APPENDIX

E NATURAL ENVIRONMENT ASSESSMENT

Natural Environment Assessment Report

Municipal Class Environmental Assessment Schedule 'C'

ARTERIAL ROAD NETWORK WITHIN THE HIGHWAY 427 INDUSTRIAL SECONDARY PLAN AREA (AREA 47) PART 'A' STUDY CORRIDOR

Submitted to:
Region of Peel
10 Peel Centre Drive, Suite B, 4th Floor
Brampton, Ontario
L6T 4B9

September 2020
TP115086

Table of Contents

Page

List of Figures

List of Tables

List of Appendices

List of Acronyms, Abbreviations, and Terms

ANSI	Areas of Natural or Scientific Interest
Area 47	Highway 427 Industrial Secondary Plan; Part 'A' and 'B' Study Corridor combined
BCI	Bat Conservation International
CEAA	Canadian Environmental Assessment Act
Class EA	Class Environmental Assessment
cm	Centimetres
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
COSSARO	Committee on the Status of Species at Risk in Ontario
DBH	Diameter at Breast Height
DFO	Fisheries and Oceans Canada
EA	Environment Assessment
ELC	Ecological Land Classification; Ecological Land Classification (ELC) for Southern Ontario: First Approximation and Its Application (Lee et al. 1998)
ESA	*Endangered Species Act*
ESC	Erosion and sediment control
ESR	Environmental Study Report
ha	Hectares
HDF(s)	headwater drainage feature(s)
IGF	*Information Gathering Form*
km	Kilometres
m	Metre(s)
MBCA	*Migratory Birds Convention Act*
MECP	Ministry of the Environment, Conservation and Parks
MESP	Master Environmental Servicing Plan
MTO	Ontario Ministry of Transportation
NEAR	Natural Environment Assessment Report
NHIC	Natural Heritage Information Centre
NHS	Natural Heritage System
OBBA	*The Second Atlas (2001-2005) of Breeding Birds of Ontario*
OMB	Ontario Municipal Board
(O)MNRF	(Ontario) Ministry of Natural Resources and Forestry
OP	Official Plan; City of Brampton Official Plan
ORAA	Ontario Reptile and Amphibian Atlas
ORM	Oak Ridges Moraine
PPS	Provincial Policy Statement

PTE(s)	Permission to Enter(s)
ROP	Regional Official Plan; Region of Peel Official Plan
ROW	Right-of-way
SAR	Species at Risk
SARA	*Species At Risk Act*
Stakeholders	Referring to the City of Brampton and Region of Peel together
Study Area	Existing and proposed roadways of the Part 'A' Study Corridor and a 120 m buffer from the corresponding roadway centreline
the City	City of Brampton
The Project	Proposed road improvements due to future projected capacity requirements in Area 47
the Region	Region of Peel
TRCA	Toronto and Region Conservation Authority
Wood	Wood Environment & Infrastructure Solutions, a Division of Wood Canada Limited

1.0 Introduction

Wood Environment and Infrastructure Solutions (Wood) was retained by the City of Brampton (the City) and the Region of Peel (the Region; a co-proponent) (together referred to as the Stakeholders) to provide an Environment Assessment (EA) as part of a Schedule 'C' Municipal Class EA study for the Arterial Road Network within the Highway 427 Industrial Secondary Plan Area. The proposed road improvements are required due to future projected capacity requirements. The projected capacity requirements came from the Highway 427 Industrial Secondary Plan (Area 47) Transportation Master Plan, which satisfactorily completed Phase 1 and 2 of the Municipal Class EA process. The EA will assess the construction of two new arterial roads and the widening of three existing roads. This Natural Environment Assessment Report (NEAR) will serve as part of the Environmental Study Report (ESR) that will be completed for the Project as part of the Municipal Class EA Process.

To address issues that may affect the timing of the EA submission, the Stakeholders have requested that two ESRs are completed. The ESRs are to be divided as Part 'A' Study Corridor and Part 'B' Study Corridor. Part 'A', which will be owned and operated by the Region, is to include:

- The new north-south major arterial road comprised of six lanes (hereafter called Arterial A2) connecting Mayfield Road east of Clarkway Drive with Major Mackenzie Drive at Regional Road (RR) 50 as recommended in the Peel-Highway 427 Transportation Master Plan and Brampton Transportation and Transit Master Plan (TTMP); and
- Widening of Coleraine Drive from two lanes to four lanes from Arterial A2 to Mayfield Road, including realignment at Arterial A2.

Part 'B', which will be owned and operated by the City, is to include:

- The new east-west minor arterial road comprised of four lanes (hereafter called E-W Arterial) from The Gore Road to Arterial A2;
- Widening of Countryside Drive from two lanes to four lanes from Clarkway Drive to Regional Road 50 (RR 50) including realignment/reconfiguration of the intersection of Countryside Drive and RR 50; and
- Widening of Clarkway Drive from Castlemore Road to E-W Arterial and full or partial urbanizing of Clarkway Drive from E-W Arterial Road to Mayfield Road with a potential continuous centre turn lane.

The ESRs will include all appropriate technical studies and aim to provide satisfactory consideration to a reasonable range of alternative solutions and designs for each road under study. The alternatives will consider the impacts on the environment and will be evaluated systematically to determine the preliminary design. The NEARs will aim to characterize the existing conditions and site-specific impacts and mitigation measures.

The following report has been prepared for Part 'A' Study Corridor as the preliminary design for this Part is complete. The NEAR for Part 'B' Study Corridor will be reported under separate cover at a future date.

1.1 Study Area

Area 47 Secondary Plan (Part 'A' and 'B' Study Corridor) is bounded by RR 50 to the east, Castlemore Road to the south, The Gore Road to the west and Mayfield Road to the north, and is located within the City of Brampton, Regional Municipality of Peel. The two distinct Study Corridors, Part 'A' and Part 'B', are detailed

in **Figure 1-1.** The Study Area follows the existing and proposed roadways of the Part 'A' Study Corridor and a 120 m buffer from the corresponding roadway centerline.

1.2 Master Environmental Servicing Plan Requirements

The Master Environmental Servicing Plan (MESP) was originally issued 9th May 2016 by Aquafor Beech Limited. In January 2018 an addendum was issued by Savanta which is focused on the Rainbow Creek realignment and restoration and is discussed in Section 8 below. The MESP is one of several studies undertaken to support the secondary planning process for Area 47. The purpose of the MESP was to investigate and inventory the natural resources which could potentially be impacted by future urban development and to identify constraints and opportunities. The findings were used to develop a comprehensive Management Plan, consisting of appropriate stormwater management and natural heritage strategies to protect the natural environment. Note that the MESP covered the entirety of the Study Area and is not divided between Part A and B, therefore the summary below is also not divided between Part A and B.

The significant MESP requirements, as related to the natural environment, are summarized below:

- Stormwater management and drainage recommendations consist of works required to mitigate the potential impacts and meet the necessary minimum control and protection requirements outlined in the 2012 TRCA Stormwater Criteria document, while also taking advantage of opportunities to provide additional environmental enhancements. The respective benefits and stormwater/drainage design targets for each of these below measures are provided in Section 4 and Table 4.5 of the MESP.
    - provision of low impact development (LID) measures to maintain water balances and to provide water quality, erosion control and environmental benefits. Incorporated LID into individual sites (i.e., source control LIDs) and within the drainage network itself (i.e., conveyance control LIDs). Further, LID measures would mitigate the loss of headwater drainage features.
    - provision of stormwater management ponds at the end of the drainage network (i.e. "end-of-pipe" controls) for water quality, erosion control, and flood (quantity) control.
    - provision of adequately sized roadway crossing structures over the study area streams to allow for flood conveyance and improved fish/wildlife passage.
    - stream restoration and grading works on the Rainbow Creek Tributary to enhance the environmental features, functions and quality of the corridor.
- Natural Heritage System (NHS) recommendations consist of strategies required to mitigate the potential impacts from direct loss of natural features and functions as a result of the development of the secondary plan area (e.g. construction activities such as clearing grading, infrastructure such as road, water and waste water servicing) or direct and indirect activities as a result of the future community (e.g. encroachment, dumping of waste material, creation of unauthorized trails, pets, artificial lighting, road crossings, physical and thermal barriers to fish migration, and the influx of salt into the watercourses). The respective benefits and design targets for each of these below measures are provided in Section 5-7 of the MESP.
    - Mitigation for wetland losses will be achieved through extensive restoration throughout the proposed realigned Rainbow Creek corridor.

- It is recommended that mitigation measures include the creation of offline ponds or pond within the floodplain to support amphibian breeding. Mitigate the loss of natural features (i.e. woodlands, wetlands, and ponds that provide significant wildlife habitat) on a 1:1 ha basis.
- Additional mitigation considerations include: the transplant/rescue of rare flora and fauna to suitable habitats within the Rainbow Creek corridor; and the removal of invasive species (including roots), with off-site disposal. Dotted Watermeal should be transplanted to an area where it would not get washed downstream during a flood event.

- Identification of three (3) Special Policy Areas (SPAs) in the Clarkway Tributary that recognize opportunities to improve corridor functions through future grading modifications, subject to future study (see Section 8 of MESP);
- Strengthening of the east-west woodland corridor connection (ELC polygon 58 on MESP) between the Gore Road Tributary and Clarkway Tributary and creation of an east-west linkage between the Rainbow Creek Tributary and the Clarkway Tributary corridors.
- Protection of natural features from development, including stream and valley corridors, significant woodlands, woodlots, wetlands, and specific agricultural ponds for enhancement. Provision of appropriate buffers to these natural features. Identification of wetland feature locations where further consultation with TRCA is recommended to confirm the protection or removal and mitigation status. It is understood that wetland features within the limits of the stream and valley corridor will be protected;
- Preservation of five healthy hedgerow features within the future Area 47 urban landscape and potential preservation of existing hedgerows located on the estate residential lots, along with the development and implementation of an Invasive Species Management Plan.
- Riparian plantings to improve aquatic habitat and shading over targeted reaches (target goal of 75% woody vegetation) and removal of barriers to fish migration in Gore Road Tributary and Clarkway Tributary.
- Native plantings within the Natural Heritage System buffers and compensation planting (3:1) for the removal of tableland vegetation (i.e. trees and hedgerows).
- Develop an appropriate construction plan to respect trees, natural areas, and buffers. Encourage the use of the Bird-Friendly Development Guidelines (City of Toronto, 2007) and minimize in-stream works/ avoid constrained periods.
- Install fencing/natural barriers and ensure to establish a well-planned trail system, use dark sky lighting, adherence to the Region of Peel's Salt Management Plan (2003) and the City of Brampton's Salt Management Guidelines. Ensure consistency with the City of Brampton's Woodlot Edge Management (724) and Woodlot Protection (725) design guidelines.

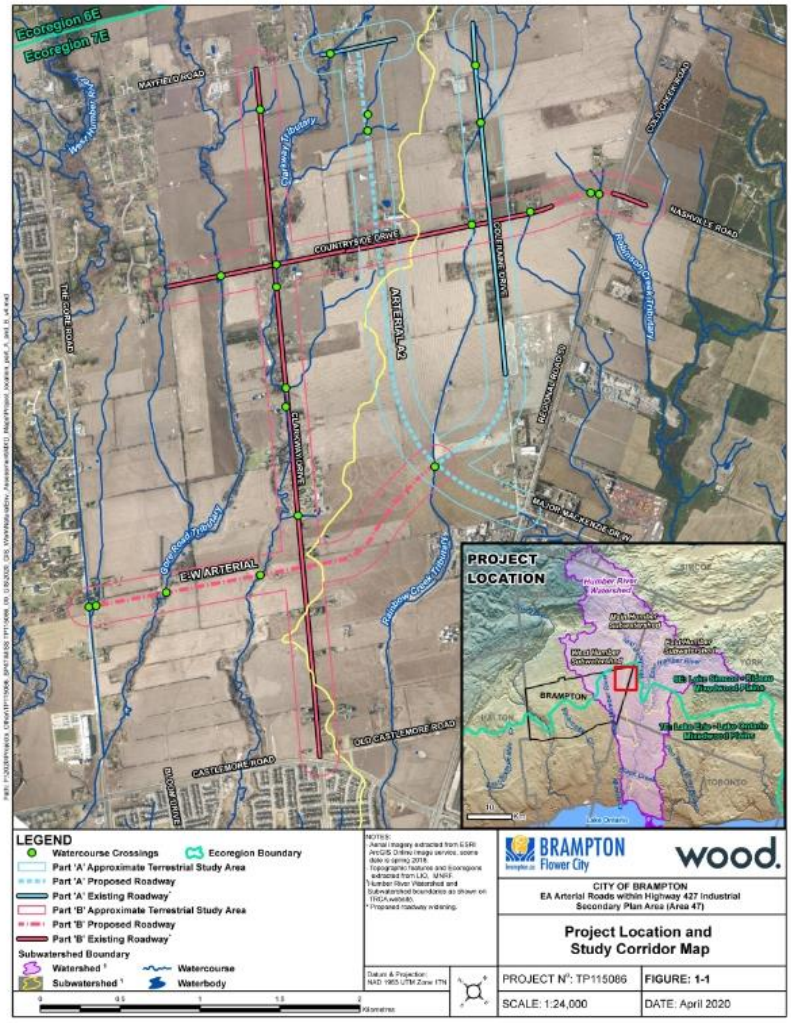
- Implementation of MESP recommendations (Section 8 of the MESP) will be required through Functional Design and Detailed Design for the three areas (47-1, 47-2, 47-3) for subsequent Community Block Planning. Areas 47-1 and 47-2 will be subject to a traditional Block Planning

approach, including development and approval of Draft Plans of Subdivision (completed as part of a comprehensive Environmental Implementation Report (EIR)). Area 47-3 may proceed on a Site Plan basis (functional design and detailed design will be undertaken together as part of an interdisciplinary EIS).

  - A Terms of Reference (TOR) for a comprehensive EIR must be completed based on the approved MESP and approved to the satisfaction of the City of Brampton and TRCA prior to initiating the comprehensive EIR process. The TOR must identify outstanding deficiencies from the approved MESP, which are to be completed as part of a comprehensive EIR. Development proponents must arrange a meeting with the City of Brampton and TRCA staff to discuss the TOR requirements.
  - Three (3) Special Policy Areas (SPAs) have been identified for the Clarkway Tributary that recognize opportunities to improve corridor functions through future grading modifications finalized through the Block Plan 47-2 EIR.
    - Area A – refine the limits of the Clarkway Tributary valley corridor in this location (Figure 7-1 of the MESP)
    - Area B – northern limits within HDF 16-1 (Figure 2.17 MESP) may be refined subject to compensation for any change to the extent of the Natural Heritage System in this area. Compensation (including restoration plantings) will be based on a minimum 1:1 ha of tableland area in a location and configuration that improves ecological features and functions.
    - Area C – northern limits within HDF 15-2 may be refined but must address the maintenance of contributing flows and ecological functions to the downstream portion of HDF 15-1.

- Monitoring of MESP recommendations (Section 9 of the MESP) will be required through future implementations. Detailed monitoring plans will be developed as part of future EIS/EIR(s) and on will be the responsibility of the developer. Integrated environmental monitoring plan for the Study Area that is based on principles of Adaptive Environmental Management. Short, medium, and long-term monitoring needs to be considered for functions and if negative impacts are detected, a more intense monitoring program may be necessary. Monitoring plans are to be vetted through the relevant review agencies before implementation and should consider:
  - Groundwater and surface water quality and quantity;
  - Stream morphology;
  - Hydrology (LID measures);
  - Terrestrial and Aquatic;
  - Rainbow Creek Tributary, once the creek has been realigned/restored, it is recommended that monitoring occur annually for a minimum of 7 years (unless relevant agencies such as the MNRF, TRCA, and/or City of Brampton require otherwise); and
  - West Humber Tributaries as per TRCA's Natural Channel Monitoring Guidelines.

Figure 1-1 Area 47 Project Location and Study Area Map



1.3 Planning Context

Municipal infrastructure projects are subject to the Ontario *Environmental Assessment Act, R.S.O. 1990, c. E.18* (EA Act). A Class Environmental Assessment (Class EA) is an approved self-assessment process and document under the EA Act that sets out a standardized planning process for classes (groups) of activities. It applies to projects that are carried out routinely and have predictable environmental effects that can be clearly managed. The Municipal Class EA (Municipal Engineers Association October 2000, amended in 2015) applies to municipal infrastructure projects (e.g., roads, water and wastewater). The Municipal Class EA classifies projects based on their scope and complexity; Schedule A, Schedule A+, Schedule B, and Schedule C. Schedule C projects include the construction of new infrastructure projects and significant expansions to infrastructure. These undertakings have the potential for significant environmental effects and must proceed under the planning and documentation procedures outlined in the Municipal Class EA document. The Arterial Road Network within the Highway 427 Industrial Secondary Plan Area Class EA Study has been identified as a Schedule 'C' under the Municipal Class EA. An ESR is required for Schedule 'C' projects to document the environmental assessment and decision-making process.

The Class EA process does not replace or exempt the formal processes of other applicable federal, provincial and municipal legislation and municipal by-laws, such as permits or approvals and the specific public and agency consultation that they may require (MCEA 2013). Municipal projects must also comply with the requirements of the Canadian Environmental Assessment Act (CEAA) where applicable (MCEA 2013). Additionally, the following policy directives are used to guide land use planning and support community objectives and forecasted economic and population growth.

1.3.1 Provincial Policy Statement

The Provincial Policy Statement (PPS) is issued under Section 3 of the *Planning Act*. The Province of Ontario updated the PPS in 2019, and the new PPS comes into effect 1st May 2020. The PPS guides the formulation of municipal policies and regulations, such as the Official Plans listed below.

The PPS is comprised of various policies on development and land use patterns, resource protection and management, and public health and safety. The Natural Heritage policies within the PPS identify natural features in which development is prohibited and where development is permitted, both within and adjacent to specified features, as long as there are no negative impacts on the features or their ecological functions.

As a part of the PPS Significant Wildlife Habitat was identified as a natural heritage area, the *Significant Wildlife Habitat Technical Guide* and Ecoregion schedules were prepared by the Ministry of Natural Resources to assist planning authorities and other participants in the land use planning system. Additionally, The *Natural Heritage Reference Manual* is a general reference manual that applies additional information on technical issues relative to Section 2.3 of the PPS.

1.3.2 Region of Peel Official Plan

The Region of Peel Official Plan (ROP) was adopted by Regional Council in July 1996 and approved by the Minister of Municipal Affairs and Housing October 1996. Various appeals then modified the ROP under the Ontario Municipal Board (OMB) and the current December 2018 Office Consolidation was prepared. The ROP is a long-term plan used to help manage Peel's growth and development. The Master Environmental Servicing Plan (MESP; Aquafor Beech Limited 2016) summarizes the ROP as follows; Section 2.3 of Peel

Region's Official Plan (1996) outlines criteria used to define its Greenlands System (Core Areas, Natural Areas and Corridors, and Potential Natural Areas and Corridors). Elements of the Greenlands System include wetlands, woodlands, environmentally sensitive or significant areas, areas of natural and scientific interest, habitats of vulnerable, threatened and endangered species, valley and stream corridors, shorelines, natural corridors, and fish and wildlife habitats.

Section 2.4 of the ROP addresses the policies associated with natural hazards. Two key subsections within this section address Ravine, Valley and Stream Corridors (Section 2.4.3) and Riverine Floodplains (Section 2.4.4). Together, these policies commit the Region to work with area municipalities and conservation authorities to achieve the following two objectives:

1. To prevent or minimize the risk to human life and property associated with flooding and slope instability: and,
2. To ensure the development and site alteration do not create new or aggravate existing Floodplain management problems along with flood susceptible riverine environments.

Section 3.4 of the Official Plan addresses all water resources within the Region, including aquifers, streams, ponds, wetlands and lakes. Region Policy dictates that appropriate studies are completed to the satisfaction of the Region, area municipalities and conservation authorities for all planning initiatives that may have an immediate or cumulative impact on water resources and the related natural system.

1.3.3 The City of Brampton Official Plan

The City of Brampton Official Plan was adopted by City Council in October 2006 and approved by the OMB in October 2008. It was then consolidated in September 2015 through and presented in the most recent Office Consolidation. It is a long-term plan used to help manage the City's growth and development. The MESP (Aquafor Beech Limited 2016) summarizes City's Official Plan (OP) as follows; The OP depicts Land Use Designations on Schedule "A". The Area 47 lands are a mixture of Residential, Industrial, Estate Residential and Open Space designations. Schedule "A" shows a portion of the secondary plan area as Corridor Protection Area, which are lands protected for the potential accommodation of the Highway 427 extension and associated arterial road network. Section 4.6 addresses Natural Heritage and Environmental Management and provides objectives and policies concerning natural heritage system planning, natural area protection, environmental management, ground and surface water, buffers and stormwater management. Applicable policies of the OP that direct Area 47 include:

- Preparation of studies (Sec. 4.6.2) that includes refinement of Schedule D;
- Stormwater management (Sec. 4.6.3);
- Natural heritage system planning including linkages (Sec. 4.6.6) including Restoration Areas (4.6.6.15) that identify "no net loss and if possible a potential net gain in natural areas and features";
- No development and site alteration within valley and watercourse corridors, including hazard lands (Sec. 4.6.7);
- Natural Hazards (Sec. 4.6.7 and 4.6.15.5), Woodlands (Sec. 4.6.8), Wetlands (Sec. 4.6.9), Fish and Wildlife Habitat (Sec. 4.6.10), Environmental Buffers (Sec. 4.6.13);
- Trails (Sec. 4.5.6) – a vital component of the City's open space system, and designed to protect natural heritage system features, functions and linkages as well as open space linkages.

In addition, Brampton's Woodlot Conservation By-law (316-2012) is referenced to identify all existing woodlots. Schedule "D" of the OP depicts the Natural Heritage Features and Areas within the City of Brampton. Schedule "D" for Area 47 lands designates valley/watercourse corridors; including many of the headwater drainage features and three small woodlands. Two of the woodlands are within the floodplains of the West Humber River and the Gore Road Tributary and one woodland feature links the Gore Road Tributary with the Clarkway Tributary just south of Countryside Drive and west of Clarkway Drive.

1.3.4 Toronto and Region Conservation Authority - Ontario Regulation 166/06

The Toronto and Region Conservation Authority (TRCA) regulates hazard lands, including floodplains, watercourses, valleylands, shorelines, and wetlands under Ontario Regulation 166/06 under Section 28 of the *Conservation Authorities Act*. TRCA also regulates other areas where development could interfere with the hydrologic function of a wetland, including areas within 120 m of all Provincially Significant Wetlands and 30 m of all other wetlands. The presence of watercourses or wetlands (evaluated or unevaluated) may trigger the need for additional consideration or studies during detailed design. It may be required that wetlands be maintained and for protective buffers to be placed on wetlands and watercourses. Subject to conformity with the Official Plan and completion of appropriate studies and Conservation Authority permits, development may be permitted within regulated areas. The Authority may grant permission for development in or on the areas regulated if, in its opinion, the control of flooding, erosion, dynamic beaches, pollution or the conservation of land will not be affected by the development. The permission of the Authority shall be given in writing, with or without conditions.

Additionally, The TRCA conducts reviews of planning processes associated with future development of properties which are located within its jurisdictional boundaries. As noted in the MESP (Aquafor Beech Limited 2016) "*The TRCA's Valley and Stream Corridor Management Program policies require that the precise limits of valley and stream corridors be established through the Block Plan process, and be legally defined through Plans of Subdivision and zoning by-laws. No buildings or structures are permitted within valley lands, except where structures are intended for flood and erosion control purposes*."

Lastly, the MESP (Aquafor Beech Limited 2016) used the Evaluation, Classification and Management of Headwater Drainage Features: Interim Guidelines (Updated March 2009) by the TRCA to identify and classify headwater drainage features (HDFs) in the Study Area.

1.3.5 Fisheries Act (1985)

The Federal *Fisheries Act* governs the protection of fisheries and aquatic habitat. The act applies to any activity that results in serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery (Section 35). Proposed developments in and around fish habitat have the potential to result in a serious harm to fish and fish habitat. Serious harm to fish is the death of fish or any permanent alteration to, or destruction of, fish habitat. Fish habitat means 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.

The introduction of substances to water that would degrade or alter or form part of a process of degradation or alteration of the quality of that water, so that is rendered or is likely to be rendered deleterious to fish or fish habitat is prohibited. In these instances, the proponent of the development is responsible for conducting a Project Screening, using criteria to determine if the project requires review by Fisheries and

Oceans Canada (DFO). If review is deemed necessary, a Request for Review is submitted to DFO, and they may decide that the project requires authorization under the *Fisheries Act* (usually only if the project cannot avoid or mitigate serious harm to fish). At this time, an application for project authorization would be submitted. In addition, DFO also administers portions of the *Species At Risk Act* (SARA) that governs the protection and treatment of the habitats of endangered and threatened species.

1.3.6 Species at Risk Act (2002)

The purpose of the *Species at Risk Act* (SARA) is to prevent wildlife species in Canada from disappearing, to provide for the recovery of wildlife species, and to manage species to prevent further risk to their status. Only species listed as Threatened, Endangered, or Extirpated under Schedule 1 are afforded both individual and habitat protection under the SARA. On provincial lands, SARA legislation does not apply, except for Migratory Birds that also fall under schedule 1 of SARA (not including their habitat) and aquatic species. Notably, prohibitions can be applied if provincial legislation or voluntary measures do not adequately protect federally listed species and their residence. Generally, compliance with provincial ESA legislation will satisfy the requirements under the SARA.

1.3.7 Endangered Species Act (2007)

The *Endangered Species Act* (ESA) provides science-based assessment, automatic species protection, and habitat protection to protect species at risk of disappearing from Ontario. Under Section 9 of the ESA, species are afforded individual protection, providing they are listed as Threatened, Endangered, or Extirpated on the Species at Risk in Ontario list. Section 10 of the ESA is in place to protect the habitat of Threatened or Endangered species only, where no damage is permitted to the habitat of those species unless under the authorization of the Ministry of the Environment, Conservation and Parks (MECP) by way of registration or permit. Destruction of Species at Risk and their habitats constitutes a contravention of the *Endangered Species Act*.

1.3.8 Migratory Birds Convention Act (1994)

The Migratory Birds Regulation protects (listed) migratory birds in Canada through the conservation of populations, individuals, and their nests. These policies and regulations ensure the protection of listed migratory bird species, their nests, eggs and offspring. Species listed under Article I of the *Migratory Birds Convention Act* (MBCA) identifies migratory species that are protected under this act. It is a contravention of this act to harass, harm, or kill migratory birds, remove or disrupt their nests, and/or eggs.

1.3.9 Fish and Wildlife Conservation Act (1997)

This act lists specially protected species in Ontario, including mammals, birds, herpetofauna, and invertebrates. "A person shall not hunt or trap specially protected wildlife or any bird that belongs to a species that is wild by nature and is not a game bird". This includes the nests and eggs of some birds that are not covered under the *Migratory Bird Convention Act*.

2.0 Agency Consultation

2.1 Toronto and Region Conservation Authority

The Toronto and Region Conservation Authority (TRCA) has been a reviewing and commenting agency

throughout the EA process. Several meetings have occurred between TRCA and Wood. An overview of the main takeaways from these meetings are as follows:

- On 25th November 2015, an Information Request and Request for Comment was sent to the TRCA.
  - On 2nd December 2015, TRCA responded to the Information Request and identified Areas of Interest to be considered in reporting as well as other considerations regarding the selection of alternatives and the ESR.
  - The preliminary comments provided by TRCA were general. In summary, the comments requested that the impacts on the Natural Heritage System (NHS) be evaluated at a landscape scale considering the variety of road improvement projects planned for the area.
- The first agency meeting occurred on 14th January 2016, and TRCA was present. The purpose was to provide an overview of the project, obtain initial comments from the agencies, and determine how the agencies want to be involved.
- The second agency meeting occurred on 3rd November 2016 and TRCA was present. The purpose was to provide feedback on the draft Public Information Center (PIC) presentation.
- On 13th April 2017, a meeting regarding the Rainbow Creek NHS was held between the City, the Region, TRCA, and Wood. The purpose was to review the proposed crossing alternatives for Rainbow Creek. On 25th April 2018, TRCA sent correspondence in response to Progress Report #2. TRCA stated they did not support the proposed Rainbow Creek crossing due to the lack of design detail.
- A presentation of Preliminary Preferred Transportation Network Configuration was held on 16th November 2018, TRCA was present.
- On 16th April 2019, a workshop on the Assessment of Rainbow Creek Crossing Alternatives was held with the TRCA. TRCA provided agreement that the revised Rainbow Creek Crossing was accepted in principle.
- The third agency meeting occurred on 17th May 2019, and TRCA was present. The purpose was to update the status of the project and elicit input on the preliminary preferred designs.

2.2 Ministry of Natural Resources and Forestry

Due to the potential presence of threatened and endangered species within the Study Area, the Ministry of Natural Resources and Forestry (MNRF) provided comments. Initial comments from the MNRF were addressed as a part of the MESP by Aquafor Beech Limited (2016) and the direction from the City of Brampton was to consider the recommendations of the MESP. In the 14th January 2016 Agency meeting, MNRF noted that the proposed E-W Arterial may impact a woodlot close to The Gore Road Tributary (Part 'B' Study Corridor). The MNRF recommended that the study team conduct bat surveys if impacts to the woodlot could not be avoided. In April 2018, MNRF Guelph District released updated Bat and Bat Habitat Survey guidelines and based on these guidelines, Wood carried out bat works in June 2018. Results will be discussed in the Part 'B' Study Corridor NEAR. The MNRF was also consulted in regard to Redside Dace.

At the time of the RFP, and June 2018 fieldwork, the ESA was administered by the MNRF. On 22nd October 2018, the administration of the ESA was transferred to the Ministry of Environment, Conservation, and Parks (MECP). The MECP was contacted, and a discussion around bats in the woodlot close to The Gore Road Tributary was held on 10th March 2020. It was determined that an Information Gathering Form (IGF) would have to be submitted to the MECP regarding the direction and recommended next steps under the ESA.

3.0 Landscape Setting

The Area 47 Study Area is situated on the South Slope and Peel Plain physiographic regions, south of the Oak Ridge Moraine (Aquafor Beech Limited 2016). The deepest sediments are assigned to the Thorncliffe Formation, which dips gently towards the south, and the Newmarket Till has been reported in the southern half of the property, beneath the Halton Till (Aquafor Beech Limited 2016). The Study Area is characterized by an average of 300 mm of topsoil and up to 1 metre of disturbed native soil containing signs indicative of crop cultivation (Aquafor Beech Limited 2016). The conditions present in the Study Area today are in striking contrast with pre-settlement conditions, which, in the 19th century, the landscape was covered by deciduous and mixed forest (Aquafor Beech Limited 2016).

3.1.1 Groundwater and Surface Water Resources

There are two aquifers in the Study Area with the majority of existing water wells obtaining water at or near the bedrock interface at depths greater than 20 metres and through a second localized aquifer found in discontinuous sand lenses within the Halton Till and the silt layers assigned to the Oak Ridge Aquifer Complex less than 10 metres (Aquafor Beech Limited 2016). The MESP (Aquafor Beech Limited 2016) reported that bacteria (total coliform and E. Coli) exceed drinking water criteria in all the dug wells sampled. Nitrate nitrogen in the farm well at 10150 The Gore Road is also above drinking water standards. Water quality exceedances are believed to represent a legacy of past agricultural practices. Additionally, the MESP (Aquafor Beech Limited 2016) reports that surface soils do not allow for significant groundwater recharge to the major aquifer and that infiltration to the shallow water table (where present) will occur, but it is slow. Groundwater discharge to the intermittent watercourses is not significant, and there are no sensitive ecological features, such as significant wetlands or vulnerable groundwater systems.

The Humber River watershed drains in a southerly direction, with headwaters located approximately 24 km north of Brampton, and ultimately reporting to the west side of Humber Bay located in Lake Ontario. Approximately 27% of the watershed is in urban land use, with 40% in rural use and 32% under natural cover (TRCA 2008c). The Humber River watershed is divided into five primary subwatersheds—the Main Humber, the East Humber, the West Humber, Black Creek, and the Lower Humber (TRCA 2008c). Study Area Groundwater levels are generally under topographic control, vary between one and 10 metres below the ground surface, and are divided between the Rainbow Creek Subwatershed to the east and the West Humber River Subwatershed to the west (Aquafor Beach 2016). The watercourse crossings located within the Study Area include tributaries of the West Humber and Main Humber subwatersheds. Four primary drainage features within Area 47 from west to east include Gore Road Tributary, Clarkway Tributary, Rainbow Creek Tributary, and Robinson Creek Tributary. As illustrated in **Figure 1-1**, each of these drainage features is comprised of multiple smaller tributaries; however, for simplicity only, these four tributary names will be used throughout the NEAR.

3.1.2 West Humber Subwatershed

The headwaters of the West Humber are located in the South Slope (a gently sloping glacial till plain) physiographic region, with the majority of the subwatershed in the Peel Plain (flat, silty clay, former lake bottom) physiographic region. Infiltration rates are low, as are the rates of groundwater discharge to streams due to the dominance of clay soils in the Peel Plain, which encompasses the Study Area (TRCA 2008c). As a result, many of the first and second-order tributaries in this region exhibit standing pools or

are completely dry during the summer months. Some large tributaries show signs of flows dissipating in the summer months.

Furthermore, the variation from low baseflow to average annual flow exhibited in this region indicates that tributaries have unstable flow regimes with stream levels fluctuating immediately after rainfall events. Water temperatures are unbuffered due to limited canopy cover provided by riparian vegetation, limited groundwater input and, as such, may reach temperatures higher than 25°C during the summer months. The thermal variability and intermittent nature of the streams have likely led in part to a lack of specialized feeders and fish-eating fish in the area (MNRF and TRCA 2005).

This subwatershed within the Humber River watershed is, therefore, the most sensitive to reductions in baseflow (from water use or groundwater changes). The upper half of the subwatershed within the Town of Caledon is primarily agricultural, while the City of Brampton portion is under development for residential, commercial and industrial purposes. The lower branches of the subwatershed in the City of Toronto were developed some time ago for residential, commercial and industrial uses (TRCA 2008c).

Two watercourses within Area 47 are located in the West Humber Subwatershed: The Gore Road Tributary and Clarkway Tributary.

3.1.3 Main Humber Subwatershed

The headwaters of the Main Humber subwatershed originate in the Niagara Escarpment and Oak Ridges Moraine (ORM), and the river continues down the South Slope to the Peel Plain. The permeable soils and hummocky terrain of the ORM result in relatively high recharge, high baseflow rates and low surface runoff. The Main Humber subwatershed contributes over half of the total baseflow (dry weather flow) in the Humber River. Further south, in the lower reaches of the Main Humber, including Rainbow Creek, the clay soils of the Peel Plain have much lower recharge rates. A larger portion of precipitation becomes surface runoff due to reduced surface water infiltration resulting from development in these areas. The potential impacts of urbanization on streamflow generated by groundwater are therefore not as great in these low recharge areas. Most of the Main Humber subwatershed is agricultural with significant natural areas. Existing urban settlements include Bolton, Caledon East, Palgrave, the Village of Kleinburg and Woodbridge (TRCA 2008c).

Two watercourses within Area 47 are located in the Main Humber Subwatershed: Rainbow Creek Tributary and Robinson Creek Tributary.

4.0 Methods

Characterization of the natural environment is based on a review of available Secondary Source information, observations made during field investigations, and information gathered through consultation with the TRCA and the City of Brampton. Field investigations were conducted where Permission to Enter was acquired. As permission to enter was not obtained at all necessary field locations before the release of this NEAR, further investigations will be required during detailed design. Aquatic field investigations were conducted in April and October 2016, and August 2017. Terrestrial field investigations were conducted June and July 2016 and bat detectors were in place June and July 2018. A tree inventory was completed in fall 2019.

Table 4-1 Summarized field survey dates, times, weather, and surveyor information for the Study Area

Survey Type	Date	Time	Weather	Surveyor(s)
Fish Habitat Assessment	19-20 April 2016 4 October 2016 25 August 2017	Various	Sunny and clear	Daryl Rideout, Brittany Ferguson Erin Hellinga Brittany Ferguson
Breeding Bird Surveys	28 June 2016 29 June 2016 30 June 2016	06:02-09:51 05:49-09:59 05:37-10:16	Air Temperature: 13-17°C Wind (Beaufort): 0-1 Precipitation: 0	Becky Harris
	10 July 2016 11 July 2016	05:31-09:57 05:47-09:03	Air Temperature: 18-23°C Wind (Beaufort): 0-1 Precipitation: 0	
Ecological Land Classification and Flora	27-29 June 2016 10-11 July 2016	Various	Various	Becky Harris
Tree Inventory	16-18 September 2019 24 October 2019	Various	Various	Todd Hagedorn

4.1 Secondary Source Review

Relevant information from existing studies, plans, databases, and other sources were analyzed as part of this NEAR. These Secondary Source documents assisted in the preliminary determination of existing Natural Heritage Features as well as candidate features, additional sensitivities, to ascertain plant and wildlife species present within the Study Area, and to contribute to the fish community and aquatic habitat data for watercourses within the Study Area. Secondary Source data also included potential occurrences of species of conservation concern, including Species at Risk (SAR) and provincially rare species and whether any Areas of Natural or Scientific Interest (ANSI), Environmentally Sensitive Areas, Provincially Significant Wetlands are located within or adjacent to the terrestrial Study Areas. Potential for species of conservation concern occurring within the Study Area was further evaluated using known habitat preferences of each potential species and distribution of these habitat types within the Study Areas.

Secondary Sources included in the review are as follows:

- Toronto and Region Conservation Authority (TRCA) publications:

  - Humber River Fisheries Management Plan (MNRF and TRCA 2005);
  - Humber River State of the Watershed Reports (TRCA 2008a, TRCA 2008b);
  - Humber River Watershed Plan: Pathways to a Healthy Humber (TRCA 2008c);
  - The Living City Policies for Planning and Development in the Watersheds of the TRCA (TRCA 2014); and
  - Crossing Guideline for Valley and Stream Corridors (TRCA 2015).
- Fisheries and Oceans Canada's (DFO) Distribution of Aquatic SAR mapping (DFO 2015; DFO 2016);
- Town of Brampton Official Plan (Town of Brampton 2008);
- Correspondence with TRCA and the Ministry of Natural Resources and Forestry (MNRF; Aurora District) (Appendix A);
- Final Report: Master Environmental Servicing Plan: Highway 427 Industrial Secondary Plan Area ("Area 47") (Aquafor Beech Limited 2016);
- Addendum to the Master Environmental Servicing Plan, High 427 Industrial Secondary Plan (Area 47). (Savanta 2018);
- Environmental Impact Study Area Blocks 47-1 and 47-2 Block Plan Application Submission #2 (Savanta 2017);
- Environment Canada's Species at Risk Public Registry database (EC 2016);
- The MNRF's Species at Risk in Ontario List (MNRF 2016a); and
- Species occurrence and natural areas records of the MNRF Natural Heritage Information Centre (NHIC) 2016 database 1 km2 search blocks encompassing the Study Area ('A' blocks are 17PJ0455, 17PJ0555, 17PJ0454, 17PJ0554, 17PJ0453, 17PJ0553, 17PJ0452, 17PJ0552, 17PJ0652, 17PJ0353, 17PJ0354; MNRF 2016b).
- The Ontario Reptile and Amphibian Atlas (ORAA) (Ontario Nature 2020) 10 x 10 km survey squares 10 X 10 km survey squares 17PJ05;
- The Atlas of the Mammals of Ontario (Dobbyn 1994);
- Bat species profiles and range maps for the province of Ontario provided by Bat Conservation International, Inc. (BCI 2016); and
- *The Second Atlas (2001-2005) of Breeding Birds of Ontario* (OBBA) 10 X 10 km survey squares 17PJ05 within Region 45 (Cadman et al. 2007).

4.2 Field Investigations

Based upon the Secondary Source Review, it was determined that the Study Area's Natural Heritage features are well documented, and strategic field investigations on publicly available lands and lands where access was permitted would define the remaining conditions. Results provide an overview of existing conditions that can be used to help evaluate the alternative solutions and future alternative design concepts to be carried forward to preliminary design and ultimately as part of the detailed design for the project.

4.2.1 Aquatics

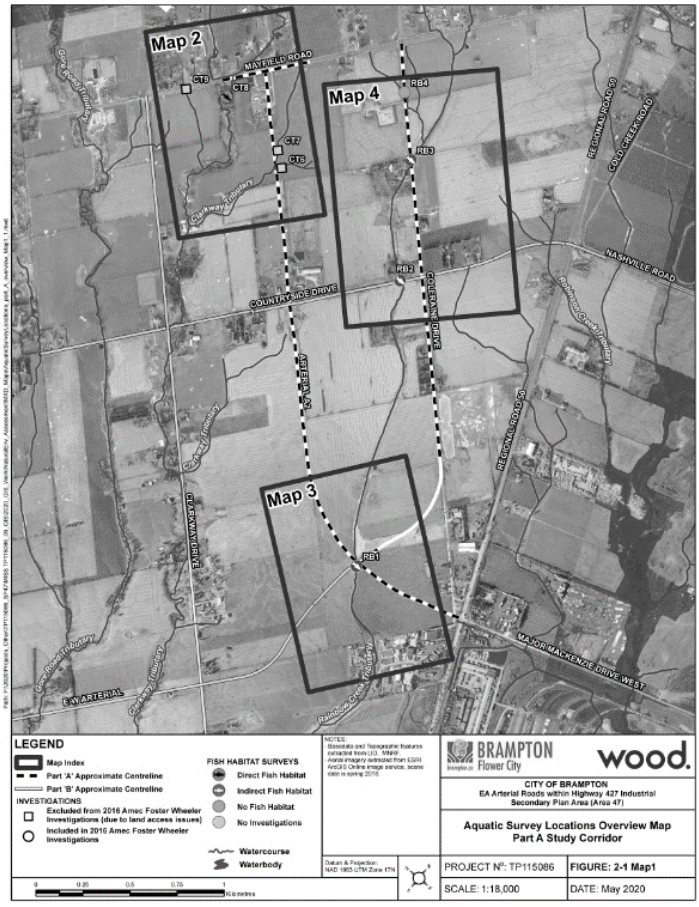
4.2.1.1 Fish Habitat Assessments

Wood conducted comprehensive fish habitat field assessments at locations where permission to enter was granted to provide field data and substantiate the Secondary Source habitat information (**Figure 4-1**). Field conditions were assessed, referencing the principles and methods described by the Ontario Ministry of Transportation (MTO) *Environmental Guide for Fish and Fish Habitat* (MTO 2009). Where direct fish habitat was present, the aquatic Study Area included a zone of detailed assessment extending from 20 m upstream to 50 m downstream of the proposed and/or existing right-of-way (ROW). General habitat mapping was conducted 50 m upstream and 200 m downstream of the proposed and/or existing ROW at each watercourse crossing representing direct fish habitat. Biophysical habitat conditions were recorded, and field photos are presented in Appendix B.

4.2.1.2 Fish Sampling

Fish sampling was not conducted as a component of the Wood investigations as sufficient community information was available through Secondary Source Review and as provided by the MNRF and TRCA.

Figure 4-1 Aquatic Survey Locations in the Study Area




MAYFIELD ROAD
CT9
CT8
CT7
CT6
40m Upstream
200m Downstream
Creditview Tributary
Creditview Tributary
Creditview Tributary
LEGEND
FISH HABITAT SURVEYS
Direct Fish Habitat
No Investigations
INVESTIGATIONS
Excluded from 2016 Amec Foster Wheeler Investigations (due to land access issues)
Included in 2016 Amec Foster Wheeler Investigations
Part 'A' Corridor
Downstream Aquatic Sampling Limit (200m)
Upstream Aquatic Sampling Limit (50m)
Watercourse
Waterbody
NOTES:
- Basedata and Topographic features extracted from LIO, MNRF.
- Aerial imagery extracted from ESRI ArcGIS Online image service, scene date is spring 2018.
BRAMPTON Flower City
wood.
CITY OF BRAMPTON
EA Arterial Roads within Highway 427 Industrial Secondary Plan Area (Area 47)
Aquatic Survey Locations
Datum & Projection: NAD 1983 UTM Zone 17N
PROJECT N°: TP115086
FIGURE: 2-1 Map 2
SCALE: 1:3,000
DATE: May 2020


RB1
CADETTA ROAD
LEGEND
FISH HABITAT SURVEYS
Indirect Fish Habitat
Part 'A' Corridor
Part 'B' Corridor
Watercourse
Waterbody
INVESTIGATIONS
Included in 2016 Amec Foster Wheeler Investigations
NOTES:
Basedata and Topographic features extracted from LIO, MNRF
Aerial imagery extracted from ESRI ArcGIS Online image service, scene date is spring 2018.
BRAMPTON Flower City
wood.
CITY OF BRAMPTON
EA Arterial Roads within Highway 427 Industrial Secondary Plan Area (Area 47)
Aquatic Survey Locations
PROJECT N°: TP115086
FIGURE: 2-1 Map 3
SCALE: 1:3,000
DATE: May 2020


RB4
RB3
RB2
COLERAINE DRIVE
COUNTRYSIDE DRIVE
Rainbow Creek Tributary
Rainbow Creek Tributary
LEGEND
FISH HABITAT SURVEYS
Indirect Fish Habitat
No Fish Habitat
INVESTIGATIONS
Included in 2016 Amec Foster Wheeler Investigations
Part 'A' Corridor
Part 'B' Corridor
Watercourse
Waterbody
BRAMPTON Flower City
wood.
CITY OF BRAMPTON
EA Arterial Roads within Highway 427 Industrial Secondary Plan Area (Area 47)
Aquatic Survey Locations
PROJECT N°: TP115086
FIGURE: 2-1 Map 4
SCALE: 1:3,500
DATE: May 2020

4.2.2 Terrestrial

4.2.2.1 Ecological Land Classification and Flora

The Study Area is located within the northern limit of Ecoregion 7E and delineated using Ecological Land Classification (ELC) for Southern Ontario: First Approximation and Its Application (Lee et al. .1998). Vegetation communities were initially described in the MESP (Aquafor Beech Limited 2016) and Wood delineated remaining communities that were accessible and confirmed communities from an observable distance (in such instances, species lists were not obtained). Generally, communities at least 0.5 ha in size are mapped following ELC protocols; however, smaller units may be mapped if the community is noteworthy. Substrate type and depth, moisture regime, topography, floral composition, stand structure and disturbance were inventoried to describe and classify vegetation communities. These physical characteristics and dominant vegetation species were used to describe the vegetation communities. The terminology used is based on ELC sampling protocols that collect information on four vegetation layers (note: some layers may not be present within a vegetation community sampled). The four layers are:

Canopy consists of tall vegetation that reaches the light first, typically composed of tall trees (in a forest community).
Sub-canopy includes vegetation growing just under the canopy, vegetation that receives filtered sunlight through the canopy, typically composed of trees and tall shrubs (in a forest community).
Understory includes vegetation growing below the sub-canopy, typically composed of both tall and low-growing shrubs (in a forest community).
Ground layer consists of the vegetation which is closest to and covers the ground, typically composed of herbaceous vegetation.

4.2.2.2 Tree Inventory

A focused tree inventory was undertaken along the proposed corridors within the Part 'A' Study Area which includes the public ROW of Coleraine Drive and that estimated for the proposed Arterial A2 roadway between the boundaries of Mayfield Road and RR50. Only select permission to enters were provided at the time the field investigations were completed, whereby those trees in locations without Permission to Enter (PTE) were assessed from the closest vantage point to the extent possible. The Tree Assessment Report is provided in Appendix D.

4.2.2.3 Breeding Bird Surveys

Breeding bird surveys were undertaken in accordance with the protocols described within the Ontario Breeding Bird Atlas (OBBA) protocol (Cadman et al. 2007). Surveys were completed on 28-30th June, and 10-11th July 2016 between sunrise and 10:00 am at 19 point-count locations within the Study Area (**Figure 5-1** Maps 1-6 display stations within corresponding ELC communities). The point count protocol was modified slightly from that presented in the OBBA to include counts of 10 minutes in duration, compared to the standard five minutes as noise from the environment is high (e.g., cars, airplanes). All bird surveys were undertaken in good weather with warm temperatures, no precipitation, and little or no wind. Species were identified through their unique vocalizations and visual observations. Breeding evidence was evaluated using the following guidelines:

Possible breeding is indicated by the presence of a singing male (or breeding calls heard) in suitable habitat

or the presence of a bird observed in suitable breeding habitat in its breeding season.

Probable breeding is defined as an observation of any of the following: (1) a pair in the breeding season in suitable habitat, (2) permanent territory presumed through registration of territorial song on at least two days, a week or more apart, at the same place or (3) courtship or display between a male and a female or two males, including courtship feeding or copulation; visiting probable nest site; agitated behaviour or anxiety calls of an adult; brood patch on an adult female or cloacal protuberance on an adult male; nest building or excavation of a nest hole.

Confirmed breeding is defined as the observation of any of the following: (1) a distraction display or injury feigning; (2) used nest or eggshell found (occupied or laid within the period of the study); (3) recently fledged young or downy young, including young incapable of sustained flight; (4) adults entering or leaving nest site in the circumstances indicating occupied nest (e.g., adult carrying fecal sac; adult carrying food for young), or (5) nest containing eggs, or nest with young seen or heard.

4.2.2.4 Mammals

Incidental wildlife inventories were compiled based on Secondary Source data and incidental observations during the breeding bird and vegetation field investigations.

4.2.2.5 Amphibians and Reptiles

Incidental wildlife inventories were compiled based on Secondary Source data and incidental observations during the breeding bird and vegetation field investigations.

4.2.2.6 Invertebrates

Incidental wildlife inventories were compiled based on Secondary Source data and incidental observations during the breeding bird and vegetation field investigations.

5.0 Results

5.1 Secondary Source Review

From the Secondary Source Review 116 species of birds, 42 species of mammals, 11 species of amphibians, 8 species of reptiles, and 8 species of fish have the potential to occur within the Study Area; however, the recorded presence of a specific species must be viewed in conjunction with existing habitat conditions (i.e., watercourses that are now dry or ephemeral cannot be expected to support the same fisheries community that they may have in the past).

A search of the MNRF's NHIC database (MNRF 2020) and the MESP (Aquafor Beech Limited 2016) revealed that there are no Environmentally Sensitive Areas (ESAs) and no provincial Natural Heritage plan areas (i.e., Greenbelt) within the Study Area. The MESP (Aquafor Beech Limited 2016) notes that land use is predominantly agricultural, mainly corn and soybeans, with some winter wheat, hay and other crops to a lesser extent (Aquafor Beech Limited 2016). Residential areas, including large farms, are also prevalent throughout the Study Area. The naturalized vegetated areas are generally riparian associated with the watercourses throughout the terrestrial Study Areas and are mapped as woodland and wetland. The City of Brampton Official Plan indicates the presence of Valleyland/Watercourse corridor surrounding the primary drainage features present in the Study Area, which serve as wildlife habitat and are administered under the

TRCA Ontario Regulation 166/06.

5.1.1 Headwater Drainage Features

The MESP (Aquafor Beech Limited 2016) used TRCA's Evaluation, Classification and Management of Headwater Drainage Features Interim Guidelines (2009) to identify management recommendations for protection, conservation and mitigation. The Study Area has nine HDFs (one of which drains to RR 50) in the Rainbow Creek Tributary and two HDFs (draining to RR 50) in the Robinson Creek Tributary.

No HDFs recommended for "Protection" or "Conservation" are included in the Study Area. Initially, the 'Rainbow HDF-4' was also recommended for "Conservation". However, further investigations have concluded that recent upstream drainage modifications at Coleraine Drive diverted the main channel of the Rainbow Creek Tributary to this feature via the roadside ditch. It was recommended in the MESP Addendum (Savanta 2017) that the channel alignment and crossing location be determined through the Coleraine Drive EA Study. All HDF's in the Study Area are classified as "Mitigation 1", "Mitigation 2", or "No Mitigation" (Figure 2.15 "HDF Management Recommendations" in the MESP by Aquafor Beech Limited 2016). HDFs classified as "Mitigation 1" or "Mitigation 2" could either remain as open watercourses provided that flows can be maintained (via stormwater pond outlets, LID swales or other techniques), or be replicated using well-vegetated urban swales or wetlands (Mitigation 1), or lot-level and conveyance stormwater techniques such as LID measures. Those HDFs with "No Management" classification could be eliminated and replaced with a traditional urban major-minor drainage system.

5.2 Field Investigations

5.2.1 Aquatics

5.2.1.1 Fish Habitat Assessments

The proposed project includes 20 drainage feature crossings (two of which are associated with both Part 'A' and Part 'B' Study Corridors, i.e., RB1 and RB2), one drainage feature parallel to Clarkway Drive, and one watercourse realignment (to be discussed in an amendment to the existing MESP (Aquafor Beech Limited 2016) and in a separate report not yet published). The aquatic ecosystem conditions, as observed during the 2016 and 2017 field investigations are summarized below. Permission to enter had not yet been granted for all properties at the time of the 2016, and 2017 field investigations. Wood did not assess one site (CT1). **Table 5-1** identify the crossings within each subwatershed that was included in the 2016/2017 field investigations and which were excluded.

An aerial view of the Study Area, **Figure 4-1** map series, provides a reference for the drainage system orientations as well as detailed views of the crossings. In an eastward progression along the Study Area, from south to north, the identified crossings include GT1 through GT5 which are associated with The Gore Road Tributary (Part 'B' Study Corridor), CT1 through CT9 which are associated with Clarkway Tributary, RB1 through RB4, related to the Rainbow Creek Tributary, and RS1 and RS2, associated with the Robinson Creek Tributary (Part 'B' Study Corridor). A reach of the Clarkway Tributary was also assessed as a component of the aquatic Study Area at CTA (Part 'B' Study Corridor), which drains parallel and directly adjacent to the west side of Clarkway Drive.

The Study Area has been heavily influenced by human activity. It is characterized primarily by agricultural

and rural areas with a small area of industrialized land located centrally at the north of the Study Area, directly adjacent to Coleraine Drive. As such, many of the drainage features where crossings are located or proposed are ephemeral drainage swales providing indirect or no fish habitat. A summary of fish habitat conditions at each crossing surveyed is presented in **Table 5-2.** Additional biophysical parameters and channel diagnostics of direct fish habitat within the Study Area are provided in **Table 5-3**. Water chemistry results for each of the crossings are presented in **Table 5-4**.

Table 5-1 Watercourse Crossings and Aquatic Field Investigations within the Study Area

Subwatershed	Watercourse	Crossings	
		Included	Excluded*
West Humber	Clarkway Tributary	CT8	CT6, CT7, CT9
Main Humber	Rainbow Creek Tributary	RB1, RB2, RB3, RB4	

*crossings excluded due to permission to enter restraints

Table 5-2 Existing Fish and Fish Habitat Conditions within the Study Area

Watercourse	Crossing ID	Flow Regime	Thermal Regime[1]	Substrate Type[2]	Vegetation	Fish Habitat Classification
Clarkway Tributary	CT6	Ephemeral – dry during site visit	None	Not Evaluated	Found in agricultural field. Channel likely impacted by agricultural tillage. Bare soil present within drainage feature. No crops growing within poorly defined bed or banks of stream.	Indirect
	CT7	Ephemeral – dry during site visit	None	Not Evaluated	Found in agricultural field. Channel likely impacted by agricultural tillage. Bare soil present within drainage feature. No crops growing within poorly defined bed or banks of stream.	Indirect
	CT8	Permanent	Warmwater	25% cobble 15% gravel 25% sand 25% silt 10% clay	Tall grasses on the top of banks and in floodplain. Trees also present and providing shade.	Direct
	CT9	Ephemeral – dry during site visit	None	Not Evaluated	Found in agricultural field. Channel likely impacted by agricultural tillage. Bare soil present within drainage feature. No crops growing within poorly defined bed or banks of stream.	Indirect
Rainbow Creek Tributary	RB1	Ephemeral – dry during site visit	None	5% boulder 10% cobble 30% gravel 40% sand 15% silt	Tall grasses and cattails surrounding upper portion of upstream reach. Corn fields along both sides of downstream reach. Herbaceous vegetation within the channel downstream.	Indirect
	RB2	Intermittent	Warmwater	90% silt 10% gravel	Riparian habitat bordered by adjacent agricultural land uses (grasses, cattails and rushes)	Indirect
	RB3	Intermittent	Warmwater	100% silt	Riparian habitat bordered by adjacent agricultural land uses (grasses, cattails and rushes)	Indirect
	RB4	Ephemeral - dry during site visit	None	Not Evaluated	Drainage swale in agricultural field	None

Notes: 1. Thermal regime as reported in the MESP (Aquafor Beech Limited 2016).
2. Substrate values are typically estimated for each morphology while in the field. The values provided here are weighted based on morphology distribution throughout the reach and presented as a round number (to the nearest 5%) as a representation of the entire length investigated.

Table 5-3 Key Biophysical Parameters and Channel Diagnostics for Direct Fish Habitat within the Study Area

Watercourse	Crossing ID	Reach	Morphology	Mean Bankfull Width (m)	Mean Bankfull Depth (m)	Mean Wetted Width (m)	Mean Wetted Depth (m)	Aquatic Vegetation (% of total area and types)	Shore Cover (% stream shaded)	Instream Cover (% of total area and types[1])	Bank Stability
Clarkway Tributary	CT8	0 to 200 m Downstream	35% riffle 45% run 20% pool	3.80	0.64	2.08	0.20	10% sedges	1-30%	20% cobble, overhanging vegetation, woody debris, boulders	Slightly Unstable
		0 to 50 m Upstream	80% run 20% pool	4.64	0.79	1.48	0.13	None	60-90%	50% woody debris, boulders, undercut banks	Slightly Unstable

Notes: 1. Instream cover types listed in decreasing order of abundance.
Width and depth measurements are taken in the field and averaged for each morphology. The values provided here are weighted based on morphology distribution throughout the reach.

Table 5-4 Water Chemistry Results Summary Table for the Study Area

Watercourse	Crossing ID	Water Temperature (°C)	Air Temperature (°C)	Conductivity (ms/cm)	pH	Dissolved Oxygen (mg/L)
Clarkway Tributary	CT6	Dry				
	CT7	Dry				
	CT8	16.5	19	1420	6.90**	N/A
	CT9	Dry				
Rainbow Creek Tributary	RB1	Dry				
	RB2	13.3	10	1937	7.98	**6.40**
	RB3	15.6	10	2206	8.08	**5.26**
	RB4	Dry				

Notes: **pH measurements fluctuated during sampling, the value provided represents the mean value

5.2.1.1.1 Clarkway Tributary

Origin and Flow

Four Clarkway Tributary crossings occur within the Study Area (CT6 – CT9). Of these crossings, only CT8 is associated with the main branch of Clarkway Tributary. Each of the other crossings are associated with independent drainage features originating in adjacent agricultural fields and converging with the main branch. The main branch of Clarkway Tributary is a low gradient stream with a well-defined channel, riparian area, and floodplain (Savanta 2017). The tributary originates in the Town of Caledon approximately 4.3 km north of Mayfield Road near Coleraine Drive. The headwater tributaries of the main branch originate north of the aquatic Study Area and converge before Mayfield Road. The watercourse drains primarily though natural creek valleys but has been channelized and straightened at some locations (Savanta 2017), presumably to accommodate the surrounding agricultural and rural residential land use. The main branch flows in a southwestward direction through the central region of the Part 'B' Study Corridor from Mayfield Road to the intersection of Countryside Drive and Clarkway Drive. From this intersection, it flows under concrete bridges continuing to Castlemore Road at the southern end of the Study Area. Downstream of Castlemore Road, the tributary flows in a southeastern direction and connects with the West Humber River just north of Highway 407.

Fisheries Limitations

No fisheries limitations were observed within the direct fish habitat of the main branch of Clarkway Tributary. Crossing CT8 were found to have direct fish habitat. Crossings CT6, CT7, CT9 were not surveyed due to permissions to enter limitations.

Crossing CT6, Crossing CT7, Crossing CT9

No permission to enter was acquired for these locations, therefore the following is determined from the

roadway. The location of these watercourse crossings is illustrated in **Figure 4-1**, Map 2. The agricultural drainage swales present at CT6 and CT7 were dry at the time of the field investigation, with some dried algae present within the poorly defined bed and banks of the features. These swales are considered ephemeral, with flows typically associated with the spring freshet and following rainfall events. CT6 and CT7 features originate within the agricultural fields to the south and east. The presence of algae within the drainage swales suggests that these features likely carry high concentrations of nutrients during periods of flow. Nutrient loading to the drainage features is likely resulting from the runoff of nitrogen and phosphorus from agricultural practices from nearby crop fields.

CT9 crossing is existing, and its location is illustrated in **Figure 4-1**, Map 2. The current, small diameter CSP culvert present in this location conveys flow from north to south across Mayfield Road. An ephemeral drainage swale is present in this location, which was dry at the time of the 2017 field investigations. Upstream of the crossing, the watercourse is conveyed through a grassy swale towards the Mayfield Road ROW. Downstream of the crossing, the swale continues through an agricultural field. The swale has a poorly defined bed and banks. It is indiscernible from the surrounding agricultural lands, aside from the presence of bare soils that are devoid of terrestrial and aquatic vegetation and crops. This swale is likely impacted by periodic agrarian tillage.

Crossing CT8

General Morphology and Habitat Conditions

The proposed location of CT8 crossing is within an agricultural field in which Clarkway Tributary has incised a well-defined channel. The tributary is highly sinuous in this area and exhibits an open grassland/meadow buffer with scattered shrubs and trees providing a total riparian area approximately 85 m wide.

Throughout the reach within the vicinity of the proposed CT8 crossing, the aquatic Study Area Clarkway Tributary is comprised of a diversified morphology of riffle, run, pool sequences. The channel location appears to be determined in part by woody vegetation on the banks and heavy clay deposits within the banks and substrate. Over the length of the aquatic Study Area, the tributary has a low gradient with the mean wetted depth ranging between 0.10 m and 0.28 m.

<u>0 to 200 m Downstream of the ROW</u>

The reach downstream of the proposed CT8 crossing location is characterized by several riffle, run, pool, sequences with the percentage of reach length approximately 35%, 45% and 20%, respectively. The reach had a mean wetted width of 2.08 m and a mean wetted depth of 0.20 m. The mean bankfull width was 3.80 m with a mean bankfull depth of 0.64 m. The sediment in the reach ranged from clay deposits dominating the run morphology to the significant cover provided by cobble in the riffles. Shear banks within this reach offer limited cover for fish. Despite the entrenched nature of the channel, the banks are vegetated and relatively stable. The in-stream cover is provided primarily by cobble with small amounts of overhanging vegetation, woody debris and boulders.

<u>0 to 50 m Upstream of the ROW</u>

The reach 0 to 50 m upstream of the proposed CT8 crossing location is characterized by 80% run and 20% pool. Within the run morphology, the mean bankfull width is 4.60 m, mean wetted width is 1.10 m, the mean bankfull depth and wetted depth is approximately 0.80 m and 0.10 m, respectively. The substrate in this

area is nearly an equal mix of silt, sand and gravel with approximately 5% cobble. Both banks show evidence of erosion and are slightly unstable. The meander at the upstream extent of the aquatic Study Area shows significant erosion on the left upstream bank. In contrast, the second meander has an undercut bank focused approximately 0.25 m above the current water level. Undercut banks (10%), boulders (10%), and woody debris (instream 20% and overhanging 10%) provide adequate cover to fish within the reach.

5.2.1.1.2 Rainbow Creek Tributary

Origin and Flow

The Rainbow Creek Tributary is an agricultural swale for much of its length (Savanta 2017). The headwaters of the creek originate north of Mayfield Road in the Town of Caledon. It flows southwest through the Study Area in an undefined valley with a wide floodplain reach extending from Mayfield Road to Coleraine Drive, then southward adjacent to Countryside Drive. The tributary continues to drain southwest to Castlemore Road, where it has a linear wetland type of morphology (Aquafor Beech Limited 2016). Flow continues through a straightened reach through the center of the Cadetta Road Industrial Park (Savanta 2017), ultimately outletting to the main branch of Rainbow Creek. The main branch of Rainbow Creek continues to flow southward, where it reaches its confluence with the Humber River near Highway 407 and Islington Avenue.

Fisheries Limitations

Rainbow Creek Tributary is primarily defined as ephemeral within the Study Area and provides indirect fish habitat at crossings RB1, RB2, RB3 and no habitat at RB4.

Crossing RB1

The approximate location of RB1 is illustrated in **Figure 4-1**, Map 3.

At this location, Rainbow Creek Tributary was dry during the October 2016 field investigation with evidence of ephemeral flow. Based on these observations and the presence of low flow conditions upstream, there is potential for this location to provide seasonal indirect fish habitat.

Crossing RB2

This crossing is located approximately 120 m west of Coleraine Drive on Countryside Drive (**Figure 4-1**, Map 4). The watercourse at crossing RB2 exhibited low flows during the field investigation. The morphology of the watercourse is primarily comprised of flats (95-100%) with a few scattered pools present downstream of the ROW (< 5%). The substrate was comprised of 90% silt and 10% gravel, which is likely the result of road runoff. A narrow well-vegetated riparian corridor, providing 60-90% cover to the watercourse, exists adjacent to the drainage feature both upstream and downstream of the ROW. The banks are stable within the reach with some undercutting (1%) evident. Organic debris (< 5%) and instream vascular macrophytes (algae; 25%) also provide cover for fish. The mean bankfull and wetted width is 0.65 m, and the mean depth is 0.07 m. This watercourse provides seasonal, intermittent warmwater fish habitat.

Crossing RB3

This crossing is located approximately 620 m north of Countryside Drive on Coleraine Drive (**Figure 4-1**, Map 4). Similar to the watercourse crossing at RB2, the watercourse at crossing RB3 exhibited low flows

during the site visit. The morphology of the watercourse in this area is comprised entirely of flats with a substrate comprised of silt. The mean bankfull and wetted widths are 0.68 m, and the mean depth is 0.18 m. Riparian vegetation and cattails provide 90-100% cover to the watercourse. This watercourse provides seasonal, intermittent warmwater fish habitat.

Crossing RB4

This crossing is located approximately 360 m north of Mayfield Road on Coleraine Drive (**Figure 4-1**, Map 4). The watercourse at crossing RB4 is an ephemeral drainage swale leading from agricultural areas and is conveyed under Coleraine Drive through a CSP. The watercourse was dry at the time of the field investigation, and it is assumed that this feature does not provide fish habitat.

5.2.1.2 Fish Sampling

Secondary Source information was reviewed for fish and fish habitat pertaining to the watercourses within the Study Area. Fish community inventories were derived from previous studies and were retrieved through information requests to MNRF as a component of the MESP (Aquafor Beech Limited 2016). The historic fisheries community information gathered is specific to the Study Area; however, the recorded presence of a specific species must be viewed in conjunction with existing aquatic habitat conditions (i.e., watercourses that are now dry or ephemeral cannot be expected to support the same fisheries community that they may have in the past). This is especially important when evaluating watercourse sensitivities and developing mitigation strategies consistent with local fisheries management objectives. The fish community results are presented in **Table 5-5** for the Study Area.

Table 5-5 Fisheries Data for the Study Area

Watercourse	Resource	Location with respect to Nearest Watercourse Crossing	Fish Species Present		Status
			Common Name	Scientific name	
Clarkway Tributary	TRCA 2004	~200m upstream of CT8, at Mayfield Road	Blacknose Dace Bluntnose Minnow Brook Stickleback Creek Chub Fathead Minnow Johnny Darter Pumpkinseed White Sucker	*Rhinichthys atratulus* *Pimephales notatus* *Culaea inconstans* *Semotilus atromaculatus* *Pimephales promelas* *Etheostoma nigrum* *Lepomis gibbosus* *Catostomus commersonii*	G5; S5 G5; S5 G5; S5 G5; S5 G5; S5 G5; S5 G5; S5 G5; S5
Rainbow Creek Tributary	MNRF 1946	~1.5km downstream of RB1	Creek Chub	*Semotilus atromaculatus*	G5;S5
	MNRF 1946	~1.7km upstream of RB2, ~150m north of	No fish captured		

		Mayfield Road			

Source: Aquafor Beech Limited 2015
G5 – Global status, secure
S5 – Subnational (Provincial) status, secure
Within the Study Area Robinson Creek Tributary does not provide fish habitat, as such fisheries data is not available.

5.2.2 Terrestrial

5.2.2.1 Ecological Land Classification

Vegetation communities identified within the Study Area are illustrated in **Figure 5-1** Maps 1-6 and a summary table of the land use is presented below. A list of plant species observed is found in Appendix C.

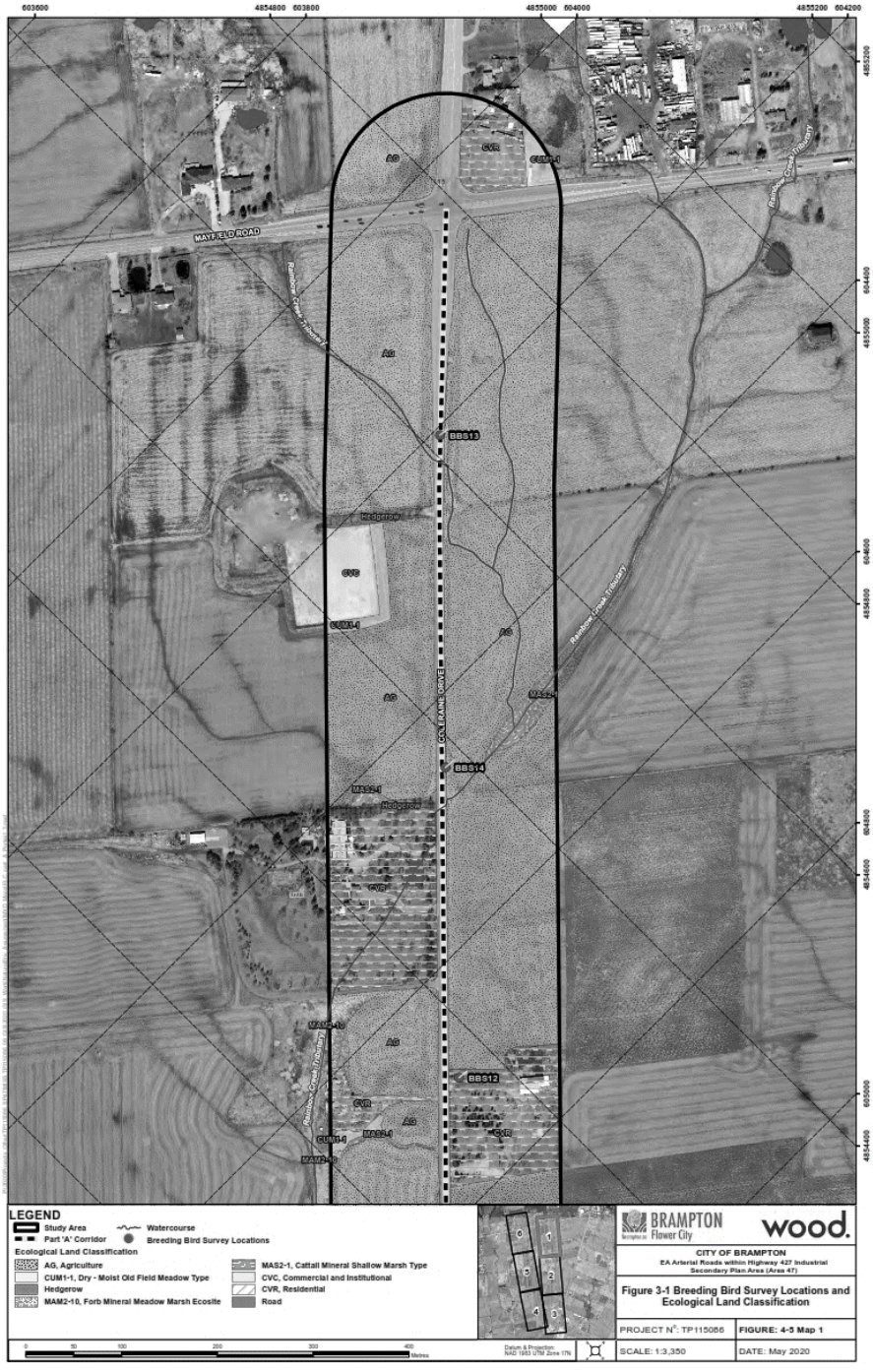
The majority of the land use within the terrestrial Study Areas includes residential areas, agricultural fields, and cultural meadows. Many of the vegetation communities are created by human disturbance and are classified as cultural. The most significant vegetation communities are the fragments of woodland/forest. These fragments of forest, plantation and cultural woodland often buffer the watercourses throughout the terrestrial Study Areas and are a relatively significant feature in the context of the Study Area landscape, given that the area is characterized by a high degree of agriculture and development. A series of photographs representing some of the identified land classifications is included in Appendix B.

In total for Area 47, 286 plant species compiled from Secondary Sources, 137 (48%) are not native to Ontario (Aquafor Beech Limited 2016). Wood investigations documented 84 plant species within the Study Area, 44 (52%) are not native to Ontario. Despite the somewhat even split in overall percentage, non-native species far outweigh native species in terms of coverage and biomass. A compiled plant species list is included in Appendix C. The MESP (Aquafor Beech Limited 2016) details the Floristic Quality Assessment completed for the 135 native species found in Area 47, which were not planted and had Coefficient of Conservatism (CC) values. The mean CC was evaluated at 3.39, which is relatively low and reflects the preponderance of early successional habitats in Area 47 (Aquafor Beach 2016). However, the percent of non-natives and mean CC of 3.39 is on par with other Greater Toronto Area Locations. The MESP (Aquafor Beech Limited 2016) provides a thorough discussion on mean CC and its use.

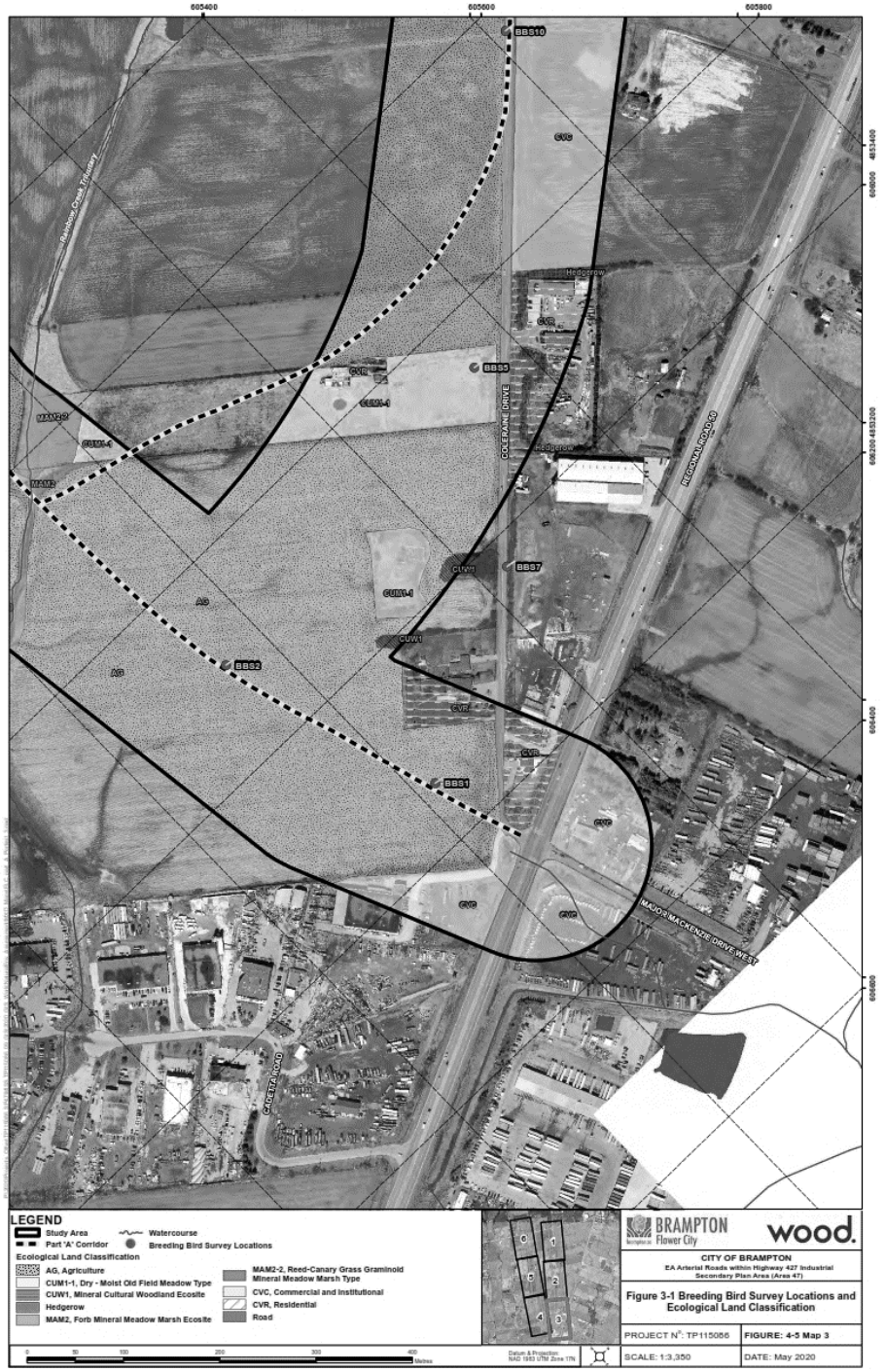
Secondary Sources and Wood field investigations did not report any vegetative SAR. Secondary Sources report one provincially rare species within the Study Area, Amethyst Aster (*Symphyotrichum* x *amethystinum*). It was reported that Amethyst Aster had a provincial rank of S3. However, recent (17 January 2020) NHIC flora status records list Amethyst Aster as SNA, not applicable as the species is not a suitable target for conservation. Wood field investigations did find Honey Locust (*Gleditsia triacanthos*) in the Study Area. Honey Locust is provincially ranked as 'S2?'. Ranking S2 indicates 'Imperiled' while the '?' indicates 'Inexact Numeric Rank'. Honey Locust is commonly planted as an ornamental tree and becoming naturalized well north of its native range (Farrar 1995), which sometimes makes it difficult to distinguish native from non-native populations. In Ontario, only presumed native populations are tracked and therefore ranked S2, and the occurrence of Honey Locust in the Study Area is not assumed to be a natural occurrence.

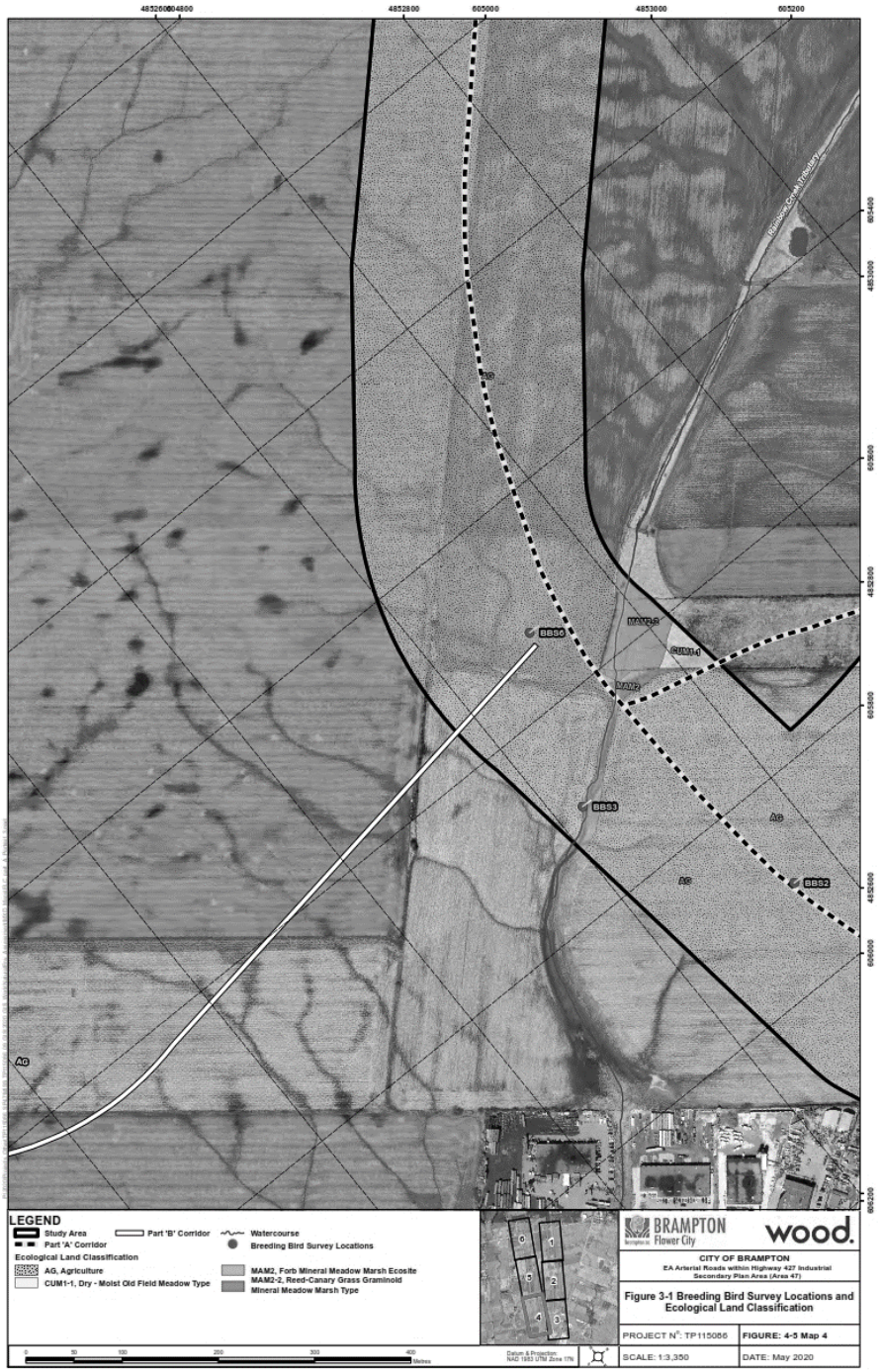
Lastly, the MESP (Aquafor Beech Limited 2016) did note the presence of 20 plant species that are considered regional species of concern under TRCA's L-rank scheme. Each species is discussed individually in the MESP (Aquafor Beech Limited 2016), and several of the species are planted.

Figure 5-1 Terrestrial Survey Locations in the Study Area




4853800
604600
4854000
604800
4854200
605000
COUNTRYSIDE DRIVE
GOREWAY DRIVE
Rainbow Creek Tributary
Robinson Creek Tributary
Hedgerow
BBS8
BBS9
BBS10
MAM2-10
MAS2
CUM1-1
CVC
CVR
OA
AG
LEGEND
Study Area
Part 'A' Corridor
Part 'B' Corridor
Watercourse
Breeding Bird Survey Locations
Ecological Land Classification
AG, Agriculture
CUM1-1, Dry - Moist Old Field Meadow Type
Hedgerow
MAM2, Forb Mineral Meadow Marsh Ecosite
MAM2-10, Forb Mineral Meadow Marsh Ecosite
MAS2, Graminoid Mineral Shallow Marsh Ecosite
CVC, Commercial and Institutional
CVR, Residential
OA, Open Water
Road
BRAMPTON Flower City
wood.
CITY OF BRAMPTON
EA Arterial Roads within Highway 427 Industrial Secondary Plan Area (Area 47)
Figure 3-1 Breeding Bird Survey Locations and Ecological Land Classification
PROJECT N°: TP115086
FIGURE: 4-5 Map 2
SCALE: 1:3,350
DATE: May 2020


605400
605600
605800
BBS10
BBS5
BBS7
BBS2
BBS1
CVC
CVR
CUM1-1
CUW1
MAM2-2
Hedgerow
COLERAINE DRIVE
REDSTONE ROAD
MAJOR MACKENZIE DRIVE WEST
CASTLEMORE ROAD
Rainbow Creek Tributary
AG
LEGEND
Study Area
Part 'A' Corridor
Watercourse
Breeding Bird Survey Locations
Ecological Land Classification
AG, Agriculture
CUM1-1, Dry - Moist Old Field Meadow Type
CUW1, Mineral Cultural Woodland Ecosite
Hedgerow
MAM2, Forb Mineral Meadow Marsh Ecosite
MAM2-2, Reed-Canary Grass Graminoid Mineral Meadow Marsh Type
CVC, Commercial and Institutional
CVR, Residential
Road
BRAMPTON Flower City
wood.
CITY OF BRAMPTON
EA Arterial Roads within Highway 427 Industrial Secondary Plan Area (Area 47)
Figure 3-1 Breeding Bird Survey Locations and Ecological Land Classification
PROJECT N°: TP115086
FIGURE: 4-5 Map 3
SCALE: 1:3,350
DATE: May 2020


4852600
4852800
605000
4853000
605200
BB50
BB53
BB52
MAM2-2
CUM1-1
MAM2
AG
LEGEND
Study Area
Part 'A' Corridor
Part 'B' Corridor
Watercourse
Breeding Bird Survey Locations
Ecological Land Classification
AG, Agriculture
CUM1-1, Dry - Moist Old Field Meadow Type
MAM2, Forb Mineral Meadow Marsh Ecosite
MAM2-2, Reed-Canary Grass Graminoid Mineral Meadow Marsh Type
BRAMPTON Flower City
wood.
CITY OF BRAMPTON
EA Arterial Roads within Highway 427 Industrial Secondary Plan Area (Area 47)
Figure 3-1 Breeding Bird Survey Locations and Ecological Land Classification
PROJECT N°: TP115086
FIGURE: 4-5 Map 4
SCALE: 1:3,350
DATE: May 2020


603800
4853400
604000
4853600
604200
Hedgerow
Clarkway Tributary
AG
Pasture
BBS29
OA
CUP3-2
SWD4-1
CVR
COUNTRYSIDE DRIVE
BBS28
CUM1-1
MAM2-2
SWT2-2
BBS35
BBS40
LEGEND
Study Area
Part 'A' Corridor
Part 'B' Corridor
Watercourse
Breeding Bird Survey Locations
Ecological Land Classification
AG, Agriculture
CUP3-2, White Pine Coniferous Plantation Type
Hedgerow
MAM2-2, Reed-Canary Grass Graminoid Mineral Meadow Marsh Type
SWD4-1, Willow Mineral Deciduous Swamp Type
SWT2-2, Willow Mineral Thicket Swamp Type
CVR, Residential
OA, Open Water
Pasture
Road
BRAMPTON Flower City
wood.
CITY OF BRAMPTON
EA Arterial Roads within Highway 427 Industrial Secondary Plan Area (Area 47)
Figure 3-1 Breeding Bird Survey Locations and Ecological Land Classification
PROJECT N°: TP115086
FIGURE: 4-5 Map 5
SCALE: 1:3,350
DATE: May 2020

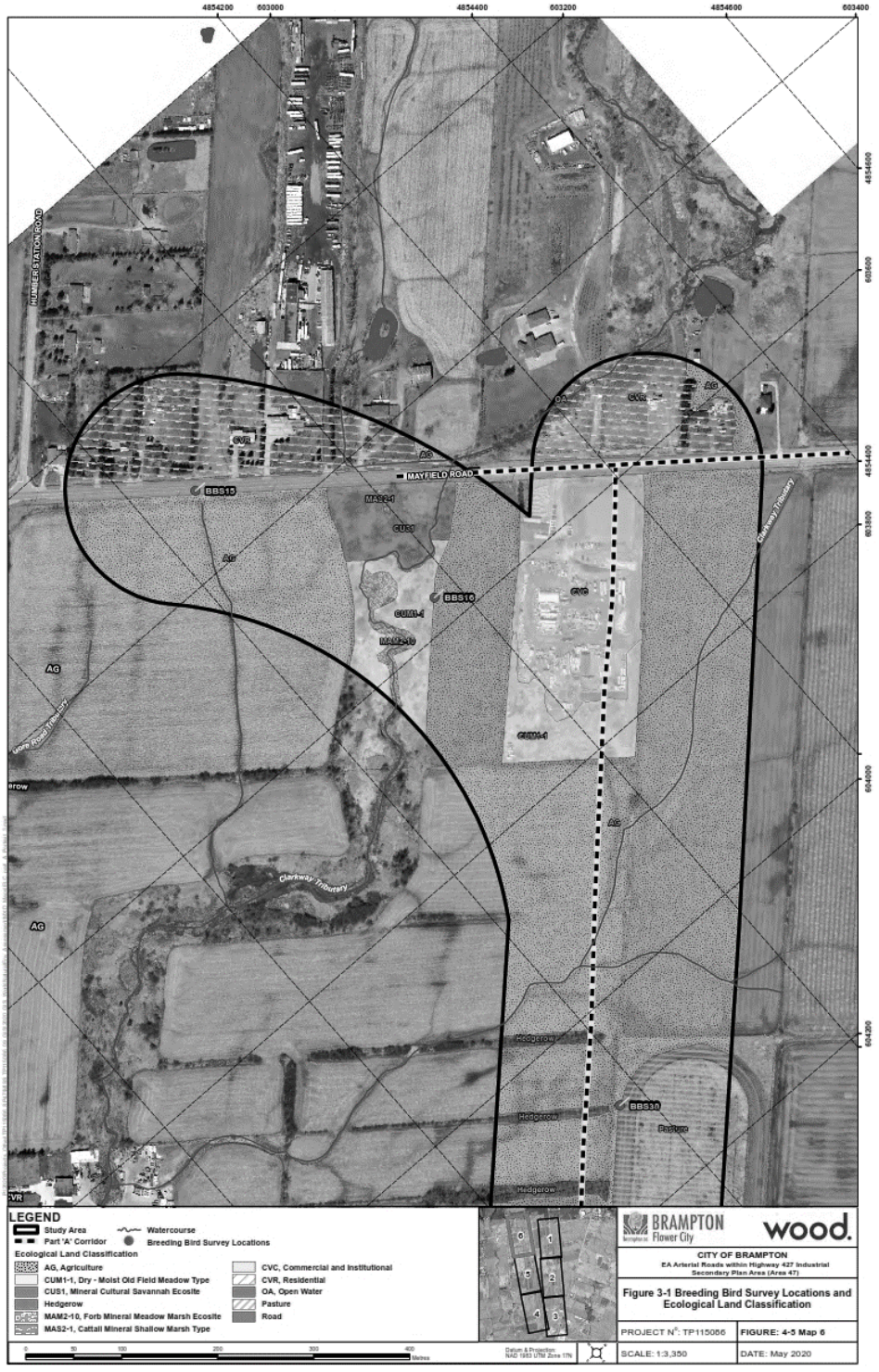

4854200
603000
4854400
603200
4854600
603400
HUMBER STATION ROAD
MAYFIELD ROAD
BBS15
BBS10
BBS30
MAS2-1
CUS1
CUM1-1
MAM2-10
CVR
OA
AG
Clarkway Tributary
Hedgerow
Pasture
LEGEND
Study Area
Part 'A' Corridor
Watercourse
Breeding Bird Survey Locations
Ecological Land Classification
AG, Agriculture
CUM1-1, Dry - Moist Old Field Meadow Type
CUS1, Mineral Cultural Savannah Ecosite
Hedgerow
MAM2-10, Forb Mineral Meadow Marsh Ecosite
MAS2-1, Cattail Mineral Shallow Marsh Type
CVC, Commercial and Institutional
CVR, Residential
OA, Open Water
Pasture
Road
BRAMPTON Flower City
wood.
CITY OF BRAMPTON
EA Arterial Roads within Highway 427 Industrial Secondary Plan Area (Area 47)
Figure 3-1 Breeding Bird Survey Locations and Ecological Land Classification
PROJECT N°: TP115086
FIGURE: 4-5 Map 6
SCALE: 1:3,350
DATE: May 2020

Table 5-6 Ecological Land Classifications with the Study Area

Community Type	Code	Description	Area (ha)	% of Study Area
Anthropogenic	CVC	Commercial and Institutional	12.82	7.6%
	CVR	Residential	18.36	10.9%
	-	Road	6.64	3.9%
Total			**37.82**	**22.5%**
Agriculture	AG	Agriculture	114.64	68.1%
	-	Hedgerow	1.39	0.8%
	-	Pasture	4.84	2.9%
Total			**120.9**	**71.8%**
Cultural	CUM1-1	Dry – Moist Old Field Meadow Type	5.92	3.5%
	CUP3-2	White Pine Coniferous Plantation Type	0.13	0.1%
	CUS1	Mineral Cultural Savannah Ecosite	0.93	0.6%
	CUW1	Mineral Cultural Woodland Ecosite	0.09	0.1%
Total			**7.07**	**4.2%**
Wetlands	MAM2	Forb Mineral Meadow Marsh Ecosite	0.49	0.3%
	MAM2-2	Reed Canary Grass Graminoid Mineral Meadow Marsh Type	1.00	0.6%
	MAM2-10	Mixed Forb Mineral Meadow Marsh Ecosite	0.49	0.3%
	MAS2	Graminoid Mineral Shallow Marsh Ecosite	0.02	0.0%
	MAS2-1	Cattail Mineral Shallow Marsh Type	0.35	0.2%
	SWT2-2	Willow Mineral Deciduous Thicket Swamp	0.07	0.0%
	SWD4-1	Willow Mineral Deciduous Swamp Type	0.05	0.0%
Total			**2.47**	**1.5%**
Open Water	OAO	Open Aquatic	**0.18**	0.1%
Part "A" Total			**168.4**	**100%**

5.2.2.1.1 Anthropogenic

Commercial and Institutional and Roads

Anthropogenic lands comprise a small percent of the overall Study Area. In the Part 'A' Study Corridor Commercial and Institutional lands comprise 7.6% and roads 3.9%. These areas are strictly anthropogenic in nature and provide minor or negative function in habitat for native species or landscape linkages between natural habitats.

Residential

Residential properties comprise 10.90% of the Study Area. Residential properties often had gardens and landscaping with a mix of native and exotic species. Highly anthropogenic in nature and provide a minor

function in providing habitat for native species or landscape linkages between natural habitats on their own.

5.2.2.1.2 Agriculture

Agriculture

Agricultural lands were prevalent throughout the entire Study Area, comprising 68.1% of the Study Area. Agricultural communities identified within the Study Areas include active fields of corn, soybeans, wheat and hay. Some weedy species of plants were noted on the field edges though these were not considered part of the community.

Hedgerows

Hedgerows comprise 0.82% of the Study Area. Hedgerows generally exist adjacent to residential properties or between agricultural fields. Despite their anthropogenic nature, these communities can host wildlife and can, at times, provide landscape linkages between natural habitats.

Pasture

Pastures are areas of grass found in the Study Area, which are kept short due to animal grazing or mowing. No species list was collected for this community.

5.2.2.1.3 Cultural

Dry – Moist Old Field Meadows

Dry – Moist Old Field Meadows result from, or are maintained by, cultural or anthropogenic based disturbances, in the Study Area it is often pasture or agricultural fields left to go fallow. This community type is characterized by ≤25% tree and shrub cover. Across the Study Area Cultural Meadows comprised of 3.52% of the land cover (5.92 ha) in the Study Area. This community was dominated by grasses and Tall Goldenrod (*Solidago altissima var. altissima*) with occurrences of Manitoba Maple (*Acer negundo*), willow species (*Salix* sp.) and European Buckthorn (*Rhamnus cathartica*) in the sub-canopy and canopy layer.

Coniferous Plantations

In the Study Area, one small coniferous plantation, White Pine Coniferous Plantation (CUP3-2, 0.13 ha) was observed during the field investigation, making up only around 0.08% of the Study Area (**Figure 5-1,** Map 5).

Despite the anthropogenic origin and monoculture nature of this community type, they can provide habitat for edge species (e.g. Raccoons (*Procyon lotor*) and Brown-Headed Cowbirds (*Molthrus ater*)). Depending on the size and shape of the stand, these woodlots can also support forest interior species.

Cultural Savannah

One polygon consisting of Mineral Cultural Savannah Ecosite (CUS1, 0.93 ha) was identified within the Study Area (**Figure 5-1,** Map 6). Cultural savannahs are characterized by 25% to 35% tree cover. The Mineral Cultural Savannah community was a mix of European Buckthorn, Hawthorn species (*Crataegus sp.*), Manitoba Maple, Green Ash (*Fraxinus pennsylvanica*), Willow species, Black Walnut (*Juglans nigra*), Spruce (*Picea sp.*) and Pine (*Pinus sp.*) species. The ground cover was composed of grasses and Tall Goldenrod.

Cultural Woodland

Cultural Woodlands are characterized by 35% to 65% tree cover. In the Study Area, one polygon of Mineral Cultural Woodland Ecosite (CUW1; 0.09 ha), was identified. (**Figure 5-1,** Map 1 and Map 3). This community was dominated by European Buckthorn, Willow species, Green Ash and Manitoba Maple. These areas were very similar to the CUT1 species lists, but were considered mature communities and have likely grown from a CUT1 into a CUW1. The southern community had European Buckthorn, Hawthorn species and Apple (*Malus pumila*) in the understory and Green Ash, Manitoba Maple, Black Walnut and Willow species. The northern community also had Silver Maple (*Acer saccharinum*), Scots Pine (*Pinus sylvestris*) and Norway Spruce (*Picea abies*). The ground cover in all these communities was a similar composition to the cultural meadow observed within Study Corridor 'Part A'.

5.2.2.1.4 Wetlands

Forb Mineral Meadow Marsh Ecosite

In the Study Area, two polygons were identified as Forb Mineral Meadow Marsh Ecosites (MAM2; 0.49 ha). One polygon was mapped along Rainbow Creek Tributary where it crosses Countryside Drive and the other polygon is situated along Rainbow Creek Tributary within an agricultural field (**Figure 5-1,** Maps 2, 3 and 4). This community is dominated by grasses and sedges (*Carex* sp.), Broad-leaved Cattail (*Typha latifolia*), Reed Canary Grass (*Phalaris arundinacea*), Tall Goldenrod, Black Bulrush (*Scirpus atrovirens*) and Common Water Plantain (*Alisma plantago-aquatica*).

Reed Canary Grass Graminoid Mineral Meadow Marsh Type

In the Study Area, two polygons were identified as Reed Canary Grass Graminoid Mineral Meadow Marsh Type (MAM2-2; 1.00 ha). Both are loosely associated with agricultural drainage, with one following the Rainbow Creek Tributary as it goes through a field, and the other located adjacent to a branch of Clarkway Tributary (**Figure 5-1,** Maps 3, 4 and 5).

Mixed Forb Mineral Meadow Marsh Type

Several small polygons were identified as Mixed Forb Mineral Meadow Marsh Type (MAM2-10), all of which are associated with watercourses within the Study Area. In the Study Area, these cover 0.49 ha; one polygon runs along Clarkway Tributary, and several small polygons are located along the Rainbow Creek Tributary as it meanders near the Study Area boundary (**Figure 5-1,** Maps 1, 2 and 6). This community type was dominated by grasses, Tall Goldenrod, sedges and had forb species such as Purple Loosestrife (*Lythrum salicaria*). European Buckthorn and Willow species were present in the shrub layer.

Graminoid Mineral Shallow Marsh Ecosite

In the Study Area, one small community of Graminoid Bedrock Shallow Marsh (MAS2; 0.02 ha) was identified surrounding a pond east of Coleraine Drive (**Figure 5-1,** Map 2) in the MESP (Aquafor Beech Limited 2016). This community was removed due to construction sometime after 2015.

Cattail Mineral Shallow Marsh Type

Three polygons were identified as Cattail Mineral Shallow Marsh Type (MAS2-1; 0.35 ha) within the Study Area. One is a small inclusion in a Cultural Savannah associated with Clarkway Tributary at the top of the

Study Area. Another is along Rainbow Creek Tributary as it flows through an agricultural field, with the third polygon near where Rainbow Creek Tributary crosses Coleraine Drive between a hedgerow and an agricultural field (**Figure 5-1,** Maps 1 and 6). This community is dominated by Broad-leaved Cattail and grasses. Some Willow species and European Buckthorn were present in the shrub layer.

Willow Mineral Deciduous Thicket Swamp

One polygon was identified as a Willow Mineral Deciduous Thicket Swamp (SWT2-2; 0.07 ha) within the Study Area (**Figure 5-1,** Map 5). Access was not granted to this area at the time of the Wood terrestrial field investigations, so a species list was not generated. ELC was taken from the MESP (Aquafor Beech Limited 2016) and confirmed with binoculars from a neighbouring property. It consisted of Willow species and was not a mature community with most specimens in the shrub layer.

Willow Mineral Deciduous Swamp Type

One narrow band of Willow Mineral Deciduous Swamp Type (SWD4-1; 0.05 ha) was identified within the Study Area around a pond located within a pasture/horse track on a farm property (**Figure 5-1,** Map 5). This community was a narrow band of trees tracking the watercourse. Willow species and Black Walnut dominate it, and the understory was comprised of wetland species such as Broad-leaved Cattail and sedges.

5.2.2.1.5 Open Water

Three areas of open water (0.18 ha) were identified within the Study Area. The first is a reach of the Clarkway Tributary just north of Mayfield Road. Another is a pond within a pasture/horse track behind a barn, and the last is an area that could not be confirmed as it is surrounded by active construction and may no longer be present (**Figure 5-1,** Maps 2, 5 and 6).

Other areas of Open Water may be present on residential properties but were often small and could not always be confirmed due to access limitations.

5.2.2.2 Tree Inventory

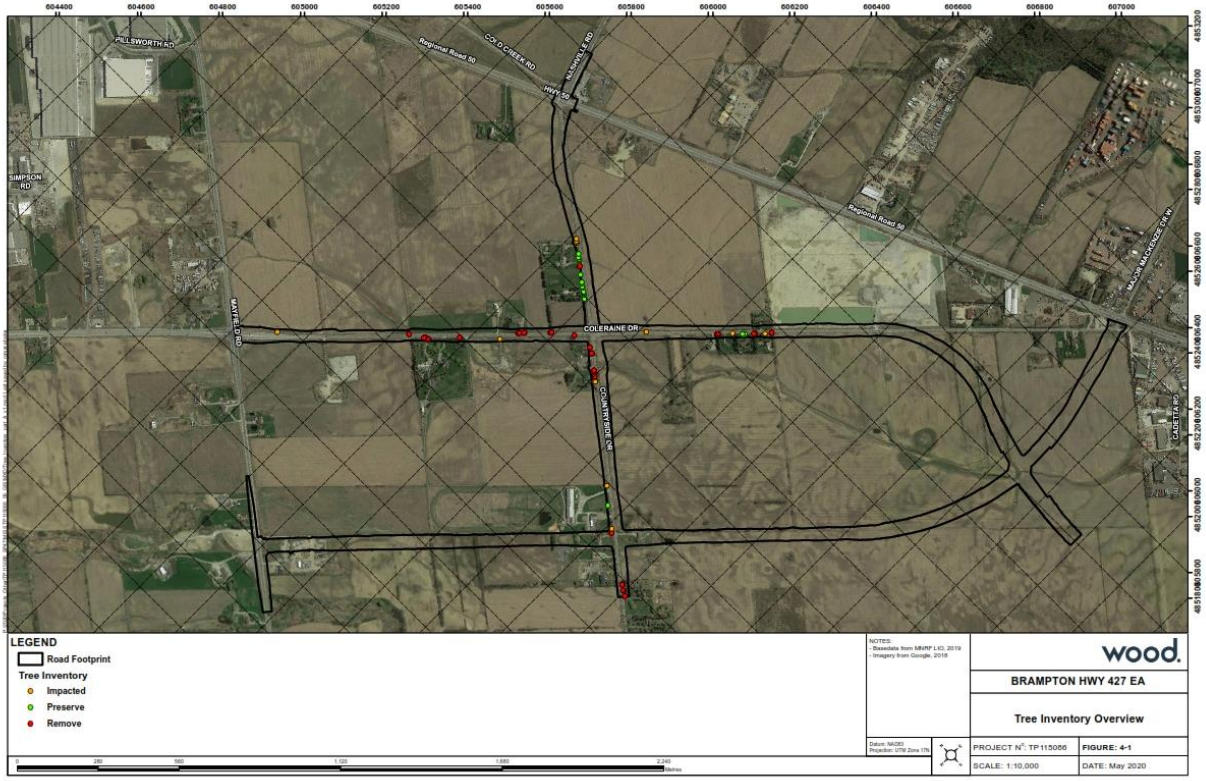
The locations were identified in the field using a hand-held Global Positioning System (GPS) unit – Trimble Geo7X. All trees included as part of this assessment were inspected visually from the ground. Inspection included a non-invasive examination of each tree documenting site conditions, root, trunk, and canopy vigour, and canopy structure. Tree species were determined, and a tree number was applied. No aluminum tags were used due to the accuracy of the GPS unit and lack of PTE.

The Tree Inventory documented a total of 353 trees greater than 10 cm Diameter at Breast Height (DBH) in the Study Area (**Figure 5-2**). Many of the trees situated within the Project Location were in fair to good condition. No tree SAR were identified during the field visits at the Project Location. Species composition ranged from native to non-native species or cultivar species. A species breakdown can be found in the Arborist Report in Appendix D.

There is a total of 293 trees, most of which are currently on private property that will need to be removed to accommodate construction. Trees listed as injured are trees outside the project footprint, but the construction footprint is still within the minimum Tree Protection Zone for the individual tree. A total of 26

trees, mostly private, may be injured by construction activities. Tree protection measures have been identified for 71 trees, those identified for preservation (45) and those identified for injury (26). Trees to be protected will follow the City of Brampton Landscape Specifications and Temporary Tree Protection Fencing Guide (City of Brampton, 2014). In order to protect trees, a Tree Protection Zone (TPZ) must be established. The prescribed compensation is 381 for trees outside of TRCA regulated areas under the City Guidelines and 1,519 for trees within TRCA regulated area, totaling 1,900 compensation trees.

Figure 5-2 Tree Inventory Overview



5.2.2.3 Breeding Bird Surveys

A total of 116 bird species were documented in the Secondary Source Review as having records within the Study Areas (Appendix C). During the Wood breeding bird point count survey, a total of 36 of the 116 Secondary Source species were identified within the Study Area and one additional bird was recorded; Broad-winged Hawk observed flying over the Study Area during Wood Investigations. A summary of results is highlighted below, with further information provided within Appendix C. The occurrence of SAR and species of conservation concern documented during breeding bird surveys are:

- Almost all bird species recorded within the applicable OBBA 10 km grid squares are provincially (sub-national) ranked S5 (very common, demonstrably secure), or S4 (common, apparently secure). One species, Acadian Flycatcher, is ranked S2S3B.
- Barn Swallow is listed as Threatened under the ESA and therefore is afforded individual and habitat protection. There were 29 individual Barn Swallows recorded at 13 breeding bird survey locations during the field investigations.
- Three bird nests were observed under the bridge structure at crossing GT4 of The Gore Road Tributary, which can likely be attributed to Cliff Swallow (S4B, Apparently Secure Breeding populations) and not Barn Swallow.

With respect to habitat for avian species of conservation concern, there has been significant changes in land use since the time of field investigations conducted for the MESP (Aquafor Beech Limited 2016). The transformation of fallow fields to active agricultural lands has resulted in a notable decline in Bobolink and Eastern Meadowlark habitat. Consequently, observations of Bobolink were much lower during Wood investigations and Eastern Meadowlark was not observed. Furthermore, many species documented in Secondary Source Review may no longer occur as they have not been seen since 2007 (Aquafor Beach 2016). Note, that these species are considered species of conservation concern in this NEAR and are therefore afforded habitat protection in keeping with Significant Wildlife Habitat policies for Special Concern and Rare Wildlife Species (Section 6.0).

5.2.2.4 Mammals

In total, 42 species of mammals were found to have habitat ranges overlapping the Study Area. Range data was gathered from the Atlas of the Mammals of Ontario (Dobbyn 1994) range maps, and bat data has been supplemented by Bat Conservation International Inc. records (BCI 2016). Most mammal ranges recorded within the applicable atlas' are for species that are provincially ranked S5 (very common, demonstrably secure), S4 (common to very common, apparently secure), or SNA (not applicable for conservation activities). Four mammal species are listed as provincially vulnerable or species of conservation concern; all four species are bats, Eastern Small-footed Myotis, Northern Myotis, Tri-colored Bat, Little Brown Myotis. Tri-colored Bat and Little Brown Myotis were found to occur in the Part 'B' Study Corridor during Wood investigations; however, suitable habitat does not exist in the Part 'A' Study Corridor and therefore acoustic surveys were not undertaken in the Study Area. During the Wood investigations, field staff observed Red Squirrel (*Tamiasciurus hudsonicus*), Eastern Cottontail (*Sylvilagus floridanus*) and White-tailed Deer (*Odocoileus virginianus*), all urban tolerant species. As through correspondence with MNRF bat detectors were not deployed within the Study Area due to lack of habitat.

5.2.2.5 Amphibians and Reptiles

A review of the ORAA species list for the natural heritage squares encompassing the Study Area indicated eight reptiles and 11 amphibian species have habitat ranges that overlap with the Study Area. (Ontario Nature 2016). The majority of reptile and amphibian species recorded within the applicable area are provincially ranked S5 (very common, demonstrably secure), S4 (common to very common, apparently secure), or SNA (not applicable for conservation activities). Four herptile species are listed as provincially vulnerable or species of conservation concern, Western Chorus Frog (*Pseudacris triseriata*), Blanding's Turtle (*Emydoidea blandingii*), Northern Map Turtle (*Graptemys geographica*), Snapping Turtle (*Chelydra serpentina*). Field investigations conducted during the development of the MESP (Aquafor Beech Limited 2016) detected the presence of American Toad (*Anaxyrus americanus*), Green Frog (*Lithobates clamitans*), Northern Leopard Frog (*Lithobates pipiens*), Eastern Gartersnake (*Thamnophis sirtalis*), and Snapping Turtle. Snapping Turtle was observed on the road near a small pond on a residential property within the Part 'B' Study Corridor. Still, it is possible Snapping Turtle could use the Study Area for certain life stages (e.g., nesting). Field investigations as a part of the MESP (Aquafor Beech Limited 2016) also identified several areas that could serve as amphibian breeding pools. These breeding pools are not located with the ROW of the proposed road works. No reptile or amphibian species were observed during the Wood investigations.

5.2.2.6 Invertebrates

Two invertebrate species were documented in the MESP (Aquafor Beech Limited 2016), Monarch butterfly and a chimney crayfish species. Monarch butterfly is provincially listed as S2N,S4B, which means non-breeding Monarch in the province are imperilled while breeding Monarch are apparently secure. Monarch is also listed as a Special Concern in the ESA. Currently, no individual or habitat protection is offered to Monarch butterflies under the ESA. In addition to the chimney crayfish findings in the MESP (Aquafor Beech Limited 2016), Wood investigations found two crayfish chimneys and a crayfish moulted exoskeleton near

crossing GT2 during the August 2017 aquatic field investigations. Subsequent year records indicate that crayfish are currently utilizing the area. In Ontario, there are two species of crayfish that are semi-terrestrial and that are primary or secondary burrowers. These are the Devil Crayfish (*Lacunicambarus diogenes*) and the Digger Crayfish (*Creaserinus fodiens*). These two crayfish species are provincially vulnerable (S3) but are not listed under the ESA. A third species is aquatic but may also create terrestrial burrows; this species is the Calico Crayfish (*Faxonius immunis*). The Calico Crayfish is provincially listed as apparently secure (S4) and not listed under the ESA. In Ecoregion 7E, Terrestrial Crayfish Habitat is Significant Wildlife Habitat (OMNRF, 2015). However, agricultural fields are not considered SWH. Additionally, if provincially vulnerable species are present, habitat may be regarded as SWH under Special Concern and Rare Wildlife Species SWH (Section 7.1.2).

6.0 Species of Conservation Concern

In Ontario, Species of conservation concern include species at risk as well as rare and rapidly declining species. Species at Risk (SAR) are both plant and animal species whose individuals or populations are considered Extirpated, Endangered, Threatened, or Special Concern, as determined by the provincial Committee on the Status of Species at Risk in Ontario (COSSARO) and the federal Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

Provincially rare species are those with a provincial rank (sub-national rank) of S1, S2, or S3 and considered provincially vulnerable to imperiled. Provincially rare species are tracked by the Natural Heritage Information Center (NHIC) and provincially rarity does not automatically provide listing under the ESA. These species are acknowledged in this report as they are considered rare within the province of Ontario and should be taken into consideration for planning purposes.

Species occurrence was based on a Secondary Source Review and information collected as part of the field investigations. Note that data in some atlases are presented on a 10 km^2 grid square, and NHIC data is presented in a 1 km^2 grid square. The Study Area is a small portion of the grid squares, and it is therefore not certain all species indicated in atlas records will occur in the Study Area. Habitat type, size, connectivity, and availability will contribute to species use. The majority of the species found in Secondary Sources do not have the potential to occur in the Study Area, and in other cases, consultation and fieldwork were required to rule out the presence of species. Species that required additional correspondence or surveys were Reside Dace (*Clinostomus elongatus*), Bobolink *(Dolichonyx oryzivorus*), Eastern Meadowlark (*Sturnella magna*), Barn Swallow (*Hirundo rustica*) and SAR bats (*Myotis* species and *Perimyotis* species). **Table 6-1** indicates which species have a Moderate to High probability of occurring in the Study Area.

A summary of SAR known to the Study Area as documented from Secondary Source Review and field investigations is provided in **Table 6-1**. The probabilities of occurrence are defined as 'High', 'Moderate', 'Low', and 'None' and are based on the following definitions:

- High: Those species recorded in the vicinity of the Study Area (typically within 10 km and recorded in the past 20 years) and whose preferred habitat is abundant within the Project Location. Species with high probability of occurrence would be expected to breed within or frequently use the habitats available within the Study Area and would be known to have a high relative abundance within the region (i.e., compared to other regions in Ontario).
- Moderate: Those species in the vicinity of the Study Area but have limited suitable habitat within the

Study Area. Species with moderate probabilities of occurrence may not occur within the Study Area frequently, but may intermittently use it for foraging, migration or movement to other parts of their home-range.

- Low: Those species recorded in the vicinity of the Project Location, but whose preferred habitat does not occur or is extremely limited within the Study Area. These species may intermittently move through the Study Area but are unlikely to become permanent residents.
- None: Those species whose preferred habitat is completely absent from the Study Area and may only migrate intermittently through the Study Area.

As noted herein, species identified as endangered and threated are provided protection under the ESA. Those species, identified as special concern, are not afforded protection under Sections 9 and 10 of the ESA however, may be afforded protection as part of SWH. As such, due diligence should be enforced if a special concern species or their habitat is determined present.

A visual record of Species of Conservation Concern is provided in Figure **6-1**. This figure does not provide the locations of any restricted species records (no restricted species were documented). Combined sightings from previous studies and Wood staff of Barn Swallow flyovers, Northern Leopard Frog, and crayfish chimneys are provided.

Figure 6-1 Species of Conservation Concern Observations in Part 'A' Study Corridor

Table 6-1 Probability of Terrestrial Species of Conservation Concern Occurring within the Study Area

Species Name and Status	Probability of Occurrence within the Study Areas based on Habitat Requirements	Observed During Wood Investigations?
Fish		
Redside Dace (*Clinostomus elongatus*) ESA- Endangered	Further correspondence with MNRF confirmed the presence of Redside Dace within the West Humber River located outside the Study Area and habitat regulations no longer apply to Robinson Creek. Furthermore, Robinson Creek and its tributaries do not have SAR records for over 20 years (Appendix A). Based on the proposed works and road alignments associated with the Study Area, no impact to Redside Dace residing in West Humber River, west of the Study Area, is anticipated and therefore, Redside Dace is not considered further within this NEAR.	**No**
Birds (Aves)		
Acadian Flycatcher (*Empidonax virescens*) ESA- Endangered **Record Source: OBBA**	**Low -** Acadian Flycatcher was documented in the OBBA in the 10 km by 10 km grid square. The Acadian Flycatcher is typically found in mature, shady forests with ravines, like those north of the Study Area along the Humber River, or in forested swamps with lots of maple and beech trees. There is no preferred habitat in the Study Area and therefore it is unlikely to occur.	**No**
Bank Swallow (*Riparia riparia*) ESA-Threatened **Record Source: OBBA**	**Low/Moderate** – Reported as observed within the two 10 x 10 km breeding bird atlas squares which encompass the Study Areas and potentially suitable banks for nesting were observed downstream of the CT8 Crossing as habitat. The Bank Swallow breeds in a variety of natural and artificial sites with vertical banks, including riverbanks, lake and ocean bluffs, aggregate pits, road cuts, and stock piles of soil. Sand-silt substrates are preferred for excavating nest burrows. Breeding sites are often situated near open terrestrial habitat used for aerial foraging (e.g., grasslands, meadows, pastures, and agricultural cropland). Large wetlands are used as communal nocturnal roost sites during post-breeding, migration, and wintering periods (COSEWIC, 2013). Limited suitable habitat exists for this species within the Study Areas, and	**No**

Species Name and Status	Probability of Occurrence within the Study Areas based on Habitat Requirements	Observed During Wood Investigations?
	communal nocturnal roost site habitat is absent from the site. Bank Swallow is not carried through to the impact assessment.	
Barn Swallow (*Hirundo rustica*) ESA- Threatened **Record Source: OBBA, MESP, EIS (Savanta 2017)**	**High** - Observed in both Part 'A' and Part 'B' Study Areas during Wood field investigations. Barn Swallow is listed as Threatened under the ESA and designated as Threatened by COSEWIC. The Barn Swallow has become associated with human settlements and will nest in and on artificial structures, including garages, houses, bridges and road culverts (a common location for nesting). This species also prefers various open habitats for foraging. Barn Swallows will use the same nests year after year. The majority of the Study Areas provides suitable habitat for the Barn Swallow as it is open habitat, with agricultural lands, cleared ROW, road culverts and artificial structures. Watercourse crossing culverts were inspected, and no Barn Swallow nests were observed. However, 29 individual Barn Swallows were recorded at 13 breeding bird survey locations during the field investigations in the Study Area (**Figure 6-1**). Also reported in the MESP (Aquafor Beech Limited 2016) are observations of Barn Swallow and Barn Swallow nests. The presence or absence of Barn Swallow habitat will need to be determined in Detailed Design. Barn Swallow receives Provincial and Federal protection. Barn Swallow is listed as Threatened under the ESA and the SARA. As such, this species is afforded protection at the individual and habitat levels. Currently, the MNRF has defined the regulated habitat of Barn Swallow as (Ontario Ministry of Natural Resources and Forestry, 2018): Category 1. Nest Category 2. The area within 5 m of the nest Category 3. The area between 5 m and 200 m of the nest	**Yes**

Species Name and Status	Probability of Occurrence within the Study Areas based on Habitat Requirements	Observed During Wood Investigations?
Bobolink (*Dolichonyx oryzivorus*) ESA- Threatened **Record Source: MNRF Correspondence and OBBA, MESP, EIS (Savanta 2017)** **Eastern Meadowlark (*Sturnella magna*) ESA- Threatened** **Record Source: OBBA, MNRF Correspondence, MESP and NHIC record**	Formerly Bobolink and Eastern Meadowlark nested in tallgrass prairies of south-central Canada and various grassland habitats such as wet prairie, graminoid peatlands, abandoned fields dominated by tall grasses, and remnants of uncultivated prairie (COSEWIC 2010). Most of tallgrass prairie lands have been converted for agricultural use. Grassland birds have adapted to nesting in forage crops and older fields with the development of grassy hummocks and, in the case of Eastern Meadowlark, occasional shrub/woody vegetation scattered throughout. Bobolink and Eastern Meadowlark receive Provincial and Federal protection, and both are listed as Threatened under the ESA and the SARA. As such, this species is afforded protection at the individual and habitat levels. However, general habitat protection does not apply to where a species formerly occurred, and the fallow fields that occurred during the MESP (Aquafor Beech Limited 2016) are no longer present due to the transition to active agricultural lands (agriculture is exempt from the ESA). Consequently, not only were observations of these species much lower during Wood investigations, extensive habitat for these species may no longer exist in the Study Area. The presence or absence of Bobolink and Eastern Meadowlark habitat will need to be confirmed in Detailed Design. Currently, the defined regulated habitat of Bobolink (Ontario Ministry of Natural Resources and Forestry, 2016a) is: Category 1. Nest and the area within 10 m of the nest Category 2. The area between 10 m and 60 m of the nest or centre of approximated defended territory Category 3. The area of continuous suitable habitat between 600 m and 300 m of the nest or approximated centre of the defended territory. **Bobolink Moderate** – The MESP (Aquafor Beech Limited 2016) recorded 155 Bobolink within the Study Areas mainly breeding in hayfields and, to a lesser extent, cultural meadow (Aquafor	**No**

Species Name and Status	Probability of Occurrence within the Study Areas based on Habitat Requirements	Observed During Wood Investigations?
	Beech Limited 2016). Wood conducted Breeding Bird Surveys and a single male Bobolink was observed at a survey station within the Part 'B' Study Corridor. Currently there is limited suitable habitat within the Study Areas so there is only moderate probability of this species using the habitats available, should more hay fields be planted in future the probability of this species occurring would increase. **Eastern Meadowlark Moderate** - Reported in the Study Area by MNRF and within the two 10 x 10 km breeding bird atlas squares which encompass the Study Areas by the OBBA. The MESP (Aquafor Beech Limited 2016) recorded 8 Meadowlarks within the Study Area mainly breeding in hay fields and to a lesser extent cultural meadow. No Eastern Meadowlark was observed by Wood. Currently there is limited suitable habitat within the Study Areas so there is only moderate probability of this species using the habitats available, should more hay fields be planted in future the probability of this species occurring would increase.	
Caspian Tern (*Hydroprogne caspia*) Provincially ranked S3B **Record Source: None**	**Low -** Reported as observed within the two 10 x 10 km breeding bird atlas squares which encompass the Study Areas and observed flying over the Part 'B' Study Area during Wood field investigations. This species is associated with habitats near water, marshes, islands in lakes and rivers and shorelines (Cornell Lab of Ornithology 2015). It is likely that Caspian Tern was travelling over the Study Area as no suitable nesting habitat is present.	**No**
Chimney Swift (*Chaetura pelagica*) ESA- Threatened **Record Source: OBBA**	**Low** - Reported as observed within the two 10 x 10 km breeding bird atlas squares which encompass the Study Areas. Due to the land clearing associated with colonization, hollow trees became increasingly rare, which led Chimney Swifts to move into house chimneys. Today, the species is mainly associated with areas where the birds can find chimneys to use as nesting and resting sites, however, it is likely that a small portion of the population continues to use hollow trees (COSEWIC 2007). Within the Study Areas, there are no adequate chimney or hollow trees.	**No**

Species Name and Status	Probability of Occurrence within the Study Areas based on Habitat Requirements	Observed During Wood Investigations?
	It is probable the OBBA records captured travelling or foraging swifts using nesting habitat outside of the Study Area.	
Common Nighthawk (*Chordeiles minor*) **ESA- Special Concern** **Record Source: OBBA**	**Low -** Reported as observed within the two 10 x 10 km breeding bird atlas squares which encompass the Study Areas. Common Nighthawk nests in a wide range of open, vegetation-free habitats, including dunes, beaches, recently cleared forests, grasslands, pastures, peat bogs, marshes, lakeshores, and river banks (COSEWIC 2007b). Very limited suitable habitat for the Common Nighthawk occurs within the Study Areas.	**No**
Eastern Wood-Pewee (*Contopus virens*) **ESA- Special Concern** **Record Source: OBBA and MESP**	**Moderate -** Eastern Wood-Pewee uses a range of deciduous and mixed forests with a sparse shrub and ground layer. This species prefers to nest on forest edges or in clearings (MNRF 2016a). This species will also use smaller woodlots, orchards, as well as trees along roadsides or in urban environments (Cornell Lab of Ornithology 2015). These habitats are available in the Study Area, though habitat is not abundant. Suitable habitat to the north along the Humber River and south along the West Humber River occurs. Eastern Wood-pewee is reported as observed within the OBBA and during breeding bird surveys undertaken for the MESP (Aquafor Beech Limited 2016; one individual in the first survey). However, breeding was not confirmed, and the individual could have been migrating through. Eastern-Wood-pewee has a moderate chance to migrate through the Study Area but a low probability of breeding in the Study Area. Eastern Wood-pewee is listed as Special Concern under the Endangered Species Act (ESA) and the Species at Risk Act (SARA). Species listed as Special Concern do not receive species or habitat protection. However, this species is considered under Special Concern and Rare Wildlife Species SWH (Section 7.1.2).	**No**
Grasshopper Sparrow	**Moderate -** Grasshopper Sparrow is reported in the southern OBBA atlas square. Grasshopper Sparrow is a grassland species and will nest in hayfields, pastures and occasionally agricultural	**No**

Species Name and Status	Probability of Occurrence within the Study Areas based on Habitat Requirements	Observed During Wood Investigations?
(*Ammodramus savannarum*) **ESA- Special Concern** **Record Source: OBBA**	grain fields (MNRF 2016). As with Bobolink and Eastern Meadowlark, there is currently limited suitable habitat available for this species within the Study Area, but the present habitat will fluctuate year to year based on the crops planted. Grasshopper Sparrow has a moderate chance to occur (depending on the crop rotation) and low probability of breeding as it has not been confirmed in the past, even when habitat was suitable for grassland birds. Grasshopper Sparrow is listed as Special Concern under the *Endangered Species Act* (ESA) and the *Species at Risk Act* (SARA). Species listed as Special Concern do not receive species or habitat protection.	
Wood Thrush **(*Hylocichla mustelina*)** **ESA- Special Concern** **Record Source: OBBA**	**Low -** Reported as observed within the two 10 x 10 km breeding bird atlas squares which encompass the Study Areas. This species prefers mature deciduous and mixed forests with a rich understory (MNRF 2016a). There is very limited suitable habitat within the Study Areas.	**No**
<u>Mammals (Mammalia)</u>		
Eastern Small-footed Myotis **(*Myotis leibii*)** **ESA- Endangered** **Record Source: AMO and BCI**	**Low**– The Eastern Small-footed Bat is one of the less common species found to hibernate in Ontario. Caves and mines serve as significant hibernacula while streams and ponds serve as foraging areas. In the spring and summer, Eastern small-footed Bats roost in a variety of habitats, including in or under rocks, in rock outcrops, in buildings, under bridges, or in caves, mines, or hollow trees. The Study Area lacks rocky areas and has limited woodlands. The probability of these species roosting in the Study Area is low (MNRF 2016a).	**No**
Little Brown Myotis **(*Myotis lucifugus*)** **ESA- Endangered**	**Low** - The Little Brown Bat is wide-spread throughout the southern half of Canada and is especially associated with humans, often forming nursery colonies in buildings, attics, and other man-made structures (BCI 2016). Little Brown Bats forage over water where their diet consists of aquatic insects, mainly midges, mosquitoes, mayflies, and caddisflies. They also feed over	**No**

Species Name and Status	Probability of Occurrence within the Study Areas based on Habitat Requirements	Observed During Wood Investigations?
Record Source: AMO and BCI	forest trails, cliff faces, meadows, and farmland where they consume a wide variety of insects, from moths and beetles to crane flies (BCI 2016). Species is likely foraging over the Study Area, but it is unlikely to be roosting due to lack of forested habitat.	
Northern Myotis (*Myotis septentrionalis*) ESA- Endangered **Record Source: AMO and BCI**	**Low** - The Northern Long-eared Bat is one of the less common species found to hibernate in Ontario. This species is closely associated with boreal forests and choose loose bark and tree cavities to roost. Boreal habitat (aspens, birch, and a variety of coniferous trees) does not occur in the Study Area. The lack of preferred habitat makes it unlikely Northern Myotis would be found in the Study Area (MNRF 2016a).	**No**
Tri-colored Bat (*Perimyotis subflavus*) ESA- Endangered **Record Source: AMO and BCI**	**Low** – The Tri-colored Bat (formerly known as the Eastern Pipistrelle) is one of the most common species of bats found throughout the eastern forests of America - from Nova Scotia and Quebec, south throughout the east coast of Mexico into northern Central America. Their range in Ontario is limited to the south. They are not often found in buildings or in deep woods, seeming to prefer edge habitats near areas of mixed agricultural use (BCI 2016). Species could be foraging over the Study Area, but it is unlikely to be roosting due to lack of forested habitat.	**No**
Amphibians and Reptiles (Amphibia and Reptilia)		
Eastern Ribbonsnake (*Thamnophis sauritus*) ESA- Special Concern **Record Source: ORAA**	**Low-** Reported as observed within the two 10 x 10 km Ontario Reptile and Amphibian Atlas squares, which encompass the Study Areas. The Eastern Ribbonsnake is usually found close to water, especially in marshes, where it hunts for frogs and small fish.	**No**
Northern Map Turtle (*Graptemys geographica*)	**Low** – Reported as observed within the two 10 x 10 km Ontario Reptile and Amphibian Atlas squares which encompass the Study Areas. The Northern Map Turtle occupies rivers, lakes,	**No**

Species Name and Status	Probability of Occurrence within the Study Areas based on Habitat Requirements	Observed During Wood Investigations?
ESA- Special Concern **Record source: ORAA**	streams, and creeks that are well-oxygenated. The habitat must also contain suitable basking sites that are adjacent to deep water and provide an unobstructed view (COSEWIC 2012b). This species may be present within the watercourses within the Study Areas and may use the adjacent terrestrial habitat for nesting.	
Snapping Turtle (*Chelydra serpentina*); ESA- Special Concern **Record Source: ORAA, MESP**	**High** – The preferred habitat for the Snapping Turtle is characterized by slow-moving water with a soft mud bottom and dense aquatic vegetation. Females generally nest on sand and gravel banks along waterways (COSEWIC 2008b). Limited suitable aquatic and some nesting habitat exists throughout the Study Area, resulting in a high possibility for Snapping Turtle occupancy. Snapping Turtle was reported within the two 10 x 10 km Ontario Reptile and Amphibian Atlas squares, which encompass the Study Areas and observed in Part 'B' Study Area during Wood field investigations. Snapping Turtle species was also found previously during field investigations for the MESP (Aquafor Beech Limited 2016). Snapping Turtle is listed as Special Concern under the Endangered Species Act (ESA) and the Species at Risk Act (SARA). Species listed as Special Concern do not receive species or habitat protection. However, it is considered under Special Concern and Rare Wildlife Species SWH (Section 7.1.2).	**No**
Western Chorus Frog – Great Lakes / St. Lawrence – Canadian Shield Population (*Pseudacris triseriata*) SARA- Threatened Provincially Ranked: S3 **Record Source: ORAA**	**Low** - Ongoing losses of habitat and breeding sites for this small frog due to suburban expansion and alteration in farming practices have resulted in losses of populations and isolation of remaining habitat patches (MNRF 2016a). The Western Chorus frog inhabits forest openings around woodland ponds but can also be found in or near damp meadows, marshes, bottomland swamps and temporary ponds in open country, or even urban areas (Ontario Nature 2016). Limited suitable habitat occurs within the Study Areas; however, remnant populations have been found in the area as recently as 2011 (ORAA, 2020). It is unlikely this species is currently found within the Study Area. However, with restoration and improved connectivity to the NHS, there is a chance this species could be found in the Study Area post-restoration. Western Chorus Frog is not listed under the Endangered Species Act but is listed as	**No**

Species Name and Status	Probability of Occurrence within the Study Areas based on Habitat Requirements	Observed During Wood Investigations?
	Threatened under the Species at Risk Act (SARA).	
Invertebrates		
Monarch (*Danaus plexippus*) ESA- Special Concern Provincially Ranked: S2N,S4B **Record Source: MESP, EIS (Savanta 2017)**	**High –** The primary food source of this species (when in its caterpillar life stage) is Common Milkweed, which was observed at multiple locations within the Study Areas. No Monarchs were observed during Wood field investigations, and Monarch was reported during the field investigations for the MESP (Aquafor Beech Limited 2016). It is most likely that this species occurs in the Study Area during nectaring periods and not during migration or breeding. Monarch is listed as Special Concern under the Endangered Species Act (ESA) and the Species at Risk Act (SARA). Species listed as Special Concern do not receive species or habitat protection. However, Monarch is considered under Special Concern and Rare Wildlife Species SWH (Section 7.1.2).	**No**
Digger Crayfish (*Fallicambarus fodiens*) Provincially ranked S3B **Record Source: MESP and Field Investigations**	**High –** Chimney crayfish are currently utilizing the area (**Figure 6-1 and Section 7.1.2**), and the crayfish are one of three species, Devil Crayfish, Digger Crayfish, or Calico Crayfish (*Faxonius immunis*). The Devil Crayfish constructs colonies of burrows in wet meadows and marshes. Areas used typically have standing water at least in the spring. Within Ontario, this species range is limited to the southwestern area of the province. As such, it is highly unlikely that this species created the chimneys present in the Study Area. The Digger Crayfish is usually associated with marshy fields, drainage ditches, marshes, ponds or in the dry ground far from permanent surface water and near temporary streams (OMNRF 2014). This species has a broader range and is found throughout southern Ontario. The Calico Crayfish inhabits slow-moving streams, ponds and lakes, marshes and roadside ditches. Calico Crayfish constructs deep burrows and can survive in temporary waters (Crayfish Ontario, 2017). The range of this species is centralized in southern Ontario; however, this species has also been found in northern Ontario (Crab Lake, Sudbury District and Snake Bay in Lake of the Woods) (Crayfish	**Yes**

Species Name and Status	Probability of Occurrence within the Study Areas based on Habitat Requirements	Observed During Wood Investigations?
	Ontario, 2017). Like the other burrowing species, the Calico Crayfish is found in many habitats that are vulnerable and subject to pressure from agriculture and urbanization. Calico Crayfish population is more stable than the chimney crayfish as its Canadian range is somewhat broader as it is not an obligate burrower and has a broader ecological niche and distribution. Furthermore, this species is more tolerant of organic pollution and low oxygen requirements, which allows the species to occupy habitats that would be unsuitable for less tolerant crayfish species (Crayfish Ontario, 2017). Given the habitat available on in the Study Area and the location of the Study Area, the observed chimneys are likely the result of Digger Crayfish or Calico Crayfish. Precise identification of the species present in the Study Area was not possible, as individuals were not observed during the site investigations. Additionally, these species spend much of their time within their burrows and typically emerge at night to feed, further increasing the difficulty of species identification. The Digger Crayfish is provincially vulnerable (S3) but is not listed under the ESA and does not receive species or habitat protection. Calico Crayfish is provincially ranked S4 (apparently secure) and not listed under the ESA and does not receive species or habitat protection. However, terrestrial crayfish is considered under Special Concern and Rare Wildlife Species SWH (Section 7.1.2).	

7.0 Ecological Significance and Function

Concurrent with other field investigations, habitats were assessed for significant wildlife habitat attributes such as vernal pooling, dens, burrows and tree cavities. The Study Areas are characterized by large amounts of cultural land use and fragmentation. Approximately 93.4% of the Study Area includes agricultural fields, existing roadways, and developed lands in the form of residential, commercial and institutional buildings. Existing terrestrial features are overrun with non-native and invasive species such as European Buckthorn, which is spreading prolifically, preventing the natural growth of native trees and shrubs. There are no Provincially or Regionally significant woodlands or valleylands within the Study Area.

Criteria for identifying significant valleylands are included in the Peel Region Official Plan, and the MESP (Aquafor Beech Limited 2016) determined that the West Humber River and The Clarkway Tributary met criteria for designation as significant valleylands (Savanta 2017). The limits of valleylands were staked by Savanta, TRCA, and the City (Savanta 2017). The valleylands and woodlands are also significant as they can act as wildlife corridors providing habitat linkages and, therefore, movement corridors to more extensive tracts of habitat outside the Study Areas.

7.1 Significant Wildlife Habitat (SWH)

Significant Wildlife Habitat (SWH) is considered of Provincial significance in Ontario. Development in SWH is prohibited unless it can be demonstrated that development will have no negative impact on features and functions. Within Ecoregion 7E, criteria for evaluating Significant Wildlife Habitat (SWH) are provided in MNRF Ecoregion schedules for Ecoregion 7E (MNRF 2015). Other Provincial documents used to identify and assess SWH is the Natural Heritage Resource Manual (MNR 2010) and the SWH Technical Guide (MNR 2000). In addition, the Town of Caledon and the Region of Peel prepared the "Peel-Caledon Significant Woodlands and Significant Wildlife Habitat Study" in 2009. This study sets a precedent for the significance of wildlife habitat in the Region of Peel.

The MESP (Aquafor Beech Limited 2016) and EIS (Savanta 2017) evaluated and reject the majority of the SWH criteria as either habitat requirements or species are not present. Subsequent to a further evaluation by Wood, applicable SWH for the Study Area include Turtle Nesting Areas and habitat for Special Concern and Rare Wildlife Species. These SWH types meet the listed habitat requirements and there is a reasonable chance of indicator species occurrence and abundance. The only confirmed SWH in the Study Area is Terrestrial Crayfish SWH.

7.1.1 Turtle Nesting SWH

Turtle Nesting areas on the sides of municipal or provincial road embankments and shoulders are not SWH. However, the presence of a Snapping Turtle during Wood Investigations and during MESP (Aquafor Beech Limited 2016) investigations could indicate potential Turtle Nesting Areas SWH if non-road areas that provide sand and gravel are available. Five or more Midland Painted Turtles or one Snapping Turtle nesting in the appropriate habitat would confirm SWH; until such a time, Turtle Nesting is Candidate SWH. As the specific locations for nesting are unidentified in the Study Area, they are assumed to fall within appropriate ELC communities, which are protected within the NHS. Impacts on potential Turtle Nesting SWH is considered in the impact assessment and enhancement opportunities.

7.1.2 Special Concern and Rare Wildlife Species SWH

Special Concern and Rare Wildlife Species applies to all special concern and provincially rare (S1-S3, SH) wildlife species. To confirm the SWH, studies need to be completed during the time of year when the species is present and easily identifiable, and the area of habitat to the finest ELC scale is the SWH. Grasshopper Sparrow, and Western Chorus Frog were not confirmed in the Study Area by Wood or in the MESP (Aquafor Beech Limited 2016), and therefore are not considered further.

Snapping Turtle

One juvenile Snapping Turtle (Special Concern in Ontario) was observed in the south end of Gore Road Tributary within Mineral Meadow Marsh during the MESP (Aquafor Beech Limited 2016) investigations and in the north end of the Gore Road Tributary on the road during Wood investigations (both outside of the Study Area). Although SWH for turtles has not been confirmed, the observations of a juvenile indicate there is potential habitat on or in the vicinity of Area 47 and therefore is carried forward to the impact assessment.

Monarch

Monarch (*Danaus plexippus*; Special Concern in Ontario) was observed in several locations in Area 47. The species was recorded outside of the migratory and breeding seasons, and therefore it is expected that it was using the Study Area for nectaring (Savanta 2017). As Monarch is not migrating or breeding in the Study Area, it was not carried forward to the impact assessment.

Eastern Wood-Pewee

One Eastern Wood-Pewee (Special Concern in Ontario) was observed in Area 47 in the north end of the Gore Road Tributary in the MESP (Aquafor Beech Limited 2016; within SWD 4-1). There is a low/moderate chance of Eastern Wood-Pewee occurring in the Study Area, and it has not been documented since the MESP (Aquafor Beech Limited 2016) surveys. Habitat for Eastern Wood-Pewee is not carried forward to the impact assessment.

7.1.3 Terrestrial Crayfish SWH

Several crayfish chimneys were found during the MESP (Aquafor Beech Limited 2016) and Wood investigations. More chimneys were found in Part B than Part A, and Part B locations are discussed here for context. In Part A the MESP (Aquafor Beech Limited 2016) also found chimneys along Rainbow Creek Tributary north of Countryside Drive in a Cattail Mineral Shallow Marsh (MAS2-1) (**Figure 6-1**). In Part B the MESP (Aquafor Beech Limited 2016) found chimneys along dry sections in the north end of the Gore Road Tributary, in a Mineral Cultural Thicket (CUT) and a Willow Mineral Deciduous Swamp (SWD4-1). Wood investigations found crayfish in the agricultural fields near GT2 crossing at the south end of the Gore Road Tributary.

Meadow marshes (MA), swamps (SW), and cultural meadows (CUM) are considered SWH if chimneys are found. Therefore, the SWD4-1 in Part 'B' and the MAS2-1 in Part 'A' are Confirmed as Terrestrial Crayfish SWH. Terrestrial Crayfish SWH is within the NHS and will be carried forward to the impact assessment.

8.0 Natural Heritage System and the Rainbow Creek Crossing

Although the current landscape is largely comprised of agricultural landuse and several drainage swales, the future NHS is to be considered as an existing condition and help frame future development and provide context of how future policies will impact such developments. The NHS, comprised of woodlands and wildlife habitat, was established for the Study Area in the MESP (Aquafor Beech Limited 2016). The NHS will achieve no net loss and, if possible, a net gain in natural heritage features following project completion. Ample opportunities to link, restore and enhance the ecological integrity of the Study Area are available especially in relation to the Rainbow Creek Tributary, which was observed to have a limited ecological function.

Rainbow Creek is classified as an intermittent small riverine warmwater system that lacks specialized fish species, piscivores and mussels. The majority of flows occur during the spring freshet and following storm events. The lands surrounding Rainbow Creek have been maintained under active agriculture and have historically been realigned and straightened for agricultural purposes (Savanta 2018). Limited tree, shrub, and wetland communities occur around Rainbow Creek.

There are three road crossings of Rainbow Creek proposed, Arterial A2, Countryside Drive, and Coleraine Drive, which will fragment the proposed NHS and reduce genetic diversity and increase wildlife mortality on roads (Savanta 2018). Therefore, wildlife crossings are being implemented at the three road crossings. The wildlife crossings at Countryside Drive and Coleraine Drive were previously set before the Arterial A2 crossing was confirmed. The Arterial A2 crossing must consider the intersection between Arterial A2, Coleraine Drive, and E-W Arterial as well as wildlife connectivity. As the other two wildlife crossings, Countryside Drive and Coleraine Drive, were set the Arterial A2 crossing is somewhat limited in design. To ensure similar sized species were able to access all three wildlife crossings and not constrained or limited in corridor usage, the dimensions (i.e., Openness Ratio) had to remain consistent in Arterial A2 wildlife crossing. Additionally, current and predicted wildlife use is not fully understood in this corridor. The MESP (Aquafor Beech Limited 2016) and Addendum (Savanta 2018) designed the Rainbow Creek crossing for herptiles and small to medium-sized mammals. However, the TRCA requested White-tailed Deer be considered as a target animal for the Rainbow Creek crossing as well.

As such, series of design alternatives were developed and assessed to arrive at a preferred location and design for the Rainbow Creek crossing. Ultimately the preferred alternative incorporated a single intersection (single bridge) over Rainbow Creek as any other option would result in significantly longer segments of roadway located within the future NHS. It is also important to note, the Rainbow Creek crossing is constrained by commitments made with respect to the Community Park at the intersection of Clarkway Drive and E-W Arterial and to keep industrial properties between Coleraine Drive and Rainbow Creek NHS suitably sized and shaped for industrial development. The preferred alternative identified to be carried forward into detailed design was assessed in consultation with the TRCA and was approved In Principle on 16th April 2019.

The design approved In Principle by TRCA requested that the following are included:

- The design meets hydraulic requirements.
- Lost NHS area and any loss of flood storage resulting from the crossing are compensated elsewhere along the corridor;

- Minimum openness ratio of 0.6 is achieved; this may require design measures such as introducing retaining structures, changing road profile and grading or any combination thereof; and
- The design adheres to the underlying principle of the Rainbow Creek Corridor Design, which has a focus on animal passage and connectivity.

The proposed corridor design presented in the MESP (Aquafor Beech Limited 2016) achieves the hydraulic objectives outlined in The Hydraulic Assessment Report. The preferred alternative incorporates these hydraulic objectives, and corridor design also considers any loss in flood storage as a result of crossing structures and compensate adequately. Creating wildlife habitat and providing safe passage for wildlife will support wildlife populations, assist in preventing the loss of biodiversity, and help protect the integrity of the landscape (Savanta 2018). All crossings have been re-designed, and all crossings achieve the minimum openness ratio of 0.6. **Table 8-1** provides dimensions and Openness Ratios for crossings associated with the Study Area. Crossings contain a large enough Openness Ratio to support the movement of target species (White-tailed Deer), small and medium mammals, amphibians, and reptiles.

Table 8-1 The type and characteristics of each crossing along Rainbow Creek

Crossing Location	Culvert Type	Dimensions	Openness Ratio [rise x span] / length
Arterial A2 and Coleraine Drive (Alternative 1B)	Span Bridge	2.25 m (H) x 25 m (W) x 75 m (L)	0.75
Countryside Drive	Span Bridge	2.0 m (H) x 17 m (W) x 53.4 m (L)	0.64
Coleraine Drive (North)	Span Bridge	2.2 m (H) x 17 m (W) x 47.3 m (L)	0.79

9.0 Assessment of Potential Impacts

The following section has been prepared to provide a summary of potential direct and indirect impacts to the natural environment relative to the Project works and provides recommended measures and strategies to avoid, minimize and/or reduce impacts and associated risks. The evaluation of potential impacts of the proposed project treats the proposed NHS as an existing condition.

9.1 Proposed Project

The City and Region's proposed road improvements are required due to future projected capacity requirements. In order to meet the requirements of Phase 1 and Phase 2 of the Class EA process, three planning alternatives were assessed and evaluated based on 2031 travel demands. Aquatic crossings were used to evaluate the alternatives regarding natural heritage resources.

The Alternative 1- "Do Nothing" approach had no impact on aquatic crossings while Alternative 2- "As Planned" would have the greatest impact on aquatic crossings as it would require four new creek crossings. Alternative 3- "Increased Network Connectivity" focused on implementing an integrated active transportation network, increasing roadway capacity and limiting the impacts that these changes may have on the environment. A series of three sub-alternatives were developed for Alternative 3, Transportation Network Option 3A, 3B, and 3C.

All Alternative 3 options will require three new creek crossings. Of the Alternative 3 options, Alternative 3C creates the least amount of natural environment impact, excluding the "Do Nothing" alternative, as it does not require the widening of Clarkway Drive over the Clarkway Tributary. Alternative 3C but is preferred to the "Do Nothing" alternative as planned growth makes the latter option infeasible. It was concluded in the alternative assessment that Alternative 3C was the preliminary preferred solution and was refined and developed into the recommended road network.

Two special policy areas were identified as requiring additional study, the intersection of Arterial A2 and Mayfield Road and the intersection between Arterial A2, Coleraine Drive, and E-W Arterial. Four alternatives for the intersection of Arterial A2 and Mayfield Road were established and Alternative 3, T-intersection of Arterial A2 at Mayfield Road, was selected which does not require an additional crossing over Clarkway Creek. Five alternatives for the intersection between Arterial A2, Coleraine Drive, and E-W Arterial were established. Alternative 3, Single Intersection at Narrowest Crossing of Rainbow Creek, was selected reducing the number of creek crossings and infrastructure in the NHS.

9.2 Potential Aquatic Ecosystem Impacts

Possible impacts from the proposed construction and improvements may include the alteration of water levels and the change in the pattern of surface water flow and shallow groundwater movement. Surface water runoff from the proposed roadways may also introduce contaminants (e.g., salts or sediments). Potential impacts to fish and fish habitat are anticipated to be limited but may include the following:

- Removal of riparian vegetation could result in increased water temperatures and instability in channel banks;
- The project works associated with new culvert installation or installation of culvert extensions within permanent fish habitat will require temporary in-water works and associated timing restrictions;
- Introduction of pollutants, concrete outwash and other deleterious substances (e.g., sediment, salt, paint, solvents, oil and grease) into the watercourse;
- Changes in stream channel structure and water clarity;
- Roadside drainage could increase the input of pollutants; and
- Removal of rocks, woody debris, and/or riparian vegetation from the banks may alter natural habitat features and bank stability.

The MESP (Aquafor Beech Limited 2016) acknowledged that urban development can alter or eliminate headwater drainage features (HDFs) and, as a result, have broad implications for water quality and quantity, recharge/infiltration, and overall health of downstream habitats and the aquatic and terrestrial integrity within watersheds. All HDF's in Part "A" Study Corridor are classified as "Mitigation 1", "Mitigation 2", or "No

Mitigation". HDFs classified as "Mitigation 1" or "Mitigation 2" could either remain as open watercourses provided that flows can be maintained (via stormwater pond outlets, LID swales or other techniques), or be replicated using well-vegetated urban swales or wetlands (Mitigation 1), or lot-level and conveyance stormwater techniques such as LID measures. Those HDFs with "No Management" classification could be eliminated and replaced with a traditional urban major-minor drainage system.

Development opportunities and constraints, including stormwater management, will have to be assessed as development proceeds through future Block or Tertiary Planning and associated environmental studies. The Savanta 2017 EIS discusses impacts in relation to Stormwater Management Facility locations, removal of Headwater Drainage Features, and encroachment of residential lots, roadways, and trails in the NHS. The Savanta EIS should be considered in conjunction with the below during detailed design.

9.3 Potential Terrestrial Ecosystem Impacts

The vegetation communities within the Study Area have been created by human disturbance and are classified as cultural vegetation types, residential areas, and predominately agricultural fields. These are the land uses which will be primarily impacted by the planned development. Species of conservation concern should be considered as they may be present. However, the severe agricultural landscape limits the candidacy of SWH, as habitat required to delineate SWH is not available. The most substantial impact on terrestrial wildlife will be the change from a relatively penetrable landscape to an impenetrable landscape due to the increase in roads. The following potential impacts relate primarily to the impacts associated with road infrastructure:

- Direct loss of floral and faunal habitat and soil compaction resulting from vehicle and machinery operations to be calculated in detailed design;
- Reduced stability of landforms composed of unconsolidated material;
- Tree/shrub root stress and possible decline as a result of re-grading/fill placement along natural area edges and the removal of 293 trees (based on preliminary design);
- Changes in drainage which may affect aquatic and wetland habitats; and
- Air quality due to increased vehicle emissions can degrade the ambient air quality. Based on the City of Brampton Transportation Master Plan (2015), different scenarios were considered at the city-wide level to assess air quality impacts. It was determined that the preferred alternative has the lowest emission. The proposed road improvements are part of the preferred design from the City of Brampton Transportation Master Plan (2015).

Many of the usual impacts associated with a direct loss of flora and fauna are not the case for this Study Area as the severe agricultural landscape limits the amount of natural area and inherent resiliency (Aquafor Beach 2016).

10.0 Avoidance and Mitigation Measures

Recommended design considerations to mitigate damages to the natural environment are provided below as well as specific recommendations for aquatic and terrestrial habitats. Refer to TRCA's Crossing Guideline for Valley and Stream Corridors during detailed design to ensure TRCA's specific technical details are met.

10.1 Erosion and Sediment Control Mitigation

Design and implement standard Erosion and Sediment Control (ESC) measures, consistent with Ontario Provincial Standards and Specifications (OPSS), to contain/isolate the construction zone, manage site drainage/runoff and prevent erosion of exposed soils and migration of sediment. ESC measures should be implemented before the commencement of works, and maintained through all phases of the project, until vegetation is re-established, or erosion protection materials stabilize all disturbed ground. The ESC plan should include regular inspection and maintenance, and removal of non-biodegradable ESC materials once the site is stabilized. Furthermore:

- Operate, store, handle, and dispose of all materials used or generated (e.g., organics, soils, construction waste and debris, etc.) and maintain equipment in a manner that prevents the entry of any deleterious substance from entering the watercourse or contaminating the natural environment. Store and stockpile materials at a safe distance from the watercourse and ensure they are stabilized and contained as necessary.
- Prohibit or limit access to banks or areas adjacent to waterbodies, to the extent required to protect the structural integrity of the banks or shorelines. Whenever possible, operate machinery on land above the high-water mark in a manner that minimizes disturbance to the bed and banks of the waterbody.
- Ensure any part of equipment entering the watercourse, or operating from the bank, shall be free of fluid leaks, invasive species and noxious weeds and externally cleaned/degreased to prevent any deleterious substances from entering the watercourse and contamination of the natural environment. Design and implement a containment plan to isolate all work above water and keep airborne contaminants and all deleterious substances from entering the watercourse (Adherence to the Region of Peel's Salt Management Plan and the City of Brampton's Salt Management Guidelines). The containment plan should include regular inspection, removal and disposal of materials generated and use in-water scaffolding where appropriate.
- Ensure a Spill Management Plan (including spill kit materials, instructions regarding their use, education of contract personnel, and emergency contact numbers) is always present on site for implementation in the event of an accidental spill.
- Minimize the removal and clearing of natural materials such as herbaceous plants, woody debris, and rocks from the banks or the shoreline of the watercourse. Where vegetation is removed, incorporate temporary measures (e.g., biodegradable materials, nurse-crop vegetation) to provide interim stabilization until vegetation is fully established. Stabilize and reinforce banks to pre-disturbance condition (or better) using properly designed and installed stabilization measures. Restore vegetation according to a vegetation rehabilitation plan.
- Design and implement a vegetation rehabilitation plan to restore riparian vegetation to pre-construction state or better. Considerations:
  - Plant with site-appropriate native species and where possible, use commercial seed mats, perforated soil cloth, etc.;
  - Plant trees and shrubs for shade to cool water and provide overhead cover;
  - Design and install riparian plantings to avoid or minimize encroachment into and/or alteration of bank and bed profile;

- Re-instate native soils or replace them with topsoil/suitable planting medium and use only clean material free of particulates;
- Incorporate soil/seed bank salvage, vegetation transplant or bio-engineering (e.g., live stakes, cuttings) techniques;
- Reinstate and re-stabilize any portion of the waterbody bed/substrates disturbed during construction to pre-construction (or better) condition including morphological elements (e.g., pools and riffles) and substrates (salvage and reinstatement of native materials); and
- Integrate the provision of fish cover where feasible. Design and install in-stream cover habitat elements (e.g., woody debris structures, boulders, overhanging vegetation on banks) to replace or reinstate fish cover removed, altered or disturbed during construction.

10.2 Aquatic Environment Mitigation

To mitigate damages specific to the aquatic environment, design and install culverts to prevent the creation of barriers to fish movement and maintain bankfull channel and habitat functions to the extent possible. This includes embedment of the culvert, or installing open bottom structures, reinstatement of the low flow channel and native substrates, proper sizing of the culvert, and maintaining channel slope. Additionally, conducting in-stream work during periods of low flow to allow work to be conducted during dry conditions or isolated from flows. If in-water works are required beyond the timing constraints, a Request For Review (RF) from DFO is required. The duration of in-water work should be minimized and scheduled work to avoid wet, windy and rainy periods that may increase erosion and sedimentation.

If in-water work is to occur, always design and implement an isolation/containment plan to isolate temporary in-water work zones and maintain clean flow downstream/around the work zone. The design should:

- Use only clean materials free of particulate matter for temporary cofferdams;
- Situate or otherwise manage flow withdrawal and discharge (e.g., see dewatering discharge) to prevent erosion and sediment release into a waterbody; and
- Ensure the work zone is stabilized against the impacts of high flow events during the work period.

Reinstate and re-stabilize any portion of the waterbody bed/substrates disturbed during construction to pre-construction (or better) condition, including:

- Morphological elements, e.g., pools and riffles; and
- Substrates, which may include salvage and reinstatement of native materials.
- Identify local regulatory authorities and have contact information available while on site.

Significant impacts to aquatic habitat as a result of the proposed works are not anticipated. There is potential for localized changes in hydrology and water quality due to the increase in impervious surfaces; however, mitigation measures and best management practices are expected to prevent these changes from impacting aquatic habitat.

Other considerations are the management of flows (e.g., minimum flows, seasonal flow augmentation, flushing flows) for specific aquatic habitat management goals and to mitigate other effects of flow management (e.g., fish passage, fish stranding). To avoid impacts to fishes:

- Exclude or move fish from the work area. Retain a qualified environmental professional to ensure applicable permits for relocating fish are obtained. Fish trapped within an isolated work area should be captured and relocated to adjacent channels sections outside the work area using appropriate capture, handling and release techniques to prevent harm and minimize stress.
    - A Licence to Collect Fish for Scientific Purposes (LCFSP) as part of the *Fish and Wildlife Conservation Act* will be required to rescue and relocate fish. The LCFSP will need to be obtained by the contractor that will be undertaking the fish rescue and relocation work.
- Pumps utilized for dewatering activities should be fitted with screens or barriers to avoid entrainment and impingement of fish at water intakes during dewatering processes.
- Discharge water from dewatering activities will be directed to an area located a minimum of 30 m from a watercourse and within a vegetated area and/or onto a scour pad.

Lastly, to mitigate damages specific to the aquatic environment, avoid hard engineering (sheet pile or other vertical walls) if possible. If rock reinforcement/armouring is required, ensure that appropriately sized, clean rock is used, and that rock is installed at a similar slope to maintain a uniform bank/shoreline and natural stream/shoreline alignment.

Based on the information collected, the in-water construction timing to be considered for this project would follow that associated with timing restrictions for warmwater fish habitat where appropriate, i.e., in-water works must be conducted between July 1 and March 31. This timing is to be confirmed during future phases of the project through consultation with TRCA/MNRF/DFO.

10.3 Terrestrial Environment Mitigation

Removal of woody vegetation is recommended to occur outside of the migratory bird nesting period (April 1 to August 31) and activities will occur in accordance with the MBCA and *Migratory Bird Regulations*. These timing constraints should not be perceived as absolutes. This period represents the core breeding period, although some species may nest in March and September. Ultimately, the objective from a compliance perspective is to not circumvent the MBCA. As such, due diligence measures should be implemented and documented for any nest searching efforts, including record control, to ensure compliance with the MBCA.

For activities, including vegetation removal, which may occur during bird nesting season, surveys to identify nesting activity will be completed by an Avian Biologist within 24 hours of scheduled work activities. The Avian Biologist conducting the surveys must be able to identify birds by species and be knowledgeable of nesting seasons and activities for appropriate species. It is important to note, that depending on the time of clearing activities nest sweeps during the breeding season may not be a viable option. More specifically in the event vegetation becomes too dense and a clear confirmation/due diligence cannot be provided through nest sweeps, clearing activities may not be able to move forward until a timing where credible due diligence can be implemented (i.e., following the nesting season).

If a species listed under the ESA as extirpated, endangered or threatened is identified, Section 9 of the Act prohibits killing, harming, harassing, capturing, taking, possessing, collecting, buying, selling, leasing, trading or offering to buy, sell, lease or trade a member of the species. Some of these prohibitions also apply to body parts of a member of the species and to things derived from a member of the species. Similarly, if a species is listed under the ESA as endangered or threatened, Section 10 of the Act prohibits damaging or destroying the habitat of the species. Species listed as special concern are not afforded

protection under Sections 9 and 10 of the ESA; however, due diligence should be enforced if a special concern species or their habitat is present. More specifically;

- Should any SAR be encountered on site during Project implementation, the MECP should be contacted immediately;
- Construction personnel should watch for wildlife attempting to nest in and around construction areas, and as possible avoid nesting areas. Construction personnel should, avoid preventing wildlife from reaching other sensitive areas beyond the work area, and;
- The effects of construction activities in areas where terrestrial crayfish chimneys were found should be considered. The current hydrology should be maintained through the appropriate design of roadside ditches and stormwater management systems. Minimize the footprint of the road and the construction area to the greatest extent practicable to avoid damaging colonies.

Other mitigation measures to consider are fencing to direct wildlife movement through wildlife crossings but also to prevent uncontrolled access and encroachment from pedestrians into adjacent natural areas. Should impenetrable barriers be considered, opportunities for wildlife passage should be incorporated. It is recommended that buffer widths be increased from the minimum 10 metres to 15 metres near areas of ecological sensitivity (Aquafor Beech Limited 2016). Additionally, all crossing structures should be clear-span structures with abutments located outside any significant valleylands and natural heritage systems to reduce impacts as recommended by Savanta (2017). These clear-span structures will also act as passages to reduce crossing hazards for wildlife.

Lastly, keeping with similar recommendation as identified within the MESP (Aquafor Beech Limited 2016), it is recommended that low mast lighting is implemented and directed downward and shielded (often referred to as directional lighting systems) to minimize light projection into the NHS and lightening at wildlife crossings should be limited, where feasible.

10.4 Habitat Compensation

The proposed removal of natural features to facilitate the proposed project (that are deemed acceptable to the City and TRCA), must be mitigated by restoring areas that will be encompassed into the future NHS as described within the MESP (Aquafor Beech Limited 2016) and further to be reflected into the City and Regional OP policies. The NHS contains various ecological components that are important to the City and the Region. For all tableland woodlands and tableland wetlands, the MESP (Aquafor Beech Limited 2016) recommends at least a 1:1 compensation, as to ensure no net loss of natural features. During detailed design, the proposed removal of features is to be totaled, and their compensation included in the Rainbow Creek corridor restoration.

Additionally, the removal of trees from hedgerows and other areas will require compensation. Compensation is currently estimated to be 1,900 compensation trees which will be further refined in detailed design.

10.5 Enhancement Opportunities

The proposed road improvement works for crossing at tributaries represent opportunities to reduce flood hazards and stream restoration works through the construction of larger bridge/culvert crossing structures and improved channel conveyance. Section 4.5.12.4 of the City of Brampton's Official Plan (2012) states that

the City of Brampton will Reference the Fisheries Management Plan prepared by the relevant Conservation Authorities to define fish habitat and their management requirements. The Humber River Fisheries Management Plan (HRFMP; 2005) prepared by the Ontario Ministry of Natural Resources and the TRCA identifies Rainbow Creek Tributary as Fish Management Zone 4 - Darter species. Each management zone in each subwatershed is managed for a certain aquatic community, which is dependent upon the physical characteristics of that subwatershed. Information is provided within the HRFMP on general characteristics, important or limiting physical characteristics, management direction and targets for each zone. The HRFMP further identifies rehabilitation priorities within each subwatershed of the Humber River that is based on the identified Fish Management Zones.

In general, shading should be enhanced to maintain or cool water temperatures by planting shrubs along the channel banks. Tree plantings are to be located sufficiently distant from the channel allowing shrubs to become well established. Plantings will incorporate habitat diversity into the final structure design (i.e., bank diversity and substrate placement associated with any scour protection requirements).

Terrestrial enhancement opportunities include the removal of invasive species and an invasive species management plan enforced on developers, which should discourage the use of chemical fertilizer and pesticide use, especially in areas draining to natural areas or groundwater recharge areas. The replanting plan should consider salt-tolerant species along the edges of trails and roads, plant early successional species along woodland edges, and ensure consistency with the City of Brampton's Woodlot Edge Management (724) and Woodlot Protection (725) design guidelines. All plantings should utilize native species where possible and appropriate.

Culverts and bridges can act as wildlife passages (and will be wildlife passages along Rainbow Creek Tributary). Placing vegetation at culvert inlets and outlets to create a funneling effect and providing suitable substrates to encourage crossing by a variety of species and removing crossing barriers such as culvert grading, log jams or fencing in the vicinity of the culvert inlet or outlet. Other enhancement measures include the addition of wildlife habitats such as turtle nesting areas and retaining dead or dying trees for wildlife benefit and the rescue of significant vegetation and wildlife found in features recommended for removal.

Opportunities to mitigate the loss of tableland natural heritage features can be examined to create east to west connections between tributaries through compensation or park naturalization, species transplant, SWM ponds, schools, and parks.

11.0 Permitting

Information pertaining to required, and potentially required, permitting under the applicable natural heritage legislation, policies, and planning components relative to federal, provincial, and municipal sections are outlined below.

11.1 Fisheries Act

The Fisheries Act requires that projects avoid causing "serious harm to fish" (as defined by DFO) unless authorized by the Minister of Fisheries and Oceans Canada (DFO 2016). This applies to work being conducted in or near waterbodies that support fish that are part of or that support a commercial, recreational or Aboriginal fishery (identified within this report as "direct" or "indirect" fish habitat). To protect

fish and fish habitat efforts should be made to avoid, mitigate and offset harm. Following DFO's measures to avoid harm (DFO 2016), as well as the mitigation measures included in Section 10.0, will help ensure compliance with the *Fisheries Act*. If the project meets the criteria for potentially requiring a RFR and in-water timing windows cannot be followed at the time of construction, then an RFR is required. DFO will review the request and will advise if an Authorization under the Fisheries Act will be required for the project works.

11.2 Permitting under the Endangered Species Act, 2007

If threatened and/or endangered species are encountered during detailed design, the Project may be subject to a permit under the ESA and/or its regulatory exemptions under the ESA for these specific species. As Barn Swallow are common in the area, any activities they may disturb or destroy their nests must be registered.

11.3 Toronto and Region Conservation Authority Work Permit under O. Reg. 166/06

As the Project footprint is located within the regulation limits for the TRCA, it is expected that a Development, Interference with Wetlands and Alterations to Shorelines and Watercourses work permit under *O. Reg. 166/06 of the Conservation Authorities Act*, *1990* will be required.

11.4 Permitting under the Fish and Wildlife Conservation Act, 1997

In the case that wildlife collection or relocation is required, permits and/or approvals under the *Fish and Wildlife Conservation Act* may be required. However, it is expected that any wildlife present on site will be able to leave the area under their own power and relocation will not be required.

11.5 Permit / Work Registry under the Ontario Water Resources Act, 1990

Where construction dewatering volumes are expected to exceed 400,000 L/day, a Permit to Take Water will be required from MECP, in accordance with Section 34 of the *Ontario Water Resources Act* (OWRA). Similarly, approvals for the discharge of pumped water will also be required, which could include one (1) or a combination of Municipal Discharge Permits, Conservation Authority Approval, and/or MECP Environmental Compliance Approval (OWRA Section 53).

12.0 Summary and Recommendations

The City and the Region are undertaking a Municipal Class EA study for the Arterial Road Network within the Highway 427 Industrial Secondary Plan Area due as a result of future projected capacity requirements. This Natural Environment Assessment Report (NEAR) facilitates the preparation of an ESR for Study Area of the project. The Study Area (Part 'A' Study Corridor) is owned and operated by the Region and includes the development of Arterial A2 and widening of Coleraine Drive.

- Aquatic field investigations were completed in accordance with the Ontario Ministry of Transportation's Environmental Guide for Fish and Fish Habitat (MTO 2009). Field investigations and background data collection identified the characteristics of the watercourses associated with the Area 47 lands and associated roadway improvements and proposed arterial roadways. The watercourses present in the Study Area include four tributaries with warmwater thermal regimes. Correspondence with the MNRF

and reference to fish collection data has confirmed that there are records of eight fish species within the Study Area with confirmation that Redside Dace is no longer considered present (Appendix A).

- The majority of lands to be impacted by the proposed project have been influenced by human disturbance and are classified as cultural. Additionally, existing vegetative communities were found to contain a relatively high proportion of non-native and invasive plant species. The most important area within the Study Area is the SWH for Terrestrial Crayfish and the forecasted Rainbow Creek NHS. To accommodate animal passage and connectivity within the proposed Rainbow Creek NHS wildlife crossing structures were designed in consultation with the TRCA.
- The MESP (Aquafor Beech Limited 2016) Addendum (Savanta 2018) recommended that the frequency and duration of flooding during key wildlife movement periods be reviewed to determine the need for a wildlife shelf within crossings to support wildlife movement' (Savanta 2018). In association with crossing structures, directional fencing to direct target species under the road must be incorporated into crossing designs. Fencing should follow MNRF (2016) wildlife fencing guidelines and be designed to accommodate all target species. This recommendation is carried forward for detailed design.
- There is little connectivity between natural areas from east to west as most contiguous natural features are oriented north to south as they coincide with the watercourses in the Study Area. East to west linkages should be incorporated between the Gore Road and Clarkway Tributaries and between the Clarkway Tributary and Rainbow Creek.
- Potential sources of disturbance include vegetation removal/trimming, disturbance from equipment, and other disruptive activities, all of which will be considered during Detail Design. General construction mitigation measures should be employed to minimize impacts. Proper planning, design, and implementation of the avoidance and mitigation measures detailed above will ensure protection of the natural environment associated with the project.
- Identified in the MESP, Brampton's Pathways System (under separate heading) will link the city's natural and built environments and be within the NHS, which may result in additional removals of the NHS. The design and planning of these trails must consider the conservation of ecological features and functions.
- Depending on the nature of the development proposal, developable lands may be subject to Environmental Implementation Reports (EIRs) or Environmental Impact Statements (EIS's) in the direction of planning authorities in consultation with the TRCA.

13.0 References

Aquafor Beech Limited. 2016. Final Report: Master Environmental Servicing Plan: Highway 427 Industrial Secondary Plan Area ("Area 47").

Bat Conservation International, Inc. (BCI). 2013. BCI Species Profiles. Cited online: http://batcon.org. Accessed June 2013.

Cadman, M.D., D.A. Sutherland, G.G. Beck, D. Lepage, and A.R. Couturier (eds.) 2007. Atlas of

the Breeding Birds of Ontario, 2001-2005. Online atlas data: https://www.birdsontario.org/atlas/datasummaries.jsp?lang=en Last accessed 23 March 2020

City of Brampton. (2014). Temporary Tree Proteciton Fencing. Brampton.

Cornell lab of Ornithology 2015. The Cornell Lab of Ornithology: All About Birds. Cited online: https://www.allaboutbirds.org/guide/search/. Accessed June 2016.

COSEWIC. 2007a. COSEWIC assessment and status report on the Chimney Swift *Chaetura pelagica* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 49 pp. (www.registrelep-sararegistry.gc.ca/default_e.cfm).

COSEWIC. 2007b. COSEWIC assessment and status report on the Common Nighthawk *Chordeiles minor* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 25 pp. (www.registrelep-sararegistry.gc.ca/default_e.cfm).

COSEWIC. 2007b. COSEWIC assessment and status report on the Red-headed Woodpecker *Melanerpes erythrocephalus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 27 pp. (www.registrelep-sararegistry.gc.ca/default_e.cfm).

COSEWIC. 2008a. COSEWIC assessment and status report on the Canada Warbler *Wilsonia canadensis* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 35 pp. (www.registrelep-sararegistry.gc.ca/default_e.cfm).

COSEWIC. 2008b. COSEWIC assessment and status report on the Snapping Turtle *Chelydra serpentina* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 47 pp. (www.registrelep-sararegistry.gc.ca/default_e.cfm).

COSEWIC. 2009a. COSEWIC assessment and status report on the Whip-poor-will *Caprimulgus vociferus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 49 pp. (www.registrelep-sararegistry.gc.ca/default_e.cfm).

COSEWIC. 2009b. COSEWIC assessment and status report on the Least Bittern *Ixobrychus exilis* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 36 pp. (www.registrelep-sararegistry.gc.ca/default_e.cfm)

COSEWIC. 2010. COSEWIC assessment and status report on the Bobolink *Dolichonyx oryzivorus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 42 pp. (www.registrelep-sararegistry.gc.ca/default_e.cfm).

COSEWIC. 2011a. COSEWIC assessment and status report on the Barn Swallow *Hirundo rustica*

in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. ix + 37 pp. (www.registrelep-sararegistry.gc.ca/default_e.cfm).

COSEWIC. 2011b. COSEWIC assessment and status report on the Eastern Meadowlark *Sturnella magna* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 40 pp. (www.registrelep-sararegistry.gc.ca/default_e.cfm).

COSEWIC. 2012a. COSEWIC assessment and status report on the Hooded Warbler *Setophaga citrina* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 39 pp. (www.registrelep-sararegistry.gc.ca/default_e.cfm).

COSEWIC. 2012b. COSEWIC assessment and status report on the Northern Map Turtle *Graptemys geographica* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xi + 63 pp. (www.registrelep-sararegistry.gc.ca/default_e.cfm).

COSEWIC. 2013. COSEWIC assessment and status report on the Bank Swallow *Riparia riparia* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. ix + 48 pp. (www.registrelep-sararegistry.gc.ca/default_e.cfm).

Donaldson, B.M. 2005. Use of Highway Underpasses by Large Mammals and Other Wildlife in Virginia and Factors Influencing their Effectiveness. Final Report for the Virginia Department of Transportation.

Endangered Species Act (ESA). 2007. Cited online: http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_07e06_e.htm. Accessed July 2016.

Environmental Policy Office (EPO). 2015. MTO Best Management Practices Manual for Fisheries.

Environment and Climate Change Canada. 2018a. Kitchener/Waterloo historical weather data. http://climate.weather.gc.ca/historical_data/search_historic_data_e.html. Last Accessed 18 March 2020.

Environment and Climate Change Canada. 2018b. Toronto INTL A historical weather data. http://climate.weather.gc.ca/historical_data/search_historic_data_e.html. Last Accessed 18 March 2020.

Farrar, John. 1995. Trees in Canada. Canadian Forest Service and Fitzhenry & Whiteside Limited. Third Impression 1997

Fisheries and Oceans Canada (DFO). 2015. Distribution of Fish Species at Risk, Toronto and Region Conservation Authority. May 2015 – May 2016 Data.

Fisheries and Oceans Canada (DFO). 2016. Distribution of Federal Aquatic Species at Risk: Ontario South West Map 10 of 33. Map produced September 2016. Cited online: http://www.dfo-mpo.gc.ca/species-especes/images/maps-cartes/onsw-soon-10-eng.jpg . Accessed December 2016.

Fisheries and Oceans Canada (DFO). 2016. Projects Near Water. Cited online: http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html . Accessed November 2016.

Fisheries and Oceans Canada (DFO). 2020. Aquatic Species at Risk Map. Searched 18 March 2020. http://www.dfo-mpo.gc.ca/species-especes/sara-lep/map-carte/index-eng.html

Foresman, K.R. 2003. Small mammal use of modified culverts on the Lolo South project of western Montana-an update. Pp. 342-343 in Proceedings of the International Conference on Ecology and Transportation, C.L. Irwin, P. Garrett, and K.P. McDermott, eds. Center for Transportation and the Environment, North Carolina State University, Raleigh.

Hamr, P. 2007.

Jackson S. 2003. Proposed Design and Considerations for Use of Amphibian and Reptile Tunnels in New England. Department of Natural Resources Conservation, University of Massachusetts Amherst.

Lemen, C., Freeman, P.W., White, J.A., and Andersen, B.R. 2015. The Problem of Low Agreement among Automated Identification Programs for Acoustical Surveys of Bats. Western North American Naturalist, 75(2), 218–225.

Matrix Solutions Inc. 2016. Draft Environmental Assessment Study of Arterial Roads within Highway 427 Industrial Secondary Plan Area (Area 47), City of Brampton: Fluvial Geomorphic Component. pp 80.

Menon, A.M., Pereira, M.J.R., and Aguiar, L.M.S. 2018. Are automated acoustic identification software reliable for bat surveys in the Neotropical region ? PeerJ Preprints, (March 2018), 1–37.

Ministry of Natural Resources and Forestry and Toronto and Region Conservation Authority (MNRF and TRCA). 2005. Humber River Fisheries Management Plan. Cited online: http://trca.on.ca/dotAsset/25855.pdf. Accessed December 2016.

Ministry of Natural Resources (MNRF). 2016a. Species at Risk in Ontario (SARO) List. Cited online: http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/MNR_SAR_CSSR_SARO_LST_EN.html. Accessed June 2016.

Ministry of Natural Resources (MNRF). 2016b. Biodiversity Explorer: Ontario Natural Heritage Information Centre database, 2010. Element Occurrence Cited online: https://www.biodiversityexplorer.mnr.gov.on.ca/nhicWEB/mainSubmit.do. Accessed June 2016.

Ministry of Natural Resources (MNRF). 2020. Make A Map: Natural Heritage Areas. Element Occurrence data. © Queen's Printer for Ontario, 2020. Last Accessed March 2020
https://www.gisapplication.lrc.gov.on.ca/mamnh/Index.html?site=MNR_NHLUPS_NaturalHeritage&viewer=NaturalHeritage&locale=en-US

Ministry of Transportation Ontario (MTO). 2006. Environmental Guide for Wildlife in the Oak Ridges Moraine, October 2006.

Ministry of Transportation Ontario (MTO). 2015. Environmental Guide to Wildlife Mitigation, March 2015.

Ministry of Transportation. 2016. Environmental Guide for Mitigating Road Impacts to Wildlife. Updated final report submitted by Eco-Kare International to the Ministry of Transportation, St. Catharines, Ontario, 107 pages.

Municipal Class Environmental Assessment (MCEA). 2013. MCEA Manual. Page 19 https://municipalclassea.ca/manual/page19.html

Ontario Ministry of Natural Resources and Forestry. 2015. Significant Wildlife Habitat Criteria Schedules For Ecoregion 7E. Last Accessed 23 March 2020. https://dr6j45jk9xcmk.cloudfront.net/documents/4776/schedule-7e-jan-2015-access-vers-final-s.pdf

Ontario Ministry of Natural Resources and Forestry. April 2016. Best Management Practices for Mitigating the Effects of Roads on Amphibians and Reptile Species at Risk in Ontario. Queen's Printer for Ontario. 112 pp

Ontario Ministry of Natural Resources and Forestry. 2016A. Bobolink General Habitat Description. Last Updated May 9, 2019. Last Accessed 23 March 2020. https://www.ontario.ca/page/bobolink-general-habitat-description

Ontario Ministry of Natural Resources and Forestry. 2018. Eastern Meadowlark General Habitat Description. Last Updated May 9, 2019. Last Accessed 23 March 2020. https://www.ontario.ca/page/eastern-meadowlark-general-habitat-description

Ontario Nature. 2020. Ontario Reptile and Amphibian Atlas. Cited online at Toronto Entomologists' Association: https://www.ontarioinsects.org/herp/index.html. Accessed March 2020

Ontario Partners in Flight. 2008. Ontario Landbird Conservation Plan: Lower Great Lakes/St. Lawrence Plain, North American Bird Conservation Region 13. Ontario Ministry of Natural Resources, Bird Studies Canada, Environment Canada. Draft Version 2.0.

Ontario Peregrine Falcon Recovery Team. 2010. Recovery Strategy for the Peregrine Falcon (*Falco peregrinus*) in Ontario. Ontario Recovery Strategy Series. Prepared for the Ontario Ministry of Natural Resources, Peterborough, Ontario. vi + 36 pp.

Reed, D.F., T.N. Woodward, and T.M. Pojar. 1975. Behavioral Response of Mule Deer to a Highway Underpass. Journal of Wildlife Management, 39: 361-167.

Rydell, J., Nyman, S., Eklöf, J., Jones, G., and Russo, D. 2017. Testing the performances of automated identification of bat echolocation calls: A request for prudence. Ecological Indicators, 78(July), 416–420.

Savanta. 2017. Environmental Impact Study: Area Blocks 47-1 and 47-2. Block Plan Application Submission #2. Submission #1 February 2016. Project No: 7531.

Savanta. 2018. Addendum to the Master Environmental Servicing Plan, High 427 Industrial Secondary Plan (Area 47).

Sott, A. 2012. The Efficacy of Wildlife Crossings as Constructed Corridors: Lessons for Planning Natural Heritage Systems in Ontario. Master's Thesis. Queen's University, Kingston, Ontario.

Species at Risk Act (SARA). 2002. Cited online: http://laws-lois.justice.gc.ca/eng/acts/s-15.3/. Accessed December 2016.

Toronto and Region Conservation Authority (TRCA). 2008a. Humber River State of the Watershed Report – Fluvial Geomorphology.

Toronto and Region Conservation Authority (TRCA). 2008b. Humber River State of the Watershed Report – Surface Water Quality.

Toronto and Region Conservation Authority (TRCA). 2008c. Humber River Watershed Plan: Pathways to a Healthy Humber.

Toronto and Region Conservation Authority (TRCA). 2014. The Living City Policies for Planning and Development in the Watersheds of the Toronto and Region Conservation Authority.

Toronto and Region Conservation Authority (TRCA). 2015. Crossing Guideline for Valley and Stream Corridors. Document dated September 2015.

Appendix A

Correspondence with TRCA and the MNRF

Hellinga, Erin

From: Heaton, Mark (MNRF) <mark.heaton@ontario.ca>
Sent: December-19-16 11:45 AM
To: Ferguson, Brittany
Cc: Rideout, Daryl T; Hellinga, Erin
Subject: RE: Area 47 – MNRF Follow-up Information Request
Attachments: 116121521203600325.jpg

Hello Brittany

Robinson Creek and its tributaries are no longer a part of regulated habitat for Redside Dace since the species has not been present in over 20 years.

The habitat regulation no longer applies to Rainbow Creek and its subwatershed tributaries.

Regards

Mark Heaton
Fish and Wildlife Biologist
OMNRF Aurora District
(905) 713 7406 office
(416) 993 1295 mobile

_____
From: Ferguson, Brittany [brittany.ferguson@amecfw.com]
Sent: Thursday, December 15, 2016 4:20 PM
To: Heaton, Mark (MNRF)
Cc: Rideout, Daryl T; Hellinga, Erin
Subject: Area 47 – MNRF Follow-up Information Request

Hello Mark,

Please find attached an information request related to potential aquatic Species at Risk habitat in Robinson Creek Tributary downstream of the Area 47 project site in Brampton, ON. Further project-specific information and site mapping are enclosed.

Kind Regards,

Brittany Ferguson, B.Sc.
Environmental Biologist
Amec Foster Wheeler

Environment & Infrastructure

160 Traders Blvd, Suite 110
Mississauga, Ontario, Canada L4Z 3K7

D +1 (905) 568 2929 x 4122
E brittany.ferguson@amecfw.com<mailto:brittany.ferguson@amecfw.com>
amecfw.com
[cid:116121521203600125@uk-mta-71.uk.mimecast.lan]

Minutes of Technical Agency Meeting #1 - Revised

Date:	February 9, 2016 - Revised February 24, 2016
File #:	TP115086-75
Meeting Date & Time:	January 14, 2016 @ 10:00 a.m.
Meeting at:	City of Brampton, Boardroom WT FCCC2-1A
Subject:	Arterial Road Network within SP47 Area – TRCA and MNRF Meeting

Attendees:

Bishnu Parajuli, City of Brampton
Inderjit Hans, City of Brampton
Gino Dela Cruz, Region of Peel
Mark Heaton, MNRF
Emily Funnell, MNRF
Annette Maher, TRCA
Sharon Lingertat, TRCA
Dilnesaw Chekol, TRCA
Brennan Paul, TRCA
David Sinke, Amec Foster Wheeler
Rob Young, Amec Foster Wheeler
Steven Chipps, Amec Foster Wheeler
Maria King, Amec Foster Wheeler
Daryl Rideout, Amec Foster Wheeler

MATTERS DISCUSSED **ACTION BY:**

1. Introduction

Bishnu Parajuli, Project Manager with the City of Brampton introduced the project and the objectives of the meeting – to provide an overview of the project, status, and to obtain initial comments from MNRF and TRCA.

David Sinke, Amec Foster Wheeler Project Manager, provided an overview of the Municipal Class Environmental Assessment for the project (attached). Key items to discuss include how the agencies want to be involved and is there additional information we need to know

2. Master Environmental Servicing Plan

MNRF last provided comments on the MESP in 2013. Bobolink, Eastern Meadowlark, and Barn Swallow are the key Species at Risk (SAR). At the time MNRF had requested delineation of SAR habitat. Amec Foster Wheeler provided mapping from the latest MESP which identified fields with SAR habitat.

3215 North Service Road
Burlington, Ontario L7N 3G2
Tel +1 905 335 2353
Fax +1 905 335-1414
amecfw.com

Amec Foster Wheeler Environment & Infrastructure
Registered office: 2020 Winston Park Drive, Suite 700, Oakville, Ontario L6H 6X7
Registered in Canada No. 773289-9; GST: 899879050 RT0008; DUNS: 25-362-6642

MATTERS DISCUSSED	ACTION BY:
TRCA is reviewing the latest (December 2015) draft of the MESP. Prologis is undertaking block planning which will involve modification to the Rainbow Creek corridor. Details are not known at this time and it is expected these will be addressed in an addendum to the MESP. Timing for the approval of the Rainbow Creek modifications is not known.	
TRCA recommends that the team should coordinate with Aquafor Beech and Prologis.	
TRCA commented that regarding Headwater Drainage Features some have been designated for retention but most are going to be mitigated with details to be addressed through stormwater management planning and landscape design and are deferred to the block planning process.	
The wildlife corridors shown in the MESP mapping have been negotiated and are a critical component of the proposed changes to the Rainbow Creek corridor. TRCA to advise are whether there are any criteria for crossing these corridors.	**TRCA**
It will be important for MESP and MCEA teams to be coordinated. The Brampton/Amec Foster Wheeler team will review the MESP and proposed projects with Brampton planners and then coordinate with Aquafor Beech.	**Amec Foster Wheeler/City of Brampton**
3. Species at Risk	
MNRF does not have a sense as yet of compensation strategy for SAR birds which will be important for roadway planning purposes. MNRF would like the MESP to quantify habitat primarily related to the new roads. Long term concern is to what extent development will affect SAR habitat. Roads may be able to avoid habitat but development will require ESA permitting.	
It was noted that habitat could change over time due to land use changes e.g. farmers could plant row crops as they are aware lands are to be developed. MNRF advised to plan for what is currently there.	
Rainbow Creek is not considered Redside Dace habitat. There is an occupied reach in the West Humber River near The Gore Road/Countryside Drive intersection. This portion of the West Humber River may not be within the study area for the MCEA.	**Amec Foster Wheeler/City of Brampton to confirm**
MNRF noted that the proposed E-W Arterial may impact a woodlot close to The Gore Road Tributary and Amec Foster Wheeler may want to check the location for bats (using acoustic monitoring and hollow tree surveys) or preferably avoid the woodlot.	

MATTERS DISCUSSED **ACTION BY:**

4. Road Network

TRCA inquired as to how the proposed road network in the Transportation Master Plan was established, are they required, and are they in the right locations. In general, there is a need to a) demonstrate the need for new roads, and b) ensure roads are in the correct locations. Brampton responded that the proposed network was based on transportation needs for the planned future development. Amec Foster Wheeler noted that confirmation of the outcomes of the Transportation Master Plan is part of the current MCEA.

TRCA provided comments on the Transportation Master Plan and a response to the comments has not been provided. Comments pertaining to Area 47 should be considered in the design.

MNRF asked why 2 options are shown for the intersection of Mayfield Road and Arterial A2. Brampton noted that this area is a Special Policy Area and is being further evaluated. Amec Foster Wheeler noted that this is a starting point and will be reviewed together with connectivity as part of the MCEA.

MNRF would like crossings of the natural heritage system to be minimized.

TRCA asked whether Coleraine Drive will be maintained north of Regional Road 50 (current proposed alignment shows a new intersection with Arterial A2 northwest of the current Coleraine Drive/Regional Road 50 intersection. Brampton and Amec Foster Wheeler noted that it will depend on the landowner's future plans.

TRCA questioned whether the future of the GTA West Highway will impact the Area 47 road network plans. Also, Peel Region road widenings in and around Area 47 should be factored into the traffic analysis.

5. Stormwater

Amec Foster Wheeler asked if the ponds shown in the MESP are final. TRCA noted that the locations are not final and could change and it remains an outstanding issue with the MESP. Amec Foster Wheeler noted that it is important that the stormwater management system includes the proposed transportation network.

TRCA noted that they have provided all hydrologic and hydraulic modeling as per Amec Foster Wheeler's request.

LID assumes 5 mm depth for the entire area.

MATTERS DISCUSSED **ACTION BY:**

6. Other

MCEA will be on-going through 2016 and 2017. The team will vet proposed PIC information with this group and will be having regular meetings to consult and obtain input.

TRCA noted that the recently issues Valley Crossing Guidelines be followed for water crossings.

Meeting Minutes prepared by,

Amec Foster Wheeler Environment & Infrastructure
A Division of Amec Foster Wheeler Americas Limited

Per: Rob Young, P. Geo., MCIP, RPP
Associate Environmental Planner

RY/kf

Ministry of Natural Resources
Aurora District Office
50 Bloomington Road
Aurora, Ontario L4G 0L8

Ministère des Richesses naturelles

Telephone: (905) 713-7368
Facsimile: (905) 713-7360

Ontario

Sent by email: Malik.Majeed@brampton.ca

November 21, 2013

Malik Majeed,
Policy Planner, Planning Design and Development Department
City of Brampton
2 Wellington Street West
Brampton, ON L6Y 4R2

Dear Malik Majeed:

Subject: Block 47 Master Environmental Servicing Plan
City of Brampton, Regional Municipality of Peel

The Ministry of Natural Resources (MNR) has reviewed the May 2013 Draft Report: Master Environmental Servicing Plan: Highway 27 Industrial Secondary Plan Area ("Area 47") hereafter referred to as "Block 47 MESP". Our review is based primarily on impacts to threatened and endangered species under the Endangered Species Act, 2007. We provide the following comments:

MNR recommends that additional Bobolink and Eastern Meadowlark surveys be completed in subsequent years within all areas of the subject land that offer suitable habitat for either species at that point in time (to account for annual crop rotation). Any area that had been previously surveyed following approved MNR survey protocols (see attachment) will not need to be re-surveyed for these two species. It is recommended that targeted Bobolink and Eastern Meadowlark surveys adhere to MNR's Draft Bobolink Survey Protocol titled "Survey Methodology under the Endangered Species Act, 2007- Dolichonyx oryzivorus (Bobolink). The MESP only discusses the 2012 surveys that were completed as a follow-up to a 2007 study and may not reflect the total area of habitat that may become available as part of the annual crop rotations.

MNR will require an estimate of the total area that is considered to be habitat for Bobolink and Eastern Meadowlark, once all appropriate field surveys have been completed.

MNR will require more information on any species at risk recorded on the subject lands so that this information can be incorporated into the Aurora District species at risk (SAR) database (species name, observation date, observer name(s), biological details, habitat description, search effort, UTM coordinates). All field survey data should be submitted to this office.

The Block 47 MESP noted that botanical surveys were not competed in some areas because the consultants were denied permission to enter certain properties. These areas will need to be surveyed for SAR prior to any development plans. It is recommended that these areas be

surveyed during the next field season to avoid potential for delays in obtaining future planning approvals.

The MESP does not appear to provide any consideration for SAR habitat with respect to the section 2.1.3 of the Provincial Policy Statement as it relates to Threatened and /or Endangered species (Bobolink, Eastern Meadowlark and Barn Swallow). As a first principle, opportunities to maintain habitat for these species within the Block 47 lands are to be considered.

Groundwater inputs to the watercourses should be quantified in terms of the Redside Dace habitat / contributing habitat requirements. The report only notes TRCA targets for Level 1 protection of 80% sediment removal and does not consider the higher standards recommended in MNR's "Guidance for Development in Redside Dace Protected Habitat." This will be important to consider for SWM Ponds discharging to Rainbow Creek.

Limited discussion was provided on thermal objectives of the stormwater management (SWM) pond designs. The report recommends designing pond outfalls to minimize thermal impacts on the receiving stream, but does not go into any further detail on what this might include (e.g., bottom-draw outlets, cooling trenches, depths of ponds). While it is recognized that this is a conceptual plan at this point, some high level assessment should be carried out to determine if such measures are feasible.

The MESP recommends that no development/site alterations occur within the regulated habitat for Redside Dace around the main branch of the West Humber River. MNR is pleased to see that this area is also identified as a suitable location for future restoration works (vegetation planting).

Please note that the legislative provisions under the Endangered Species Act, 2007 may be subject to change, as new species are continuously being updated and species habitat may become "regulated". It is for this reason that open communication with MNR is strongly encouraged throughout the review process.

Should you have any questions regarding these comments please do not hesitate to contact me at 905-713-7368.

Sincerely,

Jackie Burkart
District Planner

1 attachment – Bobolink Survey Protocol

Copy: Michael Hoy, Planner, City of Brampton - Michael.Hoy@brampton.ca
David Denyes, Species at Risk Biologist – MNR Aurora
Mark Heaton, Area Biologist – MNR Aurora

Ferguson, Brittany

From: Heaton, Mark (MNRF) <mark.heaton@ontario.ca>
Sent: November-17-15 2:06 PM
To: Lam, Andrea
Cc: Mott, Ken (MNRF); Uetz, Laurie (MNRF); Burkart, Jackie (MNRF); Lucia.Alonzi@brampton.ca; Sharon Lingertat
Subject: RE: MNRF Confirmation of 2013 Information Request - Area 47, City of Brampton

Hello Andrea,

MNRF meets with the City of Brampton on a monthly basis to discuss projects in EA planning stage and detailed design stage.

Please coordinate a meeting between yourself, the City, TRCA and MNRF to discuss this EA. The City' project manager can schedule the meeting through Lucia (cc'd in this email)

Our next monthly meeting is planned for January 14, 2016

Regards

Mark Heaton
OMNRF Aurora

_____
From: Lam, Andrea [andrea.lam@amecfw.com]
Sent: Wednesday, November 11, 2015 1:09 PM
To: Burkart, Jackie (MNRF); ESA Aurora (MNRF)
Subject: MNRF Confirmation of 2013 Information Request - Area 47, City of Brampton

Hello Jackie,

The City of Brampton is initiating an EA Study for the Arterial Road Network within the Highway 427 Industrial Secondary Plan Area (Area 47), for which Amec Foster Wheeler has been hired on as the representative consultant. Based on previous correspondence between MNRF and the City for the Block 47 Master Environmental Servicing Plan (MESP) dated 21 November 2013 (please see attached), we are requesting updates with respect to Species at Risk (SAR) for this project, which is within the Area 47 study area.

Amec Foster Wheeler has initiated search of the Natural Heritage Information Centre (NHIC) database, and understand the approximate locations of Bobolink, Eastern Meadowlark and Barn Swallow habitat within the study area based on findings of the MESP (shown in Figures 1 and 2 respectively, also attached). Amec Foster Wheeler will be initiating field work in Spring 2016 to confirm locations and the approximate area of avian SAR habitat adjacent to the proposed road improvements and new road alignments in accordance with the MNRF's Draft Bobolink Survey Protocol. Amec Foster Wheeler is also aware of the Redside Dace habitat found within the West Humber River and downstream of the study area in Rainbow Creek Tributary and will consult with MNRF regarding any works that affect these watercourses. Any changes to this information or inclusion of new data would be beneficial to the study.

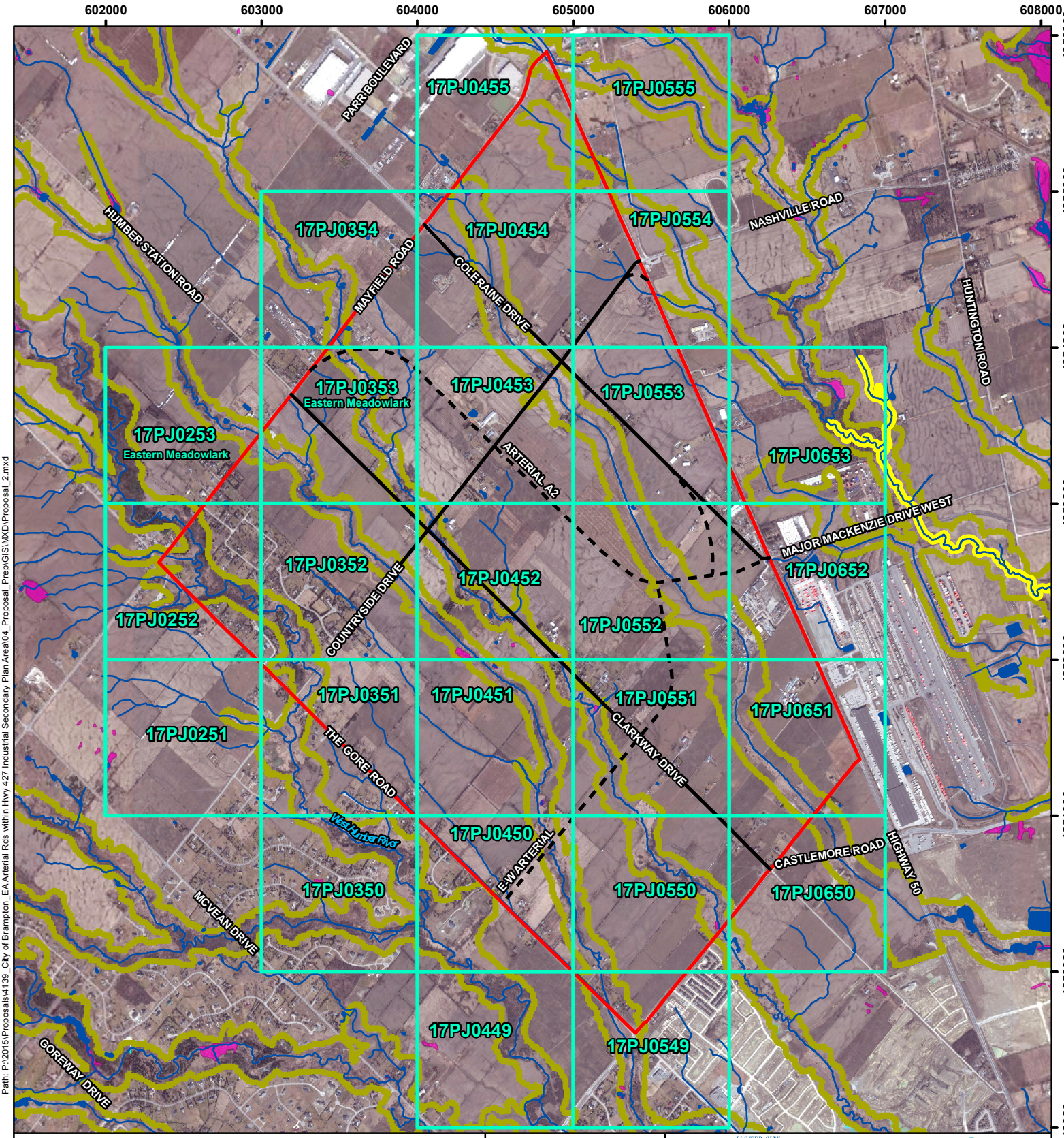
Amec Foster Wheeler looks forward to hearing from MNRF. If you have any questions, please do not hesitate to contact me.

Thank you for your attention,

Andrea Lam
Environmental Planner
Amec Foster Wheeler
Environment & Infrastructure

160 Traders Blvd East, Suite 110
Mississauga, ON L4Z 3K7
T +1 (905) 568-2929 ext. 4149
E andrea.lam@amecfw.com<mailto:andrea.lam@amecfw.com>
amecfw.com

[cid:115111118094401159@uk-mta-10.uk.mimecast.lan]



Path: P:\2015\Proposals\4139_City of Brampton_EA Arterial Rds within Hwy 427 Industrial Secondary Plan Area\04_Proposal_Prep\GIS\MXD\Proposal_2.mxd

LEGEND

- Proposed Existing Roads to be Improved
- Proposed New Roads
- Approximate Study Area
- Watercourse
- Waterbody
- NHIC Square (Labelled with ID and SAR identified within the past 20 years)
- DFO Species at Risk (American Eel and Redside Dace)
- TRCA Regulation Limits
- Non-significant Wetland

NOTES:
-Background imagery extract from ESRI
-SAR data extracted from NHIC
-Topographic data extracted from LIO
-There are no SEA, ESA, PSW, or ANSI within the area shown

0 0.2 0.4 0.6 0.8 1 Kilometres

Datum & Projection: NAD 1983 UTM Zone 17N

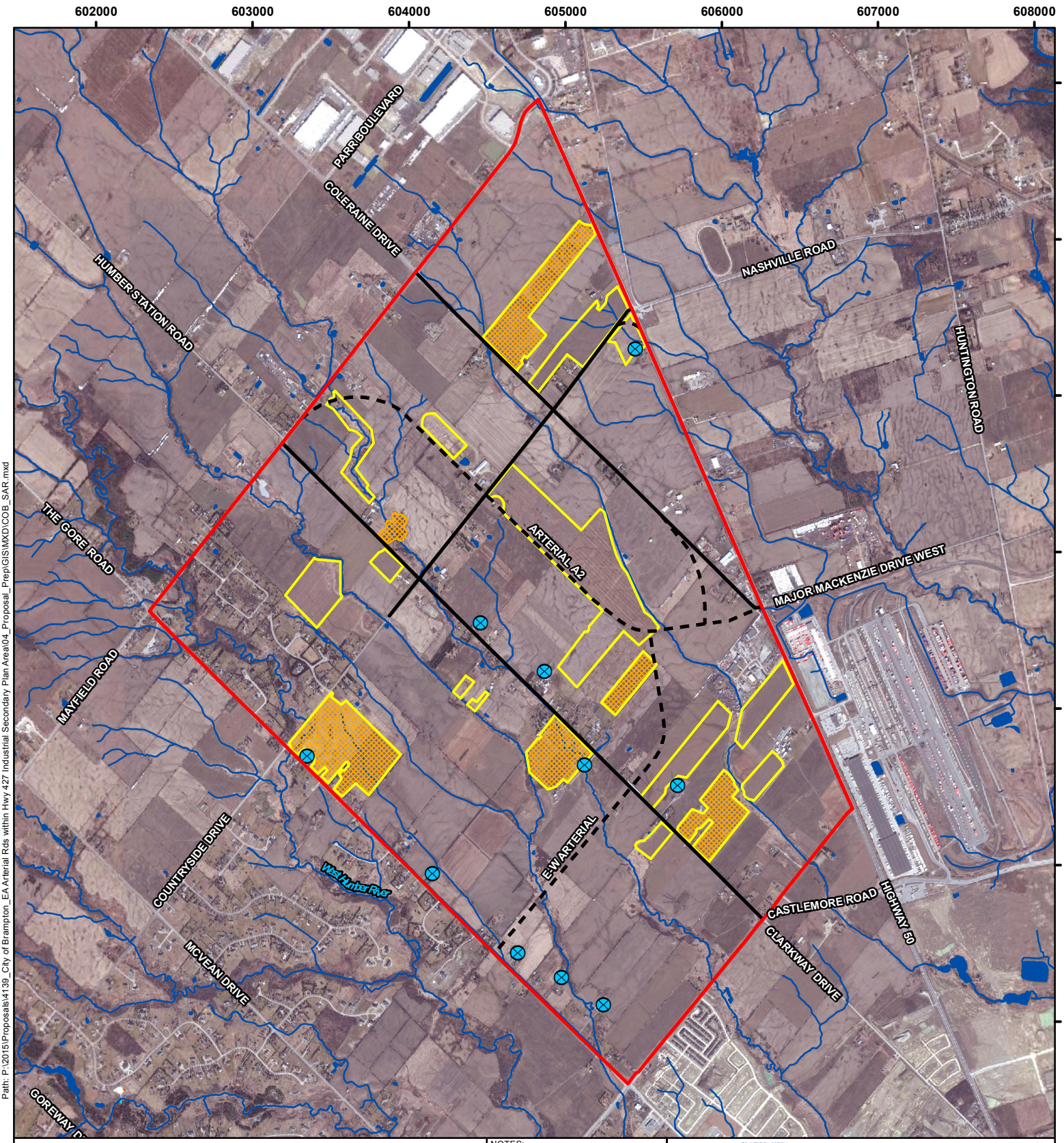
FLOWER CITY BRAMPTON.CA

amec foster wheeler

CITY OF BRAMPTON
EA Arterial Roads within Highway 427 Industrial Secondary Plan Area (Area 47)

Species at Risk and Other Natural Heritage Feature Designations

PROPOSAL N°: 4139	**FIGURE: 1**
SCALE: 1:33,000	DATE: April 2015



Path: P:\2015\Proposals\4139_City of Brampton_EA Arterial Rds within Hwy 427 Industrial Secondary Plan Area\04_Proposal_Prep\GIS\MXD\COB_SAR.mxd

LEGEND

- Approximate Barn Swallow Nests
- Approximate Bobolink Habitat
- Approximate Eastern Meadowlark Habitat
- Proposed Existing Roads to be Improved
- Proposed New Roads
- Approximate Study Area
- Watercourse
- Waterbody

NOTES:
-Background imagery extract from ESRI
-SAR data extracted from City of Brampton Draft Master Environmental Servicing Plan (Area 47) by Aquafor Beech
-Topographic data extracted from LIO
-This figure has been prepared through use of draft documentation of sensitive Species at Risk information. The information as depicted in this figure is intended only for use by AMEC Foster Wheeler in the preparation of proposal response to the City of Brampton RFP2-15-016

Datum & Projection: NAD 1983 UTM Zone 17N

0 0.2 0.4 0.6 0.8 1 Kilometres

FLOWER CITY BRAMPTON.CA

amec foster wheeler

CITY OF BRAMPTON
EA Arterial Roads within Highway 427 Industrial Secondary Plan Area (Area 47)

Avian Species at Risk Potential Habitat

PROPOSAL N°: 4139	**FIGURE: 2**
SCALE: 1:33,000	DATE: April 2015

Appendix B3

Representative field photos

Appendix B1

Aquatic Crossings in Both Part ‘A’ and Part ‘B’

Photo 1: Crossing RB1 downstream. Channel dry with sediment deposition apparent and vegetation within the channel.

Photo 2: Crossing RB1 downstream. Signs of wet conditions but no water present.

Photo 3: Crossing RB1 ROW looking upstream.

Photo 4: Crossing RB1 upstream reach through dense vegetation. Cattails present.

Photo 5: Downstream end of Crossing RB2.

Photo 6: Downstream of ROW at RB2. Very shallow and stagnated flow in watercourse.

Photo 7: Crossing RB2.

Photo 8: Crossing RB2 facing upstream.

Photo 9: Upstream end of Crossing RB2. Note ditch drainage outletting from the west of the watercourse.

Photo 10: Ditch to west draining to watercourse at Crossing RB2.

Appendix B2

Aquatic Crossings in Part ‘A’ only

TP115086

Photo 1: CT8 downstream channel.

Photo 2: CT8 side channel downstream of proposed crossing location. Tree and vegetation in middle of stream.

Photo 3: CT8 proposed crossing ROW.

Photo 4: CT8 meander within proposed ROW. Looking downstream.

Photo 5: CT8 upstream reach. Woody debris in channel and left downstream bank is undercut.

Photo 6: Downstream end of Crossing RB3. Agricultural drainage ditch passes under roadway through box culvert.

Photo 7: Crossing RB3, upstream ROW.

Photo 8: Area upstream of Crossing RB3.

Photo 9: RB4 upstream end of crossing.

Photo 10: RB4 downstream end of crossing.

Appendix B3

Terrestrial Photo Record of Typical ELC Ecosites

Photo 1: Agricultural Field.

Photo 2: Pasture.

Photo 3: Cultural Meadow (CUM 1-1).

Photo 4: Cultural Meadow (CUM 1-1) with Cultural Woodland (CUW1) in background.

Photo 5: Cultural Thicket (CUT1).

Photo 6: Cultural Savannah (CUS1).

Photo 7: Cultural Savannah (CUS1) along watercourse.

Photo 8: Cultural Meadow (CUM 1-1) and Forb Mineral Meadow Marsh (MAM 2-10) along watercourse.

Photo 9: Willow Mineral Deciduous Swamp (SWD 4-1).

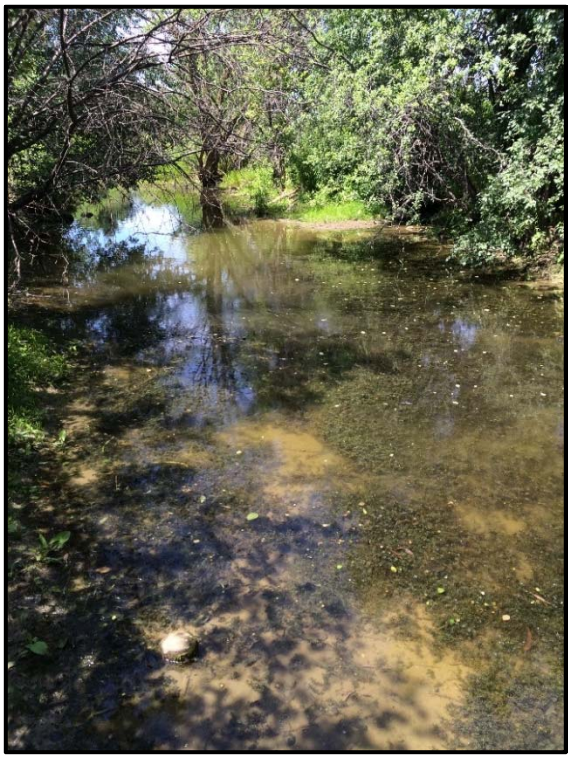


Photo 10: Willow Mineral Deciduous Swamp (SWD 4-1).

Photo 11: Waterweed Submerged Shallow Aquatic (SAS 1-2) and Willow Mineral Deciduous Swamp (SWD 4-1).

Appendix C

Flora and Fauna Species List

Legend

GRank = Global Rank
NatureServe. 2008. Appropriate Use of NatureServe Conservation Status Assessments in Species Listing Processes.

GX – Presumed extinct
GH – Possibly extinct
G1 – Critically imperiled
G2 – Imperiled
G3 – Vulnerable
G4 – Apparently secure
G5 – Secure

SRank = Sub-national Rank
Ontario Ministry of Natural Resources. 2013. Southern Ontario Vascular Plant Species List. Peterborough, Ontario.

SH – Possibly extirpated (Historical)
S1 – Extremely rare in Ontario
S2 – Very rare in Ontario
S3 – Rare to uncommon in Ontario
S4 – Considered to be common in Ontario
S5 – Indicates that a species is widespread in Ontario
S? – Not ranked yet
SNR - Unranked
SNA – Not applicable
SE – Exotic
SU – Unranked
SX – Presumed extirpated from Ontario
C – Cultivated
? – Uncertain classification due to insufficient information

ESA = Endangered Species Act
Ontario Government. 2018. Species at risk in Ontario List. Peterborough, Ontario.
EXT – Extirpated
END – Endangered
THR – Threatened
SC – Special Concern

SARA = Species at Risk Act
Government of Canada. 2018. Species at Risk Public Registry. Gatineau, Québec.
EXP – Extirpated
END – Endangered
THR – Threatened
SC – Special Concern

Appendix C1

Flora Species List

Common Name	Scientific Name	Global Rank	Provincial Rank	Found in MESP/EIS?	Wood Investigations
Velvetleaf	*Abutilon theophrasti*	GNR	SNA	x	
Amur Maple	*Acer ginnala*	n/a	n/a	x	
Manitoba Maple	*Acer negundo*	G5	S5	x	x
Norway Maple	*Acer platanoides*	GNR	SNA	x	x
Silver Maple	*Acer saccharinum*	G5	S5	x	x
Black Maple	*Acer saccharum ssp. nigrum*	G5	S4?	x	
Sugar Maple	*Acer saccharum ssp. saccharum*	G5	S5	x	x
Freeman's Maple	*Acer X freemanii*	GNA	SNA	x	
Common Yarrow	*Achillea millefolium ssp. millefolium*	G5	SNA	x	
Horse Chestnut	*Aesculus hippocastanum*	GNR	SNA	x	
Tall Agrimony	*Agrimonia gryposepala*	G5	S5	x	
Redtop Grass	*Agrostis gigantea*	G4G5	SNA	x	
Creeping Bent Grass	*Agrostis stolonifera*	G5	SNA	x	
Common Bugle	*Ajuga reptans*	GNR	SNA	x	
Common Water-plantain	*Alisma plantago-aquatica*	G5	S5	x	x
Garlic Mustard	*Alliaria petiolata*	GNR	SNA	x	
Redroot Pigweed	*Amaranthus retroflexus*	G5	SNA	x	
Common Ragweed	*Ambrosia artemisiifolia*	G5	S5	x	
Smooth Serviceberry	*Amelanchier laevis*	G5	S5	x	
Scarlet Pimpernel	*Anagallis arvensis*	GNR	SNA	x	
Indian Hemp	*Apocynum cannabinum*	G5	S5	x	
Wild Sarsaparilla	*Aralia nudicaulis*	G5	S5	x	
Great Burdock	*Arctium lappa*	GNR	SNA	x	
Common Burdock	*Arctium minus ssp. minus*	GNR	SNA	x	x
Horseradish	*Armoracia rusticana*	GNR	SNA		x
Biennial Wormwood	*Artemisia biennis*	G5	SNA	x	
Common Milkweed	*Asclepias syriaca*	G5	S5	x	x
Asparagus	*Asparagus officinalis*	G5?	SNA	x	

Common Name	Scientific Name	Global Rank	Provincial Rank	Found in MESP/EIS?	Wood Investigations
Heath Aster	*Aster ericoides var. ericoides*	G5T5	S5	x	
Panicled Aster	*Aster lanceolatus ssp. lanceolatus*	G5T5	S5	x	
One-sided Aster	*Aster lateriflorus var. lateriflorus*	G5T5	S5	x	
New England Aster	*Aster novae-angliae*	G5	S5	x	
Purple-stem Aster	*Aster puniceus var. puniceus*	G5	S5	x	
Amethyst Aster	*Aster X amethystinus*	GNA	SNA	x	
Spearscale	*Atriplex patula*	G5	SNA	x	
Common Wintercress	*Barbarea vulgaris*	GNR	SNA	x	
Nodding Beggar-ticks	*Bidens cernua*	G5	S5	x	
Devil's Beggar-ticks	*Bidens frondosa*	G5	S5	x	x
Three-lobed Beggar-ticks	*Bidens tripartita*	G5	SNR	x	
Tall Beggar-ticks	*Bidens vulgata*	G5	S5	x	
Wild Turnip	*Brassica rapa*	GNR	SNA	x	
Smooth Brome	*Bromus inermis ssp. inermis*	G5TNR	SNA	x	
European Bellflower	*Campanula rapunculoides*	GNR	SNA	x	x
Nodding Thistle	*Carduus nutans ssp. leiophyllus*	GNRTNR	SNA	x	
Common Wood Sedge	*Carex blanda*	G5	S5	x	
Crested Sedge	*Carex cristatella*	G5	S5	x	
Retrorse Sedge	*Carex retrorsa*	G5	S5	x	x
Spiked Sedge	*Carex spicata*	GNR	SNA	x	
Fox Sedge	*Carex vulpinoidea*	G5	S5	x	x
Bitternut Hickory	*Carya cordiformis*	G5	S5	x	
Shagbark Hickory	*Carya ovata*	G5	S5	x	
Northern Catalpa	*Catalpa speciosa*	G4?	SNA		x
Climbing Bittersweet	*Celastrus scandens*	G5	S5	x	
Spotted Knapweed	*Centaurea maculosa*	GNR	SNA	x	
Black Knapweed	*Centaurea nigra*	GNR	SNA		x
Common Coontail	*Ceratophyllum demersum*	G5	S5	x	

Common Name	Scientific Name	Global Rank	Provincial Rank	Found in MESP/EIS?	Wood Investigations
Celandine GNR	*Chelidonium majus*	SNA		x	
Lamb's Quarters	*Chenopodium album var. album*	G5	SNA	x	x
Oak-leaved Goosefoot	*Chenopodium glaucum ssp. glaucum*	G5	SNA	x	
Chicory	*Cichorium intybus*	GNR	SNA	x	x
Canada Enchanter's Nightshade	*Circaea lutetiana ssp. canadensis*	G5T5	S5	x	
Canada Thistle	*Cirsium arvense*	GNR	SNA	x	x
Bull Thistle	*Cirsium vulgare*	GNR	SNA	x	
Virginia Spring Beauty	*Claytonia virginica*	G5	S5	x	
Lily-of-the-valley G5	*Convallaria majalis*	SNA		x	
Field Bindweed	*Convolvulus arvensis*	GNR	SNA	x	x
Horseweed G5	*Conyza canadensis*	S5		x	
Silky Dogwood	*Cornus amomum ssp. obliqua*	G5T5	S5	x	
Grey Dogwood	*Cornus foemina ssp. racemosa*	G5	S5	x	
Rough-leaved Dogwood	*Cornus rugosa*	G5	S5	x	
Red-osier Dogwood	*Cornus stolonifera*	G5	S5	x	
Long-spined Hawthorn	*Crataegus macracantha*	GNR	S5	x	
One-seeded Hawthorn	*Crataegus monogyna*	G5	SNA	x	x
Dotted Hawthorn	*Crataegus punctata*	G5	S5	x	
White Swallow-wort	*Cynanchum rossicum*	GNR	SNA	x	
Common Hound's-tongue	*Cynoglossum officinale*	GNR	SNA	x	
Field Nut Sedge	*Cyperus esculentus*	G5	S5	x	
Orchard Grass	*Dactylis glomerata*	GNR	SNA	x	
Wild Carrot	*Daucus carota*	GNR	SNA	x	
Large Crabgrass	*Digitaria sanguinalis*	G5	SNA	x	
Common Teasel	*Dipsacus fullonum ssp. sylvestris*	GNR	SNA	x	x
Spinulose Wood Fern	*Dryopteris carthusiana*	G5	S5	x	
Barnyard Grass	*Echinochloa crusgalli*	GNR	SNA	x	
Wild Cucumber	*Echinocystis lobata*	G5	S5	x	x

Common Name	Scientific Name	Global Rank	Provincial Rank	Found in MESP/EIS?	Wood Investigations
Common Globe-thistle	*Echinops sphaerocephalus*	GNR	SNA	x	
Russian Olive	*Elaeagnus angustifolia*	GNR	SNA	x	x
Autumn Olive	*Elaeagnus umbellata*	GNR	SNA	x	
Red-stemmed Spike-rush	*Eleocharis erythropoda*	G5	S5	x	
Blunt Spike-rush	*Eleocharis obtusa*	G5	S5	x	
Canada Waterweed	*Elodea canadensis*	G5	S5	x	
Quack Grass	*Elymus repens*	GNR	SNA	x	
American Willow-herb	*Epilobium ciliatum ssp. ciliatum*	G5T5	S5	x	
Small-flowered Willow-herb	*Epilobium parviflorum*	GNR	SNA	x	
Helleborine GNR	*Epipactis helleborine*	SNA		x	
Field Horsetail	*Equisetum arvense*	G5	S5	x	
Variegated Horsetail	*Equisetum variegatum ssp. variegatum*	G5	S5	x	
Daisy Fleabane	*Erigeron annuus*	G5	S5	x	
Philadelphia Fleabane	*Erigeron philadelphicus ssp. philadelphicus*	G5	S5	x	
Lesser Daisy Fleabane	*Erigeron strigosus*	G5	S5	x	
Wormseed Mustard	*Erysimum cheiranthoides ssp. cheiranthoides*	G5	SNA	x	
Yellow Trout Lilly	*Erythronium americanum ssp. americanum*	G5	S5	x	
Running Strawberry-bush	*Euonymus obovata*	G5	S4	x	
Spotted Joe-pye-weed	*Eupatorium maculatum ssp. maculatum*	G5T5	S5	x	
Common Boneset	*Eupatorium perfoliatum*	G5	S5	x	
White Snakeroot	*Eupatorium rugosum*	G5	S5	x	
Cypress Spurge	*Euphorbia cyparissias*	G5	SNA	x	
Grass-leaved Goldenrod	*Euthamia graminifolia*	G5	S5	x	
Tall Fescue	*Festuca arundinacea*	GNR	SNA	x	
Meadow Fescue	*Festuca pratensis*	G5	SNA	x	
Red Fescue	*Festuca rubra*	G5T5	SNA	x	
Woodland Strawberry	*Fragaria vesca ssp. americana*	G5T5	S5	x	
Common Strawberry	*Fragaria virginiana ssp. virginiana*	G5	SU	x	

Common Name	Scientific Name	Global Rank	Provincial Rank	Found in MESP/EIS?	Wood Investigations
White Ash	*Fraxinus americana*	G5	S4	x	
Green Ash	*Fraxinus pennsylvanica*	G5	S4	x	x
Cleavers G5	*Galium aparine*	S5		x	
Marsh Bedstraw	*Galium palustre*	G5	S5	x	x
Fragrant Bedstraw	*Galium triflorum*	G5	S5	x	
Herb Robert	*Geranium robertianum*	G5	S5	x	
Yellow Avens	*Geum aleppicum*	G5	S5	x	x
Ground Ivy	*Glechoma hederacea*	GNR	SNA	x	x
Honey Locust	*Gleditsia triacanthos*	G5	S2?		x
Jerusalem Artichoke	*Helianthus tuberosus*	G5	SU	x	x
Tawny Day-lily	*Hemerocallis fulva*	GNA	SNA	x	x
Dame's Rocket	*Hesperis matronalis*	G4G5	SNA	x	
Squirrel-tail Grass	*Hordeum jubatum ssp. jubatum*	G5	S5?	x	
Common Hyacinth	*Hyacinthus orientalis*	n/a	n/a	x	
Virginia Water-leaf	*Hydrophyllum virginianum*	G5	S5	x	
Common St. John's-wort	*Hypericum perforatum*	GNR	SNA	x	
Spotted Touch-me-not	*Impatiens capensis*	G5	S5	x	
Pink Touch-me-not	*Impatiens glandulifera*	GNR	SNA	x	
Elecampane	*Inula helenium*	GNR	SNA	x	x
Yellow Iris	*Iris pseudacorus*	GNR	SNA	x	
Black Walnut	*Juglans nigra*	G5	S4?	x	x
Jointed Rush	*Juncus articulatus*	G5	S5	x	
Dudley's Rush	*Juncus dudleyi*	G5	S5	x	
Soft Rush	*Juncus effusus ssp. solutus*	G5T5	S5?	x	
Path Rush	*Juncus tenuis*	G5	S5	x	
Eastern Red Cedar	*Juniperus virginiana*	G5	S5	x	x
Rice Cut Grass	*Leersia oryzoides*	G5	S5	x	
Lesser Duckweed	*Lemna minor*	G5	S5	x	

Common Name	Scientific Name	Global Rank	Provincial Rank	Found in MESP/EIS?	Wood Investigations
Motherwort	*Leonurus cardiaca ssp. cardiaca*	GNR	SNA	x	
Ox-Eye Daisy	*Leucanthemum vulgare*	GNR	SNA		x
Michigan Lily	*Lilium michiganense*	G5	S4	x	x
Butter-and-eggs	*Linaria vulgaris*	GNR	SNA	x	x
Common Gromwell	*Lithospermum officinale*	GNR	SNA	x	
Perennial Rye Grass	*Lolium perenne*	GNR	SNA	x	
Morrow's Honeysuckle	*Lonicera morrowii*	GNR	SNA	x	
Tartarian Honeysuckle	*Lonicera tatarica*	GNR	SNA	x	x
Bird's-foot Trefoil	*Lotus corniculatus*	GNR	SNA	x	x
Marsh Purslane	*Ludwigia palustris*	G5	S5	x	
Cut-leaved Water-horehound	*Lycopus americanus*	G5	S5	x	
Northern Water-horehound	*Lycopus uniflorus*	G5	S5	x	
Fringed Loosestrife	*Lysimachia ciliata*	G5	S5	x	
Moneywort	*Lysimachia nummularia*	GNR	SNA	x	
Purple Loosestrife	*Lythrum salicaria*	G5	SNA	x	x
False Solomon's Seal	*Maianthemum racemosum ssp. racemosum*	G5	S5	x	
Common Apple	*Malus pumila*	G5	SNA	x	x
Scentless Chamomile	*Matricaria perforata*	GNR	SNA	x	
Black Medick	*Medicago lupulina*	GNR	SNA	x	
Alfalfa	*Medicago sativa ssp. sativa*	GNRTNR	SNA	x	
White Sweet-clover	*Melilotus alba*	G5	SNA	x	x
Yellow Sweet-clover	*Melilotus officinalis*	GNR	SNA		x
Wild Mint	*Mentha arvensis ssp. borealis*	G5	S5	x	
Peppermint	*Mentha X piperita*	GNR	SNA	x	
Square-stemmed Monkey-flower	*Mimulus ringens*	G5	S5	x	x
White Mulberry	*Morus alba*	GNR	SNA	x	x
Common Forget-me-not	*Myosotis scorpioides*	G5	SNA	x	
Catnip GNR	*Nepeta cataria*	SNA		x	

Common Name	Scientific Name	Global Rank	Provincial Rank	Found in MESP/EIS?	Wood Investigations
Common Evening-primrose	*Oenothera biennis*	G5	S5	x	
Sensitive Fern	*Onoclea sensibilis*	G5	S5	x	
Cinnamon Fern	*Osmunda cinnamomea*	G5	S5	x	
Upright Yellow Wood-sorrel	*Oxalis stricta*	G5	S5	x	
Witch Panic Grass	*Panicum capillare*	G5	S5	x	
Switch Grass	*Panicum virgatum*	G5	S4	x	
Thicket Creeper	*Parthenocissus inserta*	G5	S5	x	
Wild Parsnip	*Pastinaca sativa*	GNR	SNA	x	
Virginia Stonecrop	*Penthorum sedoides*	G5	S5	x	
Reed Canary Grass	*Phalaris arundinacea*	GNR	S5	x	x
Timothy	*Phleum pratense*	GNR	SNA	x	
Fall Phlox	*Phlox paniculata*	G5	SNA	x	
Common Reed	*Phragmites australis*	G5T5	SNA	x	x
Norway Spruce	*Picea abies*	G5	SNA	x	x
White Spruce	*Picea glauca*	G5	S5	x	x
Colorado Blue Spruce	*Picea pungens*	G5	SNA	x	
Jack Pine	*Pinus banksiana*	G5	S5	x	
Red Pine	*Pinus resinosa*	G5	S5	x	
Eastern White Pine	*Pinus strobus*	G5	S5	x	x
Scots Pine	*Pinus sylvestris*	GNR	SNA	x	x
Ribgrass	*Plantago lanceolata*	G5	SNA	x	
Common Plantain	*Plantago major*	G5	SNA	x	x
Canada Blue Grass	*Poa compressa*	GNR	SNA	x	
Fowl Blue Grass	*Poa palustris*	G5	S5	x	
Kentucky Blue Grass	*Poa pratensis ssp. pratensis*	G5T5	SNA	x	
Mayapple G5	*Podophyllum peltatum*	S5		x	
Water Smartweed	*Polygonum amphibium*	G5	S5	x	
Japanese Knotweed	*Polygonum cuspidatum*	GNR	SNA	x	

Common Name	Scientific Name	Global Rank	Provincial Rank	Found in MESP/EIS?	Wood Investigations
Common Smartweed	*Polygonum hydropiper*	G5	SNA	x	
Pale Smartweed	*Polygonum lapathifolium*	G5	S5	x	
Lady's Thumb	*Polygonum persicaria*	GNR	SNA	x	
European White Poplar	*Populus alba*	G5	SNA	x	x
Eastern Cottonwood	*Populus deltoides ssp. deltoides*	G5T5	S5	x	
Trembling Aspen	*Populus tremuloides*	G5	S5	x	x
Heimburger's Poplar	*Populus X heimburgeri*	GNA	SNA	x	
Long-leaved Pondweed	*Potamogeton nodosus*	G5	S5	x	
Sago Pondweed	*Potamogeton pectinatus*	G5	S5	x	
Flat-stem Pondweed	*Potamogeton zosteriformis*	G5	S5	x	
Rough Cinquefoil	*Potentilla norvegica ssp. monspeliensis*	G5	S5	x	
Rough-fruited Cinquefoil	*Potentilla recta*	GNR	SNA	x	x
Selfheal	*Prunella vulgaris ssp. vulgaris*	G5TU	SNA	x	
Canada Plum	*Prunus nigra*	G4G5	S4	x	
Choke Cherry	*Prunus virginiana ssp. virginiana*	G5	S5	x	
Common Pear	*Pyrus communis*	G5	SNA	x	
Bur Oak	*Quercus macrocarpa*	G5	S5	x	x
English Oak	*Quercus robur*	GNR	SNA	x	
Red Oak	*Quercus rubra*	G5	S5	x	x
Tall Buttercup	*Ranunculus acris*	G5	SNA	x	
Cursed Crowfoot	*Ranunculus sceleratus var. sceleratus*	G5T5	SNA	x	
Common Buckthorn	*Rhamnus cathartica*	GNR	SNA	x	x
Western Poison-ivy	*Rhus radicans ssp. rydbergii*	G5	S5	x	
Staghorn Sumac	*Rhus typhina*	G5	S5	x	x
Wild Black Currant	*Ribes americanum*	G5	S5	x	
Garden Red Currant	*Ribes rubrum*	G4G5	SNA	x	
Black Locust	*Robinia pseudo-acacia*	G5	SNA	x	
Smooth Wild Rose	*Rosa blanda*	G5	S5	x	

Common Name	Scientific Name	Global Rank	Provincial Rank	Found in MESP/EIS?	Wood Investigations
Multiflora Rose	*Rosa multiflora*	GNR	SNA	x	
Common Blackberry	*Rubus allegheniensis*	G5	S5	x	
	Rubus idaeus ssp. melanolasius	G5	S5	x	
Black Raspberry	*Rubus occidentalis*	G5	S5	x	
Black-eyed Susan	*Rudbeckia hirta*	G5	S5	x	
Sheep Sorrel	*Rumex acetosella ssp. acetosella*	GNR	SNA	x	
Curly Dock	*Rumex crispus*	GNR	SNA	x	x
Common Arrowhead	*Sagittaria latifolia*	G5	S5	x	
White Willow	*Salix alba*	G5	SNA	x	
Bebb's Willow	*Salix bebbiana*	G5	S5	x	
Pussy Willow	*Salix discolor*	G5	S5	x	x
Woolly-headed Willow	*Salix eriocephala*	G5	S5	x	
Sandbar Willow	*Salix exigua*	GNR	S5	x	
Crack Willow	*Salix fragilis*	GNR	SNA	x	
Hybrid White Willow	*Salix X rubens*	GNA	SNA	x	
Weeping Willow	*Salix X sepulcralis*	GNA	SNA	x	
Black Bulrush	*Scirpus atrovirens*	G5?	S5	x	x
Softstem Bulrush	*Scirpus validus*	G5	S5	x	
Giant Foxtail	*Setaria faberi*	GNR	SNA	x	
Yellow Foxtail	*Setaria pumila*	GNR	SNA	x	
Green Foxtail	*Setaria viridis*	GNR	SNA	x	
Bittersweet Nightshade	*Solanum dulcamara*	GNR	SNA	x	x
Tall Goldenrod	*Solidago altissima var. altissima*	GNR	S5	x	x
Zig-zag Goldenrod	*Solidago flexicaulis*	G5	S5	x	
Giant Goldenrod	*Solidago gigantea*	G5	S5	x	
Early Goldenrod	*Solidago juncea*	G5	S5	x	
Gray Goldenrod	*Solidago nemoralis ssp. nemoralis*	G5T5	S5	x	
Field Sow-thistle	*Sonchus arvensis ssp. arvensis*	GNRTNR	SNA	x	x

Common Name	Scientific Name	Global Rank	Provincial Rank	Found in MESP/EIS?	Wood Investigations
Common Sow-thistle	*Sonchus oleraceus*	GNR	SNA	x	
European Mountain-ash	*Sorbus aucuparia*	G5	SNA	x	
Narrow-leaved Bur-reed	*Sparganium emersum ssp. emersum*	G5	S5	x	
Giant Bur-reed	*Sparganium eurycarpum*	G5	S5	x	
Great Duckweed	*Spirodela polyrhiza*	G5	S5	x	
Common Lilac	*Syringa vulgaris*	GNR	SNA	x	x
Tansy GNR	*Tanacetum vulgare*	SNA		x	
Red-seeded Dandelion	*Taraxacum erythrospermum*	GNR	SNA	x	
Common Dandelion	*Taraxacum officinale*	G5	SNA	x	
Field Penny-cress	*Thlaspi arvense*	GNR	SNA	x	
Eastern White Cedar	*Thuja occidentalis*	G5	S5	x	x
Basswood	*Tilia americana*	G5	S5	x	
Red Clover	*Trifolium pratense*	GNR	SNA	x	x
White Clover	*Trifolium repens*	GNR	SNA	x	x
Coltsfoot GNR	*Tussilago farfara*	SNA		x	
Narrow-leaved Cattail	*Typha angustifolia*	G5	SNA	x	
Broad-leaved Cattail	*Typha latifolia*	G5	S5	x	x
Hybrid Cattail	*Typha X glauca*	GNA	SNA	x	
White Elm	*Ulmus americana*	G5	S5	x	x
Siberian Elm	*Ulmus pumila*	GNR	SNA	x	
European Stinging Nettle	*Urtica dioica ssp. dioica*	G5T5?	SNA	x	
Common Mullein	*Verbascum thapsus*	GNR	SNA	x	x
Blue Vervain	*Verbena hastata*	G5	S5	x	x
White Vervain	*Verbena urticifolia*	G5	S5	x	
European Highbush Cranberry	*Viburnum opulus*	GNR	SNA	x	
Cow Vetch	*Vicia cracca*	GNR	SNA	x	x
Periwinkle GNR	*Vinca minor*	SNA		x	
Canada Violet	*Viola canadensis*	G5T5	S5	x	

Common Name	Scientific Name	Global Rank	Provincial Rank	Found in MESP/EIS?	Wood Investigations
Common Blue Violet	*Viola sororia*	G5	S5	x	
Riverbank Grape	*Vitis riparia*	G5	S5	x	x
Dotted Water Meal	*Wolffia borealis*	G5	S4S5	x	
Columbia Water Meal	*Wolffia columbiana*	G5	S4S5	x	
Cocklebur	*Xanthium strumarium*	G5	S5	x	
Corn	*Zea mays*	GNR	SNA	x	

Appendix C2

Fauna- Bird Species List

Common Name	Scientific Name	Global Rank	Provinical Rank	SARA	ESA	OBBA 17PJ05	OBBA 17PJ04	Wood- Part A	Wood- Part B	MESP	EIS	Priotiry Species Partners in Flight
Acadian Flycatcher	*Empidonax virescens*	G5	S2S3B	END	END	x						x
Alder Flycatcher	*Empidonax alnorum*	G5	S5B			x	x			x		
American Crow	*Corvus brachyrhynchos*	G5	S5B			x	x	x	x	x	x	
American Goldfinch	*Spinus tristis*	G5	S5B			x	x	x	x	x	x	
American Kestrel	*Falco sparverius*	G5	S4			x	x	x	x	x		x
American Redstart	*Setophaga ruticilla*	G5	S5B			x	x		x	x	x	
American Robin	*Turdus migratorius*	G5	S5B			x	x	x	x	x	x	
American Woodcock	*Scolopax minor*	G5	S4B			x	x					
Baltimore Oriole	*Icterus galbula*	G5	S4B			x	x	x		x	x	x
Bank Swallow	*Riparia riparia*	G5	S4B	THR	THR	x	x					
Barn Swallow	*Hirundo rustica*	G5	S4B	THR	THR	x	x	x	x	x	x	
Belted Kingfisher	*Megaceryle alcyon*	G5	S4B			x	x		x			x
Black-and-white Warbler	*Mniotilta varia*	G5	S5B			x						
Black-billed Cuckoo	*Coccyzus erythropthalmus*	G5	S5B			x	x			x		x
Black-capped Chickadee	*Poecile atricapillus*	G5	S5			x	x	x	x	x	x	
Black-throated Green Warbler	*Setophaga virens*	G5	S5B			x						
Blue Jay	*Cyanocitta cristata*	G5	S5			x	x	x	x	x	x	
Blue-grey Gnatcatcher **	*Polioptila caerulea*	G5	S4B				x			x		
Blue-headed Vireo	*Vireo solitarius*	G5	S5B				x					
Blue-winged Warbler	*Vermivora cyanoptera*	G5	S4B			x						
Bobolink	*Dolichonyx oryzivorus*	G5	S4B	THR	THR	x	x		x	x	x	
Broad-winged Hawk	*Buteo platypterus*	G5	S5B					x	x			
Brown Creeper	*Certhia americana*	G5	S5B			x	x					
Brown Thrasher	*Toxostoma rufum*	G5	S4B			x	x	x	x	x	x	x
Brown-headed Cowbird	*Molothrus ater*	G5	S4B			x	x	x	x	x	x	
Canada Goose	*Branta canadensis*	G5	S5			x	x			x	x	
Caspian Tern	*Hydroprogne caspia*	G5	S3B						x			
Cedar Waxwing	*Bombycilla cedrorum*	G5	S5B			x	x	x	x	x		
Chestnut-sided Warbler	*Setophaga pensylvanica*	G5	S5B				x					
Chimney Swift	*Chaetura pelagica*	G5	S4B,S4N	THR	THR	x	x					x
Chipping Sparrow	*Spizella passerina*	G5	S5B			x	x	x	x	x		
Clay-colored Sparrow	*Spizella pallida*	G5	S4B			x	x		x	x	x	
Cliff Swallow	*Petrochelidon pyrrhonota*	G5	S4B			x	x	x	x			
Common Grackle	*Quiscalus quiscula*	G5	S5B			x	x	x	x	x	x	
Common Nighthawk	*Chordeiles minor*	G5	S4B	THR	SC	x	x					
Common Yellowthroat	*Geothlypis trichas*	G5	S5B			x	x			x	x	
Cooper's Hawk	*Accipiter cooperii*	G5	S4			x	x		x		x	
Downy Woodpecker	*Picoides pubescens*	G5	S5			x	x	x	x			
Eastern Bluebird	*Sialia sialis*	G5	S5B			x						
Eastern Kingbird	*Tyrannus tyrannus*	G5	S4B			x	x			x	x	x
Eastern Meadowlark	*Sturnella magna*	G5	S4B	THR	THR	x	x			x		x

Common Name	Scientific Name	Global Rank	Provinical Rank	SARA	ESA	OBBA 17PJ05	OBBA 17PJ04	Wood- Part A	Wood- Part B	MESP	EIS	Priotiry Species Partners in Flight
Eastern Phoebe	*Sayornis phoebe*	G5	S5B			x	x		x	x		
Eastern Screech-Owl	*Megascops asio*	G5	S4			x	x					
Eastern Towhee	*Pipilo erythrophthalmus*	G5	S4B			x	x					x
Eastern Wood-Pewee	*Contopus virens*	G5	S4B	SC	SC	x	x			x		x
European Starling	*Sturnus vulgaris*	G5	SNA			x	x	x	x	x	x	
Field Sparrow	*Spizella pusilla*	G5	S4B			x	x			x		x
Golden-crowned Kinglet	*Regulus satrapa*	G5	S5B			x	x					
Grasshopper Sparrow	*Ammodramus savannarum*	G5	S4B	SC	SC		x					x
Gray Catbird	*Dumetella carolinensis*	G5	S4B			x	x	x	x	x		
Great Blue Heron	*Ardea herodias*	G5	S4				x	x	x	x	x	
Great Crested Flycatcher	*Myiarchus crinitus*	G5	S4B			x	x			x		
Great Horned Owl	*Bubo virginianus*	G5	S4			x	x			x		
Green Heron	*Butorides virescens*	G5	S4B			x	x			x		
Hairy Woodpecker	*Picoides villosus*	G5	S5			x	x		x			
Hooded Merganser	*Lophodytes cucullatus*	G5	S5B,S5N				x					
Hooded Warbler	*Setophaga citrina*	G5	S4B				x					
Horned Lark	*Eremophila alpestris*	G5	S5B			x	x	x	x	x		
House Finch	*Haemorhous mexicanus*	G5	SNA			x	x	x	x	x		
House Sparrow	*Passer domesticus*	G5	SNA			x	x	x	x	x	x	
House Wren	*Troglodytes aedon*	G5	S5B			x	x		x	x		
Indigo Bunting	*Passerina cyanea*	G5	S4B			x	x		x	x	x	
Killdeer	*Charadrius vociferus*	G5	S5B,S5N			x	x	x	x	x	x	
Least Flycatcher	*Empidonax minimus*	G5	S4B			x	x					
Long-eared Owl	*Asio otus*	G5	S4				x					
Mallard	*Anas platyrhynchos*	G5	S5			x	x	x		x	x	
Mourning Dove	*Zenaida macroura*	G5	S5			x	x	x	x	x	x	
Mourning Warbler	*Geothlypis philadelphia*	G5	S4B			x	x					
Nashville Warbler	*Oreothlypis ruficapilla*	G5	S5B			x	x					
Northern Cardinal	*Cardinalis cardinalis*	G5	S5			x	x	x	x	x	x	
Northern Flicker	*Colaptes auratus*	G5	S4B			x	x			x		x
Northern Harrier **	*Circus cyaneus*	G5	S4B			x	x		x	x		x
Northern Mockingbird	*Mimus polyglottos*	G5	S4			x	x			x		
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	G5	S4B			x	x			x		
Northern Saw-whet Owl	*Aegolius acadicus*	G5	S4			x						
Northern Waterthrush	*Parkesia noveboracensis*	G5	S5B			x						
Orchard Oriole	*Icterus spurius*	G5	S4B			x	x			x		
Ovenbird	*Seiurus aurocapilla*	G5	S4B			x	x					
Pileated Woodpecker	*Dryocopus pileatus*	G5	S5			x	x					
Pine Warbler	*Setophaga pinus*	G5	S5B			x	x					
Purple Finch	*Haemorhous purpureus*	G5	S4B				x					
Purple Martin	*Progne subis*	G5	S4B				x					

Common Name	Scientific Name	Global Rank	Provinical Rank	SARA	ESA	OBBA 17PJ05	OBBA 17PJ04	Wood- Part A	Wood- Part B	MESP	EIS	Priotiry Species Partners in Flight
Red-breasted Nuthatch	*Sitta canadensis*	G5	S5				x					
Red-eyed Vireo	*Vireo olivaceus*	G5	S5B			x	x		x	x		
Red-tailed Hawk	*Buteo jamaicensis*	G5	S5			x	x	x	x	x		
Red-winged Blackbird	*Agelaius phoeniceus*	G5	S4			x	x	x	x	x	x	
Ring-billed Gull	*Larus delawarensis*	G5	S5B,S4N					x	x	x	x	
Ring-necked Pheasant	*Phasianus colchicus*	G5	SNA				x					
Rock Pigeon	*Columba livia*	G5	SNA			x	x	x	x	x	x	
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	G5	S4B			x	x			x		x
Ruby-throated Hummingbird	*Archilochus colubris*	G5	S5B			x	x					
Ruffed Grouse	*Bonasa umbellus*	G5	S4			x	x					
Savannah Sparrow **	*Passerculus sandwichensis*	G5	S4B			x	x	x	x	x	x	x
Scarlet Tanager	*Piranga olivacea*	G5	S4B			x	x					
Sedge Wren	*Cistothorus platensis*	G5	S4B				x					
Sharp-shinned Hawk	*Accipiter striatus*	G5	S5			x	x					
Song Sparrow	*Melospiza melodia*	G5	S5B			x	x	x	x	x	x	
Sora	*Porzana carolina*	G5	S4B			x	x					
Spotted Sandpiper	*Actitis macularius*	G5	S5			x	x	x		x		
Swamp Sparrow	*Melospiza georgiana*	G5	S5B				x			x		
Tree Swallow	*Tachycineta bicolor*	G5	S4B			x	x	x	x	x	x	
Turkey Vulture	*Cathartes aura*	G5	S5B			x	x		x	x	x	
Upland Sandpiper	*Bartramia longicauda*	G5	S4B			x						
Veery	*Catharus fuscescens*	G5	S4B			x	x					
Vesper Sparrow	*Pooecetes gramineus*	G5	S4B			x	x		x	x	x	x
Virginia Rail	*Rallus limicola*	G5	S5B			x						
Warbling Vireo	*Vireo gilvus*	G5	S5B			x	x			x		
White-breasted Nuthatch **	*Sitta carolinensis*	G5	S5			x	x		x	x		
White-throated Sparrow	*Zonotrichia albicollis*	G5	S5B				x					
Wild Turkey	*Meleagris gallopavo*	G5	S5			x	x					
Willow Flycatcher	*Empidonax traillii*	G5	S5B			x	x	x		x	x	x
Wilson's Snipe	*Gallinago delicata*	G5	S5B			x	x					
Winter Wren	*Troglodytes hiemalis*	G5	S5B			x	x					
Wood Duck	*Aix sponsa*	G5	S5			x	x					
Wood Thrush	*Hylocichla mustelina*	G4	S4B	SC		x	x					
Yellow Warbler	*Setophaga petechia*	G5	S5B			x	x	x		x	x	
Yellow-bellied Sapsucker	*Sphyrapicus varius*	G5	S5B			x	x					
Yellow-billed Cuckoo	*Coccyzus americanus*	G5	S4B			x	x					

Appendix C3

Fauna- Mammal Species List

Common Name	Scientific Name	Global Rank	Provinical Rank	SARA	ESA	AMO	Wood- Part A Investigations	Wood- Part B Investigations	MESP	EIS
American Mink	*Mustela vison*	G5	S4			x				
Beaver	*Castor canadensis*	G5	S5			x			x	
Big Brown Bat	*Eptesicus fuscus*	G5	S4			x				x
Common Shrew	*Sorex cinereus*	G5	S5			x				
Coyote	*Canis latrans*	G5	S5			x			x	
Deer Mouse	*Peromyscus maniculatus*	G5	S5			x				
Eastern Chipmunk	*Tamias striatus*	G5	S5			x				
Eastern Cottontail	*Sylvilagus floridanus*	G5	S5			x		x		
Eastern Red Bat	*Lasiurus borealis*	G3G4	S4			x				
Eastern Small-footed Myotis	*Myotis leibii*	G4	S2S3	END		x				
Ermine	*Mustela erminea*	G5	S5			x				
European Hare	*Lepus europaeus*	G5	SNA			x				
Grey Squirrel	*Sciurus carolinensis*	G5	S5			x				
Hoary Bat	*Lasiurus cinerus*	G3G4	S4			x				
House Mouse	*Mus musculus*	G5	SNA			x				
Little Brown Myotis	*Myotis lucifugus*	G3	S4	END	END	x				
Long-tailed Weasel	*Mustela frenata*	G5	S4			x				
Meadow Jumping Mouse	*Zapus hudsonius*	G5	S5			x				
Meadow Vole	*Microtus pennsylvanicus*	G5	S5			x			x	
Muskrat	*Ondatra zibethicus*	G5	S5			x				
Northern Flying Squirrel	*Glaucomys sabrinus*	G5	S5			x				
Northern Long-eared Myotis	*Myotis septentrionalis*	G1G2	S3	END	END	x				
Northern Short-tailed Shrew	*Blarina brevicauda*	G5	S5			x				
Norway Rat	*Rattus norvegicus*	G5	SNA			x				
Porcupine	*Erethizon dorsatum*	G5	S5			x				
Pygmy Shrew	*Sorex hoyi*	G5	S4			x				
Raccoon	*Procyon lotor*	G5	S5			x			x	
Red Fox	*Vulpes vulpes*	G5	S5			x				
Red Squirrel	*Tamiasciurus hudsonicus*	G5	S5			x	x	x		
River Otter	*Lontra canadensis*	G5	S5			x				
Silver-haired Bat	*Lasionycteris noctivagans*	G3G4	S4			x				
Smokey Shrew	*Sorex fumeus*	G5	S5			x				
Snowshoe Hare	*Lepus americanus*	G5	S5			x				
Southern Bog Lemming	*Synaptomys cooperi*	G5	S4			x				
Star-nosed Mole	*Condylura cristata*	G5	S5			x				
Striped Skunk	*Mephitis mephitis*	G5	S5			x			x	
Tri-colored Bat	*Perimyotis subflavus*	G2G3	S3?	END	END	x				
Virginia Opossum	*Didelphis virginiana*	G5	S4			x				
White-footed Mouse	*Peromyscus leucopus*	G5	S5			x				
White-tailed Deer	*Odocoileus virginianus*	G5	S5			x		x	x	
Woodchuck	*Marmota monax*	G5	S5			x				
Woodland Jumping Mouse	*Napaeozapus insignis*	G5	S5			x				

Appendix C4

Fauna- Herptile Species List

Common Name	Scientific Name	Global Rank	Provincial Rank	SARA	ESA	ORAA	Wood- Part A Investigations	Wood- Part B Investigations	MESP	EIS
American Bullfrog	*Lithobates catesbeiana*	G5	S4			x				x
American Toad	*Anaxyrus americanus*	G5	S5			x			x	x
Eastern Gartersnake	*Thamnophis sirtalis sirtalis*	G5T5	S5			x			x	
Eastern Red-backed Salamander	*Plethodon cinereus*	G5	S5			x				
Eastern Ribbonsnake	*Thamnophis sauritus*	G5	S5	SC	SC	x				
Gray Treefrog	*Hyla versicolor*	G5	S5			x				x
Green Frog	*Lithobates clamitans*	G5	S5			x			x	x
Midland Painted Turtle	*Chrysemys picta marginata*	G5T5	S4			x				
Milksnake	*Lampropeltis triangulum*	G5	S4	SC		x				
Northern Leopard Frog	*Lithobates pipiens*	G5	S5			x			x	x
Northern Map Turtle	*Graptemys geographica*	G5	S3	SC	SC	x				
Red-bellied Snake	*Storeria occipitomaculata*	G5	S5			x				
Red-eared Slider	*Trachemys scripta*	G5	SNA			x				
Eastern Newt	*Notophthalmus viridescens*	G5	S5			x				
Snapping Turtle	*Chelydra serpentina*	G5	S3	SC		x		x	x	
Spotted Salamander	*Ambystoma maculatum*	G5	S4			x				
Spring Peeper	*Pseudacris crucifer*	G5	S5			x				
Western Chorus Frog (Great Lakes/St. Lawrence-Canadian Shield Population)	*Pseudacris triseriata*	G5TNR	S3	THR		x				
Wood Frog	*Lithobates sylvatica*	G5	S5			x				x

Appendix C5

Fauna- Other Species List

Common Name	Scientific Name	Global Rank	Provincial Rank	SARA	ESA	Wood- Part A Investigations	Wood- Part B Investigations	MESP	EIS
Monarch	*Danaus plexippus*	G4	S2N,S4B	SC	SC			x	x
Digger Crayfish OR Calico Crayfish	*Creaserinus fodiens OR* *Faxonius immunis*	G5 OR G5	S3 OR S4					 x	
Giant Floater	*Pyganodon grandis*		G5	S5				x	
Cylindrical Papershell	*Anodontoides ferussacianus*		G5	S4				x	
Eastern Elliptio	*Elliptio complanata*		G5	S5				x	
Blackchin Shiner	*Notropis heterodon*		G5	S5			x	x	
Blacknose Dace	*Rhinichthys atratulus*		G5	S5		x	x	x	
Bluntnose Minnow	*Pimephales notatus*		G5	S5		x		x	
Brook Stickleback	*Culaea inconstans*		G5	S5		x	x	x	
Creek Chub	*Semotilus atromaculatus*		G5	S5		x	x	x	
Fantail Darter	*Etheostoma flabellare*		G5	S5			x	x	
Fathead Minnow	*Pimephales promelas*		G5	S5		x	x	x	
Johnny Darter	*Etheostoma nigrum*		G5	S5		x		x	
Longnose Dace	*Rhinichthys cataractae*		G5	S5			x	x	
Northern Hogsucker	*Hypentelium nigricans*		G5	S4			x	x	
Northern Pearl Dace	*Margariscus nachtriebi*		G5	S5			x	x	
Pumpkinseed	*Lepomis gibbosus*		G5	S5		x		x	
White Sucker	*Catostomus commersonii*		G5	S5		x		x	

Appendix D

Arborist Report

Tree Assessment: Part A

Brampton Arterial Roads Within Highway 427 Industrial Secondary Plan Area
Brampton, ON
Project # TP115086 City of Brampton

Prepared for:

City of Brampton
2 Wellington Street West, Brampton, Ontario, L6Y 4R2

May 25, 2021

Tree Assessment: Part A

Brampton Arterial Roads Within Highway 427 Industrial Secondary Plan Area
Brampton, ON
Project # TP115086 City of Brampton

Prepared for:

City of Brampton
2 Wellington Street West, Brampton, Ontario, L6Y 4R2

Prepared by:

Wood Environment & Infrastructure Solutions
a Division of Wood Canada Limited 900 Maple Grove Road, Unit 10
Cambridge, Ontario, N3H 4R7
Canada
T: 519-650-7109

May 25, 2021

Copyright and non-disclosure notice

Third-party disclaimer

Table of contents

List of Tables

List of Appendices

1. Introduction

Wood Environment and Infrastructure Solutions ("Wood") was retained by the City of Brampton (the "City") to undertake a Schedule 'C' Municipal Class Environmental Assessment (EA) for the Arterial Road Network within the Highway 427 Industrial Secondary Plan Area (Area 47). As part of this EA, Wood completed a Tree Assessment.

The Project Area is bounded by Regional Road 50 to the east, Castlemore Road to the south, The Gore Road to the west and Mayfield Road to the north, and is located within the City of Brampton, Regional Municipality of Peel. The Arterial Road Network within the Highway 427 Industrial Secondary Plan Area has been split into Part 'A' Study Corridor and Part 'B' Study Corridor. Part 'A' (Project Location), which will be owned and operated by the Region, includes:

- A new north-south major arterial road with six lanes (hereafter called Arterial A2) connecting Mayfield Road east of Clarkway Drive with Major Mackenzie Drive at Regional Road (RR) 50 as recommended in the Peel-Highway 427 Transportation Master Plan and Brampton Transportation Master Plan (TMP); and
- Widening of Coleraine Drive from two lanes to four lanes from Arterial A2 to Mayfield Road, including realignment at Arterial A2.

Part 'B', which will be owned and operated by the City, is to include:

- The new east-west minor arterial road with 4 lanes (hereafter called E-W Arterial) from The Gore Road to Arterial A2;
- Widening of Countryside Drive from two lanes to four lanes from Clarkway Drive to Regional Road 50 (RR 50) including realignment/reconfiguration of the intersection of Countryside Drive and RR 50; and
- Widening of Clarkway Drive from Castlemore Road to E-W Arterial and improvements to Clarkway Drive from E-W Arterial Road to Mayfield Road with a potential continuous centre turn lane.

The following report will address Part 'A' as the preliminary design for this Part is complete. Part 'B' will be reported on under separate cover when road designs and alternatives are complete.

1.1 The Purpose and Scope

The construction of new roads and the updating of existing roads represents the primary risk of impact on private and public trees. Accordingly, the purpose of this assessment has been to provide a preliminary inventory and define those trees on private or public property that would be injured or removed. Injuries and removals are

solely determined based on the outer limits of the currently proposed footprint. Information on injuries and removals is subject to change during Detailed Design, however, it is meant to support tree preservation planning opportunities and requirements related to construction logistics. Furthermore, measures to protect trees due to proximity to the works have been outlined. Additional measures concerning preservation and protection techniques during construction have also been provided.

Similarly, preliminary compensation suggestions are summarized below to support planning opportunities. Compensation Plans and Tree Protection Plans (TPP) have not been provided with this document. It is recommended that updates to tree inventory occur during Detailed Design to inform the TPP.

2. Legislative Requirements

The project falls within the City of Brampton and the Region of Peel in Ontario Canada. Accordingly, the Project is subject to the relevant City, Regional, Provincial, and Federal policies and regulatory framework. The following sections provide a general discussion of applicable legislation/regulations. This is not a comprehensive review of all potentially applicable legislation/regulations and other laws may apply.

2.1 Migratory Birds Convention Act, 1994

The *Migratory Birds Convention Act* (MBCA) was passed in 1917 and updated in 1994 and 2005. The MBCA protects migratory bird populations by regulating potentially harmful anthropogenic activities, such as tree removal. The MBCA (Government of Canada, 1994) and the *Migratory Birds Regulations* (MBR) (Government of Canada, 2016) are federal legislative requirements that are binding to members of the public and all levels of government, including federal and provincial governments.

Bird species[1] that are protected are listed under Article I of the MBCA, and are native or naturally occurring in Canada, and are species that are known to occur regularly in Canada. The legislation protects certain species, controls the harvest of others, and prohibits the commercial sale of all species. As described in Section 6 of the associated MBR:

"*Subject to subsection 5(9), no person shall:*

[1] Bird species not regulated under the Act include: Rock Dove (*Columba livia*), American Crow (*Corvus brachyrhynchos*), Brown-headed Cowbird (*Molothrus ater*), Common Grackle (*Quiscalus quiscula*), House Sparrow (*Passer domesticus*), Red-winged Blackbird (*Agelaius phoeniceus*), and European Starling (*Sturnus vulgaris*). In addition, raptors are not regulated under the MBCA, 1994. However, they are protected under provincial legislation which restricts and regulates the taking or possession of eggs and nests. Furthermore, if the species identified is protected under Ontario's *Endangered Species Act*, 2007 or the federal *Species at Risk Act*, additional restrictions may apply.

- *Disturb, destroy or take a nest, egg, nest shelter, Eider Duck shelter or duck box of a migratory bird, or*
- *Have in his possession a live migratory bird, or a carcass, skin, nest or egg of a migratory bird except under authority of a permit therefor."*

The "incidental take" of migratory birds and the disturbance, destruction or taking of the nest of a migratory bird is prohibited. "Incidental take" is the killing or harming of migratory birds due to actions, such as economic development, which are not primarily focused on taking migratory birds. No permit can be issued for the incidental take of migratory birds or their nest or eggs because of economic activities. These prohibitions apply throughout the year.

Environment and Climate Change Canada (ECCC) and the Canadian Wildlife Service have compiled nesting calendars that show the variation in nesting intensity by habitat type and nesting zone, within broad geographical areas distributed across Canada. While this does not mean birds will not nest outside of these periods, the calendars can be used to reduce the risk of encountering a nest. It is noted that ECCC and the Canadian Wildlife Service advise that avoidance is the best approach to comply with the Act.

Applicability to the Project

The MBCA applies to all of Canada and is therefore applicable to the Project. As no permit can be issued for the incidental take of migratory birds or their nest or eggs as a result of economic activities, there is a responsibility to adhere to these regulations and ensure compliance, particularly during tree and vegetation removal associated with site clearance. Thus, tree removals required for the Project are planned to occur outside of the core breeding time-period identified by the ECCC and Canadian Wildlife Service, which takes place from April 1 to August 31 in any given year. If tree removal is proposed between April 1 to August 31, it is the proponents' responsibility to enure Best Management Practices occur by obtaining a qualified biologist who may undertake a nest sweep survey and provide recommendations to avoid the contravention of the Act. Note that nest sweep survey results and recommendations should be documented in a memo or report. A nest sweep may only be feasible in simple habitat (i.e., single trees or shrubs) and not suitable or reliable for complex habitats.

2.2 Canada Food Inspection Agency

Emerald Ash Borer (EAB; *Agrilus planipennis* Fairmaire), is a wood-boring beetle that has been introduced to Ontario from Eastern Asia (Canadian Food Inspection Agency, 2014). It was first recorded in North America in the summer of 2002 in Windsor, Ontario, and Detroit, Michigan (Canadian Food Inspection Agency, 2014). All ash (*Fraxinus* species) found in North America, including cultivars and introduced species, are vulnerable to EAB infestation (Canadian Food Inspection Agency, 2014). The Canadian Food

Inspection Agency (CFIA) Directive (D-03-08): Phytosanitary Requirements to Prevent the Introduction Into and Spread within Canada of the Emerald Ash Borer, *Agrilus planipennis* (Fairmaire) (2014) applies to ash species that are located within the EAB Regulated Areas of Canada. The intent of the Directive is to slow the spread of the EAB to new areas.

Applicability to the Project

The Project Location is within the identified regulated area, which prohibits the movement of regulated materials (including but not limited to ash (*Fraxinus* species) wood or bark, and ash wood chips or bark chips). It is noted that EAB regulated materials moving out of an EAB regulated area must be accompanied by a movement certificate issued by the CFIA. The EAB Regulated Areas of Canada are found on the CFIA website:

http://www.inspection.gc.ca/plants/plant-pests-invasive-species/insects/emerald-ash-borer/areas-regulated/eng/1347625322705/1367860339942

Twenty-two individual ash trees were found on site. To avoid contravention of the directive, any ash species removed should be destroyed and used on site. Equipment must be cleaned after use on site.

2.3 Endangered Species Act, 2007

Species designated as Threatened or Endangered by the Committee on the Status of Species at Risk in Ontario, otherwise known as the Species at Risk (SAR) in Ontario List, and their habitats (e.g., areas essential for breeding, rearing, feeding, hibernation and migration) are automatically afforded legal protection under the *Endangered Species Act*, 2007 (ESA) (Queen's Printer for Ontario, 2007). The ESA (Subsection 9 (1)) states that:

> *"No person shall,*
>
> *(a) kill, harm, harass, capture or take a living member of a species that is listed on the Species at Risk in Ontario List as an extirpated, endangered or threatened species;*
>
> *(b) possess, transport, collect, buy, sell, lease, trade or offer to buy, sell, lease or trade;*
>
> > *(i) a living or dead member of a species that is listed on the Species at Risk in Ontario List as an extirpated, endangered or threatened species;*
> >
> > *(ii) any part of a living or dead member of a species referred to in subclause (i);*
> >
> > *(iii) anything derived from a living or dead member of a species referred to in subclause (i); or*

(c) sell, lease, trade or offer to sell, lease or trade anything that the person represents to be a thing described in subclause (b) (i), (ii) or (iii)".

Clause 10 (1) (a) of the ESA states that:

"No person shall damage or destroy the habitat of a species that is listed on the Species at Risk in Ontario list as an endangered or threatened species".

The Ministry of Environment, Conservation and Parks (MECP) may issue permits and approval agreements to authorize activities that would otherwise be prohibited by subsections 9 (1) or 10 (1) of the ESA provided the legal requirements of the ESA are met.

Applicability to the Project

No tree SAR were identified during the field visits at the Project Location.

2.4 Forestry Act, 1990

Trees on property lines or on adjacent property that require removal or injury could be considered boundary trees. Consent from the adjacent landowner is required in order to ensure compliance under the Act. Principle considerations in relation to boundary trees are defined in Section 10 of the Act as follows:

1.1.1.1 Boundary trees

10 (1) An owner of land may, with the consent of the owner of adjoining land, plant trees on the boundary between the two lands. 1998, c. 18, Sched. I, s. 21.

1.1.1.2 Trees common property

(2) Every tree whose trunk is growing on the boundary between adjoining lands is the common property of the owners of the adjoining lands. 1998, c. 18, Sched. I, s. 21.

1.1.1.3 Offence

(3) Every person who injures or destroys a tree growing on the boundary between adjoining lands without the consent of the landowners is guilty of an offence under this Act. 1998, c. 18, Sched. I, s. 21.

2.5 Toronto Region Conservation Authority

The Toronto and Region Conservation Authority (TRCA) regulates watercourses, wetlands, and hazard lands (valleylands, shorelines, floodplains) through the application of the *Ontario Regulation* (O. Reg.) *166/06 - Toronto and Region Conservation Authority: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses*, under Section 28 of the *Conservation Authorities Act*. The primary purpose of O. Reg. 166/06 is to ensure public health and safety, and protection of life and property in relation to natural hazards. This regulation establishes guidelines for

development, interference with wetlands and alterations to shorelines and watercourses. Additionally, TRCA is a review agency for the municipalities in the watershed and a stakeholder in the EA.

Applicability to the Project

Based on a review of the TRCAs Regulation Mapping Tool (accessed April 2020 (Toronto and Region Conservation Authority, 2020)), the Project Location is mapped within the Authority's regulated area. The TRCA regulated areas include Rainbow and Robinson Creek. These regulated areas are more sensitive to vegetation removal due to their proximity to flowing water. While O.Reg. 166/06 does not apply directly to tree removal, TRCA has compensation guidelines for use within their regulated areas.

2.6 City of Brampton Tree Preservation By-law 217-2012

The City of Brampton's Tree Preservation By-law (217-2012) protects trees from injury and removal. This by-law applies to all private property within the City of Brampton, subject to the exemptions noted in the by-law.

Trees exempt from the bylaw include but not limited to:

- Woodlots as defined by the Woodlot Conservation By-law, By-law 4022005, or any successor by-law regulating the injury or destruction of trees in woodlots in the City of Brampton;
- Hazardous trees;
- Injury to trees that are necessary for emergency work;
- Trees located within two (2) metres (m) of an occupied building;
- Trees with a DBH of less than 30 centimetres (cm);
- Trees located on rooftop gardens, interior courtyards or solariums;
- Trees located on a nursery or orchard;
- Trees exempted by Council pursuant to the provisions of this by-law; and
- Activities or matters undertaken by a municipality or a local board of a municipality.

A tree is defined as "any species of woody perennial plant, including its root system, which has reached or can reach a height of at least 4.5 m at physiological maturity.

Applicability to the Project

This by-law does not apply to activities or matters undertaken by a municipality or a local board of a municipality.

2.7 City Woodlot Conservation By-law 316-2012

The City's Woodlot Conservation By-law (316-2012) states that no person shall injure a tree growing within woodlots. Trees exempt from this by-law include but not limited to:

- Hazardous trees;
- Injury to a tree that is necessary for emergency work;
- Injury to a tree by a farming business as part of an agricultural operation; and
- Activates or matter undertaken by a municipality or a local board of a municipality.

Applicability to the Project

This by-law does not apply to activities or matters undertaken by a municipality or a local board of a municipality.

3. Methodology

3.1 Field Investigation

Field data were collected in September, and October 2019 (Table 3-1) by an International Society of Arboriculture (ISA) Certified Arborist. For the purposes of this field assessment, the review of tree-related impacts was inventoried as per the Project Location limits provided at the time; engineering drawings for the 20% design. Trees inventoried with this 20% design are then mapped in this report on the preferred alternative design for Part 'A', which was circulated on February 28, 2020.

Table 3-1 Summary of Field Investigations

Field Visit Date (2019)	Weather Conditions	Location
September 16	17°C, light wind, cloudy	Clarkway Drive North
September 17	17°C, light wind, no clouds	Clarkway Drive South, and Countryside Drive West
September 18	15°C, no wind, no clouds	Countyside Drive East, and Coleraine Drive
October 24	12°C, light wind, slightly cloudy	Private lands throughout the Project Location

It is also important to note that limited permissions to enter (PTE) were available to Wood for the field assessment. Areas where PTE was obtained are shown in Appendix B. As such, trees, where PTE was not provided, were reviewed from the closest vantage point. A location was recorded for inaccessible trees along with an approximate offset distance to the tree to reflect tree location in mapping. Areas without PTE and no vantage points to view were not assessed. When diameter-at-breast-height (DBH) could not be measured directly (i.e., for those trees where physical contact could not be made), a DBH was estimated.

Tree locations and canopies have not been surveyed. The handheld Global Positioning System (GPS) used in the field was a Trimble Geo7X, which has an approximate level of accuracy below one (1) m where location was not estimated with an offset.

For the purposes of this Report, all trees included as part of this assessment were inspected visually from the ground. This included a non-invasive inspection of each tree, documenting site conditions, roots, trunk, and branches where visible. Visual assessment was used to categorize canopy vigour and structure. Tree species were determined, and a tree number was applied. No aluminum tags were used due to the accuracy of the GPS unit and lack of PTE.

This is considered a standard assessment that is performed by arborists to identify tree conditions from the ground level. It is understood that trees and other vegetation are living organisms and subject to change, damage, and disease. Therefore, the results provided within this Report reflect those conditions on the date(s) the assessment was completed. The results from this basic assessment should not be relied on for internal, below-ground and upper crown conditions or defects, as these areas may not be possible to visually inspect from the ground level. Although observations on structural integrity have been provided, it is beyond the scope of this Report to provide hazard ratings and/or prescribed measures to mitigate risk.

3.2 Definitions and Assessment Criteria

A series of parameters was developed by Wood, as derived from ISA's Best Management Practices (BMPs) to provide a holistic assessment of trees within the Project Location. An overall condition rating (i.e., dead, poor, fair, good) was assigned to each tree meeting the required diameter (i.e., ≥10 cm). The criteria applied during field visits are below.

Tree Number: This number refers to the number (e.g., 270) that will be listed in the tree inventory chart and illustrated on plan drawings. The Tree Numbers are unique to this document and associated assessment in order to support clear reference for defined impacts and preservation recommendations.

Species: Each tree will be identified by scientific and common name.

Assessment Approximate (No PTE): Permission to enter the private property was not provided to Wood and assessments were completed from the closest vantage point.

Offset Distance: A GPS location was recorded in publicly accessible areas for inaccessible trees along with an approximate offset distance to the tree in order to reflect tree location in mapping.

DBH: DBH (measured at 1.4 m above the ground). For multiple stemmed trees that split below the 1.4 m, the DBH measurement will be calculated using the DBH of each stem

and then added together for a total DBH. For trees where access was not provided, an estimated DBH was used.

Approximate Dripline Radius: An approximate measurement of the tree's dripline was provided in metres (m). This measurement was based on a field review of existing dripline.

Tree Protection Zone (TPZ) Impact Assessment: A review of each TPZ was completed as a desktop exercise. The TPZ assigned was based on the Temporary Tree Protection Fencing Guide (City of Brampton, 2014). In Appendix A, when the tree is located completely within the proposed footprint (i.e., removal is obvious), a canopy or TPZ outline is not provided. When a tree is outside the proposed footprint and the potential to retain the tree is present, a TPZ outline is provided. The TPZ was outlined in the drawings, and compared with field notes on canopy size, to provide a review of tree-related impacts. The TPZs as assigned are based on the tree's DBH and its classification as identified in Table 3-1.

Table 3-2 Standard Tree Protection Zone (TPZ) set by the City of Brampton

Trunk Diameter (DBH)[1]	Minimum Protection Distances Required[2]
<30cm	Radius of dripline[3]
>30cm	2 x radius of the dripline

1. DBH measurement of tree stem taken at 1.4 m above the ground.
2. TPZ distances are to be measured from the outside edge of the tree base.
3. The dripline is defined as the area beneath the outermost branch tips of a tree.

Condition Rating- Structure and Crown Vigour: The condition of each tree was assessed based on several factors including size, species, condition, location, root system, trunk, branching, twigs and foliage (on coniferous trees, and buds when available for deciduous trees), disease evidence, and the overall health and vigour of the tree. Each tree was provided with a condition as outlined in the following categories:

GOOD (G): Overall, the tree is healthy and satisfactory in condition, vigour, and form based on the given tree assessment criteria (structure and health). The tree has no major structural problems, no mechanical damage, and may only have insignificant aesthetic, insect, disease, or structure problems. Small amounts of deadwood may be present in the secondary branches but account for less than 15% of the canopy. Good structure trees have one main trunk with strong root collars, zero stem splitting, and branches are spaced apart.

FAIR (F): The tree has no major structural problems, no significant mechanical damage, may have only minor aesthetic insect, disease, or structure problems, and is in good health. Trees in fair condition show moderate symptoms of decline in the lower canopy or scaffold branches, but more than 40% of the scaffold branches are viable. Fair structure trees may have two or several trunks splitting from the base or co-dominant stems. Branching will not be radially spaced along the trunk.

POOR (P): The tree may exhibit the following characteristics: minor structural problems, mechanical damage, significant damage from diseases, thin crown, or stunted growth compared to adjacent trees. This condition also includes trees that have been topped but show reasonable vitality with no obvious signs of decay. Greater than 40% of the main scaffold branches are dead, missing or in a diseased state. The poor condition rating can be applied to trees where the trunk shows evidence of advanced rot, deadwood, is hollow, or there is twig development on the main branches. Structural conditions will likely result in the breakage of major limbs and contributes to overall tree failure. E.g., weak co-dominate stems, leaning trees, one-sided canopy.

DEAD (D): The tree displayed no apparent signs of live growth.

Comments: any other comments, usually related to tree health or location.

Recommendation: Based solely on the preliminary footprint provided trees were marked as retain, injure, or remove. Trees within the footprint or had canopies which overlapped by 25% or more were considered as "remove" in figures. Trees which had TPZ zones on the footprint, but canopies were outside of the footprint were marked as injured. Trees which had no canopy or TPZ overlap with the footprint were marked as retain.

4. Existing Conditions

This Tree Assessment documented a total of 353 trees greater than 10 cm DBH in Study Corridor Part 'A'. Tree locations relative to the Project Location are illustrated in Appendix A. Project Site Photographs are provided in Appendix D.

Many of the trees situated within the Project Location were in good condition in both structure and canopy vigour (Exhibit A). No tree Species at Risk were identified during the field visits at the Project Location.

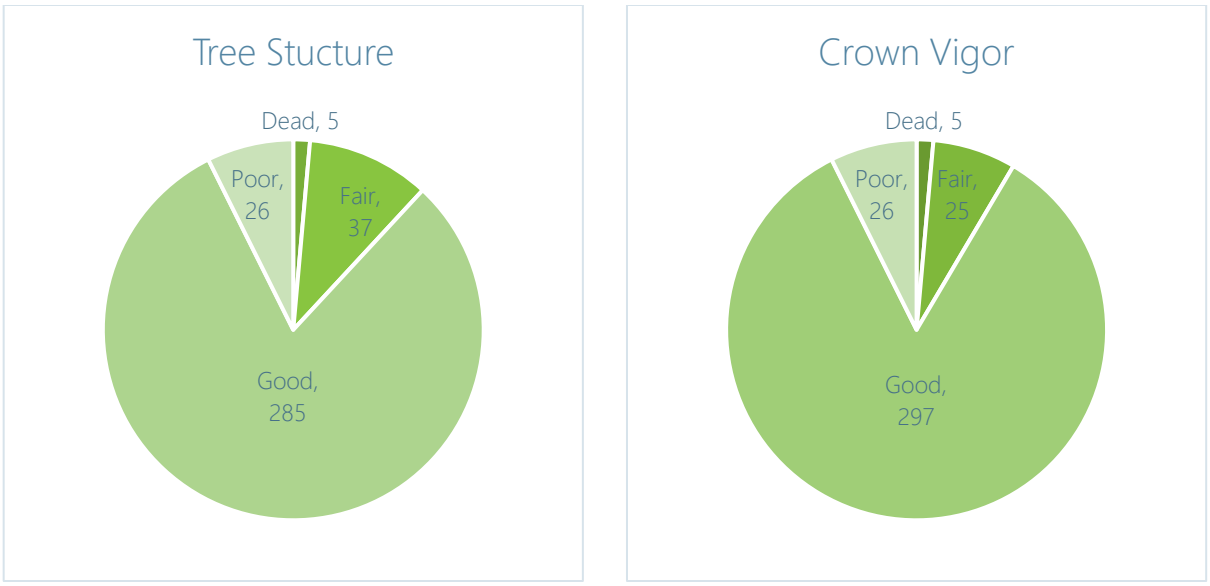


Exhibit A

The Study Area primarily consists of residential dwellings and agricultural lands, and species composition was reflective of heavily impacted site conditions. Composition ranged from non-native to native and naturalized species and cultivar species (Exhibit B). Manitoba Maple is native to the Prairies, Northwest Ontario, and Windsor, Ontario. However, it is often considered naturalized in other parts of Ontario. Some Conservation Authorities and Municipalities consider Manitoba Maple non-native. A summary of species composition is provided in Table 4-1.

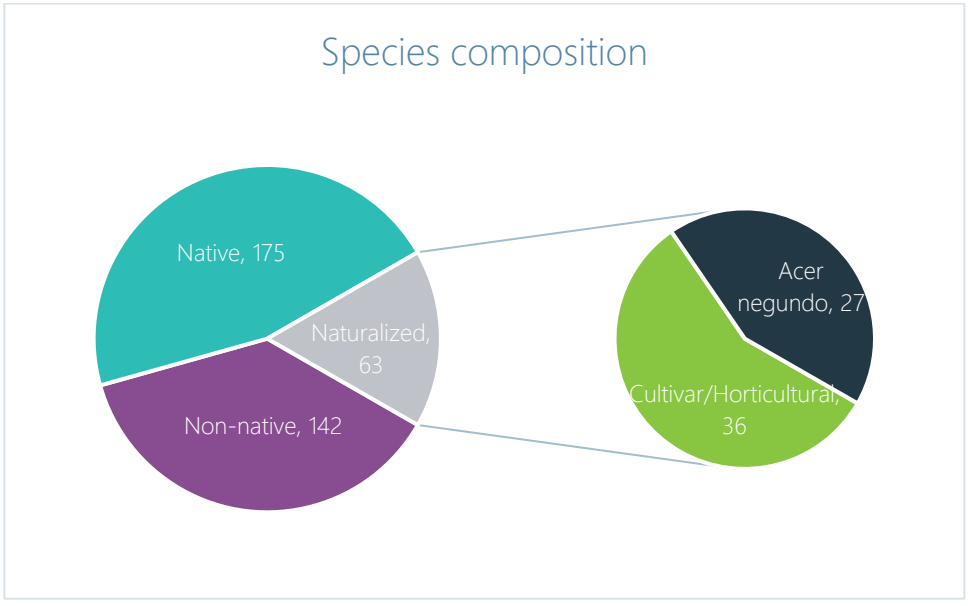


Exhibit B

Typical signs and symptoms of abiotic and biotic defects found in urbanized settings were noted, which included:

- Deadwood ranging between five (5) to greater than 40%;
- Weakly formed unions;
- Poor tree form due to abnormal development of scaffold branches causing injury to other branches;
- Lean and contorted growth (e.g., girdling roots);
- Mower damage from landscaping efforts;
- Lack of vigour;
- Broken branches;
- Trunk wounds and cracks; and
- Several dead trees.

All 22 White Ash (*Fraxinus americana*) observed showed extensive signs of EAB.

Table 4-1: Summary of Trees Inventoried in Study Corridor Part 'A' and Associated Impact

Botanical Name	Common Name	Total # Assessed	# to be Removed	# to be Injured	# to be Preserved
Tilia americana	American Basswood	1	1		
Pinus nigra	Austrian Pine*	37	37		
Robinia pseudoacacia	Black Locust*	2	2		
Juglans nigra	Black Walnut	1	1		
Picea pungens	Colorado Blue Spruce*	38	30	2	6
Catalpa speciosa	Catalpa Tree	2	1		1
Juniperus virginiana	Eastern Red Cedar	14	14		
Thuja occidentalis	Eastern White Cedar	30	30		
Thuja occidentalis	Eastern White Cedar Hedge	3	3		
Pinus strobus	Eastern White Pine	5	4		1
Quercus robur	English Oak	2	1	1	
Gleditsia triacanthos	Honey Locust	10	10		
Aesculus hippocastanum	Horse Chestnut	1	1		
Populus grandidentata	Large Tooth Aspen	1	1		
Tilia Cordata	Little Leaf Linden	18	18		
Acer negundo	Manitoba Maple	27	13	3	11
Acer platanoides	Norway Maple	10	10		
Picea abies	Norway Spruce	23	8	3	12
Malus Species	Ornamental Crabapple Tree	5	3		2
Pyrus Species	Pear	1			1
Elaeagnus angustifolia	Russian Olive	3	3		
Acer saccharinum	Silver Maple	40	30	4	6
Populus tremuloides	Trembling Poplar	1	1		
Salix babylonica	Weeping Willow	7	7		
Fraxinus americana	White Ash	22	19	1	2
Betula papyrifera	White Birch	1	1		
Morus alba	White Mulberry	1	1		
Quercus alba	White Oak	1	1		
Picea glauca	White Spruce	26	26		
Salix Species	Willow Species	20	16	1	3
Total		**353**	**293**	**15**	**45**

5. Proposed Tree Removals and Impacts Summary

The assessment of tree conflicts was completed based on the provided preferred alternative design for Part 'A' which resulted in the anticipated removal of 293 trees and the injury of 15 trees.

There are significant proposed removals and injuries are on private property (pending any property acquisition that may occur). Trees listed as injured are trees outside the project footprint, but the construction footprint is still within the Tree Protection Zone for the individual tree.

Construction activities can indirectly injure trees with a change from a permeable landscape to a nonpermeable landscape (e.g., reducing infiltration) or unknowingly cause direct damage to trees by severing roots or breaking branches (i.e., not pruning branches before activities). Potential Impacts are further described below.

Tree removals and pruning should be carried out by a qualified Arborist. A follow-up survey by a qualified arborist should occur to ensure that damage potentially resulting in tree mortality has not occurred to trunks or canopies.

5.1 Potential Impacts on Trees

There are several common impacts on trees that can occur during construction. The following construction activities have the potential to damage trees and may be encountered for this Project. Additional impacts associated with the construction based on further design elements will be added to this section as required.

5.1.1 Soil Compaction and Grade Changes

Soil compaction around areas where tree roots grow causes tree decline (Lilly, 1993). Soil compaction includes vehicle traffic, pedestrian/foot traffic, and stockpiling. Soil compaction reduces the pore space in the soil, thereby limiting oxygen and water transport. If the soil becomes heavily compacted, the tree will suffocate and begin declining, making it more susceptible to pests and disease. Impacts such as these may not be immediately visible. The decline could take up to five (5) years to become evident, likely well after construction and associated work activities have concluded.

5.1.2 Physical Injury

Accidental contact between construction equipment and trees can result in damage to the roots, trunks and crown.

5.1.3 Severing Roots

Root cutting is a type of injury to a tree that can significantly affect its health. Excavation for the installation of new infrastructure may cut tree roots if the excavation

is too close to the tree. It is important to note that the majority of tree roots are found in the upper 30 to 60 cm of the soil. Trees can become destabilized (i.e., a hazard) and may fall if structural roots that support the tree are severed or removed altogether.

5.1.4 Release of Deleterious Substances

The accidental release of deleterious substances such as oil, hydraulic fluid, etc., into the soil within proximity to trees, can inhibit tree growth and function.

6. Tree Protection Measures

The site-specific locations/extent of the work have not been determined. Therefore, general guidelines for tree preservation are provided below but should be refined during detailed design and prior to commencing construction. The Design Builder is responsible to confirm the limits of the work and tree removals and update the Arborist Report accordingly.

The majority of trees identified for preservation are outside of the Project Location and on private property. Those trees confirmed to not be in conflict and that require preservation considerations must be demarcated in drawings during Detailed Design. Additionally, injured trees may also be preserved, pending location-specific impacts. Tree protection measures have been summarized below.

For all trees to be preserved (i.e., do not require removal), a Tree Protection Zone (TPZ) is to be established. The TPZ minimum distances are established in the example plan *Temporary Tree Protection Fencing Guide* (City of Brampton, 2014) (Appendix E). The TPZ to be assigned is based on the tree's dripline. The minimum protection distance (i.e., TPZ) is provided in Table 6-1.

Table 6-1 Standard Tree Protection Zone (TPZ) set by the City of Brampton

Trunk Diameter (DBH)[1]	Minimum Protection Distances Required[2]
<30cm	Radius of dripline[3]
>30cm	2 x radius of the dripline

4. DBH measurement of tree stem taken at 1.4 m above the ground.
5. TPZ distances are to be measured from the outside edge of the tree base.
6. The dripline is defined as the area beneath the outermost branch tips of a tree.

Note that, the City of Brampton also issues a standalone section of their Landscape Specifications called Tree & Shrub Preservation which states that "Existing trees shall be properly protected beyond the drip line with minimum 1.2m high temporary fencing as per City of Brampton standard until Substantial Performance." It is the responsibility of the Design Builder to determine which standard for TPZ is to be adhered to.

6.1 Tree Protection Zone Specifics

It is the responsibility of the site supervisor to inspect the condition of the tree protection measures regularly and denote damage and maintenance requirements. If damage or maintenance is observed, repair work to the tree protection barriers should be completed immediately. To not repair is considered a breach of the tree protection By-law and could result in an immediate "stop-work" order being issued for the site.

According to the City specifications, the TPZ shall be constructed with 38 x 38 T-Bar posts 120 cm apart. Every third post is to be either 10 cm x 10 cm square or 7.6 cm diameter round pressure treated Jack Pine or Cedar Post. Posts should be driven 91.4 cm into the ground. Additionally, Fencing should be a barrier at least 1.2 m in height made from high visibility orange safety fencing framed with T-bar posts and 2"x4"s for top rails. Where fill or excavate is to be stored near the TPZ, a plywood barrier will be used. All tree protection barriers should be installed prior to construction.

The TPZ is considered a "no-touch zone" whereby there will be:

- No construction;
- No altering of grade by adding fill;
- No excavating, trenching, scraping, dumping or disturbance of any kind;
- No storage of construction materials, equipment, soil, construction waste or debris;
- No disposal of any liquids, e.g., concrete, gas, oil, paint;
- No movement of vehicles, equipment or pedestrians; and
- No parking of vehicles or machinery.

Signage should be mounted on the TPZ to inform all workers of the tree protection barrier. The minimum size is 10"x14".

6.2 Root Zone Protection Measures

The standards of a TPZ should be continued outside of the TPZ, where roots zones are located. If staging areas or access routes are proposed in areas adjacent to trees Root Zone Compaction Protection (RZCP) is recommended. The RZCP will vary depending on the intended use. For example, If use is non-vehicular access, light RZCP can be applied in the following layers:

- medium weight non-woven geotextile fabric (e.g., landscape cloth),
- 150mm of wood chips over the fabric area, and
- installation of ½" plywood over wood chips.

To negate soil compaction from heavy machinery robust RZCP should be used. RZCP should be developed on a site-specific basis but may include any addition of the above

and should focus on weight-dissipating materials or modular geocellular systems (e.g., Permavoid ArborRaft). It is also recommended that if compaction occurs, aerating the area post-construction will assist in maintaining tree health.

6.3 Other Protection Measures

Additionally, proper root and branch pruning should be done in advance of anticipated damage, root zone excavation, or immediately afterwards if such injury was unforeseen. If tree roots are damaged during soil excavation or branches during construction activities, it is required that damaged roots be pruned with clean and sharp hand tools. Prolonged exposure (3+ hours) of roots be avoided, and if necessary, exposed cut edges of roots should be kept moist by covering them with moist backfill, mulch, irrigation, or layers of damp burlap. Pruning damaged roots and branches can facilitate healing and minimize the risk of infection.

7. Replacement and Compensation

The City of Brampton guides tree replacements in the Tableland Tree Assessment Guidelines (2018). These City Guidelines provide the following for tree removal compensation ratios of healthy tableland trees:

DBH (cm)	Ratio
15-20	1:1
21-35	2:1
36-50	3:1
51-65	4:1
>65	5:1

As noted in Section 2.5, The TRCA provides compensation guidelines for regulated areas. The TRCA, in its role as a public commenting body under the planning and environmental processes, produced a Guideline for Determining Ecosystem Compensation (after the decision to compensate has been made) (2018). The Guideline instructs municipalities undertaking public infrastructure projects to discuss compensation on a case-by-case base with TRCA. The goal of the TRCA Guideline is to ensure land base compensation for ecosystem removal, as appropriate, and that the principles of their Guideline are followed.

The Guideline uses the basal area to establish ecosystem restoration replacement ratios (in hectares). However, when not a part of an Ecological Land Classification delineated system, the TRCA Guideline for Basal Area compensation does not apply. Instead, the TRCA recommends the following Table 7-1 for individual tree replacement when the basal area approach is not suitable.

Table 7-1 Replication Tree (Planting) Ratio by Diameter at Breast Height (DBH) set by the TRCA Guideline for Determining Ecosystem Compensation (2018)

DBH Range (cm)[1]	Replication Ratio
0-10	1:1
10.1-20	1:3
20.1-30	1:10
30.1-40	1:15
40.1-50	1:20
50.1-60	1:30
60.1-70	1:40
70.1+	1:50

1. DBH measurement of tree stem taken at 1.4 m above the ground.

Based on the number of removed trees the following compensation numbers are estimated:

- There are an estimated 181 City of Brampton tablelands trees to be removed. Tableland trees are assumed to be those trees outside of the TRCA regulated area. Compensation required, based on DBH, is 389 trees.
- The TRCA regulated areas contains trees within agricultural hedgerows and right-of-ways, therefore the replication ratio is applied (Table 7-1). Compensation required is 1,551 trees.
- Compensation for City tableland trees (381 trees) combined with TRCA regulated areas (1,551 trees) results in the need for 1,932 compensation trees.

Compensation should be discussed and agreed on with the City, the Region of Peel, and TRCA. On-site compensation (occurs on the same site that the ecosystem impact is taking place) is preferred over off-site compensation. It is recommended that compensation trees be planted as a part of the restoration plan for Rainbow Creek and that a mix of native shrubs and trees be considered.

8. Conclusion

Wood was retained by the City to provide a Tree Assessment as part of a Schedule 'C' Municipal Class Environmental Assessment (EA) for the Arterial Road Network within the Highway 427 Industrial Secondary Plan Area. Impacts on trees within the study area will be largely associated with construction and grading activities. To meet the requirements for the construction footprint provided in the preferred alternative design (February 2020), a total of 293 trees will need to be removed, and 15 trees may potentially be injured. While the nature of the work to be completed is generally understood, the site-specific locations/extent of the work has not been determined. The Design Builder is responsible to confirm the limits of the work and tree removals and update the Arborist Report accordingly.

Potential impacts to trees could be avoided during construction with appropriate protection measures and practices. The location and type of protection is to be confirmed during detailed design and are not illustrated at this time.

Compensation for trees needs to be discussed between the City, the Region of Peel, and the TRCA. However, using the City and TRCA guidelines, 1,932 compensation trees is likely required. As it is preferred that compensation plantings occur on-site, and the Rainbow Creek Corridor is subject to an extensive restoration plan (under separate cover), compensation plantings required as part of the arterial road network could be included within the Rainbow Creek Restoration plan, if accepted by the City, Region, and TRCA.

The above outlines observed conditions, estimates removals and summarizes protection measures and compensation potential. This tree inventory provides a view of trees inventoried in relation to the preferred alternative design (February 2020) in Appendix A.

The findings, interpretations and recommendations as outlined herein are based on the expertise of Wood and based on the observations and information available at the time of the Report preparation. This Report has been prepared by Wood for the sole benefit of the City of Brampton for the purposes of this Project as identified herein. It should not be relied upon by any other party or used for any other purposes. Any use by which a third party makes of this Report, or any reliance on or decisions made based on it, are the responsibilities of such third parties.

9. Limitations of Assessment

This assessment is based on the circumstances, observations and interpretations as they existed at the time the inventory was completed, and those trees documented within Part A. The opinions in this assessment are based on observations made and using generally accepted professional judgment. It is understood that trees and other vegetation are living organisms and subject to change, damage, and disease. Therefore, the results provided within this Report reflect those conditions on the date the assessment was completed and no guarantee, warranty, representation or opinion is offered or made as to the length of the validity of the results, observations, recommendations and analysis contained within this assessment. As noted herein, the results from this assessment should not be relied on for internal, below-ground and/or upper crown conditions or defects, as these areas were not visually inspected.

The assessment carried out was restricted to the areas where access was provided. No assessment of any other trees or plants has been undertaken by Wood under this heading.

In carrying out this assessment, Wood has exercised a reasonable standard of care, skill and diligence as would be customarily and normally provided in carrying out this type of

assessment. The assessment has been made using accepted arboricultural techniques. As such, all trees included as part of this assessment were inspected visually from the ground. This included a non-invasive inspection of each tree, documenting site conditions, buttress roots, trunk, and branches. This is considered a standard assessment that is performed by arborists to identify tree conditions from the ground level. While reasonable efforts have been made to ensure that the trees recommended for retention are healthy, no guarantees are offered, or implied, that these trees, or all parts of them will remain standing. It is both professionally and practically impossible to predict with absolute certainty the behaviour of any single tree or group of trees, or all their component parts, in all given circumstances. Inevitably, a standing tree will always pose some risk. Most trees have the potential to fall, lean, or otherwise pose a danger to property and persons in the event of adverse weather conditions, and this risk can only be eliminated if the tree is removed, or to the degree in which it can be properly pruned to mitigate risk.

10. References

Canadian Food Inspection Agency. (2014). *Directive (D-03-08): Phytosanitary Requirements to Prevent the Introduction Into and Spread within Canada of the Emerald Ash Borer, (Agrilus planipennis) (Fairmaire)*. Retrieved from http://www.inspection.gc.ca/plants/plant-pests-invasive-species/directives/forestry/d-03-08/eng/1323821135864/1323821347324

City of Brampton. (2012). *Tree Preservation By-law 316-2012*. Brampton.

City of Brampton. (2012). *Tree Preservation By-law 317-2012*.

City of Brampton. (2014). *Temporary Tree Proteciton Fencing*. Brampton.

City of Toronto. (2016). *Tree Protection Policy and Specificaiton For Construction Near Trees*. Toronto: Urban Forestry.

Government of Canada. (1994). *Migratory Birds Convention Act, 1994 (S.C. 1994, c.22)*. Retrieved from Justice Laws Website: http://laws-lois.justice.gc.ca/eng/acts/M-7.01/FullText.html

Government of Canada. (2016, 06 13). *Migratory Birds Regulations (C.R.C., c.1035)*. Retrieved from Justice Laws Website: http://laws.justice.gc.ca/eng/regulations/C.R.C.,_c._1035/index.html

Queen's Printer for Ontario. (2007). *Endangered Species Act, 2007, S.O., c.6*. Retrieved from http://www.ontario.ca/laws/statute/07e06

Toronto and Region Conservation Authority. (2020). *Regultated Area Search*.

Appendix A: Tree Inventory Figures

605000 4855000 606000 4854000 607000

4853000 607000 4852000 606000

PILLSWORTH RD
Regional Road 50
COLD CREEK RD
NASHVILLE RD
HWY 50
MAJOR MACKENZIE DR W
MAYFIELD RD
COLERAINE DR
COUNTRYSIDE DR

1A 1B 1C 1D 1E 1F 1G 1H 1J 1K 1L 1M 1N 1O 1P 1Q 1R 1S 1T 1U 1V 1W 1X 1Y 1Z 1ZA 1ZB 1ZC 1ZD 1ZE 1ZF 1ZG

G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MXD\Tree Inventory Overview.mxd Last saved by candace.macdonald

LEGEND

Tree Inventory

- Injure
- Retain
- Remove

- Tree Protection Zone
- Road Footprint
- PTE Area
- Map Index

0 250 500 1,000 1,500 2,000 Metres

NOTES:
- Basedata from MNRF LIO, 2019
- Imagery from ESRI, 2021

Datum: NAD83
Projection: UTM Zone 17N

wood.

BRAMPTON HWY 427 EA

Tree Inventory OVERVIEW

PROJECT N°: TP115086 | **FIGURE: 1**

SCALE: 1:10,000 | DATE: May 2021

4854800 605600 4854600

NASHVILLE RD

COLD CREEK RD

Regional Road 50

HWY 50

Regional Road 50

4854400

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

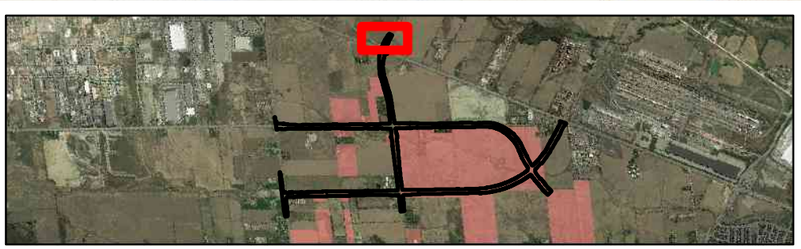
G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MXD\Tree Inventory Part A.mxd Last saved by candace.macdonald

LEGEND

Tree Inventory

- Injure
- Retain
- Remove

- Tree Protection Zone
- Road Footprint
- PTE Area



0 25 50 100 150 200 Metres

NOTES:
- Basedata from MNRF LIO, 2019
- Imagery from Google, 2018

wood.

BRAMPTON HWY 427 EA

Tree Inventory
PART A

Datum: NAD83
Projection: UTM Zone 17N

PROJECT N°: TP115086 | **FIGURE: 1A**

SCALE: 1:1,200 | DATE: May 2021

4854600

605400

Regional Road 50

COUNTRYSIDE DR

581
582
583
584
585
586
587

631

4854400

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

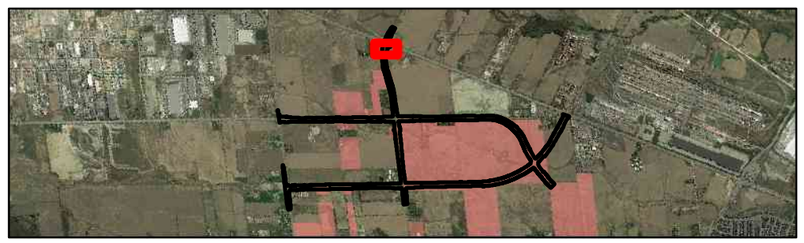
G:\PROJECTS\TP115086 Brampton Tree Inventory\V13 GIS\MXD\Tree Inventory_Part A.mxd Last saved by: candace.macdonald

LEGEND

Tree Inventory

- Injure
- Retain
- Remove

- Tree Protection Zone
- Road Footprint
- PTE Area



0 12.5 25 50 75 100 Metres

NOTES:
- Basedata from MNRF LIO, 2019
- Imagery from Google, 2018

Datum: NAD83
Projection: UTM Zone 17N

wood.

BRAMPTON HWY 427 EA

Tree Inventory
PART A

PROJECT N°: TP115086 | **FIGURE: 1B**

SCALE: 1:600 | DATE: May 2021

605200

605400

4854200

605400

COUNTRYSIDE DR

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

G:\PROJECTS\TP115086 Brampton Tree Inventory\v13 GIS\MXD\Tree Inventory Part A.mxd Last saved by: candace.macdonald

LEGEND

Tree Inventory

- Injure
- Retain
- Remove

- Tree Protection Zone
- Road Footprint
- PTE Area

0 25 50 100 150 200 Metres

NOTES:
- Basedata from MNRF LIO, 2019
- Imagery from Google, 2018

Datum: NAD83
Projection: UTM Zone 17N

wood.

BRAMPTON HWY 427 EA

Tree Inventory
PART A

PROJECT N°: TP115086	**FIGURE: 1C**
SCALE: 1:1,200	DATE: May 2021

605200

4854200

COUNTRYSIDE DR

630

629

628

627

588

589

626

605200

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

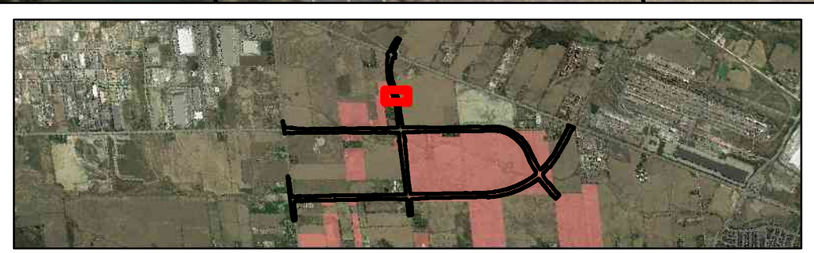
G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MXD\Tree Inventory_Part A.mxd, Last saved by: candace.macdonald

LEGEND

Tree Inventory

- Injure
- Retain
- Remove

- Tree Protection Zone
- Road Footprint
- PTE Area



0 12.5 25 50 75 100 Metres

NOTES:
- Basedata from MNRF LIO, 2019
- Imagery from Google, 2018

Datum: NAD83
Projection: UTM Zone 17N

wood.

BRAMPTON HWY 427 EA

Tree Inventory
PART A

PROJECT N°: TP115086 | **FIGURE: 1D**

SCALE: 1:600 | DATE: May 2021

4854200

605200

625
624
623
622
621
620
619
618
617
616
615
614
613
612
611
610
609

COUNTRYSIDE DR.

605200

4854000

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MXD\Tree Inventory_Part A.mxd | Last saved by: candace.macdonald

LEGEND

Tree Inventory

- Injure
- Retain
- Remove

- Tree Protection Zone
- Road Footprint
- PTE Area

0 12.5 25 50 75 100 Metres

NOTES:
- Basedata from MNRF LIO, 2019
- Imagery from Google, 2018

Datum: NAD83
Projection: UTM Zone 17N

wood.

BRAMPTON HWY 427 EA

Tree Inventory
PART A

PROJECT N°: TP115086	**FIGURE: 1E**
SCALE: 1:600	DATE: May 2021

605000

4854000

608
607
606
605
604
600
603
602
601
599
598
597
596
595
594
592
593
591

COUNTRYSIDE DR

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

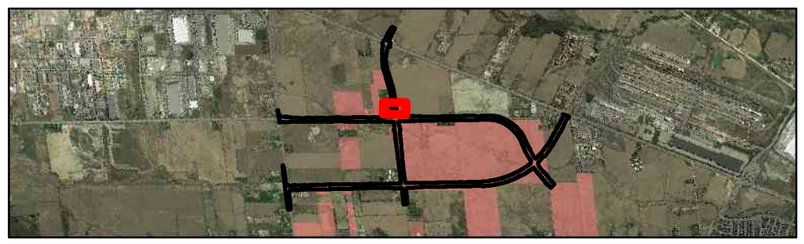
G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MXD\Tree Inventory Part A.mxd Last saved by: candace.macdonald

LEGEND

Tree Inventory

- Injure
- Retain
- Remove

- Tree Protection Zone
- Road Footprint
- PTE Area



0 12.5 25 50 75 100 Metres

NOTES:
- Basedata from MNRF LIO, 2019
- Imagery from Google, 2018

Datum: NAD83
Projection: UTM Zone 17N

wood.

BRAMPTON HWY 427 EA

Tree Inventory
PART A

PROJECT N°: TP115086 | **FIGURE: 1F**

SCALE: 1:600 | DATE: May 2021

4854000

605000

590

732

COLERAINE DR

COUNTRYSIDE DR

4853800

655

654

573

572

571

570

569

568

605000

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

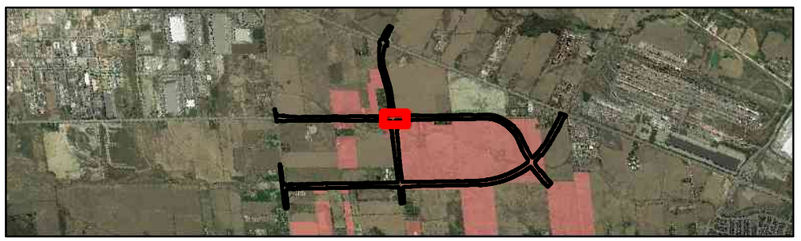
G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MXD\Tree Inventory Part A.mxd Last saved by: candace.macdonald

LEGEND

Tree Inventory

- Injure
- Retain
- Remove

- Tree Protection Zone
- Road Footprint
- PTE Area



0 12.5 25 50 75 100 Metres

NOTES:
- Basedata from MNRF LIO, 2019
- Imagery from Google, 2018

Datum: NAD83
Projection: UTM Zone 17N

wood.

BRAMPTON HWY 427 EA

Tree Inventory PART A

PROJECT N°: TP115086 | **FIGURE: 1G**

SCALE: 1:600 | DATE: May 2021

4853800

574
575
567
566
564
563
565
576
577
562
561
578
579
560
580
556
555

COUNTRYSIDE DR

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

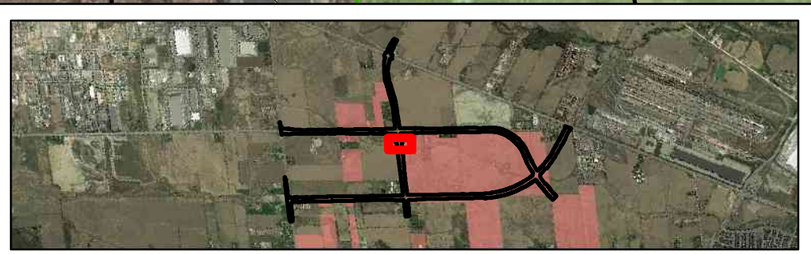
G:\PROJECTS\TP115086 Brampton Tree Inventory\v13 GIS\MXD\Tree Inventory Part A.mxd Last saved by: candace.macdonald

LEGEND

Tree Inventory

- Injure
- Retain
- Remove

- Tree Protection Zone
- Road Footprint
- PTE Area



0 12.5 25 50 75 100 Metres

NOTES:
- Basedata from MNRF LIO, 2019
- Imagery from Google, 2018

Datum: NAD83
Projection: UTM Zone 17N

wood.

BRAMPTON HWY 427 EA

Tree Inventory
PART A

PROJECT N°: TP115086 | **FIGURE: 1H**

SCALE: 1:600 | DATE: May 2021

4853800

604800

4853600

4853400

COUNTRYSIDE DR

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

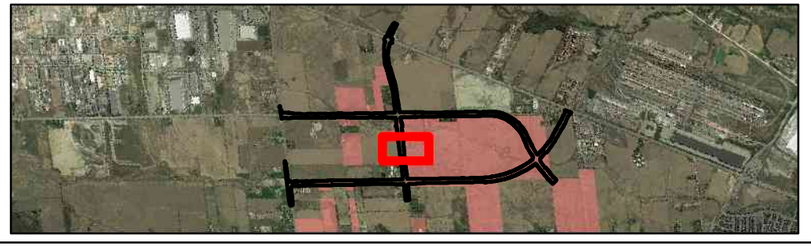
G:\PROJECTS\TP115086_Brampton_Tree_Inventory\13_GIS\MXD\Tree_Inventory_Part_A.mxd Last saved by: candace.macdonald

LEGEND

Tree Inventory

- Injure
- Retain
- Remove

- Tree Protection Zone
- Road Footprint
- PTE Area



0 25 50 100 150 200 Metres

NOTES:
- Basedata from MNRF LIO, 2019
- Imagery from Google, 2018

Datum: NAD83
Projection: UTM Zone 17N

wood.

BRAMPTON HWY 427 EA

Tree Inventory
PART A

PROJECT N°: TP115086	**FIGURE: 1J**
SCALE: 1:1,200	DATE: May 2021

604600

4853400

554
553
551
552
550
549
548
547
546
545
544
543
542
541
557
540

COUNTRYSIDE DR

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

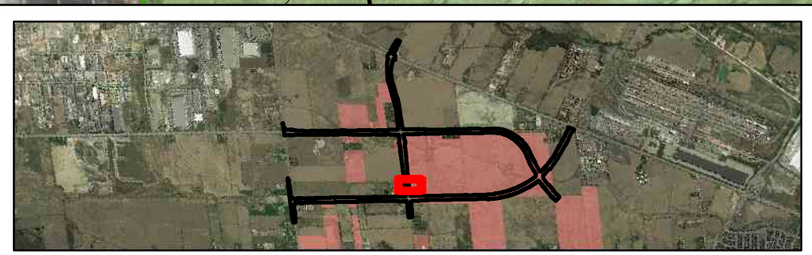
G:\PROJECTS\TP115086 Brampton Tree Inventory\v13 GIS\MXD\Tree Inventory Part A.mxd Last saved by: candace.macdonald

LEGEND

Tree Inventory

- Injure
- Retain
- Remove

- Tree Protection Zone
- Road Footprint
- PTE Area



0 12.5 25 50 75 100 Metres

NOTES:
- Basedata from MNRF LIO, 2019
- Imagery from Google, 2018

Datum: NAD83
Projection: UTM Zone 17N

wood.

BRAMPTON HWY 427 EA

Tree Inventory PART A

PROJECT N°: TP115086 | **FIGURE: 1K**

SCALE: 1:600 | DATE: May 2021

4853400

604600

604600

COUNTRYSIDE DR

539 538 537 558 536 535 559 534 533 532 531 530 529 528 527 526 525 524 458 457 456

885 884 891 892 890 889 887 888 893 886 897 894 896 898 895 880 881 883 882 899 900 879 878 877 876 875 874

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

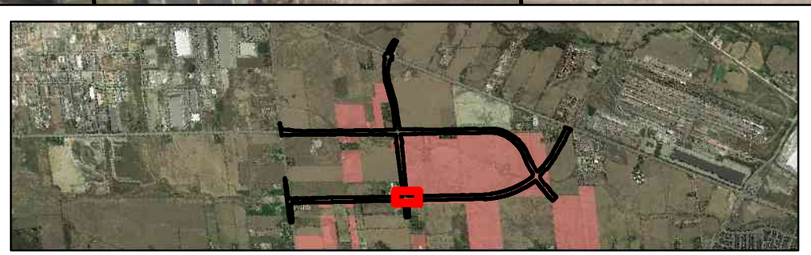
G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MXD\Tree Inventory Part A.mxd Last saved by: candace.macdonald

LEGEND

Tree Inventory

- Injure
- Retain
- Remove

- Tree Protection Zone
- Road Footprint
- PTE Area



0 12.5 25 50 75 100 Metres

NOTES:
- Basedata from MNRF LIO, 2019
- Imagery from Google, 2018

Datum: NAD83
Projection: UTM Zone 17N

wood.

BRAMPTON HWY 427 EA

Tree Inventory PART A

PROJECT N°: TP115086 | **FIGURE: 1L**

SCALE: 1:600 | DATE: May 2021

604400

4853200

455
454
453
452
451
450
449
448
447
446
445
444
443
442
441
440
439
459
460
462
461
465
463
464

COUNTRYSIDE DR

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MXD\Tree Inventory Part A.mxd Last saved by: candace.macdonald

LEGEND

Tree Inventory

- Injure
- Retain
- Remove

- Tree Protection Zone
- Road Footprint
- PTE Area

0 12.5 25 50 75 100 Metres

NOTES:
- Basedata from MNRF LIO, 2019
- Imagery from Google, 2018

Datum: NAD83
Projection: UTM Zone 17N

wood.

BRAMPTON HWY 427 EA

Tree Inventory
PART A

PROJECT N°: TP115086 | **FIGURE: 1M**

SCALE: 1:600 | DATE: May 2021

4853200

604400

466

523

522

467

COUNTRYSIDE DR

604400

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MXD\Tree Inventory Part A.mxd Last saved by: candace.macdonald

LEGEND

Tree Inventory

- Injure
- Retain
- Remove

- Tree Protection Zone
- Road Footprint
- PTE Area

0 12.5 25 50 75 100 Metres

NOTES:
- Basedata from MNRF LIO, 2019
- Imagery from Google, 2018

Datum: NAD83
Projection: UTM Zone 17N

wood.

BRAMPTON HWY 427 EA

Tree Inventory
PART A

PROJECT N°: TP115086 | **FIGURE: 1N**

SCALE: 1:600 | DATE: May 2021

604000 4855000 604200 4854800

COLERAINE DR

MAYFIELD RD

604200

4854600

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MXD\Tree Inventory_Part A.mxd, Last saved by: candace.macdonald

LEGEND

Tree Inventory

- Injure
- Retain
- Remove

- Tree Protection Zone
- Road Footprint
- PTE Area

0 25 50 100 150 200 Metres

NOTES:
- Basedata from MNRF LIO, 2019
- Imagery from Google, 2018

Datum: NAD83
Projection: UTM Zone 17N

wood.

BRAMPTON HWY 427 EA

Tree Inventory PART A

PROJECT N°: TP115086 | **FIGURE: 1O**

SCALE: 1:1,200 | DATE: May 2021

604200

4854600

633

COLERAINE DR

632

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

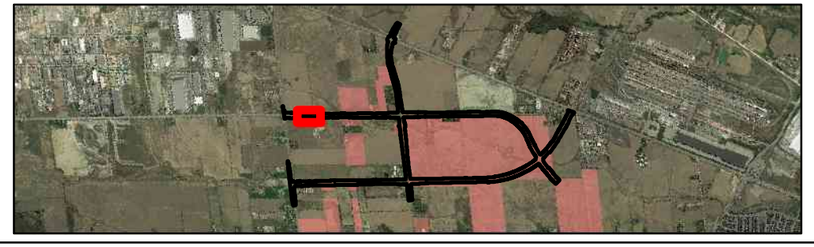
G:\PROJECTS\TP115086 Brampton Tree Inventory\19 GIS\MXD\Tree Inventory Part A.mxd Last saved by: candace.macdonald

LEGEND

Tree Inventory

- Injure
- Retain
- Remove

- Tree Protection Zone
- Road Footprint
- PTE Area



0 12.5 25 50 75 100 Metres

NOTES:
- Basedata from MNRF LIO, 2019
- Imagery from Google, 2018

Datum: NAD83
Projection: UTM Zone 17N

wood.

BRAMPTON HWY 427 EA

Tree Inventory
PART A

PROJECT N°: TP115086	**FIGURE: 1P**
SCALE: 1:600	DATE: May 2021

604400

4854400

COLERAINE DR

634

726
727
723
722
731
721
729
724
719
725
718
730
720
728

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

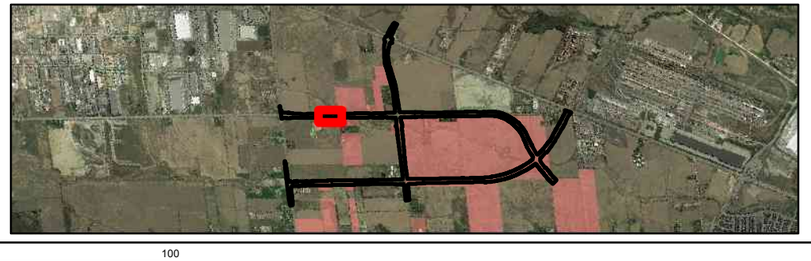
G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MXD\Tree Inventory Part A.mxd; Last saved by: candace.macdonald

LEGEND

Tree Inventory

- Injure
- Retain
- Remove

- Tree Protection Zone
- Road Footprint
- PTE Area



0 12.5 25 50 75 100 Metres

NOTES:
- Basedata from MNRF LIO, 2019
- Imagery from Google, 2018

Datum: NAD83
Projection: UTM Zone 17N

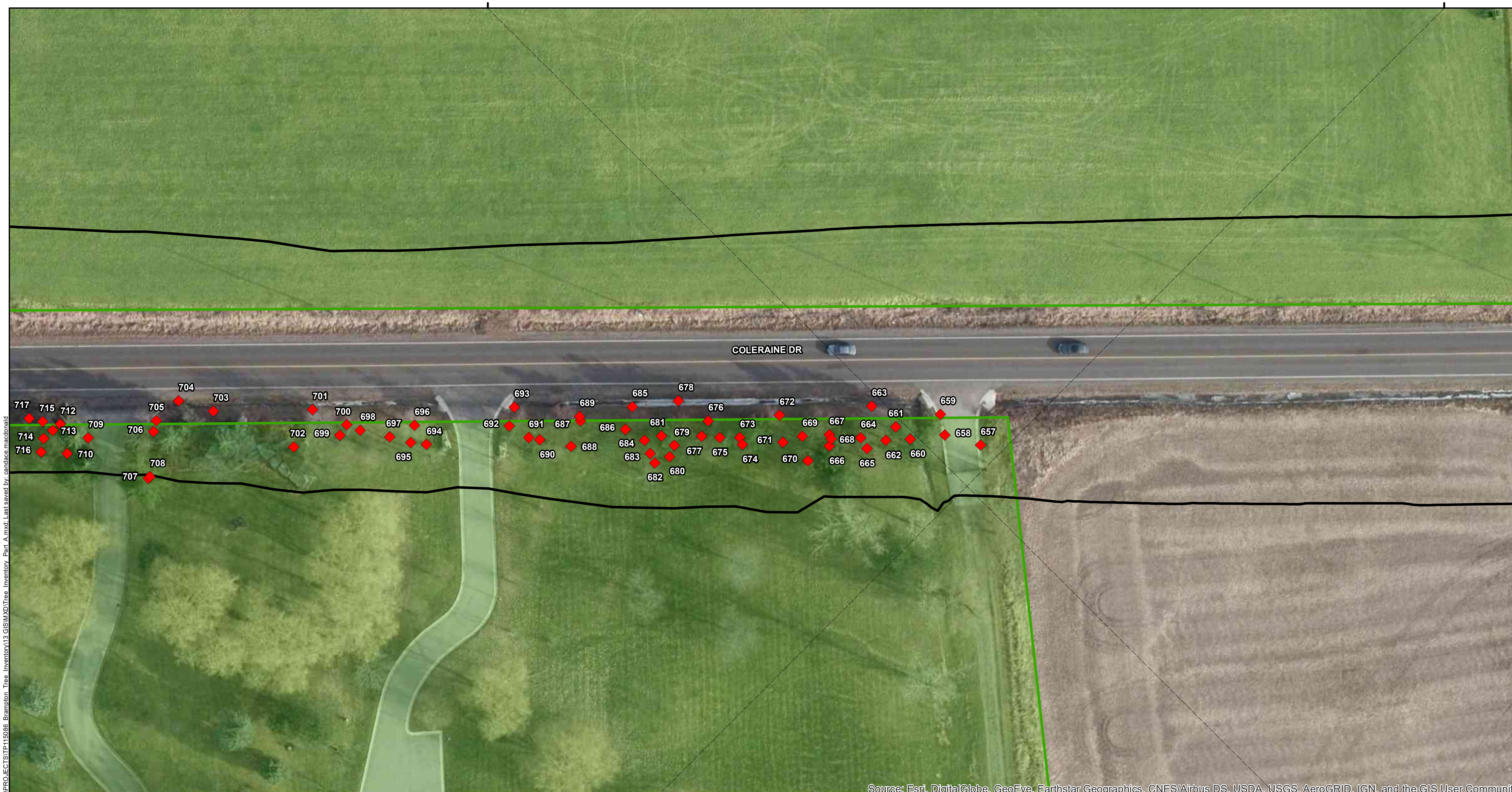
wood.

BRAMPTON HWY 427 EA

Tree Inventory
PART A

PROJECT N°: TP115086 | **FIGURE: 1Q**

SCALE: 1:600 | DATE: May 2021



G:\PROJECTS\TP115086_Brampton_Tree_Inventory\13 GIS\MXD\Tree_Inventory_Part_A.mxd; Last saved by: candace.macdonald

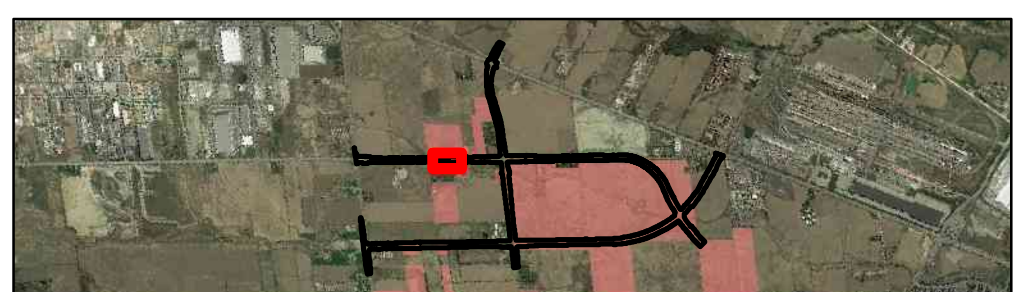
LEGEND

Tree Inventory

- Injure
- Retain
- Remove

- Tree Protection Zone
- Road Footprint
- PTE Area

0 12.5 25 50 75 100 Metres



NOTES:
- Basedata from MNRF LIO, 2019
- Imagery from Google, 2018

Datum: NAD83
Projection: UTM Zone 17N

wood.

BRAMPTON HWY 427 EA

Tree Inventory
PART A

PROJECT N°: TP115086	FIGURE: 1R
SCALE: 1:600	DATE: May 2021

604800

4854000

635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 656

COLERAINE DR

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

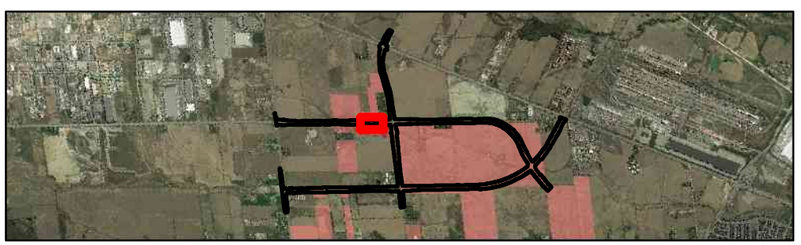
G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MXD\Tree Inventory Part A.mxd Last saved by: candace.macdonald

LEGEND

Tree Inventory

- Injure
- Retain
- Remove

- Tree Protection Zone
- Road Footprint
- PTE Area



0 12.5 25 50 75 100 Metres

NOTES:
- Basedata from MNRF LIO, 2019
- Imagery from Google, 2018

Datum: NAD83
Projection: UTM Zone 17N

wood.

BRAMPTON HWY 427 EA

Tree Inventory PART A

PROJECT N°: TP115086 | **FIGURE: 1S**

SCALE: 1:600 | DATE: May 2021

4853800

605200

733

734

735

736

COLERAINE DR

797

796

795

794

801

802

800

799

605200

4853600

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

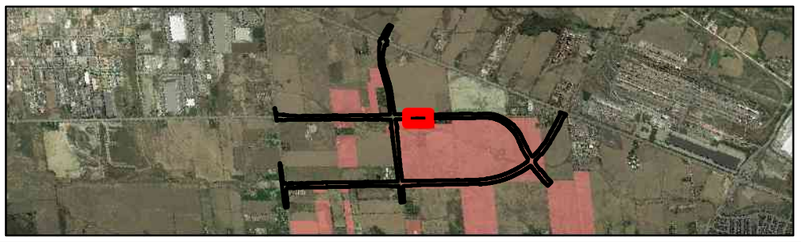
G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MXD\Tree Inventory_Part A.mxd, Last saved by: candace.macdonald

LEGEND

Tree Inventory

- Injure
- Retain
- Remove

- Tree Protection Zone
- Road Footprint
- PTE Area



0 12.5 25 50 75 100 Metres

NOTES:
- Basedata from MNRF LIO, 2019
- Imagery from Google, 2018

Datum: NAD83
Projection: UTM Zone 17N

wood.

BRAMPTON HWY 427 EA

Tree Inventory
PART A

PROJECT N°: TP115086	**FIGURE: 1T**
SCALE: 1:600	DATE: May 2021

4853600

605400

605400

COLERAINE DR

737 742 741 740 739 738 743 744 745 747 746 749 748 751 750 753 752 785 787 782 775 781 774 780 773 776 772 779 777 778 770 768 767 766 762 765 763 764 761 760 759 758 756 754 755 784 771 769 789 793 788 791 792 790 757

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

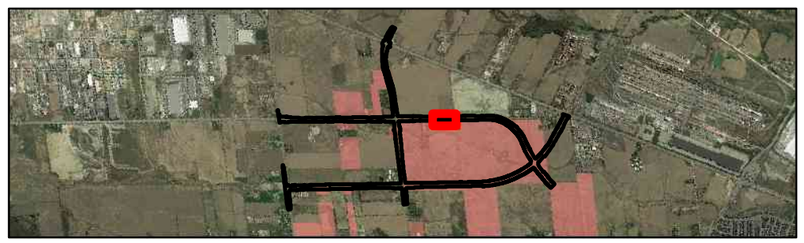
G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MXD\Tree Inventory Part A.mxd Last saved by: candace.macdonald

LEGEND

Tree Inventory

- Injure
- Retain
- Remove

- Tree Protection Zone
- Road Footprint
- PTE Area



0 12.5 25 50 75 100 Metres

NOTES:
- Basedata from MNRF LIO, 2019
- Imagery from Google, 2018

Datum: NAD83
Projection: UTM Zone 17N

wood.

BRAMPTON HWY 427 EA

Tree Inventory
PART A

PROJECT N°: TP115086 | **FIGURE: 1U**

SCALE: 1:600 | DATE: May 2021

605600

4853400

605800

4853200

605800

COLERAINE DR

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

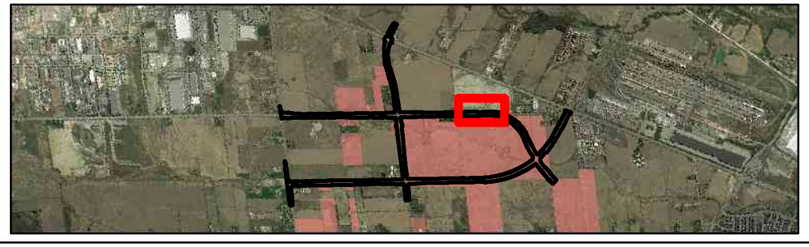
G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MXD\Tree Inventory Part A.mxd Last saved by: candace.macdonald

LEGEND

Tree Inventory

- Injure
- Retain
- Remove

- Tree Protection Zone
- Road Footprint
- PTE Area



0 25 50 100 150 200 Metres

NOTES:
- Basedata from MNRF LIO, 2019
- Imagery from Google, 2018

Datum: NAD83
Projection: UTM Zone 17N

wood.

BRAMPTON HWY 427 EA

Tree Inventory
PART A

PROJECT N°: TP115086	**FIGURE: 1V**
SCALE: 1:1,200	DATE: May 2021

605800

4853000

606000

4852800

606909

COLERAINE DR

G:\PROJECTS\TP115086 Brampton Tree Inventory\v13 GIS\MXD\Tree Inventory Part A.mxd; Last saved by: candace.macdonald

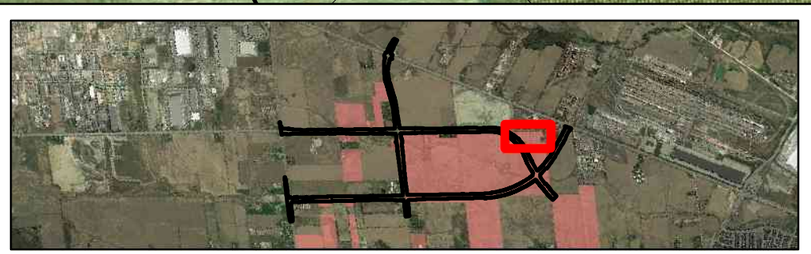
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

LEGEND

Tree Inventory

- Injure
- Retain
- Remove

- Tree Protection Zone
- Road Footprint
- PTE Area



0 25 50 100 150 200 Metres

NOTES:
- Basedata from MNRF LIO, 2019
- Imagery from Google, 2018

Datum: NAD83
Projection: UTM Zone 17N

wood.

BRAMPTON HWY 427 EA

Tree Inventory PART A

PROJECT N°: TP115086 | **FIGURE: 1W**

SCALE: 1:1,200 | DATE: May 2021

4852800 605800 4852600

4852400

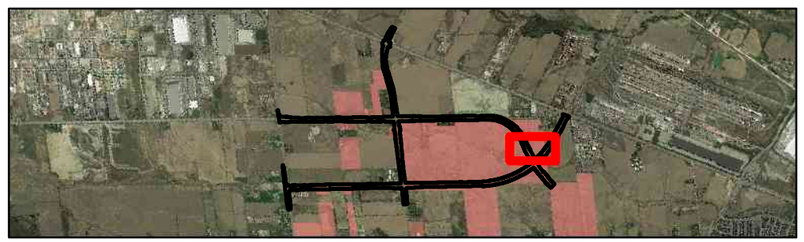
G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MXD\Tree Inventory Part A.mxd Last saved by: candace.macdonald

LEGEND

Tree Inventory

- Injure
- Retain
- Remove

- Tree Protection Zone
- Road Footprint
- PTE Area



0 25 50 100 150 200 Metres

NOTES:
- Basedata from MNRF LIO, 2019
- Imagery from Google, 2018

Datum: NAD83
Projection: UTM Zone 17N

wood.

BRAMPTON HWY 427 EA

Tree Inventory
PART A

PROJECT N°: TP115086	**FIGURE: 1X**
SCALE: 1:1,200	DATE: May 2021

4852800 606200 4852600 606400

COLERAINE DR

Regional Road 50

4852400

606400

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

G:\PROJECTS\TP115086_Brampton_Tree_Inventory\13_GIS\MXD\Tree_Inventory_Part_A.mxd Last saved by: candace.macdonald

LEGEND

Tree Inventory

- Injure
- Retain
- Remove

- Tree Protection Zone
- Road Footprint
- PTE Area

0 25 50 100 150 200 Metres

NOTES:
- Basedata from MNRF LIO, 2019
- Imagery from Google, 2018

Datum: NAD83
Projection: UTM Zone 17N

wood.

BRAMPTON HWY 427 EA

Tree Inventory
PART A

PROJECT N°: TP115086	**FIGURE: 1Y**
SCALE: 1:1,200	DATE: May 2021

605600

605800

605800

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

G:\PROJECTS\TP115086_Brampton_Tree_Inventory\13 GIS\MXD\Tree_Inventory_Part_A.mxd Last saved by: candace.macdonald

LEGEND

Tree Inventory

- Injure
- Retain
- Remove

- Tree Protection Zone
- Road Footprint
- PTE Area

0 25 50 100 150 200 Metres

NOTES:
- Basedata from MNRF LIO, 2019
- Imagery from Google, 2018

Datum: NAD83
Projection: UTM Zone 17N

wood.

BRAMPTON HWY 427 EA

Tree Inventory
PART A

PROJECT N°: TP115086	**FIGURE: 1Z**
SCALE: 1:1,200	DATE: May 2021

4853000

605200

4852800

605400

605400

4852600

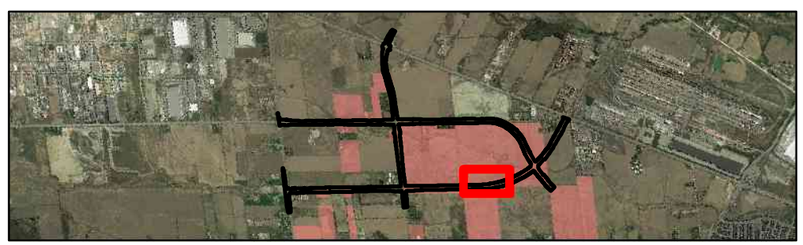
G:\PROJECTS\TP115086_Brampton_Tree_Inventory\13.GIS\MXD\Tree_Inventory_Part_A.mxd, Last saved by: candace.macdonald

LEGEND

Tree Inventory

- Injure
- Retain
- Remove

- Tree Protection Zone
- Road Footprint
- PTE Area



0 25 50 100 150 200 Metres

NOTES:
- Basedata from MNRF LIO, 2019
- Imagery from Google, 2018

Datum: NAD83
Projection: UTM Zone 17N

wood.

BRAMPTON HWY 427 EA

Tree Inventory
PART A

PROJECT N°: TP115086	**FIGURE: 1ZA**
SCALE: 1:1,200	DATE: May 2021

4853000

858

857

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

G:\PROJECTS\TP115086_Brampton_Tree_Inventory\13.GIS\MXD\Tree_Inventory_Part_A.mxd Last saved by: candace.macdonald

LEGEND

Tree Inventory

- Injure
- Retain
- Remove

- Tree Protection Zone
- Road Footprint
- PTE Area

0 12.5 25 50 75 100 Metres

NOTES:
- Basedata from MNRF LIO, 2019
- Imagery from Google, 2018

Datum: NAD83
Projection: UTM Zone 17N

wood.

BRAMPTON HWY 427 EA

Tree Inventory PART A

PROJECT N°: TP115086	**FIGURE: 1ZB**
SCALE: 1:600	DATE: May 2021

4853200

604800

604800

901

863

864

862

861

860

859

865

866

867

868

869

870

873

872

871

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

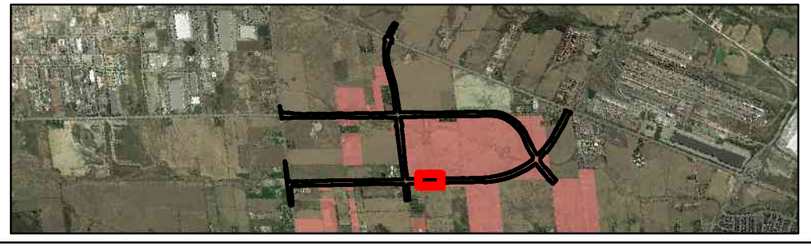
G:\PROJECTS\TP115086_Brampton_Tree_Inventory\13_GIS\MXD\Tree_Inventory_Part_A.mxd Last saved by: candace.macdonald

LEGEND

Tree Inventory

- Injure
- Retain
- Remove

- Tree Protection Zone
- Road Footprint
- PTE Area



0 12.5 25 50 75 100 Metres

NOTES:
- Basedata from MNRF LIO, 2019
- Imagery from Google, 2018

Datum: NAD83
Projection: UTM Zone 17N

wood.

BRAMPTON HWY 427 EA

Tree Inventory PART A

PROJECT N°: TP115086	**FIGURE: 1ZC**
SCALE: 1:600	DATE: May 2021

604200

4853800

604400

4853600

604400

4853400

G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MXD\Tree Inventory Part A.mxd, Last saved by candace.macdonald

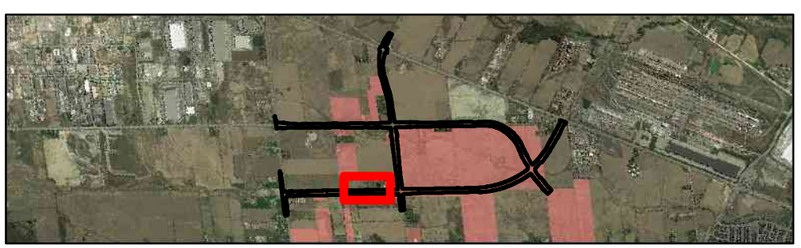
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

LEGEND

Tree Inventory

- Injure
- Retain
- Remove

- Tree Protection Zone
- Road Footprint
- PTE Area



0 25 50 100 150 200 Metres

NOTES:
- Basedata from MNRF LIO, 2019
- Imagery from Google, 2018

Datum: NAD83
Projection: UTM Zone 17N

wood.

BRAMPTON HWY 427 EA

Tree Inventory
PART A

PROJECT N°: TP115086	**FIGURE: 1ZD**
SCALE: 1:1,200	DATE: May 2021

4854200

604000

4854000

4853800

604000

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

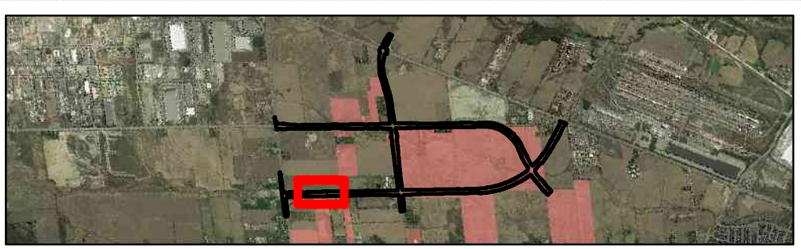
G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MXD\Tree Inventory Part A.mxd Last saved by: candace.macdonald

LEGEND

Tree Inventory

- Injure
- Retain
- Remove

- Tree Protection Zone
- Road Footprint
- PTE Area



0 25 50 100 150 200 Metres

NOTES:
- Basedata from MNRF LIO, 2019
- Imagery from Google, 2018

Datum: NAD83
Projection: UTM Zone 17N

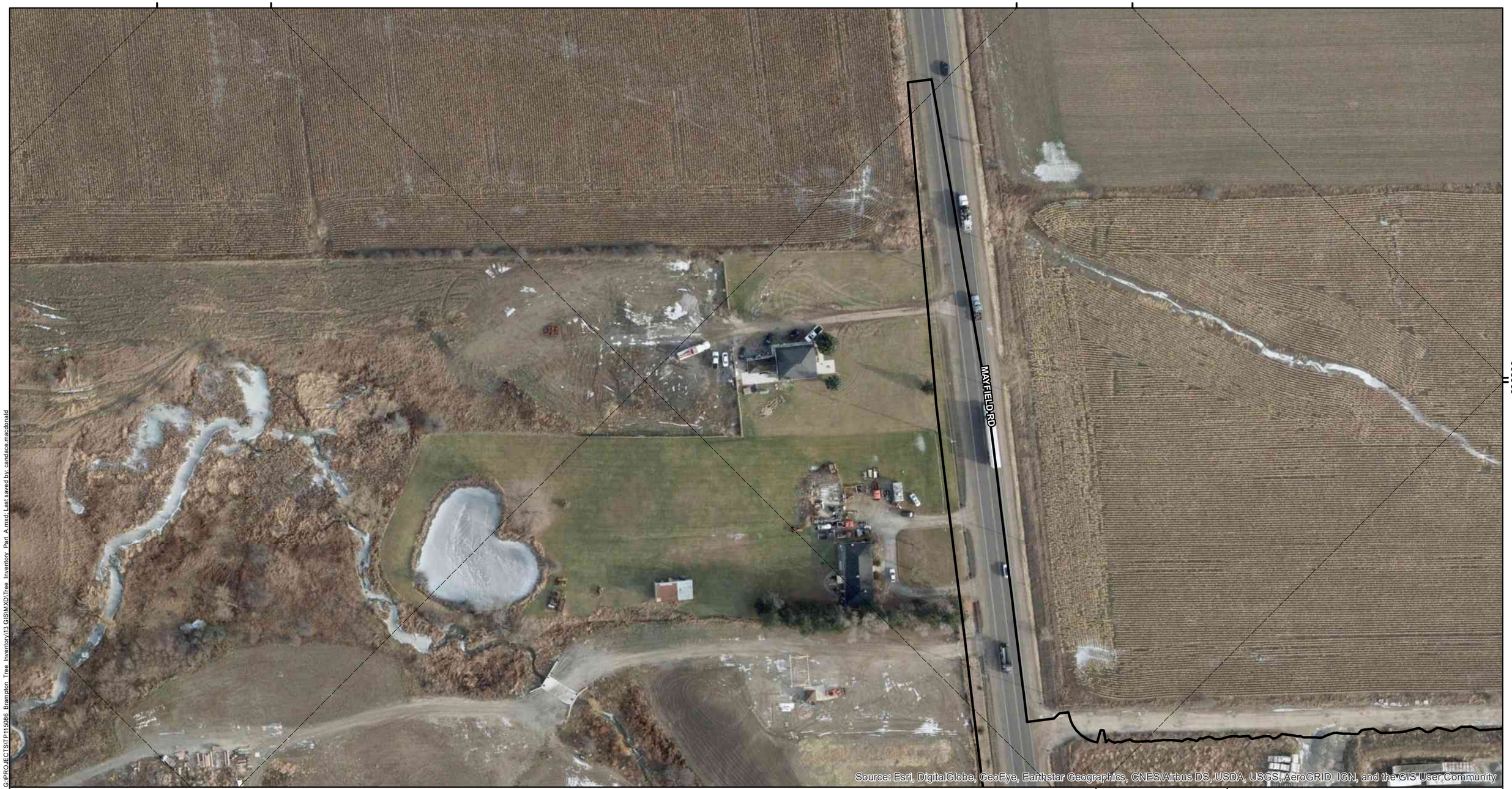
wood.

BRAMPTON HWY 427 EA

Tree Inventory
PART A

PROJECT N°: TP115086	**FIGURE: 1ZE**
SCALE: 1:1,200	DATE: May 2021

4854600 603600 4854400 603800



G:\PROJECTS\TP115086 Brampton Tree Inventory\v13 GIS\MXD\Tree Inventory_Part A.mxd Last saved by: candace.macdonald

LEGEND

Tree Inventory

- Injure
- Retain
- Remove

- Tree Protection Zone
- Road Footprint
- PTE Area

0 25 50 100 150 200 Metres

NOTES:
- Basedata from MNRF LIO, 2019
- Imagery from Google, 2018

Datum: NAD83
Projection: UTM Zone 17N

wood.

BRAMPTON HWY 427 EA

Tree Inventory PART A

PROJECT N°: TP115086 | **FIGURE: 1ZF**

SCALE: 1:1,200 | DATE: May 2021

603400 4854400

603600 4854200

603600

MAYFIELD RD

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MXD\Tree Inventory Part A.mxd, Last saved by: candace.macdonald

LEGEND

Tree Inventory

- Injure
- Retain
- Remove

- Tree Protection Zone
- Road Footprint
- PTE Area

0 25 50 100 150 200 Metres

NOTES:
- Basedata from MNRF LIO, 2019
- Imagery from Google, 2018

Datum: NAD83
Projection: UTM Zone 17N

wood.

BRAMPTON HWY 427 EA

Tree Inventory
PART A

PROJECT N°: TP115086 | **FIGURE: 1ZG**

SCALE: 1:1,200 | DATE: May 2021

Appendix B: Properties with Permission to Enter Figure

MAYFIELD ROAD

CLARKWAY DRIVE

ARTERIAL A2 (NEW)

COLERAINE DRIVE

760 m Along Centerlin

COUNTRYSIDE DRIVE

T864
T863
T862
T861
T860
T859
Should be more south
T858
T857

No trees

No trees here

Possibly

EAST-WEST ARTERIAL (NEW)

No Trees

No trees here

Hwy 50

CASTLEMORE ROAD

LEGEND

PROPERTIES WHERE PERMISSION TO EN
BEEN PROVIDED (TEXT INDICATES AGREE
AND OWNER INFORMATION.

PROPOSED RIGHT-OF-WAYS

AKSJ JSK NOTES PROVIDED BY PROPERTY OWNER

Region of Peel
working with you

SCHEDULE 'C' MUNICIPAL CLASS EA
ARTERIAL ROADS WITHIN SPECIAL POLICY AREA 47

CITY OF BRAMPTON/REGION OF PEEL

APPROVED PERMISSIONS TO ENTER

wood.

Project No.	TP
Date	SEF
Scale	0 100 200
Drawing No.	

Appendix C: Tree Inventory Table

Tree Number	Scientific Name	Common Name	Assessment Approximate or No PTE	Offset Distance (m)	DBH (CM) Stem 1	DBH (CM) Stem 2	DBH (CM) Stem 3	Total DBH (CM)	Approximate Dripline Radius (m)	TPZ Radius (m)	Structure	Crown	Comments	TRCA Reg. Area	Preliminary Recommendation
439	*Fraxinus americana*	White Ash			34			34	3	6	D	D			Remove
440	*Pinus strobus*	Eastern White Pine			18			18	2	2	G	G			Retain
441	*Picea abies*	Norway Spruce			18			18	2	2	F	F			Retain
442	*Picea abies*	Norway Spruce			14			14	2	2	F	F			Retain
443	*Picea abies*	Norway Spruce			22			22	2	2	G	G			Retain
444	*Picea abies*	Norway Spruce			23			23	2	2	G	G			Retain
445	*Picea abies*	Norway Spruce			21			21	2	2	G	G			Retain
446	*Picea abies*	Norway Spruce			19			19	2	2	G	G			Retain
447	*Picea abies*	Norway Spruce			23			23	2	2	G	G			Retain
448	*Picea abies*	Norway Spruce			31			31	2	4	G	G			Injure
449	*Picea abies*	Norway Spruce			32			32	2	4	G	G			Remove
450	*Picea abies*	Norway Spruce			25			25	2	2	G	G			Remove
451	*Picea abies*	Norway Spruce			16	13		29	2	2	G	G	2 stems		Remove
452	*Picea pungens*	Blue Spruce			13			13	2	2	F	F			Remove
453	*Picea pungens*	Blue Spruce			14			14	2	2	F	F			Remove
454	*Picea pungens*	Blue Spruce			15			15	2	2	P	F			Remove
455	*Picea pungens*	Blue Spruce			16			16	1	1	F	F			Remove
456	*Picea pungens*	Blue Spruce			12			12	1	1	P	P			Remove
457	*Picea abies*	Norway Spruce			12			12	1	1	F	F			Remove
458	*Salix Species*	Willow Species			32	29		61	4	8	G	G	2 stems		Remove
459	*Juniperus virginiana*	Eastern Red Cedar			21			21	2	2	G	G			Remove
460	*Gleditsia triacanthos*	Honey Locust			32			32	3	6	G	G			Remove
461	*Picea pungens*	Blue Spruce			25			25	2	2	G	G			Remove
462	*Gleditsia triacanthos*	Honey Locust	X	3	26			26	3	3	G	G			Remove
463	*Gleditsia triacanthos*	Honey Locust			32			32	3	6	G	G			Remove
464	*Picea pungens*	Blue Spruce	X	4	34			34	3	6	G	G			Remove
465	*Gleditsia triacanthos*	Honey Locust	X	6	33			33	3	6	G	G			Remove
466	*Juniperus virginiana*	Eastern Red Cedar			19			19	3	3	G	G			Remove
467	*Populus tremuloides*	Trembling Poplar			62			62	5	10	F	F			Remove
522	*Acer saccharinum*	Silver Maple	X	20	92			92	5	10	G	G			Injure
523	*Salix Species*	Willow Species	X	15	30	29	26	85	5	10	G	G	3 stems		Remove
524	*Acer negundo*	Manitoba Maple			43			43	4	8	G	F			Remove
525	*Acer negundo*	Manitoba Maple			73			73	5	10	G	G			Remove
526	*Gleditsia triacanthos*	Honey Locust			20			20	3	3	G	G			Remove
527	*Acer negundo*	Manitoba Maple			35			35	3	6	G	G			Remove
528	*Acer saccharinum*	Silver Maple	X	5	26	25	19	70	4	8	G	G	3 stems		Remove
529	*Acer negundo*	Manitoba Maple	X	10	30			30	4	8	G	G			Remove
530	*Salix babylonica*	Weeping Willow			27			27	3	3	G	G			Remove
531	*Acer saccharinum*	Silver Maple			63			63	5	10	G	G			Remove
532	*Acer saccharinum*	Silver Maple	X	10	52			52	5	10	G	G			Remove
533	*Acer saccharinum*	Silver Maple	X		43			43	4	8	G	G			Remove
534	*Acer saccharinum*	Silver Maple	X		50			50	4	8	G	G			Remove
535	*Acer saccharinum*	Silver Maple	X		72			72	6	12	G	G			Remove
536	*Acer saccharinum*	Silver Maple	X		72			72	6	12	G	G			Remove
537	*Acer saccharinum*	Silver Maple	X		68			68	7	14	G	G			Remove
538	*Acer saccharinum*	Silver Maple	X		90			90	6	12	F	F			Remove
539	*Acer saccharinum*	Silver Maple	X		67			67	6	12	G	G			Remove
540	*Acer saccharinum*	Silver Maple	X		30	31	29	90	4	8	G	G	3 stems		Remove
541	*Acer saccharinum*	Silver Maple			52			52	4	8	G	G			Remove
542	*Acer saccharinum*	Silver Maple			42			42	5	10	G	G			Remove
543	*Acer saccharinum*	Silver Maple			25			25	4	4	G	G			Remove
544	*Acer saccharinum*	Silver Maple	X	7	13	10	11	34	4	8	G	G	3 stems		Remove
545	*Acer saccharinum*	Silver Maple			26			26	4	4	G	G			Remove
546	*Pinus nigra*	Austrian Pine			35			35	4	8	G	G			Remove
547	*Pinus nigra*	Austrian Pine			37			37	4	8	G	G			Remove

548	*Pinus nigra*	Austrian Pine			42		42	4	8	G	G				Remove
549	*Pinus nigra*	Austrian Pine			43		43	4	8	G	G				Remove
550	*Pinus nigra*	Austrian Pine			45		45	4	8	G	G				Remove
551	*Picea abies*	Norway Spruce			26		26	2	2	G	G				Remove
552	*Acer saccharinum*	Silver Maple			37		37	3	6	G	G				Remove
553	*Acer saccharinum*	Silver Maple			26	23	49	3	6	G	G	2 stems			Remove
554	*Salix Species*	Willow Species	X	15	50		50	5	10	G	G				Injure
555	*Fraxinus americana*	White Ash	X	15	32		32	0	0	D	D			Y	Remove
556	*Acer saccharinum*	Silver Maple	X	20	80		80	5	10	G	G			Y	Remove
557	*Elaeagnus angustifolia*	Russian Olive			15	14	29	3	3	G	G	2 stems	Y		Remove
558	*Fraxinus americana*	White Ash			24		24	2	2	P	P			Y	Remove
559	*Acer saccharinum*	Silver Maple			10		10	3	3	G	G			Y	Remove
560	*Fraxinus americana*	White Ash	X	15	25		25	1	1	D	D			Y	Remove
561	*Fraxinus americana*	White Ash	X	15	25		25	1	1	D	D			Y	Remove
562	*Juniperus virginiana*	Eastern Red Cedar	X	3	29		29	3	3	G	G			Y	Remove
563	*Juniperus virginiana*	Eastern Red Cedar	X	4	26		26	3	3	G	G			Y	Remove
564	*Acer saccharinum*	Silver Maple	X	6	34		34	4	8	G	G			Y	Remove
565	*Thuja occidentalis*	Eastern White Cedar	X	6	20		20	3	3	G	G			Y	Remove
566	*Acer negundo*	Manitoba Maple	X	5	34		34	5	10	G	G			Y	Remove
567	*Juniperus virginiana*	Eastern Red Cedar	X	5	20		20	4	4	G	G			Y	Remove
568	*Acer negundo*	Manitoba Maple	X	10	26		26	4	4	G	G			Y	Remove
569	*Acer negundo*	Manitoba Maple	X	15	20		20	4	4	G	G			Y	Injure
570	*Acer negundo*	Manitoba Maple		20	20		20	4	4	G	G			Y	Retain
571	*Fraxinus americana*	White Ash			16	15	31	1	2	P	P	2 stems	Y		Remove
572	*Fraxinus americana*	White Ash	X	15	29		29	3	3	G	G			Y	Retain
573	*Elaeagnus angustifolia*	Russian Olive			10	10	20	3	3	G	G	2 stems			Remove
574	*Juniperus virginiana*	Eastern Red Cedar			30		30	2	4	G	G			Y	Remove
575	*Elaeagnus angustifolia*	Russian Olive			25	10	35	4	8	G	G	2 stems	Y		Remove
576	*Fraxinus americana*	White Ash			16		16	2	2	F	F			Y	Remove
577	*Juniperus virginiana*	Eastern Red Cedar			17		17	2	2	G	G			Y	Remove
578	*Juniperus virginiana*	Eastern Red Cedar			10		10	2	2	G	G			Y	Remove
579	*Juniperus virginiana*	Eastern Red Cedar			20		20	3	3	G	G			Y	Remove
580	*Juniperus virginiana*	Eastern Red Cedar			17		17	4	4	G	G			Y	Remove
581	*Thuja occidentalis*	Eastern White Cedar			10	10	20	4	4	F	F	2 stems			Remove
582	*Thuja occidentalis*	Eastern White Cedar			11		11	4	4	F	F				Remove
583	*Thuja occidentalis*	Eastern White Cedar			10		10	4	4	F	F				Remove
584	*Thuja occidentalis*	Eastern White Cedar			10		10	4	4	F	F				Remove
585	*Thuja occidentalis*	Eastern White Cedar			10		10	4	4	F	F				Remove
586	*Thuja occidentalis*	Eastern White Cedar			10		10	4	4	F	F				Remove
587	*Acer negundo*	Manitoba Maple	X		21	17	38	4	8	G	G	2 stems			Remove
588	*Malus Sp.*	Ornamental Crabapple Tree			10		10	3	3	G	G				Remove
589	*Malus Sp.*	Ornamental Crabapple Tree			10		10	3	3	G	G				Remove
590	*Quercus robur*	English Oak			23		23	2	2	G	G				Remove
591	*Juniperus virginiana*	Eastern Red Cedar			25		25	2	2	G	G				Remove
592	*Picea abies*	Norway Spruce	X	16	39		39	5	10	G	G				Injure
593	*Picea abies*	Norway Spruce	X	17	40		40	5	10	G	G				Injure
594	*Juglans nigra*	Black Walnut			43		43	6	12	G	G				Remove
595	*Picea pungens*	Blue Spruce	X	15	35		35	3	6	G	G				Retain
596	*Picea pungens*	Blue Spruce	X	16	30	20	50	3	6	G	G	2 stems			Retain
597	*Picea pungens*	Blue Spruce	X	18	21		21	3	3	G	G				Retain
598	*Picea pungens*	Blue Spruce	X	15	23		23	3	3	G	G				Retain
599	*Picea pungens*	Blue Spruce	X	18	43		43	3	6	G	G				Retain
600	*Picea abies*	Norway Spruce	X	5	36		36	4	8	G	G				Remove
601	*Picea abies*	Norway Spruce	X	6	21		21	3	3	G	G				Remove
602	*Picea abies*	Norway Spruce	X	7	19		19	3	3	G	G				Remove
603	*Picea abies*	Norway Spruce	X	10	16		16	3	3	G	G				Retain
604	*Picea abies*	Norway Spruce	X	11	17		17	3	3	G	G				Retain
605	*Picea abies*	Norway Spruce	X	7	26		26	4	4	G	G				Retain

606	*Picea abies*	Norway Spruce	X	10	16			16	3	3	G	G				Retain
607	*Picea abies*	Norway Spruce	X	11	27			27	3	3	G	G				Retain
608	*Malus Sp.*	Ornamental Crabapple Tree	X	20	21			21	3	3	G	G				Retain
609	*Malus Sp.*	Ornamental Crabapple Tree	X	20	22			22	3	3	G	G				Retain
610	*Pyrus Sp.*	Pear	X	20	23			23	3	3	G	G				Retain
611	*Acer saccharinum*	Silver Maple	X	6	67			67	5	10	G	G			Y	Injure
612	*Acer saccharinum*	Silver Maple	X	7	65			65	5	10	G	G			Y	Injure
613	*Acer saccharinum*	Silver Maple	X	12	32			32	5	10	G	G			Y	Retain
614	*Acer saccharinum*	Silver Maple	X	13	41			41	5	10	G	G			Y	Retain
615	*Quercus robur*	English Oak	X	10	36	32		68	6	12	F	G	2 stems		Y	Injure
616	*Catalpa speciosa*	Caltapa Tree	X	15	39			39	6	12	G	G			Y	Retain
617	*Acer saccharinum*	Silver Maple	X	10	52			52	5	10	G	G			Y	Injure
618	*Acer saccharinum*	Silver Maple	X	14	49			49	5	10	G	G			Y	Retain
619	*Salix babylonica*	Weeping Willow			108			108	7	14	G	G			Y	Remove
620	*Acer saccharinum*	Silver Maple	X	20	19			19	4	4	G	G			Y	Retain
621	*Thuja occidentalis*	Eastern White Cedar			22	19		41	3	6	G	G	2 stems			Remove
622	*Thuja occidentalis*	Eastern White Cedar			21	20		41	3	6	G	G	2 stems			Remove
623	*Thuja occidentalis*	Eastern White Cedar			27			27	3	3	G	G				Remove
624	*Thuja occidentalis*	Eastern White Cedar			31	11		42	3	6	G	G	2 stems			Remove
625	*Thuja occidentalis*	Eastern White Cedar			28	11		39	3	6	G	G	2 stems			Remove
626	*Thuja occidentalis*	Eastern White Cedar			13	12	10	35	2	4	F	F	3 stems			Remove
627	*Picea pungens*	Blue Spruce	X	20	35			35	4	8	G	G				Remove
628	*Picea pungens*	Blue Spruce	X	15	34			34	4	8	G	G				Remove
629	*Picea pungens*	Blue Spruce	X	20	33			33	4	8	G	G				Remove
630	*Malus Sp.*	Ornamental Crabapple Tree	X	15	13			13	3	3	G	G				Remove
631	*Salix Species*	Willow Species	X		23	21	19	63	3	6	G	G			Y	Remove
632	*Fraxinus americana*	White Ash			54	30		84	4	8	P	P	3 stems			Injure
633	*Acer saccharinum*	Silver Maple	X	20	47			47	4	8	F	F			Y	Retain
634	*Salix babylonica*	Weeping Willow	X	15	60			60	6	12	G	G			Y	Remove
635	*Salix babylonica*	Weeping Willow			10	10	10	30	3	6	P	G	2 stems		Y	Remove
636	*Gleditsia triacanthos*	Honey Locust			15	16	10	41	4	8	G	G	2 stems		Y	Remove
637	*Gleditsia triacanthos*	Honey Locust			23			23	4	4	G	G			Y	Remove
638	*Picea glauca*	White Spruce			35			35	4	8	G	G			Y	Remove
639	*Picea glauca*	White Spruce			31			31	4	8	G	G			Y	Remove
640	*Picea glauca*	White Spruce			29			29	3	3	G	G			Y	Remove
641	*Picea pungens*	Blue Spruce	X	15	34			34	3	6	G	G			Y	Remove
642	*Picea pungens*	Blue Spruce	X	15	35			35	3	6	G	G			Y	Remove
643	*Picea pungens*	Blue Spruce	X	10	34			34	3	6	P	P			Y	Remove
644	*Pinus nigra*	Austrian Pine	X	7	35	29		64	3	6	G	G	2 stems		Y	Remove
645	*Pinus nigra*	Austrian Pine	X	7	37			37	3	6	G	G			Y	Remove
646	*Picea pungens*	Blue Spruce	X	8	13	9		22	3	3	G	G	2 stems		Y	Remove
647	*Picea pungens*	Blue Spruce	X	10	14			14	3	3	G	G				Remove
648	*Pinus strobus*	Eastern White Pine	X	9	19			19	3	3	G	G				Remove
649	*Morus alba*	White Mulberry			15	14	13	42	4	8	F	F	3 stems			Remove
650	*Picea glauca*	White Spruce	X	10	27			27	3	3	G	G				Remove
651	*Picea glauca*	White Spruce	X	11	27			27	3	3	G	G				Remove
652	*Picea glauca*	White Spruce	X	10	26			26	3	3	G	G				Remove
653	*Picea glauca*	White Spruce	X	11	25			25	3	3	G	G				Remove
654	*Populus grandidentata*	Large Tooth Aspen	X	3	37			37	1	2	P	P				Remove
655	*Juniperus virginiana*	Eastern Red Cedar			16			16	2	2	G	G				Remove
656	*Acer negundo*	Manitoba Maple	X	20	50			50	2	4	G	G			Y	Retain
657	*Fraxinus americana*	White Ash			11			11	2	2	P	P			Y	Remove
658	*Acer platanoides*	Norway Maple			21	20		41	3	6	G	G	2 stems		Y	Remove
659	*Picea glauca*	White Spruce			20			20	3	3	G	G			Y	Remove
660	*Pinus nigra*	Austrian Pine			26			26	3	3	G	G			Y	Remove
661	*Pinus nigra*	Austrian Pine			27			27	3	3	G	G			Y	Remove
662	*Pinus nigra*	Austrian Pine			24			24	3	3	G	G			Y	Remove
663	*Acer platanoides*	Norway Maple			21	19	8	48	4	8	G	G	3 stems		Y	Remove

664	*Tilia Cordata*	Little Leaf Linden			21			21	4	4	G	G		Y	Remove
665	*Tilia Cordata*	Little Leaf Linden			22			22	4	4	G	G		Y	Remove
666	*Pinus nigra*	Austrian Pine			27	10		37	3	6	P	P	2 stems	Y	Remove
667	*Pinus nigra*	Austrian Pine	X	4	30			30	3	6	G	G		Y	Remove
668	*Tilia Cordata*	Little Leaf Linden			29	10		39	4	8	G	G	2 stems	Y	Remove
669	*Pinus nigra*	Austrian Pine			30			30	3	6	G	G		Y	Remove
670	*Pinus nigra*	Austrian Pine			28			28	3	3	G	G		Y	Remove
671	*Robinia pseudoacacia*	Black Locust			21			21	3	3	G	G		Y	Remove
672	*Tilia Cordata*	Little Leaf Linden			20	10		30	3	6	G	G	2 stems	Y	Remove
673	*Pinus nigra*	Austrian Pine			19			19	2	2	G	G		Y	Remove
674	*Pinus nigra*	Austrian Pine			21			21	3	3	P	P		Y	Remove
675	*Pinus nigra*	Austrian Pine			27			27	3	3	P	P		Y	Remove
676	*Tilia Cordata*	Little Leaf Linden			30			30	4	8	P	P		Y	Remove
677	*Tilia Cordata*	Little Leaf Linden			11	10		21	4	4	G	G	2 stems	Y	Remove
678	*Tilia Cordata*	Little Leaf Linden			27			27	4	4	G	G		Y	Remove
679	*Pinus nigra*	Austrian Pine			21			21	4	4	G	G		Y	Remove
680	*Pinus nigra*	Austrian Pine			22			22	3	3	G	G		Y	Remove
681	*Pinus nigra*	Austrian Pine			23			23	2	2	G	P		Y	Remove
682	*Robinia pseudoacacia*	Black Locust			17			17	2	2	P	P		Y	Remove
683	*Pinus nigra*	Austrian Pine			21			21	3	3	G	G		Y	Remove
684	*Pinus nigra*	Austrian Pine			25			25	3	3	G	G		Y	Remove
685	*Tilia Cordata*	Little Leaf Linden			27	26		53	3	6	G	G	2 stems	Y	Remove
686	*Tilia Cordata*	Little Leaf Linden			13	11	9	33	4	8	G	G	3 stems	Y	Remove
687	*Pinus nigra*	Austrian Pine			28			28	3	3	F	G		Y	Remove
688	*Pinus nigra*	Austrian Pine			24			24	2	2	F	F		Y	Remove
689	*Tilia Cordata*	Little Leaf Linden			31	21	19	71	4	8	G	G	3 stems	Y	Remove
690	*Tilia Cordata*	Little Leaf Linden			19	18		37	4	8	G	G	2 stems	Y	Remove
691	*Pinus nigra*	Austrian Pine			22			22	4	4	G	G		Y	Remove
692	*Pinus nigra*	Austrian Pine			23			23	4	4	G	G		Y	Remove
693	*Tilia Cordata*	Little Leaf Linden			19			19	4	4	G	G		Y	Remove
694	*Fraxinus americana*	White Ash			23			23	1	1	P	P		Y	Remove
695	*Pinus nigra*	Austrian Pine			27			27	3	3	G	G		Y	Remove
696	*Acer platanoides*	norway maple			23	22		45	4	8	G	G	2 stems	Y	Remove
697	*Gleditsia triacanthos*	Honey Locust			25			25	4	4	G	G		Y	Remove
698	*Tilia Cordata*	Little Leaf Linden			23	18		41	3	6	F	G	2 stems	Y	Remove
699	*Tilia Cordata*	Little Leaf Linden			27			27	3	3	G	G		Y	Remove
700	*Gleditsia triacanthos*	Honey Locust			24			24	4	4	G	G		Y	Remove
701	*Acer platanoides*	norway maple			29	19	18	66	4	8	G	G	3 stems	Y	Remove
702	*Picea pungens*	Blue Spruce			26			26	4	4	F	P		Y	Remove
703	*Picea pungens*	Blue Spruce			32			32	3	6	G	G		Y	Remove
704	*Picea pungens*	Blue Spruce			44			44	4	8	G	G		Y	Remove
705	*Picea pungens*	Blue Spruce			36			36	3	6	F	G		Y	Remove
706	*Acer saccharinum*	Silver Maple			24			24	2	2	G	G		Y	Remove
707	*Pinus strobus*	Eastern White Pine	X	5	36			36	5	10	G	G		Y	Remove
708	*Pinus strobus*	Eastern White Pine	X	6	25			25	5	5	G	G		Y	Remove
709	*Picea pungens*	Blue Spruce	X	5	27			27	3	3	G	G		Y	Remove
710	*Pinus nigra*	Austrian Pine	X	6	31			31	4	8	G	G		Y	Remove
712	*Picea pungens*	Blue Spruce			32			32	3	6	G	G		Y	Remove
713	*Picea pungens*	Blue Spruce			27			27	3	3	G	G		Y	Remove
714	*Pinus nigra*	Austrian Pine			26			26	3	3	G	G		Y	Remove
715	*Picea pungens*	Blue Spruce			28			28	3	3	G	G		Y	Remove
716	*Pinus nigra*	Austrian Pine			35			35	3	6	F	G		Y	Remove
717	*Picea pungens*	Blue Spruce			26			26	3	3	G	G		Y	Remove
718	*Tilia Cordata*	Little Leaf Linden			27	26		53	4	8	G	G	2 stems	Y	Remove
719	*Acer platanoides*	norway maple			25	24	23	72	4	8	G	G	3 stems	Y	Remove
720	*Pinus nigra*	Austrian Pine			32			32	4	8	G	G		Y	Remove
721	*Acer platanoides*	norway maple			22	10		32	3	6	G	G	2 stems	Y	Remove
722	*Tilia Cordata*	Little Leaf Linden			25	23	16	64	4	8	G	G	3 stems	Y	Remove

723	*Gleditsia triacanthos*	Honey Locust			11			11	2	2	F	F		Y	Remove
724	*Pinus nigra*	Austrian Pine			19			19	4	4	G	G		Y	Remove
725	*Pinus nigra*	Austrian Pine			35			35	5	10	G	G		Y	Remove
726	*Tilia Cordata*	Little Leaf Linden			18	17		35	4	8	G	G	2 stems	Y	Remove
727	*Pinus nigra*	Austrian Pine			35			35	4	8	G	G		Y	Remove
728	*Salix babylonica*	Weeping Willow			82			82	8	16	G	G		Y	Remove
729	*Tilia Cordata*	Little Leaf Linden			10	10		20	4	4	G	G	2 stems	Y	Remove
730	*Pinus nigra*	Austrian Pine			19			19	4	4	G	G		Y	Remove
731	*Pinus nigra*	Austrian Pine			18			18	4	4	G	G		Y	Remove
732	*Salix Species*	Willow Species			36	27	28	91	8	16	G	G	3 stems		Remove
733	*Acer negundo*	Manitoba Maple	X	30	30			30	4	8	G	G			Retain
734	*Fraxinus americana*	White Ash			10			10	1	1	P	P		Y	Remove
735	*Fraxinus americana*	White Ash			15			15	2	2	P	P			Remove
736	*Fraxinus americana*	White Ash			10	10		20	2	2	P	P	2 stems		Remove
737	*Acer negundo*	Manitoba Maple			14			14	3	3	G	G			Remove
738	*Acer negundo*	Manitoba Maple			12			12	3	3	G	G			Remove
739	*Thuja occidentalis*	Eastern White Cedar			16			16	3	3	F	P			Remove
740	*Acer negundo*	Manitoba Maple			17			17	3	3	G	G			Remove
741	*Thuja occidentalis*	Eastern White Cedar			15			15	3	3	P	P			Remove
742	*Acer saccharinum*	Silver Maple			65			65	6	12	G	G			Remove
743	*Betula papyrifera*	White Birch			16	15		31	3	6	G	G	2 stems		Remove
744	*Thuja occidentalis*	Eastern White Cedar			17			17	2	2	G	G			Remove
745	*Thuja occidentalis*	Eastern White Cedar			18			18	2	2	G	G			Remove
746	*Thuja occidentalis*	Eastern White Cedar			18			18	2	2	G	G			Remove
747	*Pinus nigra*	Austrian Pine			43			43	4	8	G	G			Remove
748	*Thuja occidentalis*	Eastern White Cedar			16			16	2	2	G	G			Remove
749	*Thuja occidentalis*	Eastern White Cedar			13			13	3	3	G	G			Remove
750	*Thuja occidentalis*	Eastern White Cedar			14			14	3	3	G	G			Remove
751	*Catalpa speciosa*	Caltapa Tree			15			15	3	3	G	G			Remove
752	*Thuja occidentalis*	Eastern White Cedar			17			17	2	2	G	G			Remove
753	*Thuja occidentalis*	Eastern White Cedar			14			14	2	2	G	G			Remove
754	*Picea glauca*	White Spruce	X	5	42			42	5	10	G	G			Remove
755	*Picea glauca*	White Spruce	X	7	43			43	5	10	G	G			Remove
756	*Picea pungens*	Blue Spruce			32			32	4	8	G	G			Remove
757	*Picea pungens*	Blue Spruce	X	20	42			42	4	8	G	G			Injure
758	*Thuja occidentalis*	Eastern White Cedar			18	13		31	3	6	G	G	2 stems		Remove
759	*Picea glauca*	White Spruce			23			23	3	3	G	G			Remove
760	*Picea pungens*	Blue Spruce			19			19	3	3	G	G			Remove
761	*Picea pungens*	Blue Spruce			28			28	4	4	G	G			Remove
762	*Picea glauca*	White Spruce	X	3	31			31	4	8	G	G			Remove
763	*Picea glauca*	White Spruce	X	5	33			33	4	8	G	G			Remove
764	*Picea glauca*	White Spruce	X	7	33			33	4	8	G	G			Remove
765	*Picea glauca*	White Spruce	X	5	32			32	4	8	G	G			Remove
766	*Thuja occidentalis*	Eastern White Cedar			23	22	21	66	3	6	G	G	3 stems		Remove
767	*Acer platanoides*	Norway Maple			12			12	3	3	G	G			Remove
768	*Thuja occidentalis*	Eastern White Cedar			27	25	26	78	3	6	G	G	3 stems		Remove
769	*Picea glauca*	White Spruce	X	10	20			20	3	3	G	G			Remove
770	*Salix babylonica*	Weeping Willow			72			72	8	16	G	G			Remove
771	*Acer platanoides*	Norway Maple	X	11	13			13	2	2	G	G			Remove
772	*Salix babylonica*	Weeping Willow			93			93	8	16	G	G			Remove
773	*Pinus strobus*	Eastern White Pine			38			38	4	8	G	G			Remove
774	*Picea glauca*	White Spruce			46			46	4	8	G	G			Remove
775	*Picea glauca*	White Spruce			39			39	4	8	G	G			Remove
776	*Picea glauca*	White Spruce			35			35	4	8	G	G			Remove
777	*Picea glauca*	White Spruce			23			23	4	4	G	G			Remove
778	*Picea glauca*	White Spruce			26	25		51	4	8	G	G	2 stems		Remove
779	*Picea glauca*	White Spruce			25			25	4	4	G	G			Remove
780	*Picea glauca*	White Spruce			10			10	3	3	G	G			Remove

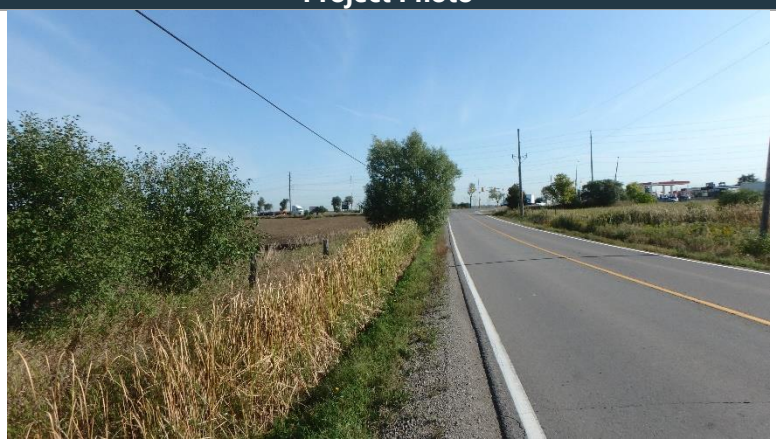
781	*Picea glauca*	White Spruce			25			25	4	4	G	G		Remove
782	*Aesculus hippocastanum*	Horse Chestnut			15			15	4	4	G	G		Remove
783	*Thuja occidentalis*	Eastern White Cedar Hedge			10	15		25	2	2	F	G	2 stems	Remove
784	*Acer saccharinum*	Silver Maple	X	15	40			40	5	10	G	G		Remove
785	*Acer platanoides*	Norway Maple			17			17	3	3	G	G		Remove
786	*Thuja occidentalis*	Eastern White Cedar Hedge			10	15		25	2	2	G	G	2 stems	Remove
787	*Picea glauca*	White Spruce			21			21	3	3	F	F		Remove
788	*Fraxinus americana*	White Ash	X	10	32			32	0	0	D	D		Remove
789	*Quercus alba*	White Oak	X	7	35			35	4	8	G	G		Remove
790	*Picea pungens*	Blue Spruce			27			27	3	3	G	G		Injure
791	*Picea pungens*	Blue Spruce			29			29	3	3	G	G		Remove
792	*Picea glauca*	White Spruce			17			17	2	2	G	G		Remove
793	*Picea pungens*	Blue Spruce			20			20	3	3	G	G		Remove
794	*Thuja occidentalis*	Eastern White Cedar			13			13	2	2	G	G		Remove
795	*Thuja occidentalis*	Eastern White Cedar			14			14	2	2	G	G		Remove
796	*Thuja occidentalis*	Eastern White Cedar			17			17	2	2	G	G		Remove
797	*Thuja occidentalis*	Eastern White Cedar			18			18	3	3	P	F		Remove
798	*Thuja occidentalis*	Eastern White Cedar Hedge			10	15		25	2	2	G	G	2 stems	Remove
799	*Fraxinus americana*	White Ash			24			24	2	2	P	P		Remove
800	*Fraxinus americana*	White Ash			25			25	2	2	P	P		Remove
801	*Fraxinus americana*	White Ash			45			45	2	4	P	P		Remove
857	*Acer negundo*	Manitoba Maple			12	10		22	2	2	G	G	2 stems	Remove
858	*Acer negundo*	Manitoba Maple			13	4	3	20	2	2	G	G	3 stems	Remove
859	*Acer saccharinum*	Silver Maple			32	30	29	91	4	8	G	G	3 stems	Remove
860	*Tilia americana*	American Basswood			18			18	3	3	F	G		Remove
861	*Acer saccharinum*	Silver Maple			27	26		53	4	8	G	G	2 stems	Remove
862	*Acer saccharinum*	Silver Maple			10	10	10	30	3	6	G	G	3 stems	Remove
863	*Acer saccharinum*	Silver Maple			26	25	23	74	5	10	G	G	3 stems	Remove
864	*Acer saccharinum*	Silver Maple			11			11	2	2	G	G		Remove
865	*Salix Species*	Willow Species			15			15	2	2	G	G		Remove
866	*Salix Species*	Willow Species			23	20		43	3	6	G	G	2 stems	Remove
867	*Salix Species*	Willow Species			21	20		41	3	6	G	G	2 stems	Remove
868	*Salix Species*	Willow Species			27	13	10	50	3	6	G	G	3 stems	Remove
869	*Salix Species*	Willow Species			21			21	3	3	G	G		Remove
870	*Salix Species*	Willow Species			10			10	2	2	G	G		Remove
871	*Salix Species*	Willow Species			13			13	2	2	G	G		Remove
872	*Salix Species*	Willow Species			35	27	24	86	4	8	G	G	3 stems	Remove
873	*Salix Species*	Willow Species			34	28	25	87	4	8	G	G	3 stems	Remove
874	*Acer saccharinum*	Silver Maple			47			47	4	8	G	G		Remove
875	*Picea pungens*	Blue Spruce			17			17	2	2	G	G		Remove
876	*Picea pungens*	Blue Spruce			18			18	2	2	G	G		Retain
877	*Acer platanoides*	Norway Maple			30	25	23	78	4	8	G	G	3 stems	Remove
878	*Juniperus virginiana*	Eastern Red Cedar			15			15	2	2	G	G		Remove
879	*Juniperus virginiana*	Eastern Red Cedar			19			19	2	2	G	G		Remove
880	*Fraxinus americana*	White Ash			18	17	16	51	2	4	P	P	3 stems	Remove
881	*Salix Species*	Willow Species			70	41		111	5	10	G	G	2 stems	Remove
882	*Salix Species*	Willow Species			50			50	5	10	G	G		Remove
883	*Salix Species*	Willow Species			37			37	3	6	F	G		Remove
884	*Salix Species*	Willow Species			29	27		56	4	8	G	G	2 stems	Retain
885	*Acer negundo*	Manitoba Maple			11	9		20	3	3	G	G	2 stems	Retain
886	*Acer negundo*	Manitoba Maple			18	12	11	41	3	6	G	G	3 stems	Injure
887	*Acer negundo*	Manitoba Maple			19	12		31	3	6	G	G	2 stems	Retain
888	*Acer negundo*	Manitoba Maple			10	10		20	3	3	G	G	2 stems	Retain
889	*Acer negundo*	Manitoba Maple			14	13		27	3	3	F	G		Retain
890	*Acer negundo*	Manitoba Maple			11			11	3	3	G	G		Retain
891	*Salix Species*	Willow Species			35	27		62	5	10	G	G	2 stems	Retain
892	*Salix Species*	Willow Species			42			42	5	10	G	G		Retain
893	*Acer negundo*	Manitoba Maple			16			16	3	3	F	G		Retain

894	*Acer negundo*	Manitoba Maple	18	18		36	3	6	F	G	2 stems	Injure
895	*Fraxinus americana*	White Ash	42			42	5	10	F	G		Remove
896	*Acer negundo*	Manitoba Maple	21			21	3	3	G	G		Retain
897	*Acer negundo*	Manitoba Maple	13			13	3	3	G	G		Retain
898	*Fraxinus americana*	White Ash	23	12		35	2	4	P	P	2 stems	Retain
899	*Acer negundo*	Manitoba Maple	16	10		26	3	3	F	G	2 stems	Remove
900	*Fraxinus americana*	White Ash	20	17	10	47	3	6	P	P	2 stems	Remove
901	*Acer saccharinum*	Silver Maple	108	19	20	147	3	6	F	F	3 stems	Retain

Appendix D: Site Photograph Log

Appendix D

Project Photos

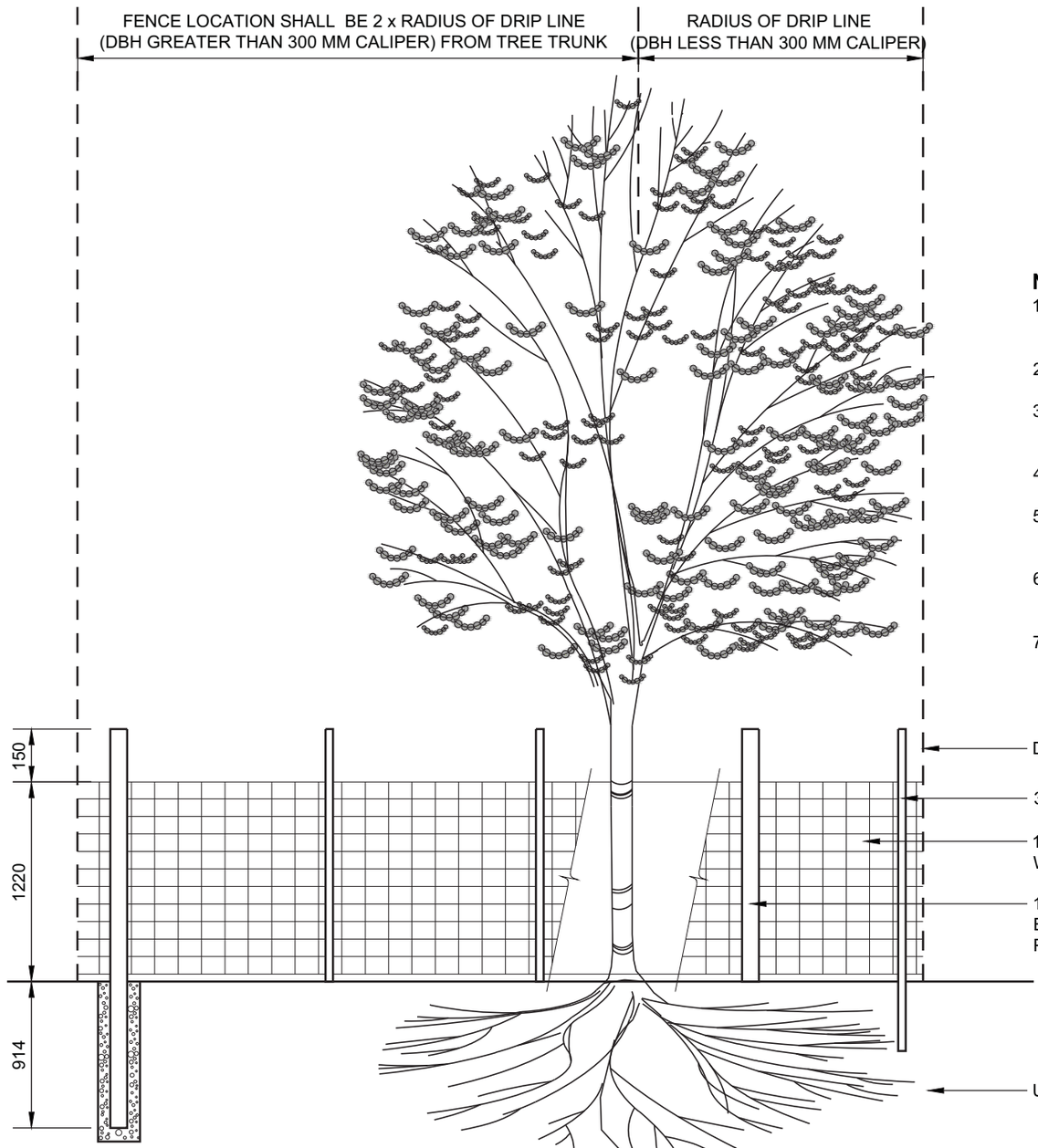
Project Photo	Description
	Trees along the Countryside Drive east of Countryside Drive's intersection with Coleraine Drive facing east.
	Tributary of the West Humber River crossing Coleraine Drive north of Coleraine Drive's intersection with Countryside Drive.
	Trees along the west side of Coleraine Drive, north of Coleraine Drive's intersection with Countryside Drive, facing north.

	Trees along Coleraine Drive, south of Coleraine Drive's intersection with Countryside Drive, facing north.
	Trees along the west side Coleraine Drive, south of Coleraine Drive's intersection with Countryside Drive, facing south.
	Vegetation in the ROW of the east-west Arterial road between Countryside Drive and Castlemore Road.

	Vegetation within the ROW of the new intersection of the east-west Arterial road and Arterial A2 near Highway 50.
	Vegetation around a swim pond in the north south section of the new Arterial A2 road
	Vegetation within a hedgerow the north south section of the new Arterial A2 road, near Arterial A2 road's intersection with Countryside Drive.

	Vegetation within a hedgerow along the north south section of the new Arterial A2 road, near Arterial A2 road's intersection with Countryside Drive.
	Vegetation within the ROW for the east-west Arterial road between east-west Arterial road's intersection with Arterial A2 road and Coleraine Drive.

Appendix E: City of Brampton Specifications



NOTES:

1. EXISTING TREES SHALL BE PROPERLY PROTECTED WITH TEMPORARY FENCING AS PER THE APPROVED LANDSCAPE PLAN UNTIL PRELIMINARY ACCEPTANCE.
2. MAINTAIN EXISTING GRADE WITHIN FENCING LINE OF ALL TREES TO BE PRESERVED.
3. THE AREA WITHIN THE PROTECTED FENCING SHALL REMAIN UNDISTURBED AND FREE OF DEBRIS, BUILDING MATERIALS AND EQUIPMENT.
4. PRUNE DEAD WOOD ONLY UNLESS DIRECTED OTHERWISE BY THE CITY. DO NOT PRUNE LEADERS.
5. WATERING AND FERTILIZING PROGRAM SHALL BE MAINTAINED TO THE SATISFACTION OF THE CITY.
   THE COST OF REPLACING DEAD AND SEVERELY DAMAGED
6. TREES, AS DETERMINED BY THE CITY, SHALL BE BORNE BY THE DEVELOPER AND/OR GENERAL CONTRACTOR. THE SPECIES AND SIZE(S) MUST BE APPROVED BY THE CITY.
7. ALL MEASUREMENTS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.

TEMPORARY TREE PROTECTION FENCING

SITE PREPARATION - SERIES 100 SEPTEMBER 2014

L110 N.T.S

BRAMPTON Flower City
brampton.ca

ENVIRONMENTAL PROTECTION

PART 1 GENERAL

1.1 Description of Work

1. Keeping site environmentally protected at all times.

2. Ensure all measures are in accordance with the specifications, drawings, and requirements of other authorities having jurisdiction.

1.2 Related Work

.1 Section 01450 .....Quality Control & Inspection
.2 Section 02231 .....Clearing & Grubbing
.3 Section 02232 .....Tree Pruning
.4 Section 02311 .....Site Grading
.5 Section 02315 .....Excavation, Trenching & Backfilling
.6 Section 02901 .....Tree & Shrub Preservation
.7 Section 02911 .....Site Topsoil & Finish Grading

1.3 Fires

.1 Fires and burning of rubbish on site are not permitted.

1.4 Protection

.1 Prevent damage to fencing, trees, landscape, natural features, bench marks, existing buildings, existing pavement, surface or underground utility lines which are to remain, and to adjacent properties.

.1 Erect siltation and sediment controls where indicated on the Contract Document drawings or as directed by the Consultant or other authorities having jurisdiction prior to construction. Maintain the controls during construction until the sodding or seeding phase is complete or as directed by the Consultant or other authorities having jurisdiction.

1.5 Disposal of Wastes

.1 The Contractor agrees to assume full responsibility and cost to procure and obtain all permits and documentation necessary to effect the proper disposal of materials.

.2 Do not bury rubbish and waste materials on site.

.3 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers.

1.6 Drainage

.1 Provide temporary drainage and pumping as necessary to keep excavations and site free from water.

.2 Do not pump water containing suspended materials into waterways, sewer or drainage systems.

.3 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

1.7 Conservation

.1 The Contractor shall take the necessary precautions to ensure construction activities are carried out with consideration given to the conservation of energy, water, and materials.

1.8 Plant Protection

.1 Protect trees and plants on site and adjacent properties where indicated.

.2 Wrap with tree protection fencing as per the City of Brampton Standard Detail (Wrap in burlap, trees and shrubs adjacent to construction Work, storage areas and access areas, and encase with protective wood framework from grade level to height to 2m).

.3 Protect roots of designated trees beyond the drip line during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.

.4 Minimize stripping of topsoil and vegetation.

.5 Restrict tree removal to areas indicated or designated by the Consultant as indicated on Contract Document drawings.

.6 Do not place surplus material over root systems within any protective fencing.

.7 No contaminants will be dumped or flushed where feeder roots of trees exist, that is within 1.5 times the diameter of the tree’s canopy.

.8 Do not drive over any roots of trees or other vegetation. Any damage caused will be made good at the expense of the Contractor.

1.9 Temporary Tree Protection Fencing

.1 Existing trees shall be properly protected with temporary fencing as per the approved landscape plan and details until Substantial Performance of the work.

.2 Maintain existing grade with fencing line of all trees to be preserved.

.3 The area within the protected fencing shall remain undisturbed and free of debris, building materials and equipment.

.4 Prune dead wood unless directed otherwise by the Consultant, do not prune leaders.

.5 Trees, as determined by the Consultant, shall be borne by the Contractor. The species and size(s) must be as per the City of Brampton Standard.

.6 38x38 mm T-bar posts shall be spaced at 1200mm o.c maximum with 1200mm high paige wire fence secured with wire ties, 300mm o.c.

.7 100x100 mm square or 76 mm dia. round wood post every third post, wood to be pressure treated jack pine or cedar.

1.10 Fertilizing Existing Trees

.1 The Work shall be carried out between April 15th and September 15th of the fiscal year.

.2 The Contractor shall provide fertilizer as recommended by soil testing results and analysis, and as directed by the Consultant.

.3 The Contractor shall use the product packaged in its original containers and prepare each tank in the presence of the Consultant.

.4 The equipment to be used will have to be inspected and approved by the Consultant.

.5 The Owner reserves the right to take samples of the mixture used, for analysis.

1.11 Work Adjacent to Waterways

.1 Do not operate construction equipment in waterways unless otherwise approved by the appropriate Conservation Authority.

.2 Do not use waterway beds for borrow material.

.3 Do not dump excavated fill, waste material or debris in waterways.

.4 Do not use skid logs or other sediment control structures as determined by appropriate Conservation Authority,

.5 Avoid indicated spawning beds or other designated Environmentally Sensitive Areas as identified by the Ministry of Natural Resources and Forestry (MNRF) & Conservation Authorities when constructing temporary crossings of waterways.

.6 Install silt-traps or other sediment control structures as determined by appropriate agencies.

1.12 Pollution Control

.1 Maintain temporary erosion and pollution control features installed under this Contract.

.2 Control emissions from equipment and plant to local authorities emission requirements.

.3 Prevent sandblasting and other extraneous materials from contaminating air beyond application area, by providing temporary enclosures.

.4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

END OF SECTION - 01561

TREE & SHRUB PRESERVATION

PART 1 GENERAL

1.1 Description of Work

.1 This section specifies the preservation of existing vegetation on the site.

1.2 Related Work

.1	All Division 1	Specification Sections
.2	Section 01561	Environmental Protection
.3	Section 02231	Clearing & Grubbing
.4	Section 02232	Tree Pruning
.5	Section 02311	Site Grading
.6	Section 02315	Excavating, Trenching & Backfilling
.7	Section 02911	Site Topsoil & Finish Grading

1.3 Quality Control (Specific)

.1 Contractor shall have a thorough knowledge of horticulture, being able to identify trees, shrubs and ground covers by both common and botanical nomenclature. All persons overseeing tree work must be trained according to the tree care standards accepted by the International Society of Arboriculture.

1.4 Product Delivery, Storage, and Handling (Specific)

.1 Roots of existing trees to be preserved are not to be driven on.

.2 Surplus soil, equipment, vehicles, debris or materials shall not be placed over root systems of the trees within the protective fencing. No contaminants will be dumped or flushed where feeder roots of trees exist, that is within 1.5 times the diameter of the tree's canopy. No cables of any type shall be wrapped around or installed in trees.

PART 2 PRODUCTS

2.1 Temporary Tree Protective Fencing (Specific)

.1 Existing trees shall be properly protected beyond the drip line with minimum 1.2m high temporary fencing as per City of Brampton standard until Substantial Performance.

.2 Maintain existing grade within drip line of all trees to be preserved.

.3 The area within the protecting fencing shall remain undisturbed and free of debris, building materials and equipment.

.4 Prune dead wood only unless directed otherwise by the Consultant. Do not prune leaders, all cuts greater than 25mm diameter shall be treated with approved dressing as per Section **02232 Tree Pruning**.

.5 Silt control fabric as per layout and extent on drawings.

2.2 Fertilizing Existing Trees

.1 The Work will be carried out between October 15th and November 14th of the fiscal year.

.2 The Contractor will provide 2.7 kg of actual nitrogen in an organic or synthetic organic form or 9 kg of product 30-10-7 per 100 square meters of area or to a 40 cm diameter tree suspended in 225 litres of water. (6 lbs. of nitrogen or 20 lbs. of product in 50 gallons of water).

.3 The Consultant reserves the right to take samples of the mixture used, for analysis.

.4 The Contractor will be responsible for any damage caused to turf, walkways, trees or structures.

PART 3 EXECUTION

3.1 Layout

.1 Stake out and locate any major root systems from existing trees.

.2 All proposed construction Works that may intersect with root systems of existing trees are to be identified and staked out using yellow flags.

.3 Protective fencing location(s) are to be staked out as directed by the Consultant.

3.2 Execution

.1 **Through Existing Root Systems:** Excavation required through existing root systems due to proposed Works is to be excavated by hand. Roots are to be cut with a sharp axe, and all cuts to be sealed with approved Tree Surgeons paint.

.2 **Pruning:** Prune vegetation, loose bark, hazardous wood removal and all dead and broken branches. Prune branches to compensate for root loss then treat with tree paint.

.3 **Grade Change Higher Around Trees:** Place 100mm diameter perforated pipe on the existing grade, radiating a minimum of 8 spokes out from the trunk, to the spread of branches, sloping away from the trunk. Connect tiles and place tiles at the end of each slope. The upright spokes shall be extended to reach the new grade to allow for aeration and watering. Tiles are to be covered with clean crushed rock and fill area covered with the tile system with sandy gravel fill.

.4 **Grade Change Lower Around Trees:** A 1:3 downward slope is be constructed to the new grade. Water is to be applied at least three (3) times during dry summer periods and once prior to freeze-up, until the tree has adapted to the new conditions, or until the project has been certified Substantially Performed.

.5 **Fencing:** Maintain Temporary Tree Protective Fencing until removal which is directed by the Consultant.

.6 **Fertilize**: Fertilize in accordance with good horticulture practises to ensure promotion of root growth for two (2) years after acceptance. Where trees whose roots have been disturbed, within the drip line, drill holes 20mm in dia. and 40mm deep at 1000mm intervals on a square grid pattern under the trees drip line, fill holes with topsoil, and water.

3.3 Trees To Be Replaced

.1 Existing trees to remain as per the Contract Documents that have been severely damage or die as a result of the construction shall be replaced with the same species or as approved by the Consultant. Trees to be removed shall be cut completely flush to ground or as otherwise directed by the Consultant.

3.4 Damage

.1 Contractor to repair or make good any damage to trees or other vegetation, at no additional cost to the Owner.

END OF SECTION - 02901

TREE PRUNING

PART 1 GENERAL

1.1 Reference Standards

.1 Perform pruning in accordance with Agriculture Canada Publication 1505-1977, The Pruning Manual, except where specified.

1.2 Related Work

.1 All Division 1 Specification Sections.
.2 Section 01450 .....Quality Control & Inspection
.3 Section 01561 .....Environmental Protection
.4 Section 01740 .....Cleaning
.5 Section 02901 .....Tree & Shrub Preservation

1.3 General Requirements

.1 The following requirements shall be used during any pruning Work:

.1 Dispose of all tree debris generated
.2 Ensure that good traffic control measures are utilized at all times.
.3 Minimize disruption of the public.
.4 Ensure the adequate safety measures are utilized at all times for employees and the public.

.2 Contact the Consultant prior to starting any tree Work.

1.4 Specific Tree Pruning Specifications

.1 All persons performing tree Work on City of Brampton projects or trees must be trained according to the tree care standards accepted by the International Society of Arboriculture;

.2 All persons performing Work on City of Brampton projects or trees or around primary electrical lines must be trained to do so.

1.5 Workmanship

.1 Pruning to be coordinated at appropriate seasonal intervals.
.2 Coordinate all pruning practices with Contractor.
.3 Store all on site materials as directed by Contractor.
.4 Collect and dispose of debris and excess materials daily.

PART 2 PRODUCTS

2.1 Disinfectant

.1 Disinfectant measures to be used in accordance with the best practices as stipulated by the International Society of Arboriculture.

PART 3 EXECUTION

3.1 Tool Maintenance

.1 All cutting tools and saws used in tree pruning shall be kept sharpened to result in final cuts with smooth wood surface and secure bark remaining intact. All trees 150mm in diameter or less shall be pruned with hand tools only. Chain saws will not be permitted on any trees 150mm in diameter or less. This is to prevent any unnecessary abrasions to cambial tissue that may predispose a tree to insect and disease problems.

.2 All tools used on a tree known to contain an infectious tree disease shall be properly disinfected immediately prior and after completing Work on such tree. All major diseases and pest problems shall be promptly reported to the Consultant.

3.2 Annual Thinning

.1 Remove dead, dying, diseased and weak growth in order to promote healthy growth. Retain natural form and shape of plant material.

.2 Prune in dormant season but not during heavy frost. Prune evergreens in spring before start of new growth.

.3 Remove growth designated by the Consultant.

.4 For branches under 150 mm in diameter:

.1 Make cuts smooth and flush with outer edge of branch collar. Do not cut lead branches unless directed by the Consultant.

.5 For branches greater than 150 mm in diameter:

.1 Make first cut on lower side of limb 300 mm from trunk, one third (1/3) diameter of limb.

.2 Make second cut on upper side of limb 500 mm from trunk until limb falls off.

.3 Make final cut adjacent to and outside limb collar. Tree limbs shall be removed and controlled in such a manner as to cause no damage to other parts of the tree or to other plants or property.

.4 Ensure that trunk bark and limb collar are not damaged or torn during limb removal.

.5 Remove one of crossed or rubbing branches. Where removal may affect natural form or health of plant, resolve pruning action with the Consultant.

.6 Remove exposed portion of girdling root after cleanly cutting root flush with grade on each side of parent root. Do not injure bark or parent root.

.7 No more than twenty-five (25) percent of the live wood may be removed from the crown of any tree, without approval from the Consultant, except live oaks, which are limited to no more than ten (10) percent. Resulting in keeping as much of the crown of the tree as possible.

.8 Any extraneous metal, wire, rubber, or other material (ex: stakes, ties) interfering with tree growth shall be removed immediately.

.9 Any defective or weakened trees shall be reported to the Consultant. Specifically, and structural weakness of a tree, decay of trunk or branches, shall be reported in writing, noting the location of the tree by street address and a description of the hazard found in the tree.

.10 The use of climbing spurs or spike shoes in the act of pruning trees is prohibited unless specifically authorized by the Consultant.

.11 Beneficial animal, bird nests, or other nesting cavities shall be preserved and protected whenever feasible, unless doing so would create a hazard.

3.3 Street Trees

.1 Complete tree pruning shall consist of the total removal of those dead or living branches as may threaten the future health, strength and attractiveness of trees. Specifically, trees shall be pruned in such a manner as to:

.1 Prevent branch and foliage interference with requirements of safe public passage. Over street clearance shall be kept to a minimum of 5000mm above the paved surface of the street, 4500mm above the curb, 2500mm above the surface of a public sidewalk or pedestrian way. Exceptions are allowed for young trees, which would be irreparably damaged by such pruning action.

.2 Remove dead and dying branches and branch stubs that are 50mm in diameter or more.

.3 Remove all broken or loose branches.

.4 When trees are in the proximity of overhead energized lines and equipment, reliability of service, safety, and governmental standards require a reasonable amount of tree pruning to avoid conductor contacts and grounding of circuits through the trees. Power line clearance pruning, therefore, shall consist of the removal of tree branches for proper electric line clearance in order to minimize the likelihood of power outages and improve safety.

.1 Clear all branches and foliage within 3000mm of primary electrical lines.

.2 Clear all branches that interfere with secondary electric lines within 915mm to 1525mm.

.3 During the tree pruning process, all safe minimum working distances for energized conductors shall be observed. These clearances are defined under ANSI Z133.1-2006, Tree Care Safety Standards. Current ANSI specifications will supersede these requirements when they take effect. Any contact with energized lines shall be promptly reported to the Consultant.

3.4 Care and Dressing of Wounds

.1 Shape bark around wound to an oblong configuration ensuring minimal increase in wound size.

3.5 Unacceptable Pruning

.1 The procedures including but not limited to those listed below will result in tree decline and are not allowed (storm damage and other extenuating circumstances exempted):

.1 Severe cutting back of all growing tips usually referred to as topping, pollarding, or hat racking.

.2 Flush cutting where a cut is made even with the surface of the trunk or limb, removing the branch collar and branch bark ridge.

.3 Stub cutting where branch removal results in the base of branch removed protruding more than approximately 6mm beyond the zone of branch collar and branch bark ridge.

.4 Removal of a healthy main leader, for reasons other than power line clearance.

.5 Excessive cutting or lifting that exceeds the International Society of Arboriculture or these specifications.

.2 The Contractor shall replace at the Contractor's sole expense any trees that have declined in health due to use of improper pruning procedures.

3.6 Public safety and cooperation

.1 All tree Work shall be conducted in a manner as to cause the least possible interference with, or annoyance to others.

.2 Pedestrian and vehicular traffic shall be allowed to pass through the Work areas only under conditions of safety and with as little inconvenience and delay as possible. Unless the Work area is totally barricaded or otherwise kept safe, at least one (1) worker shall serve to coordinate safe operations on the ground at all times when Work operations are in progress.

.1 Whenever larger tree sections are being cut in the treetop, which may endanger persons or property, such sections shall be secured by ropes and lowered safely to the ground in a controlled manner.

.2 All fire hydrants, meter vaults, water and gas shut off valves and similar facilities must remain accessible during the course of Work.

3.7 Clean-up

.1 Cleanup of any debris resulting from any tree pruning operations shall be promptly and properly accomplished. The Work area shall be kept safe at all times until all operations are completed. Under no

circumstances shall the accumulation of debris be allowed in such a manner as to result in a hazard to the public. All debris shall be cleaned up each day before the Work crew leaves the site, unless permission given by the Consultant to do otherwise. All lawn areas, parkways, streets and sidewalks shall be raked or blown clean. All brush, branches or other debris shall be removed from the site. Areas are to be left in a condition equal to or better than that which existed prior to the commencement of tree pruning.

.2 All cuttings, branches, wood chips and other debris shall be cleared from the site and disposed of by the Contractor. Disposal expenses will be the Contractor's responsibility.

3.8 Report

.1 Report to the Consultant conditions detrimental to health of plant material.

3.9 Inspections

.1 The Consultant will inspect the Work performed by the Contractor to ensure completion of the pruning in accordance with these specifications.

END OF SECTION - 02232