p>The Study Area is within an open matrix of agricultural field and forest.</p> <p>Candidate SWH</p>	<p>A stick nest was observed within the vicinity of two Red-tailed Hawk observations during winter surveys. However, this observation does not meet the criteria for SWH.</p> <p>Not SWH</p>

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

	Wildlife Species ¹	Candidate SWH		Confirmed SWH	Study Area	Subject Lands
		ELC Ecosite Codes ¹	Habitat Criteria and Information Sources ¹	Defining Criteria ¹	Assessment Details	NRSI Observed (2018 and 2019)
Wildlife Habitat: Bat Hibernacula						
Rationale: Bat hibernacula are rare habitats in Ontario landscapes.	Big Brown Bat Tri-coloured Bat	Bat Hibernacula may be found in these ecosites: CCR1 CCR2 CCA1 CCA2 (Note: buildings are not considered to be SWH)	<ul style="list-style-type: none"> Hibernacula may be found in caves, mine shafts, underground foundations and Karsts. Active mine sites should not be considered as SWH The locations of bat hibernacula are relatively poorly known. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> OMNRF for possible locations and contact for local experts Natural Heritage Information Center (NHIC) Bat Hibernaculum Ministry of Northern Development and Mines for location of mine shafts. Clubs that explore caves (eg. Sierra Club) University Biology Departments with bat experts. 	<ul style="list-style-type: none"> All sites with confirmed hibernating bats are SWH. The habitat area includes a 200m radius around the entrance of the hibernaculum^{cdviii, 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^{cdix} Index #1 provides development effects and mitigation measures. 	There is no suitable hibernacula habitat within the Study Area. Not SWH	There is no suitable hibernacula habitat within the Subject Lands. 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	<ul style="list-style-type: none"> Maternity colonies can be found in tree cavities, vegetation and often in buildings^{ccxi, xxv, xxvi, xxvii, xxxi} (buildings are not considered to be SWH). Maternity roosts are not found in caves and mines in Ontario^{ccxi}. Maternity colonies located in Mature deciduous or mixed forest stands^{ccix, ccv} with >10/ha large diameter (>25cm dbh) wildlife trees^{ccvii} Female Bats prefer wildlife tree (snags) in early stages of decay, class 1-3^{ccv} or class 1 or 2^{ccxi} 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} <p><u>Information Sources</u></p> <ul style="list-style-type: none"> OMNRF for possible locations and contact for local experts University Biology Departments with bat experts 	<ul style="list-style-type: none"> Maternity Colonies with confirmed use by: <ul style="list-style-type: none"> >10 Big Brown Bats >5 Adult Female Silver-haired Bats The area of the habitat includes the entire woodland or a forest stand ELC Ecosite or an Ecoelement containing the maternity colonies. Evaluation methods for maternity colonies should be conducted following methods outlined in the "Bats and Bat Habitats: Guidelines for Wind Power Projects"^{ccv} SWHMIS T^{cdix} Index #12 provides development effects and mitigation measures. 	Suitable roosting cavities may be present within the forest and swamp communities in the Study Area. Candidate SWH	Suitable roosting cavities may be present within the forest and swamp communities in the Subject Lands. These habitats are protected and buffered from the proposed development. Candidate SWH
Wildlife Habitat: Turtle Wintering Area						
Rationale: Generally sites are the only known sites in the area. Sites with the highest number of individuals are most significant	Midland Painted Turtle Special Concern: Northern Map Turtle Snapping Turtle	Snapping and Midland Painted Turtles - ELC Community Classes: SW, MA, OA and SA; ELC Community Series: FEO and BOO Northern Map Turtle - Open Water areas such as deeper rivers or streams and lakes with current can also be used as over-wintering habitat.	<ul style="list-style-type: none"> 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^{ccx, cc, cxi, ccviii}. Man-made ponds such as sewage lagoons or storm water ponds should not be considered SWH. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> 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) 	<ul style="list-style-type: none"> 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)^{ccvii} Congregation of turtles is more common where wintering areas are limited and therefore significant^{ccx, cc, cxi, ccvi}. SWHMIST^{cdix} Index #28 provides development effects and mitigation measures for turtle wintering habitat. 	Middle Creek, or the wetlands within the Maple Grove PSW complex may provide suitable turtle overwintering areas. Candidate SWH	No turtles or evidence of turtle nesting was observed during turtle nesting surveys within the Subject Lands. In addition, the wetlands within the Subject Lands are too shallow to provide suitable overwintering habitat for turtles. Not SWH

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

	Wildlife Species ¹	Candidate SWH		Confirmed SWH	Study Area	Subject Lands
		ELC Ecosite Codes ¹	Habitat Criteria and Information Sources ¹	Defining Criteria ¹	Assessment Details	NRSI Observed (2018 and 2019)
Wildlife Habitat: Snake Hibernaculum						
<p>Rationale: Generally sites are the only known sites in the area. Sites with the highest number of individuals are most significant</p>	<p>Snakes: Eastern Gartersnake Northern Watersnake Northern Red-bellied Snake Northern Brownsnake Smooth Green Snake Northern Ring-necked Snake</p> <p>Special Concern: Eastern Ribbonsnake</p> <p>Lizard: Special Concern (Southern Shield population): Five-lined Skink</p>	<p>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.</p> <p>Observations of congregations of snakes on sunny warm days in the spring or fall is a good indicator.</p> <p>For Five-lined Skink, ELC Community Series of FOD and FOM and Ecosites: FOC1 FOC3</p>	<ul style="list-style-type: none"> 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^{div, i, ii, iii, cxi.} 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 ccii. <p>Information Sources</p> <ul style="list-style-type: none"> 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 	<p>Studies confirming:</p> <ul style="list-style-type: none"> 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 SWHⁱ SWHMiST^{cdix} Index #13 provides development effects and mitigation measures for snake hibernacula. Presence of any active hibernaculum for skink is significant. SWHMiST^{cdix} Index #37 provides development effects and mitigation measures for five-lined skink wintering habitat. 	<p>Burrows, rock piles, crevices on slopes etc, that provide suitable overwintering habitat for snakes may be present within the Study Area.</p> <p>Candidate SWH</p>	<p>Burrows, rock piles, crevices on slopes etc, that provide suitable overwintering habitat for snakes may be present within the Subject Lands.</p> <p>Candidate SWH</p>
Wildlife Habitat: Colonially - Nesting Bird Breeding Habitat (Bank and Cliff)						
<p>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.</p>	<p>Cliff Swallow Northern Rough-winged Swallow (this species is not colonial but can be found in Cliff Swallow colonies)</p>	<p>Eroding banks, sandy hills, borrow pits, steep slopes, and sand piles Cliff faces, bridge abutments, silos, barns</p> <p>Habitat found in the following ecosites: CUM1 CUT1 CUS1 BLO1 BLS1 BLT1 CLO1 CLS1 CLT1</p>	<ul style="list-style-type: none"> Any site or areas with exposed soil banks, undisturbed or naturally eroding that is not a licensed/permitted aggregate area. Does not include man-made structures (bridges or buildings) or recently (2 years) disturbed soil areas, such as berms, embankments, soil or aggregate stockpiles. Does not include a licensed/permitted Mineral Aggregate Operation. <p>Information Sources</p> <ul style="list-style-type: none"> Reports and other information available from CAs Ontario Breeding Bird Atlas^{ccv} Bird Studies Canada; <i>NatureCounts</i> http://www.birdscanada.org/birdmon/ Field Naturalist clubs 	<p>Studies confirming:</p> <ul style="list-style-type: none"> Presence of 1 or more nesting sites with 8^{cdvix} or more cliff swallow pairs and/or rough-winged swallow pairs during the breeding season. A colony identified as SWH will include a 50m radius habitat area from the peripheral nests^{ccvi} 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^{cdix} Index #4 provides development effects and mitigation measures 	<p>Eroding slopes are not present within the Study Area.</p> <p>Not SWH</p>	<p>A fill pile is present within the Subject Lands. A habitat assessment of this pile confirmed that no nests were present and that the pile did not provide suitable habitat.</p> <p>Not SWH</p>

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

	Wildlife Species ¹	Candidate SWH		Confirmed SWH	Study Area	Subject Lands
		ELC Ecosite Codes ¹	Habitat Criteria and Information Sources ¹	Defining Criteria ¹	Assessment Details	NRSI Observed (2018 and 2019)
Wildlife Habitat: Colonially - Nesting Bird Breeding Habitat (Tree/Shrubs)						
<p>Rationale: Large Colonies are important to local bird population, typically sites are only known colony in area and are used annually.</p>	<p>Great Blue Heron Black-crowned Night-heron Great Egret Green Heron</p>	<p>SWM2 SWM3 SWM5 SWM6 SWD1 SWD2 SWD3 SWD4 SWD5 SWD6 SWD7 FET1</p>	<ul style="list-style-type: none"> Nests in live or dead standing trees in wetlands, lakes, islands, and peninsulas. Shrubs and occasionally emergent vegetation may also be used. Most nests in trees are 11 to 15m from ground, near the top of the tree. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> Ontario Breeding Bird Atlas^{ccv}, colonial nest records. Ontario Heronry Inventory 1991 available from Bird Studies Canada or NHIC (OMNR). NHIC Mixed Wader Nesting Colony Aerial photographs can help identify large heronries Reports and other information available from CAs MNRF District Offices Local naturalist clubs 	<p>Studies confirming:</p> <ul style="list-style-type: none"> Presence of 5¹ 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^{ccix} Index #5 provides development effects and mitigation measures. 	<p>Although the Maple Grove Road PSW may provide suitable habitat, previous studies within the Study Area did not document colonial nesting heron colonies.</p> <p>Not SWH</p>	<p>No nests were observed within swamp habitats.</p> <p>Not SWH</p>
Wildlife Habitat: Colonially - Nesting Bird Breeding Habitat (Ground)						
<p>Rationale: Colonies are important to local bird populations, typically sites are only known colony in area and are used annually.</p>	<p>Herring Gull Great Black-backed Gull Little Gull Ring-billed Gull Common Tern Caspian Tern Brewer's Blackbird</p>	<p>Any rocky island or peninsula (natural or artificial) within a lake or large river (two-lined on a 1:50,000 NTS map).</p> <p>Close proximity to watercourses in open fields or pastures with scattered trees or shrubs (Brewer's Blackbird)</p> <p>MAM1 – 6 MAS1 – 3 CUM CUT CUS</p>	<ul style="list-style-type: none"> Nesting colonies of gulls and terns are on islands or peninsulas associated with open water or in marshy areas. Brewers Blackbird colonies are found loosely on the ground in or in low bushes in close proximity to streams and irrigation ditches within farmlands. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> Ontario Breeding Bird Atlas^{ccv}, rare/colonial species records. Canadian Wildlife Service Reports and other information available from CAs Natural Heritage Information Center (NHIC) Colonial Waterbird Nesting Area MNRF District Offices Field naturalist clubs 	<p>Studies confirming:</p> <ul style="list-style-type: none"> Presence of >25 active nests for Herring Gulls or Ring-billed Gulls, >5 active nests for Common Tern or >2 active nests for Caspian Tern¹. 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^{ccix} Index #6 provides development effects and mitigation measures. 	<p>No suitable large open water or marshy habitats are present within the Study Area.</p> <p>Not SWH</p>	<p>No suitable large open water or marshy habitats are present within the Subject Lands.</p> <p>Not SWH</p>

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

	Wildlife Species ¹	Candidate SWH		Confirmed SWH	Study Area	Subject Lands
		ELC Ecosite Codes ¹	Habitat Criteria and Information Sources ¹	Defining Criteria ¹	Assessment Details	NRSI Observed (2018 and 2019)
Wildlife Habitat: Migratory Butterfly Stopover Areas						
<p>Rationale: Butterfly stopovers areas are extremely rare habitats and are biologically important for butterfly species that migrate south for the winter.</p>	<p>Painted Lady Red Admiral</p> <p>Special Concern: Monarch</p>	<p>Combination of ELC Community Series: Need to have present one Community Series from each landclass:</p> <p>Field: CUM CUS CUT</p> <p>Forest: FOC FOM FOD CUP</p> <p>Anecdotally, a candidate sight for butterfly stopover will have a history of butterflies being observed.</p>	<p>A butterfly stopover area will be a minimum of 10 ha in size with a combination of field and forest habitat present, and will be located within 5 km of Lake Ontario^{cxix}.</p> <ul style="list-style-type: none"> The habitat is typically a combination of field and forest, and provides the butterflies with a location to rest prior to their long migration south^{ccxi, ccxiii, ccxiv, ccxv, ccxvi}. The habitat should not be disturbed, fields/meadows with an abundance of preferred nectar plants and woodland edge providing shelter are requirements for this habitat 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^{ccxxvii, ccxxviii, ccxxix, xl, xli}. <p>Information Sources</p> <ul style="list-style-type: none"> OMNRF (NHIC) Agriculture Canada in Ottawa may have list of butterfly experts. Field Naturalist Clubs Toronto Entomologists Association Conservation Authorities 	<p>Studies confirm:</p> <ul style="list-style-type: none"> The presence of Monarch Use Days (MUD) during fall migration (Aug/Oct)^{ccxii}. MUD is based on the number of days a site is used by Monarchs, multiplied by the number of individuals using the site. Numbers of butterflies can range from 100-500/day^{ccxxvii}, significant variation can occur between years and multiple years of sampling should occur xl, xliii. 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^{ccxix} Index #16 provides development effects and mitigation measures. 	<p>The Study Area is not within 5km of Lake Ontario.</p> <p>Not SWH</p>	<p>The Subject Lands are not within 5km of Lake Ontario.</p> <p>Not SWH</p>
Wildlife Habitat: Landbird Migratory Stopover Areas						
<p>Rationale: Sites with a high diversity of species as well as high number are most significant</p>	<p>All migratory songbirds.</p> <p>Canadian Wildlife Service Ontario website: http://www.on.ec.gc.ca/wildlife_e.html</p> <p>All migrant raptors species:</p> <p>Ontario Ministry of Natural Resources: Fish and Wildlife Conservation Act, 1997. Schedule 7: Specially Protected Birds (Raptors)</p>	<p>All Ecosites associated with these ELC Community Series: FOC FOM FOD SWC SWM SWD</p>	<p>Woodlots need to be >10 ha^{iv, v, vi, vii, viii, ix, x, xi, xii, xiii, xv} in size and within 5km^{iv, v, vi, vii, viii, ix, x, xi, xii, xiii, xv} of Lake Ontario.</p> <ul style="list-style-type: none"> If multiple woodlands are located along the shoreline, those woodlands <2km from Lake Ontario are more significant^{ccxix} Sites have a variety of habitats; forest, grassland and wetland complexes^{ccxix}. The largest sites are more significant^{ccxix} Woodlots and forest fragments are important habitats to migrating birds^{ccxxiii}, these features located along the shore and located within 5km of Lake Ontario are Candidate SWH^{ccxviii}. <p>Information Sources</p> <ul style="list-style-type: none"> Bird Studies Canada Ontario Nature Local birders and naturalist club Ontario Important Bird Areas (IBA) Program 	<p>Studies confirm:</p> <ul style="list-style-type: none"> Use of the woodlot by >200 birds/day and with >35 spp. with at least 10 bird spp. recorded on at least 5 different survey dates. This abundance and diversity of migrant bird species is considered above average and significant. Studies should be completed during spring (Apr/May) and fall (Aug/Oct) migration using standardized assessment techniques. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"^{cccl} SWHMIST^{ccxix} Index #9 provides development effects and mitigation measures. 	<p>The Study Area is not within 5km of Lake Ontario.</p> <p>Not SWH</p>	<p>The Subject Lands are not within 5km of Lake Ontario.</p> <p>Not SWH</p>

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

Wildlife Species ¹	Candidate SWH		Confirmed SWH	Study Area	Subject Lands	
	ELC Ecosite Codes ¹	Habitat Criteria and Information Sources ¹	Defining Criteria ¹	Assessment Details	NRSI Observed (2018 and 2019)	
Wildlife Habitat: Deer Yarding Areas						
<p>Rationale: Winter habitat for deer is considered to be the main factor for northern deer populations. In winter, deer congregate in "yards" to survive severe winter conditions. Deer yards typically have a long history of annual use by deer, yards typically represent 10-15% of an areas summer range.</p>	White-tailed Deer	<p>Note: OMNRF to determine this habitat.</p> <p>ELC Community Series providing a thermal cover component for a deer yard would include: FOM, FOC, SWM and SWC.</p> <p>Or these ELC Ecosites: CUP2 CUP3 FOD3 CUT</p>	<p>• 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.</p> <p>• 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%^{cccv}.</p> <p>• OMNRF determines deer yards following methods outlined in "Selected Wildlife and Habitat Features: Inventory Manual"^{cccv}</p> <p>• Woodlots with high densities of deer due to artificial feeding are not significant.</p>	<p>No Studies Required:</p> <ul style="list-style-type: none"> • Snow depth and temperature are the greatest influence on deer use of winter yards. Snow depths > 40cm for more than 60 days in a typically winter are minimum criteria for a deer yard to be considered as SWH^{hi, hvii, lxi, lx, lx, l}. • 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^{cccv}. • 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^{deix} Index #2 provides development effects and mitigation measures. 	<p>The MNRF has mapped the southern and eastern woodlands within the Subject Lands as Stratum II deer wintering areas.</p> <p>Confirmed SWH</p>	<p>Heavy White-tailed Deer activity was observed within the eastern Coniferous Plantation (CUP3) within the Subject Lands, with especially high use observed along Middle Creek. Several White-tailed Deer bedding areas, and areas heavily browsed, were also observed within this community. Limited evidence of White-tailed Deer was observed within the woodland in the southern portion of the Subject Lands and none was observed within the southwestern woodland area.</p> <p>Confirmed SWH</p>
Wildlife Habitat: Deer Winter Congregation Areas						
<p>Rationale: Deer movement during winter in the southern areas of Ecoregion 6E are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands to reduce or avoid the impacts of winter conditions^{exviii}</p>	White-tailed Deer	<p>All Forested Ecosites with these ELC Community Series: FOC FOM FOD SWC SWM SWD</p> <p>Conifer plantations much smaller than 50ha may also be used.</p>	<ul style="list-style-type: none"> • Woodlots will typically be >100 ha in size. Woodlots <100ha may be considered as significant based on MNRF studies or assessment. • Deer movement during winter in the southern areas of Eco-region 6E are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands^{exviii}. • 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^{cccvv}. • Woodlots with high densities of deer due to artificial feeding are not significant. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> • MNRF District Offices • LIO/NRVIS 	<p>Studies confirm:</p> <ul style="list-style-type: none"> • Deer management is an MNRF responsibility, deer winter congregation areas considered significant will be mapped by MNRF^{ccviii}. • 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^l. • Studies should be completed during winter (Jan/Feb) when >20cm of snow is on the ground using aerial survey techniques^{cccvv}, ground or road surveys, or a pellet count deer density survey^{cccvv}. • 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^{deix} Index #2 provides development effects and mitigation measures. 	<p>There is no suitable habitat within the Study Area (woodlots are not >100ha in size).</p> <p>Not SWH</p>	<p>No suitable habitat in Subject Lands (woodlots are not >100ha in size).</p> <p>Not SWH</p>

¹MNRF 2015b

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

Rare Vegetation Community ¹	Candidate SWH			Confirmed SWH	Study Area	Subject Lands
	ELC Ecosite Codes ¹	Habitat Description ¹	Detailed Information and Sources ¹	Defining Criteria ¹	Assessment Details	NRSI Observed (2018 and 2019)
Cliff and Talus Slopes						
<p>Rationale: Cliffs and Talus Slopes are extremely rare habitats in Ontario.</p>	<p>Any ELC Ecosite within Community Series:</p> <p>TAO CLO TAS CLS TAT CLT</p>	<p>A Cliff is vertical to near vertical bedrock >3m in height.</p> <p>A Talus Slope is rock rubble at the base of a cliff made up of coarse rocky debris.</p>	<p>Most cliff and talus slopes occur along the Niagara Escarpment.</p> <p>Information Sources</p> <ul style="list-style-type: none"> The Niagara Escarpment Commission has detailed information on location of these habitats. OMNRF District Natural Heritage Information Center (NHIC) has location information on their website Local naturalist clubs Conservation Authorities 	<ul style="list-style-type: none"> Confirm any ELC Vegetation Type for Cliffs or Talus Slopes^{lxviii} SWHMIST^{cxlix} Index #21 provides development effects and mitigation measures. 	<p>No cliff or talus slopes within the Study Area.</p> <p>Not SWH</p>	<p>No cliff or talus slopes within the Subject Lands.</p> <p>Not SWH</p>
Sand Barrens						
<p>Rationale: Sand barrens are rare in Ontario and support rare species. Most Sand Barrens have been lost due to cottage development and forestry.</p>	<p>ELC Ecosites:</p> <p>SBO1 SBS1 SBT1</p> <p>Vegetation cover varies from patchy and barren to continuous meadow (SBO1), thicket-like (SBS1), or more closed and treed (SBT1). Tree cover always <60%.</p>	<p>Sand Barrens typically are exposed sand, generally sparsely vegetated and caused by lack of moisture, periodic fires and erosion. They have little or no soil and the underlying rock protrudes through the surface. Usually located within other types of natural habitat such as forest or savannah. Vegetation can vary from patchy and barren to tree covered but less than 60%.</p>	<p>Any sand barren area, >0.5ha in size.</p> <p>Information Sources</p> <ul style="list-style-type: none"> OMNRF Districts. Natural Heritage Information Center (NHIC) has location information on their website Field naturalist clubs Conservation Authorities 	<ul style="list-style-type: none"> Confirm any ELC Vegetation Type for Sand Barrens^{lxviii} Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics)^l. SWHMIST^{cxlix} Index #20 provides development effects and mitigation measures. 	<p>No sand barrens within the Study Area.</p> <p>Not SWH</p>	<p>No sand barrens within the Subject Lands.</p> <p>Not SWH</p>
Alvar						
<p>Rationale: Alvars are extremely rare habitats in Ecoregion 6E. Most alvars in Ontario are in Ecoregion 6E and 7E. Alvars in 6E are small and highly localized just north of the Palaeozoic-Precambrian contact.</p>	<p>ALO1 ALS1 ALT1 FOC1 FOC2 CUM2 CUS2 CUT2-1 CUW2</p> <p>Five Alvar</p> <p>Indicator Species: 1) Carex crawei 2) Panicum philadelphicum 3) Eleocharis compressa 4) Scutellaria parvula 5) Trichostema branchiatum</p> <p>These indicator species are very specific to Alvars within Ecoregion 6E</p>	<p>An alvar is typically a level, mostly unfractured calcareous bedrock feature with a mosaic of rock pavements and bedrock overlain by a thin veneer of soil. The hydrology of alvars is complex, with alternating periods of inundation and drought. Vegetation cover varies from sparse lichen-moss associations to grasslands and shrublands and comprising a number of characteristic or indicator plant. Undisturbed alvars can be phyto- and zoo geographically diverse, supporting many uncommon or are relict plant and animals species. Vegetation cover varies from patchy to barren with a less than 60% tree cover^{lxviii}.</p>	<p>An Alvar site > 0.5 ha in size^{lxv}.</p> <p>Information Sources</p> <ul style="list-style-type: none"> Alvars of Ontario (2000), Federation of Ontario Naturalists^{lxvii}. Ontario Nature – Conserving Great Lakes Alvars^{lxviii}. Natural Heritage Information Center (NHIC) has location information on their website Field Naturalist clubs Conservation Authorities 	<p>Field studies identify four of the five Alvar indicator species^{lxv}.^{cxlix} at a Candidate Alvar site is Significant.</p> <ul style="list-style-type: none"> Site must not be dominated by exotic or introduced species (<50% vegetative cover are exotics sp.). The alvar must be in excellent condition and fit in with surrounding landscape with few conflicting land uses^{lxv}. SWHMIST^{cxlix} Index #17 provides development effects and mitigation measures. 	<p>No alvars within the Study Area.</p> <p>Not SWH</p>	<p>No alvars within the Subject Lands.</p> <p>Not SWH</p>

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

Rare Vegetation Community ¹	Candidate SWH			Confirmed SWH	Study Area	Subject Lands
	ELC Ecosite Codes ¹	Habitat Description ¹	Detailed Information and Sources ¹	Defining Criteria ¹	Assessment Details	NRSI Observed (2018 and 2019)
Old Growth Forest						
<p>Rationale: Due to historic logging practices, extensive old growth forest is rare in the Ecoregion. Interior habitat provided by old growth forests is required by many wildlife species.</p>	<p>Forest Community Series: FOD FOC FOM SWD SWC SWM</p>	<p>Old Growth forests are characterized by heavy mortality or turnover of over-storey trees resulting in a mosaic of gaps that encourage development of a multi-layered canopy and an abundance of snags and downed woody debris.</p>	<p>Woodland Stands areas 30ha or greater in size or with at least 10 ha interior habitat assuming 100m buffer at edge of forest í.</p> <p>Information Sources</p> <ul style="list-style-type: none"> • OMNRF Forest Resource Inventory mapping • OMNRF Forester, Ecologist or Biologist • Field Local naturalist clubs • Conservation Authorities • Sustainable Forestry License (SFL) companies will possibly know locations through field operations. • Municipal forestry departments 	<p>Field Studies will determine:</p> <ul style="list-style-type: none"> • If dominant trees species of the ecosite are >140 years old, then stand is Significant Wildlife Habitat^{cxviii} • The stand will have experienced no recognizable forestry activities^{cxviii} • The area of Forest Ecosites combined to make up the stand is the SWH. • Determine ELC Vegetation Type for forest stand^{lxviii} • SWHDSS^{cxix} Index #23 provides development effects and mitigation measures. 	<p>No large old growth woodlots within the Study Area.</p> <p>Not SWH</p>	<p>No large old growth woodlots within the Subject Lands.</p> <p>Not SWH</p>
Savannah						
<p>Rationale: Savannahs are extremely rare habitats in Ontario.</p>	<p>TPS1 TPS2 TPW1 TPW2 CUS2</p>	<p>A Savannah is a tallgrass prairie habitat that has tree cover between 25 – 60%.</p>	<ul style="list-style-type: none"> • No minimum size to site • Site must be restored or a natural site. • Remnant sites such as railway right of ways are not considered to be SWH. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> • Natural Heritage Information Center (NHIC) has location information on their website • OMNRF Ecologists • Field naturalists clubs • Conservation Authorities 	<p>Field studies confirm one or more of the Savannah indicator species listed in^{lxv} Appendix N should be present. Note: Savannah plant spp. list from Ecoregion 6E should be used^{cxviii}.</p> <ul style="list-style-type: none"> • Area of the ELC Ecosite is the SWH. • Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics sp.). • SWHMIST^{cxix} Index #18 provides development effects and mitigation measures. 	<p>No savannahs within the Study Area.</p> <p>Not SWH</p>	<p>No savannahs within the Subject Lands.</p> <p>Not SWH</p>
Tallgrass Prairie						
<p>Rationale: Tallgrass Prairies are extremely rare habitats in Ontario.</p>	<p>TPO1 TPO2</p>	<p>A Tallgrass Prairie has ground cover dominated by prairie grasses. An open Tallgrass Prairie habitat has < 25% tree cover.</p>	<ul style="list-style-type: none"> • No minimum size to site • Site must be restored or a natural site. • Remnant sites such as railway right of ways are not considered to be SWH. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> • OMNR Districts • Natural Heritage Information Center (NHIC) has location information available on their website • Field naturalists clubs • Conservation Authorities 	<p>Field studies confirm one or more of the Prairie indicator species listed in^{lxv} Appendix N should be present. Note: Prairie plant spp. list from Ecoregion 6E should be used^{cxviii}.</p> <ul style="list-style-type: none"> • Area of the ELC Ecosite is the SWH • Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics). • SWHMIST^{cxix} Index #19 provides development effects and mitigation measures. 	<p>No tallgrass prairie within the Study Area.</p> <p>Not SWH</p>	<p>No tallgrass prairie within the Subject Lands.</p> <p>Not SWH</p>

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

Rare Vegetation Community ¹	Candidate SWH			Confirmed SWH	Study Area	Subject Lands
	ELC Ecosite Codes ¹	Habitat Description ¹	Detailed Information and Sources ¹	Defining Criteria ¹	Assessment Details	NRSI Observed (2018 and 2019)
Other Rare Vegetation Communities						
<p>Rationale: Plant communities that often contain rare species which depend on the habitat for survival.</p>	<p>Provincially Rare S1, S2 and S3 vegetation communities are listed in Appendix M of the SWHTG^{cxviii}. Any ELC Ecosite Code that has a possible ELC Vegetation Type that is Provincially Rare is Candidate SWH.</p>	<p>Rare Vegetation Communities may include beaches, fens, forest, marsh, barrens, dunes and swamps.</p>	<p>ELC Ecosite codes that have the potential to be a rare ELC Vegetation Type as outlined in appendix M^{cxviii}</p> <p>The OMNR/NHIC will have up to date listing for rare vegetation communities.</p> <p><u>Information Sources</u></p> <ul style="list-style-type: none"> • Natural Heritage Information Center (NHIC) has location information available on their website • OMNRF Districts • Field naturalists clubs • Conservation Authorities 	<p>Field studies should confirm if an ELC Vegetation Type is a rare vegetation community based on listing within Appendix M of SWHTG^{cxviii}.</p> <ul style="list-style-type: none"> • Area of the ELC Vegetation Type polygon is the SWH. • SWHMiST^{cxlix} Index #37 provides development effects and mitigation measures. 	<p>Vegetation community mapping (Ecological Land Classification) was completed by Stantec and Savanta for the Hunt Club Phase 3 Lands, and by NRSI for the Reszetrnik parcel in 2018. No rare vegetation communities were observed.</p> <p>Not SWH</p>	<p>Vegetation community mapping (Ecological Land Classification) was updated by NRSI in 2019. No rare vegetation communities were observed.</p> <p>Not SWH</p>

¹MNRF 2015b

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

	Wildlife Species ¹	Candidate SWH		Confirmed SWH	Study Area	Subject Lands
		ELC Ecosite Codes ¹	Habitat Criteria and Information Sources ¹	Defining Criteria ¹	Assessment Details	NRSI Observed (2018 and 2019)
Wildlife Habitat: Waterfowl Nesting Area						
<u>Rationale:</u> Important to local waterfowl populations, sites with greatest number of species and highest number of individuals are significant.	American Black Duck Northern Pintail Northern Shoveler Gadwall Blue-winged Teal Green-winged Teal Wood Duck Hooded Merganser Mallard	All upland habitats located adjacent to these wetland ELC Ecosites are Candidate SWH: MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 SWT1 SWT2 SWD1 SWD2 SWD3 SWD4 Note: includes adjacency to Provincially Significant Wetlands	A waterfowl nesting area extends 120m ^{cxviii} from a wetland (> 0.5 ha) or a wetland (>0.5ha) and any small wetlands (0.5ha) within 120m or a cluster of 3 or more small (<0.5 ha) wetlands within 120m of each individual wetland where waterfowl nesting is known to occur ^{cxix} . • Upland areas should be at least 120m wide so that predators such as raccoons, skunks, and foxes have difficulty finding nests. • Wood Ducks and Hooded Mergansers utilize large diameter trees (>40cm dbh) in woodlands for cavity nest sites. <u>Information Sources</u> • Ducks Unlimited staff may know the locations of particularly productive nesting sites. • OMNRF Wetland Evaluations for indication of significant waterfowl nesting habitat. • Reports and other information available from CAs	Studies confirmed: • Presence of 3 or more nesting pairs for listed species excluding Mallards, or • Presence of 10 or more nesting pairs for listed species including Mallards. • Any active nesting site of an American Black Duck is considered significant. • Nesting studies should be completed during the spring breeding season (April - June). Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" ^{ccxi} • A field study confirming waterfowl nesting habitat will determine the boundary of the waterfowl nesting habitat for the SWH, this may be greater or less than 120m ^{cxviii} from the wetland and will provide enough habitat for waterfowl to successfully nest. • SWHMiST ^{cxlix} Index #25 provides development effects and mitigation measures.	Suitable habitat for waterfowl nesting in the numbers required for this SWH type is not present within the Study Area. Not SWH	Suitable habitat for waterfowl nesting in the numbers required for this SWH type is not present within the Subject Lands. Not SWH
Wildlife Habitat: Bald Eagle and Osprey Nesting, Foraging and Perching Habitat						
<u>Rationale:</u> Nest sites are fairly uncommon in Eco-region 6E are used annually by these species. Many suitable nesting locations may be lost due to increasing shoreline development pressures and scarcity of habitat.	Osprey <u>Special Concern:</u> Bald Eagle	ELC Forest Community Series: FOD, FOM, FOC, SWD, SWM and SWC directly adjacent to riparian areas – rivers, lakes, ponds and wetlands	• Nests are associated with lakes, ponds, rivers or wetlands along forested shorelines, islands, or on structures over water. • Osprey nests are usually at the top a tree whereas Bald Eagle nests are typically in super canopy trees in a notch within the tree's canopy. • Nests located on man-made objects are not to be included as SWH (e.g. telephone poles and constructed nesting platforms). <u>Information Sources</u> • Natural Heritage Information Center (NHIC) compiles all known nesting sites for Bald Eagles in Ontario. • MNRF values information (LIO/NRVIS) will list known nesting locations. Note: data from NRVIS is provided as a point and does not represent all the habitat. • Nature Counts, Ontario Nest Records Scheme data. • OMNRF Districts • Sustainable Forestry License (SFL) companies will identify additional nesting locations through field operations. • Check the Ontario Breeding Bird Atlas ^{ccv} or Rare Breeding Birds in Ontario for species documented • Reports and other information available from CAs. • Field naturalists clubs	Studies confirm the use of these nests by: • One or more active Osprey or Bald Eagle nests in an area ^{cxviii} . • Some species have more than one nest in a given area and priority is given to the primary nest with alternate nests included within the area of the SWH. • For an Osprey, the active nest and a 300m radius around the nest or the contiguous woodland stand is the SWH ^{ccvii} , maintaining undisturbed shorelines with large trees within this area is important ^{cxviii} . • For a Bald Eagle the active nest and a 400-800m radius around the nest is the SWH ^{cv} , ccvii. Area of the habitat from 400-800m is dependent on site lines from the nest to the development and inclusion of perching and foraging habitat ^{cv} . • To be significant a site must be used annually. When found inactive, the site must be known to be inactive for >3 years or suspected of not being used for >5 years before being considered not significant ^{ccvii} . • Observational studies to determine nest site use, perching sites and foraging areas need to be done from mid March to mid August. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" ^{ccxi} • SWHMiST ^{cxlix} Index #26 provides development effects and mitigation measures	The wetlands and watercourses within the Study Area are not large enough to support Bald Eagle or Osprey. Not SWH	The wetlands and watercourses within the Subject Lands are not large enough to support Bald Eagle or Osprey. Not SWH

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

	Wildlife Species ¹	Candidate SWH		Confirmed SWH	Study Area	Subject Lands
		ELC Ecosite Codes ¹	Habitat Criteria and Information Sources ¹	Defining Criteria ¹	Assessment Details	NRSI Observed (2018 and 2019)
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 ^{ixooiii, looxix, xc, xc1, xciii, xciv, xcvi, cxoiii} . Interior habitat determined with a 200m buffer ^{cxviii} . • Stick nests found in a variety of intermediate-aged to mature conifer, deciduous or mixed forests within tops or crotches of trees. Species such as Cooper's hawk nest along forest edges sometimes on peninsulas or small off-shore islands. • In disturbed sites, nests may be used again, or a new nest will be in close proximity to old nest. <u>Information Sources</u> • OMNRF • Check the Ontario Breeding Bird Atlas ^{cxv} 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 ^{cxviii} . • Red-shouldered Hawk and Northern Goshawk – a 400m radius around the nest or 28ha area of habitat is the SWH ^{cxvii} . • Barred Owl – a 200m radius around the nest is the SWH ^{cxvii} . • Broad-winged Hawk and Coopers Hawk – a 100m radius around the nest is the SWH ^{cxvii} . • Sharp-shinned Hawk – a 50m radius around the nest is the SWH ^{cxvii} . • 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	Habitat of suitable size (>30ha) for woodland raptors is present within the Study Area, especially in the context of the larger landscape. Candidate SWH	Habitat of suitable size (>30ha) for woodland raptors is present within the Subject Lands. However, no nests were observed within the Subject Lands. Not SWH
Wildlife Habitat: Turtle Nesting Area						
Rationale: These habitats are rare and when identified will often be the only breeding site for local populations of turtles	Midland Painted Turtle <u>Special Concern:</u> Northern Map Turtle Snapping Turtle	Exposed mineral soil (sand or gravel) areas adjacent (<100m) ^{cxviii} or within the following ELC Ecosites: MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 BOO1 FEO1	• Best nesting habitat for turtles are close to water and away from roads and sites less prone to loss of eggs by predation from skunks, raccoons or other animals. • For an area to function as a turtle-nesting area, it must provide sand and gravel that turtles are able to dig in and are located in open, sunny areas. Nesting areas on the sides of municipal or provincial road embankments and shoulders are not SWH. • Sand and gravel beaches adjacent to undisturbed shallow weedy areas of marshes, lakes, and rivers are most frequently used. <u>Information Sources</u> • Use Ontario Soil Survey reports and maps to help find suitable substrate for nesting turtles (well-drained sands and fine gravels). • Check the Ontario Herpetofaunal Summary Atlas records or other similar atlases for uncommon turtles; location information may help to find potential nesting habitat for them. • Natural Heritage Information Center (NHIC) • Field Naturalist clubs and landowners	Studies confirm: • Presence of 5 or more nesting Midland Painted Turtles • One or more Northern Map Turtle or Snapping Turtle nesting is a SWH ^l • The area or collection of sites within an area of exposed mineral soils where the turtles nest, plus a radius of 30-100m around the nesting area dependent on slope, riparian vegetation and adjacent land use is the SWH ^{cxviii} . • 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.	Open areas within the Study Area may provide suitable nesting habitat. The agricultural fields and former aggregate extraction areas may provide suitable nesting areas for turtles within the Subject Lands. Candidate SWH	Turtle nesting surveys did not confirm SWH within the Subject Lands. Not SWH

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

	Wildlife Species ¹	Candidate SWH		Confirmed SWH	Study Area	Subject Lands
		ELC Ecosite Codes ¹	Habitat Criteria and Information Sources ¹	Defining Criteria ¹	Assessment Details	NRSI Observed (2018 and 2019)
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, cxlii, cxlv} <u>Information Sources</u> • Topographical Map • Thermography • Hydrological surveys conducted by CAs and MOE • Field naturalists clubs and landowners • Municipalities and Conservation Authorities may have drainage maps and headwater areas mapped.	Field Studies confirm: • Presence of a site with 2 or more seeps/springs should be considered SWH. • The area of a ELC forest ecosite containing the seeps/springs is the SWH. The protection of the recharge area considering the slope, vegetation, height of trees and groundwater condition need to be considered in delineation the habitat ^{cxviii} • SWHMiST ^{cxlix} Index #30 provides development effects and mitigation measures	Seeps/springs may be present within the Study Area. Candidate SWH	Seeps and Springs were not observed within the Subject Lands. 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) ^{cxviii} within or adjacent (within 120m) to a woodland (no minimum size) ^{cxviii, cxvii, cxvi, cxv, cxvii, cxviii, cxix, cxx} Some small wetlands may not be mapped and may be important breeding pools for amphibians. • Woodlands with permanent ponds or those containing water in most years until mid-July are more likely to be used as breeding habitat ^{cxviii} <u>Information Sources</u> • Ontario Herpetofaunal Summary Atlas (or other similar atlases) for records • Local landowners may also provide assistance as they may hear spring-time choruses of amphibians on their property. • OMNRF District • OMNRF wetland evaluations • Field naturalist clubs • Canadian Wildlife Service Amphibian Road Call Survey • Ontario Vernal Pool Association: http://www.ontariovernalpools.org	Studies confirm: • Presence of breeding population of 1 or more of the listed newt/salamander species or 2 or more of the listed frog species with at least 20 individuals (adults or eggs masses) ^{cxvii} or 2 or more of the listed frog species with Call Level Codes of 3. • A combination of observational study and call count surveys ^{cxvii} 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 ^{cxvii, cxvi, cxv, cxvii, cxviii, cxix, cxx} if a wetland area is adjacent to a woodland, a travel corridor connecting the wetland to the woodland is the be included in the habitat. • SWHMiST ^{cxlix} Index #14 provides development effects and mitigation measures.	Suitable habitat for woodland breeding amphibians may be present within the woodlands in the Study Area. Candidate SWH	Nighttime anuran call surveys concluded that no significant breeding habitat for anurans is present within the Subject Lands. No Ambystomatid (mole) salamander egg masses or other amphibian eggs were observed in wetlands within the Subject Lands during the habitat assessment in April, 2019. Suitable salamander breeding habitat was determined to be absent from within the Subject Lands. Not SWH

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

	Wildlife Species ¹	Candidate SWH		Confirmed SWH	Study Area	Subject Lands
		ELC Ecosite Codes ¹	Habitat Criteria and Information Sources ¹	Defining Criteria ¹	Assessment Details	NRSI Observed (2018 and 2019)
Wildlife Habitat: Amphibian Breeding Habitat (Wetland)						
Rationale: These habitats are extremely important to amphibian biodiversity within a landscape and often represent the only breeding habitat for local amphibian populations	Eastern Newt American Toad Spotted Salamander Four-toed Salamander Blue-spotted Salamander Gray Tree frog Western Chorus Frog Northern Leopard Frog Pickerel Frog Green Frog Mink Frog Bullfrog	ELC Community Classes SW, MA, FE, BO, OA and SA. Typically these wetland ecosites will be isolated (>120m) from woodland ecosites, however larger wetlands containing predominantly aquatic species (e.g. Bull Frog) may be adjacent to woodlands.	<ul style="list-style-type: none"> Wetlands >500m² (about 25m diameter)^{ccvii} supporting high species diversity are significant; some small or ephemeral habitats may not be identified on MNRF mapping and could be important amphibian breeding habitats^{cbxxiv}. Presence of shrubs and logs increase significance of pond for some amphibian species because of available structure for calling, foraging, escape and concealment from predators. Bullfrogs require permanent water bodies with abundant emergent vegetation. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> Ontario Herpetofaunal Summary Atlas (or other similar atlases) Canadian Wildlife Service Amphibian Road Surveys and Backyard Amphibian Call Count. OMNRF Districts and wetland evaluations Reports and other information available from CAs. 	<p>Studies confirm:</p> <ul style="list-style-type: none"> Presence of breeding population of 1 or more of the listed newt/salamander species or 2 or more of the listed frog/toad species and with at least 20 individuals (adults or eggs masses)^{ccxi, ccxlii}, 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^{ccviii} 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^{cclix} Index #15 provides development 	Wetlands which may support this SWH are not present within the Study Area. Not SWH	Nighttime anuran call surveys concluded that no significant breeding habitat for anurans is present within the Subject Lands. No suitable habitat for salamanders is present. Not SWH
Woodland Area-Sensitive Bird Breeding Habitat						
Rationale: Large, natural blocks of mature woodland habitat within the settled areas of Southern Ontario are important habitats for area sensitive interior forest song birds.	Yellow-Bellied Sapsucker Red-breasted Nuthatch Veery Blue-headed Vireo Northern Parula Black-throated Green Warbler Blackburnian Warbler Black-throated Blue Warbler Ovenbird Scarlet Tanager Winter Wren Special Concern: Cerulean Warbler Canada Warbler	All Ecosites associated with these ELC Community Series: FOC FOM FOD SWC SWM SWD	<ul style="list-style-type: none"> Habitats where interior forest breeding birds are breeding, typically large mature (>60 yrs old) forest stands or woodlots >30 ha.^{cv, ccxxi, ccxxii, ccxxiii, ccxxiv, ccxxv, ccxxvi, ccxxvii, ccxxviii, ccxxix, cxi, cxli, cxlii, cxliii, cxliv, cxlv, cxlvi, cl, cli, clii, cliii, cliv, clv, clvi, cxlviii, cxlix} Interior forest habitats are at least 200m from forest edge habitat. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> Local bird clubs Canadian Wildlife Service (CWS) for the location of forest bird monitoring. Bird studies Canada conducted a 3-year study of 287 woodlands to determine the effects of forest fragmentation on forest birds and to greatest value to interior species Reports and other information available from CAs. 	<ul style="list-style-type: none"> Presence of nesting or breeding pairs of 3 or more of the listed wildlife species. Note: any site with breeding Cerulean Warblers or Canada Warblers is to be considered SWH. Conduct field investigations in spring and early summer when birds are singing and defending their territories. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"^{ccxi} SWHMIST^{cclix} Index #34 provides development effects and mitigation measures. 	Woodlands within the Study Area may provide suitable habitat for woodland area-sensitive breeding birds. Candidate SWH	Breeding Bird Surveys within the Subject Lands did not document nesting or breeding pairs of 3 or more of the listed species. Not SWH

¹MNRF 2015b

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

	Wildlife Species ¹	Candidate SWH	Confirmed SWH	Study Area	Subject Lands	
		ELC Ecosite Codes ¹	Habitat Criteria and Information Sources ¹	Defining Criteria ¹	Assessment Details	NRSI Observed (2018 and 2019)
Wildlife Habitat: Marsh Bird Breeding Habitat						
Rationale: Wetlands for these bird species are typically productive and fairly rare in Southern Ontario landscapes.	American Bittern Virginia Rail Sora Common Gallinule American Coot Pied-billed Grebe Marsh Wren Sedge Wren Common Loon Sandhill Crane Green Heron Trumpeter Swan <u>Special Concern:</u> Black Tern Yellow Rail	MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 SAS1 SAM1 SAF1 FEO1 BOO1 For Green Heron: All SW, MA and CUM1 sites.	<ul style="list-style-type: none"> Nesting occurs in wetlands All wetland habitat is to be considered as long as there is shallow water with emergent aquatic vegetation present^{ccxv}. 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. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> Contact OMNRF, wetland evaluations are a good source of information. Field naturalists clubs Natural Heritage Information Center (NHIC) Records Reports and other information available from CAs. Ontario Breeding Bird Atlas^{ccv} 	<p>Studies confirm:</p> <ul style="list-style-type: none"> Presence of 5 or more nesting pairs of Sedge Wren or Marsh Wren or 1 pair of Sandhill Cranes; or breeding by any combination of 5 or more of the listed species¹. Note: any wetland with breeding of 1 or more Black Terns, Trumpeter Swan, Green Heron or Yellow Rail is SWH¹. Area of the ELC ecosite is the SWH Breeding surveys should be done in May/June when these species are actively nesting in wetland habitats. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"^{ccxi}. SWHMIST^{cxlix} Index #35 provides development effects and mitigation measures. 	Marsh habitats within the Study Area are not large enough to support this SWH. Not SWH	The marsh habitats within the Subject Lands are not large enough to support this SWH. Not SWH
Wildlife Habitat: Open Country Bird Breeding Habitat						
Rationale: This wildlife habitat is declining throughout Ontario and North America. Species such as the Upland Sandpiper have declined significantly the past 40 years based on CWS (2004) trend records.	Upland Sandpiper Grasshopper Sparrow Vesper Sparrow Northern Harrier Savannah Sparrow <u>Special Concern:</u> Short-eared Owl	CUM1 CUM2	<p>Large grassland areas (includes natural and cultural fields and meadows) >30 ha^{cxix, cxix, cxix, cxix, cxix, cxix, cxix, cxix, cxix, cxix}. Grasslands not Class 1 or 2 agricultural lands, and not being actively used for farming (i.e. no row cropping or intensive hay or livestock pasturing in the last 5 years)¹.</p> <p>Grassland sites considered significant should have a history of longevity, either abandoned fields, mature hayfields and pasturelands that are at least 5 years or older.</p> <p>The Indicator bird species are area sensitive requiring larger grassland areas than the common grassland species.</p> <p><u>Information Sources</u></p> <ul style="list-style-type: none"> Agricultural land classification maps, Ministry of Agriculture. Ask local birders Ontario Breeding Bird Atlas^{ccv} Reports and other information available from CAs. 	<p>Field Studies confirm:</p> <ul style="list-style-type: none"> Presence of nesting or breeding of 2 or more of the listed species. A field with 1 or more breeding Short-eared Owl is to be considered SWH. The area of SWH is the contiguous ELC ecosite field areas. Conduct field investigations of the most likely areas in spring and early summer when birds are singing and defending their territories. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"^{ccxi}. SWHMIST^{cxlix} Index #32 provides development effects and mitigation measures. 	Large fallow fields or grasslands of suitable size and composition are not present within the Study Area. Not SWH	Large fallow fields or grasslands of suitable size and composition are not present within the Subject Lands. Not SWH

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

	Wildlife Species ¹	Candidate SWH		Confirmed SWH	Study Area	Subject Lands
		ELC Ecosite Codes ¹	Habitat Criteria and Information Sources ¹	Defining Criteria ¹	Assessment Details	NRSI Observed (2018 and 2019)
Wildlife Habitat: Shrub/Early Successional Bird Breeding Habitat						
<p>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 cxix.</p>	<p>Indicator spp.: Brown Thrasher Clay-coloured Sparrow</p> <p>Common spp.: Field Sparrow Black-billed Cuckoo Eastern Towhee Willow Flycatcher</p> <p>Special Concern: Yellow-breasted Chat Golden-winged Warbler</p>	<p>CUT1 CUT2 CUS1 CUS2 CUW1 CUW2</p> <p>Patches of shrub ecosites can be complexed into a larger habitat for some bird species.</p>	<p>Large field areas succeeding to shrub and thicket habitats >10ha^{cxiv} in size.</p> <p>• 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)¹.</p> <p>Shrub thicket habitats (>10 ha) are most likely to support and sustain a diversity of these species^{cxviii}.</p> <p>Shrub and thicket habitat sites considered significant should have a history of longevity, either abandoned fields or pasturelands.</p> <p>Information Sources</p> <ul style="list-style-type: none"> • Agricultural land classification maps Ministry of Agriculture Local bird clubs • Ontario Breeding Bird Atlas^{ccv} • Reports and other information available from CAs 	<p>Field Studies confirm:</p> <ul style="list-style-type: none"> • Presence of nesting or breeding of 1 of the indicator species and at least 2 of the common species¹. • 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. 	<p>Early successional fields or large thicket habitats of suitable size are not present within the Study Area.</p> <p>Not SWH</p>	<p>Early successional fields or large thicket habitats of suitable size are not present within the Subject Lands.</p> <p>Not SWH</p>
Wildlife Habitat: Terrestrial Crayfish						
<p>Rationale: Terrestrial Crayfish are only found within SW Ontario in Canada and their habitats are very rare.^{ccii}</p>	<p>Chimney or Digger Crayfish: (<i>Fallicambarus fodiens</i>)</p> <p>Devil Crawfish or Meadow Crayfish: (<i>Cambarus Diogenes</i>)</p>	<p>MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 MAS1 MAS2 MAS3 SWD SWT SWM</p>	<p>Wet meadow and edges of shallow marshes (no minimum size) identified should be surveyed for terrestrial crayfish.</p> <ul style="list-style-type: none"> • 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. <p>Information Sources</p> <ul style="list-style-type: none"> • Information sources from "Conservation Status of Freshwater Crayfishes" by Dr. Premek Hamr for the WWF and CNF March 1998 	<p>Studies Confirm:</p> <ul style="list-style-type: none"> • Presence of 1 or more individuals of species listed or their chimneys (burrows) in suitable marsh meadow or terrestrial sites^{ccii} • 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 <p>Note the presence of burrows or chemistry are often the only indicator of presence, observation or collection of individuals is very difficult^{ccii}</p> <ul style="list-style-type: none"> • SWHMIST^{cxlix} Index #36 provides development effects and mitigation measures. 	<p>Shallow marsh habitats are present within the Study Area and within the Subject Lands.</p> <p>Candidate SWH</p>	<p>Several Terrestrial Crayfish chimneys were observed by NRSI within the Subject Lands.</p> <p>Confirmed SWH</p>
Wildlife Habitat: Special Concern and Rare Wildlife Species						
<p>Rationale: These species are quite rare or have experienced significant population declines in Ontario.</p>	<p>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.</p>	<p>All plant and animal element occurrences (EO) within a 1 or 10km grid.</p> <p>Older element occurrences were recorded prior to GPS being available, therefore location information may lack accuracy.</p>	<p>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^{bcviii}.</p> <p>Information Sources</p> <ul style="list-style-type: none"> • 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. 	<p>Studies Confirm:</p> <ul style="list-style-type: none"> • 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 	<p>Several Species of Conservation Concern (Special Concern or S Ranks S1-S3) may be present within the Study Area (for more information see the species lists).</p> <p>Candidate SWH</p>	<p>Species of Conservation Concern (Special Concern or S Ranks S1-S3) were confirmed by NRSI to be present within the Subject Lands (for more information see the species lists).</p> <p>Confirmed SWH</p>

¹MNRF 2015b

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

	Wildlife Species ¹	Candidate SWH		Confirmed SWH	Study Area	Subject Lands
		ELC Ecosite Codes ¹	Habitat Criteria and Information Sources ¹	Defining Criteria ¹	Assessment Details	NRSI Observed (2018 and 2019)
Wildlife Habitat: Amphibian Movement Corridors						
<p>Rationale: Movement corridors for amphibians moving from their terrestrial habitat to breeding habitat can be extremely important for local populations.</p>	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 ^{cbxxiv, cbxxv, cbxxvi, cbxxvii, cbxxviii, cbxxix, cbxxx, cbxxxi} . 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 ¹ . <u>Information Sources</u> • MNRF District Office • Natural Heritage Information Center NHIC • Reports and other information available from CAs • Field Naturalist Clubs	• Field Studies must be conducted at the time of year when species are expected to be migrating or entering breeding sites. • Corridors should consist of native vegetation, with several layers of vegetation. Corridors unbroken by roads, waterways or bodies, and undeveloped areas are most significant ^{cbxix} . • Corridors should have at least 15m of vegetation on both sides of waterway ^{cbxix} or be up to 200m wide ^{cbxix} of woodland habitat and with gaps <20m ^{cbxix} . • Shorter corridors are more significant than longer corridors, however amphibians must be able to get to and from their summer and breeding habitat ^{cbxix} . • SWHMiST ^{cbxix} Index #40 provides development effects and mitigation measures.	Wetlands which may support this SWH are not present within the Study Area, therefore, movement corridors are not present. Not SWH	No significant Amphibian Breeding Habitat (wetland) is present within the Subject Lands. Not SWH
Wildlife Habitat: Deer Movement Corridors						
<p>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.</p>	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 ¹ . • 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 ^{cbxxii, cbxxiii, cbxxix, cbxciv} . • Corridors typically follow riparian areas, woodlots, areas of physical geography (ravines, or ridges). <u>Information Sources</u> • MNRF District Office • Natural Heritage Information Center (NHIC) • Reports and other information available from CAs • Field Naturalist Clubs	• Studies must be conducted at the time of year when deer are migrating or moving to and from winter concentration areas. • Corridors that lead to a deer wintering yard should be unbroken by roads and residential areas. • Corridors should be at least 200m wide ^{cbxix} with gaps <20m ^{cbxix} and if following riparian area with at least 15m of vegetation on both sides of waterway ^{cbxix} . Shorter corridors are more significant than longer corridors ^{cbxix} . • SWHMiST ^{cbxix} Index #39 provides development effects and mitigation measures.	The MNRF has mapped the southern and eastern woodlands within the subject lands as Stratum II deer wintering areas, therefore it is possible that a movement corridor is present within the Subject Lands. Candidate SWH	Heavy White-tailed Deer movement was observed along Middle Creek within the forested areas during winter wildlife surveys. However movement studies were not completed during fall or spring migration. Candidate SWH

¹MNRF 2015b

Appendix IV

Terms of Reference and Agency Comments



October 4, 2019

Project 2204A

To: John Brum, Grand River Conservation Authority
Bryan Cooper, City of Cambridge
Matt Blevins, City of Cambridge
Kathy Padgett, City of Cambridge
Sylvia Rafalski-Misch, Region of Waterloo

Re: Hunt Club Phase 5, Cambridge: Environmental Impact Study - Terms of Reference

On behalf of Hunt Club Valley Inc., T. Johns Consulting Group, and Natural Resource Solutions Inc. (NRSI), I am pleased to provide the following Terms of Reference (TOR) for an Environmental Impact Study (EIS) for the lands at the southeast corner of Maple Grove Road and Speedsville Road in Cambridge, Ontario. The Subject Lands, referred to as Hunt Club Phase 5, include two separate parcels; a northern parcel, which was recently purchased by the client, and a southern parcel (Map 1), previously included in the Hunt Club Phase 3 lands.

Project Background

Hunt Club Valley Inc. is proposing a residential subdivision development, with low, medium, and high-density blocks, as well as some commercial areas, on the Subject Lands. The proposed development will be an extension of the Hunt Club Valley Inc. subdivision currently under construction south and east of the Subject Lands, and will include a new municipal road connecting Speedsville Road and Equestrian Way. The designation for these lands in the City of Cambridge Official Plan (2018a) is Future Urban Reserve, Natural Open Space, and Low/Medium Density residential. The zoning classifications of the Subject Lands are currently OS1 (environmentally significant and conservation areas), A1 (agricultural farm), RM3 (apartment house), and RR1 (rural non-farm-related dwellings outside settlements) (City of Cambridge 2018a). Therefore, the proposed development will require Official Plan and Zoning By-law amendments.

A pre-consultation meeting was held at Cambridge City Hall on January 31, 2019 to discuss the requirements of the Draft Plan of Subdivision and related planning applications. In addition to the study team, staff from the City of Cambridge, Region of Waterloo, Grand River Conservation Authority (GRCA), and the school boards were in attendance at the meeting.

Natural features within and adjacent to the Subject Lands include Middle Creek, wetlands that form part of the Maple Grove Road Provincially Significant Wetland (PSW) Complex, and woodlands (Map 1). The creek and wetlands are regulated by the GRCA under *Ontario Regulation 150/06* (2006). Collectively, these natural features are identified as Core Environmental Features by the Region of Waterloo (2015) and the City of Cambridge (2018a). Development Applications for lands adjacent to these natural features trigger the requirement for an EIS by the GRCA, Region of Waterloo, and City of Cambridge.

NRSI completed a natural information background review as well as preliminary field investigations on the northern parcel in 2018 to support Hunt Club Valley Inc.'s due diligence studies and ultimate purchase of the property. The information gathered through the

background information review and field investigations will be incorporated into the current EIS to provide additional data to the impact analysis.

This TOR outlines the steps required to complete the EIS and Detailed Vegetation Management Plan (DVMP) for the proposed development in accordance with the GRCA Environmental Impact Study Guidelines and Submission Standards for Wetlands (2005), the Region of Waterloo Greenlands Network Implementation Guideline (2016), the City's Tree Management Policies and Guidelines for New Developments (2002), Tree Preservation By-law (2018b), and the City's Official Plan (City of Cambridge 2018a). The following work plan consists of three phases: 1) background information review; 2) natural resource characterization, and; 3) impact analysis and EIS report. Each of these study components is described in separate sections below.

Associated Studies

To ensure a fulsome analysis of potential environmental impacts and to meet both the City's and GRCA's EIS requirements, several engineering studies 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 and DVMP. Technical support work will include:

- Hydrogeology Study,
- Servicing and Stormwater Management Report,
- Surveying and Topography,
- Planning

The hydrogeology study will include a detailed program with monitoring conducted on a monthly basis to inform a wetland water balance. This information will be used to confirm various design aspects of the 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.

1. Background Information Review

The background information review for this study will focus on characterizing the physical and biological features of the Subject Lands and Study Area. While "Subject Lands" refers to the lands owned by the proponent, the "Study Area" includes the adjacent lands up to approximately 120m (Map 1). The extent of each study component is described below along with the approach to characterization.

Collection and Review of Background Information

NRSI collected existing background information on the biological features for the Subject Lands and Study Area, for review. This includes rare species/community information from the following sources:

- City of Cambridge Official Plan (2018a);
- Region of Waterloo Official Plan (2015);
- Hespeler West Subwatershed Study (HWSS) Summary Report (City of Cambridge 2004);

- Environmental Impact Study for the Hunt Club Valley Inc. and Arriscraft Lands (Savanta Inc. 2012);
- MNRF Species at Risk (SAR) List for Waterloo Region (2018);
- MNRF SAR list for the City of Cambridge (2019);
- GRCA – Grand River Conservation Network: Interactive Mapping Tool (2016);
- MNRF Make A Map: Natural Heritage Areas online mapping tool (MNRF 2014);
- Government of Canada Species at Risk Act (SARA) Registry (2011);
- Ontario Breeding Bird Atlas (BSC et al. 2008);
- Ontario Reptile and Amphibian Atlas (ORAA) (Ontario Nature 2019);
- Atlas of the Mammals of Ontario (Dobbyn 1994);
- Fisheries and Oceans Canada - Aquatic SAR Mapping (2018);
- Ontario Butterfly Atlas (MacNaughton et al. 2019);
- Ontario Odonata Atlas (2019).

The wildlife and insect atlases listed above provide data based on 10x10km survey squares. Information was compiled from the atlas square that overlaps the Subject Lands (square 17NJ50).

In addition, specific natural heritage background information was requested from the MNRF Guelph District Office and the GRCA. NRSI received background information confirming the absence of regulated Species at Risk (SAR) habitat on the northern parcel from the MNRF on July 25, 2018 (G. Buck, pers. comm. 2018). NRSI received additional background information for the Study Area from the MNRF on March 10, 2019. This additional information was considered in the development of the work plan. All background information, including the data collected by NRSI during 2018 field surveys on the northern parcel, and data from the GRCA will be integrated into the EIS.

Initial wildlife species lists for the area were developed using these background sources and informed a desktop screening exercise to determine the potential for SAR and Species of Conservation Concern (SCC) to occur within or adjacent to the Subject Lands (Appendix I). Based on available background information, a desktop Significant Wildlife Habitat (SWH) screening exercise was also completed (Appendix II) to identify a preliminary list of candidate SWH types (MNR 2000, MNRF 2015b) which may be present on the Subject Lands, and which will be assessed through the proposed field program. The SWH screening also took into account information gathered on the northern parcel as part of NRSI's 2018 field surveys.

2. Natural Resource Characterization

A multi-season (winter, spring, summer, fall) field inventory program was developed to include assessment of species and habitats present within the Subject Lands. Inventories of wildlife and vegetation on the Subject Lands and adjacent habitats will include the following specific surveys:

Vegetation Community Mapping

The vegetation communities within the northern parcel of the Subject Lands were previously characterized and mapped by NRSI on June 12, 2018. The remainder of the Subject Lands

were characterized and mapped by NRSI on May 7 and 13, 2019. The vegetation community characterization and mapping in 2019 refined the 2018 work as well as data and mapping from Savanta from 2012. The Ecological Land Classification (ELC) for southern Ontario (Lee et al. 1998) method will be used. Details on the vegetation communities will be recorded including species composition, dominance, uncommon species or features, etc.

Vascular Flora Inventories

Vascular flora inventories were previously completed by NRSI for the northern parcel on June 12, 2018. NRSI completed a comprehensive three-season vascular plant inventory for the entire Subject Lands on May 7, 13, 31, July 4, and September 30, 2019. This included a detailed inventory of plant species in the spring (May to early June), summer (late June to early August), and fall (mid-August to early October). Particular focus was placed on surveying for SAR plant species that have been identified as potentially having suitable habitat within the Subject Lands (see the SAR and SCC screening in Appendix I). The locations of any rare species (i.e. Butternuts (*Juglans cinerea*)) were recorded with a handheld GPS unit.

Tree Inventory

A comprehensive tree inventory will be completed by Certified Arborists in October 2019, accounting for trees ≥ 10 cm diameter-at-breast-height (DBH) within the proposed development blocks on the subject property, and perimeter trees that may be in public Rights-of-Way (ROW). Each inventoried tree will be marked with an aluminum forestry tag and its location will be recorded along with the following information:

- Species,
- DBH measurement (cm),
- Crown radius (m),
- Overall health (excellent, good, fair, poor, very poor, dead),
- Potential for structural failure (improbable, possible, probable, imminent),
- General comments (i.e. disease, aesthetic quality, development constraints, sensitivity to development).

Trees within dense plantation areas, such as north of Middle Creek, will not be inventoried individually but will be tallied by species and diameter class, and general characteristics of the stand will be noted. This information will be used to prepare a DVMP that will be appended to the EIS and will summarize the findings of the tree inventory and compare tree layout to the proposed site plan.

Wetland and Woodland Boundary Delineation and Mapping

The boundaries of both wetlands and woodland in the Subject Lands were flagged in the field by qualified staff. The wetland boundaries were identified on August 13 and 14, 2019 by Ontario Wetland Evaluation System (OWES) certified staff, using the OWES protocols. The woodland driplines were also flagged on August 13 and 14, 2019. The flagged boundaries were subsequently reviewed in the field with GRCA, City of Cambridge and Region of Waterloo staff on August 19 and September 23, 2019.

Breeding Bird Surveys

Breeding Bird Surveys were conducted by NRSI for the northern parcel on June 7, 20, and July 3, 2018. In 2019, NRSI completed three early morning breeding bird surveys following the Ontario Breeding Bird Atlas methods (OBBA 2001) on May 31, June 17, and July 4, 2019.

Surveys were completed during suitable weather conditions and surveys were conducted at least 10 days apart. Survey stations were located in all representative habitats within the Subject Lands, and observers recorded standard breeding evidence for all birds observed. These surveys, along with habitat characterization, will allow for the identification of any SAR bird species, as well as any SWH present within or adjacent to the Subject Lands.

Common Nighthawk Surveys

The MNRF SAR list for the City of Cambridge (2019) indicates Common Nighthawk (*Chordeiles minor*) may occur in/around the City. This species is also reported by the Ontario Breeding Bird Atlas as being present within 1km of the Subject Lands (BSC et al. 2008). Common Nighthawk surveys were completed in 2018 and 2019 following the MNRF Guelph District protocol (MNRF 2013), which recommends conducting three surveys, consisting of 10-minute counts at point stations, between late May and early July that occur just before dusk. Three Common Nighthawk surveys were conducted by NRSI on May 31, June 11 and 20, 2018 in the northern parcel. NRSI completed surveys on June 26, July 3, and July 5, 2019 on the southern parcel to identify if nesting habitat is present and if this species is using this parcel. No Common Nighthawk individuals were observed in either year.

Turtle Nest and Nesting Surveys

Background information indicates that Blanding's Turtle (*Emydoidea blandingii*) and Snapping Turtle (*Chelydra serpentina serpentina*) have been documented in the vicinity of the Study Area (MNRF 2018d, MNRF 2019, Ontario Nature 2019). NRSI biologists identified areas potentially suitable for turtle nesting within the Subject Lands. Although correspondence from the MNRF confirmed that Regulated Habitat for Blanding's Turtle is not present on the northern parcel (G. Buck pers. comm. 2018), this does not negate the potential for turtle species to be present. Turtle nest and nesting surveys were completed in 2018 by NRSI on the northern parcel. No turtle nests were observed. Surveys were completed on June 19, 20, 26, and July 3 and 5, 2019 on the southern parcel. In either year. These surveys were conducted on warm, humid evenings between 1800hrs and 2200hrs during the three-week turtle nesting period (commencing after turtle nesting had been confirmed in the area), following the Blanding's Turtle Nest and Nesting Survey Guidelines developed by the MNRF - Guelph District (2016).

Snake Surveys

Potential snake habitat is present within the Subject Lands for Eastern Ribbonsnake (*Thamnophis sauritus septentrionalis*) (MNRF 2018d, MNRF 2019, Ontario Nature 2019). Snake boards were placed and monitored on the northern parcel in 2018. Snake boards, labeled with NRSI's contact information were also placed on the southern parcel in 2019. Cover boards were checked on May 7, May 31, June 17, and July 4, 2019. Visual encounter surveys (VES), following the MNRF Survey Protocol for Ontario's Species at Risk Snakes (2016), were completed during all site visits when the environmental conditions are suitable. All species found were identified and recorded.

Salamander Surveys

Habitat for Jefferson Salamander (*Ambystoma jeffersonianum*) or Unisexual Ambystoma Jefferson dependent population (*Ambystoma laterale - (2) jeffersonianum*) may occur within the Subject Lands (MNRF 2018d, MNRF 2019, Ontario Nature 2019). Correspondence from the MNRF in 2018 indicated that Regulated Habitat for Jefferson Salamander is not present on the northern parcel (G. Buck pers. comm. 2018). However, this does not negate the potential for this species to be present. A survey to identify potential habitat and search for salamander egg mass was conducted on April 23, 2019 to determine if salamander breeding is occurring in the

area. One pond was identified as potentially providing suitable habitat; however, no salamander egg masses were observed.

Anuran Call Surveys

To determine whether habitat for Western Chorus Frog (Great Lakes/St. Lawrence - Canadian Shield Population) (*Pseudacris triseriata pop. 2*) or SWH for breeding anurans (frog and toad) may occur within the Subject Lands, anuran point count surveys were conducted. These surveys were completed at monitoring stations located in suitable habitats throughout the Subject Lands. In accordance with the Marsh Monitoring Program protocol (BSC 2009), three night-time surveys were conducted in all representative habitats between mid-April and mid-June when the air temperatures (at least one-half hour after sunset) are $>5^{\circ}\text{C}$, $>10^{\circ}\text{C}$ and $>17^{\circ}\text{C}$, respectively. Surveys were a minimum of 15 days apart, and were conducted on April 30, May 15, and June 25, 2019.

Bat Cavity Surveys

The SAR screening identified the potential for Eastern Small-footed Myotis (*Myotis leibii*), Northern Myotis (*Myotis septentrionalis*), Little Brown Myotis (*Myotis lucifungus*), and Tri-colored Bat (*Perimyotis subflavus*) to occur in the study area. A survey for suitable cavity trees for bat maternity roosting was completed within potential areas of development during the leaf-off period on May 7, 2019, following the MNRF Survey Protocol for Species at Risk Bats within Treed Habitats (2017). Information considered (and recorded, where applicable) for cavity trees included tree species, location, diameter at breast height (DBH), canopy cover, tree height, decay class according to Watt and Caceres (1999), and number of potentially suitable cavities. In addition, it was determined that there are suitable oak and/or maple trees within the potential areas of development of the Subject Lands; therefore, surveys for suitable roosts for Tri-coloured bat will be conducted during the leaf-on period in the early fall.

American Badger Habitat Surveys

Correspondence from the MNRF in 2018 indicated that Regulated Habitat for American Badger (*Taxidea taxus jacksoni*) is not present on the northern parcel (G. Buck pers. comm. 2018); however, suitable habitat for this species may occur within the Subject Lands. American Badger surveys consist of a minimum of two site visits, with one occurring in the spring before vegetation impedes visual searches, and one in the summer when badger activity is at its peak (K. Diemer pers. comm. 2016).

Transects through the Subject Lands were walked to survey for any potential burrows/dens greater than 15 cm, as well as other signs such as scat, tracks, or fur. Transects were spaced no greater than 20m apart, and particular attention was focused on clearing edges. No potential dens were found.

Winter Mammal Track Surveys

The wooded habitats within the Subject Lands have been identified by the MNRF as SWH – Stratum II deer wintering areas (MNRF 2015a). When significant wintering areas for White-tailed Deer (*Odocoileus virginianus*) are identified, significant deer movement corridors may also be present. In order to identify whether there are significant movement corridors within the Subject Lands, three winter site visits were completed to survey for tracks and record habitat use and movement patterns by deer within the Subject Lands. These surveys were completed following snowfall events when tracks were fresh, on January 17, February 1 and 15, 2019.

Insect Surveys

Area searches designed specifically for the Yellow-banded Bumble Bee (*Bombus terricola*), a provincially and federally listed species of Special Concern with records in the City of Cambridge (MNR 2019), occurred in July and August on July 2, July 24, and August 12, 2019. At the recommendation of the MNR, surveys followed the Rusty-patched Bumble Bee Survey Protocol (Colla and Taylor-Pindar 2011) and will occur during suitable survey conditions (i.e. warm, sunny, and little wind).

Odonata (dragonflies and damselflies) and Lepidoptera (butterflies and moths) observed were also surveyed for during these insect surveys, as well as on Jun 18, and during all field surveys. Surveys occurred during favourable weather (i.e. warm, sunny, and little to no wind) in the mid-morning to early afternoon. Additionally, surveys to determine habitat for locally and provincially significant species (e.g. Monarch (*Danaus plexippus*), Tawny Emperor (*Asterocampa clyton*)) are present within the Subject Lands occurred in conjunction with vascular floral surveys.

Aquatic Habitat Characterization

An Aquatic Biologist from NRSI completed a habitat characterization in Middle Creek on July 29, 2019. This involved walking upstream through the creek, and recording the following information:

- Substrate type,
- Channel geometry including, depth, wetted width, bankfull width, etc.,
- Water temperature,
- Dissolved oxygen,
- pH, conductivity and total dissolved solids,
- General bank stability,
- Riparian and aquatic vegetation,
- Cover type and quality, and
- Flow conditions.

Detailed sketches of the assessed reaches were also completed and site photos were taken. Given that Middle Creek has been reported as both a warm-water (MNR 2019) and possibly cool/cold water (Savanta 2012) creek, data loggers have been used to record continuous water temperatures. Loggers were installed on April 1, 2019 and will be removed in late fall, 2019.

Fish Community Assessment

Electrofishing was also conducted on July 29, 2019 by NRSI's aquatic biologists in Middle Creek to document the fish community that is present. NRSI received a Licence to Collect Fish for Scientific Purposes from the MNR Guelph District. This permit is required before fish community sampling can be conducted. The Ontario Stream Assessment Protocol (OSAP) (Stanfield 2017) standard single pass method was utilized.

Incidental Wildlife

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

3. Impact Analysis and EIS Report

Data Analysis

Significant biological features will be identified based on current species and habitat status listings. This includes national, provincial, regional and local rarity. As well, the significance of species and habitats will be documented based on current ecological trends, research and professional experience/expertise, and the SWH Criteria Schedules for Ecoregion 6E (MNR 2000, MNRF 2015b) as well as input from local agency staff.

The integrated database and mapping of natural features and functions within the area will form the basis of the analysis of opportunities and constraints and will identify the limit of development from a natural heritage perspective. Implications of natural features based on current Policies and regulations will be identified, including the City of Cambridge Official Plan (2018a), Region of Waterloo Official Plan (2015), GRCA Regulation 150/06 (GRCA 2015), the Provincial Policy Statement (MMAH 2005) and the *Endangered Species Act* (2007).

NRSI will work with the project team to refine the development concept in a manner that avoids impacts to natural features and is consistent with relevant natural heritage policies.

Impact Analysis

Various aspects of the development, such as planning, servicing, stormwater management, geological and hydrogeological conditions, and trails, will be reviewed and integrated into the impact analysis. The analysis of impacts will be divided into:

- Direct impacts associated with disruption or displacement caused by the actual proposed 'footprint' of the undertaking.
- Indirect impacts associated with the construction of the project.
- Induced impacts associated with the ongoing recreational use of the area, particularly disturbance to wildlife.

Direct Impacts

The approach to identifying and delineating constraint areas will be used to avoid direct impacts from the development on important natural features. The delineation of natural features, with buffers, will be provided to the study team to assist in determining the layout of the proposed development.

Indirect Impacts

The approach to assessing the potential for indirect impacts will include an integrated analysis of proposed management of the natural features on the Subject Lands in conjunction with neighbouring lands. For the purposes of identifying potential indirect impacts, the analysis will be divided into the following:

- Sediment and erosion
This section will focus on examining potential impacts associated with stormwater management. Sediment control measures will be identified to protect wetland and woodland habitats during development.
- Changes to groundwater and surface water flow patterns
This section of the impact analysis will focus on potential changes to the flow patterns and quantity of groundwater and surface water that currently supply the

wetlands and creek on the subject property. This analysis will be based on a water balance produced by the project team hydrogeologist.

- Changes to groundwater and surface water quality
This section of the impact analysis will focus on examining potential impacts associated with stormwater management, particularly water quality. Recommendations for a salt management plan will be provided.
- Indirect Impacts to Wildlife
Indirect impacts to wildlife will focus on the construction phase of the project such as noise, dust, etc.

Induced Impacts

Induced impacts are described as those that are not directly related to the construction or operation of the facilities in question, but rather arise as a result of the ongoing and increased use of the area from the development. Potential induced impacts could include increased activity in adjacent natural areas and the introduction of non-native species.

Cumulative Impacts

This approach looks at the character and potential changes that are occurring or may occur in the future on surrounding lands within the same subwatershed as the Subject Lands. Cumulative impacts include spatial crowding, temporal crowding, spatial lags and temporal lags.

Mitigation and Restoration

Recommendations with regard to mitigation of impacts will be made and opportunities for enhancement will be highlighted. Following the wetland and woodland boundary delineations on August 19, 2019, discussions were held between the project team and the GRCA regarding previous removals of wetland areas on the northern parcel (the isolated wetland in the west and wetland areas on either side of Middle Creek). NRSI will be working with the GRCA and the project team to develop a wetland restoration plan. Other site-specific restoration needs, as well as species-specific conservation recommendations and long-term stewardship will also feed into the mitigation and restoration recommendations provided in the EIS.

Monitoring

Recommendations for pre-, during, and post-construction monitoring will be provided. The possible role of existing biological data for monitoring, as well as the need for additional baseline monitoring will be identified. The methods, timing etc. of the monitoring program will be identified.

Reporting

The findings of the characterization and impact analysis will be prepared in a written report. The report will be formatted to be consistent with the GRCA EIS guidelines (GRCA 2005) and will include appendices, such as species lists and figures including the location of the Subject Lands and study area, existing natural environment conditions and the proposed development. The final EIS report will also include a comprehensive summary of how the following relevant environmental policies apply to the proposed development:

- GRCA Wetlands Policy (GRCA 2015);
- City of Cambridge Official Plan (2018a);
- Region of Waterloo Official Plan (2015);

- Provincial Policy Statement (MMAH 2014);
- *Endangered Species Act* (Government of Ontario 2007);
- *Fish and Wildlife Conservation Act* (Government of Ontario 1997);
- *Fisheries Act* (Government of Canada 1985);
- *Migratory Birds Convention Act* (Government of Canada 1994).

The report will be submitted to the agencies for review. At a minimum the report will include:

- A description of the proposal,
- A detailed characterization of natural environment within the study area,
- Mapping that shows the boundary of confirmed natural features and the location of any SWH or species,
- Opportunities for development and natural features/areas that require protection (e.g. PSW),
- Identification of potential direct, indirect or induced impacts and requirements for mitigating adverse impacts including contingency planning,
- Recommendations for restoration and monitoring.

This TOR provides a comprehensive description of the proposed natural environment characterization work and the EIS Report that will be completed for the Hunt Club Phase 5 Lands. Should you have any questions, please do not hesitate to contact the undersigned.

Sincerely,
Natural Resource Solutions Inc.



Nyssa Hardie
Stream Corridor and Environmental Analyst

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Matt Blevins, City of Cambridge
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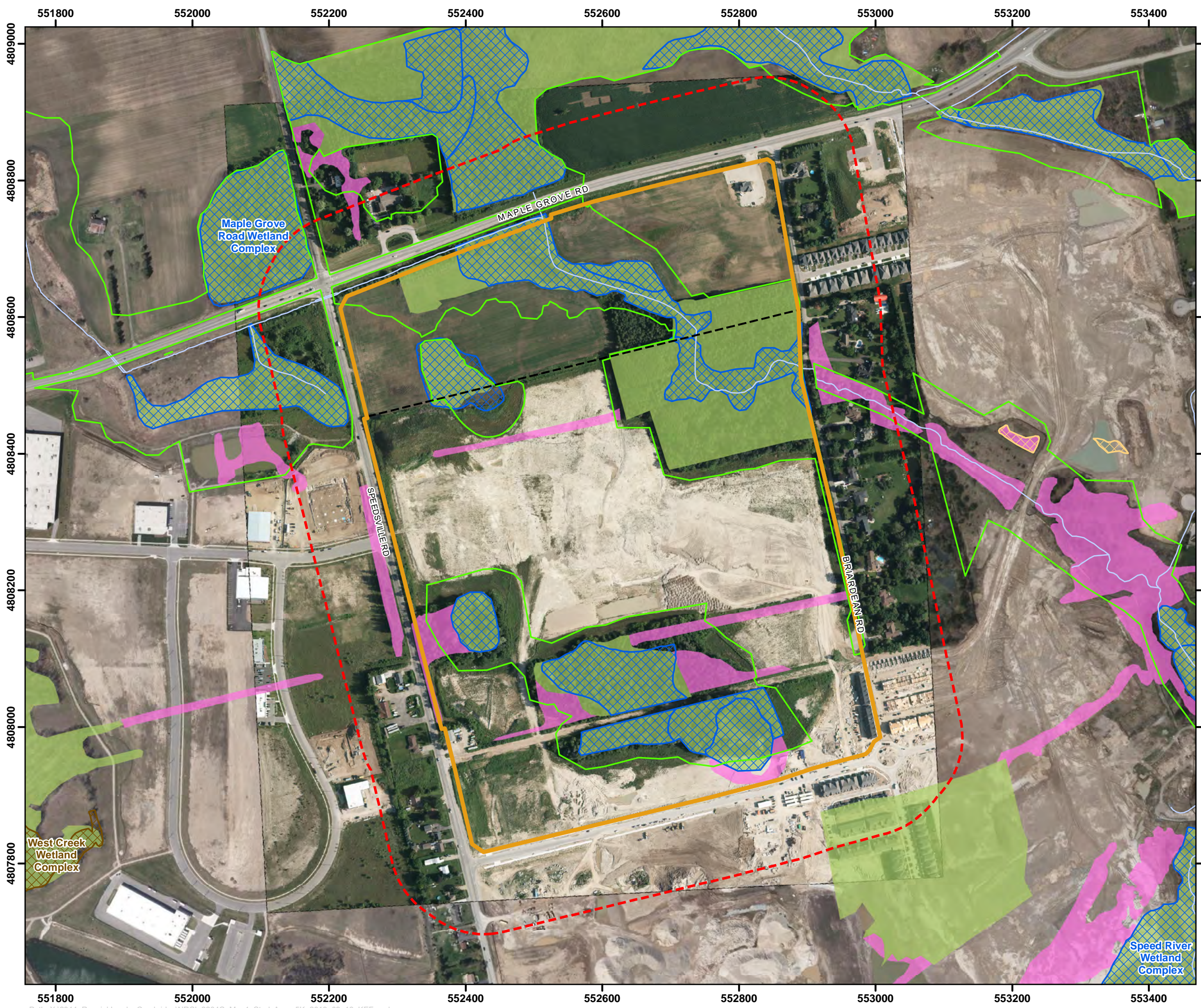
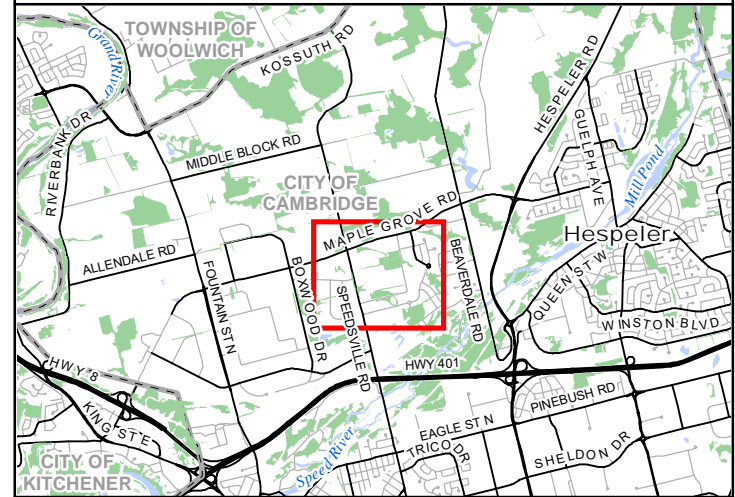
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MAP

Equestrian Way Wetland Assessment Study Area and Significant Natural Features



- Legend**
- Subject Lands
 - Study Area
 - Parcel Boundary
 - Watercourse (GRCA)
 - Provincially Significant Wetland (PSW)
 - Other Wetland (Non-PSW)
 - Unevaluated Wetland
 - Natural Heritage System (City of Cambridge 2014)
 - Core Environmental Features (Region of Waterloo 2015)
 - Locally Significant Natural Area (LSNA)



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Project: 2204A Date: September 13, 2019	NAD83 - UTM Zone 17 Size: 11x17" 1:5,500
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0 50 100 150 200 250 300 Metres

Appendix I. Species at Risk Screening

Species at Risk and Species of Conservation Concern Screening

Scientific Name	Common Name	S-Rank ¹	COSSARO ²	COSEWIC ³	SARA ⁴	Background Source	Habitat Preference ^{2,3,5,6}	Rationale	Suitable Habitat Within Subject Lands?
Plants									
<i>Castanea dentata</i>	American Chestnut	S1S2	END	E	Schedule 1	MNRF 2018d; MNRF 2019	Moist to well drained forests on sand, occasionally heavy soils.	Suitable habitat may be present within the Maple Grove Road PSW Complex and adjacent woodland	Yes
<i>Juglans cinerea</i>	Butternut	S2?	END	E	Schedule 1	Savanta 2012; MNRF 2018d; MNRF 2019	Generally grows in rich, moist, and well-drained soils often found along streams. It may also be found on well-drained gravel sites, especially those made up of limestone. It is also found, though seldomly, on dry, rocky and sterile soils. In Ontario, the Butternut generally grows alone or in small groups in deciduous forests as well as in hedgerows.	Forests and hedgrows within the Subject Lands may provide suitable habitat for this species.	Yes
<i>Panax quinquefolius</i>	Ginseng	S2	END	E	Schedule 1	MNRF 2018d; MNRF 2019	Deep leaf litter in rich, moist deciduous woods, especially on rocky, shaded cool slopes in sweet soil.	Suitable habitat may be present within the Maple Grove Road PSW Complex and adjacent woodland	Yes
<i>Arisaema dracontium</i>	Green Dragon	S3	SC	SC	Schedule 3	MNRF 2018d	Somewhat wet to wet deciduous forests along streams, particularly maple forest and forest dominated by Red Ash and White Elm trees.	Suitable habitat is present within the Maple Grove Road PSW Complex	Yes
Birds									
<i>Empidonax virescens</i>	Acadian Flycatcher	S2S3B	END	E	Schedule 1	MNRF 2018d	Mature, shady, deciduous forests; heavily wooded ravines; creek bottoms or river swamps; availability of good quality habitat is limiting factor; needs at least 30 ha of forest.	Mature deciduous forest habitat of a suitable size (>30ha) is not present within the study area	No
<i>Haliaeetus leucocephalus</i>	Bald Eagle	S2N, S4B	SC	NAR	-	MNRF 2018d; MNRF 2019	Require large continuous area of deciduous or mixed woods around large lakes, rivers; require area of 255 ha for nesting, shelter, feeding, roosting; prefer open woods with 30 to 50% canopy cover; nest in tall trees 50 to 200 m from shore; require tall, dead, partially dead trees within 400 m of nest for perching. Bald Eagles nest in a variety of habitats and forest types, almost always near a major lake or river where they do most of their hunting. They usually nest in large trees such as pine and poplar.	The Subject Lands are not near a major lake or river, and do not provide suitable habitat for this species.	No
<i>Riparia riparia</i>	Bank Swallow	S4B	THR	T	Schedule 1	BSC et al. 2008; Savanta 2012; MNRF 2018d; MNRF 2019	Sand, clay or gravel river banks or steep riverbank cliffs; lakeshore bluffs of easily crumbled sand or gravel; gravel pits, road-cuts, grassland or cultivated fields that are close to water; nesting sites are limiting factor for species presence.	Suitable nesting habitat with steep riverbanks or cliffs is not present within the study area; however, suitable foraging habitat may be present in agricultural fields within the study area	Yes

Species at Risk and Species of Conservation Concern Screening

Scientific Name	Common Name	S-Rank ¹	COSSARO ²	COSEWIC ³	SARA ⁴	Background Source	Habitat Preference ^{2,3,5,6}	Rationale	Suitable Habitat Within Subject Lands?
<i>Tyto alba</i>	Barn Owl	S1	END	E	Schedule 1	MNRF 2018d	Open areas such as fields, agricultural lands with scattered woodlots, buildings and/or orchards; grasslands, sedge meadows, marshes; snow-cover limits ability to catch prey; species has intolerance to severe cold; nests in hollow trees and live trees >46 cm dbh; also nests in barns, abandoned buildings.	The Subject Lands are on the City's boundary, adjacent to a rural area. The open fields and meadows could provide suitable foraging habitat, while treed area may provide suitable nesting habitat.	Yes
<i>Hirundo rustica</i>	Barn Swallow	S4B	THR	T	Schedule 1	BSC et al. 2008; Savanta 2012; MNRF 2018d; MNRF 2019; NRSI 2018	Farmlands or rural areas; cliffs, caves, rock niches; buildings or other man-made structures for nesting; open country near body of water.	Suitable man-made structures for nesting may be present within the study area; foraging habitat may be present within nearby agricultural fields.	Yes
<i>Chlidonias niger</i>	Black Tern	S3B	SC	NAR	-	MNRF 2018d	Black Terns build floating nests in loose colonies in shallow marshes, coastal or inland marshes; large cattail marshes, marshy edges of rivers, lakes or ponds, wet open fens, wet meadows; returns to same area to nest each year in loose colonies; must have shallow (0.5 to 1 m deep) water and areas of open water near nests; requires marshes >20 ha in size; feeds over adjacent grasslands for insects; also feeds on fish, crayfish and frogs.	There are no large marshes within the Subject Lands.	No
<i>Dolichonyx oryzivorus</i>	Bobolink	S4B	THR	T	Schedule 1	BSC et al. 2008; Savanta 2012; MNRF 2018d; MNRF 2019	Large, open expansive grasslands with dense ground cover; hayfields, meadows or fallow fields; marshes; requires tracts of grassland >50 ha.	Suitable habitat may be present in agricultural fields and meadows within the study area	Yes
<i>Cardellina canadensis</i>	Canada Warbler	S4B	SC	T	Schedule 1	BSC et al. 2008; MNRF 2018d; MNRF 2019	Canada Warblers breed in mixed conifer and deciduous forest with a shrubby and mossy understory often near water. They frequent aspen and poplar forests in Canada, and forested wetlands in the central part of their range. Nests on the ground, on logs or hummocks, and uses dense shrub layer to conceal the nest.	Interior forest habitat of a suitable size (>30ha) is not present within the study area	No
<i>Setophaga cerulea</i>	Cerulean Warbler	S3B	THR	E	Schedule 1	MNRF 2018d; MNRF 2019	Mature deciduous woodland of Great Lakes- St. Lawrence and Carolinian forests, sometimes coniferous; swamps or bottomlands with large trees; area sensitive species needing extensive areas of forest (>100 ha)	Mature deciduous forest habitat of a suitable size (>100ha) is not present within the study area	No

Species at Risk and Species of Conservation Concern Screening

Scientific Name	Common Name	S-Rank ¹	COSSARO ²	COSEWIC ³	SARA ⁴	Background Source	Habitat Preference ^{2,3,5,6}	Rationale	Suitable Habitat Within Subject Lands?
<i>Chaetura pelagica</i>	Chimney Swift	S4B,S4N	THR	T	Schedule 1	BSC et al. 2008; MNRF 2018d; MNRF 2019	Nest on cave walls and in hollow trees or tree cavities in old growth forests. Also likely to be found in and around urban settlements where they nest and roost (rest or sleep) in chimneys and other manmade structures. They also tend to stay close to water as this is where the flying insects they eat congregate.	Suitable habitat may be present within the study area	Yes
<i>Chordeiles minor</i>	Common Nighthawk	S4B	SC	T	Schedule 1	BSC et. al. 2008; MNRF 2018d; MNRF 2019	Generally prefer open, vegetation-free habitats, including dunes, beaches, recently harvested forests, burnt-over areas, logged areas, rocky outcrops, rocky barrens, grasslands, pastures, peat bogs, marshes, lakeshores, and river banks. This species also inhabits mixed and coniferous forests. Can also be found in urban areas (nest on flat roof-tops).	Open ground, forest clearings, and ploughed fields are present within the study area	Yes
<i>Sturnella magna</i>	Eastern Meadowlark	S4B	THR	T	Schedule 1	BSC et al. 2008; MNRF 2018d; MNRF 2019	Open, grassy meadows, farmland, pastures, hayfields or grasslands with elevated singing perches; cultivated land and weedy areas with trees; old orchards with adjacent, open grassy areas >10 ha in size.	Suitable habitat may be present in agricultural fields and meadows within the study area	Yes
<i>Caprimulgus vociferus</i>	Eastern Whip-poor-will	S4B	THR	T	Schedule 1	MNRF 2018d; MNRF 2019	Dry, open, deciduous woodlands of small to medium trees; oak or beech with lots of clearings and shaded leaf litter; wooded edges, forest clearings with little herbaceous growth; pine plantations; associated with >100 ha forests; may require 500 to 1000 ha to maintain population.	Dry, deciduous woodlands of a suitable size (>100ha) is not present within the study area	No
<i>Contopus virens</i>	Eastern Wood-Pewee	S4B	SC	SC	Schedule 1	BSC et al. 2008; Savanta 2012; MNRF 2014; MNRF 2018d; MNRF 2019; NRSI 2018	Lives in the mid-canopy layer of forest clearings and edges of deciduous and mixed forests. It is most abundant in intermediate-age mature forest stands with little understory vegetation.	Suitable habitat in the form of forest clearings and farm woodlots is present within the study area	Yes
<i>Vermivora chrysoptera</i>	Golden-winged Warbler	S4B	SC	T	Schedule 1	BSC et al. 2008; MNRF 2018d	Generally prefer areas of early successional vegetation, found primarily on field edges, hydro or utility right-of-ways, or recently logged areas.	Suitable habitat is present within the Maple Grove Road PSW Complex and associated woodlands (within the subject property, approximately 9.5ha of wetland/woodland are present)	Yes

Species at Risk and Species of Conservation Concern Screening

Scientific Name	Common Name	S-Rank ¹	COSSARO ²	COSEWIC ³	SARA ⁴	Background Source	Habitat Preference ^{2,3,5,6}	Rationale	Suitable Habitat Within Subject Lands?
<i>Ammodramus henslowii</i>	Henslow's Sparrow	SHB	END	E	Schedule 1	MNRF 2018d	It has been found in abandoned farm fields, pastures, and wet meadows. It tends to avoid fields that have been grazed or are crowded with trees and shrubs. It prefers extensive, dense, tall grasslands where it can more easily conceal its small ground nest.	There is no suitable habitat in the Subject Lands for this species; open habitats are too small or have been cleared of vegetation for the development.	No
<i>Podiceps auritus</i>	Horned Grebe	S1B, S4N	SC	SC	No Schedule	MNRF 2019	The Horned Grebe usually nests in small ponds, marshes and shallow bays that contain areas of open water and emergent vegetation. Nests are usually located within a few metres of open water.	There are no ponds or marshes with areas of open water suitable for this species within the Subject Lands.	No
<i>Ixobrychus exilis</i>	Least Bittern	S4B	THR	T	Schedule 1	MNRF 2018d	Generally located near pools of open water in relatively large marshes and swamps that are dominated by cattail and other robust emergent plants.	Although the study area is located within an area that is highly disturbed from a natural state, suitable habitat may be present within the Maple Grove Road PSW Complex	Yes
<i>Parkesia motacilla</i>	Louisiana Waterthrush	S3B	THR	T	Schedule 1	MNRF 2018d; MNRF 2019	Prefers wooded ravines with running streams; also woodlands swamps; large tracts of mature deciduous or mixed forests; canopy cover is essential; has strong affinity to nest sites; nests on ground.	Suitable habitat may be present within the Maple Grove Road PSW Complex and adjacent woodland	Yes
<i>Colinus virginianus</i>	Northern Bobwhite	S1	END	E	Schedule 1	MNRF 2018d	Grassland, prairie or hay fields with woody cover in form of thickets, tangles of vines, shrubs; fence rows or woodland edges; cropland growing corn, soybeans or small grains and clover or grass; well-drained sandy or loamy soil; pond edges.	Suitable habitat may be present within open meadows, hedgerows, or woodland edges within the Subject Lands.	Yes
<i>Falco peregrinus anatum/tundrius</i>	Peregrine Falcon	S3B	SC	SC	Schedule 1	MNRF 2018d; MNRF 2019	Breed in open landscapes with cliffs (or skyscrapers) for nest sites, as well as along rivers and coastlines or in cities.	Tall urban buildings within the study area may provide suitable habitat for this species	Yes
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	S4B	SC	T	Schedule 1	MNRF 2018d	Open, deciduous forest with little understory; fields or pasture lands with scattered large trees; wooded swamps; orchards, small woodlots or forest edges; groves of dead or dying trees; requires cavity trees with at least 40 cm dbh; require about 4 ha for a territory.	Forest and forest edges within the Subject Lands may provide suitable habitat for this species.	Yes

Species at Risk and Species of Conservation Concern Screening

Scientific Name	Common Name	S-Rank ¹	COSSARO ²	COSEWIC ³	SARA ⁴	Background Source	Habitat Preference ^{2,3,5,6}	Rationale	Suitable Habitat Within Subject Lands?
<i>Asio flammeus</i>	Short-eared Owl	S2N, S4B	SC	SC	Schedule 1	MNRF 2018d; MNRF 2019	Grasslands, open areas or meadows that are grassy or bushy; marshes, bogs or tundra; both diurnal and nocturnal habits; ground nester; destruction of wetlands by drainage for agriculture is an important factor in the decline of this species; home range 25 -125 ha; requires 75-100 ha of contiguous open habitat.	Large, contiguous open areas of grassland or meadows are not present in the Subject Lands (all open habitats are too small or have been cleared of vegetation).	No
<i>Hylocichla mustelina</i>	Wood Thrush	S4B	SC	T	Schedule 1	BSC et al. 2008; MNRF 2018d; MNRF 2019	Mature deciduous and mixed forests. They seek moist stands of trees with well-developed undergrowth and tall trees for singing perches. These birds prefer large forests, but will also use smaller stands of trees. They build their nests in living saplings, trees or shrubs, usually in sugar maple or American beech.	Suitable habitat may be present within the Maple Grove Road PSW Complex and adjacent woodland	Yes
<i>Icteria virens</i>	Yellow-breasted Chat	S2B	END	E	Schedule 1	MNRF 2018d; MNRF 2019	Dense thickets around wood edges, riparian areas, tall tangles of shrubbery beside streams, ponds; overgrown bushy clearings with deciduous thickets; nests above ground in bush, vines etc. The Ontario population is very dependent on successional habitats of thick shrubbery.	Suitable habitat may be present within the riparian zone of Middle Creek within the study area	Yes
Herpetofauna									
<i>Emydoidea blandingii</i>	Blanding's Turtle	S3	THR	END	Schedule 1	MNRF 2018d; MNRF 2019; Ontario Nature 2019	Shallow water marshes, bogs, ponds or swamps, or coves in larger lakes with soft muddy bottoms and aquatic vegetation; basks on logs, stumps, or banks; surrounding natural habitat is important in summer as they frequently move from aquatic habitat to terrestrial habitats; hibernates in bogs; not readily observed.	Suitable habitat may be present within the Maple Grove Road PSW Complex	Yes
<i>Thamnophis sauritus</i>	Eastern Ribbonsnake (Great Lakes population)	S4	SC	SC	Schedule 1	MNRF 2018d; MNRF 2019; Ontario Nature 2019	Sunny grassy areas with low dense vegetation near bodies of shallow permanent quiet water; wet meadows grassy marshes or sphagnum bogs; borders of ponds, lakes or streams; hibernates in groups.	Suitable habitat may be present within Middle Creek and the Maple Grove Road PSW Complex	Yes
<i>Ambystoma jeffersonianum</i>	Jefferson Salamander	S2	END	E	Schedule 1	MNRF 2018d; MNRF 2019; Ontario Nature 2019	Damp shady deciduous forest, swamps, moist pasture, lakeshores; temporary woodland pools for breeding; hides under leaf litter, stones or in decomposing logs.	Suitable habitat may be present within the Maple Grove Road PSW Complex	Yes

Species at Risk and Species of Conservation Concern Screening

Scientific Name	Common Name	S-Rank ¹	COSSARO ²	COSEWIC ³	SARA ⁴	Background Source	Habitat Preference ^{2,3,5,6}	Rationale	Suitable Habitat Within Subject Lands?
<i>Graptemys geographica</i>	Northern Map Turtle	S3	SC	SC	Schedule 1	MNRF 2018d; MNRF 2019	Rivers and lakeshores where it basks on emergent rocks and fallen trees throughout the spring and summer. In winter, the turtles hibernate on the bottom of deep, slow-moving sections of river. They require high-quality water that supports the female's mollusc prey. Their habitat must contain suitable basking sites, such as rocks and deadheads, with an unobstructed view from which a turtle can drop immediately into the water if startled.	Large bodies of water and suitable foraging or nesting habitat is not present within the study area	No
<i>Regina septemvittata</i>	Queensnake	S2	END	E	Schedule 1	MNRF 2018d; MNRF 2019; Ontario Nature 2019	The Queensnake is an aquatic species that is seldom found more than a few metres from the water. It prefers rivers, streams and lakes with clear water, rocky or gravel bottoms, lots of places to hide, and an abundance of crayfish. Queensnakes will often hibernate in groups with other snakes, amphibians and even crayfish. Suitable hibernation sites (called hibernacula) include abutments of old bridges and crevices in bedrock.	Suitable habitat is present within Middle Creek and the Maple Grove Road PSW Complex	Yes
<i>Chelydra serpentina serpentina</i>	Snapping Turtle	S3	SC	SC	Schedule 1	Savanta 2012; MNRF 2018d; MNRF 2019; Ontario Nature 2019	Permanent or semi-permanent fresh water; marshes, swamps or bogs; rivers and streams with soft muddybanks or bottoms. The species often uses soft soil or clean dry sand on south-facing slopes for nest sites and may nest at some distance from water.	Suitable habitat may be present within Middle Creek and the Maple Grove Road PSW Complex	Yes
<i>Ambystoma laterale</i> - (2) <i>jeffersonianum</i>	Unisexual <i>Ambystoma</i> Jefferson dependent population	S2	END	E	Schedule 1	MNRF 2018d; MNRF 2019; Ontario Nature 2019	Damp shady deciduous forest, swamps, moist pasture, lakeshores; temporary woodland pools for breeding; hides under leaf litter, stones or in decomposing logs	Suitable habitat may be present within the Maple Grove Road PSW Complex	Yes
<i>Pseudacris triseriata</i> pop. 2	Western Chorus Frog (<i>Great Lakes/St. Lawrence - Canadian Shield Population</i>)	S3	NAR	T	Schedule 1	Ontario Nature 2019	Roadside ditches or temporary ponds in fields; swamps or wet meadows; woodland or open country with cover and moisture; small ponds and temporary pools ponds and temporary pools	Suitable temporary pools and ditches, and suitable wetland habitat, may be present within the Subject Lands	Yes

Species at Risk and Species of Conservation Concern Screening

Scientific Name	Common Name	S-Rank ¹	COSSARO ²	COSEWIC ³	SARA ⁴	Background Source	Habitat Preference ^{2,3,5,6}	Rationale	Suitable Habitat Within Subject Lands?
Mammals									
<i>Taxidea taxus jacksoni</i>	American Badger	S1	END	E	Schedule 1	MNRF 2018d	Open grasslands and oak savannahs; dens in new hole or enlarged existing hole; sometimes makes food caches.	Suitable denning habitat may be present along forest edges adjacent to agricultural fields within the study area	Yes
<i>Myotis leibii</i>	Eastern Small-footed Myotis	S2S3	END	-	-	Dobbyn 1994, MNRF 2018d; MNRF 2019	Overwintering habitat: Caves and mines that remain above 0 degrees Celsius. Maternal Roosts: primarily under loose rocks on exposed rock outcrops, crevices and cliffs, and occasionally in buildings, under bridges and highway overpasses and under tree bark.	Suitable roosting and foraging habitat is present within the Maple Grove Road PSW Complex and adjacent woodland	Yes
<i>Myotis lucifungus</i>	Little Brown Myotis	S4	END	E	Schedule 1	Dobbyn 1994, MNRF 2018d; MNRF 2019	Caves, quarries, tunnels, hollow trees or buildings for roosting; winters in humid caves; maternity sites in dark warm areas such as attics and barns; feeds primarily in wetlands, forest edges.	Suitable roosting and foraging habitat is present within the Maple Grove Road PSW Complex and adjacent woodland	Yes
<i>Myotis septentrionalis</i>	Northern Myotis	S3	END	E	Schedule 1	Dobbyn 1994, MNRF 2018d; MNRF 2019	Northern Myotis roosts within tree crevices, hollows and under the bark of live and dead trees, particularly when trees are located within a forest gap.	Suitable roosting and foraging habitat is present within the Maple Grove Road PSW Complex and adjacent woodland	Yes
<i>Perimyotis subflavus</i>	Tri-coloured Bat	S3?	END	E	Schedule 1	Dobbyn 1994, MNRF 2018d; MNRF 2019	Open woods near water; roosts in trees, cliff crevices, buildings or caves; hibernates in damp, draft-free, warm caves, mines or rock crevices.	Suitable roosting and foraging habitat is present within the Maple Grove Road PSW Complex and adjacent woodland	Yes

Species at Risk and Species of Conservation Concern Screening

Scientific Name	Common Name	S-Rank ¹	COSSARO ²	COSEWIC ³	SARA ⁴	Background Source	Habitat Preference ^{2,3,5,6}	Rationale	Suitable Habitat Within Subject Lands?
Fish									
<i>Moxostoma duquesnei</i>	Black Redhorse	S2	THR	T	-	MNRF 2018d; MNRF 2019	The Black Redhorse lives in pools and riffle areas of medium-sized rivers and streams that are usually less than two metres deep. These rivers usually have few aquatic plants, a moderate to fast current, and a sandy or gravel bottom. In the spring, it migrates to breeding habitat where eggs are laid on gravel in fast water. The winter is spent in deeper pools.	There are no medium-sized rivers or streams within the Subject Lands.	No
<i>Ichthyomyzon fossor</i>	Northern Brook Lamprey (GL-USL Pop.)	S3	SC	SC	Schedule 1	MNRF 2018d	The Northern brook lamprey inhabits clear, coolwater streams. The larval stage requires soft substrates such as silt and sand for burrowing which are often found in the slow-moving portions of a stream. Adults are found in areas associated with spawning, including fast flowing riffles comprised of rock or gravel. Spawning occurs in May and June. The males construct small, often inconspicuous, nests by picking up pebbles with their mouths and moving them to form the rims of shallow depressions. The sticky eggs are deposited in the nest and adhere to the substrate.	There are no streams within the Subject Lands.	No
<i>Notropis photogenis</i>	Silver Shiner	S2S3	THR	T	Schedule 3	MNRF 2018d; MNRF 2019	Silver shiners prefer moderate to large size streams with swift currents that are free of weeds and have clean gravel or boulder bottoms. They live in schools and feed on crustaceans and adult flies that fall in the water or fly just above the surface. In June or July, they spawn by scattering their eggs over gravel riffles.	There are no moderate to large streams within the Subject Lands.	No

Species at Risk and Species of Conservation Concern Screening

Scientific Name	Common Name	S-Rank ¹	COSSARO ²	COSEWIC ³	SARA ⁴	Background Source	Habitat Preference ^{2,3,5,6}	Rationale	Suitable Habitat Within Subject Lands?
Molluscs									
<i>Villosa iris</i>	Rainbow	S2S3	SC	SC	Schedule 1	MNRF 2019	The Rainbow mussel prefers small to medium-sized rivers with a moderate to strong current and sand, rocky, or gravel bottoms. It is found in or near riffle areas and along the edges of vegetation in water less than one metre deep. The Rainbow mussel uses a variety of fish hosts in Ontario, including Striped shiner, Smallmouth bass, Largemouth bass, Green sunfish, Greenside darter, Rainbow darter, and Yellow perch.	There are no small to medium sized rivers within the Subject Lands	No
<i>Lampsilis fasciola</i>	Wavy-rayed Lampmussel	S1	THR	SC	Schedule 1	MNRF 2014; MNRF 2018d; MNRF 2019	The Wavy-rayed lampmussel is usually found in small to medium rivers with clear water. It lives in shallow riffle areas with clean gravel or sand bottoms. The Wavy-rayed lampmussel's fish hosts are the Largemouth bass and Smallmouth bass.	There are no small to medium-sized rivers or streams within the Subject Lands.	No
Butterflies									
<i>Euphyes conspicua</i>	Black Dash	S3	-	-	-	MacNaughton et al. 2019	Wet sedge meadows; also, open shrubby or partially-wooded wetlands with red maple	This species could be present in the wooded wetlands within the Subject Lands.	Yes
<i>Danaus plexippus</i>	Monarch Butterfly	S2N, S4B	SC	E	Schedule 1	MNRF 2018d; MNRF 2019; NRSI 2018; MacNaughton et al. 2019	Monarch caterpillars feed on milkweed plants and are confined to meadows and open areas where milkweed grows. Adult butterflies can be found in more diverse habitats where they feed on nectar from a variety of wildflowers.	Suitable open areas with milkweed may be present within the study area	Yes
<i>Asterocampa clyton</i>	Tawny Emperor	S3	-	-	-	Macnaughton et al. 2019	Most typical in edge or riparian areas where hackberry trees are present. Less tolerant of suburbia compared to <i>A. celtis</i> , as hibernating larvae may be destroyed when leaves are raked	Suitable habitat is present within the study area	Yes
<i>Pieris virginiensis</i>	West Virginia White	S3	SC	-	-	MNRF 2018d; MNRF 2019	Generally prefer moist, deciduous woodlands. The larvae feed only on the leaves of the two-leaved toothwort (<i>Cardamine diphylla</i>), which is a small, spring-blooming plant of the forest floor. It avoids edges and open fields in fragmented landscapes.	The woodlands within the Subject Lands may provide suitable habitat for this species.	Yes

Species at Risk and Species of Conservation Concern Screening

Scientific Name	Common Name	S-Rank ¹	COSSARO ²	COSEWIC ³	SARA ⁴	Background Source	Habitat Preference ^{2,3,5,6}	Rationale	Suitable Habitat Within Subject Lands?
Odonates									
<i>Enallagma anna</i>	River Bluet	S2				Ontario Odonata Atlas Database 2019	Occurs in streams and small rivers, mostly in open country but often with riparian borders; also flowing irrigation canals. Much more of a lotic species than any of its near relatives. Larvae live in aquatic vegetation.	There are no streams or small rivers within the Subject Lands.	No
<i>Rhionaeschna mutata</i>	Spatterdock Darner	S1				Ontario Odonata Atlas Database 2019	Typically restricted to fishless ponds, which may or may not be covered with water lilies. It is one of the more ecologically restricted species among North American aeshnids. Larvae live in aquatic vegetation.	There are no fishless ponds with water lilies within the Subject Lands.	No
<i>Epiaeschna heros</i>	Swamp Darner	S2S3				Ontario Odonata Atlas Database 2019	Habitat consists of swamps and slow streams for breeding, it is more confined to woodland than many other aeshnids. Larvae may develop in very shallow pools, even seasonal ones, and have been found emerging from low areas that had dried up previously. Roams widely away from breeding sites to feed, often in swarms, and has been suspected of migratory movements (Paulson 2011). Larvae live among detritus, not up in the vegetation like many other aeshnids.	Suitable habitat may be present within the Maple Grove Road PSW Complex	Yes
Other Insects									
<i>Bombus affinis</i>	Rusty-patched Bumble Bee	S1	END	E	Schedule 1	MNRF 2018d; MNRF 2019	Open habitat such as mixed farmland, urban settings, savannah, open woods and sand dunes. The most recent sightings have been in oak savannah, which contains both woodland and grassland flora and fauna.	While suitable foraging habitat may be present within the study area in the form of farmlands and wooded areas, this species is currently only known from the Pinery Provincial Park region (approximately 150km from the study area)	No
<i>Bombus terricola</i>	Yellow-banded Bumble Bee	S3S5	SC	SC	Schedule 1	MNRF 2019	Mixed woodlands and open habitat such as native grasslands, farmlands and urban areas. Close to or within wooded areas or wetlands.	The wooded areas and wetlands within the subject lands may provide suitable habitat for this species.	Yes

Appendix II. Significant Wildlife Habitat Screening

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

Wildlife Species ¹	Candidate SWH		Confirmed SWH	Subject Lands	
	ELC Ecosite Codes ¹	Habitat Criteria and Information Sources ¹	Defining Criteria ¹	Assessment Details	
Wildlife Habitat: Waterfowl Stopover and Staging Areas (Terrestrial)					
<p><u>Rationale:</u> Habitat important to migrating waterfowl.</p>	<p>American Black Duck Wood Duck Green-winged Teal Blue-winged Teal Mallard Northern Pintail Northern Shoveler American Wigeon Gadwall</p>	<p>CUM1 CUT1 - Plus evidence of annual spring flooding from melt water or run-off within these Ecosites.</p>	<p>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^{cxviii}.</p> <p><u>Information Sources</u> • Anecdotal information from the landowner, adjacent landowners or local naturalist clubs may be good information in determining occurrence. • Reports and other information available from Conservation Authorities (CAs) • Sites documented through waterfowl planning processes (eg. EHJV implementation plan) • Field Naturalist Clubs • Ducks Unlimited Canada • Natural Heritage Information Centre (NHIC) Waterfowl Concentration Area</p>	<p>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"^{cxci} • 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^{cxviii}. • 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.</p>	<p>Fields with sheet water are not present. Not SWH</p>
Wildlife Habitat: Waterfowl Stopover and Staging Areas (Aquatic)					
<p><u>Rationale:</u> Important for local and migrant waterfowl populations during the spring or fall migration or both periods. Sites identified are usually only one of a few in the eco-district.</p>	<p>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</p>	<p>MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 SWD1 SWD2 SWD3 SWD4 SWD5 SWD6 SWD7</p>	<p>• 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).</p> <p><u>Information Sources</u> • Environment Canada • Naturalist clubs often are aware of staging/stopover areas. • OMNRF Wetland Evaluations indicate presence of locally and regionally significant waterfowl staging. • Sites documented through waterfowl planning processes (eg. EHJV implementation plan) • Ducks Unlimited projects • Element occurrence specification by Nature Serve: http://www.natureserve.org • Natural Heritage Information Centre (NHIC) Waterfowl Concentration Area</p>	<p>Studies carried out and verified presence of: • Aggregations of 100⁰ or more of listed species for 7 days¹, 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"^{cxci} • 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.</p>	<p>The wetlands and watercourses on the Subject Lands are not large enough to support 100 or more of the listed species. Not SWH</p>

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

	Wildlife Species ¹	Candidate SWH		Confirmed SWH	Subject Lands
		ELC Ecosite Codes ¹	Habitat Criteria and Information Sources ¹	Defining Criteria ¹	Assessment Details
Wildlife Habitat: Shorebird Migratory Stopover Area					
<u>Rationale:</u> High quality shorebird stopover habitat is extremely rare and typically has a long history of use.	Greater Yellowlegs Lesser Yellowlegs Marbled Godwit Hudsonian Godwit Black-bellied Plover American Golden-Plover Semipalmated Plover Solitary Sandpiper Spotted Sandpiper Semipalmated Sandpiper Pectoral Sandpiper White-rumped Sandpiper Baird's Sandpiper Least Sandpiper Purple Sandpiper Stilt Sandpiper Short-billed Dowitcher Red-necked Phalarope Whimbrel Ruddy Turnstone Sanderling Dunlin	BBO1 BBO2 BBS1 BBS2 BBT1 BBT2 SDO1 SDS2 SDT1 MAM1 MAM2 MAM3 MAM4 MAM5	Shorelines of lakes, rivers and wetlands, including beach areas, bars and seasonally flooded, muddy and un-vegetated shoreline habitats. Great Lakes coastal shorelines, including groynes and other forms of armour rock lakeshores, are extremely important for migratory shorebirds in May to mid-June and early July to October. Sewage treatment ponds and storm water ponds do not qualify as a SWH. <u>Information Sources</u> • Western hemisphere shorebird reserve network. • Canadian Wildlife Service (CWS) Ontario Shorebird Survey. • Bird Studies Canada • Ontario Nature • Local birders and naturalist clubs • Natural Heritage Information Center (NHIC) Shorebird Migratory Concentration Area	Studies confirming: • Presence of 3 or more of listed species and > 1000 shorebird use days during spring or fall migration period. (shorebird use days are the accumulated number of shorebirds counted per day over the course of the fall or spring migration period) • Whimbrel stop briefly (<24hrs) during spring migration, any site with >100 Whimbrel used for 3 years or more is significant. • The area of significant shorebird habitat includes the mapped ELC shoreline ecosites plus a 100m radius area ^{cxviii} • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" ^{ccxi} • SWHMIST ^{cxlix} Index #8 provides development effects and mitigation measures.	There are no large bodies of water such as lakes, rivers or large wetlands within the Subject Lands. Not SWH
Wildlife Habitat: Raptor Wintering Area					
<u>Rational:</u> Sites used by multiple species, a high number of individuals and used annually are most significant	Rough-legged Hawk Red-tailed Hawk Northern Harrier American Kestrel Snowy Owl <u>Special Concern:</u> Short-eared Owl Bald Eagle	Hawks/Owls: Combination of ELC Community Series; need to have present one Community Series from each land class: Forest: FOD, FOM, FOC Upland: CUM, CUT, CUS, CUW	The habitat provides a combination of fields and woodlands that provide roosting, foraging and resting habitats for wintering raptors. Raptor wintering sites need to be > 20 ha ^{cxviii, cxlix} with a combination of forest and upland. ^{xvi, xvii, xviii, xix, xx, xxi} Least disturbed sites, idle/fallow or lightly grazed field/meadow (>15ha) with adjacent woodlands ^{cxlix} Field area of the habitat is to be wind swept with limited snow depth or accumulation. Eagle sites have open water, large trees and snags available for roosting <u>Information Sources</u> • OMNRF Ecologist or Biologist • Field Natural Clubs • Natural Heritage Information Center (NHIC) Raptor Winter Concentration Area • Data from Bird Studies Canada • Reports and other information available from Conservation Authorities CAs.	Studies confirm the use of these habitats by: • One or more Short-eared Owls or; One or more Bald Eagles or; At least 10 individuals and two listed hawk/owl species • To be significant a site must be used regularly (3 in 5 years) ^{cxlix} for a minimum of 20 days by the above number of birds • The habitat area for an Eagle winter site is the shoreline forest ecosites directly adjacent to the prime hunting area • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" ^{ccxi} • SWHMIST ^{cxlix} Index #10 and #11 provides development effects and mitigation measures.	The Subject Lands are part of an open matrix of agricultural field and forest. Candidate SWH

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

	Wildlife Species ¹	Candidate SWH		Confirmed SWH	Subject Lands
		ELC Ecosite Codes ¹	Habitat Criteria and Information Sources ¹	Defining Criteria ¹	Assessment Details
Wildlife Habitat: Bat Hibernacula					
Rationale: Bat hibernacula are rare habitats in Ontario landscapes.	Big Brown Bat Tri-coloured Bat	Bat Hibernacula may be found in these ecosites: CCR1 CCR2 CCA1 CCA2 (Note: buildings are not considered to be SWH)	<ul style="list-style-type: none"> Hibernacula may be found in caves, mine shafts, underground foundations and Karsts. Active mine sites should not be considered as SWH The locations of bat hibernacula are relatively poorly known. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> OMNRF for possible locations and contact for local experts Natural Heritage Information Center (NHIC) Bat Hibernaculum Ministry of Northern Development and Mines for location of mine shafts. Clubs that explore caves (eg. Sierra Club) University Biology Departments with bat experts. 	<ul style="list-style-type: none"> All sites with confirmed hibernating bats are SWH. The habitat area includes a 200m radius around the entrance of the hibernaculum^{cxviii, 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. 	No suitable hibernacula habitat on Subject Lands. 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	<p>Maternity colonies can be found in tree cavities, vegetation and often in buildings^{cxii, xxv, xxvi, xxvii, xxxi} (buildings are not considered to be SWH).</p> <ul style="list-style-type: none"> Maternity roosts are not found in caves and mines in Ontario^{xxii} Maternity colonies located in Mature deciduous or mixed forest stands^{ccix, ccx} with >10/ha large diameter (>25cm dbh) wildlife trees^{ccvii} Female Bats prefer wildlife tree (snags) in early stages of decay, class 1-3^{ccxiv} or class 1 or 2^{ccxii} Silver-haired Bats prefer older mixed or deciduous forest and form maternity colonies in tree cavities and small hollows. Older forest areas with at least 21 snags/ha are preferred^{ccx} <p><u>Information Sources</u></p> <ul style="list-style-type: none"> OMNRF for possible locations and contact for local experts 	<ul style="list-style-type: none"> Maternity Colonies with confirmed use by: <ul style="list-style-type: none"> >10 Big Brown Bats >5 Adult Female Silver-haired Bats The area of the habitat includes the entire woodland or a forest stand ELC Ecosite or an Ecoelement containing the maternity colonies. Evaluation methods for maternity colonies should be conducted following methods outlined in the "Bats and Bat Habitats: Guidelines for wind Power Projects"^{ccv} SWHMiS T^{cxlix} Index #12 provides development effects and mitigation measures. 	Suitable roosting cavities may be present within the forest and swamp communities in the Subject Lands. Candidate SWH
Wildlife Habitat: Turtle Wintering Area					
Rationale: Generally sites are the only known sites in the area. Sites with the highest number of individuals are most significant	Midland Painted Turtle <u>Special Concern:</u> Northern Map Turtle Snapping Turtle	Snapping and Midland Painted Turtles - ELC Community Classes: SW, MA, OA and SA; ELC Community Series: FEO and BOO Northern Map Turtle - Open Water areas such as deeper rivers or streams and lakes with current can also be used as over-wintering habitat.	<p>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.</p> <ul style="list-style-type: none"> Over-wintering sites are permanent water bodies, large wetlands, and bogs or fens with adequate Dissolved Oxygen^{cx, cx, cx, cxviii}. Man-made ponds such as sewage lagoons or storm water ponds should not be considered SWH. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> 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) 	<ul style="list-style-type: none"> 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^{cxix, cx, cx, cxii}. SWHMiST^{cxlix} Index #28 provides development effects and mitigation measures for turtle 	Middle Creek, or the wetlands within the Maple Grove PSW complex may provide suitable turtle overwintering areas. Candidate SWH

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

Wildlife Species ¹		Candidate SWH		Confirmed SWH	Subject Lands
		ELC Ecosite Codes ¹	Habitat Criteria and Information Sources ¹	Defining Criteria ¹	Assessment Details
Wildlife Habitat: Snake Hibernaculum					
<p><u>Rationale:</u> Generally sites are the only known sites in the area. Sites with the highest number of individuals are most significant</p>	<p><u>Snakes:</u> Eastern Gartersnake Northern Watersnake Northern Red-bellied Snake Northern Brownsnake Smooth Green Snake Northern Ring-necked Snake</p> <p><u>Special Concern:</u> Eastern Ribbonsnake</p> <p><u>Lizard:</u> <u>Special Concern</u> (Southern Shield population): Five-lined Skink</p>	<p>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.</p> <p>Observations of congregations of snakes on sunny warm days in the spring or fall is a good indicator.</p> <p>For Five-lined Skink, ELC Community Series of FOD and FOM and Ecosites: FOC1 FOC3</p>	<ul style="list-style-type: none"> 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^{xlix, l, ii, iii, 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. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> 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 	<p>Studies confirming:</p> <ul style="list-style-type: none"> 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^{cxlix} Index #13 provides development effects and mitigation measures for snake hibernacula. Presence of any active hibernaculum for skink is significant. SWHMiST^{cxlix} Index #37 provides development effects and mitigation measures for five-lined 	<p>Burrows, rock piles, crevices on slopes etc, that provide suitable overwintering habitat for snakes may be present within the Subject Lands.</p> <p>Candidate SWH</p>
Wildlife Habitat: Colonially - Nesting Bird Breeding Habitat (Bank and Cliff)					
<p><u>Rationale:</u> Historical use and number of nests in a colony make this habitat significant. An identified colony can be very important to local populations. All swallow populations are declining in Ontario.</p>	<p>Cliff Swallow Northern Rough-winged Swallow (this species is not colonial but can be found in Cliff Swallow colonies)</p>	<p>Eroding banks, sandy hills, borrow pits, steep slopes, and sand piles Cliff faces, bridge abutments, silos, barns</p> <p>Habitat found in the following ecosites: CUM1 CUT1 CUS1 BLO1 BLS1 BLT1 CLO1 CLS1 CLT1</p>	<ul style="list-style-type: none"> Any site or areas with exposed soil banks, undisturbed or naturally eroding that is not a licensed/permitted aggregate area. Does not include man-made structures (bridges or buildings) or recently (2 years) disturbed soil areas, such as berms, embankments, soil or aggregate stockpiles. Does not include a licensed/permitted Mineral Aggregate Operation. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> Reports and other information available from CAs Ontario Breeding Bird Atlas^{ccv} Bird Studies Canada; <i>NatureCounts</i> http://www.birdscanada.org/birdmon/ Field Naturalist clubs 	<p>Studies confirming:</p> <ul style="list-style-type: none"> Presence of 1 or more nesting sites with 8^{cxlvix} or more cliff swallow pairs and/or rough-winged swallow pairs during the breeding season. A colony identified as SWH will include a 50m radius habitat area from the peripheral nests^{cxvii} 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 	<p>Eroding slopes are not present in the Subject Lands.</p> <p>Not SWH</p>

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

Wildlife Species ¹	Candidate SWH		Confirmed SWH	Subject Lands	
	ELC Ecosite Codes ¹	Habitat Criteria and Information Sources ¹	Defining Criteria ¹	Assessment Details	
Wildlife Habitat: Colonially - Nesting Bird Breeding Habitat (Tree/Shrubs)					
<p><u>Rationale:</u> Large Colonies are important to local bird population, typically sites are only known colony in area and are used annually.</p>	<p>Great Blue Heron Black-crowned Night-heron Great Egret Green Heron</p>	<p>SWM2 SWM3 SWM5 SWM6 SWD1 SWD2 SWD3 SWD4 SWD5 SWD6 SWD7 FET1</p>	<p>• 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.</p> <p><u>Information Sources</u></p> <ul style="list-style-type: none"> • Ontario Breeding Bird Atlas^{ccv}, colonial nest records. • Ontario Heronry Inventory 1991 available from Bird Studies Canada or NHIC (OMNR). • NHIC Mixed Wader Nesting Colony • Aerial photographs can help identify large heronries • Reports and other information available from CAs • MNRF District Offices • Local naturalist clubs 	<p>Studies confirming:</p> <ul style="list-style-type: none"> • Presence of 5¹ 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^{cclix} Index #5 provides development effects and mitigation measures. 	<p>Fieldwork completed to date has ruled out the possibility of this SWH occurring within the Subject Lands.</p> <p>Not SWH</p>
Wildlife Habitat: Colonially - Nesting Bird Breeding Habitat (Ground)					
<p><u>Rationale:</u> Colonies are important to local bird populations, typically sites are only known colony in area and are used annually.</p>	<p>Herring Gull Great Black-backed Gull Little Gull Ring-billed Gull Common Tern Caspian Tern Brewer's Blackbird</p>	<p>Any rocky island or peninsula (natural or artificial) within a lake or large river (two-lined on a 1:50,000 NTS map).</p> <p>Close proximity to watercourses in open fields or pastures with scattered trees or shrubs (Brewer's Blackbird)</p> <p>MAM1 – 6 MAS1 – 3 CUM CUT CUS</p>	<p>• Nesting colonies of gulls and terns are on islands or peninsulas associated with open water or in marshy areas. • Brewer's Blackbird colonies are found loosely on the ground in or in low bushes in close proximity to streams and irrigation ditches within farmlands.</p> <p><u>Information Sources</u></p> <ul style="list-style-type: none"> • Ontario Breeding Bird Atlas^{ccv}, rare/colonial species records. • Canadian Wildlife Service • Reports and other information available from CAs • Natural Heritage Information Center (NHIC) Colonial Waterbird Nesting Area • MNRF District Offices • Field naturalist clubs 	<p>Studies confirming:</p> <ul style="list-style-type: none"> • Presence of >25 active nests for Herring Gulls or Ring-billed Gulls, >5 active nests for Common Tern or >2 active nests for Caspian Tern¹. • 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^{cclix} Index #6 provides development effects and mitigation measures. 	<p>No suitable large open water or marshy habitats are present within the Subject Lands.</p> <p>Not SWH</p>

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

	Wildlife Species ¹	Candidate SWH		Confirmed SWH	Subject Lands
		ELC Ecosite Codes ¹	Habitat Criteria and Information Sources ¹	Defining Criteria ¹	Assessment Details
Wildlife Habitat: Migratory Butterfly Stopover Areas					
<p><u>Rationale:</u> Butterfly stopovers areas are extremely rare habitats and are biologically important for butterfly species that migrate south for the winter.</p>	<p>Painted Lady Red Admiral</p> <p><u>Special Concern:</u> Monarch</p>	<p>Combination of ELC Community Series: Need to have present one Community Series from each landclass:</p> <p><u>Field:</u> CUM CUS CUT</p> <p><u>Forest:</u> FOC FOM FOD CUP</p> <p>Anecdotally, a candidate sight for butterfly stopover will have a history of butterflies being observed.</p>	<p>A butterfly stopover area will be a minimum of 10 ha in size with a combination of field and forest habitat present, and will be located within 5 km of Lake Ontario^{cxlix}.</p> <ul style="list-style-type: none"> The habitat is typically a combination of field and forest, and provides the butterflies with a location to rest prior to their long migration south^{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}. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> OMNRF (NHIC) Agriculture Canada in Ottawa may have list of butterfly experts. Field Naturalist Clubs Toronto Entomologists Association 	<p>Studies confirm:</p> <ul style="list-style-type: none"> 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, xliii}. Observational studies are to be completed and need to be done frequently during the migration period to estimate MUD MUD of >5000 or >3000 with the presence of Painted Ladies or Red Admiral's is to be considered significant. SWHMiST^{cxlix} Index #16 provides development effects and mitigation measures. 	<p>The Subject Lands are not within 5km of Lake Ontario.</p> <p>Not SWH</p>
Wildlife Habitat: Landbird Migratory Stopover Areas					
<p><u>Rationale:</u> Sites with a high diversity of species as well as high number are most significant</p>	<p>All migratory songbirds.</p> <p>Canadian Wildlife Service Ontario website: http://www.on.ec.gc.ca/wildlife_e.html</p> <p>All migrant raptors species:</p> <p>Ontario Ministry of Natural Resources: Fish and Wildlife Conservation Act, 1997. Schedule 7: Specially Protected Birds (Raptors)</p>	<p>All Ecosites associated with these ELC Community Series: FOC FOM FOD SWC SWM SWD</p>	<p>Woodlots need to be >10 ha¹ in size and within 5km^{iv, v, vi, vii, viii, ix, x, xi, xii, xiii, xiv, xv} of Lake Ontario.</p> <ul style="list-style-type: none"> If multiple woodlands are located along the shoreline, those woodlands <2km from Lake Ontario are more significant^{cxlix} Sites have a variety of habitats; forest, grassland and wetland complexes^{cxlix}. The largest sites are more significant^{cxlix} Woodlots and forest fragments are important habitats to migrating birds^{ccxiii}, these features located along the shore and located within 5km of Lake Ontario are Candidate SWH^{cxviii}. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> Bird Studies Canada Ontario Nature Local birders and naturalist club Ontario Important Bird Areas 	<p>Studies confirm:</p> <ul style="list-style-type: none"> Use of the woodlot by >200 birds/day and with >35 spp. with at least 10 bird spp. recorded on at least 5 different survey dates. This abundance and diversity of migrant bird species is considered above average and significant. Studies should be completed during spring (Apr/May) and fall (Aug/Oct) migration using standardized assessment techniques. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"^{ccxi} SWHMiST^{cxlix} Index #9 provides development effects and mitigation measures. 	<p>The Subject Lands are not within 5km of Lake Ontario.</p> <p>Not SWH</p>

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

Wildlife Species ¹	Candidate SWH		Confirmed SWH	Subject Lands
	ELC Ecosite Codes ¹	Habitat Criteria and Information Sources ¹	Defining Criteria ¹	Assessment Details
Wildlife Habitat: Deer Yarding Areas				
<p>Rationale: Winter habitat for deer is considered to be the main factor for northern deer populations. In winter, deer congregate in "yards" to survive severe winter conditions. Deer yards typically have a long history of annual use by deer, yards typically represent 10-15% of an areas summer range.</p>	<p>White-tailed Deer</p> <p>Note: OMNRF to determine this habitat.</p> <p>ELC Community Series providing a thermal cover component for a deer yard would include: FOM, FOC, SWM and SWC.</p> <p>Or these ELC Ecosites: CUP2 CUP3 FOD3 CUT</p>	<ul style="list-style-type: none"> Deer yarding areas or winter concentration areas (yards) are areas deer move to in response to the onset of winter snow and cold. This is a behavioural response and deer will establish traditional use areas. The yard is composed of two areas referred to as Stratum I and Stratum II. Stratum II covers the entire winter yard area and is usually a mixed or deciduous forest with plenty of browse available for food. Agricultural lands can also be included in this area. Deer move to these areas in early winter and generally, when snow depths reach 20cm, most of the deer will have moved here. If the snow is light and fluffy, deer may continue to use this area until 30cm snow depth. In mild winters, deer may remain in the Stratum II area the entire winter. The Core of a deer yard (Stratum I) is located within the Stratum II area and is critical for deer survival in areas where winters become severe. It is primarily composed of coniferous trees (pine, hemlock, cedar, spruce) with a canopy cover of more than 60%^{ccxiv}. OMNRF determines deer yards following methods outlined in "Selected Wildlife and Habitat Features: Inventory Manual"^{ccxv} Woodlots with high densities of deer due to artificial feeding are not significant. 	<p>No Studies Required:</p> <ul style="list-style-type: none"> Snow depth and temperature are the greatest influence on deer use of winter yards. Snow depths > 40cm for more than 60 days in a typically winter are minimum criteria for a deer yard to be considered as SWH^{lvi, lvii, lviii, lix, lx, l}. 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^{cccv}. 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^{cclix} Index #2 provides development effects and mitigation measures. 	<p>The MNRF has mapped the southern and eastern woodlands within the Subject Lands as Stratum II deer wintering areas.</p> <p>Confirmed SWH</p>
Wildlife Habitat: Deer Winter Congregation Areas				
<p>Rationale: Deer movement during winter in the southern areas of Ecoregion 6E are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands to reduce or avoid the impacts of winter conditions^{ccviii}</p>	<p>White-tailed Deer</p> <p>All Forested Ecosites with these ELC Community Series: FOC FOM FOD SWC SWM SWD</p> <p>Conifer plantations much smaller than 50ha may also be used.</p>	<ul style="list-style-type: none"> Woodlots will typically be >100 ha in size. Woodlots <100ha may be considered as significant based on MNRF studies or assessment. Deer movement during winter in the southern areas of Eco-region 6E are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands^{ccviii}. 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^{ccxiv}. Woodlots with high densities of deer due to artificial feeding are not significant. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> MNRF District Offices LIO/NRVIS 	<p>Studies confirm:</p> <ul style="list-style-type: none"> Deer management is an MNRF responsibility, deer winter congregation areas considered significant will be mapped by MNRF^{ccviii}. 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^l. Studies should be completed during winter (Jan/Feb) when >20cm of snow is on the ground using aerial survey techniques^{ccxiv}, ground or road surveys, or a pellet count deer density survey^{ccxv}. 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^{cclix} Index #2 provides development 	<p>No suitable habitat in Subject Lands (woodlots are not >100ha in size).</p> <p>Not SWH</p>

¹MNRF 2015b

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

Rare Vegetation Community ¹	Candidate SWH			Confirmed SWH	Subject Lands
	ELC Ecosite Codes ¹	Habitat Description ¹	Detailed Information and Sources ¹	Defining Criteria ¹	Assessment Details
Cliff and Talus Slopes					
<p><u>Rationale:</u> Cliffs and Talus Slopes are extremely rare habitats in Ontario.</p>	<p>Any ELC Ecosite within Community Series:</p> <p>TAO CLO TAS CLS TAT CLT</p>	<p>A Cliff is vertical to near vertical bedrock >3m in height.</p> <p>A Talus Slope is rock rubble at the base of a cliff made up of coarse rocky debris.</p>	<p>Most cliff and talus slopes occur along the Niagara Escarpment.</p> <p><u>Information Sources</u></p> <ul style="list-style-type: none"> • The Niagara Escarpment Commission has detailed information on location of these habitats. • OMNRF District • Natural Heritage Information Center (NHIC) has location information on their website • Local naturalist clubs • Conservation Authorities 	<ul style="list-style-type: none"> • Confirm any ELC Vegetation Type for Cliffs or Talus Slopes^{lxviii} • SWHMiST^{cxlix} Index #21 provides development effects and mitigation measures. 	<p>No cliff or talus slopes within the Subject Lands.</p> <p>Not SWH</p>
Sand Barrens					
<p><u>Rationale:</u> Sand barrens are rare in Ontario and support rare species. Most Sand Barrens have been lost due to cottage development and forestry.</p>	<p>ELC Ecosites:</p> <p>SBO1 SBS1 SBT1</p> <p>Vegetation cover varies from patchy and barren to continuous meadow (SBO1), thicket-like (SBS1), or more closed and treed (SBT1). Tree cover always <60%.</p>	<p>Sand Barrens typically are exposed sand, generally sparsely vegetated and caused by lack of moisture, periodic fires and erosion. They have little or no soil and the underlying rock protrudes through the surface. Usually located within other types of natural habitat such as forest or savannah. Vegetation can vary from patchy and barren to tree covered but less than 60%.</p>	<p>Any sand barren area, >0.5ha in size.</p> <p><u>Information Sources</u></p> <ul style="list-style-type: none"> • OMNRF Districts. • Natural Heritage Information Center (NHIC) has location information on their website • Field naturalist clubs • Conservation Authorities 	<ul style="list-style-type: none"> • Confirm any ELC Vegetation Type for Sand Barrens^{lxviii} • Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics)ⁱ. • SWHMiST^{cxlix} Index #20 provides development effects and mitigation measures. 	<p>No sand barrens within the Subject Lands.</p> <p>Not SWH</p>

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

Rare Vegetation Community ¹	Candidate SWH			Confirmed SWH	Subject Lands
	ELC Ecosite Codes ¹	Habitat Description ¹	Detailed Information and Sources ¹	Defining Criteria ¹	Assessment Details
Alvar					
<p><u>Rationale:</u> Alvars are extremely rare habitats in Ecoregion 6E. Most alvars in Ontario are in Ecoregion 6E and 7E. Alvars in 6E are small and highly localized just north of the Palaeozoic-Precambrian contact.</p>	<p>ALO1 ALS1 ALT1 FOC1 FOC2 CUM2 CUS2 CUT2-1 CUW2</p> <p>Five Alvar</p> <p>Indicator Species: 1) Carex crawei 2) Panicum philadelphicum 3) Eleocharis compressa 4) Scutellaria parvula 5) Trichostema branchiatum</p> <p>These indicator species are very specific to Alvars within Ecoregion 6E</p>	<p>An alvar is typically a level, mostly unfractured calcareous bedrock feature with a mosaic of rock pavements and bedrock overlain by a thin veneer of soil. The hydrology of alvars is complex, with alternating periods of inundation and drought. Vegetation cover varies from sparse lichen-moss associations to grasslands and shrublands and comprising a number of characteristic or indicator plant. Undisturbed alvars can be phyto- and zoo geographically diverse, supporting many uncommon or are relict plant and animals species. Vegetation cover varies from patchy to barren with a less than 60% tree cover^{lxviii}.</p>	<p>An Alvar site > 0.5 ha in size^{lxv}.</p> <p><u>Information Sources</u></p> <ul style="list-style-type: none"> Alvars of Ontario (2000), Federation of Ontario Naturalists^{lxvi}. Ontario Nature – Conserving Great Lakes Alvars^{ccviii}. Natural Heritage Information Center (NHIC) has location information on their website Field Naturalist clubs Conservation Authorities 	<p>Field studies identify four of the five Alvar indicator species^{lxv},^{cxlix} at a Candidate Alvar site is Significant.</p> <ul style="list-style-type: none"> Site must not be dominated by exotic or introduced species (<50% vegetative cover are exotics sp.). The alvar must be in excellent condition and fit in with surrounding landscape with few conflicting land uses^{lxv}. SWHMiST^{cxlix} Index #17 provides development effects and mitigation measures. 	<p>No alvars within the Subject Lands.</p> <p>Not SWH</p>

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

Rare Vegetation Community ¹	Candidate SWH			Confirmed SWH	Subject Lands
	ELC Ecosite Codes ¹	Habitat Description ¹	Detailed Information and Sources ¹	Defining Criteria ¹	Assessment Details
Old Growth Forest					
<p><u>Rationale:</u> Due to historic logging practices, extensive old growth forest is rare in the Ecoregion. Interior habitat provided by old growth forests is required by many wildlife species.</p>	<p>Forest Community Series: FOD FOC FOM SWD SWC SWM</p>	<p>Old Growth forests are characterized by heavy mortality or turnover of overstorey trees resulting in a mosaic of gaps that encourage development of a multi-layered canopy and an abundance of snags and downed woody debris.</p>	<p>Woodland Stands areas 30ha or greater in size or with at least 10 ha interior habitat assuming 100m buffer at edge of forest í.</p> <p><u>Information Sources</u></p> <ul style="list-style-type: none"> • OMNRF Forest Resource Inventory mapping • OMNRF Forester, Ecologist or Biologist • Field Local naturalist clubs • Conservation Authorities • Sustainable Forestry License (SFL) companies will possibly know locations through field operations. • Municipal forestry departments 	<p>Field Studies will determine:</p> <ul style="list-style-type: none"> • If dominant trees species of the ecosite are >140 years old, then stand is Significant Wildlife Habitat^{cxlviii} • The stand will have experienced no recognizable forestry activities^{cxlviii} • The area of Forest Ecosites combined to make up the stand is the SWH. • Determine ELC Vegetation Type for forest stand^{lxxviii} • SWHDSS^{cxlix} Index #23 provides development effects and mitigation measures. 	<p>No large old growth woodlots within the Subject Lands.</p> <p>Not SWH</p>
Savannah					
<p><u>Rationale:</u> Savannahs are extremely rare habitats in Ontario.</p>	<p>TPS1 TPS2 TPW1 TPW2 CUS2</p>	<p>A Savannah is a tallgrass prairie habitat that has tree cover between 25 – 60%.</p>	<ul style="list-style-type: none"> • No minimum size to site • Site must be restored or a natural site. • Remnant sites such as railway right of ways are not considered to be SWH. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> • Natural Heritage Information Center (NHIC) has location information on their website • OMNRF Ecologists • Field naturalists clubs • Conservation Authorities 	<p>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}.</p> <ul style="list-style-type: none"> • Area of the ELC Ecosite is the SWH. • Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics sp.). • SWHMiST^{cxlix} Index #18 provides development effects and mitigation measures. 	<p>No savannahs within the Subject Lands.</p> <p>Not SWH</p>

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

Rare Vegetation Community ¹	Candidate SWH			Confirmed SWH	Subject Lands
	ELC Ecosite Codes ¹	Habitat Description ¹	Detailed Information and Sources ¹	Defining Criteria ¹	Assessment Details
Tallgrass Prairie					
<p><u>Rationale:</u> Tallgrass Prairies are extremely rare habitats in Ontario.</p>	TPO1 TPO2	A Tallgrass Prairie has ground cover dominated by prairie grasses. An open Tallgrass Prairie habitat has < 25% tree cover.	<ul style="list-style-type: none"> No minimum size to site Site must be restored or a natural site. Remnant sites such as railway right of ways are not considered to be SWH. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> OMNR Districts Natural Heritage Information Center (NHIC) has location information available on their website Field naturalists clubs Conservation Authorities 	<p>Field studies confirm one or more of the Prairie indicator species listed in^{xxv} Appendix N should be present. Note: Prairie plant spp. list from Ecoregion 6E should be used^{cxlviii}.</p> <ul style="list-style-type: none"> Area of the ELC Ecosite is the SWH Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics). SWHMiST^{cxlix} Index #19 provides development effects and mitigation measures. 	<p>No tallgrass prairie within the Subject Lands.</p> <p>Not SWH</p>
Other Rare Vegetation Communities					
<p><u>Rationale:</u> Plant communities that often contain rare species which depend on the habitat for survival.</p>	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.	<p>ELC Ecosite codes that have the potential to be a rare ELC Vegetation Type as outlined in appendix M^{cxlviii}</p> <p>The OMNR/NHIC will have up to date listing for rare vegetation communities.</p> <p><u>Information Sources</u></p> <ul style="list-style-type: none"> Natural Heritage Information Center (NHIC) has location information available on their website OMNRF Districts Field naturalists clubs Conservation Authorities 	<p>Field studies should confirm if an ELC Vegetation Type is a rare vegetation community based on listing within Appendix M of SWHTG^{cxlviii}.</p> <ul style="list-style-type: none"> Area of the ELC Vegetation Type polygon is the SWH. SWHMiST^{cxlix} Index #37 provides development effects and mitigation measures. 	<p>Vegetation community mapping (Ecological Land Classification) was completed by Stantec and Savanta for the Hunt Club Phase 3 Lands, and by NRSI for the Resznetnik parcel in 2018. No rare vegetation communities were observed.</p> <p>Not SWH</p>

¹MNRF 2015b

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

	Wildlife Species ¹	Candidate SWH		Confirmed SWH	Subject Lands
		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. <u>Information Sources</u> • Ducks Unlimited staff may know the locations of particularly productive nesting sites. • OMNRF Wetland Evaluations for indication of significant waterfowl nesting habitat. • Reports and other information available from CAs	Studies confirmed: • Presence of 3 or more nesting pairs for listed species excluding Mallards, or • Presence of 10 or more nesting pairs for listed species including Mallards. • Any active nesting site of an American Black Duck is considered significant. • Nesting studies should be completed during the spring breeding season (April - June). Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" ^{ccxi} • A field study confirming waterfowl nesting habitat will determine the boundary of the waterfowl nesting habitat for the SWH, this may be greater or less than 120m ^{cxviii} from the wetland and will provide enough habitat for waterfowl to successfully nest. • SWHMiST ^{cxlix} Index #25 provides development effects and mitigation measures.	Suitable habitat for waterfowl nesting in the numbers required for this SWH type is not present within the Subject Lands. Not SWH
Wildlife Habitat: Bald Eagle and Osprey Nesting, Foraging and Perching Habitat					
Rationale: Nest sites are fairly uncommon in Eco-region 6E are used annually by these species. Many suitable nesting locations may be lost due to increasing shoreline development pressures and scarcity of habitat.	Osprey <u>Special Concern:</u> Bald Eagle	ELC Forest Community Series: FOD, FOM, FOC, SWD, SWM and SWC directly adjacent to riparian areas – rivers, lakes, ponds and wetlands	• Nests are associated with lakes, ponds, rivers or wetlands along forested shorelines, islands, or on structures over water. • Osprey nests are usually at the top a tree whereas Bald Eagle nests are typically in super canopy trees in a notch within the tree's canopy. • Nests located on man-made objects are not to be included as SWH (e.g. telephone poles and constructed nesting platforms). <u>Information Sources</u> • Natural Heritage Information Center (NHIC) compiles all known nesting sites for Bald Eagles in Ontario. • MNR values information (LIO/NRVIS) will list known nesting locations. Note: data from NRVIS is provided as a point and does not represent all the habitat. • Nature Counts, Ontario Nest Records Scheme data. • OMNRF Districts • Sustainable Forestry License (SFL) companies will identify additional nesting locations through field operations. • Check the Ontario Breeding Bird Atlas ^{ccv} or Rare Breeding Birds in Ontario for species documented • Reports and other information available from CAs. • Field naturalists clubs	Studies confirm the use of these nests by: • One or more active Osprey or Bald Eagle nests in an area ^{cxviii} . • Some species have more than one nest in a given area and priority is given to the primary nest with alternate nests included within the area of the SWH. • For an Osprey, the active nest and a 300m radius around the nest or the contiguous woodland stand is the SWH ^{ccvii} , maintaining undisturbed shorelines with large trees within this area is important ^{cxviii} . • For a Bald Eagle the active nest and a 400-800m radius around the nest is the SWH ^{cv} , ccvii. Area of the habitat from 400-800m is dependent on site lines from the nest to the development and inclusion of perching and foraging habitat ^{cv} . • To be significant a site must be used annually. When found inactive, the site must be known to be inactive for >3 years or suspected of not being used for >5 years before being considered not significant ^{ccvii} • Observational studies to determine nest site use, perching sites and foraging areas need to be done from mid March to mid August. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" ^{ccxi} • SWHMiST ^{cxlix} Index #26 provides development effects and mitigation measures	The wetlands and watercourses within the Subject Lands are not large enough to support Bald Eagle or Osprey. Not SWH

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

	Wildlife Species ¹	Candidate SWH		Confirmed SWH	Subject Lands
		ELC Ecosite Codes ¹	Habitat Criteria and Information Sources ¹	Defining Criteria ¹	Assessment Details
Wildlife Habitat: Woodland Raptor Nesting Habitat					
<p>Rationale: Nests sites for these species are rarely identified; these area sensitive habitats and are often used annually by these species.</p>	<p>Northern Goshawk Cooper's Hawk Sharp-shinned Hawk Red-shouldered Hawk Barred Owl Broad-winged Hawk</p>	<p>May be found in all forested ELC Ecosites.</p> <p>May also be found in SWC, SWM, SWD and CUP3.</p>	<p>All natural or conifer plantation woodland/forest stands >30ha with >10ha of interior habitat^{ixxxviii, lxxxix, xc, xcii, xciv, xcv, xcvi, cxxxiii}. Interior habitat determined with a 200m buffer^{cxlviii}.</p> <ul style="list-style-type: none"> • 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. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> • 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 	<p>Studies confirm:</p> <ul style="list-style-type: none"> • 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 	<p>Habitat of suitable size (>30ha) for woodland raptors is present within the Subject Lands, especially in the context of the larger landscape.</p> <p>Candidate SWH</p>
Wildlife Habitat: Turtle Nesting Area					
<p>Rationale: These habitats are rare and when identified will often be the only breeding site for local populations of turtles</p>	<p>Midland Painted Turtle</p> <p>Special Concern: Northern Map Turtle Snapping Turtle</p>	<p>Exposed mineral soil (sand or gravel) areas adjacent (<100m)^{cxlviii} or within the following ELC Ecosites: MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 BOO1 FEO1</p>	<ul style="list-style-type: none"> • Best nesting habitat for turtles are close to water and away from roads and sites less prone to loss of eggs by predation from skunks, raccoons or other animals. • For an area to function as a turtle-nesting area, it must provide sand and gravel that turtles are able to dig in and are located in open, sunny areas. Nesting areas on the sides of municipal or provincial road embankments and shoulders are not SWH. • Sand and gravel beaches adjacent to undisturbed shallow weedy areas of marshes, lakes, and rivers are most frequently used. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> • Use Ontario Soil Survey reports and maps to help find suitable substrate for nesting turtles (well-drained sands and fine gravels). • Check the Ontario Herpetofaunal Summary Atlas records or other similar atlases for uncommon turtles; location information may help to find potential nesting habitat for them. • Natural Heritage Information Center (NHIC) • Field Naturalist clubs and landowners 	<p>Studies confirm:</p> <ul style="list-style-type: none"> • Presence of 5 or more nesting Midland Painted Turtles • One or more Northern Map Turtle or Snapping Turtle nesting is a SWHⁱ • The area or collection of sites within an area of exposed mineral soils where the turtles nest, plus a radius of 30-100m around the nesting area dependent on slope, riparian vegetation and adjacent land use is the SWH^{cxlviii}. • Travel routes from wetland to nesting area are to be considered within the SWH^{cxlix}. • Field investigations should be conducted in prime nesting season typically late spring to early summer. Observational studies observing the turtles nesting is a recommended method. • SWHMiST^{cxlix} Index #28 provides development effects and mitigation measures for turtle nesting habitat. 	<p>The agricultural fields and former aggregate extraction areas may provide suitable nesting areas for turtles within the Subject Lands.</p> <p>Candidate SWH</p>

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

	Wildlife Species ¹	Candidate SWH		Confirmed SWH	Subject Lands
		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, cxxiii, cxiv} <u>Information Sources</u> • Topographical Map • Thermography • Hydrological surveys conducted by CAs and MOE • Field naturalists clubs and landowners • Municipalities and Conservation Authorities may have drainage maps and headwater areas mapped.	Field Studies confirm: • Presence of a site with 2 or more seeps/springs should be considered SWH. • The area of a ELC forest ecosite containing the seeps/springs is the SWH. The protection of the recharge area considering the slope, vegetation, height of trees and groundwater condition need to be considered in delineation the habitat ^{cxlviii} • SWHMIST ^{cxlix} Index #30 provides development effects and mitigation measures	Seeps/springs may be present within the Subject Lands. Candidate 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) ^{cbxxxii, bxiii, bxv, bxvi, bxvii, bxviii, bxix, bxx} Some small wetlands may not be mapped and may be important breeding pools for amphibians. • Woodlands with permanent ponds or those containing water in most years until mid-July are more likely to be used as breeding habitat ^{cxviii} <u>Information Sources</u> • Ontario Herpetofaunal Summary Atlas (or other similar atlases) for records • Local landowners may also provide assistance as they may hear spring-time choruses of amphibians on their property. • OMNRF District • OMNRF wetland evaluations • Field naturalist clubs • Canadian Wildlife Service Amphibian Road Call Survey • Ontario Vernal Pool Association: http://www.ontariovernalpools.org	Studies confirm: • Presence of breeding population of 1 or more of the listed newt/salamander species or 2 or more of the listed frog species with at least 20 individuals (adults or eggs masses) ^{bcxi} 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 ^{bxiii, bxv, bxvi, bxvii, bxviii, bxix, bxx, bxxi} if a wetland area is adjacent to a woodland, a travel corridor connecting the wetland to the woodland is to be included in the habitat. • SWHMIST ^{cxlix} Index #14 provides development effects and mitigation measures.	Suitable habitat for woodland breeding amphibians may be present within the Subject Lands. Candidate SWH

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

	Wildlife Species ¹	Candidate SWH	Confirmed SWH	Subject Lands	
		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 Pickereel Frog Green Frog Mink Frog Bullfrog	ELC Community Classes SW, MA, FE, BO, OA and SA. Typically these wetland ecosites will be isolated (>120m) from woodland ecosites, however larger wetlands containing predominantly aquatic species (e.g. Bull Frog) may be adjacent to woodlands.	<ul style="list-style-type: none"> Wetlands >500m² (about 25m diameter)^{ccvii} supporting high species diversity are significant; some small or ephemeral habitats may not be identified on MNRF mapping and could be important amphibian breeding habitats^{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. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> Ontario Herpetofaunal Summary Atlas (or other similar atlases) Canadian Wildlife Service Amphibian Road Surveys and Backyard Amphibian Call Count. OMNRF Districts and wetland evaluations Reports and other information available from CAs. 	<p>Studies confirm:</p> <ul style="list-style-type: none"> Presence of breeding population of 1 or more of the listed newt/salamander species or 2 or more of the listed frog/toad species and with at least 20 individuals (adults or eggs masses)^{lxxi, lxxiii}, or 2 or more of the listed frog/toad species with Call Level Codes of 3. or; Wetland with confirmed breeding Bullfrogs are significant. The ELC ecosite wetland area and the shoreline are the SWH. A combination of observational study and call count surveys^{cviii} will be required during spring March to June) when amphibians are concentrated around suitable breeding habitat within or near the wetlands. If a SWH is determined for Amphibian Breeding Habitat (Wetlands) then Movement Corridors are to be considered as outlined in Table 1.4.1 of this Schedule. SWHMiST^{cxlix} Index #15 provides development 	Wetlands which may support this SWH are not present within the subject lands. Not SWH
Woodland Area-Sensitive Bird Breeding Habitat					
Rationale: Large, natural blocks of mature woodland habitat within the settled areas of Southern Ontario are important habitats for area sensitive interior forest song birds.	Yellow-Bellied Sapsucker Red-breasted Nuthatch Veery Blue-headed Vireo Northern Parula Black-throated Green Warbler Blackburnian Warbler Black-throated Blue Warbler Ovenbird Scarlet Tanager Winter Wren Special Concern: Cerulean Warbler Canada Warbler	All Ecosites associated with these ELC Community Series: FOC FOM FOD SWC SWM SWD	<ul style="list-style-type: none"> Habitats where interior forest breeding birds are breeding, typically large mature (>60 yrs old) forest stands or woodlots >30 ha.^{cv, cxxxi, cxxxii, cxxxiii, cxxxiv, cxxv, cxxvi, cxxvii, cxxviii, 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. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> Local bird clubs Canadian Wildlife Service (CWS) for the location of forest bird monitoring. Bird studies Canada conducted a 3-year study of 287 woodlands to determine the effects of forest fragmentation on forest birds and to greatest value to interior species Reports and other information available from CAs. 	<ul style="list-style-type: none"> Presence of nesting or breeding pairs of 3 or more of the listed wildlife species. Note: any site with breeding Cerulean Warblers or Canada Warblers is to be considered SWH. Conduct field investigations in spring and early summer when birds are singing and defending their territories. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"^{ccxi} SWHMiST^{cxlix} Index #34 provides development effects and mitigation measures. 	The subject property may provide suitable habitat for woodland area-sensitive breeding birds. Candidate SWH

¹MNRF 2015b

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

	Wildlife Species ¹	Candidate SWH	Confirmed SWH	Subject Lands	
		ELC Ecosite Codes ¹	Habitat Criteria and Information Sources ¹	Defining Criteria ¹	Assessment Details
Wildlife Habitat: Marsh Bird Breeding Habitat					
<p><u>Rationale:</u> Wetlands for these bird species are typically productive and fairly rare in Southern Ontario landscapes.</p>	<p>American Bittern Virginia Rail Sora Common Gallinule American Coot Pied-billed Grebe Marsh Wren Sedge Wren Common Loon Sandhill Crane Green Heron Trumpeter Swan</p> <p><u>Special Concern:</u> Black Tern Yellow Rail</p>	<p>MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 SAS1 SAM1 SAF1 FEO1 BOO1</p> <p>For Green Heron: All SW, MA and CUM1 sites.</p>	<ul style="list-style-type: none"> Nesting occurs in wetlands All wetland habitat is to be considered as long as there is shallow water with emergent aquatic vegetation present^{ccxiv}. For Green Heron, habitat is at the edge of water such as sluggish streams, ponds and marshes sheltered by shrubs and trees. Less frequently, it may be found in upland shrubs or forest a considerable distance from water. <p><u>Information Sources</u></p> <ul style="list-style-type: none"> Contact OMNRF, wetland evaluations are a good source of information. Field naturalist clubs Natural Heritage Information Center (NHIC) Records Reports and other information available from CAs. Ontario Breeding Bird Atlas^{ccv} 	<p>Studies confirm:</p> <ul style="list-style-type: none"> Presence of 5 or more nesting pairs of Sedge Wren or Marsh Wren or 1 pair of Sandhill Cranes; or breeding by any combination of 5 or more of the listed species¹. Note: any wetland with breeding of 1 or more Black Terns, Trumpeter Swan, Green Heron or Yellow Rail is SWH¹. Area of the ELC ecosite is the SWH Breeding surveys should be done in May/June when these species are actively nesting in wetland habitats. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"^{ccxi}. SWHMIST^{cxlix} Index #35 provides development effects and mitigation measures. 	<p>The marsh habitats within the Subject Lands are not large enough to support this SWH.</p> <p>Not SWH</p>
Wildlife Habitat: Open Country Bird Breeding Habitat					
<p><u>Rationale:</u> This wildlife habitat is declining throughout Ontario and North America. Species such as the Upland Sandpiper have declined significantly the past 40 years based on CWS (2004) trend records.</p>	<p>Upland Sandpiper Grasshopper Sparrow Vesper Sparrow Northern Harrier Savannah Sparrow</p> <p><u>Special Concern:</u> Short-eared Owl</p>	<p>CUM1 CUM2</p>	<p>Large grassland areas (includes natural and cultural fields and meadows) >30 ha^{cbx, cbxi, cbxii, cbxiii, cbxiv, cbxv, cbxvi, cbxvii, cbxviii, cbxix}. Grasslands not Class 1 or 2 agricultural lands, and not being actively used for farming (i.e. no row cropping or intensive hay or livestock pasturing in the last 5 years)¹.</p> <p>Grassland sites considered significant should have a history of longevity, either abandoned fields, mature hayfields and pasturelands that are at least 5 years or older.</p> <p>The Indicator bird species are area sensitive requiring larger grassland areas than the common grassland species.</p> <p><u>Information Sources</u></p> <ul style="list-style-type: none"> Agricultural land classification maps, Ministry of Agriculture. Ask local birders Ontario Breeding Bird Atlas^{ccv} Reports and other information available from CAs. 	<p>Field Studies confirm:</p> <ul style="list-style-type: none"> Presence of nesting or breeding of 2 or more of the listed species. A field with 1 or more breeding Short-eared Owl is to be considered SWH. The area of SWH is the contiguous ELC ecosite field areas. Conduct field investigations of the most likely areas in spring and early summer when birds are singing and defending their territories. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"^{ccxi}. SWHMIST^{cxlix} Index #32 provides development effects and mitigation measures. 	<p>Large fallow fields or grasslands of suitable size and composition are not present within the Subject Lands.</p> <p>Not SWH</p>

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

	Wildlife Species ¹	Candidate SWH		Confirmed SWH	Subject Lands
		ELC Ecosite Codes ¹	Habitat Criteria and Information Sources ¹	Defining Criteria ¹	Assessment Details
Wildlife Habitat: Shrub/Early Successional Bird Breeding Habitat					
<p>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.</p>	<p>Indicator spp.: Brown Thrasher Clay-coloured Sparrow</p> <p>Common spp.: Field Sparrow Black-billed Cuckoo Eastern Towhee Willow Flycatcher</p> <p>Special Concern: Yellow-breasted Chat Golden-winged Warbler</p>	<p>CUT1 CUT2 CUS1 CUS2 CUW1 CUW2</p> <p>Patches of shrub ecosites can be complexed into a larger habitat for some bird species.</p>	<p>Large field areas succeeding to shrub and thicket habitats >10ha^{cxiv} in size.</p> <ul style="list-style-type: none"> Shrub land or early successional fields, not class 1 or 2 agricultural lands, not being actively used for farming (i.e. no row-cropping, haying or live-stock pasturing in the last 5 years)ⁱ. <p>Shrub thicket habitats (>10 ha) are most likely to support and sustain a diversity of these species^{cxiii}.</p> <p>Shrub and thicket habitat sites considered significant should have a history of longevity, either abandoned fields or pasturelands.</p> <p>Information Sources</p> <ul style="list-style-type: none"> Agricultural land classification maps Ministry of Agriculture Local bird clubs Ontario Breeding Bird Atlas^{ccv} Reports and other information available from 	<p>Field Studies confirm:</p> <ul style="list-style-type: none"> Presence of nesting or breeding of 1 of the indicator species and at least 2 of the common speciesⁱ. 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. 	<p>Early successional fields or large thicket habitats of suitable size are not present within the Subject Lands.</p> <p>Not SWH</p>
Wildlife Habitat: Terrestrial Crayfish					
<p>Rationale: Terrestrial Crayfish are only found within SW Ontario in Canada and their habitats are very rare.^{ccii}</p>	<p>Chimney or Digger Crayfish: (<i>Fallicambarus fodiens</i>)</p> <p>Devil Crawfish or Meadow Crayfish: (<i>Cambarus Diogenes</i>)</p>	<p>MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 MAS1 MAS2 MAS3 SWD SWT SWM</p>	<p>Wet meadow and edges of shallow marshes (no minimum size) identified should be surveyed for terrestrial crayfish.</p> <ul style="list-style-type: none"> 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. <p>Information Sources</p> <ul style="list-style-type: none"> Information sources from "Conservation Status of Freshwater Crayfishes" by Dr. Premek Hamr for the WWF and CNF March 1998 	<p>Studies Confirm:</p> <ul style="list-style-type: none"> 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 <p>Note the presence of burrows or chemistry are often the only indicator of presence, observation or collection of individuals is very difficult^{cci}</p> <ul style="list-style-type: none"> SWHMiST^{cxlix} Index #36 provides development effects and mitigation measures. 	<p>Shallow marsh habitats are present within the Subject Lands.</p> <p>Candidate SWH</p>

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

	Wildlife Species ¹	Candidate SWH		Confirmed SWH	Subject Lands
		ELC Ecosite Codes ¹	Habitat Criteria and Information Sources ¹	Defining Criteria ¹	Assessment Details
Wildlife Habitat: Special Concern and Rare Wildlife Species					
<p><u>Rationale:</u> These species are quite rare or have experienced significant population declines in Ontario.</p>	<p>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.</p>	<p>All plant and animal element occurrences (EO) within a 1 or 10km grid.</p> <p>Older element occurrences were recorded prior to GPS being available, therefore location information may lack accuracy.</p>	<p>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^{bcxviii}.</p> <p><u>Information Sources</u></p> <ul style="list-style-type: none"> • 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. 	<p>Studies Confirm:</p> <ul style="list-style-type: none"> • 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 	<p>Several Species of Conservation Concern (Special Concern or S Ranks S1-S3) may be present within the Subject Lands (for more information see the species lists).</p> <p>Candidate SWH</p>

¹MNRF 2015b

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

	Wildlife Species ¹	Candidate SWH	Confirmed SWH	Subject Lands	
		ELC Ecosite Codes ¹	Habitat Criteria and Information Sources ¹	Defining Criteria ¹	Assessment Details
Wildlife Habitat: Amphibian Movement Corridors					
<p>Rationale: Movement corridors for amphibians moving from their terrestrial habitat to breeding habitat can be extremely important for local populations.</p>	<p>Eastern Newt Blue-spotted Salamander Spotted Salamander Gray Treefrog Spring Peeper Western Chorus Frog Northern Leopard Frog Pickerel Frog Green Frog Mink Frog Bullfrog</p>	<p>Corridors may be found in all ecosites associated with water.</p> <ul style="list-style-type: none"> Corridors will be determined based on identifying the significant breeding habitat for these species in Table 1.1. 	<p>Movement corridors between breeding habitat and summer habitat^{cxixiv, cxixv, cxixvi, cxixvii, cxixviii, cxixix, cxixx, cxixxi}</p> <p>Movement corridors must be determined when Amphibian breeding habitat is confirmed as SWH from Table 1.2.2 (Amphibian Breeding Habitat – Wetland) of this Scheduleⁱ.</p> <p><u>Information Sources</u></p> <ul style="list-style-type: none"> MNRF District Office Natural Heritage Information Center NHIC Reports and other information available from CAs Field Naturalist Clubs 	<ul style="list-style-type: none"> Field Studies must be conducted at the time of year when species are expected to be migrating or entering breeding sites. Corridors should consist of native vegetation, with several layers of vegetation. Corridors unbroken by roads, waterways or bodies, and undeveloped areas are most significant^{cxlix}. Corridors should have at least 15m of vegetation on both sides of waterway^{cxlix} or be up to 200m wide^{cxlix} of woodland habitat and with gaps <20m^{cxlix}. Shorter corridors are more significant than longer corridors, however amphibians must be able to get to and from their summer and breeding habitat^{cxlix}. SWHMiST^{cxlix} Index #40 provides development effects and mitigation measures. 	<p>No Amphibian Breeding Habitat (wetland) is present within the Subject Lands.</p> <p>Not SWH</p>
Wildlife Habitat: Deer Movement Corridors					
<p>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.</p>	<p>White-tailed Deer</p>	<p>Corridors may be found in all forested ecosites.</p> <p>A Project Proposal in Stratum II Deer Wintering Area has potential to contain corridors.</p>	<p>Movement corridor must be determined when Deer Wintering Habitat is confirmed as SWH from Table 1.1 of this scheduleⁱ.</p> <ul style="list-style-type: none"> 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^{cxixxii, cxixxiii, cxlix, cxxciv} Corridors typically follow riparian areas, woodlots, areas of physical geography (ravines, or ridges). <p><u>Information Sources</u></p> <ul style="list-style-type: none"> MNRF District Office Natural Heritage Information Center (NHIC) Reports and other information available from CAs Field Naturalist Clubs 	<ul style="list-style-type: none"> 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. 	<p>The MNRF has mapped the southern and eastern woodlands within the subject lands as Stratum II deer wintering areas, therefore it is possible that a movement corridor is present within the Subject Lands.</p> <p>Candidate SWH</p>

¹MNRF 2015b

Subject: RE: Hunt Club Phase 5, Cambridge Ontario - EIS Terms of Reference (proj2204) - Region Comments (proj2204a)
From: Jane Gurney <JGurney@regionofwaterloo.ca>
Date: 7/9/2019, 8:58 AM
To: 'Nyssa Hardie' <nhardie@nrsi.on.ca>, Sylvia Rafalski-Misch <SRafalskiMisch@regionofwaterloo.ca>
CC: Jennifer McCarter <jmccarter@nrsi.on.ca>

Nyssa,

I apologize for not providing comments directly to you previously, I had reviewed the Terms of Reference but can't find any email response to you with my comment. I am sorry about this. The comments I have are below:

Regional staff have reviewed the "Hunt Club Phase 5, Cambridge: Environmental Impact Study – Terms of Reference" prepared by Natural Resource Solutions Inc. (April 9, 2019). Regional staff concur with the comments provided by the GRCA (May 8, 2019) and the City of Cambridge (May 13, 2019). The only further comment offered by the Region is to include reference to the Region of Waterloo Greenlands Network Implementation Guideline (GNIG) and ensure that methodologies proposed are in accordance with the GNIG. If any survey methods do not conform to the GNIG (e.g. Breeding Bird Surveys) explanation as to the standard protocols followed should be included in the EIS.

Please contact Jane Gurney (jgurney@regionofwaterloo.ca, 519-575-4500 Ext. 3454) for questions or clarification on the above, or if you would like to arrange a site visit with Regional staff to delineate any Regionally designated environmental features.

I am sorry that the above wasn't provided earlier. Please let me know if you have any questions or concerns.
Jane

Jane E. Gurney

Principal Planner

Community Planning

Region of Waterloo

Tel: 519-575-4500 Ext. 3454

JGurney@regionofwaterloo.ca

From: Nyssa Hardie [mailto:nhardie@nrsi.on.ca]

Sent: Tuesday, July 09, 2019 8:32 AM

To: Sylvia Rafalski-Misch; Jane Gurney

Cc: Jennifer McCarter

Subject: Re: Hunt Club Phase 5, Cambridge Ontario - EIS Terms of Reference (proj2204) - Region Comments (proj2204a)

Hi Sylvia and Jane,

I have not received a response to my email below. I am waiting on the Region's comments on the Hunt Club Phase 5 Terms of Reference so that I can finalize the document. I hear that you are both very busy these days and that you may be backed up. I would appreciate a response to my inquiry / comments on the TOR within the next 2 weeks (i.e. by July 24).

Thank you, I appreciate your attention to this matter.
Nyssa

Nyssa Hardie M.Sc.
Ecohydrologist
Natural Resource Solutions Inc.
415 Phillip Street, Unit C
Waterloo, ON N2L 3X2
(p) 519-725-2227 Ext. 231 (f) 519-725-2575
(m) 519-577-2003
(w) www.nrsi.on.ca (e) nhardie@nrsi.on.ca
[@nrsinews](#)

On 2019-05-29 12:39 p.m., Nyssa Hardie wrote:

Hi Sylvia and Jane,

Has the Region had a chance to review our Terms of Reference for the Hunt Club Phase 5 lands in Cambridge? I plan to address all comments at once and re-submit once. Please let me know when you anticipate you can have comments to us.

Thanks,
Nyssa

Nyssa Hardie M.Sc.
Ecohydrologist
Natural Resource Solutions Inc.
415 Phillip Street, Unit C
Waterloo, ON N2L 3X2
(p) 519-725-2227 Ext. 231 (f) 519-725-2575
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[@nrsinews](#)

On 2019-05-15 12:17 p.m., Sylvia Rafalski-Misch wrote:

I am copying Jane Gurney, our Environmental Planner on this correspondence. Please make sure to include Jane in the EIS ToFR discussions. Thanks.

Sylvia

From: Kathy Padgett [<mailto:PadgettK@cambridge.ca>]
Sent: Monday, May 13, 2019 2:46 PM
To: John Brum; Nyssa Hardie; Sylvia Rafalski-Misch; Buck, Graham (MNRF)

Cc: Bryan Cooper; Matthew Blevins; sarontario@ontario.ca; Terri Johns; Jacqueline Svedas; James Warren; Jennifer McCarter; Tony Zammit

Subject: RE: Hunt Club Phase 5, Cambridge Ontario - EIS Terms of Reference (proj2204) - Resubmission-GRCA Comments

Hi Nyssa,

I have reviewed the Terms of Reference and provide the following comments:

1. With respect to Project Background, the City of Cambridge Official Plan also identifies Locally Significant Natural Areas (LSNAs) in addition to Core Environmental Features. See 3.A.4 of the Cambridge Official Plan for more information.
2. Seeing as the site has the potential to provide bat roosting and maternity habitat I'm curious as to why field surveys have not been included in the scope of work.
3. If trails are to be included as part of the development, please review trails as part of the EIS with respect to their location in/adjacent to buffers and associated impacts/mitigation measures.
4. Please include me on site visits for both the wetland and woodland boundary delineations.

Thank you for the opportunity to comment.

Kathy Padgett, MES (Pl.)
Senior Planner – Environment

City of Cambridge
Community Development Department
50 Dickson St, 3rd Floor
PO Box 669
Cambridge ON N1R 5W8
Phone (519) 623-1340 ext. 4826
Fax (519) 740-9545
PadgettK@Cambridge.ca

From: John Brum [<mailto:jbrum@grandriver.ca>]

Sent: Wednesday, May 08, 2019 1:33 PM

To: Nyssa Hardie; Kathy Padgett; Sylvia Rafalski-Misch; Buck, Graham (MNRF)

Cc: Bryan Cooper; Matthew Blevins; sarontario@ontario.ca; Terri Johns; Jacqueline Svedas; James Warren; Jennifer McCarter; Tony Zammit

Subject: RE: Hunt Club Phase 5, Cambridge Ontario - EIS Terms of Reference (proj2204) - Resubmission-GRCA Comments

Hi Nyssa:

The terms of reference submitted by NRSI are generally acceptable. We can offer a couple of minor comments, which can be addressed as part of the EIS.

1. It is requested that the GRCA's current wetland mapping be reviewed more closely. The GRCA has mapped 2 separate wetland units immediately north of Briardean Road whereas only 1 large unit is mapped by the Province. Given the time that has elapsed since the Savanta EIS was completed (2012), I agree that all wetland boundaries will need to be delineated by NRSI and subsequently verified in the field with the GRCA. Site visits should be scheduled when site conditions are appropriate. All wetland boundaries will also need to be surveyed using a high quality GPS unit.
2. The inclusion of pre-, during-, and post-development monitoring recommendations will be a key section of the EIS report. It would be beneficial to obtain a copy of Savanta's 2018 monitoring report to ensure some level of consistency in field methods and sampling locations. Unfortunately, a map illustrating creek and wetland sampling locations were not included with Savanta's report.
3. A brief terms of reference that clearly outlines how pre- and post-development water balance within all wetland areas on the subject lands will be assessed is also required. I presume the terms of reference and resultant hydrogeology report is will be prepared by a qualified hydrogeologist and submitted under separate cover.

We trust the above is of assistance on this matter.

Regards,

cid:image1 **John Brum** | Resource Planner
Grand River Conservation Authority
400 Clyde Road, PO Box 729, Cambridge, Ontario N1R 5W6
Tel: 519-621-2763 x2233 | Fax: 519-621-4945 | Toll free: 1-866-900-4722
jbrum@grandriver.ca

From: Nyssa Hardie [<mailto:nhardie@nrsi.on.ca>]
Sent: Tuesday, April 16, 2019 3:46 PM
To: John Brum; Kathy Padgett; Sylvia Rafalski-Misch; Buck, Graham (MNRF)
Cc: cooperb@cambridge.ca; blevinsm@cambridge.ca; sarontario@ontario.ca; Terri Johns; Jacqueline Svedas; James Warren; Jennifer McCarter
Subject: Hunt Club Phase 5, Cambridge Ontario - EIS Terms of Reference (proj2204) - Resubmission

Hello,
Thank you for raising the issue with font in my previous email. Please refer to this email and it's attachments for your review of our Terms of Reference for the Hunt Club Phase 5 EIS. I believe I have solved the issue with the font. Please let me know if the issue persists.

Natural Resource Solutions Inc. has been retained by the owner of 1285

Speedsville Road and 800 Briardean Road to complete an Environmental Impact Study (EIS). A terms of reference has been developed based on a detailed background review and comments received as part of the pre-consultation meeting held on March 31, 2019. The lands are located at the southeast corner of the Maple Grove Road and Speedsville Road intersection in Cambridge, Ontario (see the attached TOR and maps).

The background review included the following sources:

City of Cambridge Official Plan (2018a);

- Region of Waterloo Official Plan (2015);
- Hespeler West Subwatershed Study (HWSS) Summary Report (2005)
- Environmental Impact Study for the Hunt Club Valley Inc. and Arriscraft Lands (Savanta Inc. 2012)
- MNRF Species at Risk (SAR) List for Waterloo Region (2018);
- MNRF SAR list for the City of Cambridge (2019)
- GRCA – Grand River Conservation Network: Interactive Mapping Tool (2016);
- MNRF Make A Map: Natural Heritage Areas online mapping tool (MNRF 2014);
- Government of Canada *Species at Risk Act* (SARA) Registry (2011);
- Ontario Breeding Bird Atlas (BSC et al. 2008);
- Ontario Reptile and Amphibian Atlas (ORAA) (Ontario Nature 2019);
- Atlas of the Mammals of Ontario (Dobbyn 1994);
- Fisheries and Oceans Canada - Aquatic SAR Mapping (2018);
- Ontario Butterfly Atlas (MacNaughton et al. 2019); and
- Ontario Odonata Atlas (2019).

Additional information was gathered through background information requests to the Guelph District MNRF and the GRCA.

The potential for Species at Risk habitat and Significant Wildlife Habitat has been evaluated through a desktop screening exercise and site reconnaissance. A summary of the SAR and SWH screenings are provided in Appendix I and II of the Terms of Reference, respectively.

We are available to discuss the Terms of Reference and our proposed approach to the EIS, should you have any questions. Please review the attached and provide any comments you may have to me, Jennifer McCarter (NRSI), Jacqueline Svedas (T. Johns Consulting), and Terri Johns (T. Johns Consulting), who are cc'd to this email.

Regards,
Nyssa

--

Our main office in Waterloo has moved! Please note change of address below.

cid:image001.png

Nyssa Hardie M.Sc.

Ecohydrologist

Natural Resource Solutions Inc.

415 Phillip Street, Unit C

Waterloo, ON N2L 3X2

(p) 519-725-2227 Ext. 231 (f) 519-725-2575

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(w) www.nrsi.on.ca (e) nhardie@nrsi.on.ca

cid @nrsinews

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Subject: RE: Hunt Club Phase 5, Cambridge Ontario - EIS Terms of Reference (proj2204) - Resubmission-GRCA Comments
From: "Buck, Graham (MNRF)" <Graham.Buck@ontario.ca>
Date: 5/13/2019, 3:13 PM
To: Nyssa Hardie <nhardie@nrsi.on.ca>
CC: Kathy Padgett <PadgettK@cambridge.ca>

Hi Nyssa,

Recently MNRF has been looking at the best option for completing surveys for bats, because of the potential for significant wildlife habitat. Specifically the guidance on conducting surveys in the Bats and Bat Habitats: Guidelines for Wind Power Projects predates a lot of the work that went into advising consultants on surveys for species at risk bats. However I feel there is enough flexibility in the Significant Wildlife Habitat Technical Guide to allow for deviation from the proposed methods, as long as what is proposed is as good or better. Therefore I feel that if surveys are warranted for bats (i.e. there is the potential for direct or indirect impacts to bat habitat) it maybe best to use one method for all bats, rather than one for SAR bats and another for the non SAR bats. However as the approval authority the City of Cambridge will need to approve with the approach that is proposed; as would MECP for SAR bats.

Graham

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From: Kathy Padgett <PadgettK@cambridge.ca>
Sent: May-13-19 2:46 PM
To: John Brum <jbrum@grandriver.ca>; Nyssa Hardie <nhardie@nrsi.on.ca>; Sylvia Rafalski-Misch <SRafalskiMisch@regionofwaterloo.ca>; Buck, Graham (MNRF) <Graham.Buck@ontario.ca>
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Subject: RE: Hunt Club Phase 5, Cambridge Ontario - EIS Terms of Reference (proj2204) - Resubmission-GRCA Comments

Hi Nyssa,

I have reviewed the Terms of Reference and provide the following comments:

Appendix V

Detailed Vegetation Management Plans



River Mill Community, Phase 4

Detailed Vegetation Management Plan

Prepared for:

River Mill Development Corporation
2000 Garth Street, Suite 201
Hamilton, Ontario
L9B 0C1

Project No. 2204B | November 2020



NATURAL RESOURCE SOLUTIONS INC.

Aquatic, Terrestrial and Wetland Biologists

River Mill Community, Phase 4
Detailed Vegetation Management Plan

Project Team

David Stephenson	Senior Biologist, Project Advisor
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Joseph Lance	Terrestrial & Wetland Biologist, Certified Arborist, Qualified Tree Appraiser
Laura Hockley	GIS Specialist & Environmental Analyst

Report submitted on November 5, 2020



Joseph Lance
Terrestrial & Wetland Biologist / Certified Arborist (ON-1877A)

Table of Contents

1.0	Introduction	1
2.0	Tree Inventory and Methods.....	3
2.1	Bat Habitat Assessment	5
3.0	Summary of Tree Inventory Findings.....	6
3.1	Bat Habitat Findings.....	6
3.2	Butternuts	6
4.0	Tree Removal and Retention Analysis.....	8
4.1	Butternut Impact.....	8
5.0	Tree Protection Measures and Recommended Mitigation.....	10
5.1	Prior to Construction	10
5.1.1	Migratory Birds Convention Act.....	11
5.2	During Construction.....	11
5.3	Post-Construction	12
5.4	Compensation	12
5.4.1	Butternut Compensation	13
5.5	Mitigation	13
6.0	Conclusion.....	15
7.0	References.....	16

Maps

Map 1. Study Area

Map 2. Detailed Vegetation Management Plan

Map 3. Tree Protection Fencing Plan

List of Appendices

APPENDIX I Tree Inventory Data

APPENDIX II Tree Health and Potential for Structural Failure Criteria

APPENDIX III Conditions of Assessment

APPENDIX IV Tree Data and Summary Tables

APPENDIX V Tree Compensation Fees

1.0 Introduction

Natural Resource Solutions Inc. (NRSI) was retained in March 2019 by River Mill Development Corporation (the Client) to complete an Environmental Impact Study (EIS) and a Tree Inventory and Detailed Vegetation Management Plan (DVMP) for a proposed mixed-use development, referred to as the “River Mill Community” in Cambridge, Ontario.

The scope of this DVMP includes the two parcels composing Phase 4 of the proposed River Mill Community, hereafter referred to as the ‘Subject Lands’. These parcels total 46.3ha in area proposed for development and are located south of Maple Grove Road and east of Speedsville Road (Map 1). Another parcel to the south, also owned by the Client, is a former mineral aggregate resource extraction area (License #: 5537 and 46162; active until August 14, 2017). and was previously included in the approved Draft Plan of Subdivision 30T-12103 (Hunt Club - Phase 3). The majority of the Subject Lands is characterized by active agricultural lands. The remaining areas of the Subject Lands are characterized by wetlands, woodlands, and the Middle Creek riparian corridor. Phase 5 of the River Mill Community is to the northeast of the Subject Lands and is addressed under separate cover.

The following report has been prepared to satisfy the City of Cambridge’s Private Tree Preservation By-Law 124-18 (City of Cambridge 2018a). City of Cambridge By-Law 124-18 aims to regulate the destruction or injuring of trees on private property within City limits and to enhance tree canopy cover in the City. The City’s Tree Management Policies and Guidelines for New Developments (City of Cambridge 2002) requires that a DVMP considering all trees with a diameter-at-breast-height (DBH) $\geq 10\text{cm}$ is prepared by a recognized professional in tree management, which includes International Society of Arboriculture (ISA) Certified Arborists. Certified Arborists from NRSI completed all assessments in accordance with these policy documents.

Within the Private Tree Preservation By-law 124-18, a regulated tree consists of any self-supporting woody plant that will reach a height of at least 4.5m at maturity. By-law 124-18 prohibits “the destruction or injuring of any tree with a DBH equal to or greater than 20cm” without a permit; an exemption is made for the injuring or destruction of trees as a condition to the approval of *Planning Act* applications (City of Cambridge 2018a). This DVMP is prepared as part of the Client’s Draft Plan of Subdivision.

This DVMP provides the findings of the tree inventory, analysis of construction plans against the overall health and the structural integrity (referring to the potential for structural failure) of trees, protection measures for trees to be retained, and recommended mitigation and compensation measures. The tree data and mapping has been compared to the layout of the Draft Plan of Subdivision prepared by T. Johns Consulting Group (revised September 14, 2020). Map 2 shows the tree inventory data overlaying the proposed development plan. Avoidance, mitigation, and protection measures for trees were examined to determine which trees would be impacted and which could be retained. In the case of trees requiring removal, compensation for removal is discussed.

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 Draft Plan;
- Protection measures for trees to be retained; and
- Recommended mitigation measures.

2.0 Tree Inventory and Methods

A comprehensive tree inventory and assessment was conducted by NRSI Certified Arborists on October 4 & 17, 2019. The inventory included the assessment of all trees $\geq 10\text{cm}$ DBH within the Subject Lands that may be impacted by the proposed development (i.e. outside of the significant natural heritage features) as well as trees on adjacent lands with the potential to be impacted by the proposed development. This includes boundary trees (i.e. trees with shared ownership located on the boundary between the Subject Lands and adjacent lands) and off-property trees (i.e. trees located on neighbouring lands, owned by others). Also included here are all Endangered Butternut (*Juglans cinerea*) trees, regardless of their size, that were identified by NRSI staff during tree inventory or other field work on the Subject Lands and adjacent lands to the south, for which a different application is being submitted.

Natural features within the Subject Lands include Middle Creek, significant woodlands, wetlands that form part of the Maple Grove Road Provincially Significant Wetland (PSW) Complex, as well as habitat for endangered or threatened species, as described in the corresponding EIS under separate cover (NRSI 2020). These features are identified as Core Environmental Features by the Region of Waterloo (2015) and the City of Cambridge (2018b). Development will be confined to the area outside these features and their associated buffers; therefore, individual trees were not inventoried from within natural heritage features.

All trees located on the Subject Lands were tagged with pre-numbered aluminum forestry tags. All off-property and boundary trees were assigned an alphabetical identifier and were not tagged. The locations of the trees inventoried were surveyed by the Certified Arborist using an SXBlue II GNSS GPS unit and are shown on Map 2. For trees with more than one stem, the DBH is presented as the sum of diameters of up to the largest three stems, as per the definition in By-law 124-18. 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 all inventoried trees:

- Tree location;
- Tag number (where applicable);
- Species (common and scientific name);
- DBH (cm);
- Crown radius (m);
- General health (excellent, good, fair, poor, very poor, dead);

- Potential for structural failure (improbable, possible, probable, imminent); and
- General comments (i.e. disease, aesthetic quality, development constraints, sensitivity to development, etc.).

The overall health of each tree was assessed based on the criteria outlined in Appendix II, and was compared to the criteria outlined in the Tree Management Policies and Guidelines for New Developments (referred to throughout this report as the 'City Guidelines') (City of Cambridge 2002). Both sets of criteria are very similar, with the exception that the criteria outlined in Appendix II assesses health using 6 rankings (i.e. excellent, good, fair, poor, very poor, dead), whereas the City Guidelines (2002) assess health using 4 ratings (i.e. good, fair, poor, dead), and are defined as follows:

- **Good:** dead branches less than 10%, signs of good compartmentalization on any wounds, no structural defects;
- **Fair:** 10-30% dead branches, size or occurrence of wounds presents some concerns, minor structural defects;
- **Poor:** more than 30% dead branches, weak compartmentalization, early leaf drop, presence of insects/disease, major structural defects; and
- **Dead:** tree shows no signs of life.

As such, any trees assessed in excellent or very poor health can be considered to be in good or poor health, respectively, according to the City Guidelines (2002). The potential for structural failure 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. 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, the condition of any visible root structures, the degree and direction of lean (if any), the general condition of the tree and the surrounding site, and the current or planned proximity of property and people. None of the trees examined were dissected, cored, probed or climbed, and detailed root 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

There are 4 bat species with records in the vicinity that are listed as Endangered provincially and are afforded general habitat protection under the *Endangered Species Act (ESA)* (2007). As part of the tree health assessments, NRSI's Certified Arborists, who are trained and experienced in the Ministry of Natural Resources and Forestry (MNRF) bat habitat assessment protocols (OMNR 2011, MNRF 2017) visually scanned all trees $\geq 10\text{cm}$ DBH for the presence of features (i.e. cavities, loose bark, etc.) that may provide bat maternity colony habitat for Little Brown Myotis (*Myotis lucifugus*) or Northern Myotis (*Myotis septentrionalis*). However, since the inventory was completed during leaf-on conditions when features may have been obscured by foliage, a separate habitat assessment was also conducted by NRSI biologists during leaf-off conditions on March 21, 2019 as part of surveys completed for the EIS (refer to NRSI 2020).

3.0 Summary of Tree Inventory Findings

In total, 257 trees were inventoried, consisting of 24 species. Of the trees inventoried and assessed, 219 (85%) are native species, dominated by Trembling Aspen (*Populus tremuloides*) and Red Pine (*Pinus resinosa*); 38 (15%) are non-native species, dominated by Scots Pine (*Pinus sylvestris*) and Crack Willow (*Salix fragilis*). The largest concentration of inventoried trees (47%) is in Block 28 or the Maple Grove Road ROW in the northwest portion of the Subject Lands.

Three regionally rare species were recorded: 5 Black Walnut (*Juglans nigra*), 5 Eastern Cottonwood (*Populus deltoides*), and 9 White Spruce (*Picea glauca*). Each of these species is denoted by Richardson and Martin (1999) as being regionally rare if demonstrably indigenous, though most populations in Waterloo Region are thought to be of non-indigenous origin. Two Black walnuts (trees #23-24) have naturalized beside a large soil stockpile; 1 Eastern Cottonwood (tree 'cu') is dead. The remaining specimens of these three species are planted or naturalized along existing roadways or yards. Therefore, it is unlikely that any of the living trees of these species are demonstrably indigenous in origin and they do not warrant special consideration.

Of the 30 Ash trees (*Fraxinus* spp.) inventoried, 83% are in poor or very poor health, or dead. Many of these have confirmed or suspected evidence of infestation by the Emerald Ash Borer (EAB) beetle (*Agilus planipennis*).

A complete list of inventoried trees is provided in Appendix I and tree locations are shown on Map 2. Appendix IV provides a summary of the overall condition of trees inventoried, along with their potential for structural failure rating. Nearly half (114) of the trees inventoried are in good or fair condition with an improbable potential for structural failure while, notably, 37 inventoried trees were dead.

3.1 Bat Habitat Findings

Please refer to the EIS for more information (NRSI 2020).

3.2 Butternuts

Nine Butternut trees were observed within the Subject Lands, and an additional 3 were recorded in the Study Area, from the adjacent lands to the south for which a different application (Draft Plan of Subdivision No. 30T-12104) was submitted (Map 2). Five of these trees were identified

during tree inventory field work and a Certified Arborist collected the information outlined in Section 2.0; the remaining seven Butternuts were identified during other field surveys and limited information was collected. Therefore, some Butternuts are displayed on Map 2 without a crown size but this does not indicate that they are without a crown.

This species is listed as Endangered (MNR 2020) under the provincial *Endangered Species Act* (ESA, 2007). Under the ESA and Section 23.7 of Ontario Regulation 242/08, it is an offence to kill, harm, or take a live Butternut tree that is not exempt from protection. Butternut specimens that may be exempt from protection under the ESA include genetic hybrids, cultivated individuals that were not planted as a condition of a permit under the ESA, and specimens severely impacted by the Butternut canker (*Ophiognomonia clavignenti-juglandacearum*) (Government of Ontario 2014). Determinations of infection by the Butternut canker, potential for hybridity, and cultural origin are made through a Butternut Health Assessment by a Butternut Health Assessor (BHA) qualified by the Ministry of Natural Resources and Forestry (MNR). The purpose of the assessment is to determine the health Category that reflects the tree's condition and the tree's proximity to other Butternuts infected with Butternut canker. As a result of such an assessment, a Butternut is classified as one of: Category 1, "non-retainable"; Category 2, "retainable"; or Category 3, "archivable". Trees classified as Category 1 are not afforded protection under the ESA. Butternut trees JUG-006, JUG-007, and JUG-010 were classified as Category 2, and the others from the Subject Lands and Study Area were classified as Category 1.

4.0 Tree Removal and Retention Analysis

This analysis has been conducted using the Draft Plan (revised September 14, 2020), not a detailed grading plan for the Subject Lands; a re-analysis may be necessary when grading plans are available.

Of the 257 inventoried trees, 9 are anticipated to be removed based on the extent of development and anticipated site grading, which is required to effectively service the lands, shown in the Draft Plan on Maps 2 and 3. One other tree has already been removed (see Section 4.1). Tree #24 is recommended as a candidate for transplant using tree spade due to its relative size, condition, and accessibility to machinery; transplant should occur in early spring or late autumn in order to maximize chance of survival.

Of the 10 trees to be removed or already removed, 3 are regionally rare tree species (2 Black Walnut, 1 Eastern Cottonwood) (Richardson and Martin 1999). As described in Section 3.0, however, these specimens are not demonstrably indigenous in origin and, therefore, are not considered regionally rare.

Most (66%) of the inventoried trees to be removed are located around an existing commercial parcel in Block 20 that is proposed to be redeveloped. It is anticipated that a further 46 trees in the southwest portion of the Subject Lands will require removal related to the widening of the ROW of Speedsville Road, as shown on the Draft Plan. Since this work is not directly related to the proposed development of the Subject Lands, these 46 trees are to be retained at this time.

4.1 Butternut Impact

All nine Butternuts from the Subject Lands and two from the Study Area (JUG-002, JUG-012) are within existing natural features that are proposed to remain as Open Space blocks (Maps 2 and 3); these 11 Butternuts will be retained. Furthermore, the applicable buffers to the natural features will prevent the proposed development from impacting the regulated habitat of most of the recorded Butternuts. The proposed construction of a street will be within 25m of JUG-006 (Category 2), constituting *harm* under the ESA. As of a site visit on April 27, 2020, clearing and grading of a field had taken place near another proposed street, associated with the Draft Plan of Subdivision No. 30T-12104. These activities extended to within 25m of JUG-002, but because this tree is Category 1, this does not constitute a contravention of the ESA.

This same clearing and grading work resulted in the removal of one young Butternut (JUG-001) that was located south of the Subject Lands. JUG-001 was assessed by a BHA as a Category

1 tree, not protected by the ESA, though removal should not have taken place until after a BHA Report was submitted and the 30-day examination period had elapsed.

5.0 Tree Protection Measures and Recommended Mitigation

5.1 Prior to Construction

Temporary tree protection fencing (TPF) will be situated where trees are adjacent to the limit of disturbance, a minimum of 1m outside the dripline. A combined sediment and erosion control fence (i.e. silt fence) and TPF is recommended where trees are situated adjacent to the limit of disturbance. This TPF is to take the form of page wire farm fencing; plastic fencing (such as snow fencing) is not acceptable (City of Cambridge 2002). Fencing is to be erected in the locations shown on Map 3.

The temporary TPF will be installed and maintained by the Developer prior to any construction activities (rough grading, vegetation and tree removal). Prior to works commencing on-site, fence installation and location is to be inspected by a Certified Arborist or other recognized professional (City of Cambridge 2002). Signage indicating the purpose of protection fencing will be attached to the TPF every 45m or less (City of Cambridge 2002). Recommended signage placement, as outlined in the City Guidelines (2002), is shown on Map 3. TPF has been recommended for the trees at the north of the Subject Lands, in Block 28, because wetland creation is proposed nearby, as shown in the New Community Conceptual Block Plan (CBP1-1) by T. Johns Consulting Group (October 7, 2020).

As per section 17 of By-law 124-18, the owner shall protect all trees within the Subject Lands until the issuance of a permit under that By-Law or final approval of any planning application (City of Cambridge 2018a). Notwithstanding, any maintenance required for a tree that is proposed for retention—such as crown pruning, deep root fertilization, tree watering, and/or soil replacement—should be completed prior to construction as outlined in the City Guidelines (2002).

Prior to any rough grading, the Certified Arborist or other recognized professional will provide written verification to the City of Cambridge, Community Services Department that all of the recommended tree protection measures have been installed in accordance with the DVMP (City of Cambridge 2002). At the discretion of the Certified Arborist or other recognized professional, minor modifications to the TPF location, as shown on Map 3, may be required if it is determined that additional trees can be retained during construction. Any proposed changes to the TPF location or tree retention will be provided in the written verification.

5.1.1 Migratory Birds Convention Act

The removal of vegetation (trees, shrubs, grasses, etc.), structures and soil piles during site grading has the potential to disrupt nesting birds. The MBCA (Government of Canada 1994) identifies a list of migratory bird species that are protected. The Act prohibits the destruction of nests, individuals and activities that would cause an adult bird to abandon a nest. Vegetation removal is to occur outside of the core nesting period for migratory birds as established by the Canadian Wildlife Service (Government of Canada 2017). This period extends from approximately April 1 through August 31. Each developer/consultant/contractor, etc. is legally obligated 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). Because the trees to be removed are few in number and mostly fencerow or isolated naturalized trees, this may qualify as 'simple habitat'. Should tree 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 City for their files in the event a record of due diligence is requested by CWS.

5.2 During Construction

Temporary TPF is to be maintained by the Developer during the entire construction period to ensure that trees being retained (including their root systems) are protected. A Certified Arborist will need to be on-site during critical stages of development to provide weekly

inspection sheets to the City's Community Department Forestry Technician pertaining to tree removals/maintenance, grading adjacent to protective areas, as outlined in section 2.3.4 of the City Guidelines (2002). Critical stages include any work in and around retained trees and prior to the commencement of grading to inspect the condition of TPF. Minor construction damage (e.g. damage to limbs or roots) to trees to be retained must be pruned using proper arboricultural techniques, and areas of disturbed root systems must be backfilled with native material immediately after damage occurs to prevent desiccation (City of Cambridge 2002). Should any of the trees intended to be retained be seriously damaged or die as a result of construction activities, consultation with the City will be required.

Areas protected by TPF shall remain undisturbed and shall not be used for temporary storage, placement or excavation of fill or top soil, the storage of construction materials or equipment, or the storage of debris. Recognizing the feeder root system of a tree often extends well beyond its dripline (i.e. outside the protected area), construction contaminants such as fuels, oils, etc. must be kept clear of tree preservation areas.

5.3 Post-Construction

It is recommended that the temporary TPF be removed upon completion of construction activities and that adjacent areas are stabilized with suitable vegetative cover. A Certified Arborist must inspect all retained trees and their rooting areas, and recommend remediation work, if needed. As outlined in section 2.3.4 of the City Guidelines, a Post-Grading Tree Maintenance Report is to be prepared by a Certified Arborist and be provided to the Community Department Forestry Technician (City of Cambridge 2002). A post-construction remediation plan may be required if damage to retained trees is noted. A final assessment should be done to ensure all protocols were met, ensuring final project approval.

5.4 Compensation

This DVMP includes an analysis of the tree retention opportunities along with a summary of proposed tree removals based on the Draft Plan (revised September 14, 2020). By-law 124-18 states that the Director of the Parks, Recreation and Culture Division, or their designate, may issue a permit to injure or destroy trees subject to conditions that may include replacing each injured or destroyed tree in a manner satisfactory to the Director (City of Cambridge 2018a).

As outlined in the Permit to Destroy or Remove Private Trees, any tree proposed for removal may require compensation as calculated based on the Tree Compensation Fee equation in order to obtain a permit (City of Cambridge 2019). The equation is as follows:

$$= 0.05 \times (\text{Basic Tree Cost} \times \text{Species Rating} \times \text{Condition Rating} \times \text{Location Rating})$$

The Private Tree Preservation By-Law 124-18 prohibits the injury or destruction of trees $\geq 20\text{cm}$ DBH; it follows that trees $< 20\text{cm}$ DBH do not require compensation for removal or injury. The definition of 'Dead/Hazardous' in the Permit to Destroy or Remove Private Trees (City of Cambridge 2019) closely fits the condition of trees assessed as Very Poor, so these have been assigned a Condition Rating of zero.

In total, 7 trees $\geq 20\text{cm}$ DBH are proposed for removal within or adjacent to the Subject Lands. Appendix V shows the data pertinent to the compensation calculation that are associated with these trees. Based on the Tree Compensation Fee equation, the calculated tree compensation fee for the proposed River Mill Phase 4 development is \$2,315.58. This amount will be applied to costs associated with tree planting in the Subject Lands or will be contributed to the City's Replacement Tree Planting Fund; details of compensation plantings will be determined at a later stage in the development process, but can be incorporated into lot street frontages, parks and stormwater management areas (City of Cambridge 2002).

5.4.1 Butternut Compensation

JUG-006 is afforded protection under the ESA and any works within 25m of this tree is considered harm to its regulated habitat; this harm is subject to conditions as outlined in Section 23.7 of O.Reg. 242/08. Prior to construction a "Notice of Butternut Impact" must be filed with the province on behalf of the Client.

A minimum of 10 Butternut seedlings and an equal number of seedlings of other species native to the area will need to be planted and maintained as per subsection 23.7(10) of O.Reg. 242/08. A planting and maintenance plan will need to be developed to meet the stipulations of subsection 23.7(10) and seedlings must be planted within three years of submitting the relevant Notice of Butternut Impact.

5.5 Mitigation

Species used for replacement/enhancement plantings, with the exception of street trees, should be native to the Region of Waterloo, especially as the Subject Lands are so close to Core

Environmental Features (Regional Municipality of Waterloo 2015). The use of non-native species that are sometimes more tolerant of urban conditions (i.e. salt and drought tolerant) may be suitable as long as they do not include invasive species such as Norway Maple (*Acer platanoides*) or Sweet Cherry (*Prunus avium*).

It is recommended that the following criteria be followed during the development of proposed planting plans:

- Plantings should conform to the latest edition of the Canadian Nursery Trades Association Specifications and Standards;
- The plan should be developed by, or reviewed and approved by an Ontario Landscape Architect (OLA) or Certified Arborist;
- Plantings should be limited to non-invasive species, with preference toward species native to the Region of Waterloo;
- Where feasible, plantings should include hardy, native tree species that are known to thrive in more urban conditions (i.e. compacted soil, drought, high salt tolerance);
- Plantings should include a diversity of trees from several genera to increase disease and pest tolerance and discourage monocultures (no more than 30% of planted trees should be from a single genus, and no more than 10% of planted trees should be from a single species);
- The plan should include a watering and monitoring plan for 2 years following planting;
- The plan should note that trees will be replaced if they are documented to have died within the 2-year monitoring period;
- The plan should include appropriate soil types and soil volumes;
- Ash species should be avoided in the planting plan due to the risk of the EAB beetle infestation;
- 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.; and
- Special attention should be given to the location and height of trees in proximity to utilities.

6.0 Conclusion

NRSI was retained in March 2019 by River Mill Development Corporation (the Client) to complete an Environmental Impact Study (EIS) and a Tree Inventory and Detailed Vegetation Management Plan (DVMP) for a proposed mixed-use development, referred to as the “River Mill Community” in Cambridge, Ontario. NRSI Certified Arborists conducted a comprehensive inventory of all trees $\geq 10\text{cm}$ DBH within the Subject Lands and adjacent lands that may be impacted by the proposed development. In total, 257 trees were inventoried, consisting of 24 species. Twelve Butternut trees were recorded, 9 from the Subject Lands and 3 from the Study Area. Butternut is provincially Endangered, as listed under the *Endangered Species Act* (ESA, 2007).

Nine trees are proposed to be removed as a result of the Draft Plan. One Butternut tree (JUG-001) has been removed through site grading activities for associated with another planning application. This was a Category 1 tree and is not protected by the ESA. JUG-006 is a Category 2 Butternut and the proposed works within its regulated habitat constitute harm under the ESA; 10 Butternut seedlings and 10 seedlings of various other native species shall be planted as per Section 23.7 of O.Reg. 242/08. A number of actions must be taken before and during construction to avoid impacts to trees that are to be retained. To compensate for trees removed through the course of the development, the client will apply \$2,315.58 towards tree planting in the Subject Lands or this amount will be contributed to the City’s Replacement Tree Planting Fund.

7.0 References

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APPENDIX I Tree Inventory Data

River Mill Community Phase 4 Detailed Vegetation Management Plan
Tree Inventory Data

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
10	White Spruce	<i>Picea glauca</i>	Native	1	29.2	3.0	Improbable	Excellent	Retain			Good form and health.
11	White Spruce	<i>Picea glauca</i>	Native	1	22.2	5.0	Improbable	Good	Retain			Slightly suppressed; light pruning.
12	White Spruce	<i>Picea glauca</i>	Native	1	24.1	3.0	Improbable	Good	Retain			Good form.
13	White Spruce	<i>Picea glauca</i>	Native	1	29.1	5.0	Improbable	Good	Retain			Slightly suppressed; light pruning; asymmetrical crown due east.
14	Freeman's Maple	<i>Acer X freemanii</i>	Native	2	60.6	6.0	Possible	Fair	Retain			Unbalanced crown to the east; 1 broken scaffold branch with water sprouts; stones piled in root zone; minor dieback.
15	Freeman's Maple	<i>Acer X freemanii</i>	Native	5	134.3	6.5	Improbable	Good	Retain			Codominant stems spread from near base; broad, low crown; minor crown thinning.
16	Manitoba Maple	<i>Acer negundo</i>	Native	3	46.5	6.0	Possible	Fair	Remove	Development	Yes	Original stem dead and rotted away; tree composed of suckers; stems lean west; asymmetrical crown due west; vines.
17	Manitoba Maple	<i>Acer negundo</i>	Native	1	37.1	6.0	Possible	Fair	Remove	Development	Yes	History of major failure of former stem; sapwood decay; fruiting bodies; leaning northwest; fill in root zone; vine in crown.
18	Manitoba Maple	<i>Acer negundo</i>	Native	3	76.3	6.0	Possible	Fair	Remove	Development	Yes	Fill in root zone; 1 stem has broken top; poor structure; leaning north; epicormic growth; vine in crown.
19	Eastern Cottonwood	<i>Populus deltoides</i>	Native	1	33.9	5.0	Possible	Poor	Remove	Development	Yes	Crown dieback; vines; chain wrapped around base; epicormic leader forming new crown; main leader dead.
20	Manitoba Maple	<i>Acer negundo</i>	Native	2	56.9	5.0	Possible	Poor	Remove	Development	Yes	Former stem dead and broken; diverging stems; fencewire through 1; included bark.
21	American Basswood	<i>Tilia americana</i>	Native	8	64.0	8.0	Improbable	Fair	Remove	Development	Yes	Asymmetrical crown due south; branch rub; abuts fence; sapsucker holes; crown dieback.
23	Black Walnut	<i>Juglans nigra</i>	Native	1	31.4	5.0	Improbable	Fair	Remove	Development	Yes	Canker; vines; light pruning; insect defoliation.
24	Black Walnut	<i>Juglans nigra</i>	Native	1	10.7	2.5	Improbable	Fair	Transplant	Development	No	Tent caterpillar infestation; insect defoliation.
25	White Willow	<i>Salix alba</i>	Non-Native	1	11.1	2.0	Improbable	Good	Remove	Development	No	Good form; sapsucker holes.
26	White Willow	<i>Salix alba</i>	Non-Native	1	16.0	2.0	Improbable	Fair	Remove	Development	No	Abuts fence; woody debris and dirt piled at base; branch rub.
27	Crack Willow	<i>Salix fragilis</i>	Non-Native	2	102.0	7.0	Improbable	Good	Retain			"Wet feet"; couple dead, broken branches; water sprouts; healthy crown.
28	Crack Willow	<i>Salix fragilis</i>	Non-Native	1	133.7	7.0	Possible	Fair	Retain			History of major failures; sapwood decay; epicormic growth; much live crown remains, some composed of water sprouts.
29	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	1	13.4	1.5	Improbable	Fair	Retain			Tight scaffold branch angle; couple stem wounds.
30	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	1	12.1	1.5	Possible	Poor	Retain			Upper stem sharply bent; open lower stem wound; both likely caused by failed branches in adjacent willow.
31	Manitoba Maple	<i>Acer negundo</i>	Native	1	32.4	5.5	Possible	Fair	Retain			Codominant leaders with included bark; slight lean northwest; basal shoots; dense crown.
32	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	1	28.4	3.5	Possible	Very Poor	Retain			Bark cracks; insect galleries; insectivore action; basal shoots; vine in crown.
33	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	1	30.6	4.0	Possible	Very Poor	Retain			Bark cracks; signs of EAB; insectivore action; basal shoots; outsized branch with tight angle; vine in crown.
34	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	1	18.7	3.0	Improbable	Fair	Retain			Open stem wounds with some woundwood; fairly healthy crown with vine.
35	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	22.1	3.5	Improbable	Good	Retain			Slightly asymmetrical crown with vine in lower part.
36	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	17.0	2.5	Improbable	Fair	Retain			Good taper; sunken tissue one side.
37	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	17.2	2.5	Possible	Fair	Retain			Slight lean north; vines in lower crown; light pruning.
38	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	1	16.9	2.5	Possible	Very Poor	Retain			Bark cracks; insect galleries; live basal shoots; EAB exit holes.
39	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	1	14.2	0.5	Probable	Very Poor	Retain			Insect galleries; fruiting bodies; broken top.
40	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	27.1	4.0	Improbable	Good	Retain			Slightly crooked stem.
41	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	10.5	1.5	Improbable	Fair	Retain			Pistol butt; suppressed crown.
42	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	24.4	4.0	Probable	Dead	Retain			Dead top; shedding bark.
43	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	1	14.7	3.0	Possible	Fair	Retain			Bark cracks with woundwood; insect galleries; live crown and basal shoots.
44	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	19.5	2.5	Possible	Fair	Retain			Hypoxylon canker at 3m; 1 dying branch in high crown.
45	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	22.5	3.0	Probable	Very Poor	Retain			Crown mostly dead.
46	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	27.7	4.0	Improbable	Fair	Retain			Couple dead lower branches; slightly asymmetrical crown.
47	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	10.7	1.5	Possible	Poor	Retain			Crooked stem; declining.
48	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	24.4	5.0	Possible	Fair	Retain			Slight lean northeast; very tall with high crown; signs of hypoxylon canker; sunken tissue.
49	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	22.1	5.0	Possible	Dead	Retain			Broken top; sapwood decay; conks.
50	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	18.1	3.0	Possible	Fair	Retain			Bark discoloration, oozing at base; crooked stem.
51	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	28.5	4.5	Improbable	Fair	Retain			Dead lower branches.

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
52	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	19.0	3.0	Improbable	Fair	Retain			Pistol butt; dead lower branches; asymmetrical crown due to neighbouring tree; vine in lower crown.
53	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	23.0	3.0	Improbable	Fair	Retain			Imbalanced root flare; minor dieback.
54	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	19.3	3.0	Improbable	Good	Retain			Couple dead lower branches.
55	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	19.0	2.5	Possible	Fair	Retain			Broken top; stem wound nearly closed.
56	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	26.1	4.5	Improbable	Fair	Retain			Canker wound closed; gypsy moth egg sac; healthy crown.
57	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	16.2	3.5	Possible	Poor	Retain			Broken top.
58	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	19.3	3.0	Improbable	Good	Retain			Crooked stem.
59	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	26.0	4.0	Improbable	Fair	Retain			1 broken branch; 5% dieback.
60	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	17.3	4.0	Probable	Poor	Retain			Original leader dead; scaffold branch leans north over creek and comprises crown.
61	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	13.4	2.5	Possible	Fair	Retain			Suppressed crown; good taper in crooked stem; small bark seams.
62	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	30.4	4.0	Probable	Very Poor	Retain			60% live crown lost; dead lower branches.
63	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	12.6	1.0	Probable	Dead	Retain			Dead crown; shedding bark.
64	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	15.9	2.5	Possible	Fair	Retain			Leaning east.
65	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	24.7	4.5	Improbable	Good	Retain			Good form; couple dead branches.
66	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	22.2	4.0	Improbable	Good	Retain			Vigorous lateral branch; vine up stem.
67	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	13.3	2.0	Possible	Fair	Retain			Dieback; bark crack at base.
68	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	1	14.8	1.5	Possible	Poor	Retain			Relatively extensive crown dieback; minor evidence of insect feeding.
69	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	16.9	1.5	Improbable	Fair	Retain			Lower scaffold dieback; riverbank grape up main stem.
70	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	28.0	4.5	Possible	Fair	Retain			Past wound mostly closed; sunken tissue; dead lower branches.
71	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	13.1	2.0	Improbable	Fair	Retain			Many small branch stubs closed.
72	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	12.5	1.5	Possible	Poor	Retain			Narrow crown and lower scaffold dieback due to neighboring trees; bark rub on lower stem due to fallen tree; minor insect defoliation.
73	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	28.3	3.0	Improbable	Fair	Retain			Slight lean toward road; light pruning in lower scaffold; minor crown dieback.
74	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	19.3	3.5	Possible	Fair	Retain			Slight lean northwest; broken top.
75	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	11.3	2.0	Possible	Fair	Retain			Dieback, including leader; leaning north; vine in crown.
76	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	13.0	3.0	Possible	Fair	Retain			Leaning north; bearing weight of past failed branch from another tree.
77	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	17.4	2.5	Improbable	Fair	Retain			Slight phototropic lean toward road; some crown dieback.
78	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	30.0	3.5	Improbable	Fair	Retain			Round, high crown; vine in lower crown; woundwood around old branch base.
79	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	25.6	3.0	Probable	Very Poor	Retain			Leader snapped; scaffold dieback; evidence of decay on main stem.
80	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	32.5	5.0	Possible	Poor	Retain			40% live crown lost; dead leader; vine up stem.
81	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	33.0	3.0	Improbable	Fair	Retain			Riverbank grape up main and into lower scaffold branches; some crown dieback; slight phototropic lean toward road.
82	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	33.0	5.0	Improbable	Good	Retain			Dead lower branches; vine in lower crown.
83	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	1	18.3	2.5	Probable	Very Poor	Retain			Galleries; woodpecker damage; extensive crown dieback.
84	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	26.9	5.0	Improbable	Good	Retain			Good form; healthy crown.
85	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	29.1	1.5	Improbable	Fair	Retain			Light pruning in lower scaffold branches; narrow crown due to neighboring trees; riverbank grape in lower scaffold branches.
86	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	16.3		Possible	Dead	Retain			Broken stem; shedding bark.
87	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	29.6	4.5	Improbable	Good	Retain			Asymmetrical crown due to neighbouring tree; crooked stem.
88	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	1	12.0	2.0	Possible	Very Poor	Retain			Extensive crown dieback; some insect feeding; riverbank grape in crown.
89	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	25.9	4.0	Improbable	Good	Retain			Asymmetrical crown due to neighbouring tree; light pruning; good structure.
90	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	22.7	1.5	Improbable	Fair	Retain			Narrow crown due to neighboring trees; riverbank grape up stem; slight phototropic lean.
91	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	28.4	5.0	Possible	Fair	Retain			Signs of potential root rot; codominant leaders in otherwise healthy crown.
92	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	27.2	2.5	Improbable	Good	Retain			Relatively full crown with minor light pruning dieback; some riverbank grape in lower scaffold.
93	Balsam Poplar	<i>Populus balsamifera</i>	Native	1	28.1	2.0	Possible	Very Poor	Retain			History of branch failure; relatively extensive crown dieback; unbalanced root flare.
94	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	19.2	4.0	Possible	Fair	Retain			1 dead exposed root; asymmetrical root flare; bark discoloration, possibly from branch rubbing; vine up stem.
95	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	12.8	1.0	Improbable	Fair	Retain			Minor crown dieback; some decay at old limb wound but also compartmentalization.
96	Balsam Poplar	<i>Populus balsamifera</i>	Native	1	19.5	3.0	Improbable	Good	Retain			Good wound closure; 2 dead branches; bark rubbing; vine in crown.
97	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	1	13.4	1.5	Possible	Very Poor	Retain			Extensive crown dieback; galleries; epicormic growth; woodpecker damage.
98	Balsam Poplar	<i>Populus balsamifera</i>	Native	1	22.5	2.0	Probable	Poor	Retain			History of branch failure; phototropic lean; main leader gone.

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
99	Balsam Poplar	<i>Populus balsamifera</i>	Native	1	22.7	3.5	Possible	Fair	Retain			Man small branch stubs closed; crooked stem leaning slightly east; epicormic growth.
100	Balsam Poplar	<i>Populus balsamifera</i>	Native	1	15.4	1.0	Probable	Very Poor	Retain			Extensive crown dieback; staining and evidence of decay on main stem.
101	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	1	10.0	2.0	Possible	Poor	Retain			Bark wounds; epicormic growth; minor insectivore action; insect galleries.
102	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	10.8	1.5	Probable	Very Poor	Retain			Extensive crown dieback; almost dead; bark cracks; decay on main stem.
103	Balsam Poplar	<i>Populus balsamifera</i>	Native	1	18.3	2.5	Possible	Poor	Retain			Unbalanced root flare; phototropic lean toward road; some crown dieback.
104	Balsam Poplar	<i>Populus balsamifera</i>	Native	1	22.4	4.0	Possible	Fair	Retain			20% dieback; decent structure.
105	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	1	11.0	1.5	Probable	Very Poor	Retain			Almost dead; fruiting bodies; EAB exit holes.
106	Balsam Poplar	<i>Populus balsamifera</i>	Native	1	18.5	3.5	Improbable	Fair	Retain			Arching lean west, phototropic growth; some dieback in irregular crown; light pruning.
107	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	15.4	2.0	Improbable	Fair	Retain			Narrow crown with light pruning in lower scaffold branches; some crown dieback; riverbank grape in lower scaffold branches.
108	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	1	14.7	3.0	Probable	Dead	Retain			Sapwood decay (fruiting bodies); insect galleries; EAB exit holes.
109	Balsam Poplar	<i>Populus balsamifera</i>	Native	1	15.5	3.0	Probable	Poor	Retain			Upper stem arches sharply southwest; phototropic growth; dead leader.
110	Balsam Poplar	<i>Populus balsamifera</i>	Native	1	17.8	2.5	Possible	Poor	Retain			Growing on slight lean with 45 degree bend in upper stem; epicormic growth; crown dieback.
111	Balsam Poplar	<i>Populus balsamifera</i>	Native	1	15.0	2.5	Probable	Poor	Retain			Upper stem arches south; phototropic growth; dead leader; live crown primarily a water sprout.
112	Balsam Poplar	<i>Populus balsamifera</i>	Native	1	13.7		Probable	Dead	Retain			Missing crown; vertical cracks up main stem.
113	Balsam Poplar	<i>Populus balsamifera</i>	Native	1	13.2	2.5	Possible	Fair	Retain			Crooked stem; poor structure; 2 small dead branches.
114	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	1	30.2	4.0	Probable	Very Poor	Retain			Extensive crown dieback; epicormic growth; woodpecker damage; galleries.
115	Balsam Poplar	<i>Populus balsamifera</i>	Native	1	14.2	2.5	Improbable	Fair	Retain			Crooked stem; no other defects visible.
116	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	1	11.2	1.5	Probable	Very Poor	Retain			Epicormic growth; galleries; EAB exit holes.
117	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	1	17.0	4.0	Possible	Dead	Retain			EAB exit holes; loose bark in top; bark discoloration.
118	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	20.8	3.5	Improbable	Good	Retain			Minor dieback; some branch rubs from adjacent buckthorn.
119	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	24.0	4.5	Improbable	Good	Retain			Closed bark seam; crooked stem; leaves still green; light pruning; vine in lower crown.
120	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	1	19.2	2.5	Possible	Fair	Retain			Crown dieback; bark cracks in upper stem; no obvious signs of EAB.
121	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	1	21.3	3.5	Possible	Very Poor	Retain			Insect galleries; live epicormic growth; dead top.
122	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	1	10.8	1.0	Possible	Poor	Retain			Some crown dieback; woodpecker damage.
123	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	1	11.6	2.0	Possible	Poor	Retain			Live epicormic growth; patches of loose bark.
124	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	13.9	2.5	Possible	Poor	Retain			Irregular growth; codominant leaders; 1 leader dead; stem cankers.
125	White Ash	<i>Fraxinus americana</i>	Native	1	21.2	4.0	Possible	Poor	Retain			Codominant leaders with tight union; minor insectivore action; some live crown this year.
126	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	1	12.1	1.5	Possible	Poor	Retain			Epicormic growth; woodpecker damage; extensive crown dieback.
127	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	1	10.7	1.0	Possible	Poor	Retain			Galleries; woodpecker damage; epicormic growth; some compartmentalization in gallery wounds.
128	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	12.2	2.0	Improbable	Fair	Retain			Light pruning; crooked stem; green foliage.
129	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	19.2	2.5	Improbable	Good	Retain			Relatively full crown with minimal dieback; slight phototropic growth.
130	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	12.4	2.5	Possible	Fair	Retain			Stem wounds from removal of adjacent trees; wounds with some decay but also compartmentalizing; relatively full crown; dead tree leaning on main stem.
131	White Ash	<i>Fraxinus americana</i>	Native	1	17.1	3.0	Possible	Very Poor	Retain			Crown mostly dead; live epicormic growth; insect galleries.
132	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	17.3	2.5	Possible	Poor	Retain			Canker in crooked stem; upper crown dead; lower crown live.
133	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	14.4	2.0	Probable	Dead	Retain			Dead top; shedding bark.
134	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	19.5	3.0	Improbable	Fair	Retain			Relatively full, vigorous crown; light pruning in lower scaffold branches; unbalanced root flare.
135	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	16.0	3.5	Possible	Fair	Retain			Dead leader; lateral became dominant, comprising an asymmetrical crown; green foliage; light pruning.

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
136	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	14.6	2.0	Improbable	Good	Retain			Full, vigorous crown; some riverbank grape starting to grow into lower scaffold branches; solid, straight main stem.
137	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	16.2	2.5	Possible	Fair	Retain			Hypoxylon canker with closed bark seam below; decent effort to contain decay, but not ultimately successful; vine in lower crown.
138	Scots Pine	<i>Pinus sylvestris</i>	Non-Native	1	21.8	2.0	Improbable	Fair	Retain			Slightly asymmetrical crown due to neighboring trees; riverbank grape in lower scaffold branches.
139	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	17.2	3.0	Possible	Fair	Retain			Significant open wound in lower stem; good structure; bark discoloration.
140	Scots Pine	<i>Pinus sylvestris</i>	Non-Native	1	23.6	3.0	Improbable	Good	Retain			Codominant leaders; slightly asymmetrical crown due to neighboring trees; crown otherwise healthy.
141	Scots Pine	<i>Pinus sylvestris</i>	Non-Native	1	21.9	3.0	Improbable	Excellent	Retain			Good structure; healthy crown.
a	Sugar Maple	<i>Acer saccharum ssp. saccharum</i>	Native	1	29.4	5.0	Improbable	Fair	Retain			Codominant leaders; included bark; large wound along stem; compartmentalized.
b	White Spruce	<i>Picea glauca</i>	Native	1	20.9	6.0	Improbable	Fair	Retain			Asymmetrical crown due east; light pruning; slightly suppressed.
c	White Spruce	<i>Picea glauca</i>	Native	1	21.7	4.5	Improbable	Fair	Retain			Asymmetrical crown due east; light pruning; slightly suppressed.
d	Norway Maple	<i>Acer platanoides</i>	Non-Native	1	17.9	4.5	Improbable	Fair	Retain			Included bark; phototrophic growth; branch rub.
e	Norway Maple	<i>Acer platanoides</i>	Non-Native	1	28.1	3.5	Improbable	Good	Retain			Included bark; branch rub; history of pruning; compartmentalized wounds.
f	Black Walnut	<i>Juglans nigra</i>	Native	1	40.7	5.5	Improbable	Good	Retain			Codominant leaders; good wound closure.
g	White Spruce	<i>Picea glauca</i>	Native	1	24.3	2.5	Improbable	Good	Retain			Heavy fruit set in upper crown; minor light pruning.
h	Norway Maple	<i>Acer platanoides</i>	Non-Native	1	42.0	6.0	Improbable	Good	Retain			Multiple leaders; included bark; asymmetrical crown due east; compartmentalized wounds; branch rub.
i	White Spruce	<i>Picea glauca</i>	Native	1	27.6	2.5	Improbable	Good	Retain			Heavy fruit set in upper crown; good form.
j	Manitoba Maple	<i>Acer negundo</i>	Native	2	41.1	4.5	Improbable	Fair	Retain			Stem lean west; asymmetrical crown due west; epicormic growth.
k	Manitoba Maple	<i>Acer negundo</i>	Native	4	63.1	5.0	Possible	Fair	Retain			Stems spread from base; poor structure; heavy fruit set; included bark.
l	White Mulberry	<i>Morus alba</i>	Non-Native	1	12.2	2.0	Improbable	Good	Retain			Asymmetrical crown due to neighbouring trees.
m	Bur Oak	<i>Quercus macrocarpa</i>	Native	1	37.3	4.0	Possible	Good	Retain			Small hangers; epicormic growth; included bark.
n	Manitoba Maple	<i>Acer negundo</i>	Native	4	79.9	6.0	Possible	Fair	Retain			Stems spread from base where water pools; included bark; natural graft from bark rubbing; minor epicormic growth.
o	Manitoba Maple	<i>Acer negundo</i>	Native	4	80.4	6.0	Improbable	Fair	Retain			Included bark; asymmetrical crown due west; vines; stem lean west.
p	Manitoba Maple	<i>Acer negundo</i>	Native	2	22.2	2.5	Improbable	Fair	Retain			Codominant stems; vines in crown.
q	Freeman's Maple	<i>Acer X freemanii</i>	Native	1	94.7	9.0	Possible	Fair	Retain			Bark staining; suckers; history of branch pruning; compartmentalized wounds; dead branches; leaf clusters.
r	Manitoba Maple	<i>Acer negundo</i>	Native	2	32.3	3.0	Improbable	Fair	Retain			Asymmetrical crown due west; stem lean west; epicormic growth; vines.
s	Common Apple	<i>Malus domestica</i>	Non-Native	1	15.0	4.0	Improbable	Fair	Retain			Asymmetrical crown due west; stem lean west; epicormic growth; vines.
t	Common Apple	<i>Malus domestica</i>	Non-Native	1	16.8	4.0	Improbable	Fair	Retain			Asymmetrical crown due west; codominant leaders; epicormic growth; vines.
u	Scots Pine	<i>Pinus sylvestris</i>	Non-Native	1	31.4	2.0	Possible	Dead	Retain			Crooked top draped in vines; light pruning; no live foliage observed.
v	White Ash	<i>Fraxinus americana</i>	Native	1	22.7	0.5	Possible	Very Poor	Retain			Only basal epicormic growth is alive; vines; stem lean west.
w	Austrian Pine	<i>Pinus nigra</i>	Non-Native	1	27.8	3.0	Improbable	Fair	Retain			Compartmentalized wounds; vines; light pruning.
x	Austrian Pine	<i>Pinus nigra</i>	Non-Native	1	36.8	3.0	Improbable	Fair	Retain			Compartmentalized wounds; vines; light pruning; bark compartmentalized around pole resting on stem.
y	Eastern Cottonwood	<i>Populus deltoides</i>	Native	1	69.9	7.0	Improbable	Good	Retain			Strong leader; low branching, oval crown; vigorous scaffold branches; minor dieback; debris in root zone; closed basal wounds.
z	Eastern Cottonwood	<i>Populus deltoides</i>	Native	1	17.2	1.0	Improbable	Fair	Retain			Vines; phototrophic growth; epicormic growth.
aa	Eastern Cottonwood	<i>Populus deltoides</i>	Native	1	16.3	2.0	Improbable	Good	Retain			Lean resulting from phototrophic growth.
ab	Red Pine	<i>Pinus resinosa</i>	Native	1	21.5	3.5	Improbable	Fair	Retain			Codominant leaders; wide union; vines.
ac	Black Walnut	<i>Juglans nigra</i>	Native	1	17.1	3.5	Improbable	Excellent	Retain			Good structure.
ad	Red Pine	<i>Pinus resinosa</i>	Native	1	21.7	0.5	Possible	Very Poor	Retain			Major crown dieback; vines.
ae	Red Pine	<i>Pinus resinosa</i>	Native	1	19.6	2.5	Improbable	Fair	Retain			Crooked stem; asymmetrical crown with vine.
af	Red Pine	<i>Pinus resinosa</i>	Native	1	18.4	1.5	Possible	Dead	Retain			Crooked stem; dead top.
ag	Red Pine	<i>Pinus resinosa</i>	Native	1	18.3	0.5	Possible	Dead	Retain			Vines; no top.
ah	Red Pine	<i>Pinus resinosa</i>	Native	1	17.5	2.0	Possible	Fair	Retain			Sharply crooked stem; 1 dead scaffold branch; vine in crown.
ai	Red Pine	<i>Pinus resinosa</i>	Native	1	24.0	4.0	Possible	Fair	Retain			Vines; asymmetrical crown due west.
aj	Red Pine	<i>Pinus resinosa</i>	Native	1	18.6	2.0	Improbable	Fair	Retain			Vines; light pruning.
ak	Red Pine	<i>Pinus resinosa</i>	Native	1	19.5	2.0	Probable	Dead	Retain			Dead and broken top; shedding bark.
al	Red Pine	<i>Pinus resinosa</i>	Native	1	23.1	2.0	Possible	Dead	Retain			Vines.
am	Red Pine	<i>Pinus resinosa</i>	Native	1	14.8	1.0	Possible	Dead	Retain			Dead and broken top; loose bark.
an	Red Pine	<i>Pinus resinosa</i>	Native	1	18.7	1.0	Probable	Dead	Retain			Dead and broken top; shedding bark.
ao	Red Pine	<i>Pinus resinosa</i>	Native	1	20.3	2.0	Possible	Dead	Retain			Vines.
ap	Red Pine	<i>Pinus resinosa</i>	Native	1	18.4	2.0	Possible	Dead	Retain			
aq	Red Pine	<i>Pinus resinosa</i>	Native	1	11.7	0.5	Probable	Dead	Retain			

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
ar	Black Walnut	<i>Juglans nigra</i>	Native	1	27.6	4.5	Improbable	Excellent	Retain			Strong leader; good structure.
as	Red Pine	<i>Pinus resinosa</i>	Native	1	18.2	1.5	Probable	Dead	Retain			Dead top; shedding bark.
at	Red Pine	<i>Pinus resinosa</i>	Native	1	18.0	0.5	Possible	Dead	Retain			
au	White Ash	<i>Fraxinus americana</i>	Native	1	16.9	0.5	Possible	Very Poor	Retain			Only basal epicormic growth alive; crown intact; EAB.
av	Red Pine	<i>Pinus resinosa</i>	Native	1	18.2	1.5	Probable	Dead	Retain			Dead top; shedding bark.
aw	Red Pine	<i>Pinus resinosa</i>	Native	1	21.5	0.5	Possible	Dead	Retain			
ax	Red Pine	<i>Pinus resinosa</i>	Native	1	21.8	1.0	Possible	Dead	Retain			Dead top; crooked stem.
ay	Red Pine	<i>Pinus resinosa</i>	Native	1	21.0	2.5	Improbable	Fair	Retain			Irregular crown; minor dieback; light pruning.
az	Red Pine	<i>Pinus resinosa</i>	Native	1	14.0	0.5	Possible	Dead	Retain			
ba	Red Pine	<i>Pinus resinosa</i>	Native	1	18.5	1.0	Possible	Dead	Retain			
bb	Red Pine	<i>Pinus resinosa</i>	Native	1	20.3	1.0	Possible	Dead	Retain			
bc	Red Pine	<i>Pinus resinosa</i>	Native	1	22.7	1.0	Improbable	Poor	Retain			Crown dieback; light pruning.
bd	Red Pine	<i>Pinus resinosa</i>	Native	1	27.0	1.0	Improbable	Fair	Retain			Crown dieback; light pruning.
be	Red Pine	<i>Pinus resinosa</i>	Native	1	29.7	3.5	Improbable	Fair	Retain			Tight branch angles; unbalanced crown; 1 dead branch.
bf	Red Pine	<i>Pinus resinosa</i>	Native	1	11.8	0.5	Possible	Dead	Retain			
bg	Red Pine	<i>Pinus resinosa</i>	Native	1	12.5	0.5	Possible	Very Poor	Retain			Major crown dieback.
bh	Red Pine	<i>Pinus resinosa</i>	Native	1	16.8	0.5	Possible	Very Poor	Retain			Major crown dieback; vines.
bi	Red Pine	<i>Pinus resinosa</i>	Native	1	22.6	3.0	Improbable	Fair	Retain			1 vigorous scaffold branch; crown thinning.
bj	Red Pine	<i>Pinus resinosa</i>	Native	1	12.8	0.5	Possible	Dead	Retain			
bk	Red Pine	<i>Pinus resinosa</i>	Native	1	14.6	2.0	Possible	Very Poor	Retain			Very little live foliage remaining; crooked stem.
bl	Red Pine	<i>Pinus resinosa</i>	Native	1	18.2	1.5	Possible	Dead	Retain			
bm	Red Pine	<i>Pinus resinosa</i>	Native	1	22.4	2.0	Probable	Dead	Retain			Dead top; shedding bark.
bn	Red Pine	<i>Pinus resinosa</i>	Native	1	18.6	2.5	Probable	Dead	Retain			Dead top; shedding bark.
bo	Eastern White Pine	<i>Pinus strobus</i>	Native	1	35.6	3.0	Possible	Dead	Retain			Broken top; pileated woodpecker holes; cavities.
bp	Red Pine	<i>Pinus resinosa</i>	Native	1	19.3	1.5	Probable	Dead	Retain			Dead crown with vine; missing most bark.
bq	Scots Pine	<i>Pinus sylvestris</i>	Non-Native	1	13.0	2.0	Improbable	Good	Retain			Branch rub; slightly suppressed; vines.
br	Scots Pine	<i>Pinus sylvestris</i>	Non-Native	1	21.8	2.5	Improbable	Good	Retain			Healthy crown; multiple leaders.
bs	Eastern White Cedar	<i>Thuja occidentalis</i>	Native	1	11.6	1.0	Improbable	Good	Retain			Good form.
bt	Eastern White Cedar	<i>Thuja occidentalis</i>	Native	1	10.6	3.0	Improbable	Good	Retain			Needle shedding; abuts fence.
bu	Eastern White Cedar	<i>Thuja occidentalis</i>	Native	1	13.3	3.0	Improbable	Good	Retain			Needle shedding; abuts fence.
bv	Crack Willow	<i>Salix fragilis</i>	Non-Native	3	52.8	3.5	Improbable	Good	Retain			Codominant stems; corrected leans; creekside; fee dead lower branches.
bw	Crack Willow	<i>Salix fragilis</i>	Non-Native	3	40.2	2.5	Improbable	Fair	Retain			Codominant stems, upright; 1 broken top.
bx	Crack Willow	<i>Salix fragilis</i>	Non-Native	1	13.3	2.5	Improbable	Fair	Retain			Crooked stem; asymmetrical crown.
by	Crack Willow	<i>Salix fragilis</i>	Non-Native	2	12.4	5.0	Possible	Fair	Retain			Asymmetrical crown due north; stem lean north; second stem under 10; crown dieback.
bz	Eastern White Cedar	<i>Thuja occidentalis</i>	Native	1	15.0	1.0	Improbable	Dead	Retain			Cut down; only stump remains.
ca	Eastern White Cedar	<i>Thuja occidentalis</i>	Native	2	28.1	1.5	Possible	Fair	Retain			Codominant stems with included bark; dense upright branching.
cb	Eastern White Cedar	<i>Thuja occidentalis</i>	Native	2	21.7	2.0	Improbable	Good	Retain			Light pruning; shedding needles.
cc	Scots Pine	<i>Pinus sylvestris</i>	Non-Native	1	29.9	3.0	Improbable	Fair	Retain			Vigorous lateral became codominant leader; tight branch angles; vine in crown.
cd	Eastern White Cedar	<i>Thuja occidentalis</i>	Native	1	17.6	2.0	Improbable	Good	Retain			Codominant leaders; included bark; vines; branch rub.
ce	Crack Willow	<i>Salix fragilis</i>	Non-Native	3	47.4	3.0	Improbable	Fair	Retain			Crooked codominant stems.
cf	Scots Pine	<i>Pinus sylvestris</i>	Non-Native	1	24.2	4.0	Improbable	Good	Retain			Branch rub from adjacent tree; vines.
cg	Crack Willow	<i>Salix fragilis</i>	Non-Native	1	11.3	2.0	Improbable	Fair	Retain			Asymmetrical crown due north; stem lean north; branch rub with adjacent tree.
ch	Scots Pine	<i>Pinus sylvestris</i>	Non-Native	1	36.8	3.5	Possible	Fair	Retain			Vigorous lateral became codominant leader; included bark; sap exuding at sapsucker holes.
ci	Scots Pine	<i>Pinus sylvestris</i>	Non-Native	1	33.4	4.0	Improbable	Good	Retain			Codominant leaders, included bark; branch rub; woody debris piled at base.
cj	Crack Willow	<i>Salix fragilis</i>	Non-Native	4	71.8	4.5	Improbable	Good	Retain			Included bark between stems; rooted at creek edge; 5% dieback.
ck	Freeman's Maple	<i>Acer X freemanii</i>	Native	1	12.4	2.0	Improbable	Good	Retain			Asymmetrical crown due north; branch rub; compartmentalized wound.
cl	Scots Pine	<i>Pinus sylvestris</i>	Non-Native	1	14.5	2.0	Improbable	Fair	Retain			Light pruning; crown dieback.
cm	Scots Pine	<i>Pinus sylvestris</i>	Non-Native	1	16.9	2.0	Possible	Fair	Retain			Once lost leader; swollen tissue in stem; light pruning.
cn	Scots Pine	<i>Pinus sylvestris</i>	Non-Native	1	18.1	2.5	Improbable	Fair	Retain			Light pruning; crown dieback.
co	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	16.2	2.5	Possible	Dead	Retain			Girdled in lower stem.
cp	Scots Pine	<i>Pinus sylvestris</i>	Non-Native	1	21.2	4.0	Improbable	Good	Retain			Asymmetrical crown due north; sapsucker holes; light pruning; reaction wood.
cq	Scots Pine	<i>Pinus sylvestris</i>	Non-Native	1	24.0	3.0	Improbable	Good	Retain			Good form; healthy crown.
cr	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	1	10.4	1.0	Possible	Dead	Retain			EAB exit holes; insect galleries; dead top.
cs	Common Pear	<i>Pyrus communis</i>	Non-Native	3	37.8	4.5	Improbable	Fair	Retain			Asymmetrical crown due north; slightly suppressed; branch rub; abuts fence.

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
ct	Scots Pine	<i>Pinus sylvestris</i>	Non-Native	1	22.5	2.5	Improbable	Good	Retain			Healthy crown.
cu	Eastern Cottonwood	<i>Populus deltoides</i>	Native	1	10.6	1.0	Possible	Dead	Retain			Crown intact.
cv	Crack Willow	<i>Salix fragilis</i>	Non-Native	2	40.0	4.0	Possible	Fair	Retain			Phototropic arch over creek, toward road; secondary stem failed; basal shoots; insect defoliation.
cw	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	24.8	3.0	Possible	Poor	Retain			Significant stem wound reveals heartwood brown rot; significant ram's horn on either side.
cx	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	29.7	4.0	Improbable	Good	Retain			Asymmetrical crown due north; stem lean north; light pruning.
cy	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	24.0	4.0	Possible	Fair	Retain			Once lost leader; crooked stem.
cz	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	17.3	3.0	Improbable	Fair	Retain			Earlier leaf drop than neighbouring conspecifics.
da	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	14.8	2.0	Improbable	Fair	Retain			Crown dieback; poison ivy; asymmetrical crown due north.
db	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	22.1	3.0	Improbable	Fair	Retain			Earlier leaf drop than neighbouring conspecifics.
dc	Manitoba Maple	<i>Acer negundo</i>	Native	2	30.4	4.0	Improbable	Fair	Retain			Asymmetrical crown due north; stem lean north; vines; branch rub; epicormic growth.
dd	Balsam Poplar	<i>Populus balsamifera</i>	Native	1	10.3	2.0	Possible	Fair	Retain			Crooked stem; vine in lower crown.
de	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	33.2	6.0	Improbable	Fair	Retain			Asymmetrical crown due north; vines; slightly suppressed; dead stem under 10.
df	Manitoba Maple	<i>Acer negundo</i>	Native	2	24.6	3.0	Improbable	Fair	Retain			2 stems; basal shoot; healthy crown.
dg	Trembling Aspen	<i>Populus tremuloides</i>	Native	1	19.2	3.0	Improbable	Fair	Retain			Light pruning; crown dieback; vines.
dh	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	1	28.3	3.5	Improbable	Fair	Retain			Codominant leaders with tight angle; 10% dieback; minor bark wounds.
dj	White Spruce	<i>Picea glauca</i>	Native	1	26.6	2.5	Improbable	Good	Retain			Slightly asymmetrical due to neighbouring tree.
dk	Norway Maple	<i>Acer platanoides</i>	Non-Native	4	56.6	3.5	Improbable	Fair	Retain			Multiple stems; included bark; poor structure; tar spot.
JUG-001	Butternut	<i>Juglans cinerea</i>	Native	1	5.0	--	--	--	Removed prior.	Development	No	Data collected for Butternut Health Assessment.
JUG-002	Butternut	<i>Juglans cinerea</i>	Native	2	55.8	5.0	Possible	Fair	Retain			2 stems, included bark; most wounds have been closed with woundwood; few sooty canker; centre rot in secondary stem; asymmetrical crown; few dead branches.
JUG-003	Butternut	<i>Juglans cinerea</i>	Native	1	50.5	7.0	Possible	Fair	Retain			Open cankers on root flare; sooty cankers below 2m; 4 dead branches; minor dieback; asymmetrical crown due to neighbouring trees.
JUG-004	Butternut	<i>Juglans cinerea</i>	Native	1	35.0	3.5	Possible	Very Poor	Retain			2 large open cankers below 2m, reveals decay; many open and sooty cankers up bole; 5 dead branches; gypsy moth egg sac.
JUG-005	Butternut	<i>Juglans cinerea</i>	Native	1	45.0	--	--	--	Retain			Data collected for Butternut Health Assessment.
JUG-006	Butternut	<i>Juglans cinerea</i>	Native	1	15.0	--	--	--	Retain			Data collected for Butternut Health Assessment.
JUG-007	Butternut	<i>Juglans cinerea</i>	Native	1	83.0	--	--	--	Retain			Data collected for Butternut Health Assessment.
JUG-008	Butternut	<i>Juglans cinerea</i>	Native	1	47.4	7.0	Possible	Fair	Retain			Open and sooty wounds; dead lower branches; planar crown shape.
JUG-009	Butternut	<i>Juglans cinerea</i>	Native	1	52.0	7.0	Probable	Very Poor	Retain			Main crown dead; only epicormic growth live; root flare cankers; large stem wound; gypsy moth egg sacs.
JUG-010	Butternut	<i>Juglans cinerea</i>	Native	1	3.0	--	--	--	Retain			Data collected for Butternut Health Assessment.
JUG-011	Butternut	<i>Juglans cinerea</i>	Native	1	37.0	--	--	--	Retain			Data collected for Butternut Health Assessment.
JUG-012	Butternut	<i>Juglans cinerea</i>	Native	1	28.0	--	--	--	Retain			Data collected for Butternut Health Assessment.

APPENDIX II Tree Health and Potential for Structural Failure 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 imbalance, 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 a major state of decline and would be identified as very poor. These trees have a probable or imminent potential for structural failure. These trees should be identified for removal.
Dead	Represents a tree that exhibits no sign of new growth, including buds, foliage, or shoot growth. These trees have a probable or imminent potential for structural failure. These trees should be identified for removal.

¹ (Dunster 2009)

Potential for Structural Failure Assessment Criteria

Assessment Criteria*	Definition ¹
Improbable	The tree or branch is not likely to fail during normal weather conditions and may not fail in many severe weather conditions within the specified time frame.
Possible	Failure could occur, but it is unlikely during normal weather conditions within the specified time frame.
Probable	Failure may be expected under normal weather conditions within the specified time frame.
Imminent	Failure has started or is most likely to occur in the near future, even if there is no significant wind or increased load. This is a rare occurrence for an 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.	

¹ (Dunster et al. 2013)

APPENDIX III Conditions of 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 Property as described in this report (the "Subject Lands") and the trees situated thereon, and upon information provided by the Client to NRSI. The opinions in this assessment are given based on observations made and using generally accepted professional judgment, however, because trees are living organisms and subject to change, damage and disease, the results, observations, recommendations, and analysis as set out in this assessment are valid only at the date any such observations and analysis took place. No guarantee, warranty, representation or opinion is offered or made by NRSI as to the length of the validity of the results, observations, recommendations and analysis contained within this assessment. As a result, the Client shall not rely upon this assessment, save and except for representing the circumstances and observations 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 (e.g. 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 areas as described in this report. 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 Data and Summary Tables

Summary of Inventoried Trees

Common Name	Scientific Name	Excellent	Good	Fair	Poor	Very Poor	Dead	N/A	Total
Native Species									
American Basswood	<i>Tilia americana</i>			1					1
Balsam Poplar	<i>Populus balsamifera</i>		1	6	5	2	1		15
Black Walnut	<i>Juglans nigra</i>	2	1	2					5
Bur Oak	<i>Quercus macrocarpa</i>		1						1
Butternut	<i>Juglans cinerea</i>			3		2		7	12
Eastern Cottonwood	<i>Populus deltoides</i>		2	1	1		1		5
Eastern White Cedar	<i>Thuja occidentalis</i>		5	1			1		7
Eastern White Pine	<i>Pinus strobus</i>						1		1
Freeman's Maple	<i>Acer X freemanii</i>		2	2					4
Green Ash	<i>Fraxinus pennsylvanica</i>			5	7	11	3		26
Manitoba Maple	<i>Acer negundo</i>			12	1				13
Red Pine	<i>Pinus resinosa</i>			9	1	4	23		37
Sugar Maple	<i>Acer saccharum</i> <i>ssp. saccharum</i>			1					1
Trembling Aspen	<i>Populus tremuloides</i>		16	44	8	4	6		78
White Ash	<i>Fraxinus americana</i>				1	3			4
White Spruce	<i>Picea glauca</i>	1	6	2					9
<i>Subtotal</i>		3	34	89	24	26	36	7	219
Non-Native Species									
Austrian Pine	<i>Pinus nigra</i>			2					2
Common Apple	<i>Malus domestica</i>			2					2
Common Pear	<i>Pyrus communis</i>			1					1
Crack Willow	<i>Salix fragilis</i>		3	7					10
Norway Maple	<i>Acer platanoides</i>		2	2					4
Scots Pine	<i>Pinus sylvestris</i>	1	8	6			1		16
White Mulberry	<i>Morus alba</i>		1						1
White Willow	<i>Salix alba</i>		1	1					2
<i>Subtotal</i>		1	15	21	0	0	1	0	38
Overall Total		4	49	110	24	26	37	7	257

Overall Condition of Trees Inventoried

Potential for Structural Failure Rating	Overall Condition						Total
	Excellent	Good	Fair	Poor	Very Poor	Dead	
Improbable	4	48	66	1		1	120
Possible		1	44	19	15	23	102
Probable				4	11	13	28
Imminent							0
Total	4	49	110	24	26	37	250*

*This total differs from that in the 'Summary of Inventoried Trees' table, above, because of the exclusion of 7 Butternuts for which ratings were not assigned, as these were found during field surveys other than tree inventory.

APPENDIX V Tree Compensation Fee Calculations

River Mill Community Phase 4 Detailed Vegetation Management Plan

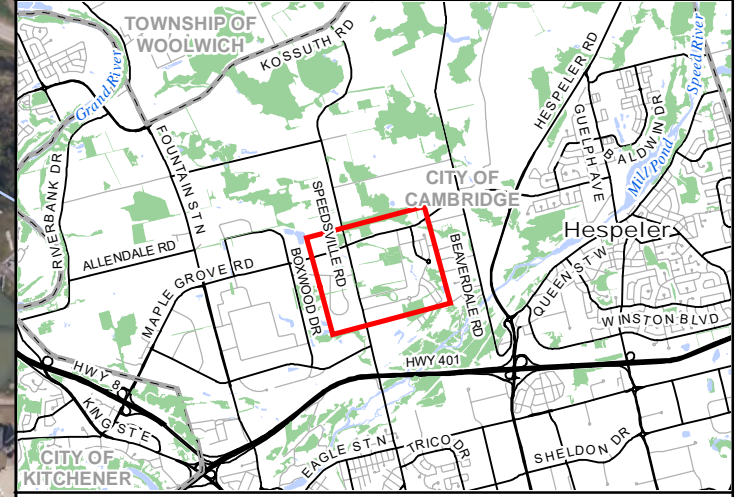
Tree Compensation Fee Calculations

Tree Number	Tree Species	DBH (cm)	Condition	1. Basic Tree Cost	2. Species Rating	3. Condition Rating	4. Location Rating	5. Appraised Value (1*2*3*4)	6. Tree Compensation Fee (0.05* Appraised Value)
16	Manitoba Maple	47	Fair	\$37,646.49	0.55	0.5	0.6	\$6,211.67	\$310.58
17	Manitoba Maple	37	Fair	\$23,330.92	0.55	0.5	0.6	\$3,849.60	\$192.48
18	Manitoba Maple	76	Fair	\$95,980.72	0.55	0.5	0.6	\$15,836.82	\$791.84
19	Eastern Cottonwood	34	Poor	\$19,700.90	0.55	0.25	0.6	\$1,625.32	\$81.27
20	Manitoba Maple	57	Poor	\$55,370.54	0.55	0.25	0.6	\$4,568.07	\$228.40
21	American Basswood	64	Fair	\$69,805.41	0.55	0.5	0.6	\$11,517.89	\$575.89
23	Black Walnut	31	Fair	\$16,377.64	0.55	0.5	0.6	\$2,702.31	\$135.12
Total									\$2,315.58

MAPS

River Mill Community

Study Area

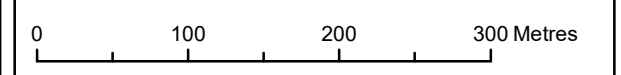


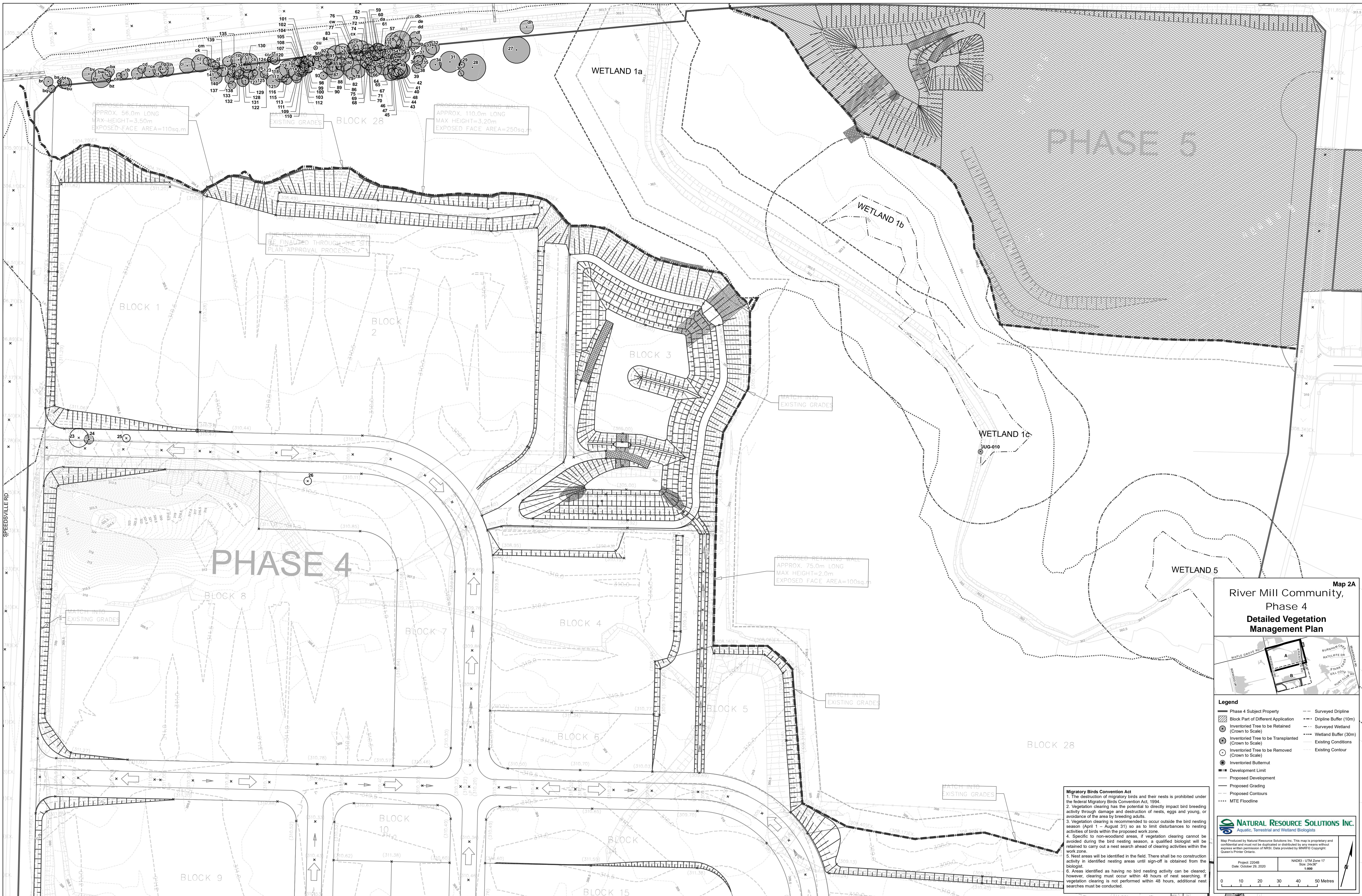
- Legend**
- Study Area
 - Subject Lands
 - Parcel Boundary
 - Phase 4 - New Community
 - Phase 5 - Annex
 - Watercourse (GRCA)

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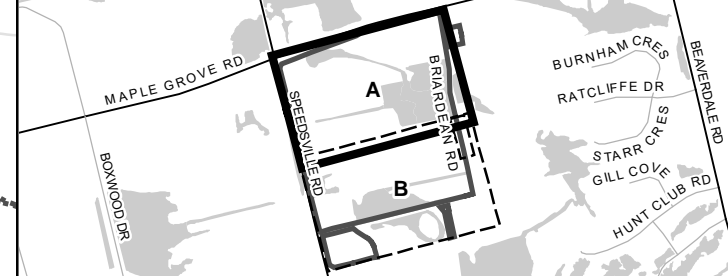
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Project: 2204B Date: November 5, 2020	NAD83 - UTM Zone 17 Size: 11x17" 1:5,000
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Map 2A
 River Mill Community,
 Phase 4
**Detailed Vegetation
 Management Plan**



- Legend**
- Phase 4 Subject Property
 - Block Part of Different Application
 - Inventoried Tree to be Retained (Crown to Scale)
 - Inventoried Tree to be Transplanted (Crown to Scale)
 - Inventoried Tree to be Removed (Crown to Scale)
 - Inventoried Butternut
 - Development Limit
 - Proposed Development
 - Proposed Grading
 - Proposed Contours
 - MTE Floodline
 - Surveyed Dripline
 - Dripline Buffer (10m)
 - Surveyed Wetland
 - Wetland Buffer (30m)
 - Existing Conditions
 - Existing Contour

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

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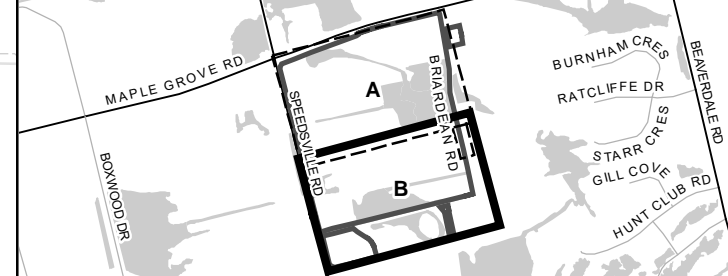
Project: 2204B
 Date: October 29, 2020

NAD83 - UTM Zone 17
 Size: 24x30"
 1:800

0 10 20 30 40 50 Metres



Map 2B
River Mill Community,
Phase 4
Detailed Vegetation
Management Plan



- Legend**
- Phase 4 Subject Property
 - Block Part of Different Application
 - Inventoried Tree to be Retained (Crown to Scale)
 - Inventoried Tree to be Transplanted (Crown to Scale)
 - Inventoried Tree to be Removed (Crown to Scale)
 - Inventoried Butternut
 - Development Limit
 - Proposed Development
 - Proposed Grading
 - Proposed Contours
 - MTE Floodline
 - Surveyed Dripline
 - Dripline Buffer (10m)
 - Surveyed Wetland
 - Wetland Buffer (30m)
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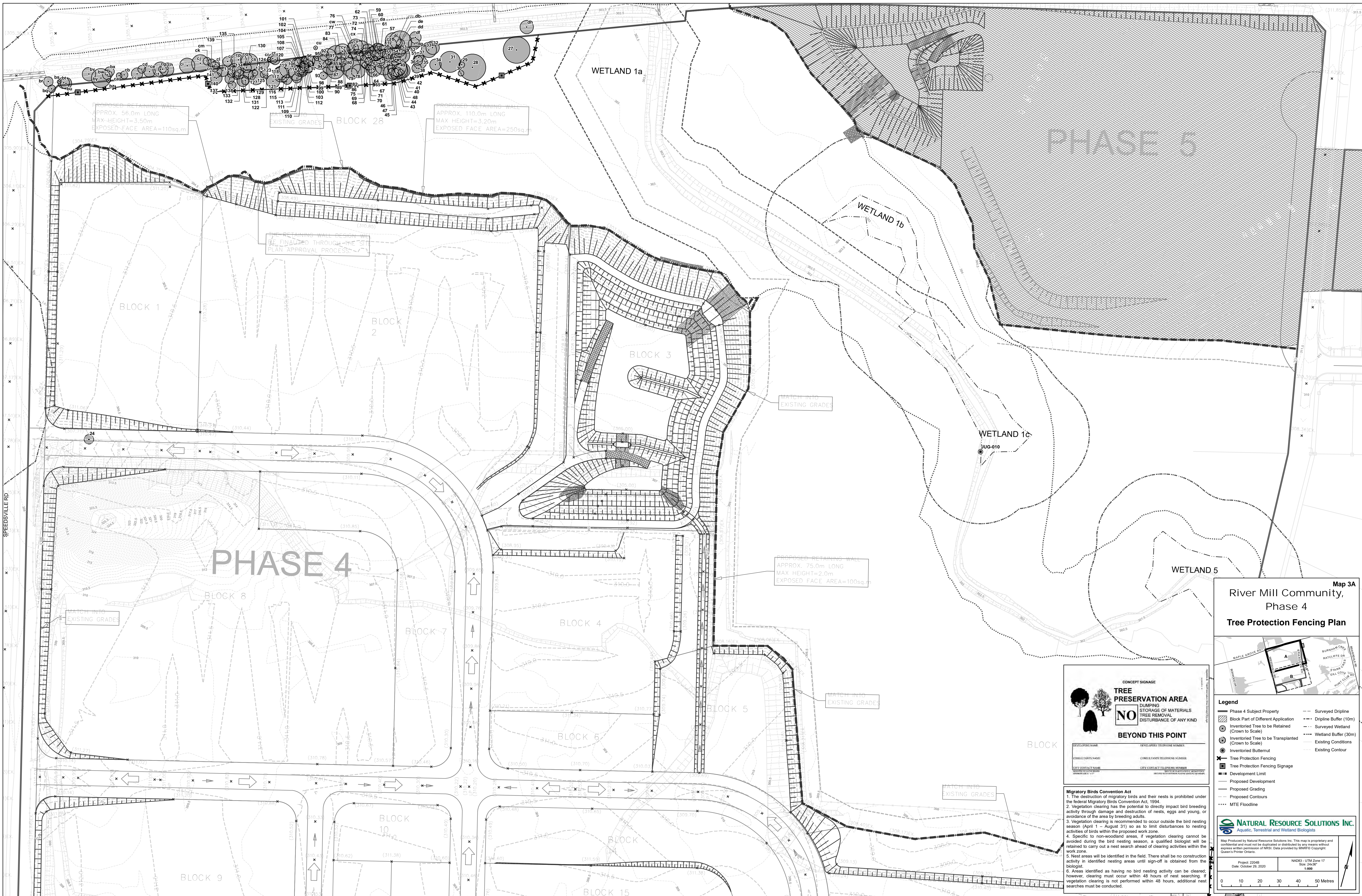
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Project: 2204B
 Date: October 29, 2020

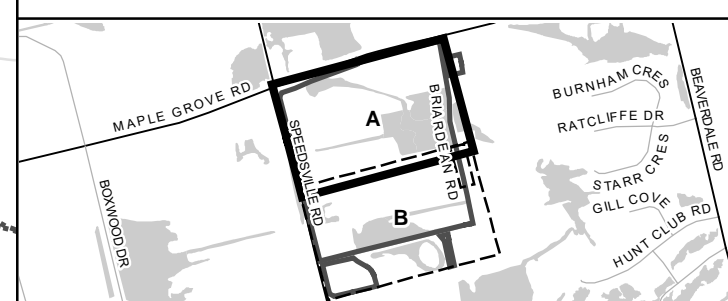
NAD83 - UTM Zone 17
 Size: 24x30"
 1:800

0 10 20 30 40 50 Metres

Tree Number	Common Name	Scientific Name	Native / Non-native	DBH (cm)	Stem Count	Crown Radius (m)	Potential for Structural Failure Rating	Overall Condition	Removal Status	Rationale for Removal	Compensation Required	Comments
10	White Spruce	<i>Picea glauca</i>	Native	29.2	1	3.0	Improbable	Excellent	Retain			Good form and health.
11	White Spruce	<i>Picea glauca</i>	Native	22.2	1	5.0	Improbable	Good	Retain			Slightly suppressed; light pruning.
12	White Spruce	<i>Picea glauca</i>	Native	24.1	1	3.0	Improbable	Good	Retain			Good form.
13	White Spruce	<i>Picea glauca</i>	Native	29.1	1	5.0	Improbable	Good	Retain			Slightly suppressed; light pruning; asymmetrical crown due east.
14	Freeman's Maple	<i>Acer X freemanii</i>	Native	60.6	2	6.0	Possible	Fair	Retain			Unbalanced crown to the east; 1 broken scaffold branch with water sprouts; stones piled in root zone; minor dieback.
15	Freeman's Maple	<i>Acer X freemanii</i>	Native	134.3	5	6.5	Improbable	Good	Retain			Codominant stems spread from near base; broad, low crown; minor crown thinning.
16	Manitoba Maple	<i>Acer negundo</i>	Native	46.5	3	6.0	Possible	Fair	Remove	Development	Yes	Original stem dead and rotted away; tree composed of suckers; stems lean west; asymmetrical crown due west; vines.
17	Manitoba Maple	<i>Acer negundo</i>	Native	37.1	1	6.0	Possible	Fair	Remove	Development	Yes	History of major failure of former stem; sapwood decay; fruiting bodies; leaning northwest; fill in root zone; vine in crown.
18	Manitoba Maple	<i>Acer negundo</i>	Native	76.3	3	6.0	Possible	Fair	Remove	Development	Yes	Fill in root zone; 1 stem has broken top; poor structure; leaning north; epicormic growth; vine in crown.
19	Eastern Cottonwood	<i>Populus deltoides</i>	Native	33.9	1	5.0	Possible	Poor	Remove	Development	Yes	Crown dieback; vines; chain wrapped around base; epicormic leader forming new crown; main leader dead.
20	Manitoba Maple	<i>Acer negundo</i>	Native	56.9	2	5.0	Possible	Poor	Remove	Development	Yes	Former stem dead and broken; diverging stems; abut fence through 1; included bark.
21	American Basswood	<i>Tilia americana</i>	Native	64.0	8	8.0	Improbable	Fair	Remove	Development	Yes	Asymmetrical crown due south; branch rub; abut fence; sapsucker holes; crown dieback; vines; light pruning; insect defoliation.
23	Black Walnut	<i>Juglans nigra</i>	Native	31.4	1	5.0	Improbable	Fair	Remove	Development	Yes	Canker; vines; light pruning; insect defoliation.
24	Black Walnut	<i>Juglans nigra</i>	Native	10.7	1	2.5	Improbable	Fair	Remove	Development	No	Tent caterpillar infestation; insect defoliation.
25	White Willow	<i>Salix alba</i>	Non-Native	11.1	1	2.0	Improbable	Good	Remove	Development	No	Good form; sapsucker holes.
26	White Willow	<i>Salix alba</i>	Non-Native	16.0	1	2.0	Improbable	Fair	Remove	Development	No	Abuts fence; waxy debris and dirt piled at base; branch rub.
27	Crack Willow	<i>Salix fragilis</i>	Non-Native	102.0	2	7.0	Improbable	Good	Retain			"Vet feet"; couple dead, broken branches; water sprouts; healthy crown.
28	Crack Willow	<i>Salix fragilis</i>	Non-Native	133.7	1	7.0	Possible	Fair	Retain			History of major failures; sapwood decay; epicormic growth; much live crown remains, some composed of water sprouts.
29	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	13.4	1	1.5	Improbable	Fair	Retain			Tight scaffold branch angle; couple stem wounds.
30	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	12.1	1	1.5	Possible	Fair	Retain			Upper stem sharply bent; open lower stem wound; both likely caused by failed branches in adjacent willow.
31	Manitoba Maple	<i>Acer negundo</i>	Native	32.4	1	5.5	Possible	Fair	Retain			Codominant leaders with included bark; slight lean northwest; basal shoots; dense crown.
32	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	28.4	1	3.5	Possible	Very Poor	Retain			Bark cracks; insect galleries; insecticide action; basal shoots; vine in crown.
33	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	30.6	1	4.0	Possible	Very Poor	Retain			Bark cracks; signs of EAB; insecticide action; basal shoots; outsize branch with tight angle; vine in crown.
34	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	18.7	1	3.0	Improbable	Fair	Retain			Open stem wounds with some woodwork; fairly healthy crown with vine.
35	Trembling Aspen	<i>Populus tremuloides</i>	Native	22.1	1	3.5	Improbable	Good	Retain			Slightly asymmetrical crown with vine in lower part.
36	Trembling Aspen	<i>Populus tremuloides</i>	Native	17.0	1	2.5	Improbable	Fair	Retain			Good taper; sunken tissue one side.
37	Trembling Aspen	<i>Populus tremuloides</i>	Native	17.2	1	2.5	Possible	Fair	Retain			Slight lean north; vines in lower crown; light pruning.
38	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	16.9	1	2.5	Possible	Very Poor	Retain			Bark cracks; insect galleries; vine basal shoots; EAB exit holes.
39	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	14.2	1	0.5	Probable	Very Poor	Retain			Insect galleries; fruiting bodies; broken top.
40	Trembling Aspen	<i>Populus tremuloides</i>	Native	27.1	1	4.0	Improbable	Good	Retain			Slightly crooked stem.
41	Trembling Aspen	<i>Populus tremuloides</i>	Native	10.5	1	1.5	Improbable	Fair	Retain			Pistol butt; suppressed crown.
42	Trembling Aspen	<i>Populus tremuloides</i>	Native	24.4	1	4.0	Probable	Dead	Retain			Dead top; shedding bark.
43	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	14.7	1	3.0	Possible	Fair	Retain			Bark cracks with woodwork; insect galleries; live crown and basal shoots.
44	Trembling Aspen	<i>Populus tremuloides</i>	Native	19.5	1	2.5	Possible	Fair	Retain			Hypoxylon canker with closed bark seam below; decent effort to contain decay, but not ultimately successful; vine in lower crown.
45	Trembling Aspen	<i>Populus tremuloides</i>	Native	22.5	1	3.0	Probable	Very Poor	Retain			Crown mostly dead.
46	Trembling Aspen	<i>Populus tremuloides</i>	Native	27.7	1	4.0	Improbable	Fair	Retain			Couple dead lower branches; slightly asymmetrical crown.
47	Trembling Aspen	<i>Populus tremuloides</i>	Native	10.7	1	1.5	Possible	Poor	Retain			Crooked stem; declining.
48	Trembling Aspen	<i>Populus tremuloides</i>	Native	24.4	1	5.0	Possible	Fair	Retain			Slight lean northeast; very tall with high crown; signs of hypoxylon canker; sunken tissue.
49	Trembling Aspen	<i>Populus tremuloides</i>	Native	22.1	1	5.0	Possible	Dead	Retain			Broken top; sapwood decay; conks.
50	Trembling Aspen	<i>Populus tremuloides</i>	Native	18.1	1	3.0	Possible	Fair	Retain			Bark discoloration; oozing at base; crooked stem.
51	Trembling Aspen	<i>Populus tremuloides</i>	Native	28.5	1	4.5	Improbable	Fair	Retain			Dead lower branches.
52	Trembling Aspen	<i>Populus tremuloides</i>	Native	19.0	1	3.0	Improbable	Fair	Retain			Pistol butt; dead lower branches; asymmetrical crown due to neighbouring tree; vine in lower crown.
53	Trembling Aspen	<i>Populus tremuloides</i>	Native	23.0	1	3.0	Improbable	Fair	Retain			Imbalanced root flare; minor dieback.
54	Trembling Aspen	<i>Populus tremuloides</i>	Native	19.3	1	3.0	Improbable	Good	Retain			Couple dead lower branches.
55	Trembling Aspen	<i>Populus tremuloides</i>	Native	19.0	1	2.5	Possible	Fair	Retain			Crooked top; stem wound nearly closed.
56	Trembling Aspen	<i>Populus tremuloides</i>	Native	28.1	1	4.5	Improbable	Fair	Retain			Canker wound closed; gypsy moth egg sac; healthy crown.
57	Trembling Aspen	<i>Populus tremuloides</i>	Native	16.2	1	3.5	Possible	Poor	Retain			Broken top.
58	Trembling Aspen	<i>Populus tremuloides</i>	Native	19.3	1	3.0	Improbable	Good	Retain			Crooked stem.
59	Trembling Aspen	<i>Populus tremuloides</i>	Native	26.0	1	4.0	Improbable	Fair	Retain			1 broken branch; 5% dieback.
60	Trembling Aspen	<i>Populus tremuloides</i>	Native	17.3	1	4.0	Probable	Poor	Retain			Original leader dead; scaffold branch leans north over creek and comprises crown.
61	Trembling Aspen	<i>Populus tremuloides</i>	Native	13.4	1	2.5	Possible	Fair	Retain			Suppressed crown; good taper in crooked stem; small bark seams.
62	Trembling Aspen	<i>Populus tremuloides</i>	Native	30.4	1	4.0	Probable	Very Poor	Retain			60% live crown lost; dead lower branches.
63	Trembling Aspen	<i>Populus tremuloides</i>	Native	12.6	1	1.0	Probable	Dead	Retain			Dead crown; shedding bark.
64	Trembling Aspen	<i>Populus tremuloides</i>	Native	15.9	1	2.5	Possible	Fair	Retain			Leaning east.
65	Trembling Aspen	<i>Populus tremuloides</i>	Native	24.7	1	4.5	Improbable	Good	Retain			Good form; couple dead branches.
66	Trembling Aspen	<i>Populus tremuloides</i>	Native	22.2	1	4.0	Improbable	Good	Retain			Vigorous lateral branch; vine up stem.
67	Trembling Aspen	<i>Populus tremuloides</i>	Native	13.3	1	2.0	Possible	Fair	Retain			Dieback; bark crack at base.
68	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	14.8	1	1.5	Possible	Poor	Retain			Relatively extensive crown dieback; minor evidence of insect feeding.
69	Trembling Aspen	<i>Populus tremuloides</i>	Native	16.9	1	1.5	Improbable	Fair	Retain			Lower scaffold dieback; nerbank grape up main stem.
70	Trembling Aspen	<i>Populus tremuloides</i>	Native	28.0	1	4.5	Possible	Fair	Retain			Past wound mostly closed; sunken tissue; dead lower branches.
71	Trembling Aspen	<i>Populus tremuloides</i>	Native	13.1	1	2.0	Improbable	Fair	Retain			Many small branch stubs closed.
72	Trembling Aspen	<i>Populus tremuloides</i>	Native	12.5	1	1.5	Possible	Poor	Retain			Narrow crown and lower scaffold dieback due to neighbouring trees; bark rub on lower stem due to fallen tree; minor insect defoliation.
73	Trembling Aspen	<i>Populus tremuloides</i>	Native	28.3	1	3.0	Improbable	Fair	Retain			Slight lean toward road; light pruning in lower scaffold; minor crown dieback.
74	Trembling Aspen	<i>Populus tremuloides</i>	Native	19.3	1	3.5	Possible	Fair	Retain			Slight lean northwest; broken top.
75	Trembling Aspen	<i>Populus tremuloides</i>	Native	11.3	1	2.0	Possible	Fair	Retain			Dieback, including leader; leaning north; vine in crown.
76	Trembling Aspen	<i>Populus tremuloides</i>	Native	13.0	1	3.0	Possible	Fair	Retain			Leaning north; bearing weight of past failed branch from another tree.
77	Trembling Aspen	<i>Populus tremuloides</i>	Native	17.4	1	2.5	Improbable	Fair	Retain			Slight phototropic; lean toward road; some crown dieback.
78	Trembling Aspen	<i>Populus tremuloides</i>	Native	30.0	1	3.5	Improbable	Fair	Retain			Reid; high crown; vine in lower crown; woodwork around old branch base.
79	Trembling Aspen	<i>Populus tremuloides</i>	Native	25.6	1	3.0	Probable	Very Poor	Retain			Leader snapped; scaffold dieback; evidence of decay on main stem.
80	Trembling Aspen	<i>Populus tremuloides</i>	Native	32.5	1	5.0	Possible	Poor	Retain			40% live crown lost; dead leader; vine up stem.
81	Trembling Aspen	<i>Populus tremuloides</i>	Native	33.0	1	3.0	Improbable	Fair	Retain			Riverbank grape up main and into lower scaffold branches; some crown dieback; slight phototropic lean toward road.
82	Trembling Aspen	<i>Populus tremuloides</i>	Native	33.0	1	5.0	Improbable	Good	Retain			Dead lower branches; vine in lower crown.
83	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	18.3	1	2.5	Probable	Very Poor	Retain			Galleries; woodpecker damage; extensive crown dieback.
84	Trembling Aspen	<i>Populus tremuloides</i>	Native	26.9	1	5.0	Improbable	Good	Retain			Good form; healthy crown.
85	Trembling Aspen	<i>Populus tremuloides</i>	Native	29.1	1	1.5	Improbable	Fair	Retain			Light pruning in lower scaffold branches; narrow crown due to neighbouring trees; nerbank grape in lower scaffold branches.
86	Trembling Aspen	<i>Populus tremuloides</i>	Native	16.3	1		Possible	Dead	Retain			Broken stem; shedding bark.
87	Trembling Aspen	<i>Populus tremuloides</i>	Native	29.6	1	4.5	Improbable	Good	Retain			Asymmetrical crown due to neighbouring tree; crooked stem.
88	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	12.0	1	2.0	Possible	Very Poor	Retain			Extensive crown dieback; some insect feeding; riverbank grape in crown.
89	Trembling Aspen	<i>Populus tremuloides</i>	Native	25.9	1	4.0	Improbable	Good	Retain			Asymmetrical crown due to neighbouring tree; light pruning; good structure.
90	Trembling Aspen	<i>Populus tremuloides</i>	Native	22.7	1	1.5	Improbable	Fair	Retain			Phototropic lean.
91	Trembling Aspen	<i>Populus tremuloides</i>	Native	28.4	1	5.0	Possible	Fair	Retain			Signs of potential rot; codominant leaders in otherwise healthy crown.
92	Trembling Aspen	<i>Populus tremuloides</i>	Native	27.2	1	2.5	Improbable	Good	Retain			Relatively full crown with minor light pruning dieback; some riverbank grape in lower scaffold.
93	Balsam Poplar	<i>Populus balsamifera</i>	Native	28.1	1	2.0	Possible	Very Poor	Retain			History of branch failure; relatively extensive crown dieback; unbalanced root flare.
94	Trembling Aspen	<i>Populus tremuloides</i>	Native	19.2	1	4.0	Possible	Fair	Retain			1 dead exposed root; asymmetrical root flare; bark discoloration, possibly from branch rubbing; vine up stem.
95	Trembling Aspen	<i>Populus tremuloides</i>	Native	12.8	1	1.0	Improbable	Fair	Retain			Minor crown dieback; some decay at old limb wound but also compartmentalization.
96	Balsam Poplar	<i>Populus balsamifera</i>	Native	19.5	1	3.0	Improbable	Good	Retain			Good wound closure; 2 dead branches; bark rubbing; vine in crown.
97	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	13.4	1	1.5	Possible	Very Poor	Retain			Extensive crown dieback; galleries; epicormic growth; woodpecker damage.
98	Balsam Poplar	<i>Populus balsamifera</i>	Native	22.5	1	2.0	Probable	Poor	Retain			History of branch failure; phototropic lean; main leader gone.
99	Balsam Poplar	<i>Populus balsamifera</i>	Native	22.7	1	3.5	Possible	Fair	Retain			Main small branch stubs closed; crooked stem leaning slightly east; epicormic growth.
100	Balsam Poplar	<i>Populus balsamifera</i>	Native	15.4	1	1.0	Probable	Very Poor	Retain			Extensive crown dieback; staining and evidence of decay on main stem.
101	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	10.0	1	2.0	Possible	Poor	Retain			Bark wounds; epicormic growth; minor insecticide action; insect galleries.
102	Trembling Aspen	<i>Populus tremuloides</i>	Native	10.8	1	1.5	Probable	Very Poor	Retain			Extensive crown dieback; almost dead; bark cracks; decay on main stem.
103	Balsam Poplar	<i>Populus balsamifera</i>	Native	18.3	1	2.5	Possible	Poor	Retain			Unbalanced root flare; phototropic lean toward road; some crown dieback.
104	Balsam Poplar	<i>Populus balsamifera</i>	Native	22.4	1	4.0	Possible	Fair	Retain			Vine dieback; dead stem.
105	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	11.0	1	1.5	Probable	Very Poor	Retain			Almost dead; fruiting bodies; EAB exit holes.
106	Balsam Poplar	<i>Populus balsamifera</i>	Native	18.5	1	3.5	Improbable	Fair	Retain			Arching lean west; phototropic growth; some dieback in irregular crown; light pruning.
107	Trembling Aspen	<i>Populus tremuloides</i>	Native	15.4	1	2.0	Improbable	Fair	Retain			Narrow crown with light pruning in lower scaffold branches; some crown dieback; nerbank grape in lower scaffold branches.
108	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	14.7								



Map 3A
**River Mill Community,
 Phase 4
 Tree Protection Fencing Plan**



- Legend**
- Phase 4 Subject Property
 - Block Part of Different Application
 - Inventoried Tree to be Retained (Crown to Scale)
 - Inventoried Tree to be Transplanted (Crown to Scale)
 - Inventoried Butternut
 - Tree Protection Fencing
 - Tree Protection Fencing Signage
 - Development Limit
 - Proposed Development
 - Proposed Grading
 - Proposed Contours
 - MTE Floodline
 - Surveyed Dripline
 - Dripline Buffer (10m)
 - Surveyed Wetland
 - Wetland Buffer (30m)
 - Existing Conditions
 - Existing Contour

CONCEPT SIGNAGE

TREE PRESERVATION AREA

DUMPING STORAGE OF MATERIALS
 TREE REMOVAL
 DISTURBANCE OF ANY KIND

NO

BEYOND THIS POINT

DEVELOPER'S NAME: _____ DEVELOPER'S TELEPHONE NUMBER: _____
 CONSULTANT'S NAME: _____ CONSULTANT'S TELEPHONE NUMBER: _____
 CITY CONTACT NAME: _____ CITY CONTACT TEL. (AREA) NUMBER: _____

Migratory Birds Convention Act

- The destruction of migratory birds and their nests is prohibited under the federal Migratory Birds Convention Act, 1994.
- Vegetation clearing has the potential to directly impact bird breeding activity through damage and destruction of nests, eggs and young, or avoidance of the area by breeding adults.
- Vegetation clearing 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.
- Specific to non-woodland areas, if vegetation clearing cannot be avoided during the bird nesting season, a qualified biologist will be retained to carry out a nest search ahead of clearing activities within the work zone.
- 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.
- 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.

NATURAL RESOURCE SOLUTIONS INC.
 Aquatic, Terrestrial and Wetland Biologists

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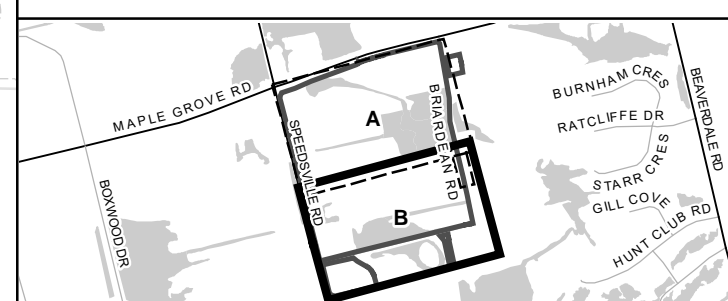
Project: 2204B
 Date: October 29, 2020

NAD83 - UTM Zone 17
 Size: 24x30"
 1:800

0 10 20 30 40 50 Metres



Map 3B
 River Mill Community,
 Phase 4
 Tree Protection Fencing Plan



- Legend**
- Phase 4 Subject Property
 - Block Part of Different Application
 - Inventoried Tree to be Retained (Crown to Scale)
 - Inventoried Tree to be Transplanted (Crown to Scale)
 - Inventoried Butternut
 - Tree Protection Fencing
 - Tree Protection Fencing Signage
 - Development Limit
 - Proposed Development
 - Proposed Grading
 - Proposed Contours
 - MTE Floodline
 - Surveyed Dripline
 - Dripline Buffer (10m)
 - Surveyed Wetland
 - Wetland Buffer (30m)
 - Existing Conditions
 - Existing Contour

CONCEPT SIGNAGE

TREE PRESERVATION AREA
 DUMPING
 STORAGE OF MATERIALS
 TREE REMOVAL
 DISTURBANCE OF ANY KIND
NO
 BEYOND THIS POINT

DEVELOPER'S NAME: _____ DEVELOPER'S TELEPHONE NUMBER: _____
 CONSULTANT'S NAME: _____ CONSULTANT'S TELEPHONE NUMBER: _____
 CITY CONTRACT NAME: _____ CITY CONTRACT TEL. (OVER NUMBER): _____

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

NATURAL RESOURCE SOLUTIONS INC.
 Aquatic, Terrestrial and Wetland Biologists

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Project: 2204B
 Date: October 29, 2020

NAD83 - UTM Zone 17
 Size: 24x30"
 1:800

0 10 20 30 40 50 Metres



River Mill Community, Phase 5

Detailed Vegetation Management Plan

Prepared for:

River Mill Development Corporation
2000 Garth Street, Suite 201
Hamilton, Ontario
L9B 0C1

Project No. 2204B | November 2020



NATURAL RESOURCE SOLUTIONS INC.

Aquatic, Terrestrial and Wetland Biologists

River Mill Community, Phase 5
Detailed Vegetation Management Plan

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Laura Hockley	GIS Specialist & Environmental Analyst

Report submitted on November 5, 2020



Joseph Lance
Terrestrial & Wetland Biologist / Certified Arborist (ON-1877A)

Table of Contents

1.0	Introduction	1
2.0	Tree Inventory and Methods.....	3
2.1	Bat Habitat Assessment	5
3.0	Summary of Tree Inventory Findings.....	6
3.1	Bat Habitat Findings.....	6
4.0	Tree Removal and Retention Analysis.....	7
5.0	Tree Protection Measures and Recommended Mitigation.....	8
5.1	Prior to Construction	8
5.1.1	Migratory Birds Convention Act.....	8
5.2	During Construction.....	9
5.3	Post-Construction	10
5.4	Compensation	10
5.5	Mitigation	11
6.0	Conclusion.....	13
7.0	References.....	14

Maps

Map 1. Study Area

Map 2. Detailed Vegetation Management Plan

List of Appendices

APPENDIX I Tree Inventory Data

APPENDIX II Tree Health and Potential for Structural Failure Criteria

APPENDIX III Conditions of Assessment

APPENDIX IV Tree Data and Summary Tables

APPENDIX V Tree Compensation Fee Calculations

1.0 Introduction

Natural Resource Solutions Inc. (NRSI) was retained in March 2019 by River Mill Development Corporation (the Client) to complete an Environmental Impact Study (EIS) and a Tree Inventory and Detailed Vegetation Management Plan (DVMP) for a proposed mixed-use development, referred to as the “River Mill Community” in Cambridge, Ontario.

The scope of this DVMP includes the two parcels composing Phase 5 of the proposed River Mill Community, hereafter referred to as the ‘Subject Lands’. These parcels total 4.15ha in area proposed for development and are located south of Maple Grove Road, on either side of the north end of Briardean Road (Map 1). The majority of the Subject Lands is characterized by active agricultural lands in the parcel west of Briardean Road, though a model home and parking lot has been constructed. The parcel to the east of Briardean Road was a residential lot with a house and amenity structures but is presently being used as a site office and laydown area. To the southwest of the Subject Lands lie the River Mill Community Phase 4 lands, also owned by the Client, which include wetlands, woodlands, and the Middle Creek riparian corridor, and are addressed under separate cover.

The following report has been prepared to satisfy the City of Cambridge’s Private Tree Preservation By-Law 124-18 (City of Cambridge 2018a). City of Cambridge By-Law 124-18 aims to regulate the destruction or injuring of trees on private property within City limits and to enhance tree canopy cover in the City. The City’s Tree Management Policies and Guidelines for New Developments (City of Cambridge 2002) requires that a DVMP considering all trees with a diameter-at-breast-height (DBH) $\geq 10\text{cm}$ is prepared by a recognized professional in tree management, which includes International Society of Arboriculture (ISA) Certified Arborists. Certified Arborists from NRSI completed all assessments in accordance with these policy documents.

Within the Private Tree Preservation By-law 124-18, a regulated tree consists of any self-supporting woody plant that will reach a height of at least 4.5m at maturity. By-law 124-18 prohibits “the destruction or injuring of any tree with a DBH equal to or greater than 20cm” without a permit; an exemption is made for the injuring or destruction of trees as a condition to the approval of *Planning Act* applications (City of Cambridge 2018a). This DVMP is prepared as part of the Client’s Draft Plan of Subdivision.

This DVMP provides the findings of the tree inventory, analysis of plans against the overall health and the structural integrity (referring to the potential for structural failure) of trees, protection measures for trees to be retained, and recommended mitigation and compensation measures. The tree data and mapping has been compared to the layout of the Preliminary Area Grading Plan (AG1.1) prepared by MTE Consultants Inc. (September 3, 2020).

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 observations since the inventory was conducted;
- Protection measures for trees to be retained; and
- Recommended mitigation measures.

2.0 Tree Inventory and Methods

A comprehensive tree inventory and assessment was conducted by a NRSI Certified Arborist on May 19, 2020. The inventory included the assessment of all trees $\geq 10\text{cm}$ DBH within the Subject Lands that may be impacted by the proposed development as well as trees on adjacent lands with the potential to be impacted by the proposed development. This includes boundary trees (i.e. trees with shared ownership located on the boundary between the Subject Lands and adjacent lands) and off-property trees (i.e. trees located on neighbouring lands, owned by others).

There are no natural features within the Subject Lands, but the adjacent Phase 4 lands include Middle Creek, significant woodlands, wetlands that form part of the Maple Grove Road Provincially Significant Wetland (PSW) Complex, as well as habitat for endangered or threatened species, as described in the corresponding EIS under separate cover (NRSI 2020). These features are identified as Core Environmental Features by the Region of Waterloo (2015) and the City of Cambridge (2018b). Development will be confined to the area outside these features and their associated buffers; therefore, individual trees were not inventoried from within natural heritage features.

All trees located on the Subject Lands were tagged with pre-numbered aluminum forestry tags. All off-property and boundary trees were assigned an alphabetical identifier and were not tagged. The locations of the trees inventoried were surveyed by the Certified Arborist using an SXBlue II GNSS GPS unit and are shown on Map 1. For trees with more than one stem, the DBH is presented as the sum of diameters of up to the largest three stems, as per the definition in By-law 124-18. 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 all inventoried trees:

- Tree location;
- Tag number (where applicable);
- Species (common and scientific name);
- DBH (cm);
- Crown radius (m);
- General health (excellent, good, fair, poor, very poor, dead);
- Potential for structural failure (improbable, possible, probable, imminent); and

- General comments (i.e. disease, aesthetic quality, development constraints, sensitivity to development, etc.).

The overall health of each tree was assessed based on the criteria outlined in Appendix II, and was compared to the criteria outlined in the Tree Management Policies and Guidelines for New Developments (referred to throughout this report as the 'City Guidelines') (City of Cambridge 2002). Both sets of criteria are very similar, with the exception that the criteria outlined in Appendix II assesses health using six rankings (i.e. excellent, good, fair, poor, very poor, dead), whereas the City Guidelines (2002) assess health using four ratings (i.e. good, fair, poor, dead), and are defined as follows:

- **Good:** dead branches less than 10%, signs of good compartmentalization on any wounds, no structural defects;
- **Fair:** 10-30% dead branches, size or occurrence of wounds presents some concerns, minor structural defects;
- **Poor:** more than 30% dead branches, weak compartmentalization, early leaf drop, presence of insects/disease, major structural defects; and
- **Dead:** tree shows no signs of life.

As such, any trees assessed in excellent or very poor health can be considered to be in good or poor health, respectively, according to the City Guidelines (2002). The potential for structural failure 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. 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, the condition of any visible root structures, the degree and direction of lean (if any), the general condition of the tree and the surrounding site, and the current or planned proximity of property and people. None of the trees examined were dissected, cored, probed or climbed, and detailed root 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

There are 4 bat species with records in the vicinity that are listed as Endangered provincially and are afforded general habitat protection under the *Endangered Species Act (ESA)* (2007). As part of the tree health assessments, NRSI's Certified Arborists, who are trained and experienced in the Ministry of Natural Resources and Forestry (MNRF) bat habitat assessment protocols (OMNR 2011, MNRF 2017) visually scanned all trees $\geq 10\text{cm}$ DBH for the presence of features (i.e. cavities, loose bark, etc.) that may provide bat maternity colony habitat for Little Brown Myotis (*Myotis lucifugus*) or Northern Myotis (*Myotis septentrionalis*). However, since the inventory was completed during bud break and early leaf-out for most species, a separate habitat assessment was also conducted by NRSI biologists trying to capture leaf-off conditions on May 7, 2020 as part of surveys completed for the EIS (refer to NRSI 2020).

3.0 Summary of Tree Inventory Findings

In total, 78 trees were inventoried, consisting of 20 species. Of the trees inventoried and assessed, 50% are native species, dominated by White Spruce (*Picea glauca*) and White Ash (*Fraxinus americana*), and 50% are non-native species, dominated by Colorado Spruce (*Picea pungens*). No individual trees were inventoried from within the larger parcel of the Phase 5 Subject Lands west of Briardean Road. Nine trees were recorded along the right-of-way (ROW) of Briardean Road, and the remainder are landscape trees from around the existing residential property, which is reflected by the even distribution of native and non-native species.

Two regionally rare species were recorded: 14 White Spruce and 3 Black Walnut (*Juglans nigra*). Each of these species is denoted by Richardson and Martin (1999) as being regionally rare if demonstrably indigenous, though most populations in Waterloo Region are thought to be of non-indigenous origin. All of the White Spruce from the Subject Lands are planted as fencerow or ornamental features around the existing residential property. The three Black Walnuts have naturalized or were planted along the side of Briardean Road. Therefore, it is unlikely that any of the specimens of these species are demonstrably indigenous in origin and they do not warrant special consideration.

Of the 10 Ash trees (*Fraxinus* spp.) inventoried, half are in very poor health and all of those have confirmed evidence of infestation by the Emerald Ash Borer (EAB) beetle (*Agilus planipennis*). Trees #166, #167, and #217 are large trees with a Probable potential for structural failure in the next two years. Three others (#178, #187, #501) show no sign of EAB infestation despite their proximity to trees that have been infested.

A complete list of inventoried trees is provided in Appendix I and tree locations are shown on Map 2. Appendix IV provides a summary of the overall condition of trees inventoried, along with their potential for structural failure rating. A majority (77%) of the trees inventoried are in good or fair condition with an improbable potential for structural failure.

3.1 Bat Habitat Findings

Please refer to the EIS for more information (NRSI 2020).

4.0 Tree Removal and Retention Analysis

This preliminary analysis has been conducted using the Preliminary Area Grading Plan (September 3, 2020), not a detailed grading plan for the Subject Lands. A re-analysis will be necessary when detailed grading plans are available at the Site Plan stage.

Between the tree inventory on May 19, 2020 and a site visit on October 27, 2020, 34 inventoried trees were removed for the creation of a construction site office and laydown area where materials and equipment are being stored (“Removed prior” in Appendix I). An additional 13 trees are expected to be removed from the interior of Block 2 and along the west side of Briardean Road; two of these (trees ‘ds’ and ‘dr’) have already been removed as part of the works to construct a cul-de-sac associated with the closing of the north end of Briardean Road.

Of the 47 trees removed prior or expected to be removed, 17 are regionally rare tree species (3 Black Walnut, 14 White Spruce) (Richardson and Martin 1999). As described in Section 3.0, however, these specimens are not demonstrably indigenous in origin and, therefore, are not considered regionally rare.

Twenty-nine (29) inventoried trees were observed to remain standing during the site visit on October 27, 2020 and, because of their positions around the perimeter of Block 2 of the Subject Lands, it is unclear whether they will conflict with the proposal. These trees have been marked as “Retained for now” and, as stated above, further analysis will be required once detailed grading plans are available. This analysis will consider three White Ash (*Fraxinus americana*) trees on Block 2 that do not exhibit signs of having been infested by EAB despite being in close proximity to other Ash trees that have extensive damage or have been killed by the pest.

One off-property tree (‘di’) belonging to the neighbour to the north is recommended for retention. One tree (#495) from the Subject Lands is recommended as a good candidate for transplant using tree spade due to its relative size, condition, and accessibility to machinery. If further analysis shows that this tree is in conflict with the proposed development, this tree should be transplanted in early spring or late autumn in order to maximize chance of survival.

5.0 Tree Protection Measures and Recommended Mitigation

5.1 Prior to Construction

Once a final analysis has taken place, temporary tree protection fencing (TPF) will be situated where trees to be retained are adjacent to the limit of disturbance, a minimum of 1m outside the dripline. A combined sediment and erosion control fence (i.e. silt fence) and TPF is recommended where trees are situated adjacent to the limit of disturbance. This TPF is to take the form of page wire farm fencing; plastic fencing (such as snow fencing) is not acceptable (City of Cambridge 2002). At the Site Plan stage, mapping will be refined and fencing is to be erected in recommended locations.

The temporary TPF will be installed and maintained by the Developer prior to any further construction activities (rough grading, vegetation and tree removal). Prior to works commencing on-site, fence installation and location is to be inspected by a Certified Arborist or other recognized professional (City of Cambridge 2002). Signage indicating the purpose of protection fencing will be attached to the TPF every 45m or less (City of Cambridge 2002).

As per section 17 of By-law 124-18, the owner shall protect all trees within the Subject Lands until the issuance of a permit under that By-Law or final approval of any planning application (City of Cambridge 2018a). Notwithstanding, any maintenance required for a tree that is proposed for retention—such as crown pruning, deep root fertilization, tree watering, and/or soil replacement—should be completed prior to construction as outlined in the City Guidelines (2002).

Prior to any rough grading, the Certified Arborist or other recognized professional will provide written verification to the City of Cambridge, Community Services Department that all of the recommended tree protection measures have been installed in accordance with the DVMP (City of Cambridge 2002). At the discretion of the Certified Arborist or other recognized professional, minor modifications to the TPF location, as shown on Map 2, may be required if it is determined that additional trees can be retained during construction. Any proposed changes to the TPF location or tree retention will be provided in the written verification.

5.1.1 Migratory Birds Convention Act

The removal of vegetation (trees, shrubs, grasses, etc.), structures and soil piles during site grading has the potential to disrupt nesting birds. The MBCA (Government of Canada 1994) identifies a list of migratory bird species that are protected. The Act prohibits the destruction of

nests, individuals and activities that would cause an adult bird to abandon a nest. Vegetation removal is to occur outside of the core nesting period for migratory birds as established by the Canadian Wildlife Service (Government of Canada 2017). This period extends from approximately April 1 through August 31. Each developer/consultant/contractor, etc. is legally obligated 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). Because the trees to be removed are mostly from a landscaped yard, this may qualify as 'simple habitat'. Should tree 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 City for their files in the event a record of due diligence is requested by CWS.

5.2 During Construction

Temporary TPF is to be maintained by the Developer during the entire construction period to ensure that trees being retained (including their root systems) are protected. A Certified Arborist will need to be on-site during critical stages of development to provide weekly inspection sheets to the City's Community Department Forestry Technician pertaining to tree removals/maintenance, grading adjacent to protective areas, as outlined in section 2.3.4 of the City Guidelines (2002). Critical stages include any work in and around retained trees and prior to the commencement of grading to inspect the condition of TPF. Minor construction damage (e.g. damage to limbs or roots) to trees to be retained must be pruned using proper

arboricultural techniques, and areas of disturbed root systems must be backfilled with native material immediately after damage occurs to prevent desiccation (City of Cambridge 2002). Should any of the trees intended to be retained be seriously damaged or die as a result of construction activities, consultation with the City will be required.

Areas protected by TPF shall remain undisturbed and shall not be used for temporary storage, placement or excavation of fill or top soil, the storage of construction materials or equipment, or the storage of debris. Recognizing the feeder root system of a tree often extends well beyond its dripline (i.e. outside the protected area), construction contaminants such as fuels, oils, etc. must be kept clear of tree preservation areas.

5.3 Post-Construction

It is recommended that the temporary TPF be removed upon completion of construction activities and that adjacent areas are stabilized with suitable vegetative cover. A Certified Arborist must inspect all retained trees and their rooting areas, and recommend remediation work, if needed. As outlined in section 2.3.4 of the City Guidelines, a Post-Grading Tree Maintenance Report is to be prepared by a Certified Arborist and be provided to the Community Department Forestry Technician (City of Cambridge 2002). A post-construction remediation plan may be required if damage to retained trees is noted. A final assessment should be done to ensure all protocols were met, ensuring final project approval.

5.4 Compensation

This DVMP includes a preliminary analysis of the tree retention opportunities based on the Preliminary Area Grading Plan (September 3, 2020) along with a summary of tree removals that have already taken place and some that are anticipated. By-law 124-18 states that the Director of the Parks, Recreation and Culture Division, or their designate, may issue a permit to injure or destroy trees subject to conditions that may include replacing each injured or destroyed tree in a manner satisfactory to the Director (City of Cambridge 2018a).

As outlined in the Permit to Destroy or Remove Private Trees, any tree proposed for removal may require compensation as calculated based on the Tree Compensation Fee equation in order to obtain a permit (City of Cambridge 2019). The equation is as follows:

$$= 0.05 \times (\text{Basic Tree Cost} \times \text{Species Rating} \times \text{Condition Rating} \times \text{Location Rating})$$

The Private Tree Preservation By-Law 124-18 prohibits the injury or destruction of trees ≥ 20 cm DBH; it follows that trees < 20 cm DBH do not require compensation for removal or injury. The definition of 'Dead/Hazardous' in the Permit to Destroy or Remove Private Trees (City of Cambridge 2019) closely fits the condition of trees assessed as Very Poor, so these have been assigned a Condition Rating of zero.

In total, 38 trees ≥ 20 cm DBH have been removed or are expected to be removed within or adjacent to the Subject Lands. Appendix V shows the data pertinent to the compensation calculation that are associated with these trees. Based on the Tree Compensation Fee equation, the calculated tree compensation fee for the proposed River Mill Phase 5 development is \$10,750.08. This amount may change after re-analysis of tree retention against detailed grading plans. Compensation fees will be applied to costs associated with tree planting in the Subject Lands or will be contributed to the City's Replacement Tree Planting Fund; details of compensation plantings will be determined at a later stage in the development process, but can be incorporated into lot street frontages, parks and stormwater management areas (City of Cambridge 2002).

5.5 Mitigation

Species used for replacement/enhancement plantings, with the exception of street trees, should be native to the Region of Waterloo, especially as the Subject Lands are so close to Core Environmental Features (Regional Municipality of Waterloo 2015). The use of non-native species that are sometimes more tolerant of urban conditions (i.e. salt and drought tolerant) may be suitable as long as they do not include invasive species such as Norway Maple (*Acer platanoides*) or Sweet Cherry (*Prunus avium*).

It is recommended that the following criteria be followed during the development of proposed planting plans:

- Plantings should conform to the latest edition of the Canadian Nursery Trades Association Specifications and Standards;
- The plan should be developed by, or reviewed and approved by an Ontario Landscape Architect (OLA) or Certified Arborist;
- Plantings should be limited to non-invasive species, with preference toward species native to the Region of Waterloo;
- Where feasible, plantings should include hardy, native tree species that are known to thrive in more urban conditions (i.e. compacted soil, drought, high salt tolerance);

- Plantings should include a diversity of trees from several genera to increase disease and pest tolerance and discourage monocultures (no more than 30% of planted trees should be from a single genus, and no more than 10% of planted trees should be from a single species);
- The plan should include a watering and monitoring plan for 2 years following planting;
- The plan should note that trees will be replaced if they are documented to have died within the 2-year monitoring period;
- The plan should include appropriate soil types and soil volumes;
- Ash species should be avoided in the planting plan due to the risk of the EAB beetle infestation;
- 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.; and
- Special attention should be given to the location and height of trees in proximity to utilities.

6.0 Conclusion

NRSI was retained in March 2019 by River Mill Development Corporation (the Client) to complete an Environmental Impact Study (EIS) and a Tree Inventory and Detailed Vegetation Management Plan (DVMP) for a proposed mixed-use development, referred to as the “River Mill Community” in Cambridge, Ontario. NRSI Certified Arborists conducted a comprehensive inventory of all trees $\geq 10\text{cm}$ DBH within the Subject Lands and adjacent lands that may be impacted by the proposed development. In total, 78 trees were inventoried, consisting of 20 species.

Thirty-four trees have already been removed for either the establishment of a site office and laydown area in Block 2, or the construction of a cul-de-sac at the north end of Briardean Road. An additional 13 trees are expected to be removed at this preliminary stage based on the Preliminary Area Grading Plan. Further analysis will be necessary when detailed grading plans are available in order to evaluate impacts to retained trees. A number of actions must be taken before and during construction to avoid impacts to trees that are to be retained. To compensate for trees removed through the course of the development, the Client will apply at least \$10,750.08 towards tree planting in the Subject Lands or this amount will be contributed to the City’s Replacement Tree Planting Fund.

7.0 References

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APPENDIX I Tree Inventory Data

River Mill Community Phase 5 Detailed Vegetation Management Plan
Tree Inventory Data

Tree Number	Common Name	Scientific Name	Native / Non-native	Stem Count	DBH (cm)	Crown Radius (m)	Potential for Structural Failure Rating	Overall Condition	Removal Status	Rationale for Removal	Compensation Required	Comments
6	Black Walnut	<i>Juglans nigra</i>	Native	2	14.6	2.5	Improbable	Good	Remove	Development	No	Secondary stem from basal shoot; 1 tight branch angle; tent caterpillar.
166	White Ash	<i>Fraxinus americana</i>	Native	1	57.3	5.0	Probable	Very Poor	Removed prior	Development	No	EAB exit holes; basal decay; codominant leaders; dead crown , live basal shoots.
167	White Ash	<i>Fraxinus americana</i>	Native	1	56.1	5.0	Probable	Very Poor	Removed prior	Development	No	EAB exit holes; dead crown; shedding bark; history of branch failure; crack forming between leaders; live basal shoots.
168	Silver Maple	<i>Acer saccharinum</i>	Native	1	65.7	6.0	Improbable	Fair	Removed prior	Development	Yes	Full, round crown; minor epicormic growth; tight unions; gypsy moth egg sacs.
169	Horsechestnut	<i>Aesculus hippocastanum</i>	Non-Native	4	97.5	5.0	Improbable	Fair	Removed prior	Development	Yes	Codominant stems with included bark; good branch stub closure; epicormic growth; gypsy moth egg sacs; 4 small dead branches.
170	Horsechestnut	<i>Aesculus hippocastanum</i>	Non-Native	4	108.9	5.0	Possible	Fair	Removed prior	Development	Yes	Codominant stems with included bark; decay evident at several branch stubs; 1 broken branch; epicormic growth.
171	White Ash	<i>Fraxinus americana</i>	Native	1	40.4	4.0	Possible	Very Poor	Removed prior	Development	No	EAB exit holes; dead crown, live basal shoot; loose bark; codominant leaders.
172	White Spruce	<i>Picea glauca</i>	Native	1	41.8	3.5	Improbable	Good	Remove	Development	Yes	Healthy crown but for 1 side where another tree once was.
173	White Spruce	<i>Picea glauca</i>	Native	1	31.7	3.0	Improbable	Good	Remove	Development	Yes	Minor dieback possibly from proximity to fire pit; lower branches poorly pruned; crown a bit irregular.
174	White Spruce	<i>Picea glauca</i>	Native	1	33.3	3.0	Improbable	Good	Remove	Development	Yes	Minor thinning.
175	Norway Maple	<i>Acer platanoides</i>	Non-Native	1	40.8	3.5	Possible	Fair	Remove	Development	Yes	Tight codominant leaders; included bark; longitudinal crack in 1 scaffold branch; crossing branches; circling root; fairly healthy crown.
176	Colorado Spruce	<i>Picea pungens</i>	Non-Native	2	55.0	3.0	Improbable	Good	Retained for now			Codominant stems; mostly healthy crown, minor dieback.
177	White Spruce	<i>Picea glauca</i>	Native	1	30.5	3.0	Improbable	Good	Retained for now			Good form; minor thinning.
178	White Ash	<i>Fraxinus americana</i>	Native	1	19.6	2.5	Improbable	Fair	Retained for now			Codominant leaders in top; no evidence of EAB; pretty full crown last season; leaf-out beginning; epicormic growth.
179	Colorado Spruce	<i>Picea pungens</i>	Non-Native	1	32.0	2.0	Improbable	Fair	Retained for now			Light pruning on 1 side due to neighboring tree; good form.
180	Colorado Spruce	<i>Picea pungens</i>	Non-Native	1	30.2	2.5	Improbable	Fair	Retained for now			Asymmetrical crown due to neighboring tree; crown thinning.
181	Colorado Spruce	<i>Picea pungens</i>	Non-Native	1	31.0	3.0	Improbable	Fair	Retained for now			Light pruning, 1 side.
182	White Ash	<i>Fraxinus americana</i>	Native	1	15.0	3.0	Possible	Very Poor	Retained for now			EAB exit holes; insectivore activity; dead crown; 1 live epicormic shoot; beginning to shed bark.
183	Colorado Spruce	<i>Picea pungens</i>	Non-Native	1	32.0	2.5	Improbable	Fair	Retained for now			Light pruning on 1 side, asymmetrical crown.
184	White Spruce	<i>Picea glauca</i>	Native	1	41.0	3.5	Improbable	Fair	Retained for now			Good form; dieback in lower crown.
185	Sugar Maple	<i>Acer saccharum ssp. saccharum</i>	Native	1	13.5	2.0	Improbable	Fair	Retained for now			Bark seam; epicormic growth; asymmetrical crown; small bark wounds on low branches.
186	White Ash	<i>Fraxinus americana</i>	Native	1	20.1	3.0	Improbable	Fair	Retained for now			EAB exit holes; some dieback; minor epicormic growth.
187	White Ash	<i>Fraxinus americana</i>	Native	1	17.4	2.5	Improbable	Good	Retained for now			Codominant leaders; good leaf-out beginning; no evidence of EAB.
188	Colorado Spruce	<i>Picea pungens</i>	Non-Native	1	28.3	2.5	Improbable	Good	Retained for now			Codominant leaders; exuding sap; good form.
189	Colorado Spruce	<i>Picea pungens</i>	Non-Native	1	30.8	2.5	Improbable	Fair	Retained for now			Irregular crown; slightly crooked stem; exuding sap.
190	Colorado Spruce	<i>Picea pungens</i>	Non-Native	1	30.0	2.5	Improbable	Fair	Removed prior	Development	Yes	Slightly crooked stem; light pruning and dieback in lower crown on 1 side.
191	Colorado Spruce	<i>Picea pungens</i>	Non-Native	1	33.0	2.5	Improbable	Good	Removed prior	Development	Yes	Good form; slightly sparse due to neighboring tree.
192	Green Ash	<i>Fraxinus pennsylvanica</i>	Native	1	15.8	2.5	Possible	Fair	Removed prior	Development	No	Healthy crown; tight union at codominant leaders; both leaders have bark cracks and woundwood.
193	Colorado Spruce	<i>Picea pungens</i>	Non-Native	1	34.4	2.5	Improbable	Good	Removed prior	Development	Yes	Good form; minor light pruning; lower branches poorly pruned, exuding sap.
194	Sugar Maple	<i>Acer saccharum ssp. saccharum</i>	Native	3	34.8	2.5	Improbable	Good	Removed prior	Development	Yes	3 upright stems; bark rubbing wound; phototropic growth east; healthy crown.
195	Dawn Redwood	<i>Metasequoia glyptostroboides</i>	Non-Native	1	26.3	2.5	Improbable	Fair	Removed prior	Development	Yes	2 dead branches; sloughing outer bark; tight union at leaders; poorly pruned lower branch.
196	Northern Catalpa	<i>Catalpa speciosa</i>	Non-Native	1	73.0	4.0	Possible	Fair	Removed prior	Development	Yes	Centre rot in stem and at least 1 scaffold branch; bark stained at base; history of branch failure; epicormic growth.
197	Colorado Spruce	<i>Picea pungens</i>	Non-Native	1	30.7	2.5	Improbable	Fair	Removed prior	Development	Yes	Crown thinning; epicormic growth; lower branches poorly pruned; fence affixed.
198	Bur Oak	<i>Quercus macrocarpa</i>	Native	1	16.8	2.5	Improbable	Excellent	Removed prior	Development	No	Strong central leader; healthy, slightly asymmetrical crown.
199	Red Oak	<i>Quercus rubra</i>	Native	1	23.0	3.0	Possible	Fair	Removed prior	Development	Yes	Good structure; slightly asymmetrical crown due to neighboring tree; concerning bark discoloration mid-stem; low scaffold branch poorly pruned.
200	Colorado Spruce	<i>Picea pungens</i>	Non-Native	1	29.3	2.0	Improbable	Fair	Removed prior	Development	Yes	Lower branches poorly pruned; light pruning; root flare underdeveloped.
201	White Spruce	<i>Picea glauca</i>	Native	1	37.6	3.5	Improbable	Good	Removed prior	Development	Yes	Lower branches poorly pruned; exposed roots, 1 circling; 1 broken branch.
202	Colorado Spruce	<i>Picea pungens</i>	Non-Native	1	31.7	2.5	Improbable	Good	Removed prior	Development	Yes	Branches poorly pruned.

Tree Number	Common Name	Scientific Name	Native / Non-native	Stem Count	DBH (cm)	Crown Radius (m)	Potential for Structural Failure Rating	Overall Condition	Removal Status	Rationale for Removal	Compensation Required	Comments
203	Red Oak	<i>Quercus rubra</i>	Native	1	11.5	2.5	Possible	Fair	Removed prior	Development	No	Asymmetrical crown due to neighboring tree; sunken bark and dead sapwood at 2m; codominant leaders.
204	Norway Spruce	<i>Picea abies</i>	Non-Native	1	60.4	5.0	Improbable	Good	Removed prior	Development	Yes	Lower branches poorly pruned; minor dieback; vehicle compaction in root zone.
205	White Spruce	<i>Picea glauca</i>	Native	1	21.5	3.5	Improbable	Fair	Removed prior	Development	Yes	Slightly suppressed; light pruning; birdhouse affixed.
206	White Spruce	<i>Picea glauca</i>	Native	1	21.7	3.0	Improbable	Fair	Removed prior	Development	Yes	Suppressed, planar crown; light pruning; 1 crooked branch.
207	White Spruce	<i>Picea glauca</i>	Native	1	30.2	3.5	Improbable	Fair	Removed prior	Development	Yes	Sparse crown with minor dieback; light pruning.
208	Norway Spruce	<i>Picea abies</i>	Non-Native	1	37.0	4.0	Improbable	Fair	Removed prior	Development	Yes	Irregular crown; minor dieback; exuding sap; lower branches poorly pruned.
209	White Spruce	<i>Picea glauca</i>	Native	1	37.5	4.5	Improbable	Good	Removed prior	Development	Yes	Very minor dieback; lower branches poorly pruned.
210	White Spruce	<i>Picea glauca</i>	Native	1	23.7	3.0	Improbable	Fair	Removed prior	Development	Yes	Suppressed, sparse crown in planar shape; fence affixed; lower branches poorly pruned.
211	White Spruce	<i>Picea glauca</i>	Native	1	32.5	3.5	Improbable	Fair	Removed prior	Development	Yes	Irregular crown; codominant leaders; minor dieback; lower branches poorly pruned.
212	Japanese Silk Lilac	<i>Syringa reticulata</i>	Non-Native	1	21.2	2.5	Improbable	Good	Removed prior	Development	Yes	Good form; very minor dieback; branches all originate at 1.5m.
213	Norway Maple	<i>Acer platanoides</i>	Non-Native	1	53.3	5.0	Possible	Fair	Removed prior	Development	Yes	Large codominant leaders with included bark; exposed roots, circling roots; lower branches poorly pruned; full crown; gypsy moth egg sacs.
214	Japanese Silk Lilac	<i>Syringa reticulata</i>	Non-Native	1	15.6	2.0	Improbable	Good	Remove	Development	No	Good form; low branching; minor tip dieback.
215	Silver Maple	<i>Acer saccharinum</i>	Native	7	134.9	7.5	Possible	Fair	Retained for now			Many codominant stems; 1 former stem dead and cut; included bark; history of 5 branch failures; lower stem wounds show dead sapwood; gypsy moth egg sacs; healthy crown.
216	Redbud	<i>Cercis canadensis</i>	Native	1	17.7	3.0	Improbable	Fair	Removed prior	Development	No	Upper stem bending toward house; asymmetrical crown due to neighboring tree; scaffold branch rubbing against roof; basal shoots.
217	White Ash	<i>Fraxinus americana</i>	Native	1	67.4	7.5	Probable	Very Poor	Removed prior	Development	No	EAB exit holes; outer bark patchy; large codominant stems with included bark, likely decay; only live basal shoots.
218	White Spruce	<i>Picea glauca</i>	Native	1	25.4	2.0	Improbable	Fair	Retained for now			Crown thinning; good form;
219	Colorado Spruce	<i>Picea pungens</i>	Non-Native	1	26.5	2.0	Improbable	Fair	Retained for now			Crown thinning; light pruning; some poor pruning cuts.
220	Sycamore Maple	<i>Acer pseudoplatanus</i>	Non-Native	1	21.7	3.0	Improbable	Good	Retained for now			Good structure; 1 dead branch; basal shoot; excavation within root zone.
221	Colorado Spruce	<i>Picea pungens</i>	Non-Native	1	24.5	2.5	Improbable	Fair	Retained for now			Crown thinning; light pruning; lower branches poorly pruned;
222	Bur Oak	<i>Quercus macrocarpa</i>	Native	1	16.7	2.5	Improbable	Good	Retained for now			Good structure; a few improper pruning cuts; healthy crown.
223	Colorado Spruce	<i>Picea pungens</i>	Non-Native	1	23.9	2.0	Improbable	Fair	Retained for now			Crooked stem; asymmetrical crown due to neighboring tree.
224	Colorado Spruce	<i>Picea pungens</i>	Non-Native	1	27.2	2.0	Improbable	Fair	Retained for now			Lower crown thinning.
225	Norway Spruce	<i>Picea abies</i>	Non-Native	2	41.5	2.5	Improbable	Good	Retained for now			2 stems; healthy crown.
226	Colorado Spruce	<i>Picea pungens</i>	Non-Native	1	23.0	2.0	Improbable	Fair	Retained for now			Light pruning; minor thinning.
227	Norway Spruce	<i>Picea abies</i>	Non-Native	1	27.5	3.0	Possible	Fair	Retained for now			Being girdled by 2 guy wires; chlorosis; minor thinning.
495	Bur Oak	<i>Quercus macrocarpa</i>	Native	1	11.3	1.0	Improbable	Good	Transplant	Development		Strong central leader; good structure; slightly asymmetrical crown due to neighboring tree.
501	White Ash	<i>Fraxinus americana</i>	Native	1	26.7	3.5	Improbable	Good	Retained for now			Codominant leaders with tight union; no evidence of EAB; axe damage to stem bark; good bud break.
520	Pussy Willow	<i>Salix discolor</i>	Non-Native	1	28.2	2.5	Possible	Very Poor	Remove	Development	No	Broken tops; water sprouts; significant decay; dead branches.
525	Sugar Maple	<i>Acer saccharum ssp. saccharum</i>	Native	2	12.8	2.0	Improbable	Fair	Retained for now			Included bark between stems; epicormic growth; gypsy moth egg sac; asymmetrical crown due to neighboring tree.
529	Sycamore Maple	<i>Acer pseudoplatanus</i>	Non-Native	1	17.3	2.5	Improbable	Fair	Retained for now			Asymmetrical crown due to neighboring tree; 3 small dead branches; minor thinning; long stem wound with woundwood, reveals dead sapwood; excavation within root zone.
532	Sugar Maple	<i>Acer saccharum ssp. saccharum</i>	Native	1	22.3	3.5	Improbable	Fair	Retained for now			Strong central leader; minor epicormic growth; couple tight branch attachments.
dl	White Spruce	<i>Picea glauca</i>	Native	1	32.2	3.0	Improbable	Fair	Retain			Minor dieback; exuding sap from past cuts; good cone production last year.
dl	Prunus species	<i>Prunus sp.</i>	Non-Native	5	55.5	4.0	Improbable	Fair	Remove	Development	Yes	Asymmetrical crown to south; branch rub; canker; improper prune cuts.
dm	Prunus species	<i>Prunus sp.</i>	Non-Native	1	18.7	2.0	Improbable	Fair	Remove	Development	No	Branch rub; asymmetrical crown to west; small dead branches.
dn	Norway Maple	<i>Acer platanoides</i>	Non-Native	1	10.7	1.0	Improbable	Good	Remove	Development	No	Branch rub; epicormic growth.
do	Common Apple	<i>Malus domestica</i>	Non-Native	4	60.0	2.0	Improbable	Fair	Remove	Development	Yes	Included bark; branch rub.
dp	Common Apple	<i>Malus domestica</i>	Non-Native	1	15.0	2.0	Improbable	Poor	Remove	Development	No	Included bark; branch rub, improper prune cuts; oystershell scale.
dq	Common Apple	<i>Malus domestica</i>	Non-Native	4	48.0	2.0	Improbable	Poor	Remove	Development	Yes	Included bark; branch rub, improper prune cuts; oystershell scale; vines.
dr	Black Walnut	<i>Juglans nigra</i>	Native	5	40.6	4.0	Improbable	Fair	Removed prior	Development	Yes	Included bark; branch rub; little canker.
ds	Black Walnut	<i>Juglans nigra</i>	Native	3	39.7	3.0	Improbable	Fair	Removed prior	Development	Yes	Minor dieback; codominant leaders.

APPENDIX II Tree Health and Potential for Structural Failure 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 imbalance, 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 a major state of decline and would be identified as very poor. These trees have a probable or imminent potential for structural failure. These trees should be identified for removal.
Dead	Represents a tree that exhibits no sign of new growth, including buds, foliage, or shoot growth. These trees have a probable or imminent potential for structural failure. These trees should be identified for removal.

¹ (Dunster 2009)

Potential for Structural Failure Assessment Criteria

Assessment Criteria*	Definition ¹
Improbable	The tree or branch is not likely to fail during normal weather conditions and may not fail in many severe weather conditions within the specified time frame.
Possible	Failure could occur, but it is unlikely during normal weather conditions within the specified time frame.
Probable	Failure may be expected under normal weather conditions within the specified time frame.
Imminent	Failure has started or is most likely to occur in the near future, even if there is no significant wind or increased load. This is a rare occurrence for an 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.	

¹ (Dunster et al. 2013)

APPENDIX III Conditions of 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 Property as described in this report (the "Subject Lands") and the trees situated thereon, and upon information provided by the Client to NRSI. The opinions in this assessment are given based on observations made and using generally accepted professional judgment, however, because trees are living organisms and subject to change, damage and disease, the results, observations, recommendations, and analysis as set out in this assessment are valid only at the date any such observations and analysis took place. No guarantee, warranty, representation or opinion is offered or made by NRSI as to the length of the validity of the results, observations, recommendations and analysis contained within this assessment. As a result, the Client shall not rely upon this assessment, save and except for representing the circumstances and observations 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 (e.g. 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 areas as described in this report. 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 Data and Summary Tables

Summary of Inventoried Trees

Common Name	Scientific Name	Excellent	Good	Fair	Poor	Very Poor	Total
Native Species							
Black Walnut	<i>Juglans nigra</i>		1	2			3
Bur Oak	<i>Quercus macrocarpa</i>	1	2				3
Green Ash	<i>Fraxinus pennsylvanica</i>			1			1
Red Oak	<i>Quercus rubra</i>			2			2
Redbud	<i>Cercis canadensis</i>			1			1
Silver Maple	<i>Acer saccharinum</i>			2			2
Sugar Maple	<i>Acer saccharum ssp. saccharum</i>		1	3			4
White Ash	<i>Fraxinus americana</i>		2	2		5	9
White Spruce	<i>Picea glauca</i>		6	8			14
<i>Subtotal</i>		1	12	21	0	5	39
Colorado Spruce	<i>Picea pungens</i>		5	13			18
Common Apple	<i>Malus domestica</i>			1	2		3
Dawn Redwood	<i>Metasequoia glyptostroboides</i>			1			1
Horsechestnut	<i>Aesculus hippocastanum</i>			2			2
Japanese Silk Lilac	<i>Syringa reticulata</i>		2				2
Northern Catalpa	<i>Catalpa speciosa</i>			1			1
Norway Maple	<i>Acer platanoides</i>		1	2			3
Norway Spruce	<i>Picea abies</i>		2	2			4
Prunus species	<i>Prunus sp.</i>			2			2
Pussy Willow	<i>Salix discolor</i>					1	1
Sycamore Maple	<i>Acer pseudoplatanus</i>		1	1			2
<i>Subtotal</i>		0	11	25	2	1	39
Overall Total		1	23	46	2	6	78

Overall Condition of Trees Inventoried

Potential for Structural Failure Rating	Overall Condition					Total
	Excellent	Good	Fair	Poor	Very Poor	
Improbable	5	71	103	3		63
Possible		1	53	19	18	12
Probable				4	14	3
Imminent						0
Total	5	72	156	26	32	78

APPENDIX V Tree Compensation Fee Calculations

River Mill Community Phase 5 Detailed Vegetation Management Plan

Tree Compensation Fee Calculations

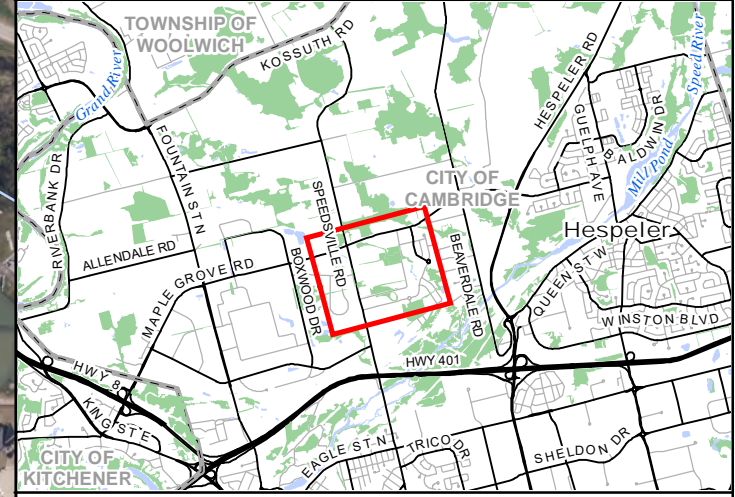
Tree Number	Tree Species	DBH (cm)	Condition	1. Basic Tree Cost	2. Species Rating	3. Condition Rating	4. Location Rating	5. Appraised Value (1*2*3*4)	6. Tree Compensation Fee (0.05* Appraised Value)
166	White Ash	57	Very Poor	\$55,370.54	0.55	0	0.6	\$0.00	\$0.00
167	White Ash	56	Very Poor	\$53,444.75	0.55	0	0.6	\$0.00	\$0.00
168	Silver Maple	66	Fair	\$74,236.42	0.55	0.5	0.6	\$12,249.01	\$612.45
169	Horsechestnut	98	Fair	\$152,201.37	0.55	0.5	0.6	\$25,113.23	\$1,255.66
170	Horsechestnut	109	Fair	\$177,671.65	0.55	0.5	0.6	\$29,315.82	\$1,465.79
171	White Ash	40	Very Poor	\$27,267.70	0.55	0	0.6	\$0.00	\$0.00
172	White Spruce	42	Good	\$30,062.65	0.55	0.75	0.6	\$7,440.51	\$372.03
173	White Spruce	32	Good	\$17,451.31	0.55	0.75	0.6	\$4,319.20	\$215.96
174	White Spruce	33	Good	\$18,559.06	0.55	0.75	0.6	\$4,593.37	\$229.67
175	Norway Maple	41	Fair	\$28,648.13	0.55	0.5	0.6	\$4,726.94	\$236.35
190	Colorado Spruce	30	Fair	\$15,338.06	0.55	0.5	0.6	\$2,530.78	\$126.54
191	Colorado Spruce	33	Good	\$18,559.06	0.55	0.75	0.6	\$4,593.37	\$229.67
193	Colorado Spruce	34	Good	\$19,700.90	0.55	0.75	0.6	\$4,875.97	\$243.80
194	Sugar Maple	35	Good	\$20,876.82	0.55	0.75	0.6	\$5,167.01	\$258.35
195	Dawn Redwood	26	Fair	\$11,520.57	0.55	0.5	0.6	\$1,900.89	\$95.04
196	Northern Catalpa	73	Fair	\$90,818.62	0.55	0.5	0.6	\$14,985.07	\$749.25
197	Colorado Spruce	31	Fair	\$16,377.64	0.55	0.5	0.6	\$2,702.31	\$135.12
199	Red Oak	23	Fair	\$9,015.34	0.55	0.5	0.6	\$1,487.53	\$74.38
200	Colorado Spruce	29	Fair	\$14,332.56	0.55	0.5	0.6	\$2,364.87	\$118.24
201	White Spruce	38	Good	\$24,609.09	0.55	0.75	0.6	\$6,090.75	\$304.54
202	Colorado Spruce	32	Good	\$17,451.31	0.55	0.75	0.6	\$4,319.20	\$215.96
204	Norway Spruce	60	Good	\$61,352.40	0.55	0.75	0.6	\$15,184.72	\$759.24
205	White Spruce	22	Fair	\$8,248.44	0.55	0.5	0.6	\$1,360.99	\$68.05
206	White Spruce	22	Fair	\$8,248.44	0.55	0.5	0.6	\$1,360.99	\$68.05
207	White Spruce	30	Fair	\$15,338.06	0.55	0.5	0.6	\$2,530.78	\$126.54
208	Norway Spruce	37	Fair	\$23,330.92	0.55	0.5	0.6	\$3,849.60	\$192.48
209	White Spruce	38	Good	\$24,609.09	0.55	0.75	0.6	\$6,090.75	\$304.54
210	White Spruce	24	Fair	\$9,816.33	0.55	0.5	0.6	\$1,619.69	\$80.98
211	White Spruce	33	Fair	\$18,559.06	0.55	0.5	0.6	\$3,062.24	\$153.11

Tree Number	Tree Species	DBH (cm)	Condition	1. Basic Tree Cost	2. Species Rating	3. Condition Rating	4. Location Rating	5. Appraised Value (1*2*3*4)	6. Tree Compensation Fee (0.05* Appraised Value)
212	Japanese Silk Lilac	21	Good	\$7,515.62	0.55	0.75	0.6	\$1,860.12	\$93.01
213	Norway Maple	53	Fair	\$47,871.90	0.55	0.5	0.6	\$7,898.86	\$394.94
217	White Ash	67	Very Poor	\$76,503.05	0.55	0	0.6	\$0.00	\$0.00
520	Pussy Willow	28	Very Poor	\$13,361.14	0.55	0	0.6	\$0.00	\$0.00
dl	Prunus species	56	Fair	\$53,444.75	0.55	0.5	0.6	\$8,818.38	\$440.92
do	Common Apple	60	Fair	\$61,352.40	0.55	0.5	0.6	\$10,123.15	\$506.16
dq	Common Apple	48	Poor	\$39,265.52	0.55	0.25	0.6	\$3,239.41	\$161.97
dr	Black Walnut	41	Fair	\$28,648.13	0.55	0.5	0.6	\$4,726.94	\$236.35
ds	Black Walnut	40	Fair	\$27,267.70	0.55	0.5	0.6	\$4,499.17	\$224.96
Total									\$10,750.08

MAPS

River Mill Community

Study Area

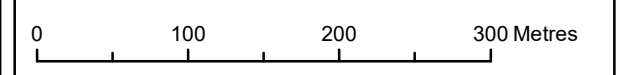


- Legend**
- Study Area
 - Subject Lands
 - Parcel Boundary
 - Phase 4 - New Community
 - Phase 5 - Annex
 - Watercourse (GRCA)

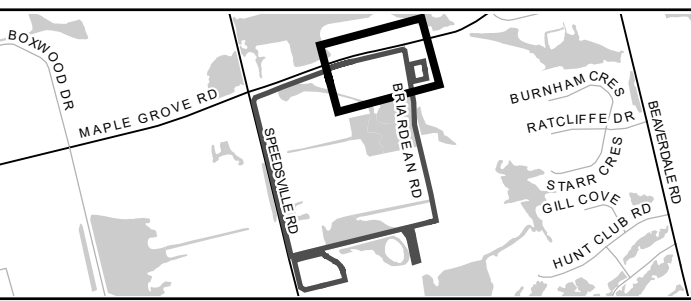
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Project: 2204B Date: November 5, 2020	NAD83 - UTM Zone 17 Size: 11x17" 1:5,000
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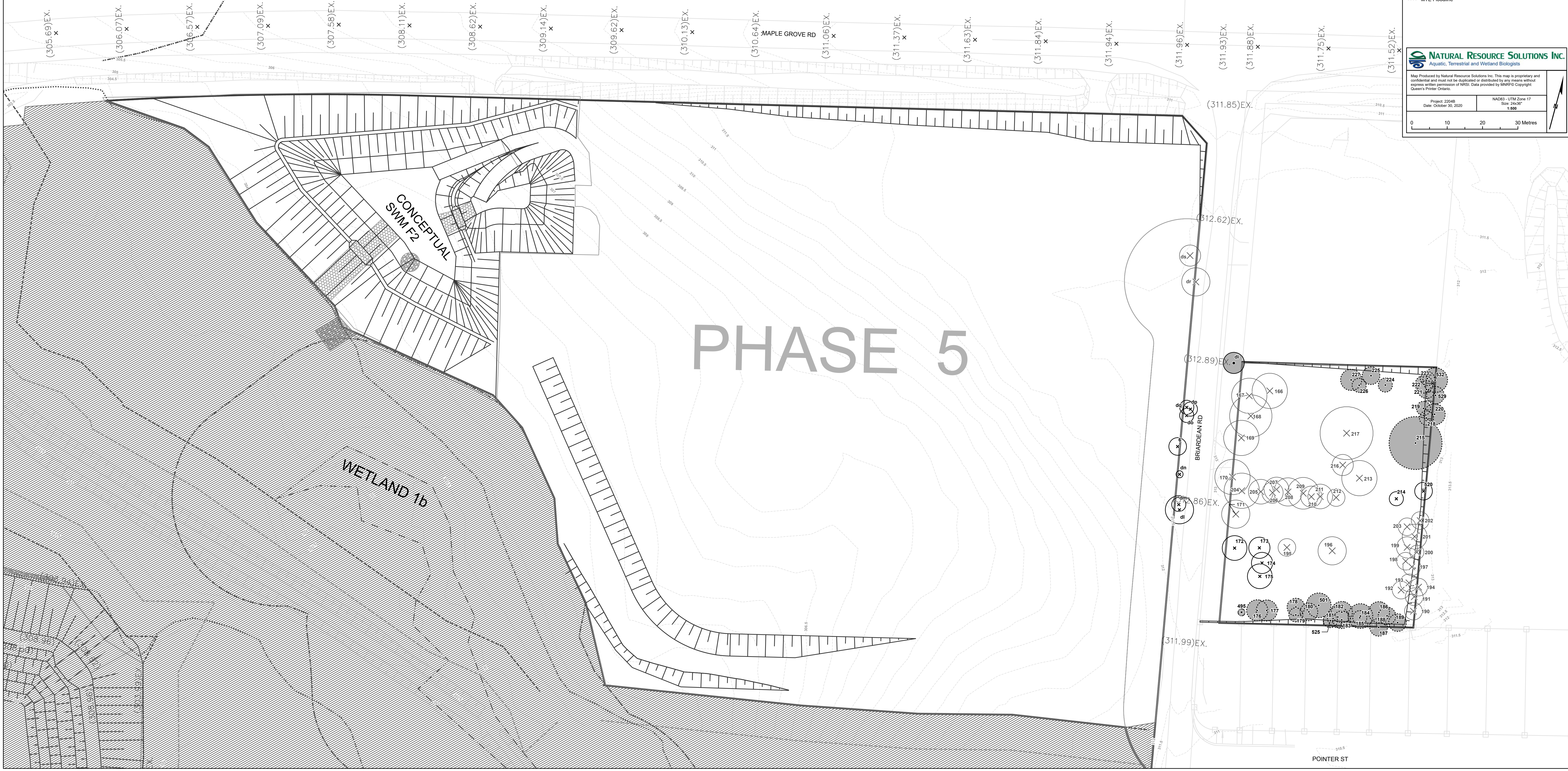


River Mill Community, Phase 5 Detailed Vegetation Management Plan



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

Tree Number	Common Name	Scientific Name	Native / Non-native	DBH (cm)	Stem Count	Crown Radius (m)	Potential for Structural Failure Rating	Overall Condition	Removal Status	Rationale for Removal	Compensation Required	Comments
6	Black Walnut	Juglans nigra	Native	14.8	2	2.5	Improbable	Good	Retained for now	Secondary stem from basal shoot, 1 light branch angle, tent caterpillar.	No	
166	White Ash	Fraxinus americana	Native	57.3	1	5.0	Probable	Very Poor	Removed prior	EAB exit holes, basal decay, codominant leaders, dead crown, live basal shoots.	No	
167	White Ash	Fraxinus americana	Native	56.1	1	5.0	Probable	Very Poor	Removed prior	EAB exit holes, basal decay, codominant leaders, dead crown, live basal shoots.	No	
168	Sugar Maple	Acer saccharum	Native	65.7	1	6.0	Improbable	Fair	Retained for now	Full, round crown, minor epicormic growth, light unions, gypsy moth egg sacs.	Yes	
169	Horseshoebush	Aesculus hippocastanum	Non-Native	97.5	4	5.0	Improbable	Fair	Retained for now	Codominant stems with included bark, good branch structure, epicormic growth, gypsy moth egg sacs, 4 small dead branches.	Yes	
170	Horseshoebush	Aesculus hippocastanum	Non-Native	108.0	4	5.0	Improbable	Fair	Retained for now	Codominant stems with included bark, decay evident at several branch stubs, 1 broken branch, epicormic growth.	Yes	
171	White Ash	Fraxinus americana	Native	40.4	1	4.0	Possible	Very Poor	Removed prior	EAB exit holes, basal decay, codominant leaders, dead crown, live basal shoots.	No	
172	White Spruce	Picea glauca	Native	41.8	1	3.5	Improbable	Good	Retained for now	Healthy crown but for 1 side where another tree once was.	Yes	
173	White Spruce	Picea glauca	Native	37.7	1	3.0	Improbable	Good	Retained for now	Minor dieback possibly from proximity to site post, lower branches poorly pruned, crown a bit irregular.	Yes	
174	White Spruce	Picea glauca	Native	33.3	1	3.0	Improbable	Good	Retained for now	Minor dieback.	Yes	
175	Norway Spruce	Picea abies	Non-Native	40.8	1	3.5	Possible	Fair	Retained for now	Tight codominant leaders, included bark, longitudinal crack in 1 scaffold branch, crossing branches, circling root, fairly healthy crown.	Yes	
176	Colorado Spruce	Picea pungens	Non-Native	55.0	2	3.0	Improbable	Good	Retained for now	Codominant stems, mostly healthy crown, minor dieback.	No	
177	White Spruce	Picea glauca	Native	30.5	1	3.0	Improbable	Good	Retained for now	Good form, minor thinning.	No	
178	White Ash	Fraxinus americana	Native	19.6	1	2.5	Improbable	Fair	Retained for now	Codominant leaders in top, no evidence of EAB, pretty full crown last season; leaf-out beginning, epicormic growth.	No	
179	Colorado Spruce	Picea pungens	Non-Native	32.0	1	2.0	Improbable	Fair	Retained for now	Light pruning on 1 side due to neighboring tree, good form.	No	
180	Colorado Spruce	Picea pungens	Non-Native	30.2	1	2.5	Improbable	Fair	Retained for now	Asymmetrical crown due to neighboring tree, crown thinning.	No	
181	Colorado Spruce	Picea pungens	Non-Native	11.0	1	3.0	Improbable	Fair	Retained for now	Light pruning, 1 side.	No	
182	White Ash	Fraxinus americana	Native	15.0	1	3.0	Possible	Very Poor	Retained for now	EAB exit holes, insecticide activity, dead crown, 1 live epicormic shoot, beginning to shed bark.	No	
183	Colorado Spruce	Picea pungens	Non-Native	32.0	1	2.5	Improbable	Fair	Retained for now	Light pruning on 1 side, asymmetrical crown.	No	
184	White Spruce	Picea glauca	Native	41.0	1	3.5	Improbable	Fair	Retained for now	Good form, dieback in lower crown.	No	
185	Sugar Maple	Acer saccharum ssp. saccharum	Native	13.5	1	2.0	Improbable	Fair	Retained for now	Blank seam, epicormic growth, asymmetrical crown, small bark wounds on low branches.	No	
186	White Ash	Fraxinus americana	Native	20.1	1	3.0	Improbable	Fair	Retained for now	EAB exit holes, some dieback, minor epicormic growth.	No	
187	White Ash	Fraxinus americana	Native	17.4	1	2.5	Improbable	Good	Retained for now	Codominant leaders, good leaf-out beginning, no evidence of EAB.	No	
188	Colorado Spruce	Picea pungens	Non-Native	28.3	1	2.5	Improbable	Good	Retained for now	Codominant leaders, excluding sap, good form.	No	
189	Colorado Spruce	Picea pungens	Non-Native	30.8	1	2.5	Improbable	Fair	Retained for now	Irregular crown, slightly crooked stem, excluding sap.	Yes	
190	Colorado Spruce	Picea pungens	Non-Native	30.0	1	2.5	Improbable	Fair	Retained for now	Slightly crooked stem, light pruning and dieback in lower crown on 1 side.	Yes	
191	Colorado Spruce	Picea pungens	Non-Native	33.0	1	2.5	Improbable	Good	Retained for now	Good form, slightly sparse due to neighboring tree.	Yes	
192	Green Ash	Fraxinus pennsylvanica	Native	15.8	1	2.5	Possible	Fair	Retained for now	Healthy crown, light union at codominant leaders, both leaders have bark cracks and woundwood.	No	
193	Colorado Spruce	Picea pungens	Non-Native	34.4	1	2.5	Improbable	Good	Retained for now	Good form, minor light pruning, lower branches poorly pruned, excluding sap.	Yes	
194	Sugar Maple	Acer saccharum ssp. saccharum	Native	34.8	3	2.5	Improbable	Good	Retained for now	3 upright stems, bark rubbing wound, phototropic growth east, healthy crown.	Yes	
195	Green Ash	Fraxinus pennsylvanica	Native	15.8	1	2.5	Possible	Fair	Retained for now	2 dead branches, snagging outer bark, light union at leaders, poorly pruned lower branch.	No	
196	Northern Catalpa	Catalpa speciosa	Non-Native	73.0	1	4.0	Possible	Fair	Retained for now	Centre rot in stem and at least 1 scaffold branch, bark stained at base, history of branch failure, epicormic growth.	Yes	
197	Colorado Spruce	Picea pungens	Non-Native	30.7	1	2.5	Improbable	Fair	Retained for now	Crown thinning, epicormic growth, lower branches poorly pruned, fence allowed.	Yes	
198	Red Oak	Quercus macrocarpa	Native	16.8	1	2.5	Improbable	Excellent	Retained for now	Strong central leader, healthy, slightly asymmetrical crown.	No	
199	Red Oak	Quercus rubra	Native	23.0	1	3.0	Possible	Fair	Retained for now	Good structure, slightly asymmetrical crown due to neighboring tree, concerning bark discoloration mid-stem; low scaffold branch poorly pruned.	Yes	
200	Colorado Spruce	Picea pungens	Non-Native	29.3	1	2.0	Improbable	Fair	Retained for now	Lower branches poorly pruned, light pruning, roof flare undeveloped.	Yes	
201	White Spruce	Picea glauca	Native	37.6	1	3.5	Improbable	Good	Retained for now	Lower branches poorly pruned, light pruning, 1 circling, 1 broken branch.	Yes	
202	Colorado Spruce	Picea pungens	Non-Native	31.7	1	2.5	Improbable	Good	Retained for now	Branches poorly pruned.	Yes	
203	Red Oak	Quercus rubra	Native	11.5	1	2.5	Possible	Fair	Retained for now	Asymmetrical crown due to neighboring tree, sunken bark and dead sapwood at 2m; codominant leaders.	No	
204	Norway Spruce	Picea abies	Non-Native	60.4	1	5.0	Improbable	Good	Retained for now	Lower branches poorly pruned, minor dieback, vehicle compaction in root zone.	Yes	



Legend

- Phase 5 Subject Property
- Block Part of Different Application
- Invented Tree to be Retained (Crown to Scale)
- Invented Tree to be Retained for Now (Crown to Scale)
- Invented Tree to be Transplanted (Crown to Scale)
- Invented Tree to be Removed (Crown to Scale)
- Invented Tree Removed Prior (Crown to Scale)
- Preliminary Area Development Plan
- Preliminary Area Grading Plan
- MTE Floodline
- Surveyed Dripline
- Dripline Buffer (10m)
- Surveyed Wetland
- Wetland Buffer (30m)
- Existing Conditions
- Existing Contour

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Project: 22048
 Date: October 30, 2020

NAD83 - UTM Zone 17
 Date: 1:800

0 10 20 30 Metres

Appendix VI

Vascular Flora Species Reported from the Study Area

Vascular Plant Species Reported from the Study Area

Scientific Name	Common Name	CC	CW	Weed	SRANK ¹	SARO ²	COSEWIC ³	SARA Schedule ³	Waterloo Region ⁴	Waterloo Region ⁵	NHIC Data ⁴	MNRF Region of Waterloo SAR List ⁴	NRSI Observed (2018 and 2019)											
													Savanta ⁶	Subject Lands	FOD7-3	FOD7 (a, b, and inclusions)	SWD3-3 (FOD7 inclusion)	SWD4-1	SWD6-3	MAM2-9	MAM2-10	CUM1	CUP3	Ag Field
Psilotopsida																								
Ferns & Allies																								
Bracken Fern Family																								
<i>Pteridium aquilinum</i> var. <i>latiusculum</i>	Eastern Bracken	2	3		S5					X			X											
Dryopteridaceae																								
<i>Athyrium filix-femina</i> var. <i>angustum</i>	Northern Lady Fern	4	0		S5								X	X										
<i>Cystopteris bulbifera</i>	Bulbifer Fern	5	-2		S5					X			X	X										X
<i>Dryopteris carthusiana</i>	Spinulose Wood Fern	5	-2		S5					X			X	X										X
<i>Dryopteris cristata</i>	Crested Wood Fern	7	-5		S5					X			X	X										
<i>Matteuccia struthiopteris</i> var. <i>pensylvanica</i>	Ostrich Fern	5	-3		S5					X			X	X										X
<i>Onoclea sensibilis</i>	Sensitive Fern	4	-3		S5					X			X	X									X	X
Equisetaceae																								
<i>Equisetum arvense</i>	Field Horsetail	0	0		S5					X			X	X									X	X
<i>Equisetum fluviatile</i>	Water Horsetail	7	-5		S5					X			X	X									X	X
<i>Equisetum hyemale</i> ssp. <i>affine</i>	Scouring-rush	2	-2		S5					X			X	X										X
<i>Equisetum palustre</i>	Marsh Horsetail	10	-3		S5				R	R			X	X									X	X
<i>Equisetum pratense</i>	Meadow Horsetail	8	-3		S5				R+	X			X	X									X	X
<i>Equisetum variegatum</i> ssp. <i>variegatum</i>	Variegated Horsetail	5	-3		S5					X			X	X										X
Ophioglossaceae																								
<i>Botrychium virginianum</i>	Rattlesnake Fern	5	3		S5					X			X	X										X
Osmundaceae																								
<i>Osmunda cinnamomea</i>	Cinnamon Fern	7	-3		S5					X			X	X										X
<i>Osmunda regalis</i> var. <i>spectabilis</i>	American Royal Fern	7	-5		S5					X			X	X										X
Thelypteridaceae																								
<i>Thelypteris palustris</i> var. <i>pubescens</i>	Marsh Fern	5	-4		S5					X			X	X										
Gymnosperms																								
Cupressaceae																								
<i>Juniperus virginiana</i>	Eastern Red Cedar	4	3		S5								X	X									X	X
<i>Thuja occidentalis</i>	Eastern White Cedar	4	-3		S5					X			X	X									X	X
Pinaceae																								
<i>Larix laricina</i>	Tamarack	7	-3		S5					X			X	X										X
<i>Picea abies</i>	Norway Spruce	5	-1		SE3					X			X	X									X	X
<i>Picea glauca</i>	White Spruce	6	3		S5				R+	X			X	X									X	X
<i>Picea pungens</i>	Colorado Spruce			NA	SE1								X	X									X	X
<i>Pinus nigra</i>	Austrian Pine		-5	-1	SE2								X	X									X	X
<i>Pinus resinosa</i>	Red Pine	8	3		S5					X Int			X	X									X	X
<i>Pinus strobus</i>	Eastern White Pine	4	3		S5					X			X	X									X	X
<i>Pinus sylvestris</i>	Scot's Pine	4	5	-3	SE5					X			X	X									X	X
Dicotyledons																								
Aceraceae																								
Maple Family																								
<i>Acer negundo</i>	Manitoba Maple	0	-2		S5					X			X	X									X	X
<i>Acer platanoides</i>	Norway Maple		5	-3	SE5					X			X	X									X	X
<i>Acer rubrum</i>	Red Maple	4	0		S5					X			X	X									X	X
<i>Acer saccharinum</i>	Silver Maple	5	-3		S5					X			X	X									X	X
<i>Acer saccharum</i> ssp. <i>saccharum</i>	Sugar Maple	4	3		S5					X			X	X									X	X
<i>Acer spicatum</i>	Mountain Maple	6	3		S5					X			X	X									X	X
<i>Acer X. freemanii</i>	Freeman's Maple												X	X									X	X
Anacardiaceae																								
Sumac or Cashew Family																								
<i>Rhus hirta</i>	Staghorn Sumac	1	5		S5					X			X	X										X
<i>Toxicodendron rydbergii</i>	Poison-ivy	0	0		S5					X			X	X									X	X
Apiaceae																								
Carrot or Parsley Family																								
<i>Cicuta maculata</i>	Spotted Water-hemlock	6	-5		S5					X			X	X									X	X
<i>Cicuta virosa</i>	Water-hemlock				S4S5					X			X	X									X	X
<i>Daucus carota</i>	Wild Carrot		5	-2	SE5					X			X	X									X	X
<i>Sium suave</i>	Hemlock Water-parsnip	4	-5		S5					X			X	X									X	X
Apocynaceae																								
Dogbane Family																								
<i>Apocynum androsaemifolium</i> ssp. <i>androsaemifolium</i>	Spreading Dogbane	3	5		S5								X	X										X
<i>Apocynum cannabinum</i> var. <i>cannabinum</i>	Indian Hemp		1		S5								X	X									X	X
<i>Vinca minor</i>	Periwinkle		5	-2	SE5								X	X									X	X
Araliaceae																								
Ginseng Family																								
<i>Aralia nudicaulis</i>	Wild Sarsaparilla	4	3		S5					X			X	X										X
<i>Panax quinquefolius</i>	Ginseng	9	5		S3	END	E	Schedule 1	R	R-5		X	X	X										X
Asclepiadaceae																								
Milkweed Family																								
<i>Asclepias syriaca</i>	Common Milkweed	0	5		S5								X	X									X	X
Asteraceae																								
Composite or Aster Family																								
<i>Achillea millefolium</i> ssp. <i>millefolium</i>	Common Yarrow		3	-1	SE7					X			X	X									X	X
<i>Ambrosia artemisiifolia</i>	Common Ragweed	0	3		S5					X			X	X									X	X
<i>Arctium minus</i> ssp. <i>minus</i>	Common Burdock		5	-2	SE5					X			X	X									X	X

Scientific Name	Common Name	CC	CW	Weed	SRANK ¹	SARO ²	COSEWIC ³	SARA Schedule ³	Waterloo Region ⁴	Waterloo Region ⁴	NHIC Data ⁵	MNR Region of Waterloo SAR List ⁶	Savanta ⁶	NRSI Observed (2018 and 2019)									
														Subject Lands	FOD7-3	FOD7 (a, b, and inclusions)	SWD3-3 (FOD7 inclusion)	SWD4-1	SWD6-3	MAM2-9	MAM2-10	CUM1	CUP3
<i>Bidens cernua</i>	Stick-tight	2	-5		S5									X									X
<i>Bidens frondosa</i>	Devil's Beggar-ticks	3	-3		S5									X			X						
<i>Carduus nutans</i> ssp. <i>leiocephalus</i>	Musk Thistle				SE5									X							X		
<i>Centaurea maculosa</i>	Spotted Knapweed		5	-3	SE5				X				X								X		
<i>Cichorium intybus</i>	Chicory		5	-1	SE5				X				X								X		X
<i>Cirsium arvense</i>	Canada Thistle		3	-1	SE5				X				X			X					X		X
<i>Cirsium vulgare</i>	Bull Thistle		4	-1	SE5				X				X								X		X
<i>Conyza canadensis</i>	Horseweed	0	1		S5				X				X								X		
<i>Crepis tectorum</i>	Narrow-leaved Hawk's Beard	1	5	-1	SE5				X				X	X							X		
<i>Erigeron annuus</i>	Daisy Fleabane	0	1		S5				X				X	X							X		X
<i>Erigeron philadelphicus</i> ssp. <i>philadelphicus</i>	Philadelphia Fleabane	1	-3		S5				X				X	X									X
<i>Eupatorium perfoliatum</i>	Perfoliate Thoroughwort	2	-4		S5				X				X	X			X					X	X
<i>Eupatorium maculatum</i> ssp. <i>maculatum</i>	Spotted Joe-pye-weed	3	-5		S5				X				X	X			X	X				X	X
<i>Euthamia graminifolia</i>	Flat-topped Bushy Goldenrod	2	-2		S5				X				X	X			X				X		X
<i>Hieracium pilosella</i>	Mouse-ear Hawkweed		5	-1	SE5				X				X	X									
<i>Leucanthemum vulgare</i>	Ox-eye Daisy		5	-1	SE5				X				X	X							X		X
<i>Matricaria discoidea</i>	Pineapple-weed				SE5				X				X	X							X		X
<i>Solidago altissima</i> var. <i>altissima</i>	Tall Goldenrod	1	3		S5				X				X	X			X	X				X	X
<i>Solidago caesia</i>	Blue-stem Goldenrod	5	3		S5				X				X	X									
<i>Solidago canadensis</i>	Canada Goldenrod	1	3		S5				X				X	X			X	X			X	X	X
<i>Solidago flexuosula</i>	Zia-zag Goldenrod	6	3		S5				X				X	X							X	X	X
<i>Solidago patula</i>	Rough-leaved Goldenrod	8	-5		S5								X	X							X		
<i>Solidago rugosa</i> ssp. <i>rugosa</i>	Rough Goldenrod	4	-1		S5				X				X	X			X	X				X	
<i>Symphotrichum ericoides</i> var. <i>ericoides</i>	White Heath Aster				S5				X					X							X		
<i>Symphotrichum lanceolatum</i>	Panicked Aster	3	-3		S5									X			X	X				X	
<i>Symphotrichum lanceolatum</i> var. <i>lateflorum</i>	Tall White Aster	3	-3		S5								X	X									
<i>Symphotrichum lateriflorum</i> var. <i>lateriflorum</i>	Calico Aster	3	-2		S5				X					X									X
<i>Symphotrichum novae-angliae</i>	New England Aster	2	-3		S5				X					X							X	X	X
<i>Symphotrichum pilosum</i> var. <i>pilosum</i>	Hairy Aster	4	2		S5				X					X							X		
<i>Symphotrichum puniceum</i>	Purple-stemmed Aster				S5								X	X			X	X	X			X	
<i>Symphotrichum X amethystinum</i>	Amethyst Aster				SNA									X							X		
<i>Tanacetum vulgare</i>	Common Tansy		5	-1	SE5				X				X	X									X
<i>Taraxacum officinale</i>	Common Dandelion		3	-2	SE5				X				X	X			X	X			X	X	X
<i>Tragopogon dubius</i>	Doubtful Goat's-beard		5	-1	SE5				X				X	X							X	X	X
<i>Tragopogon parrifolius</i>	Common Salsify		5	-1	SE4?				X					X							X		
<i>Tripleurospermum inodorum</i>	Scentless Chamomile		5	-1	SE7				X					X									
<i>Tussilago farfara</i>	Coltsfoot		3	-2	SE5				X					X			X				X		
Balsaminaceae	Touch-me-not Family																						
<i>Impatiens capensis</i>	Spotted Jewelweed	4	-3		S5				X					X	X		X				X	X	
Barberraceae	Barberry Family																						
<i>Barberis thunbergii</i>	Japanese Barberry		4	-3	SE5				X					X									
<i>Podophyllum peltatum</i>	May-apple	5	3		S5				X					X			X						X
Betulaceae	Birch Family																						
<i>Betula alleghaniensis</i>	Yellow Birch	6	0		S5				X				X	X				X					X
<i>Betula papyrifera</i>	White Birch		1	2		S5			X					X									
<i>Ostrya virginiana</i>	Hop Hornbeam	4	4		S5				X					X									
Boraginaceae	Borage Family																						
<i>Echium plantagineum</i>	Purple Viper's Bugloss				SE1									X									X
<i>Echium vulgare</i>	Blueweed		5	-2	SE5				X					X							X		
<i>Symphytum officinale</i> ssp. <i>officinale</i>	Common Comfrey		5	-1	SE5				X					X									
Brassicaceae	Mustard Family																						
<i>Alliaria petiolata</i>	Garlic Mustard		0	-3	SE5				X					X	X	X					X	X	X
<i>Arabis glabra</i>	Tower-mustard	4	5		S5				X					X							X		
<i>Barbarea vulgaris</i>	Yellow Rocket		0	-1	SE5				X					X			X						
<i>Berteroa incana</i>	Hoary Alyssum		5	-3	SE5				X					X							X		
<i>Brassica nigra</i>	Black Mustard		5	-1	SE5				X					X									X
<i>Capsella bursa-pastoris</i>	Shepherd's Purse		1	-1	SE5				X					X	X								X
<i>Cardamine bulbosa</i>	Bulbous Cress	8	-5		S4			R	X					X	X		X	X					
<i>Cardamine diphylla</i>	Two-leaved Toothwort	7	5		S5				X					X									
<i>Erysimum cheiranthoides</i> ssp. <i>cheiranthoides</i>	Wormseed Mustard		3	-1	SE5				X					X									
<i>Hesperis matronalis</i>	Dame's Rocket		5	-3	SE5				X					X			X				X	X	X
<i>Lepidium campestre</i>	Field Cress		5	-1	SE5				X					X									
<i>Lepidium densiflorum</i>	Common Pepper-grass		0	-2	SE5				X					X									X
<i>Nasturtium microphyllum</i>	Small-leaved Water-cress		-5	-3	SE5				X					X									X
<i>Thlaspi arvense</i>	Field Penny-cress		5	-1	SE5				X					X									X

Scientific Name	Common Name	CC	CW	Weed	SRANK ¹	SARO ²	COSEWIC ³	SARA Schedule ³	Waterloo Region ⁴	Waterloo Region ⁴	NHIC Data ⁵	MNR of Waterloo SAR List ⁶	Savanta ⁶	NRSI Observed (2018 and 2019)														
														Subject Lands	FOD7-3	FOD7 (a, b, and inclusions)	SWD3-3 (FOD7 inclusion)	SWD4-1	SWD6-3	MAM2-9	MAM2-10	CUM1	CUP3	Ag Field	Entire Site			
<i>Mentha arvensis ssp. borealis</i>	American Wild Mint	3	-3		S5									X			X									X		
<i>Nepeta cataria</i>	Catnip		1	-2	SE5								X	X												X	X	
<i>Prunella vulgaris ssp. vulgaris</i>	Common Heal-all		0	-1	SE3									X												X		
<i>Prunella vulgaris ssp. lanceolata</i>	Heal-all	5	5		S5									X													X	
Lythraceae	Loosestrife Family																											
<i>Lythrum salicaria</i>	Purple Loosestrife		-5	-3	SE5									X	X		X									X	X	X
Menispermaceae	Moonseed Family																											
<i>Menispermum canadense</i>	Moonseed	7	0		S4				R	X				X		X												
Moraceae	Mulberry Family													X	X													X
<i>Morus alba</i>	White Mulberry		0	-3	SE5					X				X		X										X		X
Oleaceae	Olive Family													X	X													
<i>Fraxinus americana</i>	White Ash	4	3		S5									X	X			X							X	X		X
<i>Fraxinus nigra</i>	Black Ash	7	-4		S5									X	X													X
<i>Fraxinus pennsylvanica</i>	Green Ash	3	-3		S5									X	X	X	X	X	X						X	X	X	X
<i>Ligustrum vulgare</i>	Common Privet		1	-2	SE5									X														X
<i>Syringa vulgaris</i>	Common Lilac		5	-2	SE5									X	X													X
Onagraceae	Evening-primrose Family																											
<i>Circaea alpina</i>	Smaller Enchanter's Nightshade	6	-3		S5									X	X													
<i>Circaea luteiana ssp. canadensis</i>	Yellowish Enchanter's Nightshade	3	3		S5					X				X	X		X	X								X		X
<i>Oenothera biennis</i>	Common Evening-primrose	0	3		S5					X				X	X											X		X
Oxalidaceae	Wood Sorrel Family																											
<i>Oxalis stricta</i>	Upright Yellow Wood-sorrel	0	3		S5					X				X	X													X
Papaveraceae	Poppy Family																											
<i>Chelidonium majus</i>	Celandine		5	-3	SE5					X				X														X
<i>Sanguinaria canadensis</i>	Bloodroot	5	4		S5					X				X														
Plantaginaceae	Plantain Family																											
<i>Plantago lanceolata</i>	Ribgrass		0	-1	SE5					X				X													X	X
<i>Plantago major</i>	Common Plantain		-1	-1	SE5					X				X														X
Polygonaceae	Smartweed Family																											
<i>Persicaria amphibia</i>	Water Smartweed	5	-5		S5					X				X														X
<i>Polygonum persicaria</i>	Lady's-thumb		-3	-1	SE5					X				X												X		X
<i>Rumex acetosella</i>	Sheep Sorrel		0		SNA					X				X														X
<i>Rumex crispus</i>	Curly-leaf Dock		-1	-2	SE5					X				X	X											X	X	
<i>Rumex obtusifolius ssp. obtusifolius</i>	Bitter Dock		-3	-1	SE5					X				X														X
Primulaceae	Primrose Family																											
<i>Lysimachia ciliata</i>	Fringed Loosestrife	4	-3		S5									X			X	X										
<i>Lysimachia thyrsiflora</i>	Tufted Loosestrife	7	-5		S5									X			X									X		
Pyrolaceae	Wintergreen Family																											
<i>Pyrola elliptica</i>	Shinleaf	5	5		S5									X														X
Ranunculaceae	Buttercup Family																											
<i>Actaea rubra</i>	Red Baneberry	5	5		S5					X				X														
<i>Anemone canadensis</i>	Canada Anemone	3	-3		S5					X				X			X											
<i>Anemone cylindrica</i>	Thimbleweed	7	5		S4				R					X												X		
<i>Caltha palustris</i>	Marsh-marigold	5	-5		S5					X				X	X		X	X								X	X	X
<i>Clematis virginiana</i>	Virgin's-bower	3	0		S5					X				X	X		X	X								X		
<i>Ranunculus abortivus</i>	Kidney-leaf Buttercup	2	-2		S5					X				X														
<i>Ranunculus acris</i>	Tall Buttercup		-2	-2	SE5					X				X	X		X									X	X	X
<i>Ranunculus hispidus var. nitidus</i>	Swamp Buttercup				SNR									X	X													X
<i>Ranunculus recurvatus var. recurvatus</i>	Hooked Buttercup	4	-3		S5					X				X				X										
<i>Ranunculus repens</i>	Creeping Buttercup		-1	-1	SE5					X				X				X										
<i>Thalictrum dioicum</i>	Early Meadow-rue	5	2		S5					X				X	X													X
<i>Thalictrum pubescens</i>	Tall Meadow-rue	5	-2		S5					X				X	X													
Rhamnaceae	Buckthorn Family																											
<i>Rhamnus cathartica</i>	European Buckthorn	3	-3		SE5					X				X	X	X	X	X								X	X	X
<i>Frangula alnus</i>	Glossy Buckthorn		-1	-3	SE5					X				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Rosaceae	Rose Family																											
<i>Agrimonia gryposepala</i>	Tall Hairy Agrimony	2	2		S5					X				X														
<i>Filipendula ulmaria ssp. ulmaria</i>	Meadow-sweet				SE1									X			X									X	X	
<i>Fragaria virginiana</i>	Wild Strawberry				S5					X				X			X									X	X	
<i>Fragaria virginiana ssp. virginiana</i>	Scarlet Strawberry	2	1		SU					X				X														
<i>Geum sp.</i>	Avens species													X	X	X												
<i>Geum aleppicum</i>	Yellow Avens	2	-1		S5					X				X	X	X	X	X							X	X		
<i>Geum canadense</i>	White Avens	3	0		S5					X				X	X	X	X	X										X
<i>Geum laciniatum</i>	Rough Avens		-3		S4					X				X														
<i>Malus domestica</i>	Apple													X	X		X											X
<i>Potentilla norvegica</i>	Rough Cinquefoil				S5									X												X		
<i>Potentilla recta</i>	Rough-fruited Cinquefoil		5	-2	SE5									X												X	X	
<i>Prunus serotina</i>	Black Cherry	3	3		S5					X				X	X			X								X	X	
<i>Prunus virginiana ssp. virgin</i>																												

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														Subject Lands	FOD7-3	FOD7 (a, b, and inclusions)	SWD3-3 (FOD7 inclusion)	SWD4-1	SWD6-3	MAM2-9	MAM2-10	CUM1	CUP3	Ag Field	Entire Site			
<i>Setaria viridis</i>	Green Foxtail			-1	SE5					X				X													X	
Smilacaceae	Catbrier Family																											
<i>Smilax herbacea</i>	Herbaceous Carrion Flower	5	0		S4					X			X	X														X
Typhaceae	Cattail Family																											
<i>Typha angustifolia</i>	Narrow-leaved Cattail	3	-5		S5					X			X	X												X	X	
<i>Typha latifolia</i>	Broad-leaved Cattail	3	-5		S5								X	X											X	X	X	
Total										1	4	180	283	14	41	62	89	63	9	12	50	67	79	177				

¹MNRF 2018c; ²MNRF 2018b; ³Government of Canada 2019; ⁴Richardson and Martin 1999; ⁵Riley 1989; ⁶MNRF 2018; ⁷Savanta 2012

Appendix VII

Bird Species Reported from the Study Area

Bird Species Reported from the Study Area

Scientific Name	Common Name	SRANK ¹	SARO ²	COSEWIC ³	SARA Schedule ³	Region of Waterlooo Status ⁴	OBBA ⁵ Square 17NJ50	NHIC Data ⁶	MNRFSAR Lists ^{7,8}	Savanta ⁹	NRSI Observed by Vegetation Community (2019 Breeding Bird Station)											
											All Obs.	BMB-001 (SWD4-1)	BMB-002 (SWD4-1)	BMB-003 (SWD3-3)	BMB-004 (CUP3)	BMB-005 (FOD7-2)	BMB-006 (Ag.)	BMB-006 (Ag.)	BMB-007 (SWD4-1)	Incidental		
Anatidae		Ducks, Geese & Swans																				
<i>Branta canadensis</i>	Canada Goose	S5					CO			X	X									OB		
<i>Cygnus buccinator</i>	Trumpeter Swan	S4	NAR	NAR			CO															
<i>Aix sponsa</i>	Wood Duck	S5				√*	CO				X										OB	
<i>Anas platyrhynchos</i>	Mallard	S5					CO				X										OB	
<i>Anas discors</i>	Blue-winged Teal	S4					PR							PR								
<i>Anas crecca</i>	Green-winged Teal	S4				√	PR															
<i>Lophodytes cucullatus</i>	Hooded Merganser	S5B, S5N				√	PO			X												
<i>Mergus merganser</i>	Common Merganser	S5B, S5N				√	PR															
Odontophoridae		New World Quails																				
<i>Colinus virginianus</i>	Northern Bobwhite	S1	END	E	Schedule 1	√				X												
Phasianidae		Partridges, Grouse & Turkeys																				
<i>Bonasa umbellus</i>	Ruffed Grouse	S4					CO				X										OB	
<i>Meleagris gallopavo</i>	Wild Turkey	S5					CO				X										OB	
Podicipediformes		Grebes																				
<i>Podilymbus podiceps</i>	Pied-billed Grebe	S4B, S4N				√	CO															
<i>Podiceps auritus</i>	Horned Grebe	S1B, S4N	SC	SC	No Schedule					X												
Columbidae		Pigeons & Doves																				
<i>Columba livia</i>	Rock Pigeon	SNA					CO			X												
<i>Zenaidura macroura</i>	Mourning Dove	S5					CO			X	X										OB	
Cuculiformes		Cuckoos & Anis																				
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo	S4B				√	CO															
<i>Coccyzus erythrophthalmus</i>	Black-billed Cuckoo	S5B				√	CO															
Caprimulgidae		Goatsuckers																				
<i>Chordeiles minor</i>	Common Nighthawk	S4B	SC	SC	Schedule 1	√*	PR			X												
Apodidae		Swifts																				
<i>Chaetura pelagica</i>	Chimney Swift	S4B, S4N	THR	T	Schedule 1		CO			X												
Trochilidae		Hummingbirds																				
<i>Archilochus colubris</i>	Ruby-throated Hummingbird	S5B				√	PR															
Rallidae		Rails, Gallinules & Coots																				
<i>Rallus limicola</i>	Virginia Rail	S5B				√	PR															
<i>Porzana carolina</i>	Sora	S4B				√	PR															
<i>Fulica americana</i>	American Coot	S4B	NAR	NAR		√	PR															
Gruidae		Cranes																				
<i>Grus canadensis</i>	Sandhill Crane	S5B				√	CO															
Charadriidae		Plovers																				
<i>Charadrius vociferus</i>	Killdeer	S5B, S5N					CO			X	X			PO	PR				PR	PR	PR	OB
Scolopacidae		Waders																				
<i>Scolopax minor</i>	American Woodcock	S4B					CO				X										OB	
<i>Actitis macularia</i>	Spotted Sandpiper	S5					CO			X	X									PR	OB	
<i>Tringa solitaria</i>	Solitary Sandpiper	S4B					CO				X										OB	
Laridae		Gulls, Terns & Skimmers																				
<i>Larus delawarensis</i>	Ring-billed Gull	S5B, S4N				√				X	X				OB					OB		
<i>Chlidonias niger</i>	Black Tern	S3B	SC	NAR		√				X											OB	
Ardeidae		Herons & Bitterns																				
<i>Ixobrychus exilis</i>	Least Bittern	S5B, S5N								X												
<i>Ardea herodias</i>	Great Blue Heron	S4B				√	CO			X	X									OB	OB	
<i>Butorides virescens</i>	Green Heron	S4B				√	CO			X	X										OB	
Cathartidae		Vultures																				
<i>Cathartes aura</i>	Turkey Vulture	S5B				√	PO			X	X										OB	
Accipitridae		Hawks, Kites, Eagles & Allies																				
<i>Pandion haliaetus</i>	Osprey	S5B				√	PR			X	X										OB	
<i>Haliaeetus leucocephalus</i>	Bald Eagle	S2N, S4B	SC	NAR		√				X											OB	
<i>Accipiter striatus</i>	Sharp-shinned Hawk	S5	NAR	NAR		√	CO			X												
<i>Accipiter cooperii</i>	Cooper's Hawk	S4	NAR	NAR		√	CO															
<i>Buteo jamaicensis</i>	Red-tailed Hawk	S5	NAR	NAR		√	CO			X	X										OB	
Tytoonidae		Barn Owls																				
<i>Tyto alba</i>	Barn Owl	S1	END	E	Schedule 1	√				X												
Strigidae		Typical Owls																				
<i>Megascops asio</i>	Eastern Screech-Owl	S4	NAR	NAR			CO															
<i>Bubo virginianus</i>	Great Horned Owl	S4					CO			X												
<i>Asio flammeus</i>	Short-eared Owl	S2N, S4B	SC	SC	Schedule 3	√				X												
<i>Aegolius acadicus</i>	Northern Saw-whet Owl	S4				√	PR															
Alcedinidae		Kingfishers																				
<i>Megaceryle alcyon</i>	Belted Kingfisher	S4B				√	CO			X	X										OB	
Picidae		Woodpeckers																				
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	S4B	SC	END	Schedule 1	√				X												
<i>Melanerpes carolinus</i>	Red-bellied Woodpecker	S4				√	CO				X				PO	PR					OB	
<i>Dryobates pubescens</i>	Downy Woodpecker	S5					CO			X	X				PO	PO					OB	
<i>Dryobates villosus</i>	Hairy Woodpecker	S5					CO			X	X				PO							
<i>Colaptes auratus</i>	Northern Flicker	S4B					CO			X	X										OB	
<i>Dryocopus pileatus</i>	Pileated Woodpecker	S5				√	CO			X												
Falconidae		Caracaras & Falcons																				
<i>Falco sparverius</i>	American Kestrel	S4					CO				X											
<i>Falco peregrinus anatumtundrius</i>	Peregrine Falcon	S3B	SC	SC	Schedule 1	√				X												
Tyrannidae		Tyrant Flycatchers																				
<i>Contopus virens</i>	Eastern Wood-Pewee	S4B	SC	SC			CO	X	X	X	X			PO	PR	PO	PO	PR			PO	OB
<i>Empidonax virescens</i>	Acadian Flycatcher	S2S3B	END	E	Schedule 1	√				X												
<i>Empidonax aliorum</i>	Alder Flycatcher	S5B				√	PR															
<i>Empidonax traillii</i>	Willow Flycatcher	S5B					CO			X	X											
<i>Empidonax minimus</i>	Least Flycatcher	S4B				√	PR														PO	
<i>Sayornis phoebe</i>	Eastern Phoebe	S5B					CO				X											
<i>Myiarchus cineritus</i>	Great Crested Flycatcher	S4B					PR			X	X			PR	PO						OB	
<i>Tyrannus tyrannus</i>	Eastern Kingbird	S4B					CO			X	X										OB	
Vireonidae		Vireos																				

Scientific Name	Common Name	SRANK ¹	SARO ²	COSEWIC ³	SARA Schedule ³	Waterloo Status ⁴	Square 17NJ50	NHIC Data ⁶	MNRF SAR Lists ^{7,8}	Savanta ⁹	All Obs.	BMB-001 (SWD4-1)	BMB-002 (SWD4-1)	BMB-003 (SWD3-3)	BMB-004 (CUP3)	BMB-005 (FOD7-2)	BMB-006 (Ag.)	BMB-006 (Ag.)	BMB-007 (SWD4-1)	Incidental	
<i>Vireo solitarius</i>	Blue-headed Vireo	S5B									X			PO							
<i>Vireo gilvus</i>	Warbling Vireo	S5B					CO				X	PO		PR	PO					OB	
<i>Vireo olivaceus</i>	Red-eyed Vireo	S5B					CO			X	X			PR		PO				OB	
Corvidae		Crows & Jays																			
<i>Cyanocitta cristata</i>	Blue Jay	S5					CO			X	X		CO	PO	OB	CO				PO	OB
<i>Corvus brachyrhynchos</i>	American Crow	S5B					CO			X	X	OB	OB	PO	PO	CO	CO			PO	OB
<i>Corvus corax</i>	Common Raven	S5									X				OB						OB
Alaudidae		Larks																			
<i>Eremophila alpestris</i>	Horned Lark	S5B					CO			X	X			PO							OB
Hirundinidae		Swallows																			
<i>Progne subis</i>	Purple Martin	S4B				√*	PO				X										OB
<i>Tachycineta bicolor</i>	Tree Swallow	S4B					CO			X	X	PO	PO		OB		PO				OB
<i>Stelgidopteryx serripennis</i>	Northern Rough-winged Swallow	S4B					CO			X	X						OB				OB
<i>Riparia riparia</i>	Bank Swallow	S4B	THR	T			CO			X	X				PR	OB	PR	PR			OB
<i>Petrochelidon pyrrhonota</i>	Cliff Swallow	S4B				√*	CO				X										OB
<i>Hirundo rustica</i>	Barn Swallow	S4B	THR	T			CO			X	X						PO	OB			OB
Paridae		Chickadees & Titmice																			
<i>Poecile atricapillus</i>	Black-capped Chickadee	S5					CO			X	X	OB	PR	PO	PR	PO				CO	OB
Sittidae		Nuthatches																			
<i>Sitta canadensis</i>	Red-breasted Nuthatch	S5				√	PO				X										OB
<i>Sitta carolinensis</i>	White-breasted Nuthatch	S5					CO				X					PO					OB
Certhiidae		Creepers																			
<i>Certhia americana</i>	Brown Creeper	S5B				√	CO				X										OB
Troglodytidae		Wrens																			
<i>Troglodytes aedon</i>	House Wren	S5B					CO			X	X	PO	PO	PR	PR	PO	PR	PO	PO	PO	OB
<i>Troglodytes hiemalis</i>	Winter Wren	S5B				√	PR														
<i>Cistothorus palustris</i>	Marsh Wren	S4B				√	PR														
<i>Thryothorus ludovicianus</i>	Carolina Wren	S4				√	PR														
Poliophtidae		Gnatcatchers																			
<i>Poliophtila caerulea</i>	Blue-gray Gnatcatcher	S4B				√							PO								
Regulidae		Kinglets																			
<i>Regulus satrapa</i>	Golden-crowned Kinglet	S5B				√	CO				X										
Muscicapidae		Old world Flycatchers																			
Thuridae		Thrushes																			
<i>Sialia sialis</i>	Eastern Bluebird	S5B	NAR	NAR		√	CO														
<i>Catharus fuscescens</i>	Veery	S4B				√	PR														
<i>Hylocichla mustelina</i>	Wood Thrush	S4B	SC	T			PR														
<i>Turdus migratorius</i>	American Robin	S5B					CO			X	X	PO	PR	PR	PO	PR	PO			PR	OB
Mimidae		Mockingbirds, Thrashers & Allies																			
<i>Dumetella carolinensis</i>	Gray Catbird	S4B					CO			X	X	PO	PO	PR			PO	PO	PO	PO	OB
<i>Toxostoma rufum</i>	Brown Thrasher	S4B				√	PR				X										OB
Sturnidae		Starlings																			
<i>Sturnus vulgaris</i>	European Starling	SNA					CO			X	X		PO	PO	PR	PO	PO	PO	PO	PO	OB
Bombycillidae		Waxwings																			
<i>Bombycilla cedrorum</i>	Cedar Waxwing	S5B					CO			X	X	PO		PO	PO	PR	PO	PO	PR	PO	OB
Passeridae		Old World Sparrows																			
<i>Passer domesticus</i>	House Sparrow	SNA					CO				X			PO	PO						
Fringillidae		Finches & Allies																			
<i>Carpodacus mexicanus</i>	House Finch	SNA					CO				X										
<i>Spinus tristis</i>	American Goldfinch	S5B					CO			X	X		OB	PO	PR	PO	PR	PR	PR	PR	OB
Calcariidae		Longspurs & Snow Buntings																			
<i>Plectrophenax nivalis</i>	Snow Bunting	SNA									X										OB
Parulidae		Wood Warblers																			
<i>Seiurus aurocapillus</i>	Ovenbird	S4B				√	CO				X										OB
<i>Parkesia noveboracensis</i>	Northern Waterthrush	S5B				√	PR														
<i>Vermivora chrysoptera</i>	Golden-winged Warbler	S4B	SC	T	Schedule 1	√	PO														
<i>Vermivora cyanoptera</i>	Blue-winged Warbler	S4B				√	CO														
<i>Mniotilta varia</i>	Black-and-white Warbler	S5B				√	PO				X										OB
<i>Geothlypis philadelphia</i>	Mourning Warbler	S4B				√	PR														
<i>Geothlypis trichas</i>	Common Yellowthroat	S5B					CO			X	X			PO	PO		PO	PO	PR	OB	
<i>Setophaga ruticilla</i>	American Redstart	S5B				√	CO			X	X			PR						PO	OB
<i>Setophaga cerulea</i>	Cerulean Warbler	S3B	THR	E	Schedule 1	√				X											OB
<i>Setophaga magnolia</i>	Magnolia Warbler	S5B				√	PR				X										OB
<i>Setophaga petechia</i>	Yellow Warbler	S5B					CO				X			PO			PR	PR			OB
<i>Setophaga pensylvanica</i>	Chestnut-sided Warbler	S5B				√	PR			X	X										OB
<i>Setophaga pinus</i>	Pine Warbler	S5B				√	CO			X	X										OB
<i>Setophaga coronata</i>	Yellow-rumped Warbler	S5B				√	PO														OB
<i>Setophaga virens</i>	Black-throated Green Warbler	S5B				√	PR														OB
<i>Cardellina canadensis</i>	Canada Warbler	S4B	SC	T	Schedule 1	√	PR			X											OB
<i>Icteria virens</i>	Yellow-breasted Chat	S2B	END	E	Schedule 1	√				X											
Emberizidae		New World Sparrows & Allies																			
<i>Pipilo erythrophthalmus</i>	Eastern Towhee	S4B					PR														
<i>Spizella passerina</i>	Chipping Sparrow	S5B					CO			X	X		PO	PR			PO				OB
<i>Spizella pallida</i>	Clay-colored Sparrow	S4B				√	PR														
<i>Spizella pusilla</i>	Field Sparrow	S4B					CO				X										OB
<i>Poecetes gramineus</i>	Vesper Sparrow	S4B				√	CO				X										
<i>Passerculus sandwichensis</i>	Savannah Sparrow	S4B					CO			X	X						CO	PR	PR		OB
<i>Centronyx henstowii</i>	Henslow's Sparrow	SHB	END	E	Schedule 1	√				X											
<i>Melospiza melodia</i>	Song Sparrow	S5B					CO			X	X	PR	PR	PR	PR	PR	PR	PR	PR	PR	OB
<i>Melospiza georgiana</i>	Swamp Sparrow	S5B					CO				X	PO					PO	PO			OB
<i>Zonotrichia albicollis</i>	White-throated Sparrow	S5B				√	PR				X										OB
Cardinalidae		Cardinals, Grosbeaks & Allies																			
<i>Piranga olivacea</i>	Scarlet Tanager	S4B				√	PR														
<i>Cardinalis cardinalis</i>	Northern Cardinal	S5					CO			X	X	PO	PR	PR	PO	PR	PR	PR	PR	PR	OB
<i>Pheucticus ludovicianus</i>	Rose-breasted Grosbeak	S4B					CO			X	X			PO	PO	PO	PO				OB
<i>Passerina cyanea</i>	Indigo Bunting	S4B					CO			X	X	PO	PR		PR	PR					OB
Icteridae		Blackbirds																			
<i>Dolichonyx oryzivorus</i>	Bobolink	S4B	THR	T	No Schedule		CO			X	X										

Scientific Name	Common Name	SRANK ¹	SARO ²	COSEWIC ³	SARA Schedule ³	Waterloo Status ⁴	Square 17NJ50	NHIC Data ⁶	MNRF SAR Lists ^{7,8}	Savanta ⁹	All Obs.	BMB-001 (SWD4-1)	BMB-002 (SWD4-1)	BMB-003 (SWD3-3)	BMB-004 (CUP3)	BMB-005 (FOD7-2)	BMB-006 (Ag.)	BMB-006 (Ag.)	BMB-007 (SWD4-1)	Incidental
<i>Agelaius phoeniceus</i>	Red-winged Blackbird	S4					CO			X	X	PO	PO	PR	PR		PR	PR	PR	OB
<i>Sturnella magna</i>	Eastern Meadowlark	S4B	THR	T	No Schedule		CO		X											
<i>Quiscalus quiscula</i>	Common Grackle	S5B					CO			X	X						PO	OB		OB
<i>Molothrus ater</i>	Brown-headed Cowbird	S4B					CO			X	X	PO	PO	PO	PO				PO	OB
<i>Icterus spurius</i>	Orchard Oriole	S4B				√	CO													
<i>Icterus galbula</i>	Baltimore Oriole	S4B					CO			X	X	PO	PO	PR						OB
Total						107	115	1	22	59	72	17	19	31	29	19	33	19	23	65

1MNRF 2019c, 2MNRF 2019b, 3Government of Canada 2019, 4Martin 1996, 5OBBA 2008, 6MNRF 2014a, 7MNRF 2018, 8MNRF 2018, 9Savanta 2012

Appendix VIII

Herpetofauna Species Reported from the Study Area

Reptile and Amphibian Species Reported from the Study Area

Scientific Name	Common Name	SRANK ¹	SARO ²	COSEWIC ³	SARA Schedule ³	Region of Waterloo Status ⁴	Ontario Reptile and Amphibian Atlas ⁵	NHIC Data ⁶	MNRF Region of Waterloo SAR List ⁷	Savanta ⁸	NRSI Observed (2018 and 2019)
Turtles											
<i>Chelydra serpentina serpentina</i>	Snapping Turtle	S3	SC	SC	Schedule 1	C	X		X	X	
<i>Chrysemys picta marginata</i>	Midland Painted Turtle	S5		SC		C	X			X	
<i>Emydoidea blandingii</i>	Blanding's Turtle (<i>Great Lakes/St Lawrence population</i>)	S3	THR	T	Schedule 1	√	X		X		
<i>Graptemys geographica</i>	Northern Map Turtle	S3	SC	SC	Schedule 1				X		
Snakes											
<i>Lampropeltis triangulum</i>	Eastern Milksnake	S4	NAR	SC	Schedule 1	√	X				
<i>Ophedrys vernalis</i>	Smooth Greensnake	S4				√	X				
<i>Nerodia sipedon sipedon</i>	Northern Watersnake	S5	NAR	NAR		√	X				
<i>Regina septemvittata</i>	Queensnake	S2	END	E	Schedule 1	√	X		X		
<i>Storeria dekayi dekayi</i>	Northern Brownsnake	S5	NAR	NAR		C*	X				X
<i>Storeria occipitomaculata</i>	Northern Red-bellied Snake	S5				C*	X				
<i>Thamnophis sauritus septentrionalis</i>	Eastern Ribbonsnake	S3	SC	SC	Schedule 1	√	X		X		
<i>Thamnophis sirtalis sirtalis</i>	Eastern Gartersnake	S5				C	X				X
Salamanders											
<i>Ambystoma jeffersonianum</i>	Jefferson Salamander	S2	END	E	Schedule 1	√	X		X		
<i>Ambystoma laterale</i> - (2) <i>jeffersonianum</i>	Unisexual Ambystoma Jefferson Salamander dependent population	S2	END	E		√	X		X		
<i>Ambystoma</i> (2) <i>laterale</i> - <i>jeffersonianum</i>	Unisexual Ambystoma Blue Spotted Salamander dependent population	S2					X				
<i>Ambystoma</i> sp.	Jefferson/Blue-spotted Salamander Complex	S2				√	X				
<i>Ambystoma laterale</i>	Blue-spotted Salamander	S4				C	X				
<i>Ambystoma maculatum</i>	Spotted Salamander	S4				√	X				
<i>Hemidactylium scutatum</i>	Four-toed Salamander	S4	NAR	NAR			X				
<i>Notophthalmus viridescens</i>	Red-spotted Newt	S5				√	X				
<i>Plethodon cinereus</i>	Eastern Red-backed Salamander	S5				C	X				
Toads and Frogs											
<i>Anaxyrus americanus</i>	American Toad	S5				C	X			X	X
<i>Hyla versicolor</i>	Tetraploid Gray Treefrog	S5				C	X			X	X
<i>Pseudacris triseriata</i> pop. 2	Western Chorus Frog (<i>Great Lakes/St. Lawrence</i>)	S3	NAR	T	Schedule 1		X				
<i>Pseudacris crucifer</i>	Spring Peeper	S5				C	X			X	
<i>Lithobates catesbeiana</i>	American Bullfrog	S4				√	X				X
<i>Lithobates clamitans melanota</i>	Northern Green Frog	S5				C	X			X	X
<i>Lithobates palustris</i>	Pickerel Frog	S4	NAR	NAR		√	X				
<i>Lithobates pipiens</i>	Northern Leopard Frog	S5	NAR	NAR		C	X				X
<i>Lithobates sylvaticus</i>	Wood Frog	S5				C	X			X	X
						Total	29	0	7	7	8

1MNRF 2019c, 2MNRF 2019b, 3Government of Canada 2019, 4RMOW 1985, 5Ontario Nature 2019, 6MNRF 2014a, 7MNRF 2018, 8Savanta 2012

Appendix IX

Mammal Species Reported from the Study Area

Mammal Species Reported from the Subject Lands

Scientific Name	Common Name	SRANK ¹	SARO ²	COSEWIC ³	SARA Schedule ³	Region of Waterloo Status ⁴	Ontario Mammal Atlas ⁵	NHIC Data ⁶	Region of Waterloo SAR List ⁷	Savanta ⁸	NRSI Observed (2018 and 2019)
Didelphimorphia	Opossums										
<i>Didelphis virginiana</i>	Virginia Opossum	S4				R	X				
Insectivora	Shrews and Moles										
<i>Blarina brevicauda</i>	Northern Short-tailed Shrew	S5					X				X
<i>Condylura cristata</i>	Star-nosed Mole	S5					X				
<i>Parascalops breweri</i>	Hairy-tailed Mole	S4				R	X				
<i>Sorex cinereus</i>	Masked Shrew	S5				G	X				
<i>Sorex fumeus</i>	Smoky Shrew	S5				R	X				
Chiroptera	Bats										
<i>Eptesicus fuscus</i>	Big Brown Bat	S4					X				
<i>Lasiorycteris noctivagans</i>	Silver-haired Bat	S4					X				
<i>Lasiurus borealis</i>	Eastern Red Bat	S4					X				
<i>Lasiurus cinereus</i>	Hoary Bat	S4					X				
<i>Myotis leibii</i>	Eastern Small-footed Myotis	S2S3	END				X		X		
<i>Myotis lucifugus</i>	Little Brown Myotis	S4	END	E	Schedule 1		X		X		
<i>Myotis septentrionalis</i>	Northern Myotis	S3	END	E	Schedule 1		X		X		
<i>Perimyotis subflavus</i>	Tri-colored Bat	S3?	END	E	Schedule 1		X		X		
Lagomorpha	Rabbits and Hares										
<i>Lepus americanus</i>	Snowshoe Hare	S5				S	X				
<i>Lepus europaeus</i>	European Hare	SNA					X				
<i>Sylvilagus floridanus</i>	Eastern Cottontail	S5					X			X	X
Rodentia	Rodents										
<i>Castor canadensis</i>	Beaver	S5				S	X				X
<i>Erethizon dorsatum</i>	Porcupine	S5				S	X				
<i>Glaucomys sabrinus</i>	Northern Flying Squirrel	S5				R	X				
<i>Marmota monax</i>	Woodchuck	S5					X				
<i>Microtus pennsylvanicus</i>	Meadow Vole	S5					X				X
<i>Mus musculus</i>	House Mouse	SNA					X				
<i>Napaeozapus insignis</i>	Woodland Jumping Mouse	S5					X				
<i>Ondatra zibethicus</i>	Muskrat	S5					X				
<i>Peromyscus sp.</i>	Mouse species									X	
<i>Peromyscus leucopus</i>	White-footed Mouse	S5					X				
<i>Peromyscus maniculatus</i>	Deer Mouse	S5					X				
<i>Rattus norvegicus</i>	Norway Rat	SNA					X				X
<i>Sciurus carolinensis</i>	Eastern Gray Squirrel	S5					X			X	X
<i>Tamiasciurus hudsonicus</i>	Red Squirrel	S5					X			X	X
<i>Tamias striatus</i>	Eastern Chipmunk	S5					X				X
<i>Zapus hudsonius</i>	Meadow Jumping Mouse	S5					X				
Carnivora	Carnivores										
<i>Canis latrans</i>	Coyote	S5				S	X			X	X
<i>Mephitis mephitis</i>	Striped Skunk	S5					X			X	X
<i>Mustela sp.</i>	Weasel species									X	
<i>Mustela erminea</i>	Ermine	S5					X				X
<i>Mustela frenata</i>	Long-tailed Weasel	S4				S	X				
<i>Mustela vison</i>	American Mink	S4				S	X				X
<i>Procyon lotor</i>	Northern Raccoon	S5					X			X	X
<i>Taxidea taxus jacksoni</i>	American Badger	S2	END	E	Schedule 1				X		

Scientific Name	Common Name	SRANK ¹	SARO ²	COSEWIC ³	SARA Schedule ³	Region of Waterloo Status ⁴	Ontario Mammal Atlas ⁵	NHIC Data ⁶	Region of Waterloo SAR List ⁷	Savanta ⁸	NRSI Observed (2018 and 2019)
<i>Vulpes vulpes</i>	Red Fox	S5					X				
Artiodactyla	Deer and Bison										
<i>Odocoileus virginianus</i>	White-tailed Deer	S5					X			X	X
						Total	40	0	5	9	14

1MNRF 2019c, 2MNRF 2019b, 3Government of Canada 2019, 4RMOW 1985, 5Dobbyn 1994, 6MNRF 2014a, 7MNRF 2018, 8Savanta 2012

Appendix X

Butterflies Species Reported from the Study Area

Butterfly Species Reported From the Study Area

Scientific Name	Common Name	SRANK ¹	SARO ²	COSEWIC ³	SARA Schedule ³	Region of Waterloo Status ⁴	TEA Atlas ⁵ (Square 17NJ50)	NHIC Data ⁶	MNRF Region of Waterloo SAR List ⁷	Savanta ⁸	NRSI Observed (2018 and 2019)
Hesperiidae		Skippers									
<i>Anatrytone logan</i>	Delaware Skipper	S4				C	X				X
<i>Ancyloxypha numitor</i>	Least Skipper	S5				UC	X				X
<i>Atalopedes campestris</i>	Sachem	SNA					X				
<i>Carterocephalus palaemon</i>	Arctic Skipper	S5				R	X				
<i>Epargyreus clarus</i>	Silver-spotted Skipper	S4				UC	X				
<i>Erynnis baptisiae</i>	Wild Indigo Duskywing	S4				UK	X				X
<i>Erynnis icelus</i>	Dreamy Duskywing	S5				R	X				
<i>Erynnis juvenalis</i>	Juvenal's Duskywing	S5				R	X				
<i>Erynnis lucilius</i>	Columbine Duskywing	S4				R	X				
<i>Euphyes conspicua</i>	Black Dash	S3				UC	X				
<i>Euphyes dion</i>	Dion Skipper	S4				R	X				
<i>Euphyes vestris</i>	Dun Skipper	S5				VC	X				
<i>Hesperia leonardus</i>	Leonard's Skipper	S4					X				
<i>Lerema accius</i>	Clouded Skipper	SNA									X
<i>Panoquina ocola</i>	Ocola Skipper	SNA					X				
<i>Pholisora catullus</i>	Common Sootywing	S4				R	X				X
<i>Poanes hobomok</i>	Hobomok Skipper	S5				C	X				
<i>Poanes massasoit</i>	Mulberry Wing	S4				R	X				
<i>Poanes viator</i>	Broad-winged Skipper	S4				C	X				
<i>Polites mystic</i>	Long Dash Skipper	S5				UC	X				
<i>Polites origenes</i>	Crossline Skipper	S4				R	X				
<i>Polites peckius</i>	Peck's Skipper	S5				VC	X				X
<i>Polites themistocles</i>	Tawny-edged Skipper	S5				C	X				
<i>Pompeius verna</i>	Little Glassywing	S4				UC	X				
<i>Thorybes pylades</i>	Northern Cloudywing	S5				R	X				
<i>Thymelicus lineola</i>	European Skipper	SNA				VC	X				X
<i>Wallengrenia egeremet</i>	Northern Broken Dash	S5				C	X				
Papilionidae		Swallowtails									
<i>Papilio cressphontes</i>	Giant Swallowtail	S4				UC	X				
<i>Papilio glaucus</i>	Eastern Tiger Swallowtail	S5				VC	X				X
<i>Papilio polyxenes</i>	Black Swallowtail	S5				VC	X				X
<i>Papilio troilus</i>	Spicebush Swallowtail	S4					X				
Pieridae		Whites and Sulphurs									
<i>Colias eurytheme</i>	Orange Sulphur	S5				VC	X				
<i>Colias philodice</i>	Clouded Sulphur	S5					X				X
<i>Pieris oleracea</i>	Mustard White	S4				PE	X				
<i>Pieris rapae</i>	Cabbage White	SNA				VC	X				X
<i>Pieris virginianensis</i>	West Virginia White	S3		SC					X		
<i>Pontia protodice</i>	Checkered White	SNA				R	X				
<i>Pyrisitia lisa</i>	Little Yellow	SNA				R	X				
Lycaenidae		Harvesters, Coppers, Hairstreaks, Blues									
<i>Callophrys niphon</i>	Eastern Pine Elfin	S5				R	X				

Scientific Name	Common Name	SRANK ¹	SARO ²	COSEWIC ³	SARA Schedule ³	Region of Waterloo Status ⁴	TEA Atlas ⁵ (Square 17NJ50)	NHIC Data ⁶	MNRF Region of Waterloo SAR List ⁷	Savanta ⁸	NRSI Observed (2018 and 2019)
<i>Celastrina ladon</i>	Spring Azure	SU				C					X
<i>Celastrina lucia</i>	Northern Spring Azure	S5					X				X
<i>Celastrina neglecta</i>	Summer Azure	S5				VC	X				X
<i>Cupido comyntas</i>	Eastern Tailed Blue	S5				UC	X				X
<i>Feniseca tarquinius</i>	Harvester	S4				R	X				
<i>Glaucopsyche lygdamus</i>	Silvery Blue	S5					X				
<i>Lycaena hylus</i>	Bronze Copper	S5				VC	X				
<i>Satyrium acadica</i>	Acadian Hairstreak	S4				UC	X				
<i>Satyrium calanus</i>	Banded Hairstreak	S4				UC	X				
<i>Satyrium caryaevorus</i>	Hickory Hairstreak	S4				R	X				
<i>Satyrium edwardsii</i>	Edwards' Hairstreak	S4				R	X				
<i>Satyrium liparops</i>	Striped Hairstreak	S5				UC	X				
<i>Satyrium titus</i>	Coral Hairstreak	S5				UC	X				
Nymphalidae	Brush-footed Butterflies										
<i>Aglais milberti</i>	Milbert's Tortoiseshell	S5				UC	X				X
<i>Asterocampa clyton</i>	Tawny Emperor	S2S3				UC	X				
<i>Boloria bellona</i>	Meadow Fritillary	S5				VC	X				
<i>Boloria selene</i>	Silver-bordered Fritillary	S5				R	X				
<i>Cercyonis pegala</i>	Common Wood-Nymph	S5				VC	X				X
<i>Chlosyne nycteis</i>	Silvery Checkerspot	S5				R	X				
<i>Coenonympha tullia</i>	Common Ringlet	S5				C	X				X
<i>Coenonympha tullia inornata</i>	Common (Inornate) Ringlet	S5									X
<i>Danaus plexippus</i>	Monarch	S2N, S4B	SC	END	Schedule 1	VC	X		X		X
<i>Euphydryas phaeton</i>	Baltimore Checkerspot	S4				R	X				
<i>Euptoieta claudia</i>	Variegated Fritillary	SNA				R	X				
<i>Junonia coenia</i>	Common Buckeye	SNA				UC	X				
<i>Lethe anhedon</i>	Northern Pearly-Eye	S5				C	X				
<i>Lethe appalachia</i>	Appalachian Brown	S4				UC	X				
<i>Lethe eurydice</i>	Eyed Brown / Northern Eyed	S5				VC	X				
<i>Libytheana carinenta</i>	American Snout	SNA				R	X				
<i>Limenitis archippus</i>	Viceroy	S5				VC	X				X
<i>Limenitis arthemis arthemis</i>	White Admiral/Banded Purple	S5				C	X				
<i>Limenitis arthemis astyanax</i>	Red-spotted Purple	S5				C	X				X
<i>Megisto cymela</i>	Little Wood-Satyr	S5				VC	X				
<i>Nymphalis antiopa</i>	Mourning Cloak	S5				VC	X				X
<i>Nymphalis l-album</i>	Compton Tortoiseshell	S5				UC	X				
<i>Phyciodes cocyta</i>	Northern Crescent	S5				UC	X				X
<i>Phyciodes tharos</i>	Pearl Crescent	S4				C	X				X
<i>Polygonia comma</i>	Eastern Comma	S5				VC	X				
<i>Polygonia comma</i>	Eastern Comma/Hop Merchant	S5					X				
<i>Polygonia interrogationis</i>	Question Mark	S5				VC	X				X
<i>Polygonia progne</i>	Grey Comma	S5				UC	X				
<i>Speyeria aphrodite</i>	Aphrodite Fritillary	S5				R	X				
<i>Speyeria cybele</i>	Great Spangled Fritillary	S5				VC	X				
<i>Vanessa atalanta</i>	Red Admiral	S5				VC	X				X

Scientific Name	Common Name	SRANK ¹	SARO ²	COSEWIC ³	SARA Schedule ³	Region of Waterloo Status ⁴	TEA Atlas ⁵ (Square 17NJ50)	NHIC Data ⁶	MNRF Region of Waterloo SAR List ⁷	Savanta ⁸	NRSI Observed (2018 and 2019)
<i>Vanessa cardui</i>	Painted Lady	S5				C	X				
<i>Vanessa virginiensis</i>	American Lady	S5				C	X				
						Total	81	0	2	0	27

1MNRF 2019c, 2MNRF 2019b, 3Government of Canada 2019, 4Linton 2012, 5MacNaughton et al. 2019, 6MNRF 2014a, 7MNRF 2018, 8Savanta 2012

Appendix XI

Odonate Species Reported from the Study Area

Odonate Species Reported from the Study Area

Scientific Name	Common Name	SRANK ¹	SARO ²	COSEWIC ³	SARA Schedule ³	Waterloo Status ⁴	Odonate Atlas ⁵	Region of Waterloo SAR List ⁶	NHIC Data ⁷	Savanta ⁸	NRSI Observed (2018 and 2019)
Calopterygidae		Broadwinged Damselflies									
<i>Calopteryx aequabilis</i>	River Jewelwing	S5				X	X				
<i>Calopteryx maculata</i>	Ebony Jewelwing	S5				X	X				X
<i>Hetaerina americana</i>	American Rubyspot	S4				X	X				
Lestidae		Spreadwings									
<i>Lestes disjunctus</i>	Common Spreadwing	S5				Expected	X				
Coenagrionidae		Narrow-winged Damselflies									
<i>Amphiagrion saucium</i>	Eastern Red Damsel	S4				X	X				
<i>Argia apicalis</i>	Blue-fronted Dancer	S4				X	X				
<i>Argia fumipennis violacea</i>	Violet Dancer	S5				X	X				
<i>Argia moesta</i>	Powdered Dancer	S5				X	X				
<i>Chromagrion conditum</i>	Aurora Damsel	S5				X	X				
<i>Enallagma anna</i>	River Bluet	S2				X	X				
<i>Enallagma annexum</i>	Northern Bluet	S4				Expected	X				
<i>Enallagma antennatum</i>	Rainbow Bluet	S4				X	X				
<i>Enallagma boreale</i>	Boreal Bluet	S5				X	X				
<i>Enallagma carunculatum</i>	Tule Bluet	S5				X	X				
<i>Enallagma civile</i>	Familiar Bluet	S5				X	X				
<i>Enallagma ebrium</i>	Marsh Bluet	S5				X	X				
<i>Enallagma exsulans</i>	Stream Bluet	S5				X	X				X
<i>Enallagma geminatum</i>	Skimming Bluet	S4				X	X				
<i>Enallagma hageni</i>	Hagen's Bluet	S5				X	X				
<i>Enallagma signatum</i>	Orange Bluet	S4				X	X				
<i>Enallagma vesperum</i>	Vesper Bluet	S4				Expected	X				
<i>Ischnura posita</i>	Fragile Forktail	S4				X	X				
<i>Ischnura verticalis</i>	Eastern Forktail	S5				X	X				X
<i>Nehalennia irene</i>	Sedge Sprite	S5				X	X				
Aeshnidae		Darners									
<i>Aeshna canadensis</i>	Canada Darner	S5				X	X				
<i>Aeshna umbrosa</i>	Shadow Darner	S5				X	X				
<i>Anax junius</i>	Common Green Darner	S5				X	X				X
<i>Basiaeschna janata</i>	Springtime Darner	S5				Expected	X				
<i>Boyeria vinosa</i>	Fawn Darner	S5				Expected	X				
<i>Epiaeschna heros</i>	Swamp Darner	S2S3				X	X				
<i>Rhionaeschna mutata</i>	Spatterdock Darner	S1				X	X				
Libellulidae		Skimmers									
<i>Celithemis elisa</i>	Calico Pennant	S5				Expected					X
<i>Celithemis eponina</i>	Halloween Pennant	S4				X					X
<i>Erythemis simplicicollis</i>	Eastern Pondhawk	S5				X					X
<i>Leucorrhinia proxima</i>	Red-waisted (Belted) Whiteface	S5				X	X				
<i>Libellula luctuosa</i>	Widow Skimmer	S5				X					X
<i>Libellula pulchella</i>	Twelve-spotted Skimmer	S5				X					X
<i>Pachydiplax longipennis</i>	Blue Dasher	S5				X					X
<i>Plathemis lydia</i>	Common Whitetail	S5				X					X
<i>Sympetrum sp.</i>	Meadowhawk species						X				
<i>Sympetrum rubicundulum</i>	Ruby Meadowhawk	S5				X					X
<i>Sympetrum semicinctum</i>	Band-winged Meadowhawk	S4				X					X

Scientific Name	Common Name	SRANK ¹	SARO ²	COSEWIC ³	SARA Schedule ³	Waterloo Status ⁴	Odonate Atlas ⁵	Region of Waterloo SAR List ⁶	NHIC Data ⁷	Savanta ⁸	NRSI Observed (2018 and 2019)
<i>Tramea lacerata</i>	Black Saddlebags	S4				X					X
						Total	33	0	0	0	14

1MNRF 2019c, 2MNRF 2019b, 3Government of Canada 2019, 4RMOW 1985, 5MNRF 2019d, 6MNRF 2018, 7MNRF 2014a, 8Savanta 2012

Appendix XII

Bumblebee Species Reported from the Study Area

Bumble Bee Species Reported from the Study Area

Scientific Name	Common Name	SRANK ¹	SARO ²	COSEWIC ³	SARA Schedule ³	MNRF SAR List ⁴	NHIC ⁵	NRSI Observed (2018 and 2019)
<i>Apis mellifera</i>	Western Honey Bee	Not yet Ranked						X
<i>Bombus bimaculatus</i>	Two-spotted Bumble Bee	S4						
<i>Bombus borealis</i>	Northern Amber Bumblebee	S5						
<i>Bombus impatiens</i>	Common Eastern Bumble Bee	S4S5						X
<i>Bombus flavidus</i>	Fernald's Cuckoo Bumble Bee	S3						X
<i>Bombus rufocinctus</i>	Red-belted Bumble Bee	S4						
<i>Bombus terricola</i>	Yellow-banded Bumble Bee	S5	SC	SC	No Schedule	X		
<i>Bombus affinis</i>	Rusty-patched Bumble Bee	S1	END	E	Schedule 1	X		
<i>Xylocopa virginica</i>	Eastern Carpenter Bee	S4						X
<i>Bombus fervidus</i>	Golden Northern Bumble Bee	S3S4						X
Total							0	4

1MNRF 2019c, 2MNRF 2019b, 3Government of Canada 2019, 4MNRF 2018, 5MNRF 2014a

Appendix XIII

Aquatic Habitat Photo Log

Fish Species Photographs – Middle Creek



Photo 1: Eastern Blacknose Dace



Photo 5: Pumpkinseed



Photo 2: Creek Chub



Photo 6: Common Shiner



Photo 3: White Sucker (juvenile)

*not photographed was Fathead Minnow, Central Mudminnow, and Redbelly Dace



Photo 4: Brook Stickleback

AHY-001 (Downstream Reach) – From Briardeen Road



Photo 7: Briardeen Road looking upstream



Photo 10: Upstream view



Photo 8: Culvert under road



Photo 11: erosion, undercut banks, pool features.



Photo 9: Second culvert under road



Photo 12: Woody debris, good shading.

AHY-002 – Middle Reach



Photo 13: Upstream view, straightened, limited cobble, uniform depth



Photo 16: Less shading, aquatic vegetation



Photo 14: Limited flow



Photo 17: Deeper pool

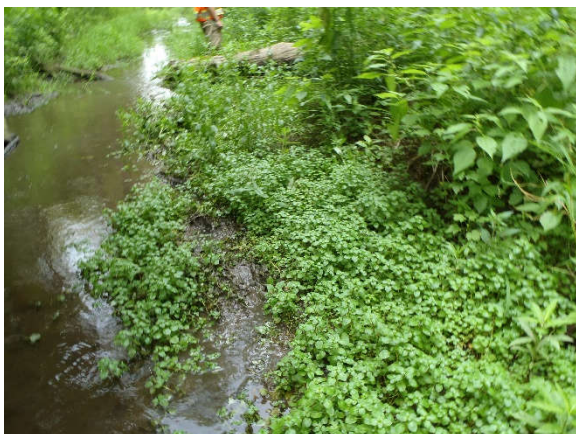


Photo 15: Silty, watercress present



Photo 18: Clear, uniform flow, silt substrate

AHY-003 – Upstream Reach along Middle Block Road



Photo 19: Culvert under Middleblock Road



Photo 22: Facing upstream



Photo 20: Good vegetation cover, clear and flowing



Photo 23: Channelized along the road

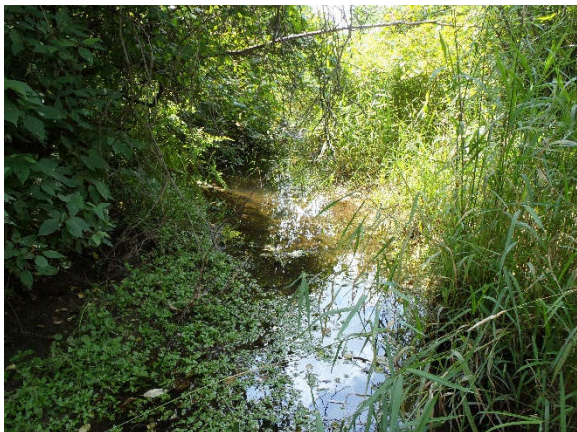


Photo 21: Straightened alongside the road



Photo 24: Watercress, silt substrates

Appendix XIV

Fish and Mussel Species Reported from the Study Area

Fish Species Reported from the Study Area

Scientific Name	Common Name	SRANK ¹	SARO ²	COSEWIC ³	SARA Schedule ³	NHIC Data ⁵	Region of Waterloo SAR List ⁶	Savanta ⁶	Aquatic Resource Point Data ⁸	NRSI Observed (2019)
Petromyzontidae	Lampreys									
<i>Ichthyomyzon fossor</i>	Northern Brook Lamprey (GL-USL)	S3	SC	SC (April 2007)	Schedule 1		X			
Cyprinidae	Carp and Minnows									
<i>Chrosomus eos</i>	Northern Redbelly Dace	S5								X
<i>Luxilus cornutus</i>	Common Shiner	S5								X
<i>Notropis photogenis</i>	Silver Shiner	S2S3	THR	T (May 2011)	Schedule 3		X			
<i>Pimephales promelas</i>	Fathead Minnow	S5								X
<i>Rhinichthys atratulus</i>	Blacknose Dace	SNR							X	X
<i>Semotilus atromaculatus</i>	Creek Chub	S5							X	X
Catostomidae	Suckers									
<i>Catostomus commersonii</i>	White Sucker	S5								X
<i>Moxostoma duquesnei</i>	Black Redhorse	S2	THR	T (May 2005)			X			
Umbridae	Mudminnows									
<i>Umbra limi</i>	Central Mudminnow	S5							X	X
Gasterosteidae	Sticklebacks									
<i>Culaea inconstans</i>	Brook Stickleback	S5							X	X
Centrarchidae	Sunfishes and Basses									
<i>Lepomis gibbosus</i>	Pumpkinseed	S5						X		X
<i>Lepomis macrochirus</i>	Bluegill	S5						X		
Total						0	3	2	4	9

1MNRF 2019c, 2MNRF 2019b, 3Government of Canada 2019, 4MNRF 2014a, 5MNRF 2018, 6Savanta 2012, 7MNRF 2010

Freshwater Mussel Species Reported from the Study Area

Scientific Name	Common Name	SRANK ¹	SARO ²	COSEWIC ³	SARA Schedule ³	NHIC Data ⁴	MNRF SAR Lists ⁵	Savanta ⁶	NRSI Observed (2019)
Lampsilinae									
<i>Lampsilis fasciola</i>	Wavy-rayed Lampmussel	S1	THR	SC	Schedule 1	X	X		
<i>Villosa iris</i>	Rainbow	S2S3	SC	SC	Schedule 1		X		
Total						1	2	0	0

1MNRF 2019c, 2MNRF 2019b, 3Government of Canada 2019, 4MNRF 2014a, 5MNRF 2018, 6Savanta 2012

Appendix XV

Evaluation of Candidate Significant Wildlife Habitat for Monarch

Evaluation of Candidate Significant Wildlife Habitat for Monarch

Important Evaluation Criteria ¹	Suggested Guidelines ¹	Evaluation Comments
Degree of rarity of species found at site	<ul style="list-style-type: none"> -Habitats of the rarest species are more significant than those of less rare species. For example, habitats for species ranked S1 and S2 should be considered more significant than habitats for species ranked S3. Species ranked as vulnerable by the OMNR should also be considered significant. -Less rare species and their habitats in the planning area may be deemed species of conservation concern by the municipality based on such factors as the number of known occurrences, total extent of remaining habitat, degree of threat or risk to habitat, and/or local interest in a particular species. -If a species' habitat is to be protected, sufficient area (based on the species' known requirements) should be retained to ensure a viable and sustainable population. 	<p>Monarch is ranked S2N, S4B meaning that the stopover habitat is Imperiled while the breeding population is Apparently Secure. Stopover habitat does not occur in the study area. Breeding habitat for Monarch is abundant and widespread throughout Ontario and the City of Cambridge.</p>
Documented significant decline in a species and/or its critical habitat	<ul style="list-style-type: none"> -The habitat for species experiencing the greatest declines is most significant. -The habitat for declining species that has the lowest representation in the planning area is more significant. -Those habitats that provide the best opportunity for the long-term sustainability of the declining species are most significant (e.g., large well-protected sites; sites that best meet the species' habitat requirements; sites with good connections to other similar habitats). 	<p>Monarch have experienced significant declines in the past decades largely due to alterations to wintering habitat, changing agricultural practices, and loss of Milkweed plants throughout their breeding range. Breeding habitat for Monarch is limited in the Subject Lands but opportunities to enhance habitat for the species are possible.</p>
Species whose range is solely in Ontario	<ul style="list-style-type: none"> -Habitat for those species with the poorest representation within the planning area is more significant. -These species and their habitats are significant even if well represented in the planning area, due to high provincial responsibility for their protection. 	<p>Habitat for Monarch is relatively common throughout the planning area and throughout Ontario. The species occurs throughout North America.</p>
Condition of existing habitat on site	<ul style="list-style-type: none"> -Sites that provide habitat that best meets the survival requirements of the target species and that also include a natural buffer zone are most significant (i.e. most likely to sustain species/population over the long-term). -Sites that contain the fewest non-native species of potential threat to the target species are significant. -Undisturbed or least-disturbed habitats (e.g., no/few deleterious impacts from roads, human activities) are significant. 	<p>Breeding habitat for Monarch is limited in the study area to a few Milkweed plants which are not capable of substantially contributing to the overall survival of the species or of producing large numbers of individuals. In addition, only limited numbers of Monarchs were observed during NRSI's 2019 surveys. Further, the</p>

Important Evaluation Criteria ¹	Suggested Guidelines ¹	Evaluation Comments
	<ul style="list-style-type: none"> -Sites capable of producing a large number of individuals of a single species of conservation concern are significant. -Highly diverse sites that support one or more species of conservation concern are most significant. 	caterpillars that were observed were not on Milkweed plants.
Size of species population at site	<ul style="list-style-type: none"> -Habitats supporting large populations of a several species of conservation concern are most significant. -Habitat supporting large populations of a single species is significant. 	Large populations are not expected for Monarch in the Study area due to the area/extent of breeding habitats. In addition, limited numbers of Monarchs were observed during NRSI's 2019 surveys.
Size and location of habitat	<ul style="list-style-type: none"> -Large sites supporting large populations of several species of conservation concern are most significant. -Large sites are generally more significant than most comparable but smaller sites. -Sites large enough to ensure long-term support and viability of species of conservation concern are significant. -Sites with large areas of suitable habitat that are also connected to other potentially suitable habitat and/or natural areas are most significant. 	The breeding habitat for Monarch within the Subject Lands is limited.
Potential for long term protection of the habitat	<ul style="list-style-type: none"> -Habitats that provide the best opportunity for long-term protection are usually more significant than similar habitats with little opportunity for protection or facing an uncertain future due to potential threats (e.g., habitat found in a large natural area vs. an isolated site close to an expanding residential development). -Habitats threatened with degradation or loss are more significant than similar, but currently unthreatened habitats, if they can be protected. - Habitats of species currently experiencing severe population declines in Ontario (e.g., grassland bird species) due to habitat loss are most significant. -Habitats of species currently experiencing significant population declines in the municipality are significant. 	The threats to Monarch are mainly due to loss of wintering habitat in central America and breeding habitat in the United States.
Representation of species/habitat within the municipality	<ul style="list-style-type: none"> -Poorly represented habitats for species of conservation concern are significant. -Habitats that could be lost or severely degraded and cannot be replaced by similar habitats in the planning area, are highly significant. 	Habitat for Monarch is well represented in the municipality.
Evidence of use of the habitat	Sites with documented traditional use by species are most significant.	Historical data on the use of the site by Monarch is not available, however it is likely

Important Evaluation Criteria ¹	Suggested Guidelines ¹	Evaluation Comments
		that these species have occurred in the study area year after year.
Species of particular interest to the planning authority	Sites providing the best examples of habitat that will ensure the long-term sustainability of the species are significant.	Monarch are all found in abundance in areas outside of the planning authority.

¹MNRF 2000

Appendix XVI

Wetland and Forest Habitat Creation Plan

Wetland Planting Area 1									
Common Name	Scientific Name	Minimum Size	Percent Cover	Percent Cover/Item	Planting Area (ha)	Density	Number of Individuals		
Trees	Freeman's Maple	<i>Acer X freemanii</i>		60%			51		
	Eastern White Cedar	<i>Thuja occidentalis</i>		20%			17		
	Peach-leaved Willow	<i>Salix amygdalioides</i>		10%			9		
	White Elm	<i>Ulmus americana</i>		10%			9		
Total Trees				100%			86		
Shrubs	Red Panicle Dogwood	<i>Cornus foemina ssp. racemosa</i>		10%	0.86		77		
	Red-osier Dogwood	<i>Cornus stolonifera</i>		20%			154		
	Grey Dogwood	<i>Cornus racemosa</i>		20%			154		
	Bebb's Willow	<i>Salix bebbiana</i>		10%			77		
	Pussy Willow	<i>Salix discolor</i>		15%			116		
	Common Elderberry	<i>Sambucus canadensis</i>		15%			116		
	Sandbar Willow	<i>Salix eximia</i>		5%			77		
Total Shrubs				100%			771		
Total Plantings							856		

Wetland Planting Area 2									
Common Name	Scientific Name	Minimum Size	Percent Cover	Percent Cover/Item	Planting Area (ha)	Density	Number of Individuals		
Trees	Freeman's Maple	<i>Acer X freemanii</i>		15%			6		
	Eastern White Cedar	<i>Thuja occidentalis</i>		70%			27		
	Peach-leaved Willow	<i>Salix amygdalioides</i>		10%			4		
	White Elm	<i>Ulmus americana</i>		5%			2		
Total Trees				100%			38		
Shrubs	Red Panicle Dogwood	<i>Cornus foemina ssp. racemosa</i>		10%	0.10		6		
	Red-osier Dogwood	<i>Cornus stolonifera</i>		20%			11		
	Grey Dogwood	<i>Cornus racemosa</i>		20%			11		
	Bebb's Willow	<i>Salix bebbiana</i>		10%			6		
	Pussy Willow	<i>Salix discolor</i>		15%			9		
	Common Elderberry	<i>Sambucus canadensis</i>		15%			9		
	Sandbar Willow	<i>Salix eximia</i>		10%			6		
Total Shrubs				100%			57		
Total Plantings							95		

Upland Planting Area									
Common Name	Scientific Name	Minimum Size	Percent Cover	Percent Cover/Item	Planting Area (ha)	Density	Number of Individuals		
Trees	American Basswood	<i>Tilia americana</i>		10%			207		
	Black Cherry	<i>Prunus serotina</i>		10%			207		
	Black Maple	<i>Acer saccharum ssp. nigrum</i>		10%			207		
	Black Willow	<i>Salix nigra</i>		5%			103		
	Bur Oak	<i>Quercus macrocarpa</i>		15%			310		
	Eastern White Cedar	<i>Thuja occidentalis</i>		5%			103		
	Eastern White Pine	<i>Pinus strobus</i>		5%			103		
	Sugar Maple	<i>Acer saccharum ssp. saccharum</i>		35%			723		
	Red Oak	<i>Quercus rubra</i>		5%			103		
Total Trees				100%			2067		
Shrubs	Alternate-leaved Dogwood	<i>Cornus alternifolia</i>		20%			103		
	Choke Cherry	<i>Prunus virginiana</i>		25%			129		
	Grey Dogwood	<i>Cornus racemosa</i>		20%			103		
	Purple-flowering Raspberry	<i>Rubus odoratus</i>		15%			78		
	Staghorn Sumac	<i>Rhus typhina</i>		20%			103		
Total Shrubs				100%			517		
Total Plantings							2584		

Wetland Seed Mix	
Common Name	Scientific Name
Awl-fruited Sedge	<i>Carex stipata</i>
Common Boveset	<i>Eupatorium perfoliatum</i>
Fox Sedge	<i>Carex vulpinoidea</i>
Fringed Sedge	<i>Carex crinita</i>
Dark-green Bulrush	<i>Scirpus atrovirens</i>
Hard-stemmed Bulrush	<i>Schoenoplectus acutus</i>
Sallow Sedge	<i>Carex lasiocarpa</i>
Nodding Beggar-ticks	<i>Biternis cernua</i>
Swamp Aster	<i>Symphoricarpon punctatum</i>
Rice Cutgrass	<i>Leersia oryzoides</i>
Spotted Joe Pye Weed	<i>Eutrochium maculatum</i>
Swamp Milkweed	<i>Asclepias incarnata</i>
Tall Mannagrass	<i>Glyceria grandis</i>
Virginia Wildrice	<i>Elymus virginicus</i>

Upland Seed Mix	
Common Name	Scientific Name
Foxglove Beardtongue	<i>Penstemon digitalis</i>
Bebb's Sedge	<i>Carex bebbii</i>
Nodding/Fringed Sedge	<i>Carex crinita</i>
Fowl Bluegrass	<i>Poa palustris</i>
Showy Tick Trefoil	<i>Desmodium canadensis</i>
Fowl Mannagrass	<i>Glyceria striata</i>
Spotted Joe Pye Weed	<i>Eupatorium maculatum</i>
Canada Anemone	<i>Anemone canadensis</i>
White Awns	<i>Geum canadense</i>

Objectives

Objective 1: To achieve early successional woodland, and thicket wetland communities by the Year 5 monitoring season, using a goal of 1,000 trees or shrubs per hectare. This density is to be achieved through:

- Direct planting: tree nursery stock as outlined in Stage 3 of the Sequencing notes, and
- Natural succession: to occur through natural seed dispersal from adjacent natural areas.

Objective 2: To reduce prevalence of invasive species throughout the Planting Area. This objective will be realized through the following 6-year plan, including 1 year of planting, followed by 5 years of monitoring and maintenance. Invasive species management will occur concurrently with Stage 2, 4, 5 and 6.

The restoration team will employ adaptive management techniques to ensure the success of the plan Objectives. This includes applying new recommendations throughout the monitoring and maintenance period, as needed.

Sequencing

1. Land Preparation
The proposed planting areas contain some earth and debris piles, which should be either burned on site (following applicable approvals), removed from the property, or used as mulch for the proposed plantings, where feasible. An excavator should be used to pull debris out of the planting area without disturbing the root zone of the adjacent trees. Machinery should be located entirely outside of the disciplines of existing trees, with only the excavator arms extending farther. The removal of all debris should be monitored by a Certified Arborist or qualified biologist.

2. Invasive Species Management
European Buckthorn (*Rhamnus cathartica*) greater than 1m in height should be treated prior to planting activities by spraying the trunk with Garlon RTU. Individuals less than 1m in height should be treated with a foliar spray of Garlon XRT. Garlon RTU can be applied at any point throughout the growing season. Garlon XRT should be applied early in the active growing season (June is best). Following the first year of chemical treatment, manual removal will occur twice in each successive year (Years 2-5), as outlined in Stages 4-5. Manual removal may overlap with monitoring activities in the following years. If additional chemical treatments are required, it will be determined through during stages 4 through 6.

3. Planting and Seeding
Planting activities will be completed throughout each area in the spring (no later than May 20th), or fall following approval. Refer to the Planting Notes for planting details. Coco fibre mulch mats or locally sourced mulch should be placed around the base of each planting, making sure not to cover any stems. If mulch is used, a depth of approximately 2cm should be achieved. It is recommended that a deer and rodent deterrent such as Skout is applied to all shrub plantings to limit browse. A native seed mix will be applied throughout the planting area at the end of April or May following the installation. The native seed mix will be applied with a nurse crop of White Proso Millet (*Panicum miliaceum*), or an alternate mix approved by the qualified biologist. Refer to the Seeding Mix section of this sheet for seed species and application rates.

4. Monitoring and Maintenance (Year 1, 2 and 3)
Monitoring will occur one year following planting and seeding, and each successive year afterwards for a total of 5 years. Monitoring should occur during the active growing season, at approximately the same time each year.

Monitoring will be conducted in 5% of the total planting area. This will be achieved by assessing the vegetation in 35 50m² circular forestry (4m radius) plots that will be randomly located throughout the planted areas. NRSI Biologists will inventory and assess the health of all trees and shrubs >50cm in height, including planted stock and natural succession. New plot locations will be randomly selected each monitoring year. Information collected will be documented in table format for each plot documenting species, size and health of tree and shrub species >50cm in height within each plot, with a discussion regarding any other notable observations outside of plot surveys. These results will be compared to each Objective.

Invasive species management will occur twice annually; once in early spring to align with Garlic Mustard (*Alliaria petiolata*) flowering season, and once later in the summer to remove additional emergence and other invasive species, such as European Buckthorn and Tartarian Honey-suckle (*Lonicera tatarica*). Invasive species will be identified and hand-pulled or cut throughout the planting areas. Areas requiring intensive management will be identified, mapped and compared annually to determine the success of the plan in achieving Objective 2.

5. Monitoring and Maintenance (Year 4)
Monitoring will continue following the methods outlined in Stage 4 of this plan. NRSI will compare the monitoring results to the objectives of this plan, and apply adaptive management strategies to ensure that the final monitoring in Year 5 achieves both objectives. These strategies may include additional tree planting, seeding, or invasive species management.

Invasive species management will occur following the directions outlined in Stage 4.

6. Monitoring and Maintenance (Year 5)
Monitoring will continue following the methods outlined in Stage 4 of this plan. The results of these plots will be compared to both objectives.

Invasive species management will occur following the directions outlined in Stage 4.

It is expected that the monitoring results in Year 5 will identify the presence of at least 1,000 trees or shrubs per hectare, accomplishing the objectives of this plan. Though invasive species are not expected to be eradicated, the chemical treatment, manual removal, and establishment of native flora is expected to eliminate invasive species dominance, effectively achieving Objective 2. The overall success will be measured through having met Objective 1 of this plan. If either restoration area has not reached the target density by the Year 5 Monitoring stage, consideration for additional plantings and invasive species management will be discussed.

Planting Notes

- Plant spacing will be generally 2.0m off-center.
- The exact planting locations of each species will be determined by the ecologist in the field. Locations will be determined based predominantly on soil moisture tolerances for the respective species.
- Exact planting locations will also be determined by the spacing of any existing native trees and shrubs.
- All plantings will be mulched using 36cm diameter coconut fiber mulch mats, or locally sourced mulch. Each mat will be secured using 2-6 inch landscape staples.

POTTED TREE OR SHRUB PLANTING

Prune only injured or infected branches. Do not trim tags. Remove all nursery tags, after inspected.

Construct 100mm soil saucer around shrub base and cover with 100mm of shredded cedar mulch or approved other.

Remove plastic or fiber pot.

Compact topsoil to eliminate air pockets and settlement.

Undisturbed soil

200 mm MIN.

Notes:

- Saucer shall be soaked with water and mulched immediately following planting.
- All dimensions are in mm.
- In poorly drained soils plant shrubs slightly higher than adjacent grade.
- All plants to be straight and planted vertically regardless of slope.

FOD5

Map 1

River Mill EIS

Proposed Wetland and Forest Habitat Creation Plan

Legend

Subject Lands	Ecological Land Classification (ELC)
Phase 4 Draft Plan	(Ag) Mineral Cultural Meadow Ecocline
Phase 4 Draft Plan Trail	(CUP3) Coniferous Plantations
Development Limit	(CUM1) Mineral Cultural Woodland Ecocline
Proposed Grading	(FOD5) Dry - Fresh Sugar Maple Deciduous Forest Ecocline
Proposed Contours	(FOD5-3) Fresh-Moist Willow Lowland Deciduous Forest Type
Existing Conditions	(H) Hedgerow
Existing Contours	(MAM2) Mineral Meadow Marsh Ecocline
Forest Planting	(MAM2-10) Fort Mineral Meadow Marsh Type
Created Wetland	(MAM2-9) Jewelweed Mineral Meadow Marsh Type
Wetland 1b	(R6a) Residential
	(SWD3-3) Swampy Maple Mineral Deciduous Swamp Type
	(SWD4-1) Willow Mineral Deciduous Swamp Type
	(SWM1-1) White Cedar Mineral Mixed Swamp Ecocline

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Project: Z30A
Date: November 24, 2020
NAD83 - UTM Zone 17
Size: 24x30"
Scale: 1:850

0 10 20 30 40 Metres

