

# 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 'B'  
STUDY CORRIDOR  
City of Brampton  
Project # TP115086

Prepared for:

**Region of Peel**

10 Peel Centre Drive, Suite B, 4th Floor, Brampton ON L6T 4B9

November 2021



# Natural Environment Assessment Report Municipal Class Environmental Assessment Schedule 'C'

ARTERIAL ROAD NETWORK WITHIN THE HIGHWAY 427 INDUSTRIAL  
SECONDARY PLAN AREA (AREA 47) PART 'B' STUDY CORRIDOR  
City of Brampton  
Project # TP115086

## Prepared for:

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November 2021

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## List of Acronyms and Abbreviations

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)MNR	(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 'B' 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 'B' Study Corridor. The NEAR for Part 'A' Study Corridor will have been reported under separate cover.

## 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 'B' 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:

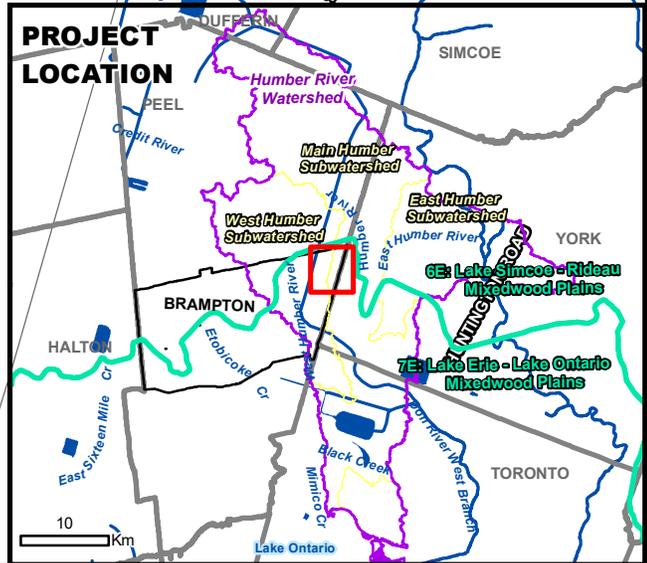
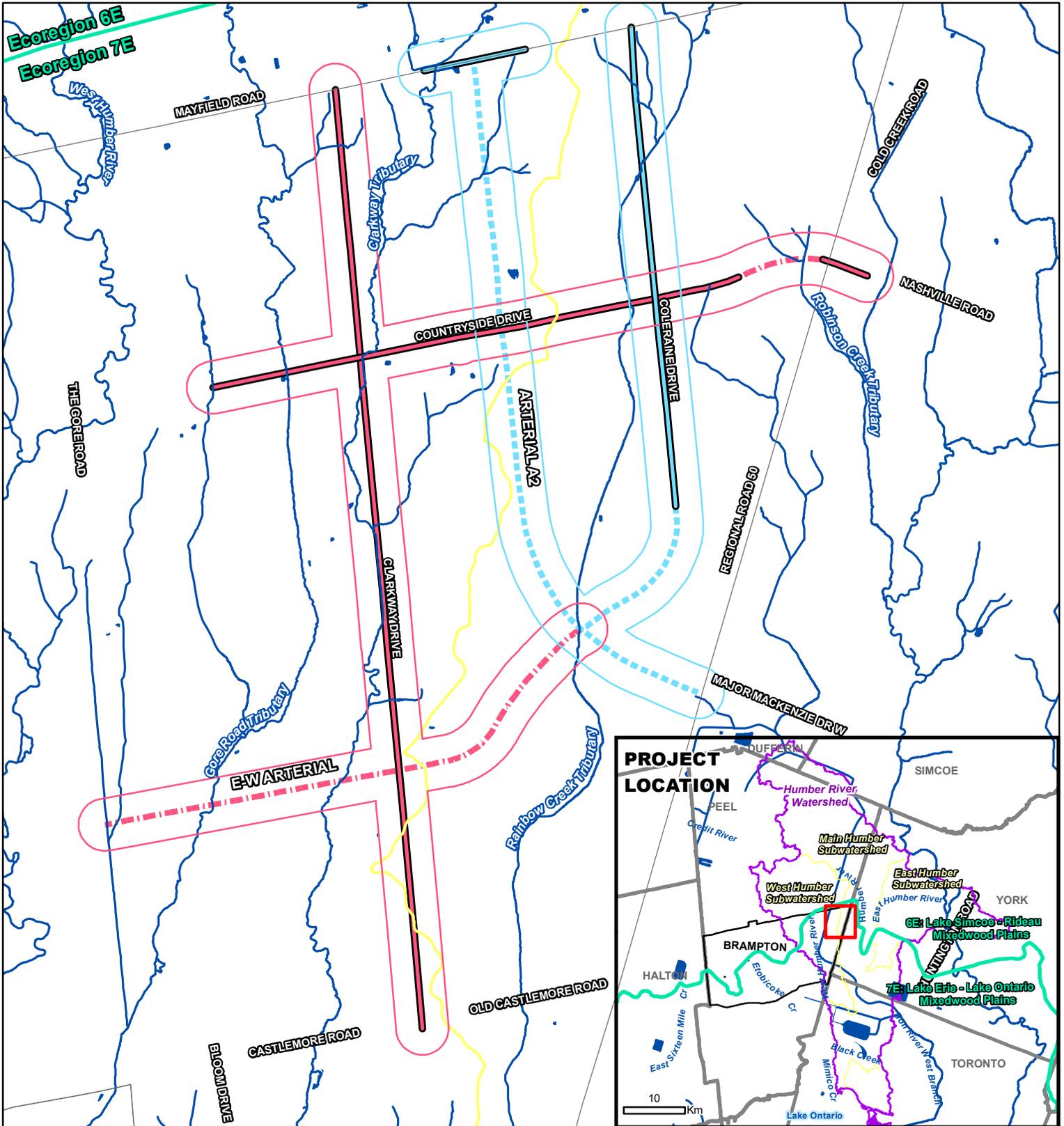
- Stormwater management and drainage recommendations consist of works required to mitigate the potential impacts and meet the necessary minimum control and protection requirements outlined in the 2012 TRCA Stormwater Criteria document, while also taking advantage of opportunities to provide additional 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.
- o 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);
- o 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.
- o 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;
- o 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.
- o 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.
- o Native plantings within the Natural Heritage System buffers and compensation planting (3:1) for the removal of tableland vegetation (i.e. trees and hedgerows).
- o 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.
- o 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).
  - o 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.

Path: G:\PROJECTS\TP115086\_Brampton\_Tree\_Inventory\13 GIS\MXD\Figure\_1-1\_Project\_Location\_Parts\_A\_B.mxd



**LEGEND**

- Ecoregion Boundary
- Part 'A' Approximate Terrestrial Study Area
- Part 'A' Proposed Roadway
- Part 'A' Existing Roadway
- Part 'B' Approximate Terrestrial Study Area
- Part 'B' Proposed Roadway
- Part 'B' Existing Roadway
- Subwatershed Boundary**
- Watershed 1
- Subwatershed 1
- ~ Watercourse
- Waterbody

NOTES:  
 - ESRI Clarity Basemap Imagery - 2018.  
 - Topographic features and Ecoregions extracted from LIO, MNRF.  
 \* Humber River Watershed and Subwatershed boundaries as shown on TRCA website.  
 \* Proposed roadway widening.



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

**Project Location and  
 Study Corridor Map**

Datum & Projection:  
 NAD 1983 UTM Zone 17N



PROJECT N<sup>o</sup>: TP115086

FIGURE: 1-1

SCALE: 1:24,000

DATE: August 2021



## 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 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. 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.
- On 13th April 2017, a meeting regarding the Rainbow Creek NHS (Part 'A' Study Corridor) 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 (Part 'A' Study Corridor) was held with the TRCA. TRCA provided agreement that the revised Rainbow Creek Crossing was accepted in principle.
- TRCA provided NHS comments on 9<sup>th</sup> November 2020. The final NER for Part 'A' was completed 25<sup>th</sup> May 2021. Two continuing comments were received from the TRCA 5<sup>th</sup> August 2021. Responses to these comments were submitted November 2021.
- On 4<sup>th</sup> May 2021 the Preferred design for Part 'B' was provided. During previous consultation with TRCA, very few comments directly related to Part 'B' were received, due to the onus of the Rainbow Creek Corridor in Part 'A'. The Part 'B' NER submission occurred November 2021.

## 2.2 Ministry of Natural Resources and Forestry/Ministry of Environment, Conservation, and Parks

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 14<sup>th</sup> January 2016 Agency meeting, MNRF noted that the proposed E-W Arterial might impact a woodlot close to The Gore Road Tributary. 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. Based on these guidelines, Wood carried out bat works in June 2018. Results are discussed in Section 5.2.2.4. The MNRF was also consulted regarding Redside Dace (Section 6.0; Table 6-1).

At the time of the agency consultation 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 once impacts to The Gore Road woodlot were understood (i.e., once the preliminary design was provided). Though to include possible mitigation into the design of the road, input from the MECP is required. An IGF was submitted to the general email (sarontario@ontario.ca) 5th August 2020. On 22nd February 2021 Shamus Snell from the SAR branch at the MECP responded (Appendix A) stating *"Generally, if the habitat of threatened and endangered Species at Risk cannot be avoided Species at Risk Branch will recommend that an authorization under the Endangered Species Act be pursued. If that is confirmed to be the case it is best to start pursuing an authorization as soon as possible as it can take a substantial amount of time to obtain some Endangered Species Act permit."* As well as *"In general it is the responsibility of the proponent to ensure that SAR are not killed, harmed, or harassed, and that their habitat is not damaged or destroyed through the proposed activities to be carried out on the sites. If the proposed activities can not avoid impacting protected species and their habitats then the proponent will need to apply for a authorization under the Endangered Species Act."*

### 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 (MNR 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 (Table 4-1). 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).

**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	Various	Sunny and clear	Daryl Rideout, Brittany Ferguson  Erin Hellinga, Brittany Ferguson
	4 October 2016			
	25 August 2017			
Breeding Bird Surveys	28 June 2016	06:02-09:51	Air Temperature: 13-17°C	Becky Harris
	29 June 2016	05:49-09:59	Wind (Beaufort): 0-1	
	30 June 2016	05:37-10:16	Precipitation: 0	
	10 July 2016	05:31-09:57	Air Temperature: 18-23°C	
	11 July 2016	05:47-09:03	Wind (Beaufort): 0-1	
			Precipitation: 0	
Ecological Land Classification and Flora	27-29 June 2016	Various	Various	Becky Harris
	10-11 July 2016			
Bat Detectors	15 June to 12 July 2018	Various	Various	Reuven Martin for placement and Joel Jameson for analysis
Tree Inventory	16-18 September 2019	Various	Various	Todd Hagedorn
	24 October 2019			

Note(s)

1. When it comes to baseline data for an impact assessment, inventories of the natural environment should generally be updated every five (5) years. While this is not governed by policy, it is an industry standard. For example, invasive species can dominate communities in short time frames and stochastic environmental events (e.g., floods) can drastically change an ecosystem within five (5) years.

## 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);
- 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 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 km<sup>2</sup> search blocks encompassing the Study Area ('B' blocks are 17PJ0453, 17PJ0352, 17PJ0452, 17PJ0351, 17PJ0451, 17PJ0551, 17PJ0651, 17PJ0550, 17PJ0650?, 17PJ0450, 17PJ0549; 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 17PJ04 and 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.

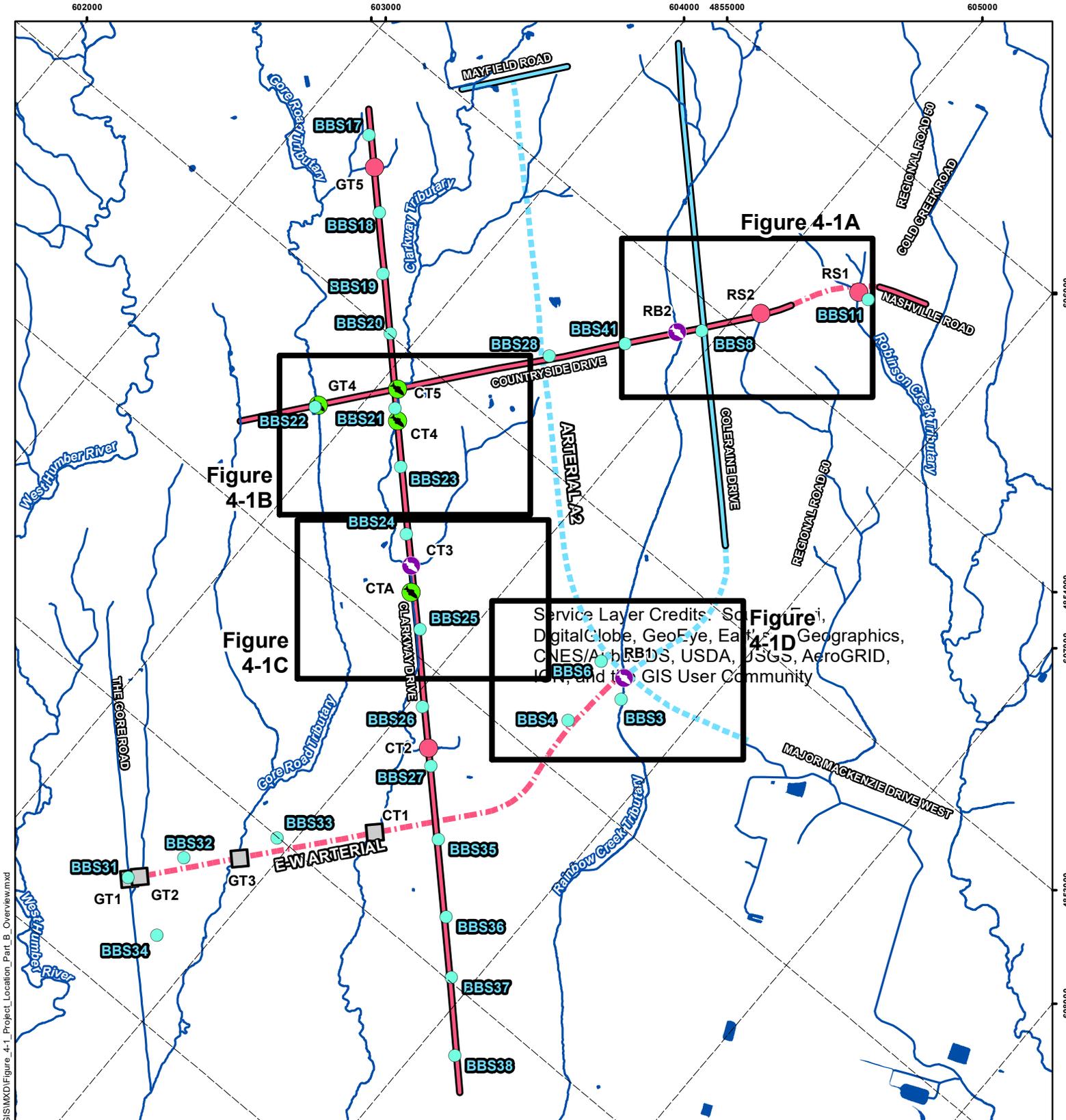
### 4.2.1 Aquatics

#### 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.



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**LEGEND**

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| <ul style="list-style-type: none"> <li><span style="border: 1px solid black; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> Subet Figure Extents</li> <li><span style="border-bottom: 2px solid black; width: 20px; margin-right: 5px;"></span> Part 'A' Existing Roadway</li> <li><span style="border-bottom: 2px solid red; width: 20px; margin-right: 5px;"></span> Part 'B' Existing Roadway</li> <li><span style="border-bottom: 2px dashed blue; width: 20px; margin-right: 5px;"></span> Part 'A' Proposed Roadway</li> <li><span style="border-bottom: 2px dashed red; width: 20px; margin-right: 5px;"></span> Part 'B' Proposed Roadway</li> </ul> <p><b>INVESTIGATIONS</b></p> <ul style="list-style-type: none"> <li><span style="border: 1px solid black; display: inline-block; width: 10px; height: 10px; margin-right: 5px;"></span> Excluded from 2016 Amec Foster Wheeler Investigations (due to land access issues)</li> <li><span style="border: 1px solid black; border-radius: 50%; width: 10px; height: 10px; margin-right: 5px;"></span> Included in 2016 Amec Foster Wheeler Investigations</li> </ul> | <p><b>FISH HABITAT SURVEYS</b></p> <ul style="list-style-type: none"> <li><span style="color: green; font-size: 1.2em;">●</span> Direct Fish Habitat</li> <li><span style="color: purple; font-size: 1.2em;">●</span> Indirect Fish Habitat</li> <li><span style="color: red; font-size: 1.2em;">●</span> No Fish Habitat</li> <li><span style="color: grey; font-size: 1.2em;">●</span> No Investigations</li> </ul> <ul style="list-style-type: none"> <li><span style="color: blue; font-size: 1.2em;">~</span> Watercourse</li> <li><span style="color: blue; font-size: 1.2em;">■</span> Waterbody</li> </ul> |
|--|--|

**NOTES:**  
 - ESRI Clarity Basemap Imagery - 2018  
 - Topographic features extracted from LIO, MNR  
 \* Proposed roadway widening.



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

**Key Map - Part B - Aquatic & Breeding Bird Survey Locations**

Datum & Projection:  
 NAD 1983 UTM Zone 17N



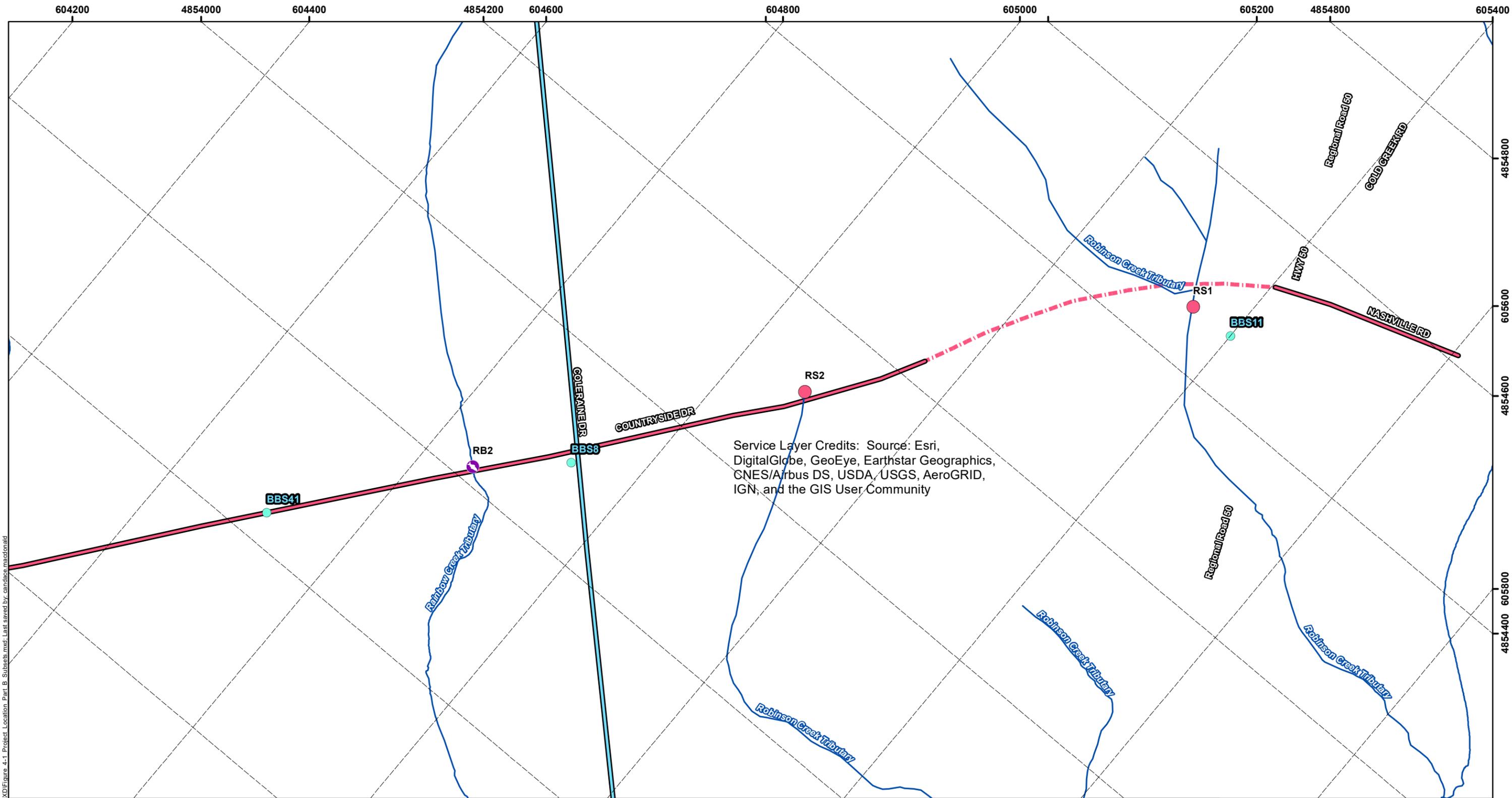
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FIGURE: 4-1

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DATE: August 2021





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

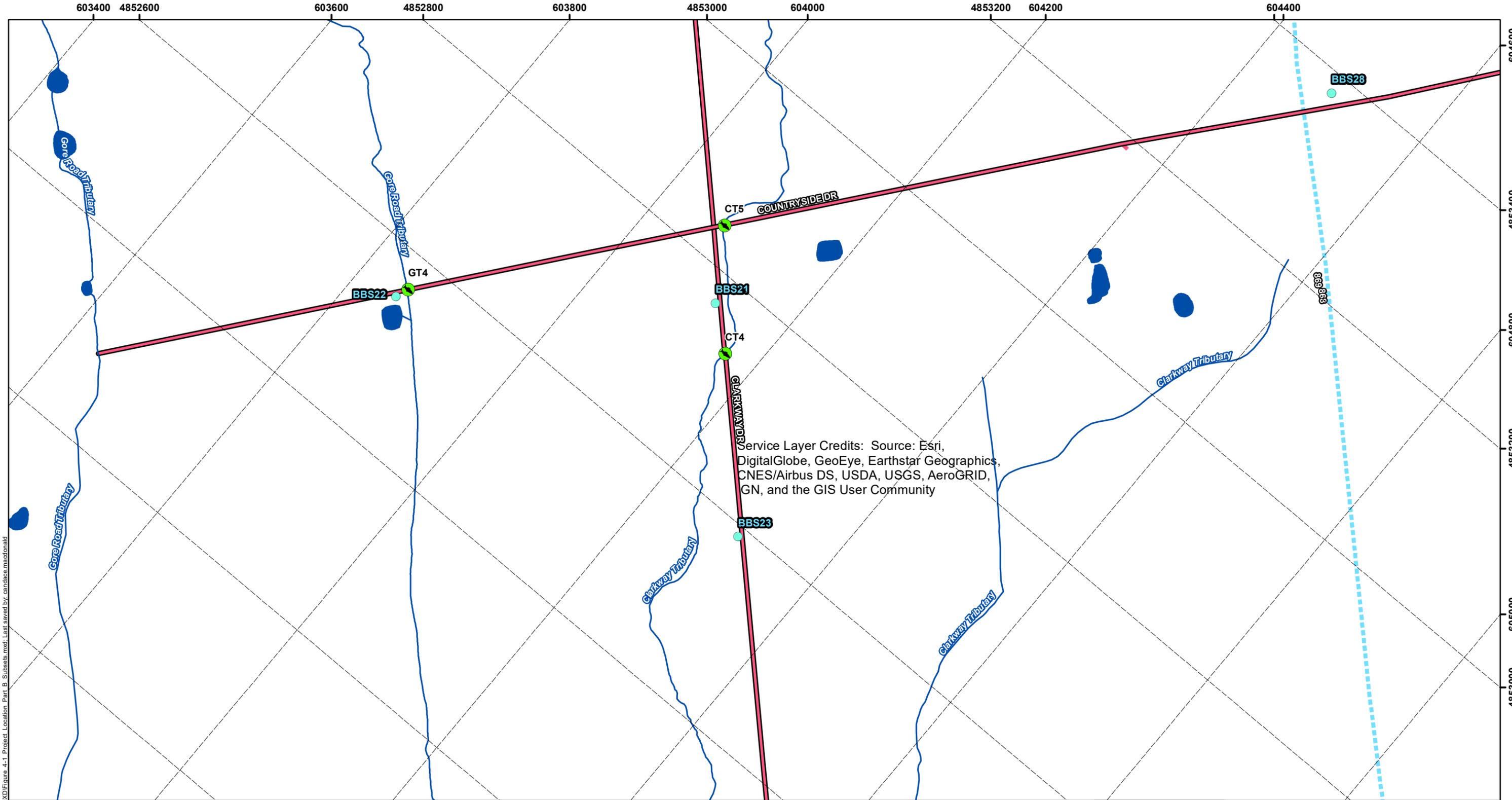
<b>LEGEND</b>		<b>INVESTIGATIONS</b>		<b>FISH HABITAT SURVEYS</b>	
Part 'A' Existing Roadway*	Watercourse	Excluded from 2016 Amec Foster Wheeler Investigations (due to land access issues)	Direct Fish Habitat	Direct Fish Habitat	
Part 'B' Existing Roadway*	Waterbody	Included in 2016 Amec Foster Wheeler Investigations	Indirect Fish Habitat	No Fish Habitat	
Part 'B' Proposed Roadway			No Investigations	No Investigations	

NOTES:  
 - Basedata from MNR/LIO, 2019  
 - ESRI Clarity Basemap Imagery - 2018  
 \* Proposed Roadway Widening

Datum: NAD83  
 Projection: UTM Zone 17N

<b>BRAMPTON HWY 427 EA</b>	
<b>Part B - Aquatic &amp; Breeding Bird Survey Locations</b>	
PROJECT N <sup>o</sup> : TP115086	FIGURE: 4-1A
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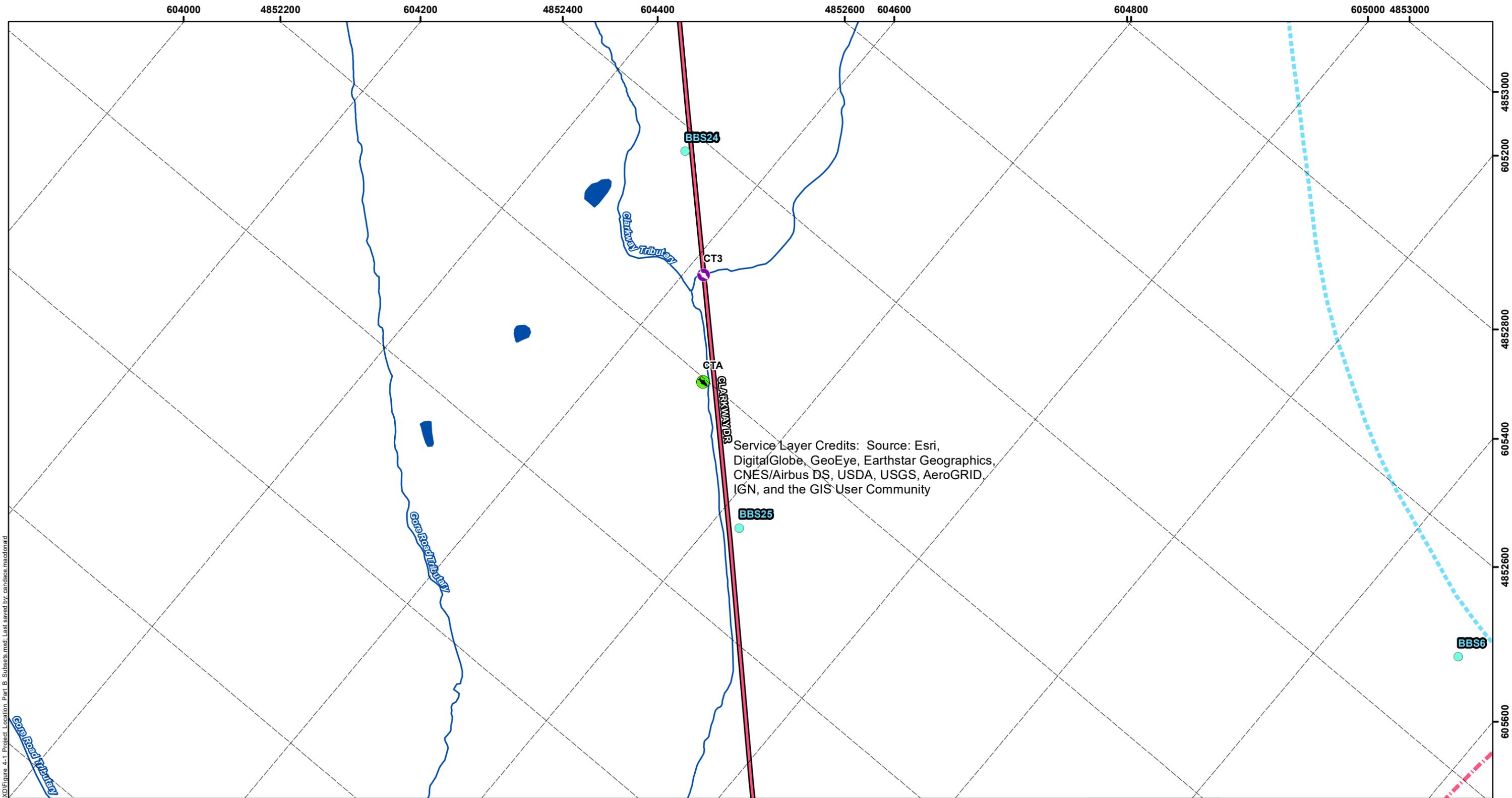


Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, GN, and the GIS User Community

<p><b>LEGEND</b></p> <ul style="list-style-type: none"> <li><span style="color: red; font-weight: bold;">—</span> Part 'B' Existing Roadway*</li> <li><span style="color: blue; font-weight: bold;">- - -</span> Part 'A' Proposed Roadway</li> <li><span style="color: red; font-weight: bold;">- - -</span> Part 'B' Proposed Roadway</li> <li><span style="color: blue; font-weight: bold;">~ ~ ~</span> Watercourse</li> <li><span style="color: blue; font-weight: bold;">■</span> Waterbody</li> </ul>	<p><b>INVESTIGATIONS</b></p> <ul style="list-style-type: none"> <li><span style="border: 1px solid black; display: inline-block; width: 10px; height: 10px;"></span> Excluded from 2016 Amec Foster Wheeler Investigations (due to land access issues)</li> <li><span style="border: 1px solid black; border-radius: 50%; display: inline-block; width: 10px; height: 10px;"></span> Included in 2016 Amec Foster Wheeler Investigations</li> </ul>	<p><b>FISH HABITAT SURVEYS</b></p> <ul style="list-style-type: none"> <li><span style="color: green; font-weight: bold;">●</span> Direct Fish Habitat</li> <li><span style="color: purple; font-weight: bold;">●</span> Indirect Fish Habitat</li> <li><span style="color: pink; font-weight: bold;">●</span> No Fish Habitat</li> <li><span style="color: grey; font-weight: bold;">●</span> No Investigations</li> </ul>	<p><b>NOTES:</b></p> <ul style="list-style-type: none"> <li>- Basedata from MNRF LIO, 2019</li> <li>- ESRI Clarity Basemap Imagery - 2018</li> <li>* Proposed Roadway Widening</li> </ul>	BRAMPTON HWY 427 EA			
				Part B - Aquatic & Breeding Bird Survey Locations			
				Datum: NAD83 Projection: UTM Zone 17N		PROJECT N <sup>o</sup> : TP115086	FIGURE: 4-1B
				SCALE: 1:4,000		DATE: August 2021	

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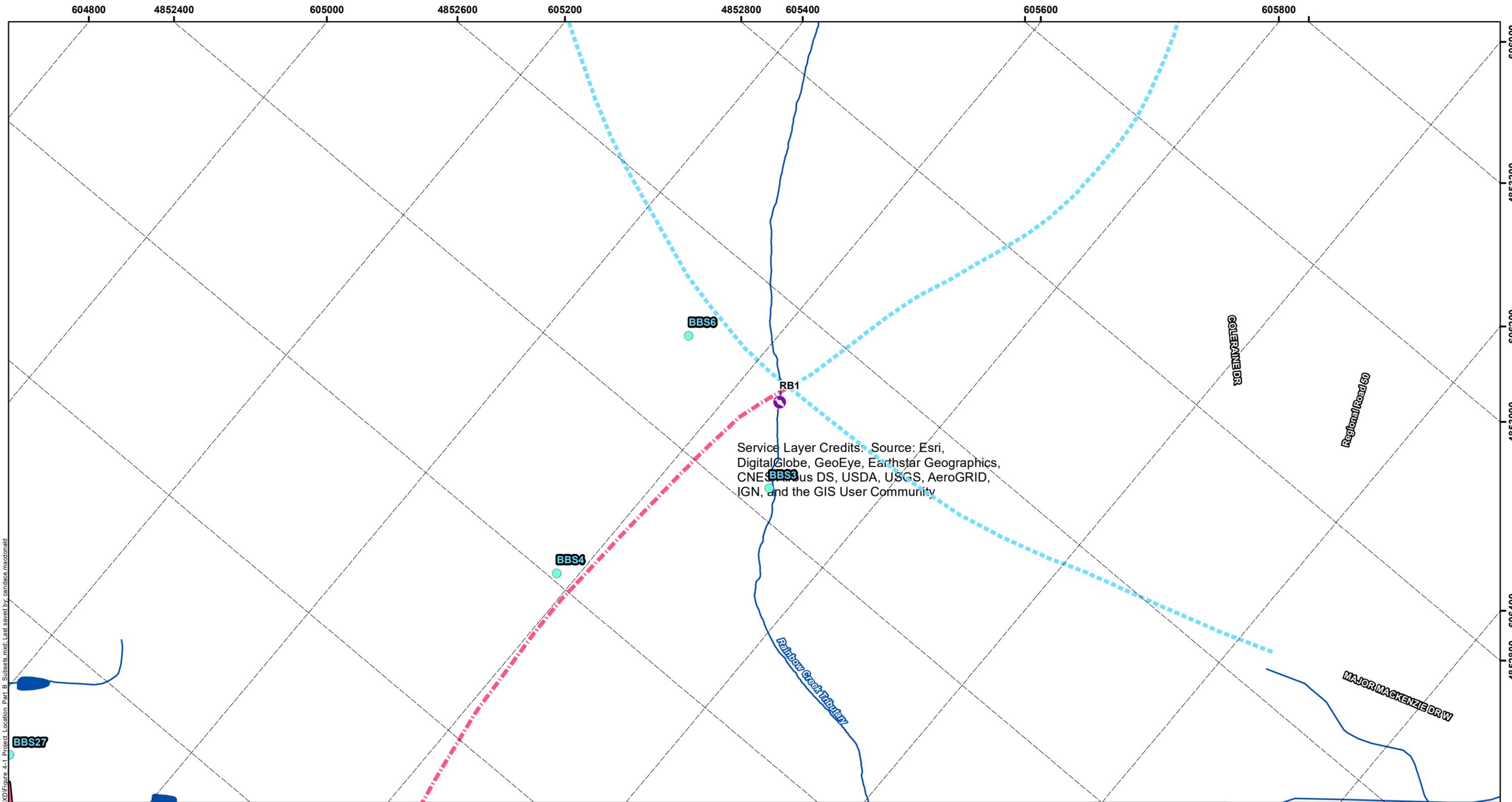
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<b>LEGEND</b>		<b>INVESTIGATIONS</b>		<b>FISH HABITAT SURVEYS</b>	
	Part 'B' Existing Roadway*		Watercourse		Direct Fish Habitat
	Part 'A' Proposed Roadway		Waterbody		Indirect Fish Habitat
	Part 'B' Proposed Roadway		Excluded from 2016 Amec Foster Wheeler Investigations (due to land access issues)		No Fish Habitat
			Included in 2016 Amec Foster Wheeler Investigations		No Investigations

**NOTES:**  
 - Basedata from MNRF LIO, 2019  
 - ESRI Clarity Basemap  
 Imagery - 2018  
 \* Proposed Roadway Widening

Datum: NAD83  
 Projection: UTM Zone 17N

<b>BRAMPTON HWY 427 EA</b>	
<b>Part B - Aquatic &amp; Breeding Bird Survey Locations</b>	
PROJECT N <sup>o</sup> : TP115086	FIGURE: 4-1C
SCALE: 1:4,000	DATE: August 2021



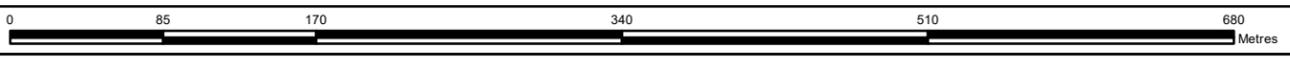
<b>LEGEND</b> Part 'B' Existing Roadway* Part 'A' Proposed Roadway Part 'B' Proposed Roadway Watercourse Waterbody		<b>INVESTIGATIONS</b> Excluded from 2016 Amec Foster Wheeler Investigations (due to land access issues) Included in 2016 Amec Foster Wheeler Investigations		<b>FISH HABITAT SURVEYS</b> Direct Fish Habitat Indirect Fish Habitat No Fish Habitat No Investigations	
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NOTES:  
 - Basedata from MNR/LIO, 2019  
 - ESRI Clarity Basemap Imagery - 2018  
 \* Proposed Roadway Widening

Datum: NAD83  
 Projection: UTM Zone 17N

 <b>BRAMPTON HWY 427 EA</b>	
<b>Part B - Aquatic &amp; Breeding Bird Survey Locations</b>	
PROJECT N <sup>o</sup> : TP115086	FIGURE: 4-1D
SCALE: 1:4,000	DATE: August 2021

G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MXD\Figure 4-1 Protected Location Part B Subsets.mxd. Last saved by: candace.macdonald



## 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).

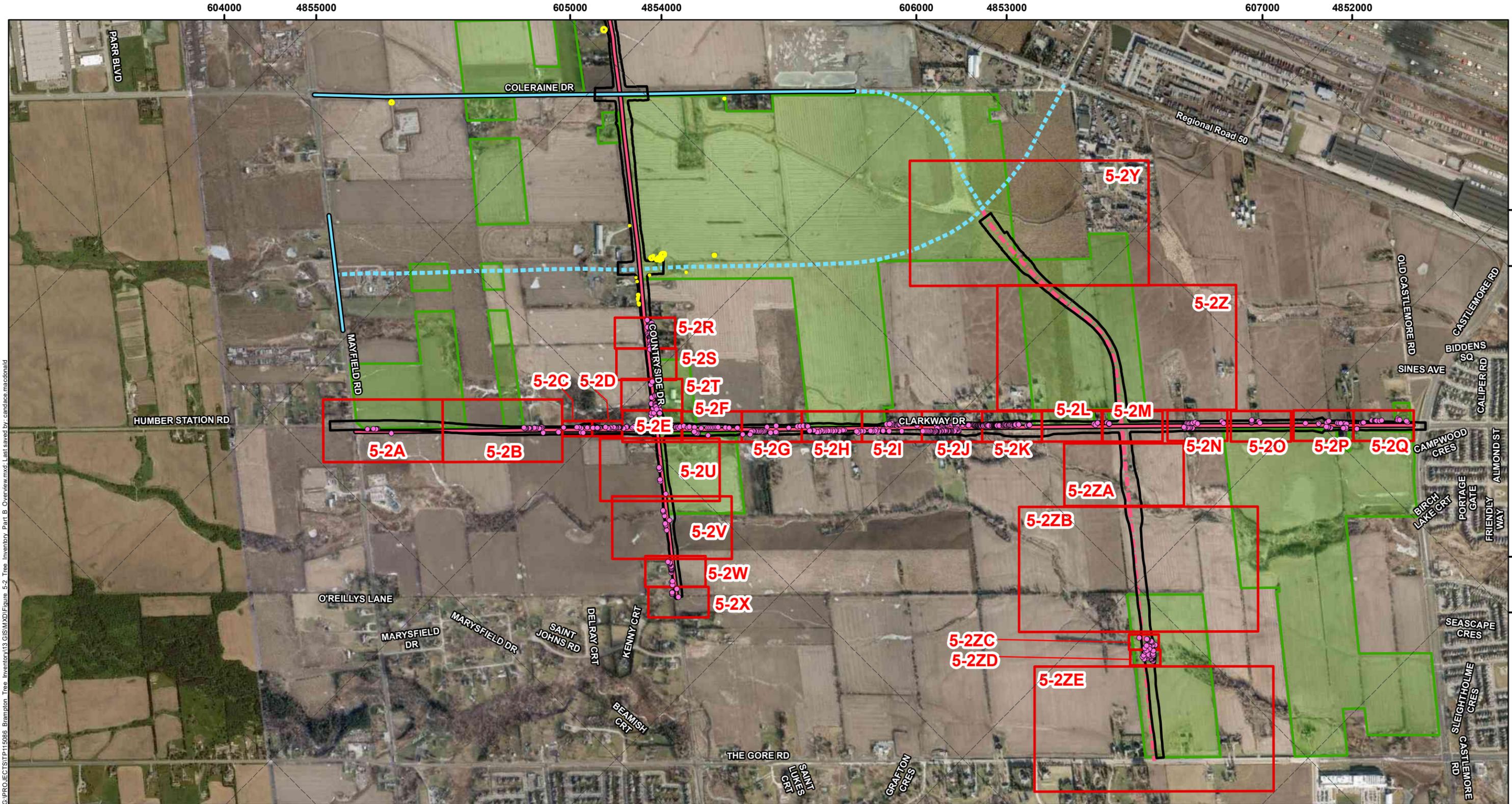
**Sub-canopy** includes vegetation growing just under the canopy, vegetation that receives filtered sunlight through the canopy, typically composed of trees and tall shrubs (in a forest community).

**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 tree inventory was undertaken along the proposed corridors within the Part 'B' Study Area based on the 20% drawings. For the purposes of the tree inventory Part 'B' included the E-W Arterial from The Gore Road to Arterial A2, Countryside Drive from west of Clarkway Drive to A2, and Clarkway Drive from Castlemore Road to Mayfield Road. The remaining roads are covered under the Part 'A' Tree Assessment Report; a Overview of location is provided in Figure 4-2. Figure 4-2: Tree Inventory Locations in the Study Area Only select permission to enters was 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 C.



**LEGEND**

	Part 'A' Existing Roadway*		Tree Protection Zone
	Part 'B' Existing Roadway*		Injure
	Part 'A' Proposed Roadway		Retain
	Part 'B' Proposed Roadway		Remove
	Road Footprint		Map Index
	PTE Area		

**Scale:** 0 375 750 1,500 2,250 3,000 Metres

**NOTES:**  
 - Basedata from MNRFP LIO, 2019  
 - ESRI Clarity Basemap Imagery - 2018  
 \* Proposed roadway widening.

Datum: NAD83  
 Projection: UTM Zone 17N

**wood.**

**BRAMPTON HWY 427 EA**

**Tree Inventory  
Part B - Overview**

PROJECT N<sup>o</sup>: TP115086    **FIGURE: 4-2**

SCALE: 1:15,000    DATE: August 2021

G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MapXFigure 5-2 Tree Inventory Part B Overview.mxd. Last saved by: candace.macdonald

### 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 26 point-count locations within the Study Area (Figure 4-1). 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

#### **Bat Acoustic Surveys**

As mentioned above in Section 2.2, the MNRF noted that the proposed E-W Arterial may impact a woodlot close to The Gore Road Tributary (Figure 4-3) and in the Environmental Impact Study Area, Blocks 47-1 and 47-2 by Savanta (2017), identified the same woodlot as potential significant wildlife habitat for bat maternity colonies. It was recommended that species consideration be given to this area as four bat species potentially present in the Study Area are designated Endangered provincially (Savanta 2017). Therefore, Wood conducted bat surveys in this woodlot to provide technical documentation for planning and process-related submissions under the Endangered Species Act, 2007 (ESA) relative to potential impacts on bat Species at Risk (SAR), should impact to the woodlot be unavoidable. Following the MNRF Guelph District Bat and Bat Habitat Survey guidelines (April 2018), acoustic surveys were conducted to detect nocturnal bat activity during the maternity rearing period in June 2018, with surveys also extending into early July 2018. Due to the vegetated nature of the woodlot, suitably uncluttered sites for bat detectors are limited. Acoustic survey locations were selected based on (a) nearby potentially suitable roost cavities, (b) likely feeding areas, (c) uncluttered areas, and (d) to maximize site coverage. Three Songmeter SM4Bat (Wildlife Acoustics Inc.) ultrasonic recording detectors paired with SMM-U2 ultrasonic microphones (Wildlife Acoustics Inc.) were deployed at three locations within the woodlot. The characteristics of placement sites of the detectors are summarized in Table 4-2 below, and a photo record of each acoustic detector is provided in Appendix D.

**Table 4-2: Characteristics of Detector Placement Sites**

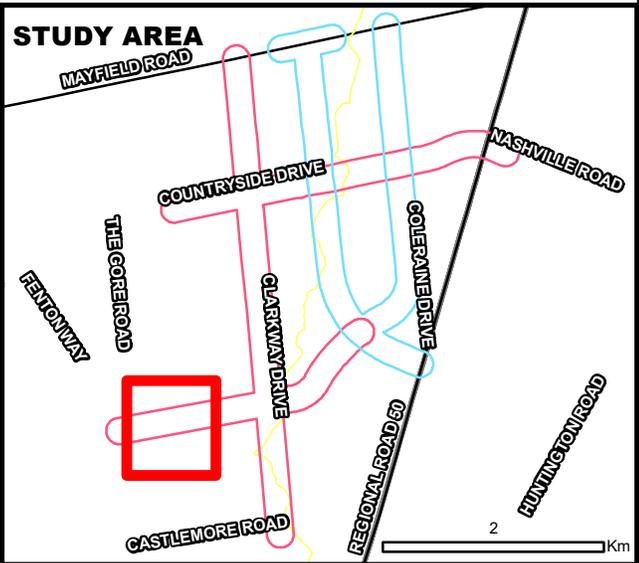
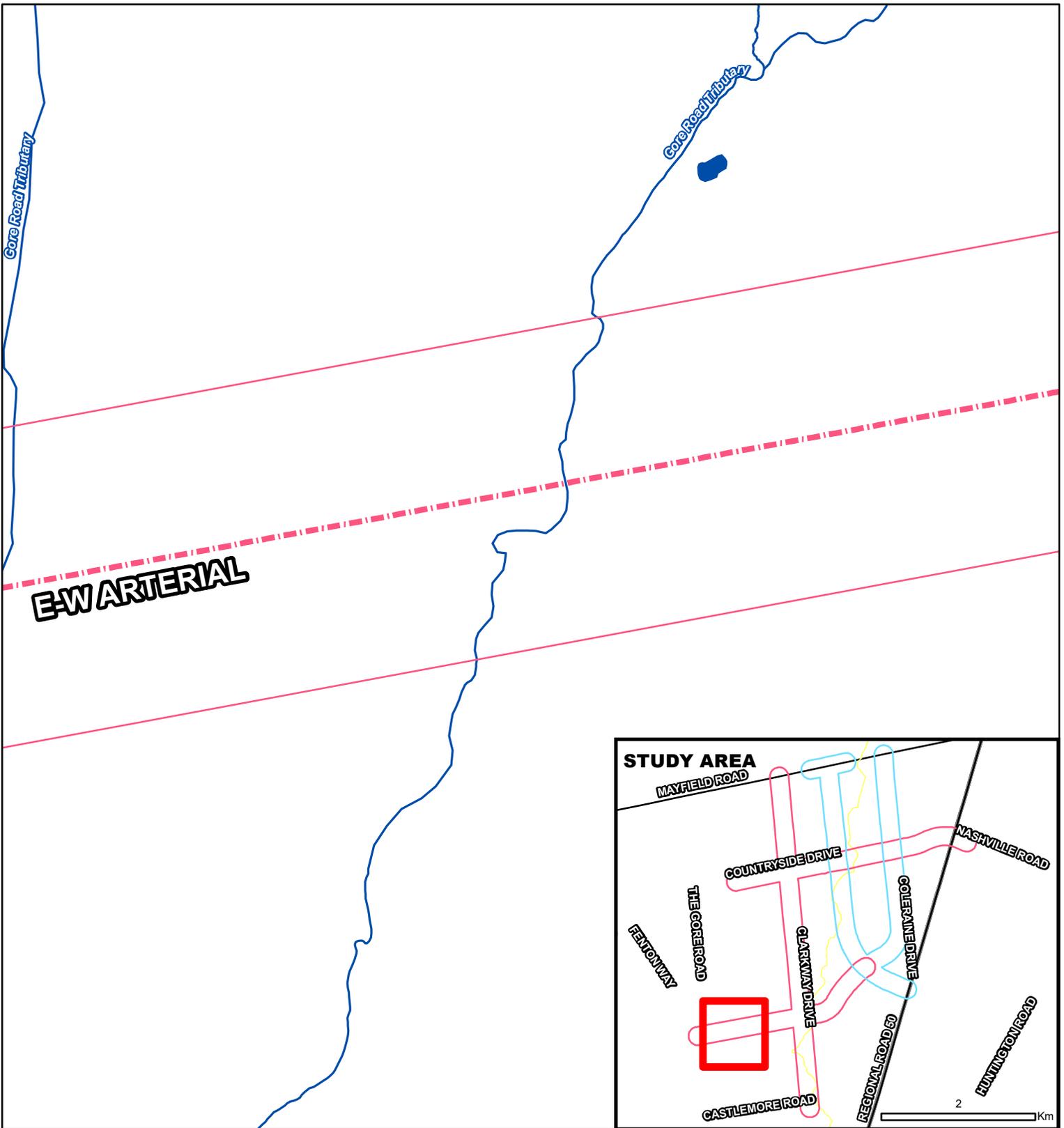
Detector Number	Habitat	Notable Nearby Features
61	Grassy clearing adjacent to stream	Large trees, flowing stream, open clearing
65	Edge of grassy clearing adjacent to stream	Large trees, flowing stream, open clearing
70	Edge of grassy clearing adjacent to stream	Flowing stream, open clearing

The bat detectors were deployed from 15 June to 12 July 2018. Weather conditions were generally optimal during the deployed period, with considerable precipitation ( $\geq 10$  cm) only recorded on 24 and 27 June and 3 July (Environment and Climate Change Canada 2018a and 2018b), indicating that/the detectors received up to 23 nights of optimal recording. All nocturnal bat activity was recorded from 30 minutes before sunset to 30 minutes after sunrise.

Prior to deployment, an ultrasonic calibrator (Wildlife Acoustics Inc.) was used to verify the sensitivity and proper functioning of the bat detector microphones. Bat detectors were configured to begin recording when ultrasonic signals greater than 18 decibels (dB) above the noise floor rolling average were detected. Upon trigger, a 2 to 5-second recording was saved. A signal process then filtered recorded signals and retained those files resembling bat echolocation. All recordings were made in .wav format with a 384 kHz sampling frequency and 16-bit resolution, resulting in real-time, full-spectrum data.

All recordings were initially filtered using the Sonobat Batch Scrubber (version 5.2.vi). The scrubber was set to remove files containing only tonal signals below 5 kHz, as well as any file where tonal signals resembled noise. Recordings were initially identified to species using Sonobat 3.2.0 NE.vi (SonobatTM) automated processing software for Ontario and United States, north and northeast. Automated classification can provide accurate classifications for clear recordings that have a high signal-to-noise ratio, especially for regions of low species diversity. However, most field recordings contain some level of noise, which can limit the accuracy of automated software and its ability to detect echolocation calls within recordings. Automated classification can reliably classify major bat species groups (e.g. high-frequency species vs low-frequency species); therefore studies recommend using automated software as an initial sorting step to reduce manual classification workload (Rydell, J., et al. 2017, Lemen, C. et al. 2015, Menon, A.M., et al. 2018). The focus for this survey was to detect SAR bats, which in Ontario are all classified as high-frequency species (species that emit calls with an average minimum frequency above 35 kHz). Consequently, recordings selected for manual revision included all high-frequency species passes that were not classified to a specific species. Additionally, up to 200 randomly selected high-frequency automated species classifications were reviewed manually, as well as any rare or unlikely classification.

The automated classification used the 'mean classification' decision method in Sonobat. Up to 8 calls within each recording were classified based on over 30 acoustic parameters. The software uses discriminant analysis to provide an accuracy probability for each classification, and only calls with a probability greater than 90% were accepted. The calls within a sequence are then sorted hierarchically and processed to generate a mean classification decision. The manual classification was accomplished by comparing qualitative and quantitative parameters of recorded bat calls to a library of known species parameters. Parameters used for species identification included the: frequency of maximum energy, minimum frequency, maximum frequency, call duration, the slope of the call; and other more qualitative parameters such as the time-frequency shape of the call, the position of the knee, presence of inflections and terminal curvatures. Less importance was placed on maximum frequency due to its susceptibility to atmospheric attenuation. Calls that could not be classified to a single species were placed in a group named after the two or more species most likely to have produced the call.



**LEGEND**

- Part 'A' Approximate Terrestrial Study Area
- Part 'A' Proposed Roadway
- Part 'A' Existing Roadway
- Part 'B' Approximate Terrestrial Study Area
- Part 'B' Proposed Roadway
- Part 'B' Existing Roadway
- FOD7-7, Fresh-Moist Manitoba Maple Lowland Deciduous Forest Type
- Other ELC
- Subwatershed Boundary
- Watershed <sup>1</sup>
- Subwatershed <sup>1</sup>
- ~ Watercourse
- Waterbody

0 0.3 Kilometres

**NOTES:**

- ESRI Clarity Basemap Imagery - 2018.
- Topographic features and Ecoregions extracted from LIO, MNRF.
- <sup>1</sup>Humber River Watershed and Subwatershed boundaries as shown on TRCA website.
- \* Proposed roadway widening.

Datum & Projection:  
NAD 1983 UTM Zone 17N

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

**Gore Road Tributary  
Woodlot and Bat Recorders**

PROJECT N <sup>o</sup> : TP115086	FIGURE: 4-3
SCALE: 1:4,000	DATE: August 2021

### ***Incidental 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. Three significant woodlands were identified within the Study Area. Two were cultural habitats (cultural woodlot and cultural plantation) and one was a deciduous forest which was also identified as potentially Significant Wildlife Habitat due to the potential for bat hibernacula (Aquafor Beech Limited 2016).

#### **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. A total of 44 HDFs within the Area 47 study extents were evaluated in the MESP (

Figure 5-1). Each HDF was associated with one of the three primary tributaries running longitudinally through the site. The Gore Road Tributary has 17 HDFs, the Clarkway Tributary has 16 HDFs, the Rainbow Creek Tributary has 9 HDFs (one drains to Regional Road 50), and Robinson Creek Tributary has 2 HDFs draining to Regional Road 50.

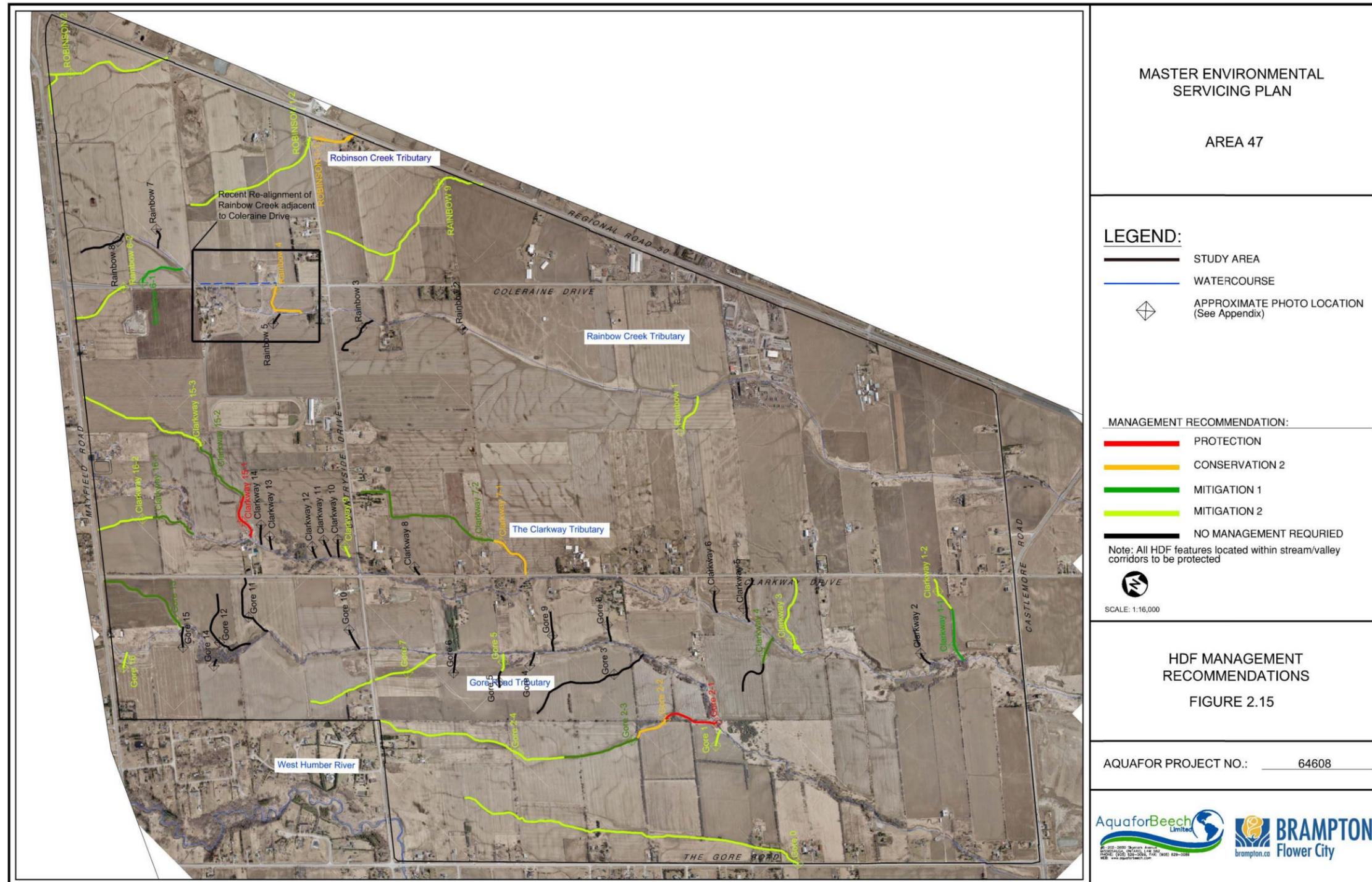
The Gore Road Tributary is wholly located in Part 'B' and majority of the Clarkway Tributary is located in Part 'B'. Most of the Rainbow Creek Tributary occurs in the Part 'A' study area, however, the proposed intersection of the E-W Arterial, Arterial A2, and Coleraine Drive occurs adjacent to the "Rainbow 1" HDF cross section. Adjacent to Countryside Drive, HDFs of the Rainbow Creek Tributary number 3, 4, 5, and 9 occur. Likewise, HDFs of the Robinson Creek Tributary 1-1 and 1-2 occur adjacent to Countryside Drive.

HDFs recommended for "Protection" should remain as open watercourses at their current location. Future stormwater management planning will require that flows be maintained to these features, via storm pond outfalls, low impact development (LID) swales or other techniques. These include Gore Road HDF 2 – Reach 1 and Clarkway HDF 15 – Reach 1, also recommended to remain as open watercourses in future urban landscape after floodplain mapping.

HDFs recommended for "Conservation" should remain as open watercourses, and future stormwater management planning will require that flows be maintained to these features. Although not preferred, some modification/relocation of these features may be considered, to obtain a suitable storm pond outlet, for example. These include Gore Road HDF 2 – Reach 2, Clarkway HDF 7 – Reach 1, and Robinson Creek Tributary HDF 1 – Reach 1. It was recommended in the MESP that these remain as open watercourses in future urban landscape after floodplain mapping and any proposed modifications to these features would require further analysis and approval from the City and TRCA. Rainbow HDF-4 was also recommended for "Conservation" in the MESP. It was later identified that Rainbow HDF-4 was a result of recent upstream drainage modifications at Coleraine Drive which diverted the main channel of the Rainbow Creek Tributary to this feature via the roadside ditch.

The remaining 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.

Figure 5-1: HDF Management Recommendations from the MESP Figure 2.15



## 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 identifies 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, the identified crossings include GT1 through GT5 which are associated with The Gore Road Tributary, CT1 through CT5 associated with Clarkway Tributary, RB1 and RB2 related to the Rainbow Creek Tributary, and RS1 and RS2, associated with the Robinson Creek Tributary. A reach of the Clarkway Tributary was also assessed as a component of the aquatic Study Area at CTA, 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	CT2, CTA, CT3, CT4, CT5	CT1
	Gore Road Tributary	GT1, GT2, GT3, GT4, GT5	
Main Humber	Rainbow Creek Tributary	RB1, RB2	
	Robinson Creek Tributary	RS1, RS2	

Note(s)

1. 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 <sup>1</sup>	Substrate Type <sup>2</sup>	Vegetation	Fish Habitat Classification
Clarkway Tributary	CT2	Ephemeral - dry during site visit	None	Not Evaluated	Drainage swale in agricultural field	None
	CTA (Ditchline)	Permanent	Warmwater	5% boulder 35% cobble 20% gravel 30% silt 10% clay	Drainage ditch located adjacent to roadway and residential areas	Direct
	CT3	Intermittent – no flow during site visit	Warmwater	Not Evaluated	Narrow strip of riparian vegetation associated with agricultural drainage channel.	Indirect
	CT4	Permanent	Warmwater	10% boulder 30% cobble 30% gravel 20% sand 5% silt	Riparian habitat bordered by adjacent agricultural and residential land uses (grasses, cattails and rushes)	Direct
	CT5	Permanent	Warmwater	20% gravel 20% sand 60% silt	Riparian habitat bordered by adjacent agricultural and residential land uses (grasses, cattails and rushes)	Direct
Gore Road Tributary	GT1	Ephemeral	Warmwater	Not Evaluated	Drainage swale, roadside drainage ditch	None
	GT2	Intermittent - dry during site visit, some pooling	Warmwater	Not Evaluated	Drainage swale in agricultural field	Indirect
	GT3	Intermittent - dry during site visit, some pooling	Warmwater	Not Evaluated	Drainage swale in agricultural field	Indirect
	GT4	Permanent	Warmwater	30% cobble 5% gravel 65% clay	Riparian habitat bordered by adjacent agricultural land uses (grasses, cattails and rushes)	Direct



Watercourse	Crossing ID	Flow Regime	Thermal Regime <sup>1</sup>	Substrate Type <sup>2</sup>	Vegetation	Fish Habitat Classification
	GT5	Ephemeral - dry during site visit	None	Not Evaluated	Drainage swale in agricultural field	None
Rainbow Creek Tributary	RB1	Ephemeral – dry during site visit	Warmwater	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
Robinson Creek Tributary	RS1	Ephemeral - dry during site visit	None	Not Evaluated	Drainage swale in agricultural field	None
	RS2	Ephemeral - dry during site visit	None	Not Evaluated	Drainage swale in agricultural field	None

Note(s)

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 <sup>2</sup> )	Bank Stability
Clarkway Tributary	CTA (ditchline)	Reach 1 (62 m - Downstream End)	80% riffle 20% flats	3.20	0.38	3.00	0.27	None	30-60%	5% undercut banks, instream woody debris	Stable
		Reach 2 (27 m)	10% run	2.40	0.38	2.4	0.24	<5% emergent species	30-60%	1% undercut banks	Stable
		Reach 3 (70 m)	10% riffle 90% flats	3.00	0.41	2.68	0.15	1% watercress <5% cattails	30-60%	5% cobble	Stable
		Reach 4 (19 m)	100% pool	3.40	0.53	3.40	0.25	1% watercress	30-60%	25% cobble, undercut banks, organic debris	L US - slightly unstable R US - stable
		Reach 5 (120 m - Upstream End)	20% pool 20% riffle 60% flats	3.55	0.40	3.17	0.19	5% cattails 1% watercress	30-60%	21% instream vascular macrophytes (algae), undercut banks (1%)	L US - slightly unstable R US - stable
	CT4	ROW to 50 m Downstream	30% riffle 70% flats	2.50	0.39	2.41	0.12	None	30-60%	45% cobble, instream vascular macrophytes (algae)	L US - moderately unstable R US - stable

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 <sup>2</sup> )	Bank Stability
	CT5	ROW to 50 m Upstream	20% pool 10% riffle 70% flats	3.40	0.38	2.70	0.29	None	1-30%	20% vascular macrophytes (algae)	Stable
		ROW to 50 m Downstream	95% riffle 5% pool	2.90	0.39	2.75	0.08	<5% instream vascular macrophytes (algae)	30-60%	10% cobble, instream vascular macrophytes, instream woody debris	L US - slightly unstable R US - stable
		ROW to 50 m Upstream	20% run 20% pool 60% flats	3.13	0.45	2.58	0.21	<5% cattails	30-60%	10% undercut banks, instream vascular macrophytes	L US - stable R US - slightly unstable
Gore Road Tributary	GT4	ROW to 50 m Downstream	10% riffle 90% flats	1.20	0.36	0.95	0.17	25% algae	60-90%	1% instream vascular macrophytes	Stable
		ROW to 50 m Upstream	100% flats	3.70	0.34	3.20	0.12	15% submergents	60-90%	16% instream vascular macrophytes, boulders (1%)	Stable

Note(s)

1. 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
2. Instream cover types listed in decreasing order of abundance



**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)
Gore Road Tributary	GT1	Dry				
	GT2	15	22	550	6.64	6.30
	GT3	14.7	22	687	6.78	6.03
	GT4	17.7	12	788	8.02	7.85
	GT5	17.7	12	788	8.02	7.85
Clarkway Tributary	CT2	Dry				
	CTA (Ditchline)	15.3	12	2078	8.21	5.63
	CT3	Dry				
	CT4	10.1	10	2242	8.17	6.40
	CT5	10.1	10	2242	8.17	6.40
Rainbow Creek Tributary	RB1	Dry				
	RB2	13.3	10	1937	7.98	6.40
Robinson Creek Tributary	RS1	Dry				
	RS2	Dry				

Note(s)

1. pH measurements fluctuated during sampling the value provided represents the mean value

### 5.2.1.2 Gore Road Tributary

#### Origin and Flow

All five of the Gore Road Tributary crossings occur within the Study Area (GT1, GT2, GT3, GT4, and GT5). The main branch of the Gore Road Tributary is a permanent watercourse with a warmwater thermal regime and is crossed at GT3 and GT4. Crossings GT1, GT2 and GT5 are individual headwater tributaries converging with the main branch. Gore Road Tributary's main branch originates approximately 4.7 km north of Mayfield Road on Clarkway Drive (Humber Station Road) in an area south of King Street in the Town of Caledon. The tributary flows south through natural creek valleys, with agricultural and rural residential land use. Within the project area, the main branch of Gore Road Tributary flows in a southerly direction from Mayfield Road, across Countryside Drive and then continues in a southwestward direction, passing under the Gore Road, just north of Castlemore Road eventually merging with the West Humber River north of Highway 407.

## **Fisheries Limitations**

Flow velocities and water levels were low during the site visit, and there is some potential for water levels to further decrease during seasonally dry periods, which would create seasonal barriers to fish passage.

### ***Crossing GT1***

The location of GT1 is illustrated in Figure 4-1. Land access was granted for this site in 2017, and field investigations were conducted at this site, as well as GT2 and GT3 on August 25, 2017. This crossing is located nearest the intersection of the proposed East-West Arterial Roadway and The Gore Road. This watercourse was dry at the time of the field visit. It is a roadside drainage ditch conveying runoff resulting from rainfall events.

As alternative locations for the E-W Arterial Road are under discussion, the preferred option will determine the precise location of watercourse crossings GT1, GT2 and GT3 (in addition to CT1 and RB1). As such, the locations illustrated in Figure 4-1, may be subject to change.

### ***Crossing GT2***

The location of GT2 is illustrated in Figure 4-1. This watercourse crossing is located on the tributary located directly east of GT1. During the August 2017 site visit, the watercourse exhibited minimal amounts of water and no flow. This watercourse is considered to be intermittent, with seasonal flows present.

A pond is found in the residential property located immediately north of the proposed crossing. This pond likely contributes to the seasonal flows present within the downstream reach. Some small pooled areas of standing water were evident immediately downstream of the pond within the agricultural field. These pools were not connected to upstream or downstream reaches and contained stagnated water within a poorly defined channel. The mean wetted width of the pooled areas was 1.35, and the mean bankfull width was 1.75. The average depth was 0.08 m, with the greatest depth recorded reaching 0.11 m. The substrate was comprised of sand, silt, clay and muck. Cyprinids were observed within the pooled areas.

From the residential pond upstream, the tributary continues for approximately 88 m before out-letting into the roadside ditch just south of Crossing GT1. This watercourse is likely impacted by agricultural practices, with the poorly defined channel impacted by agricultural tillage. Furthermore, a large amount of algae was evident (covering approximately 70% of the water surface). Algae is likely prolific within the area due to the runoff of nutrients from agricultural practices and lawn herbicides/pesticides used within nearby areas. Some organic food waste was also observed in the area. Two crayfish chimneys were observed alongside the watercourse. These could be created by burrowing crayfish inhabiting the area which is discussed in greater detail in Section 5.2.2.6. A crayfish molted exoskeleton was also observed in close vicinity to the watercourse, indicating current use of the area by this species.

As alternative locations for the E-W Arterial Road are under discussion, the preferred option will determine the precise location of watercourse crossings GT1, GT2 and GT3 (in addition to CT1 and RB1). As such, the locations illustrated in Figure 4-1, may be subject to change

### ***Crossing GT3***

The location of GT3 is illustrated in Figure 4-1. This watercourse was almost completely dry, with no flow at the time of the site visit aside from a few small areas where pooled water was evident in deeper, shaded areas of the channel. GT3 is an intermittent watercourse which has seasonal flows. Cyprinids were found contained to the pooled areas, which ranged in size and depth. The watercourse varies in width in the vicinity of the proposed crossing. The substrate comprises of sand, silt, clay and muck.

As alternative locations for the E-W Arterial Road are under discussion, the preferred option will determine the precise location of watercourse crossings GT1, GT2 and GT3 (in addition to CT1 and RB1). As such, the locations illustrated in Figure 4-1, may be subject to change.

### ***Crossing GT4***

The location of GT4 is illustrated in Figure 4-1 and Figure 4-1B.

### **General Morphology and Habitat Conditions**

In the vicinity of the project, the watercourse associated with GT4 flows through a relatively well-defined valley (Aquafor Beech Limited 2016). The habitat characteristics of this tributary are largely uniform throughout the aquatic study area, exhibiting 90-100% flats as well as a short riffle downstream of the ROW. Surrounding land use is characterized by riparian habitat directly adjacent to the stream and agricultural fields outside of the stream corridor.

#### 0 to 50 m Downstream of the ROW

The morphology of this reach is characterized primarily by flats (90%), with a small riffle present (10%) directly adjacent to the ROW. The stream narrows slightly in this area and inherits a more prominent meandering pattern, with a mean bankfull width of 1.2 m, a wetted width of 0.95 m and a mean wetted depth of 0.17 m. Limited instream cover is present within the reach, exhibiting 1% aquatic macrophyte cover in the form of algae. The majority of cover present in this reach is provided by overhanging riparian vegetation (60-90%).

#### Within the ROW

The primary morphology is flats within the ROW and under the concrete culvert, which measures 5.5 m wide x 1.4 m high (above the bed) x 7.5 m long (Matrix Solutions Inc. 2016). Substrates within this area were mainly fines (clays and silts) with some cobble present.

#### 0 to 50 m Upstream of the ROW

The morphology of the reach is characterized by a continuous flat (100%), with a mean bankfull width of 3.70 m, a mean wetted width of 3.20 m and a mean bankfull depth of 0.34 m and a mean wetted depth of 0.12 m. The reach has a substrate composition of 30% cobble, 5% gravel and 65% clay. Large boulders were scattered sporadically throughout the reach and provide cover to fish species. Instream vascular macrophytes were also present in the form of algae covering approximately 25% of the substrate. Several small minnow species were observed in this reach.

### ***Crossing GT5***

The location of GT5 is illustrated in Figure 4-1. This feature acts as a drainage swale from nearby agricultural areas and does not provide habitat to fish. The crossing structure is an existing corrugated steel pipe (CSP). Water was not present at this crossing during field investigations, and this drainage feature is ephemeral.

### **5.2.1.3 Clarkway Tributary**

#### **Origin and Flow**

Five of the Clarkway Tributary crossings and one reach of the channel that flows within the ditchline adjacent to Clarkway Drive occur within the Study Area (CT1 – CT5 and CTA, respectively). Of these crossings only CT1, CT4, CT5 are associated with the main branch of Clarkway Tributary. Each of the other crossings is related to 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 through 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 Study Area from Mayfield Road to the intersection of Countryside Drive and Clarkway Drive. From this intersection, it flows under concrete bridges at CT5 then CT4, 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 was found to have direct fish habitat. Crossings CT6, CT7, CT9 were not surveyed due to permission to enter limitations.

#### ***Crossing CT1***

The location of CT1 is illustrated in Figure 4-1. Land access restrictions at the time of the 2016/2017 field investigations prevented field investigation of this area. Furthermore, as alternative locations for the E-W Arterial Road are under discussion, the location of this watercourse crossing (in addition to GT1, GT2, GT3 and RB1) may be subject to change.

#### ***Crossing CT2***

The location of CT2 is illustrated in Figure 4-1. Water is conveyed through CSP culverts at this location. Water was not present at this crossing during field investigations, and the drainage feature is ephemeral. This feature is defined as a drainage swale within agricultural fields and does not provide habitat to fish.

#### ***Crossing CTA (Ditchline)***

The location of CTA is illustrated in Figure 4-1 and Figure 4-1C.

### **General Morphology and Habitat Condition**

Due to the proximity of the watercourse to the existing roadway, it is anticipated that channel realignment may be required to accommodate the road widening works. Several driveway bridge structures are present within this reach, which connect residential houses to Clarkway Drive. These structures may be modified or replaced to accommodate the widened road dependent on the final footprint of the roadway widening.

The morphology of the watercourse was mainly uniform within this area, consisting primarily of flats, with small sections of riffles and runs and a limited number of small pooled areas. The reach is channelized with the right upstream bank stabilized with gabion baskets, which extend approximately 62 m upstream from the first residential driveway crossing. A cross-drainage culvert is located under the road and outlets into the watercourse midway through this reach. The watercourse is uniformly wide in this area due to the hardened banks and exhibits 90% flats and 10% pools. Over the 70 m reach the Clarkway Tributary has a mean bankfull width of 3.00 m, a mean bankfull depth of 0.41 m, a mean wetted width of 2.68 m and a mean wetted depth of 0.18 m.

Upstream of this area where the channel is directed away from the roadway, the banks of the watercourse are naturalized, the watercourse maintains a slightly meandering pattern as well as riffle, run and pool sequences. Riffles have a mean bankfull width of approximately 3.00 m, mean wetted width of 2.45 m and a mean wetted depth of 0.09 m. Runs have a mean bankfull and wetted width of 2.40 m and a mean wetted depth of 0.24 m. Pools exhibit a mean bankfull width of 3.40 to 4.35 m, a mean wetted width of 3.40 to 4.00 m and a mean wetted depth ranging from 0.25 to 0.35 m. The left upstream bank is failing in several areas, with large undercut areas and evidence of erosion. The substrate largely consists of cobble and gravels with varying amounts of fines (silt, sand and clay) throughout.

### ***Crossing CT3***

The tributary at this crossing originates in an agricultural area located approximately 150 m south of Countryside Drive on the western side of the Part 'A' Study Corridor near the proposed Arterial A2 road. However, it crosses the project area under Clarkway Drive within the Part 'B' Study Corridor (Figure 4-1, and Figure 4-1C). This feature is a drainage swale collecting water from agricultural fields. It outlets to the northern (upstream) end of the CTA reach of Clarkway Tributary through a CSP culvert. This drainage swale had some standing water but exhibited no flow during the site visit, therefore the watercourse provides indirect fish habitat.

### ***Crossing CT4***

The location of CT4 is illustrated in Figure 4-1 and Figure 4-1B.

## **General Morphology and Habitat Conditions**

At the time of the 2016 surveys, permission to enter had not yet been granted for areas beyond the road ROW. As such, detailed assessments were conducted within the ROW, and general habitat mapping was completed for areas beyond the ROW.

Within the ROW area, a pool is located directly upstream of the bridge, which continues under the bridge structure. A riffle is present downstream of the bridge. The watercourse maintains flats morphology both upstream and downstream of the ROW.

### 0 to 50 m Downstream of the ROW

Within the ROW directly downstream of the bridge, the watercourse narrows where rip rap from bank treatments has eroded into the watercourse resulting in a small riffle. The watercourse then continues as flats downstream of the ROW (30% riffle and 70% flats). The substrate in this reach consists of 50% cobble (rip rap), 20% gravel, 15% sand and 15% silt. The mean bankfull width is 2.50 m, the mean wetted width is 2.41 m, and the mean wetted depth is 0.12 m. Instream vascular macrophytes were observed in the form of algae, covering 20% of the substrate. Riparian vegetation, as well as a treed area located from approximately 20 m to 50 m downstream of the ROW likely, provide between 30% and 60% cover to the stream during the spring/summer months.

### Within the ROW

A pool habitat extended from upstream of the ROW to under the bridge structure. The pooled area under the bridge was measured as having a maximum depth of 0.67 m and a substrate composition of 100% fines (silts, sand and clay). Evidence of nesting activity was found under the bridge, with residual material present from approximately 12 fallen Cliff Swallow (*Petrochelidon pyrrhonota*) nests. A dry wildlife bench

is present, which would potentially provide wildlife passage. The bench is approximately 1.4 m wide and is located on the northern side of the bridge.

#### 0 to 50 m Upstream of the ROW

Upstream of the ROW, a long section of flats adjacent to Clarkway Drive leads to a riffle prior to entering a large pool, approximately 7 m in length, and continues underneath the crossing. The morphology of the stream is made up of 70% flats, 10% riffle and 20% pool. Due to land access restrictions within this reach, only detailed assessments of the pool were able to be undertaken. The pool had a mean bankfull width of 3.40 m, a mean wetted width of 2.70 m and a mean wetted depth of 0.29 m. Substrate composition consisted of 20% boulders, 30% sand and 50% gravel. The boulders present within the stream and bank are likely the result of the bank stabilization treatment. Bank vegetation provided approximately 30-60% cover to the watercourse, with several large trees found adjacent to the stream.

#### **Crossing CT5**

The location of CT5 is illustrated in Figure 4-1 and Figure 4-1B.

#### **General Morphology and Habitat Conditions**

At the time of the surveys, permission to enter had not yet been granted for areas beyond the road ROW. As such, detailed assessments were conducted within the ROW, and general habitat mapping was completed for areas beyond the ROW.

Within the ROW, a pool is found directly upstream of the bridge, which remains continuous under the bridge structure. A riffle is present downstream of the bridge. The watercourse maintains flats morphology both upstream and downstream of the ROW.

#### 0 to 50 m Downstream of the ROW

A large pooled area is present within the reach and extends approximately 4 m downstream from the bridge. A series of riffles exists beyond this area, which is approximately 6 m in length, followed by flats. Due to land access restrictions, only detailed assessments of the riffle were undertaken. The riffle had a mean bankfull width of 2.9 m, a mean wetted width of 2.75 and a mean wetted depth of 0.08 m. The substrate is comprised of 80% gravel, 10% sand and 10% boulder. The flats present in the downstream area running adjacent to the road ROW exhibit a failing bank stabilization treatment on the left upstream bank.

#### Within the ROW

The pool located within the upstream ROW extends under the bridge structure. The pooled area under the bridge has a large amount of sediment deposition and exhibits a composition of 100% fines (silts and sand). A bench of sediment, approximately 3 m wide, provides potential wildlife passage on the eastern side of the bridge. No evidence of nesting activity was observed at this location.

#### 0 to 50 m Upstream of the ROW

The morphology of this reach is characterized by 20% run, 20% pool and 60% flats. The mean bankfull width is 3.13 m, the mean wetted width is 2.58 m, and the mean wetted depth is approximately 0.21 m. The substrate in this area is comprised of 60% silt, 20% sand and 20% gravel. The right upstream bank

shows evidence of erosion and is slightly unstable. Undercut banks (< 5%), and instream vascular macrophytes (5%) provide limited cover to fish. Emergent vegetation (cattails; 5%) are also present within this reach. Beyond the immediate ROW, the stream continues as flats.

#### **5.2.1.4 Rainbow Creek Tributary**

##### **Origin and Flow**

The Rainbow Creek Tributary is an agricultural swale for much of its length (Savanta 2016). The headwaters of the creek originate north of Mayfield Road in the Town of Caledon. It flows southwest through the Part 'A' Study Corridor 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 2016), 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 and Figure 4-1D.

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. Furthermore, as alternative locations for the E-W Arterial Road are under discussion, the location of this watercourse crossing (in addition to GT1, GT2, GT3 and CT1) may be subject to change.

##### **Crossing RB2**

This crossing is located approximately 120 m west of Coleraine Drive on Countryside Drive (Figure 4-1 and Figure 4-1A). 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 composed 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.

#### **5.2.1.5 Robinson Creek Tributary**

##### **Origin and Flow**

Robinson Creek is comprised of two tributaries originating in agricultural fields north of Countryside Drive and flow south, converging approximately 200 m south of Major MacKenzie Drive and flowing into a pond on the east side of Huntington Road, which ultimately drains into the Humber River south of Highway 407.

The unnamed tributaries are crossed by the Study Area at the eastern end of Countryside Drive, where water is conveyed through CSP culverts. As a component of the MESP, these features were assessed through TRCA's headwater drainage feature protocol and the tributary reach between Countryside Drive and RR 50 was identified for conservation as defined by the Regulatory Floodplain (Aquafor Beech Limited 2016).

### **Fisheries Limitations**

Within the project area, Robinson Creek unnamed tributaries do not provide fish habitat.

### ***Crossing RS1 and RS2***

Water was not present at these crossings during field investigations, and the drainage feature is ephemeral. These features are drainage swales draining from agricultural areas north of Countryside Drive and do not provide fish habitat (Figure 4-1 and Figure 4-1A).

### **5.2.1.6 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 to Nearest Watercourse Crossing	Fish Species Present		Status
			Common Name	Scientific Name	
Gore Road Tributary	MNRF 1995	~100m downstream of GT3	No fish captured		
	MNRF 1972	~600m upstream of GT2	Blackchin Shiner	<i>Notropis heterodon</i>	G5;S5
			Fathead Minnow	<i>Pimephales promelas</i>	G5;S5
			Northern Hogsucker	<i>Hypentelium nigricans</i>	G5;S4
	MNRF 1972	~1.5km upstream of GT4, at Mayfield Road	No fish captured		
	MNRF 1970	~1.2km downstream of GT3, near The Gore Road	Fathead Minnow	<i>Pimephales promelas</i>	G5;S5
MNRF 1970	~1.3km downstream of GT3, near The Gore Road	Fathead Minnow	<i>Pimephales promelas</i>	G5;S5	
MNRF 2004	at GT4	Brook Stickleback	<i>Culaea inconstans</i>	G5;S5	
Clarkway Tributary	MNRF 2004	~100m upstream of GT5	Fantail Darter	<i>Etheostoma flabellare</i>	G5;S5
			Longnose Dace	<i>Rhinichthys cataractae</i>	G5;S5
Northern Pearl Dace			<i>Margariscus nachtriebi</i>	G5;S5	
MNRF 1994	~1.5km downstream of CT1, ~100m south of Castlemore Road	Blacknose Dace	<i>Rhinichthys atratulus</i>	G5;S5	
Rainbow Creek Tributary	MNRF 1946	~1.5km downstream of RB1	Creek Chub	<i>Semotilus atromaculatus</i>	G5;S5
	MNRF 1946	~1.7km upstream of RB2, ~150m north of Mayfield Road	No fish captured		

Note(s)

1. Source: Aquafor Beech Limited 2015
2. G5 – Global status, secure, S5 – Subnational (Provincial) status, secure
3. 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 5-2 Maps 1-8, and a summary table of the land use is presented below (Table 5-6). A list of plant species observed is found in Appendix F.

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 F. 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 (*Symphotrichum 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.

**Table 5-6: Ecological Land Classifications with the Study Area**

Community Type	Code	Description	Area (ha)	% of Study Area
Anthropogenic	CVR	Residential	44.91	19.2%
	-	Road	10.76	4.6%
	<b>Total</b>		<b>55.67</b>	<b>23.8%</b>
Agriculture	AG	Agriculture	151.62	64.9%
	-	Hedgerow	1.66	0.7%
	<b>Total</b>		<b>153.28</b>	<b>65.6%</b>
Cultural	CUM1-1	Dry – Moist Old Field Meadow Type	15.46	6.6%
	CUP3	Coniferous Plantation	0.11	0.0%
	CUP3-2	White Pine Coniferous Plantation Type	0.02	0.0%
	CUS1	Mineral Cultural Savannah Ecosite	1.96	0.8%
	CUS1-1	Hawthorn Cultural Savannah Type	1.84	0.8%
	CUT1	Mineral Cultural Thicket Ecosite	0.73	0.3%
	CUW1	Mineral Cultural Woodland Ecosite	1.57	0.7%
	<b>Total</b>		<b>21.69</b>	<b>9.3%</b>
Deciduous Forest	FOD7	Fresh-Moist Lowland Deciduous Forest Ecosite	0.5	0.2%
	<b>Total</b>		<b>0.5</b>	<b>0.2%</b>
Wetlands	MAM2	Forb Mineral Meadow Marsh Ecosite	0.62	0.3%
	MAM2-2	Reed Canary Grass Graminoid Mineral Meadow Marsh Type	0.76	0.3%
	MAM2-10	Mixed Forb Mineral Meadow Marsh Type	0.64	0.3%
	MAS1	Graminoid Bedrock Shallow Marsh Ecosite	0.02	0.0%
	MAS2-1	Cattail Mineral Shallow Marsh Type	0.01	0.0%
	SWD4-1	Willow Mineral Deciduous Swamp Type	0.21	0.1%
	SAS1-2	Waterweed Submerged Shallow Aquatic Type	0.03	0.0%
	<b>Total</b>		<b>2.29</b>	<b>1.0%</b>
Open Water	OAO	Open Aquatic	0.26	0.1%
	<b>Total</b>		<b>0.26</b>	<b>0.1%</b>
<b>Part 'B' Total</b>			<b>233.69</b>	<b>100%</b>

## ***Anthropogenic***

### **Roads**

In the Part 'B' Study Corridor roads comprise 4.6%. 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 19.2% 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.

### ***Agriculture***

#### **Agriculture**

Agricultural lands were prevalent throughout the entire Study Area, comprising 64.9% 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. Pasture lands, grasslands which are kept short due to animal grazing or mowing, were not found.

### **Hedgerows**

Hedgerows comprise 0.7% 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.

### ***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  $\leq 25\%$  tree and shrub cover. Across the Study Area Cultural Meadows (CUM1-1) comprised of 6.6% of the land cover. 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 Part 'B' Study Corridor two types of coniferous plantations were observed during the field investigation, making up less than a percent of the Study Area: Coniferous Plantation (CUP3, 0.11 ha) and White Pine Coniferous Plantation (CUP3-2, 0.02 ha). The polygon classified as White Pine Coniferous Plantation was designated a Significant Woodland in the MESP. The edge of the CUP3-2 occurs within the Study Area, between Clarkway Drive and Gore Road Tributary. In agrarian areas such as this, where existing tree vegetation is greatly diminished it is important to preserve the fragments of habitat that remain. It is not expected this community will be impacted by the project.

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 (*Molothrus ater*)). Depending on the size and shape of the stand, these woodlots can also support forest interior species.

#### **Cultural Savannah**

In the Part 'B' Study Corridor one polygon consisting of Mineral Cultural Savannah Ecosite (CUS1, 0.8%) was identified just northeast of the intersection of Clarkway and Countryside Drives and a complex along the Clarkway Tributary has areas of Hawthorn Cultural Savannah Type (CUS1-1, 0.8%). 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 Thicket**

Cultural thickets are characterized by  $\leq 25\%$  tree cover and  $> 25\%$  shrub cover. One area of cultural thicket (CUT1; 0.3%) was identified. This specific community is primarily populated by grasses, European Buckthorn and Willow species and some Black Walnut (*Juglans nigra*).

### **Cultural Woodland**

Cultural Woodlands are characterized by 35% to 65% tree cover. In the Study Area, three polygons of Mineral Cultural Woodland Ecosite (CUW1; 0.7%) were identified. This community was dominated by European Buckthorn, Willow species, Green Ash and Manitoba Maple. These areas were very similar to the CUT1 species list, 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 onsite.

### **Forest**

#### **Deciduous Forest**

One deciduous forest community (0.50 ha), was identified in the Part 'B' Study Corridor which comprises only 0.2% of the Study Area. This community has been classified as Fresh-Moist Manitoba Maple Lowland Deciduous Forest Type (FOD7-7). The forest is dominated by relatively small and young invasive trees/shrubs such as Manitoba Maple, European Buckthorn, Common Apple and Hawthorn species, with very few native plants in the understory and groundlayer.

### **Wetlands**

#### **Forb Mineral Meadow Marsh Ecosite**

In the Part 'B' Study Corridor two polygons were identified as Forb Mineral Meadow Marsh Ecosites (0.3%). Both run along sections of Rainbow Creek Tributary. 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 Part 'B' Study Corridor three polygons were identified as this community type (MAM2-2, 0.3%). This community is dominated by Reed Canary Grass with minimal other grasses and sedges present.

#### **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 0.3%; one runs along Robinson Creek Tributary, several are located within a vegetated complex along Clarkway Tributary and the last two are inclusions within a cultural meadow located along Gore Road Tributary. 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 (0.02ha) of Graminoid Bedrock Shallow Marsh (MAS2; less than a percent) was identified surrounding a pond. This community was removed due to construction sometime after 2015.

#### **Cattail Mineral Shallow Marsh Type**

In the Part 'B' Study Corridor only one tiny portion of a Cattail Mineral Shallow Marsh Type (0.01 ha) was captured in the Study Area. This community rings a small pond behind a residential property (the pond itself is outside the Study Area). This community is less than a percent coverage and is dominated by Broad-leaved Cattail and grasses. Some Willow species and European Buckthorn were present in the shrub layer.

#### **Willow Mineral Deciduous Swamp Type**

Narrow bands of Willow Mineral Deciduous Swamp Type (SWD4-1; 0.1%) was identified within the Study Area along the Gore Road Tributary as it crosses Countryside Drive. 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.

#### **Waterweed Submerged Shallow Aquatic Type**

A small sliver (0.03 ha) of Waterweed Submerged Shallow Aquatic Type (SAS1-2; less than one percent) was identified within the Part 'B' Study Corridor along the Gore Road Tributary as it crosses Countryside Drive. This community was not observed during Wood 2016 field investigations and its presence is derived from ELC mapping in the MESP.

#### **Open Water**

Two areas of open water were identified within the Part 'B' Study Corridor. The first is a reach of the Clarkway Tributary running through a complex of vegetation on the west side of Clarkway Drive, south of Countryside Drive. The other was a small pond adjacent to the Gore Road Tributary. Other areas of Open Water may be present on residential properties, but these have been classified within the Residential community as they were often small and could not always be confirmed.

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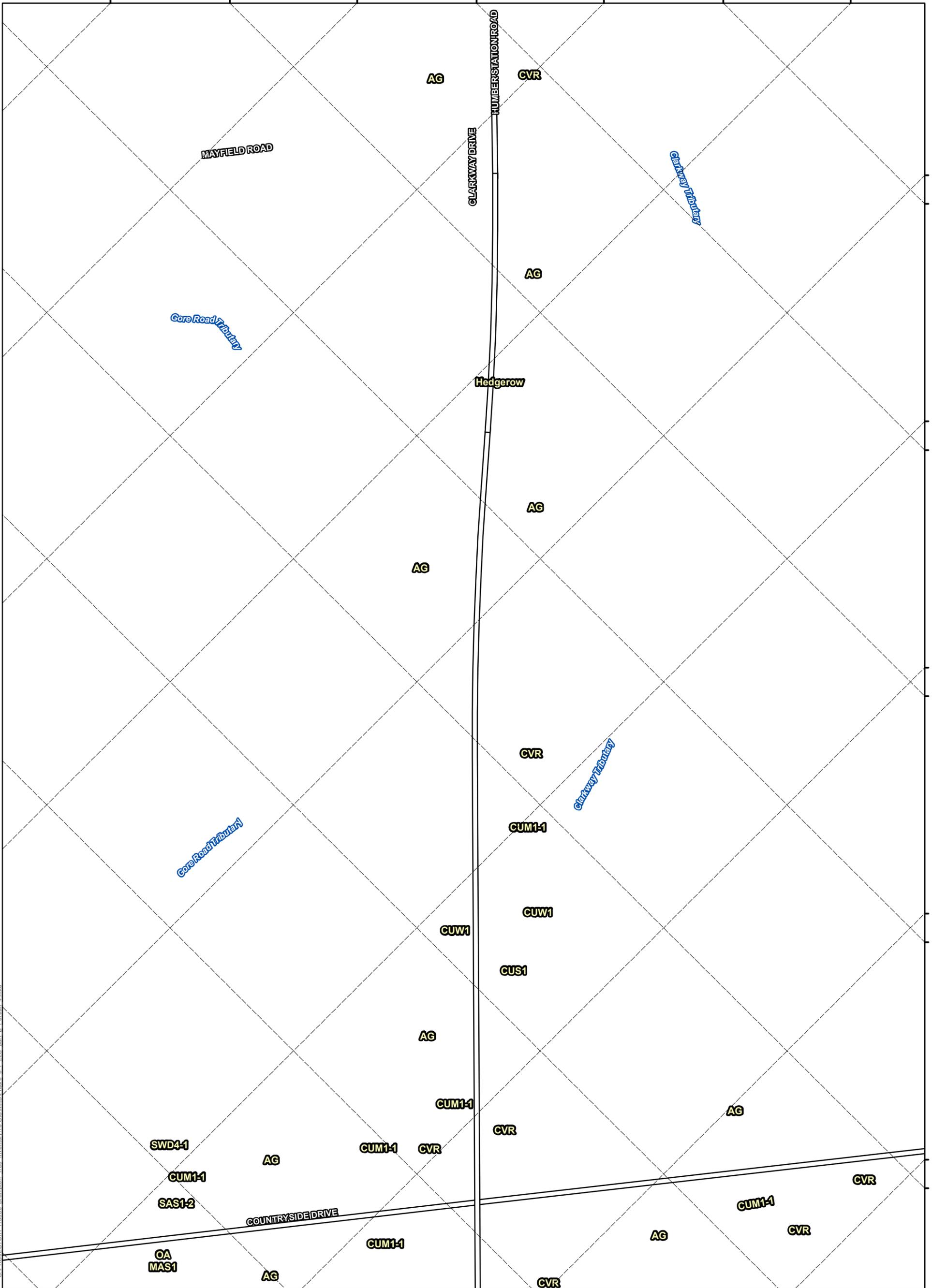
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603400



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4853600604000

4853400604200

4853200604400

G:\PROJECTS\TP115086 - Brampton - Tree Inventory\13 GIS\MXD\Figure 5-1 ELC - part B - Portrait - 4.mxd

<b>LEGEND</b> Study Area Part 'B' Corridor Part 'A' Corridor Watercourse Waterbody			<p align="center"><b>CITY OF BRAMPTON</b> EA Arterial Roads within Highway 427 Industrial Secondary Plan Area (Area 47)</p> <p align="center"><b>Ecological Land Classification</b> Part 'B' Study Corridor</p>
<b>Ecological Land Classification</b> AG, Agriculture CUM1-1, Dry - Moist Old Field Meadow Type CUS1, Mineral Cultural Savannah Ecosite CUW1, Mineral Cultural Woodland Ecosite MAS1, Graminoid Bedrock Shallow Marsh Ecosite SAS1-2, Waterweed Submerged Shallow Aquatic Type SWD4-1, Willow Mineral Deciduous Swamp type Hedgerow, Hedgerow OA, Open Water CVR, Residential Road			
		<p>Datum &amp; Projection: NAD 1983 UTM Zone 17N</p>	<p>PROJECT N<sup>o</sup>: TP115086    <b>FIGURE: 5-2 Map 1</b></p> <p>SCALE: 1:4,000    DATE: September 2021</p>

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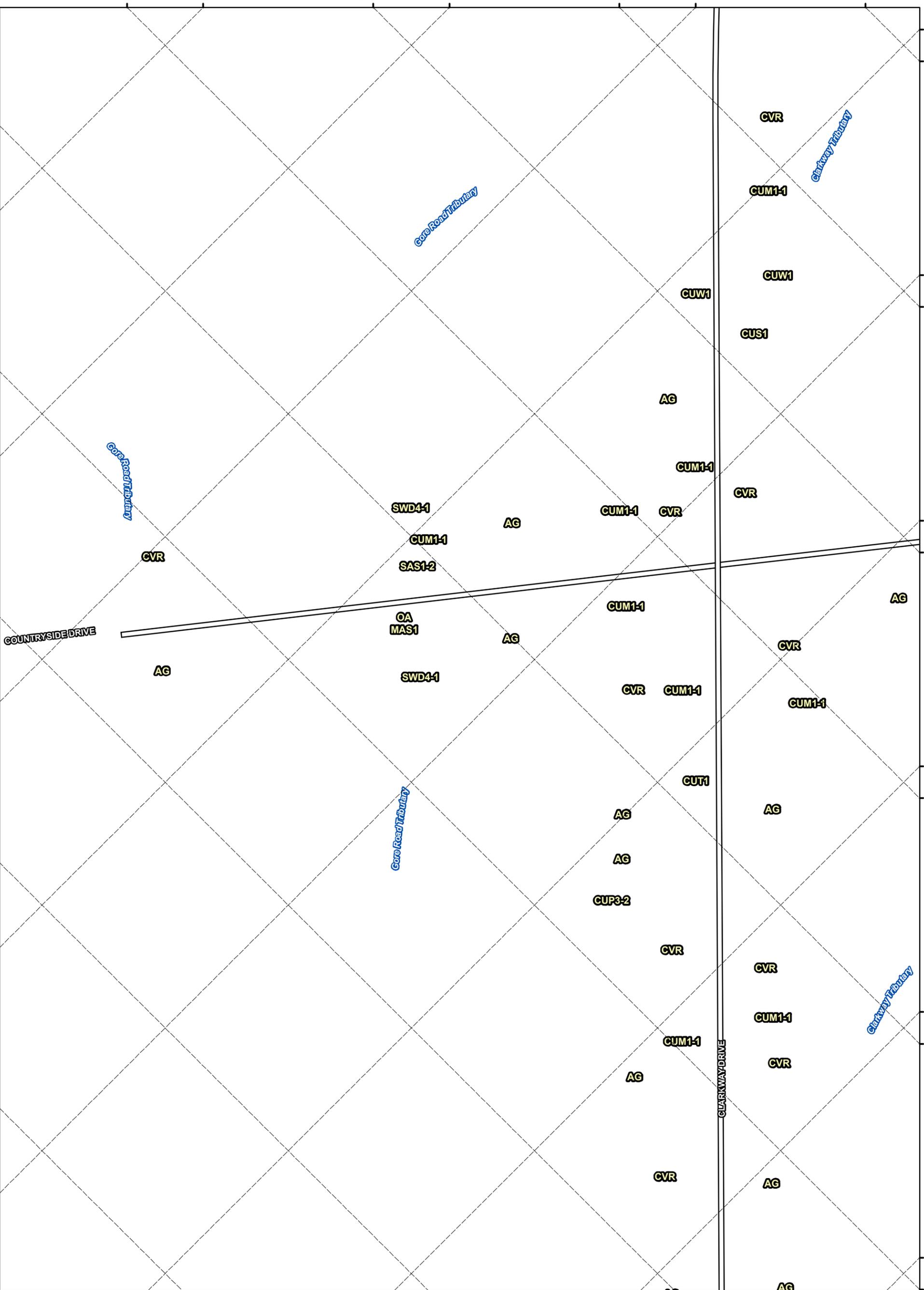
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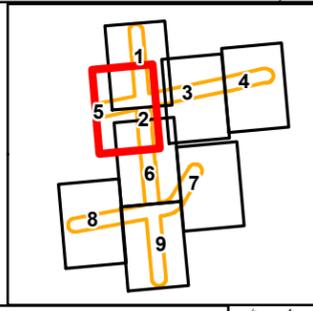
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4852400 604800



G:\PROJECTS\TP115086 - Brampton - Tree Inventory\13 GIS\MXD\Figure 5-1 ELC part B - Portrait 4.mxd

**LEGEND**

- Study Area
  - Part 'B' Corridor
  - Watercourse
  - Waterbody
- Ecological Land Classification**
- AG, Agriculture
  - CUM1-1, Dry - Moist Old Field Meadow Type
  - CUP3-2, White Pine Coniferous Plantation Type
  - CUS1, Mineral Cultural Savannah Ecosite
  - CUT1, Mineral Cultural Thicket Ecosite
  - CUW1, Mineral Cultural Woodland Ecosite
  - MAS1, Graminoid Bedrock Shallow Marsh Ecosite
  - SAS1-2, Waterweed Submerged Shallow Aquatic Type
  - SWD4-1, Willow Mineral Deciduous Swamp type
  - OA, Open Water
  - CVR, Residential
  - Road



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

**Ecological Land Classification  
Part 'B' Study Corridor**

PROJECT N<sup>o</sup>: TP115086

FIGURE: 5-2 Map 2



Datum & Projection:  
NAD 1983 UTM Zone 17N



SCALE: 1:4,000

DATE: September 2021

604000 4853800

604200 4854000

604400 4854200

Clarkway Tributary

Rainbow Creek Tributary

Clarkway Tributary

COUNTRYSIDE DRIVE

COLERAIN DRIVE

CVR

AG

MAM2-2

AG

AG

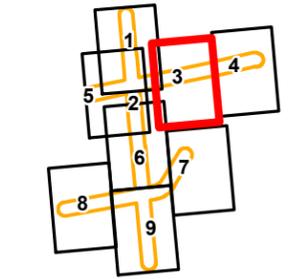
CUPS

CVR

AG

MAM-2

G:\PROJECTS\TP115086 - Brampton - Tree Inventory\13 GIS\MXD\Figure 5-1 ELC part B Portrait 4.mxd

<b>LEGEND</b>  Study Area  Part 'B' Corridor <b>Ecological Land Classification</b>  AG, Agriculture  CUP3, Coniferous Plantation  MAM2, Forb Mineral Meadow Marsh Ecosite  Part 'A' Corridor  Watercourse  Waterbody  MAM2-2, Reed Canary Grass Graminoid Mineral Meadow Marsh Type  CVR, Residential  Road			<b>CITY OF BRAMPTON</b> EA Arterial Roads within Highway 427 Industrial Secondary Plan Area (Area 47)	
<b>Ecological Land Classification          Part 'B' Study Corridor</b>			<b>PROJECT N°: TP115086</b> <b>FIGURE: 5-2 Map 3</b>	
		Datum & Projection: NAD 1983 UTM Zone 17N	SCALE: 1:4,000	DATE: September 2021

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Robinson Creek Tributary

Robinson Creek Tributary

COUD CREEK ROAD

CUM1-1

AG

AG

CVR

COUNTRYSIDE DRIVE

MAM2-10

HEDGEROW

CUM1-1

CVR

NASHVILLE ROAD

CUM1-1

AG

Robinson Creek Tributary

REGIONAL ROAD 60

Robinson Creek Tributary

Robinson Creek Tributary

4855000605400

4854800605600

4854600605800

4854400606000

4854200606200

**LEGEND**

 Study Area

 Watercourse

 Part 'B' Corridor

**Ecological Land Classification**

 AG, Agriculture

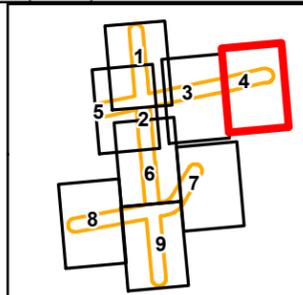
 Hedgerow, Hedgerow

 CUM1-1, Dry - Moist Old Field Meadow Type

 CVR, Residential

 MAM2-10, Mixed Forb Mineral Meadow Marsh Type

 Road



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

**Ecological Land Classification**  
Part 'B' Study Corridor

PROJECT N<sup>o</sup>: TP115086

FIGURE: 5-2 Map 4

SCALE: 1:4,000

DATE: September 2021



Datum & Projection:  
NAD 1983 UTM Zone 17N



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CUP3-2

CVR

CVR

CUM1-1

CUM1-1

CVR

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AG

CVR

AG

CUM1-1

CVR

CUS1-1

CUM1-1

CVR

MAM2-10

MAM2-10

CUS1-1

CUM1-1

MAM2-10

AG

MAM2-10

CUS1-1

MAM2-10

MAM2-10

OA

CUM1-1

Clarkway Tributary

Hedgerow

AG

CUM1-1

AG

AG

CVR

CUM1-1

CVR

AG

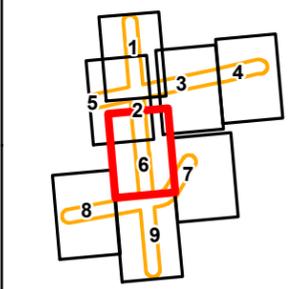
LEGEND

- Study Area
- Part 'B' Corridor

- Watercourse
- Waterbody

Ecological Land Classification

- AG, Agriculture
- CUM1-1, Dry - Moist Old Field Meadow Type
- CUP3-2, White Pine Coniferous Plantation Type
- CUS1-1, Hawthorn Cultural Savannah Type
- CUT1, Mineral Cultural Thicket Ecosite
- MAM2-10, Mixed Forb Mineral Meadow Marsh Type
- Hedgerow, Hedgerow
- OA, Open Water
- CVR, Residential
- Road



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

Ecological Land Classification  
Part 'B' Study Corridor

PROJECT N°: TP115086

FIGURE: 5-2 Map 5



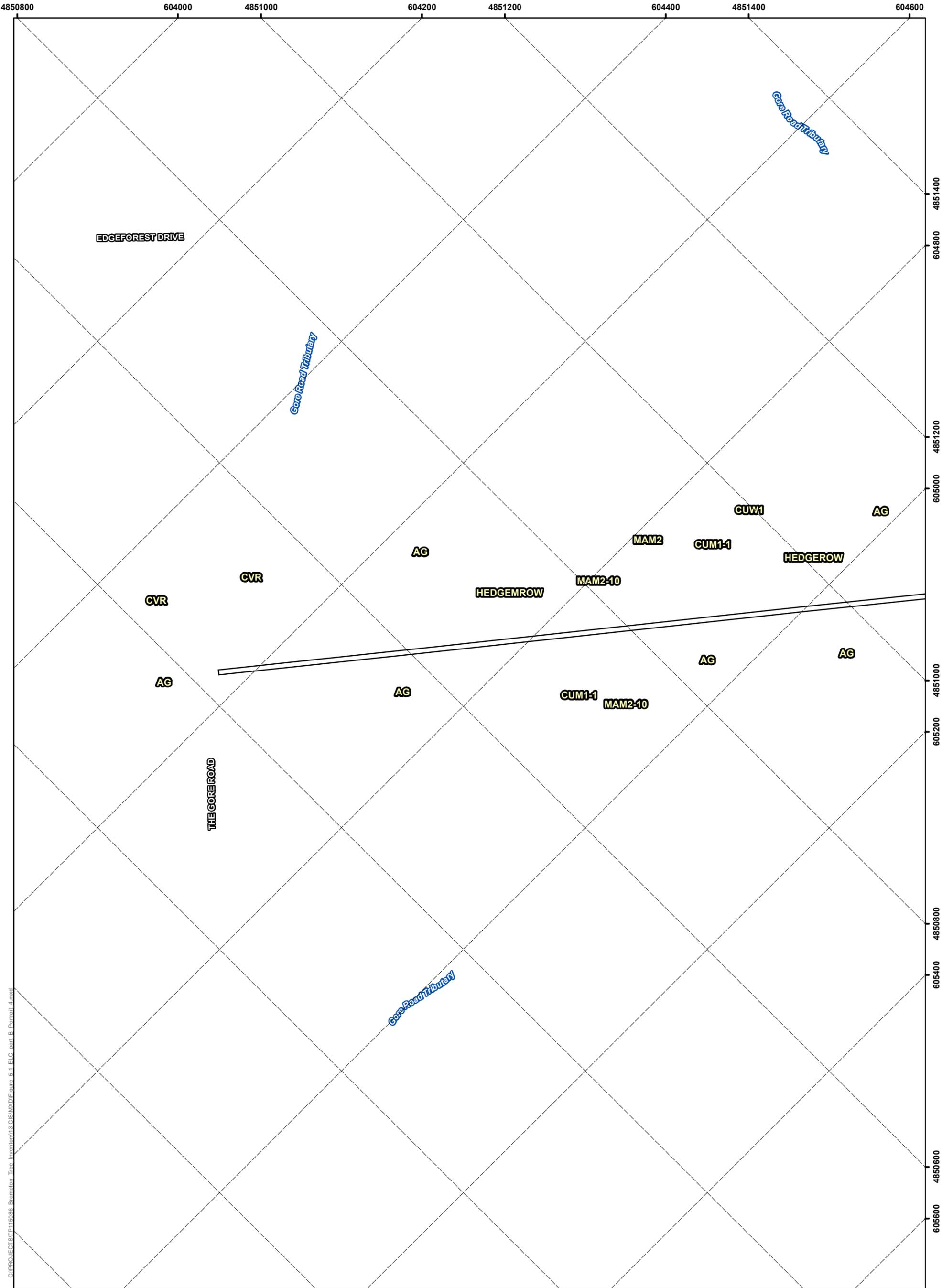
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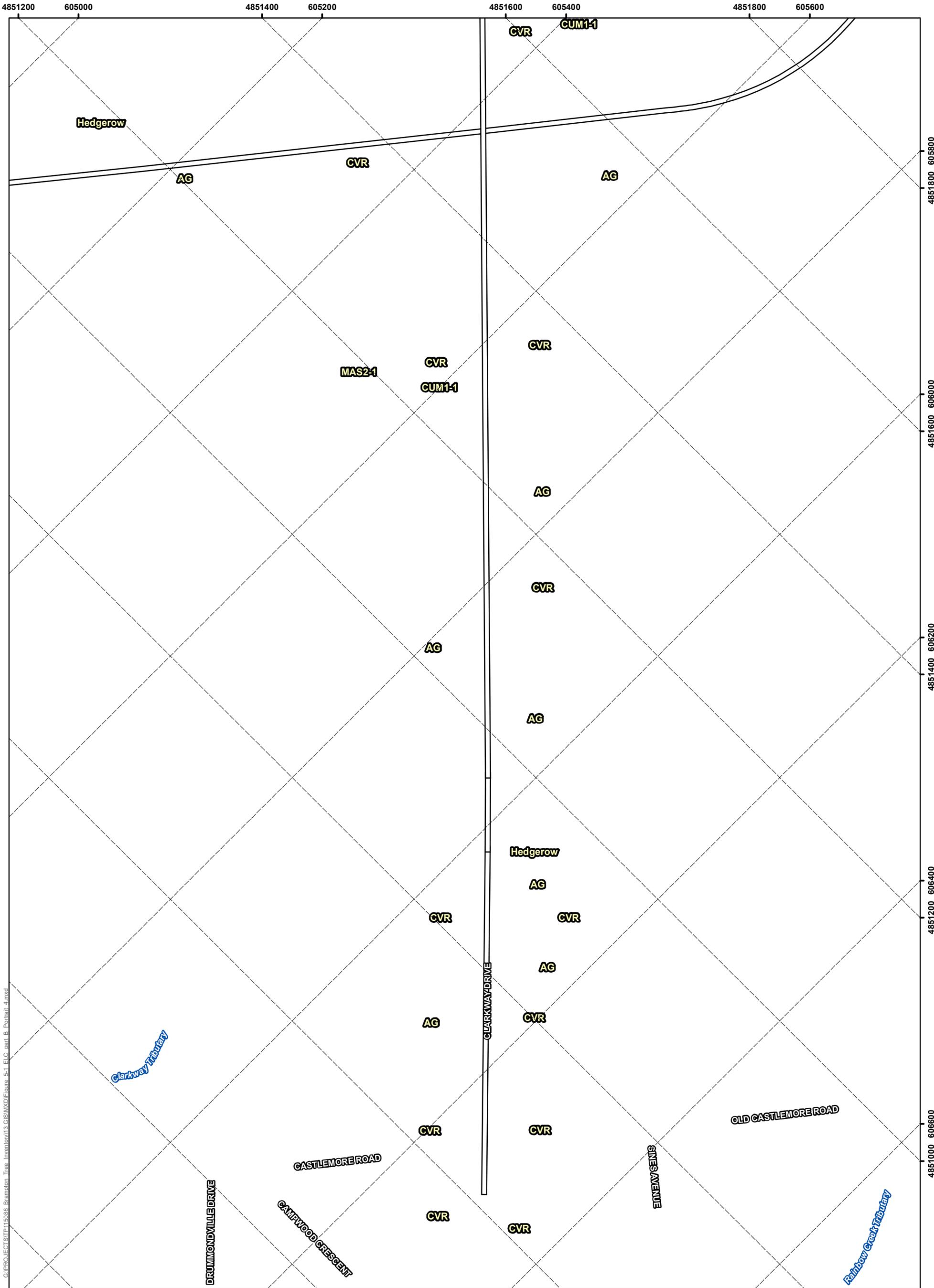
DATE: September 2021

G:\PROJECTS\TP115086 - Brampton - Tree Inventory\13 GIS\MXD\Figure 5-1 ELC - part B - Portrait - 4.mxd



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<b>LEGEND</b> Study Area Part 'B' Corridor Watercourse Waterbody			<b>CITY OF BRAMPTON</b> EA Arterial Roads within Highway 427 Industrial Secondary Plan Area (Area 47)								
<b>Ecological Land Classification</b> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;"> AG, Agriculture</td> <td style="width: 50%; border: none;"> MAM2-10, Mixed Forb Mineral Meadow Marsh Type</td> </tr> <tr> <td style="border: none;"> CUM1-1, Dry - Moist Old Field Meadow Type</td> <td style="border: none;"> Hedgerow, Hedgerow</td> </tr> <tr> <td style="border: none;"> CUW1, Mineral Cultural Woodland Ecosite</td> <td style="border: none;"> CVR, Residential</td> </tr> <tr> <td style="border: none;"> MAM2, Forb Mineral Meadow Marsh Ecosite</td> <td style="border: none;"> Road</td> </tr> </table>			AG, Agriculture	MAM2-10, Mixed Forb Mineral Meadow Marsh Type	CUM1-1, Dry - Moist Old Field Meadow Type	Hedgerow, Hedgerow	CUW1, Mineral Cultural Woodland Ecosite	CVR, Residential	MAM2, Forb Mineral Meadow Marsh Ecosite	Road	<b>Ecological Land Classification</b> <b>Part 'B' Study Corridor</b>
AG, Agriculture	MAM2-10, Mixed Forb Mineral Meadow Marsh Type										
CUM1-1, Dry - Moist Old Field Meadow Type	Hedgerow, Hedgerow										
CUW1, Mineral Cultural Woodland Ecosite	CVR, Residential										
MAM2, Forb Mineral Meadow Marsh Ecosite	Road										
		PROJECT N <sup>o</sup> : TP115086 <b>FIGURE: 5-2 Map 6</b>									
Datum & Projection: NAD 1983 UTM Zone 17N		SCALE: 1:4,000     DATE: September 2021									



G:\PROJECTS\TP115086 - Brampton - Tree Inventory\13 GISMXD\Figure 5-1 ELC part B Portrait 4.mxd

<b>LEGEND</b> Study Area Part 'B' Corridor Watercourse Waterbody		<b>Ecological Land Classification</b> AG, Agriculture CUM1-1, Dry - Moist Old Field Meadow Type MAS2-1, Cattail Mineral Shallow Marsh type Hedgerow, Hedgerow CVR, Residential Road	
		<b>CITY OF BRAMPTON</b> EA Arterial Roads within Highway 427 Industrial Secondary Plan Area (Area 47)	
		<b>Ecological Land Classification</b> <b>Part 'B' Study Corridor</b>	
		PROJECT N <sup>o</sup> : TP115086 SCALE: 1:4,000	FIGURE: 5-2 Map 7 DATE: September 2021
Datum & Projection: NAD 1983 UTM Zone 17N			

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Rainbow Creek Tributary

MAM2-2

MAM2

AG

AG

COLERAIN DRIVE

REGIONAL ROAD 60

MAJOR MACKENZIE DRIVE WEST

GADETTA ROAD

**LEGEND**

Study Area

Part 'B' Corridor

**Ecological Land Classification**

AG, Agriculture

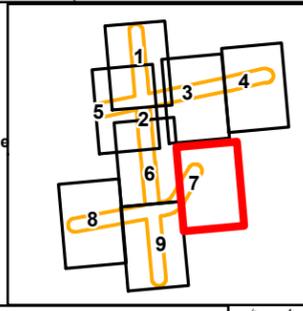
MAM2, Forb Mineral Meadow Marsh Ecosite

Part 'A' Corridor

Watercourse

Waterbody

MAM2-2, Reed Canary Grass Graminoid Mineral Meadow Marsh Type



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

**Ecological Land Classification**  
Part 'B' Study Corridor

PROJECT N<sup>o</sup>: TP115086

FIGURE: 5-2 Map 8

SCALE: 1:4,000

DATE: September 2021



Datum & Projection:  
NAD 1983 UTM Zone 17N



### 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 547 trees greater than 10 cm Diameter at Breast Height (DBH) in the Study Area (Figure 4-2). 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 C.

There is a total of 488 trees 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 20 trees, mostly private, may be injured by construction activities. Tree protection measures have been identified but it is the design-builders responsibility to update the inventory and report as needed. 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 492 for trees outside of TRCA regulated areas under the City Guidelines and 4,473 for trees within TRCA regulated area, totaling 4,965 compensation trees. The Tree Assessment Report is provided in Appendix C.

### 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 Area (Appendix F). During the Wood breeding bird point count survey, a total of 46 of the 116 Secondary Source species were identified within the Study Area and two additional birds were recorded, Broad-winged Hawk and Caspian Tern were both observed flying over the Study Area during Wood Investigations. A summary of results is highlighted below, 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.
- One Caspian Tern was observed flying over an agricultural field at a single breeding bird survey location within the Part 'B' Study Corridor. Caspian Tern is provincially ranked S3B (vulnerable breeding population). The lone Caspian Tern observation is not mapped as there is no evidence of breeding. Caspian Tern is not documented in any Secondary Sources.
- Barn Swallow is listed as Threatened under the ESA and therefore is afforded individual and habitat protection. There were 19 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.
- Bobolink is listed as Threatened under the ESA and therefore is afforded individual and habitat protection. A male Bobolink was recorded singing at a single breeding bird survey location within the Part 'B' Study Corridor

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).

#### 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.

#### Bat Acoustic Surveys

Automated classification counted 20,271 bat passes, and high-frequency species made up 21% (4,210) of recorded bat passes. High-frequency species include all SAR species as well as the Eastern Red Bat. Of the high-frequency calls, 62 were confirmed as Eastern Red Bat, and 3,001 could only be classified as High-frequency species (Table 5-7). Most passes belonged to low-frequency species, which include the Big Brown Bat, Silver-haired Bat and Hoary Bat. All three low-frequency species were confirmed present at the site by the automated classification. Most of the passes classified as high-frequency species resembled those of the Eastern Red Bat more than they did SAR; however, the quality of these recordings prohibited confident discrimination between these groups. There were 1,147 calls confirmed as SAR (Myotis sp./Perimyotis sp.), of which three could be confirmed as Little Brown Myotis, and one pass could be confirmed as Tri-colored Bat.

**Table 5-7: Results from Classification of Echolocation Calls**

Call Category	Common Species Name	Scientific Name	Detector 61	Detector 65	Detector 70	Total Passes
High-frequency Bats	Little Brown Myotis*	<i>Myotis lucifugus</i>	2	0	1	3
	Northern Myotis*	<i>Myotis septentrionalis</i>	0	0	0	0
	Eastern Small-footed Myotis*	<i>Myotis leibii</i>	0	0	0	0
	Myotis species*	<i>Myotis sp.</i>	284	345	512	1141
	Tri-colored Bat*	<i>Perimyotis subflavus</i>	1	0	0	1
	Eastern Red Bat	<i>Lasiurus borealis</i>	23	13	26	62
	Little Brown Myotis/ Eastern Red Bat**	-	1	0	0	1
	Myotis species/ Tri-colored Bat*	-	2	0	0	2

Call Category	Common Species Name	Scientific Name	Detector 61	Detector 65	Detector 70	Total Passes
	Unknown High-Frequency**	-	427	1520	1053	<b>3000</b>
Low-frequency Bats	Hoary Bat	<i>Lasiurus cinereus</i>	899	868	839	<b>2606</b>
	Silver-haired Bat	<i>Lasionycteris noctivagans</i>	1004	615	860	<b>2479</b>
	Big Brown Bat	<i>Eptesicus fuscus</i>	2892	789	3147	<b>6828</b>
	Unknown Low-Frequency	-	1528	1234	1380	<b>4142</b>
Unknown	Unknown	-	0	4	2	<b>6</b>
<b>Total</b>			<b>7063</b>	<b>5388</b>	<b>7820</b>	<b>20271</b>

Note(s)

1. \*denotes SAR
2. \*\*denotes potential SAR due to similar call frequency

In summary, Little Brown Myotis, and potentially other Myotis species, use the habitat regularly. Although a Tri-colored Bat was recorded, the species does not appear to use the habitat regularly. An additional four non-Species at Risk Bat (Hoary Bat, Silver-haired Bat, Eastern Red Bat, Big Brown Bat) use the habitat regularly.

**Incidental Mammals**

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.

**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) (Section 7.1.3). 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.

## 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<sup>2</sup> grid square, and NHIC data is presented in a 1 km<sup>2</sup> 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 threatened 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.

**Table 6-1: Probability of 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?
<b>Fish</b>		
Redside Dace ( <i>Clinostomus elongatus</i> ) ESA- Endangered	<b>None</b> - 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. 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.	<b>No</b>
<b>Birds</b>		
Acadian Flycatcher ( <i>Empidonax vireescens</i> ) ESA- Endangered  Record Source: OBBA	<b>Low</b> - 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.	<b>No</b>
Bank Swallow ( <i>Riparia riparia</i> ) ESA-Threatened  Record Source: OBBA	<b>Low/Moderate</b> – 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 stockpiles 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,	<b>No</b>

Species Name and Status	Probability of Occurrence within the Study Areas based on Habitat Requirements	Observed During Wood Investigations?
	2013). Limited suitable habitat exists for this species within the Study Areas, and communal nocturnal roost site habitat is absent from the site. Bank Swallow is not carried through to the impact assessment.	
<p>Barn Swallow (<i>Hirundo rustica</i>) ESA- Threatened</p> <p>Record Source: OBBA, MESP, EIS (Savanta 2017)</p>	<p><b>High</b> - 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.</p> <p>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, 19 individual Barn Swallows were recorded at 13 breeding bird survey locations during the field investigations in the Study Area. The occurrence of Barn Swallow is illustrated in</p> <p>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.</p> <p>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):</p> <ul style="list-style-type: none"> <li>Category 1. Nest</li> <li>Category 2. The area within 5 m of the nest</li> <li>Category 3. The area between 5 m and 200 m of the nest</li> </ul>	<p><b>Yes</b></p>
<p>Bobolink (<i>Dolichonyx oryzivorus</i>) ESA- Threatened</p> <p>Record Source: MNRF Correspondence and OBBA, MESP, EIS (Savanta 2017)</p> <p>Eastern Meadowlark (<i>Sturnella magna</i>) ESA- Threatened</p> <p>Record Source: OBBA, MNRF</p>	<p>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.</p> <p>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</p>	<p><b>No</b></p>



Species Name and Status	Probability of Occurrence within the Study Areas based on Habitat Requirements	Observed During Wood Investigations?
<p>Correspondence, MESP and NHIC record</p>	<p>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, but extensive habitat for these species may also 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, as fields left fallow for subsequent years may become suitable habitat. Currently, the defined regulated habitat of Bobolink (Ontario Ministry of Natural Resources and Forestry, 2016a) is:</p> <ul style="list-style-type: none"> <li>Category 1. Nest and the area within 10 m of the nest</li> <li>Category 2. The area between 10 m and 60 m of the nest or centre of approximated defended territory</li> <li>Category 3. The area of continuous suitable habitat between 600 m and 300 m of the nest or approximated centre of the defended territory.</li> </ul> <p><b>Bobolink Moderate</b> – 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 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.</p> <p><b>Eastern Meadowlark Moderate</b> - Reported in the Study Area by MNR 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.</p>	
<p>Caspian Tern (<i>Hydroprogne caspia</i>) Provincially ranked S3B</p> <p>Record Source: None</p>	<p><b>Low</b> - 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.</p>	<p><b>No</b></p>
<p>Chimney Swift (<i>Chaetura pelagica</i>) ESA- Threatened</p> <p>Record Source: OBBA</p>	<p><b>Low</b> - 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,</p>	<p><b>No</b></p>

Species Name and Status	Probability of Occurrence within the Study Areas based on Habitat Requirements	Observed During Wood Investigations?
	<p>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. It is probable the OBBA records captured travelling or foraging swifts using nesting habitat outside of the Study Area.</p>	
<p>Common Nighthawk (<i>Chordeiles minor</i>)            ESA- Special Concern             Record Source: OBBA</p>	<p><b>Low</b> - 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 riverbanks (COSEWIC 2007b). Very limited suitable habitat for the Common Nighthawk occurs within the Study Areas.</p>	<p><b>No</b></p>
<p>Eastern Wood-Pewee (<i>Contopus virens</i>)            ESA- Special Concern             Record Source: OBBA and MESP</p>	<p><b>Moderate</b> - 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.</p> <p>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 7.1.4.3).</p>	<p><b>No</b></p>
<p>Grasshopper Sparrow (<i>Ammodramus savannarum</i>)            ESA- Special Concern             Record Source: OBBA</p>	<p><b>Moderate</b> - 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 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 <i>Endangered Species Act</i> (ESA) and the <i>Species at Risk Act</i> (SARA). Species listed as Special Concern do not receive species or habitat protection.</p>	<p><b>No</b></p>
<p>Wood Thrush (<i>Hylocichla mustelina</i>)            ESA- Special Concern</p>	<p><b>Low</b> - 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.</p>	<p><b>No</b></p>

Species Name and Status	Probability of Occurrence within the Study Areas based on Habitat Requirements	Observed During Wood Investigations?
Record Source: OBBA Mammals		
Eastern Small-footed Myotis <i>(Myotis leibii)</i> ESA- Endangered  Record Source: AMO and BCI	<b>Low</b> – 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).	<b>No</b>
Little Brown Myotis <i>(Myotis lucifugus)</i> ESA- Endangered  Record Source: AMO and BCI	<b>Moderate</b> - 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 forest trails, cliff faces, meadows, and farmland where they consume a wide variety of insects, from moths and beetles to crane flies (BCI 2016). Most of the passes classified as high-frequency species resembled those of the Eastern Red Bat more than they did SAR; however, the quality of these recordings prohibited confident discrimination between these groups. There were 1,147 calls confirmed as SAR ( <i>Myotis</i> sp./ <i>Perimyotis</i> sp.), of which three could be confirmed as Little Brown Myotis, and one pass could be confirmed as Tri-colored Bat. In summary, Little Brown Myotis, and potentially other <i>Myotis</i> species, use the habitat regularly. Although a Tri-colored Bat was recorded, the species does not appear to use the habitat regularly.	<b>Yes</b>
Northern Myotis <i>(Myotis septentrionalis)</i> ESA- Endangered  Record Source: AMO and BCI	<b>Low</b> - 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).	<b>No</b>
Tri-colored Bat <i>(Perimyotis subflavus)</i> ESA- Endangered  Record Source: AMO and BCI	<b>Low</b> – 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). Most of the passes classified as high-frequency species resembled those of the Eastern Red Bat more than they did SAR; however, the quality of these recordings prohibited confident discrimination between these groups. There were 1,147 calls confirmed as SAR ( <i>Myotis</i> sp./ <i>Perimyotis</i> sp.), of which three could be confirmed as Little Brown Myotis, and one pass could be confirmed as Tri-colored Bat. In	<b>Yes</b>

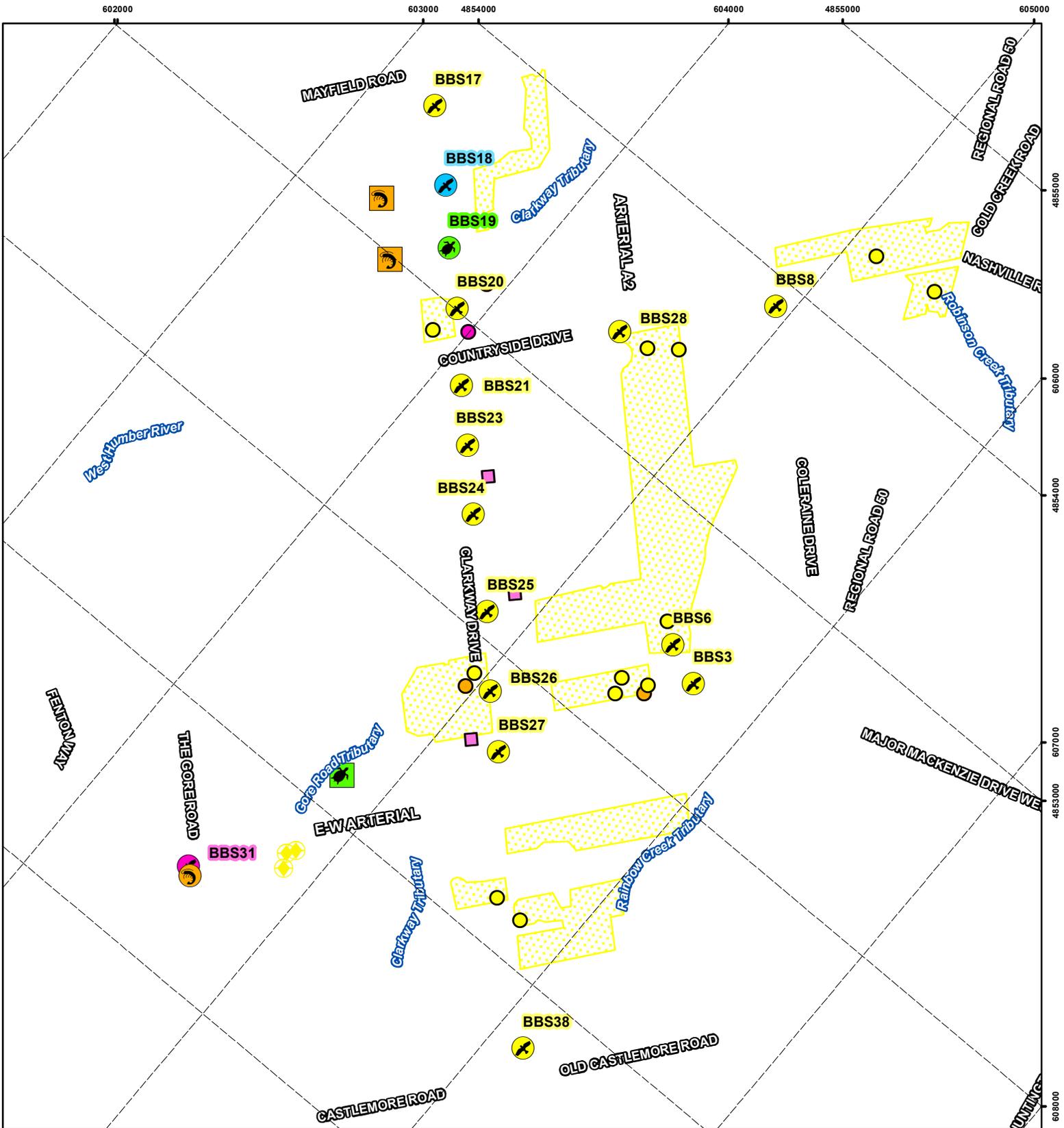


Species Name and Status	Probability of Occurrence within the Study Areas based on Habitat Requirements	Observed During Wood Investigations?
	summary, Little Brown Myotis, and potentially other Myotis species, use the habitat regularly. Although a Tri-colored Bat was recorded, the species does not appear to use the habitat regularly.	
<b>Amphibians and Reptiles</b>		
Eastern Ribbonsnake ( <i>Thamnophis sauritus</i> ) ESA- Special Concern  Record Source: ORAA	<b>Low</b> - 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.	<b>No</b>
Northern Map Turtle ( <i>Graptemys geographica</i> ) ESA- Special Concern  Record source: ORAA	<b>Low</b> – 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, 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.	<b>No</b>
Snapping Turtle ( <i>Chelydra serpentina</i> ); ESA- Special Concern  Record Source: ORAA, MESP	<b>High</b> – 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 7.1.4.1).	<b>No</b>
Western Chorus Frog – Great Lakes / St. Lawrence – Canadian Shield Population ( <i>Pseudacris triseriata</i> ) SARA- Threatened Provincially Ranked: S3  Record Source: ORAA	<b>Low</b> - 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 (MNR 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 Threatened under the Species at Risk Act (SARA).	<b>No</b>
<b>Invertebrates</b>		
Monarch	<b>High</b> – The primary food source of this species (when in its caterpillar	<b>No</b>

Species Name and Status	Probability of Occurrence within the Study Areas based on Habitat Requirements	Observed During Wood Investigations?
<p>(<i>Danaus plexippus</i>)            ESA- Special Concern            Provincially Ranked:            S2N,S4B</p> <p>Record Source: MESP,            EIS (Savanta 2017)</p>	<p>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 7.1.4.2).</p>	
<p>Digger Crayfish            (<i>Fallicambarus fodiens</i>)            Provincially ranked            S3B</p> <p>Record Source: MESP            and Field            Investigations</p>	<p><b>High</b> – Chimney crayfish are currently utilizing the area, and the crayfish are one of three species, Devil Crayfish, Digger Crayfish, or Calico Crayfish (<i>Faxonius immunis</i>). 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 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).</p> <p>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.</p> <p>The Digger Crayfish is provincially vulnerable (S3) but is not listed under the ESA and does not receive species or habitat protection.</p>	<p><b>Yes</b></p>

Species Name and Status	Probability of Occurrence within the Study Areas based on Habitat Requirements	Observed During Wood Investigations?
	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 7.1.3).	

Path: G:\PROJECTS\TP115086\_Brampton\_Tree\_Inventory\13 GIS\MXD\Figure\_6-1\_SAR\_Part\_B.mxd



### LEGEND

**Wood BBS Point Counts**

- Barn Swallow
- Bobolink
- Caspian Tern
- Snapping Turtle
- Chimney Crayfish

**Secondary Sources**

- Barn Swallow
- Incidental Observations
- Barn Swallow Nest
- Bobolink
- Breeding Observations
- Bobolink Habitat
- Eastern Meadowlark
- Breeding Observations
- Eastern Meadowlark Habitat
- MESP Snapping Turtle
- MESP Chimney Crayfish

**Corridors and Study Areas**

- Part 'A' Corridor
- Part 'B' Corridor
- Part 'A' Approximate Study Area
- Part 'B' Approximate Study Area

**Water Features**

- Watercourse
- Waterbody

0 0.25 0.5 0.75 1 Kilometres

**NOTES:**  
 - Background extracted from ESRI online

Datum & Projection:  
 NAD 1983 UTM Zone 17N

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

**Species of Conservation Concern Locations in  
 Part 'B' Study Corridor from Secondary Sources**

PROJECT N<sup>o</sup>: TP115086      **FIGURE: 4-4**

SCALE: 1:22,000      DATE: September 2021

## 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 88.7% 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.

The most notable areas within the Study Areas are the fragments of woodland/forest/plantation which fall under Peel Region criteria for Natural Area and Corridor (NAC) and therefore are Significant Woodlands (MESP, EIS [Savanta 2017]). The majority of Significant Woodland area is within the NHS. The E-W Arterial Road bisects one of these woodlands on the Gore Road Tributary, which also is the woodland that was evaluated for SAR bats. Additionally, these fragments of forest plantation and cultural woodland offer a buffer to the watercourses throughout the site and are a relatively significant feature in context of the Study Area landscape, given that the area is characterized by a high degree of disturbance and development. However, the limited occurrence of large standing snags and deadfall, as well as the severe fragmentation (which limits the suitable forest interior habitat), speaks to the limited functionality of these lands as wildlife habitat.

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

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 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, candidate SWH for the Study Area include Bat Maternity Colonies, Turtle Nesting Areas and habitat for Special Concern and Rare Wildlife Species. These candidate SWH types meet the listed habitat requirements or species requirements but not both. Further studies confirming habitat and species presence and use would confirm SWH. The only confirmed SWH in the Study Area is Terrestrial Crayfish SWH.

### 7.1.1 Bat Maternity Colonies - Candidate

The FOD7 in Part 'B' along the Gore Road Tributary is Candidate Bat Maternity Colonies SWH. SWH is confirmed by the presence of over 10 large diameter trees (>25 cm DBH) per hectare and over 10 Big Brown Bats or over 5 adult female Silver-haired Bats. Tree diameters were not confirmed and therefore it is unknown if the presence of 10 large trees per hectare is met. Additionally, the sex and number of bats cannot be determined in acoustic recordings; however, Big Brown Bats and Silver-haired Bats were abundant in recordings. Impacts on Bat Maternity Colonies is considered in the impact assessment and enhancement opportunities.

### 7.1.2 Turtle Nesting Areas - Candidate

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. One juvenile Snapping Turtle 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 (Figure 6-1).

Five or more Midland Painted Turtles or one Snapping Turtle nesting in the appropriate habitat would confirm SWH; until such a time as species abundance or appropriate habitat use is confirmed, Turtle Nesting is Candidate SWH. Impacts on potential Turtle Nesting SWH is considered in the impact assessment and enhancement opportunities.

### 7.1.3 Terrestrial Crayfish - Confirmed

Several crayfish chimneys were found during the MESP (Aquafor Beech Limited 2016) and Wood investigations. 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 in agricultural fields. Meadow marshes (MA), swamps (SW), and cultural meadows (CUM) are considered SWH if chimneys are found. Therefore, the SWD4-1 (Savanta 2017) in Part 'B' is confirmed as Terrestrial Crayfish SWH. Terrestrial Crayfish SWH is within the NHS and will be carried forward to the impact assessment.

### 7.1.4 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. When an element occurrence is identified within a 1 or 10 km grid for a Special Concern or provincially Rare species; linking candidate habitat on the site needs to be completed to ELC Ecosites. To confirm the SWH, studies need to be completed during the time of year when the species is present and easily identifiable. 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, Monarch, and Eastern Wood-pewee are considered below.

#### 7.1.4.1 Snapping Turtle - Confirmed

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 (Figure 6-1).

Although turtle nesting SWH has not been confirmed, the observations during work for the MESP and by Wood indicate there is potential habitat. Under the Special Concern SWH category Snapping Turtle habitat is protected. To determine the habitat form and function used by Snapping Turtle (e.g., movement corridor, nesting, overwintering) further studies are required. However, suitable habitat is limited in the Study Area and will occur within the delineated NHS. Impacts to the NHS in relation to Snapping Turtle habitat will be carried forward to the impact assessment.

#### **7.1.4.2 Monarch - Confirmed**

Monarch (*Danaus plexippus*) was observed in several locations in Area 47 (Savanta 2017 and MESP). Adult butterflies can be found in a variety of habitats and environments where they feed on nectar from a variety of wildflowers. Caterpillars rely solely on milkweeds and are therefore confined to open areas and meadows of milkweeds (MECP 2021).

In February Monarchs come out of hibernation and find a mate in the Oyamel Fir forests found in central Mexico; generation zero. They migrate north to the southern states to lay eggs on milkweed plants around March and April; first generation. The butterflies that result from those eggs continue to fly further north and lay eggs in May and June; second generation. The third generation will be born in July and August. The generation which reproduces dies after the egg laying stage except for the fourth generation. The fourth generation is born in September and October and does not die after two to six weeks but migrates south back to Mexico and will live for six to eight months until it is time to start the whole process again. Sometimes in the southern states the Monarchs migrating south for the winter will breed again, creating a fifth generation which will continue south (Journey North 2021).

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. Monarchs are frequently reported between May and September in Ontario (Cavasin 2016) which can encompass all life stages and breeding and non-breeding individuals. The MESP states that the majority of the monarch habitat in the Area 47 study area consists of foraging habitat, with scattered patches of common milkweed present in many of the cultural meadows. Large swaths of monarch foraging habitat exists within the valleyland/watercourse corridors, and therefore are protected within these features in the NHS. The EIS completed (Savanta 2017) recommended that enhanced Monarch habitat and general pollinator habitat within the new NHS (Rainbow Creek) be provided.

#### **7.1.4.3 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.

## **8.0 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.

## 8.1 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 (relevant to Part "A"). 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.

## 8.2 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. HDFs recommended for "Protection" should remain as open watercourses at their current location. Future stormwater management planning will require that flows be maintained to these features, via storm pond outfalls, low impact development (LID) swales or other techniques. These include Gore Road HDF 2 – Reach 1 and Clarkway HDF 15 – Reach 1, also recommended to remain as open watercourses in future urban landscape after floodplain mapping.

HDFs recommended for "Conservation" should remain as open watercourses, and future stormwater management planning will require that flows be maintained to these features. Although not preferred, some modification/relocation of these features may be considered, to obtain a suitable storm pond outlet, for example. These include Gore Road HDF 2 – Reach 2, Clarkway HDF 7 – Reach 1, and Robinson Creek Tributary HDF 1 – Reach 1. It was recommended in the MESP that these remain as open watercourses in future urban landscape after floodplain mapping and any proposed modifications to these features would require further analysis and approval from the City and TRCA. Rainbow HDF-4 was also recommended for "Conservation" in the MESP. It was later identified that Rainbow HDF-4 was a result of recent upstream drainage modifications at Coleraine Drive which diverted the main channel of the Rainbow Creek Tributary to this feature via the roadside ditch.

The remaining HDF's in the Study Area are classified as "Mitigation 1", "Mitigation 2", or "No Mitigation" (Figure 5 1: HDF Management Recommendations from the MESP Figure 2.15). 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.

### 8.3 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 488 trees (based on preliminary design);
- Changes in drainage which may affect aquatic and wetland habitats;

- 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).

### 8.3.1 Species at Risk Impacts

The following is a summary of SAR reported in the Study Area that may experience species-specific impacts by the proposed Project. Those determined to have a low or no probability of being impacted have been excluded from this summary.

The Little Brown Bat has a moderate chance of roosting, nesting, or occurring on site. Little Brown Bats forage over water where their diet consists of aquatic insects, mainly midges, mosquitoes, mayflies, and caddisflies. They also feed over forest trails, cliff faces, meadows, and farmland where they consume a wide variety of insects, from moths and beetles to crane flies (BCI 2016). Little Brown Myotis, and potentially other Myotis species, use the habitat regularly. Although a Tri-colored Bat was recorded, the species does not appear to use the habitat regularly. It is assumed the woodlot is habitat for this species and adjacent lands are foraging habitat. Impacts to this woodlot, and removal of foraging habitat, may result in a negative impact to Little Brown Bat. If negative impacts to Little Brown Bat and its habitat occur, authorization (in the form of permitting) from the MECP will be required.

Three bird SAR were determined to have potential habitat in the Study Area. Barn Swallow, Bobolink, and Eastern Meadowlark. Habitat for these species must be confirmed during detailed design, as permission to enter was not accessible for many properties confirmation of habitat could not be made. Additionally, five years have passed since field surveys and farming practices could impact or remove grassland habitat. Removal of habitat for these species is a contravention of the ESA unless authorized or permitted by the MECP.

### 8.3.2 Significant Woodland and Significant Valleylands Impacts

The most notable areas within the Study Areas are the fragments of woodland/forest/plantation that have been determined as Significant Woodlands in the MESP (Aquafor Beech Limited 2016) and EIS (Savanta 2017). The EIS (Savanta 2017) also determined that the West Humber River and The Clarkway Tributary met criteria for designation as significant valleylands. 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.

Due to the fragment size of each woodland any removal or encroachment will result in a negative impact to form and function. Impacts in the form of tree removals will occur to the woodland community, as well as impacts to SWH.

As documented, the significant valleylands are largely anthropogenic and located in a highly fragmented landscape. As a natural drainage system in the watershed, and associated with the other remaining natural heritage features, they should be protected from impacts and enhanced for wildlife use. Removal of valleylands will result in a negative impact to form and function.

### 8.3.3 Significant Wildlife Habitat Impacts

#### 8.3.3.1 Bat Maternity Colony Impacts

E-W Arterial will impact a woodlot along the Gore Road Tributary. Little Brown Myotis, and potentially other Myotis species, were documented. There are several factors responsible for the decline of bat populations; these factors probably vary from species to species and area to area. The most important

threats to the survival of bats include destruction of hibernating bats and nursery colonies, habitat loss, and persecution (OMNRF 2014). Road construction may impact bat maternity colonies by destroying forest habitat which includes tree hollows used as nurseries. Bats may also roost under loose bark with their young (OMNRF 2014). Road development close to woodlots may also increase human access to woodlots which can indirectly harm bats (disturbed bats may drop pups).

Development will not be permitted in bat maternity colony SWH unless it can be demonstrated that there will be no negative impacts on the feature or its ecological function. The area of the habitat includes the entire woodland or the forest stand ELC ecosite containing the colony (OMNRF 2014). As the woodlot is very small and fragmented from other woodlots, it is possible this habitat is the only maternity roosting habitat around. Clearing for development, and development-related human disturbance, in bat maternity colony SWH will likely result in reduced ecological function or loss of the habitat. The best mitigation option is to avoid developing in the habitat. To avoid direct impacts to individuals, vegetation removal should be done in the winter. It is expected that foraging habitat will remain post-construction, at least while surrounding land is agricultural.

### **8.3.3.2 Turtle Nesting Impacts**

For an area to function as a turtle nesting area, it must provide sand and gravel that turtles are able to dig in along with appropriate exposure to sun in areas that are free of vegetation and have good drainage. The beach must be wide and elevated enough that high water does not inundate nests. When turtles must cross roads to nest or reach water, there is often high mortality. Grading of shoulders may dig up nests, and spraying emulsified oil on shoulders will affect egg viability by suffocating eggs and direct chemical effects. This will also harden the substrate, potentially preventing emergence of hatchlings.

Roads may be the most significant source of turtle mortality and poorly designed roads have the potential to cause local populations to be extirpated (OMNRF 2014). Road-effect zones range from less than 200 m for sedentary species to more than 2 km for some turtle and frog species. Thus, the effects from roads may be very far-reaching (OMNRF 2014). Development will not be permitted in SWH unless it can be demonstrated that there will be no negative impacts on the feature or its ecological function. Roads need to be designed so that they are not barriers to turtles travelling between water and nesting, if this is not possible, suitable underpasses need to be provided. If crossings are included planning for longterm land use must occur to ensure corridors and connectivity between habitats.

### **8.3.3.3 Terrestrial Crayfish Habitat Impacts**

Development within habitat for the Meadow and Chimney Crayfish will result in direct loss of their habitat and possibly extirpation of the local population. The development of roads in terrestrial crayfish habitat may result in its loss. Surface water from roads that is directed toward crayfish habitat has the potential to have adverse effects as this may result in flooding of burrows, unstable water levels within burrows and introduction of contaminants into the crayfish habitat. Additionally, surface water has the potential to introduce sediments into crayfish habitat. If the clay and silty clay soils that they require become covered with other sediments, the soils may not be suitable for burrowing or constructing chimneys. Roads may act as a barrier to surface water and shallow groundwater movement. Changes in water level will result in destruction of habitat (OMNRF 2014).

Development will not be permitted within the SWH unless it can be demonstrated that there will be no negative impacts on the feature or its ecological function (OMNRF 2014). The ELC ecosite that contains the terrestrial crayfish burrow(s) is the SWH.

## 9.0 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.

### 9.1 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;
- Reinstall 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.

## 9.2 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.

Reinstall 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.
- o 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.

### 9.3 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).

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 (Section 4.2.1.2.1) 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.

### 9.3.1 Species at Risk Mitigation

It is assumed the woodlot is habitat for Little Brown Bat and adjacent lands are foraging habitat. Impacts to this woodlot, and removal of foraging habitat, may result in a negative impact to Little Brown Bat. If negative impacts to Little Brown Bat and its habitat occur, authorization (in the form of permitting) from the MECP will be required. It is recommended that the alignment is moved north or south to avoid the woodlot. The alignment should be moved at least 120m away as to not occur in adjacent lands.

Additionally, three bird SAR were determined to have potential habitat in the Study Area. Barn Swallow, Bobolink, and Eastern Meadowlark. Habitat for these species must be confirmed during detailed design, as permission to enter was not accessible for many properties confirmation of habitat could not be made. Additionally, five years have passed since field surveys and farming practices could impact or remove grassland habitat. Removal of habitat for these species is a contravention of the ESA unless authorized or permitted by the MECP. Moving the alignment to avoid the woodlot habitat may result in impacts to SAR bird habitat. Habitat for SAR must be confirmed during detailed design and appropriate steps taken.

### 9.3.2 Significant Woodland and Significant Valleylands Mitigation

Due to the fragment size of each woodland any removal or encroachment will result in a negative impact to form and function. Impacts in the form of tree removals will occur to the woodland community, as well as impacts to SWH. It is recommended that the alignment is moved north or south to avoid the natural heritage features present. The alignment should be moved at least 120m away as to not occur in adjacent

lands. For areas of roads which cross significant valleylands, bridges, not cut and fill, is recommended to retain form and function of significant valleylands.

### 9.3.3 Significant Wildlife Habitat Mitigation

Site selection is typically an important component of a successful mitigation strategy. Planners should account for known impacts in neighbouring developments and the cumulative amount of disturbed/converted habitat relative to the amount of undisturbed habitat.

#### 9.3.3.1 Bat Maternity Roost Mitigation

As stated above, it is recommended that the alignment is moved north or south to avoid the natural heritage features present.

#### 9.3.3.2 Turtle Nesting Mitigation

Roads need to be designed so that they are not barriers to turtles travelling between water and nesting, if this is not possible, suitable underpasses need to be provided. If crossings are included planning for long-term land use must occur to ensure corridors and connectivity between habitats.

#### 9.3.3.3 Terrestrial Crayfish Habitat Mitigation

Vegetation should never be removed immediately adjacent to crayfish habitat, as this is important forage. Spraying of pesticides to control roadside vegetation should be avoided in areas near crayfish habitat, as this has the potential to affect the crayfish food supply. Consideration should be given to using de-icing compounds other than salt near the habitat.

Roadside ditches should be designed so that they do not drain crayfish burrows or dry up the soils where burrows are located. Likewise, sufficient culverts should be installed under the road to ensure unimpeded movement of surface water and groundwater.

Surface water runoff should always be directed away from crayfish habitat to avoid sedimentation that adversely affects the crayfish's ability to dig burrows. It may be necessary to construct stormwater management ponds if surface runoff is likely to run directly into crayfish habitat. Maintenance of ditches should be scheduled for periods when the crayfish are less likely to be present (e.g., early spring, when adults are often found in streams, lakes, and rivers) (OMNRF 2014).

## 9.4 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 or other restoration as appropriate.

Additionally, the removal of trees from hedgerows and other areas will require compensation. Compensation is currently estimated to be 4,965 compensation trees which will be further refined in detailed design once land acquisition or permission to enter has been completed to allow for a thorough inventory.

## 9.5 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. Larger bridge/culvert crossing structures will also remove the fish barriers at agricultural crossings of The Gore Road Tributary (i.e., perched culverts). 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 West Humber River as Fish Management Zone 7 - Redside Dace and Darter species and Gore Road Tributary and Clarkway 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.

## 10.0 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.

## 10.1 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.

## 10.2 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. Additionally, Bobolink and Eastern Meadowlark may have habitat in the area.

Little Brown Bat was documented by recorders in the Gore Road woodlot. If the woodlot can not be avoided, permit/authorization by MECP may be required. Alternatively, the MECP can be consulted to determine further and intensive studies to access habitat use by SAR and potentially confirm non-use.

## 10.3 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.

## 10.4 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.

## 10.5 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 or a combination of Municipal Discharge Permits, Conservation Authority Approval, and/or MECP Environmental Compliance Approval (OWRA Section 53).

## 11.0 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 facilitates the preparation of an ESR for Study Area of the

project. The Study Area (Part 'B' Study Corridor) is owned and operated by the City and includes the development of the new E-W Arterial and widening of Countryside Drive and Clarkway Drive.

- As the woodlot along Gore Road Tributary will be removed for the E-W Arterial, an Overall Benefit permit from the MECP is likely. The woodlot is habitat of threatened and endangered bat SAR, and it is the only habitat in the area. As impacts to SAR habitat cannot be avoided with the alignment of the E-W Arterial the Species at Risk Branch will recommend that an authorization under the Endangered Species Act be pursued. It is the responsibility of the proponent (City and Region) to ensure that SAR are not killed, harmed, or harassed, and that their habitat is not damaged or destroyed through the proposed activities to be carried out on the sites.
- 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 MNR 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.
- 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 (Part "A").
- The MESP (Aquafor Beech Limited 2016) and 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 MNR (2016) wildlife fencing guidelines and be designed to accommodate all target species. This recommendation is carried forward for detailed design. This is relevant for the intersection of E-W arterial with Arterial A2 but is discussed in Part "A".
- 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.
- Brampton's Pathways System aims to link the city's natural and built environments. Current projections occur within the proposed NHS, which may result in removals of the NHS. The design and planning of these trails must consider the conservation of ecological features and functions. The City and Region must consider the relevance of these recreation ways in light of the proposed NHS improvements and compensation.

- 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.

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**Appendix A**  
**Agency Correspondance**

## Hughes, Samantha

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**From:** Snell, Shamus (MECP) <Shamus.Snell@ontario.ca>  
**Sent:** Monday, 22 February, 2021 09:34  
**To:** Hughes, Samantha  
**Subject:** RE: Potential Impact to SAR Bats, Brampton ON

**Follow Up Flag:** Follow up  
**Flag Status:** Flagged

**CAUTION:** External email. Please do not click on links/attachments unless you know the content is genuine and safe.

Hi Sam,

I was able to download and open the IFG with no issues. I will endeavor to review it and get my comments and suggestions back to you over the next few days.

Generally, if the habitat of threatened and endangered Species at Risk cannot be avoided Species at Risk Branch will recommend that an authorization under the Endangered Species Act be pursued. If that is confirmed to be the case it is best to start pursuing an authorization as soon as possible as it can take a substantial amount of time to obtain some Endangered Species Act permit.

Regards,

Shamus Snell  
A/ Management Biologist  
Species at Risk Branch  
Ministry of Environment, Conservation and Parks  
Email: [shamus.snell@ontario.ca](mailto:shamus.snell@ontario.ca)

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**From:** Hughes, Samantha <samantha.hughes@woodplc.com>  
**Sent:** February 12, 2021 9:57 AM  
**To:** Snell, Shamus (MECP) <Shamus.Snell@ontario.ca>  
**Subject:** RE: Potential Impact to SAR Bats, Brampton ON

**CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.**

Hey Shamus,

Not sure what happened with that original IGF but I asked a colleague to redo it, so hopefully the attached works!

I also reattached the other documents. The IGF will be missing some data, as this project keeps getting put on hold and restarting (there have been some issues with the proposed GTA west corridor).

However, when I did discuss with Michelle, the objective was to give as much information as possible so we could discuss what will be required as avoidance of this woodlot will not be possible and myotis were captured in recordings.

I am available today and next week to discuss if need, or later in March (have some remote fieldwork coming up).

Thanks,

Samantha

**Samantha Hughes**

Senior Biologist

Mobile: +1 (416) 540 8475

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**From:** Snell, Shamus (MECP) <[Shamus.Snell@ontario.ca](mailto:Shamus.Snell@ontario.ca)>

**Sent:** Tuesday, 2 February, 2021 04:02 PM

**To:** Hughes, Samantha <[samantha.hughes@woodplc.com](mailto:samantha.hughes@woodplc.com)>

**Subject:** RE: Potential Impact to SAR Bats, Brampton ON

**CAUTION:** External email. Please do not click on links/attachments unless you know the content is genuine and safe.

Hi Samantha,

I have started to reviewing the information you provided but can only view a single page from the IGF.... On further inspection it appears like the document may be locked with a password which is preventing me from viewing the rest of the document.

Could you please resend the IGF to me.

Thanks,

Shamus Snell

A/ Management Biologist

Species at Risk Branch

Ministry of Environment, Conservation and Parks

Email: [shamus.snell@ontario.ca](mailto:shamus.snell@ontario.ca)

---

**From:** Hughes, Samantha <[samantha.hughes@woodplc.com](mailto:samantha.hughes@woodplc.com)>

**Sent:** January 29, 2021 12:02 PM

**To:** Snell, Shamus (MECP) <[Shamus.Snell@ontario.ca](mailto:Shamus.Snell@ontario.ca)>

**Subject:** RE: Potential Impact to SAR Bats, Brampton ON

**CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.**

Hi Shamus,

Thank you for following up. No, unfortunately I never received a response. I reattached the email so you have the attachments I am referring to readily available. Would appreciate the input.

Thanks,

Samantha

**Samantha Hughes**

Senior Biologist

Mobile: +1 (416) 540 8475

---

**From:** Snell, Shamus (MECP) <[Shamus.Snell@ontario.ca](mailto:Shamus.Snell@ontario.ca)>

**Sent:** Thursday, 28 January, 2021 02:54 PM

**To:** Hughes, Samantha <[samantha.hughes@woodplc.com](mailto:samantha.hughes@woodplc.com)>

**Subject:** RE: Potential Impact to SAR Bats, Brampton ON

**CAUTION:** External email. Please do not click on links/attachments unless you know the content is genuine and safe.

Hi Samantha,

Due to a high volume of requests received during the transition of the Endangered Species Act from the Ministry of Natural Resources and Forest (MNRF) to the Ministry of Environment, Conservation and Parks (MECP) and work restrictions and delays as a result of COVID-19 a number of requests which came into our office during that time may not have been responded to. I am working though some of these requests to ensure that someone has reached out to you and if not to check to see if your request for review is still active and if you would still like a response.

My apologies if no one from our office has reached out to you sooner.

Regards,

Shamus Snell  
A/ Management Biologist  
Species at Risk Branch  
Ministry of the Environment, Conservation and Parks  
Email: [shamus.snell@ontario.ca](mailto:shamus.snell@ontario.ca)

---

**From:** Hughes, Samantha <[samantha.hughes@woodplc.com](mailto:samantha.hughes@woodplc.com)>

**Sent:** August 5, 2020 2:20 PM

**To:** Species at Risk (MECP) <[SAROntario@ontario.ca](mailto:SAROntario@ontario.ca)>

**Subject:** FW: Potential Impact to SAR Bats, Brampton ON

**CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.**

As Michelle is not available, please see below.

Thanks,  
Samantha

**Samantha Hughes**

Senior Biologist

Direct: +1 519 650 7112

Mobile: +1 416 540 8475

---

**From:** Hughes, Samantha

**Sent:** Wednesday, 5 August, 2020 02:12 PM

**To:** Karam, Michelle (MECP) <[Michelle.Karam@ontario.ca](mailto:Michelle.Karam@ontario.ca)>

**Subject:** Potential Impact to SAR Bats, Brampton ON

Hi Michelle,

Hope all is well!

Following up on conversations we had earlier in the year, I have a project I need your advice on (is in one of the projects we briefly discussed earlier). I attached the excel file you provided at that time, as well as the results I was provided (word document) and a draft figure of the area (PDF; removed the draft stamp for easier viewing). I also attached a completed IGF- can send the referenced MESP if you require (and draft documents once I have them).

We discussed that the removal of the woodlot to accommodate the proposed E-W Arterial road would likely result in impacts to bats, given the limited habitat around. Acoustic surveys did document MYLU (3 passes), PESU (1 pass), and over a thousand passes of *Myotis* sp.

So, the question is, how do we proceed as avoidance will not be possible (even if the E-W connection was moved north or south, it will impact a woodlot)?

Thanks,  
Samantha

**Samantha Hughes**

Senior Biologist

Direct: +1 519 650 7112

Mobile: +1 416 540 8475

[www.woodplc.com](http://www.woodplc.com)

The logo for Wood PLC, featuring the word "wood." in a bold, lowercase, sans-serif font. The period is a solid black dot.

**Appendix B**  
**Representative Field Photos**

## **Appendix B1**

# **Aquatic Crossings in Both Part 'A' and Part 'B'**

**Photo Record – Appendix B1**



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 Record – Appendix B1**



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 'B' only**

**Photo Record – Appendix B3**



Photo 1: GT4 looking downstream of crossing.



Photo 2: GT4 facing downstream end of bridge.

**Photo Record – Appendix B3**



Photo 3: GT4 within the ROW. Nests observed under bridge.



Photo 4: GT4 area directly upstream of ROW.



Photo 5: GT4 upstream of ROW.



Photo 6: GT4 upstream of ROW.



Photo 7: GT5 upstream of crossing mud visible in photo but no water present.



Photo 8: GT5 downstream of crossing.

**Photo Record – Appendix B3**



Photo 9: Crossing CT2 at downstream end.



Photo 10: Crossing CT2 at upstream end.



Photo 11: CTA, Reach 1, downstream end of surveyed area.



Photo 12: CTA, watercourse under first residential driveway crossing.



Photo 13: CTA, facing upstream (north). Note gabion baskets and channelization.



Photo 14: CTA facing downstream. Note culvert inletting on the right upstream bank (eastern bank). Conveys water under the road from agricultural drainage.



Photo 15: CTA, Reach 2. Gabion baskets end and moderate bank instability is evident in this area.



Photo 16: CTA, Reach 2 – note slight instability of banks.



Photo 17: CTA, Reach 3 facing upstream. Active erosion of left upstream bank (west bank).



Photo 18: CTA Reach 4 facing upstream. Pooled area.



Photo 19: CTA Reach 4. Active erosion evident on western bank.



Photo 20: CTA Reach 5 facing upstream. Small riffle present.



Photo 21: CTA, Reach 5 facing upstream. Beyond riffle, watercourse continues as uniform flats.



Photo 22: CTA, Reach 5. Another culvert outlets to the stream from the east. Culvert conveys flows from dry agricultural drainage ditch under the road.



Photo 23: CTA, Reach 5. Old bridge structure remains.



Photo 24: CTA, Reach 5.



Photo 25: CTA, Reach 5.



Photo 26: CT3 – agricultural drainage ditch which is conveyed under the road and outlets to CTA to the west.



Photo 27: CT3, downstream end of culvert facing west – northern end of CTA present in background.



Photo 28: CT4, facing northeast. Downstream end of bridge looking upstream.



Photo 29: CT4 – downstream of the bridge as seen from the road.



Photo 30: CT4, looking 20-50 m downstream of ROW.

**Photo Record – Appendix B3**



Photo 31: CT4 – under the bridge. Note wildlife passage area found on north side of bridge.



Photo 32: CT4, upstream end of bridge facing south.

**Photo Record – Appendix B3**



Photo 33: CT4 looking upstream of bridge. Note large pool directly adjacent to ROW.



Photo 34: 50 m upstream of CT4 and 50 m downstream of CT5. Flats with staked bank treatment on west bank closest to road.



Photo 35: Downstream ROW area of Crossing CT5.



Photo 36: Crossing CT5 facing upstream. Note wildlife crossing under west side of bridge.



Photo 37: Upstream (north) end of Crossing CT5.



Photo 38: Crossing CT5, ROW to 20 m upstream area. Note failing bank on south bank of stream adjacent to roadway.



Photo 39: Area approximately 50 m upstream of Crossing CT5 ROW.



Photo 40: Wetland area downstream of crossing RS1.



Photo 41: Crossing RS1, downstream ROW, twin CSP culverts.



Photo 42: Crossing RS1, upstream ROW.



Photo 43: Crossing RS1, upstream.

## **Appendix B3**

# **Terrestrial Photo Record of Typical ELC Ecosites**



Photo 1: Agricultural Field.



Photo 2: Pasture.

**Photo Record – Appendix B4**



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



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

**Photo Record – Appendix B4**



Photo 5: Cultural Thicket (CUT1).



Photo 6: Cultural Savannah (CUS1).

**Photo Record – Appendix B4**



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 Record – Appendix B4**



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

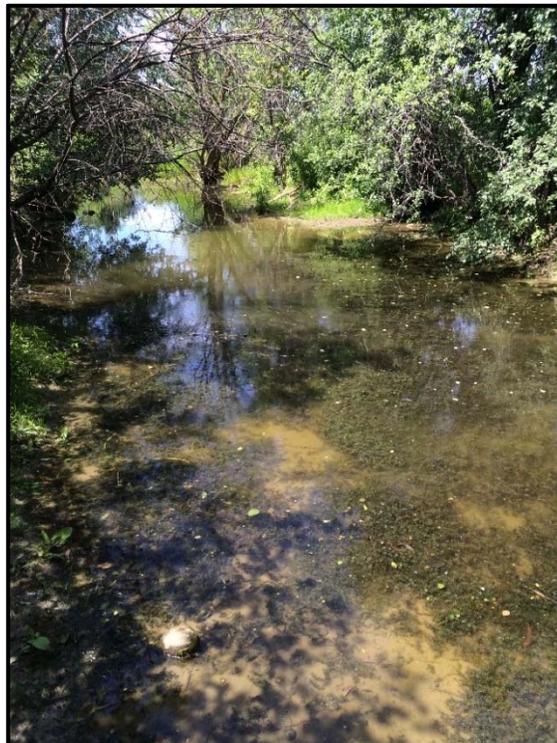


Photo 10: Willow Mineral Deciduous Swamp (SWD 4-1).



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

**Appendix C Tree Inventory  
Report**



## **Tree Assessment: Part B**

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

September 15, 2021

# Tree Assessment: Part B

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**  
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Cambridge, Ontario, N3H 4R7  
Canada  
T: 519-650-7109

**September 15, 2021**

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- Appendix D: Site Photograph Log
- Appendix E: City of Brampton Specifications

## 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 ‘B’ as the preliminary design for this Part is now complete. Part ‘A’ was submitted May 2021 under separate cover.

### 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<sup>1</sup> 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:*

- *Disturb, destroy or take a nest, egg, nest shelter, Eider Duck shelter or duck box of a migratory bird, or*

---

<sup>1</sup> 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.

- *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 ensure 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; *Agilus 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, *Agilus 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>

Sixteen ash trees were documented during surveys. 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 September 2021 (Toronto and Region Conservation Authority, 2020)), the Project Location is mapped within the Authority's regulated area. The TRCA regulated areas include Clarkway Drive Tributary and Gore Road Tributary. 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 'B', which was circulated on May 4, 2021.

**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, as applicable. 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.,  $\geq 10$  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) <sup>1</sup>	Minimum Protection Distances Required <sup>2</sup>
<30cm	Radius of dripline <sup>3</sup>
>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 547 trees greater than 10 cm DBH in Study Corridor Part 'B'. 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.

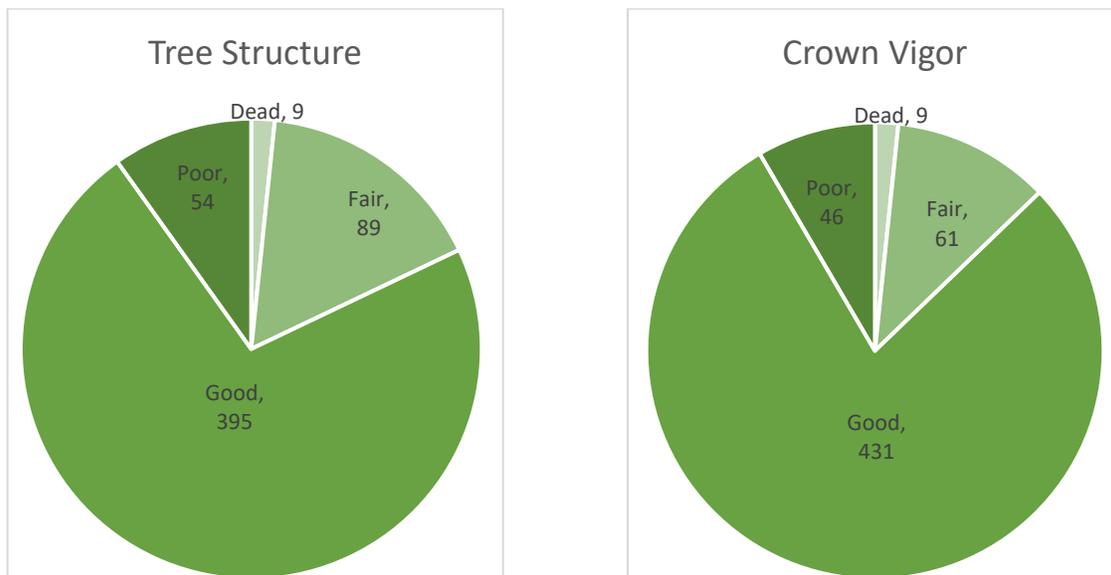


Exhibit A

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.

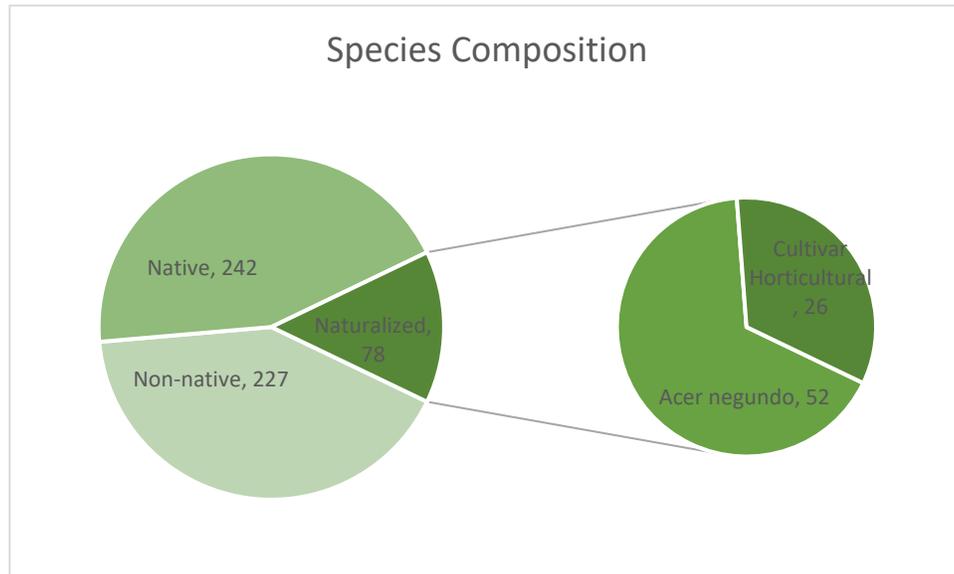


Exhibit B

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

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

Botanical Name	Common Name	Total # Assessed	# to be Removed	# to be Injured	# to be Preserved
<i>Acer negundo</i>	Manitoba Maple <sup>1</sup>	52	48	1	3
<i>Acer platanoides</i>	Norway Maple*	26	23	2	1
<i>Acer saccharinum</i>	Silver Maple	33	32		1
<i>Acer saccharum</i>	Sugar Maple	12	12		
<i>Betula papyrifera</i>	Paper Birch	12	7	3	2
<i>Carya cordiformis</i>	Bitternut Hickory	4	4		
<i>Elaeagnus angustifolia</i>	Russian Olive*	3	3		
<i>Fraxinus americana</i>	White Ash	16	16		
<i>Gleditsia triacanthos</i>	Honey Locust <sup>1</sup>	2		2	
<i>Juglans nigra</i>	Black Walnut	30	30		
<i>Juniperus virginiana</i>	Eastern Red Cedar <sup>1</sup>	9	8		1
<i>Malus Sp.</i>	Ornamental Crabapple <sup>1</sup>	10	9	1	
<i>Morus alba</i>	White Mulberry*	6	5	1	
<i>Picea abies</i>	Norway Spruce*	28	26	2	
<i>Picea glauca</i>	White Spruce	26	18	1	7
<i>Picea pungens</i>	Colorado Blue Spruce*	29	21	5	3
<i>Pinus nigra</i>	Austrian Pine*	84	80	2	2
<i>Pinus strobus</i>	White Pine	15	14		1
<i>Pinus sylvestris</i>	Scots Pine*	12	12		
<i>Populus alba</i>	White Poplar*	16	16		
<i>Populus deltoides</i>	Eastern Cottonwood	2	2		
<i>Populus grandidentata</i>	Large-toothed Aspen	2	1		1
<i>Populus tremuloides</i>	Trembling Aspen	10	10		
<i>Quercus macrocarpa</i>	Bur Oak	6	6		
<i>Robinia pseudoacacia</i>	Black Locust <sup>1</sup>	4	4		
<i>Salix babylonica</i>	Weeping Willow*	3			3
<i>Salix species</i>	Willow species	28	26		2
<i>Sorbus decora</i>	Showy Mountain-ash <sup>1</sup>	1	1		
<i>Taxus cuspidat</i>	Japanese Yew*	1	1		
<i>Thuja occidentalis</i>	Eastern White Cedar	41	29		12
<i>Tilia americana</i>	American Basswood	3	3		
<i>Tilia Cordata</i>	Little-leaved Linden*	2	2		
<i>Ulmus americana</i>	American Elm	2	2		

Botanical Name	Common Name	Total # Assessed	# to be Removed	# to be Injured	# to be Preserved
<i>Ulmus pumila</i>	Siberian Elm*	17	17	1	3
<b>Total</b>		<b>547</b>	<b>488</b>	<b>20</b>	<b>39</b>

Notes:

<sup>1</sup> naturalized and cultivar species

\* non-native species

## 5. Proposed Tree Removals and Impacts Summary

The assessment of tree conflicts was completed based on the provided preferred alternative design for Part 'B' which resulted in the anticipated removal of 488 trees and the injury of 20 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) <sup>1</sup>	Minimum Protection Distances Required <sup>2</sup>
<30cm	Radius of dripline <sup>3</sup>
>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) <sup>1</sup>	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 216 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 492 trees.
- The TRCA regulated areas contains trees within agricultural hedgerows and right-of-ways, as well along waterways. The overall project will look at compensation for community loss, therefore, in terms of this tree inventory the replication ratio is applied (Table 7-1). There are an estimated 272 trees in TRCA regulated area and compensation, based on Table 7-1, is 4,473 trees.
- Compensation for City tableland trees (216 trees) combined with TRCA regulated areas (272 trees) results in the need for 4,965 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 enhancement of Clarkway Drive Tributary and Gore Road Tributary as well as 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 488 trees will need to be removed, and 20 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, 4,965 compensation trees is likely required. It is preferred that compensation plantings occur on-site. Compensation could occur as a part of the enhancement of Clarkway Drive Tributary and Gore Road Tributary as well as the restoration plan for Rainbow Creek.

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

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**

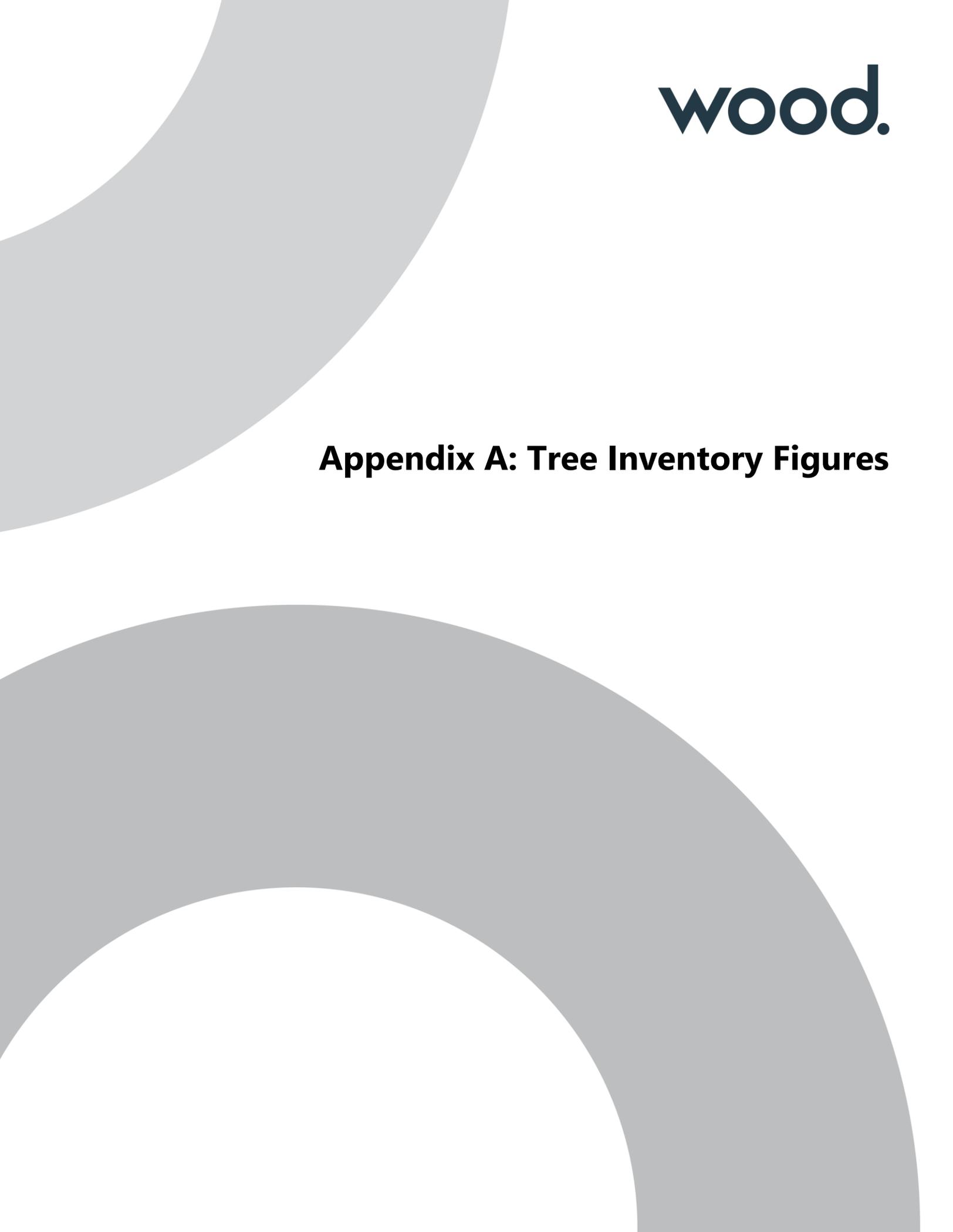
This assessment is based on the circumstances, observations and interpretations as they existed at the time the inventory was completed, and those trees documented within Part A. The opinions in this assessment are based on observations made and using generally accepted professional judgment. It is understood 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.

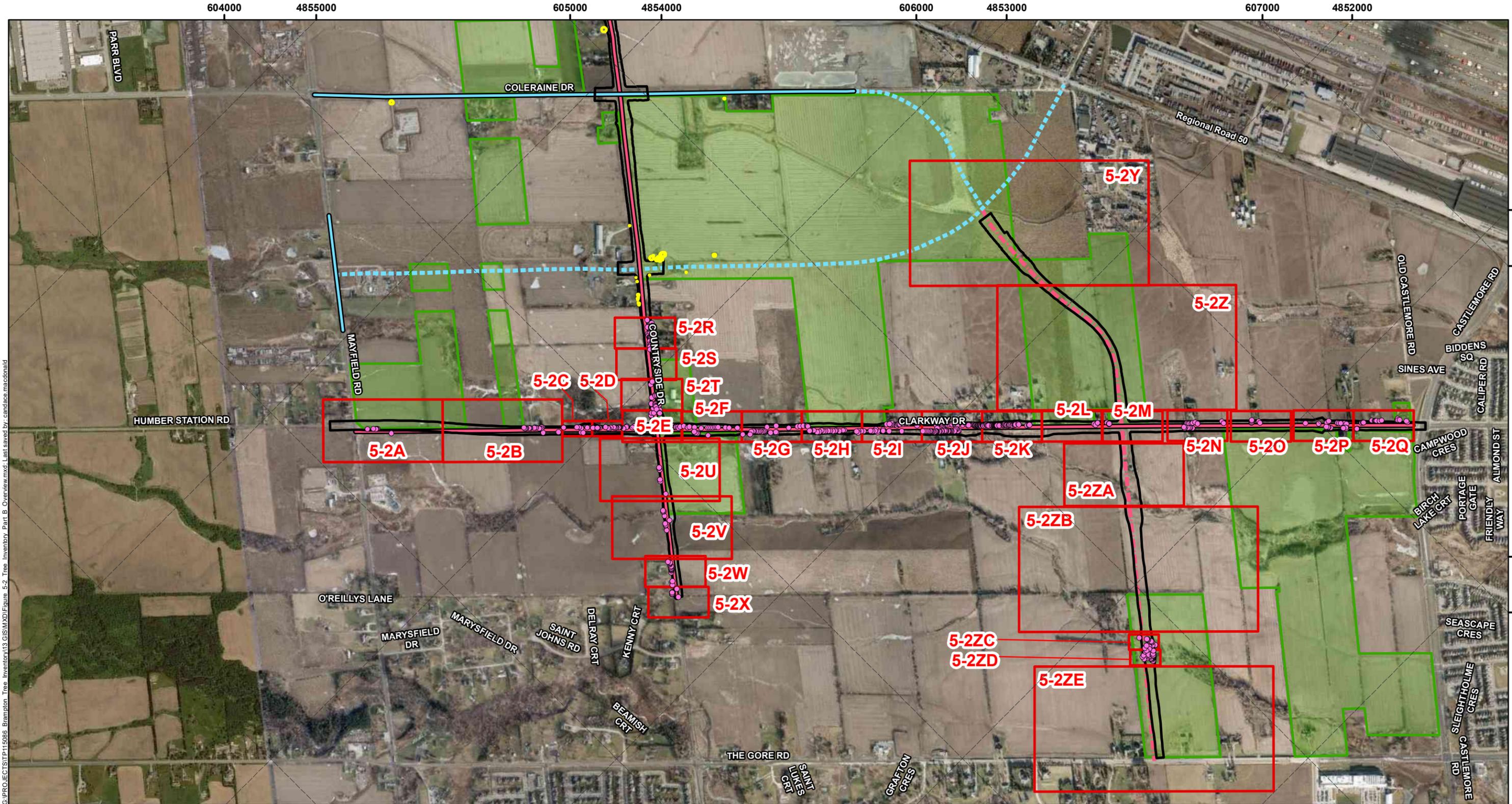
## 10. References

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**wood.**

## **Appendix A: Tree Inventory Figures**



G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\Map\Figure 5-2 Tree Inventory Part B Overview.mxd. Last saved by: candace.macdonald

**LEGEND**

- |                            |                       |                      |
|----------------------------|-----------------------|----------------------|
| Part 'A' Existing Roadway* | <b>Tree Inventory</b> | Tree Protection Zone |
| Part 'B' Existing Roadway* | Injure                | Road Footprint       |
| Part 'A' Proposed Roadway  | Retain                | PTE Area             |
| Part 'B' Proposed Roadway  | Remove                | Map Index            |

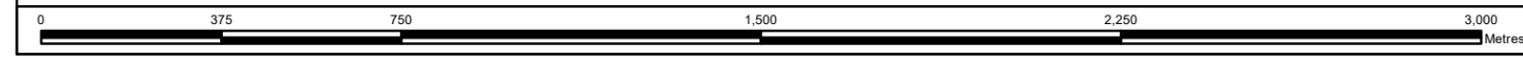
NOTES:  
 - Basedata from MNRFP LIO, 2019  
 - ESRI Clarity Basemap Imagery - 2018  
 \* Proposed roadway widening.



**BRAMPTON HWY 427 EA**

**Tree Inventory  
Part B - Overview**

PROJECT N <sup>o</sup> : TP115086	FIGURE: 5-2
SCALE: 1:15,000	DATE: August 2021



Datum: NAD83  
 Projection: UTM Zone 17N

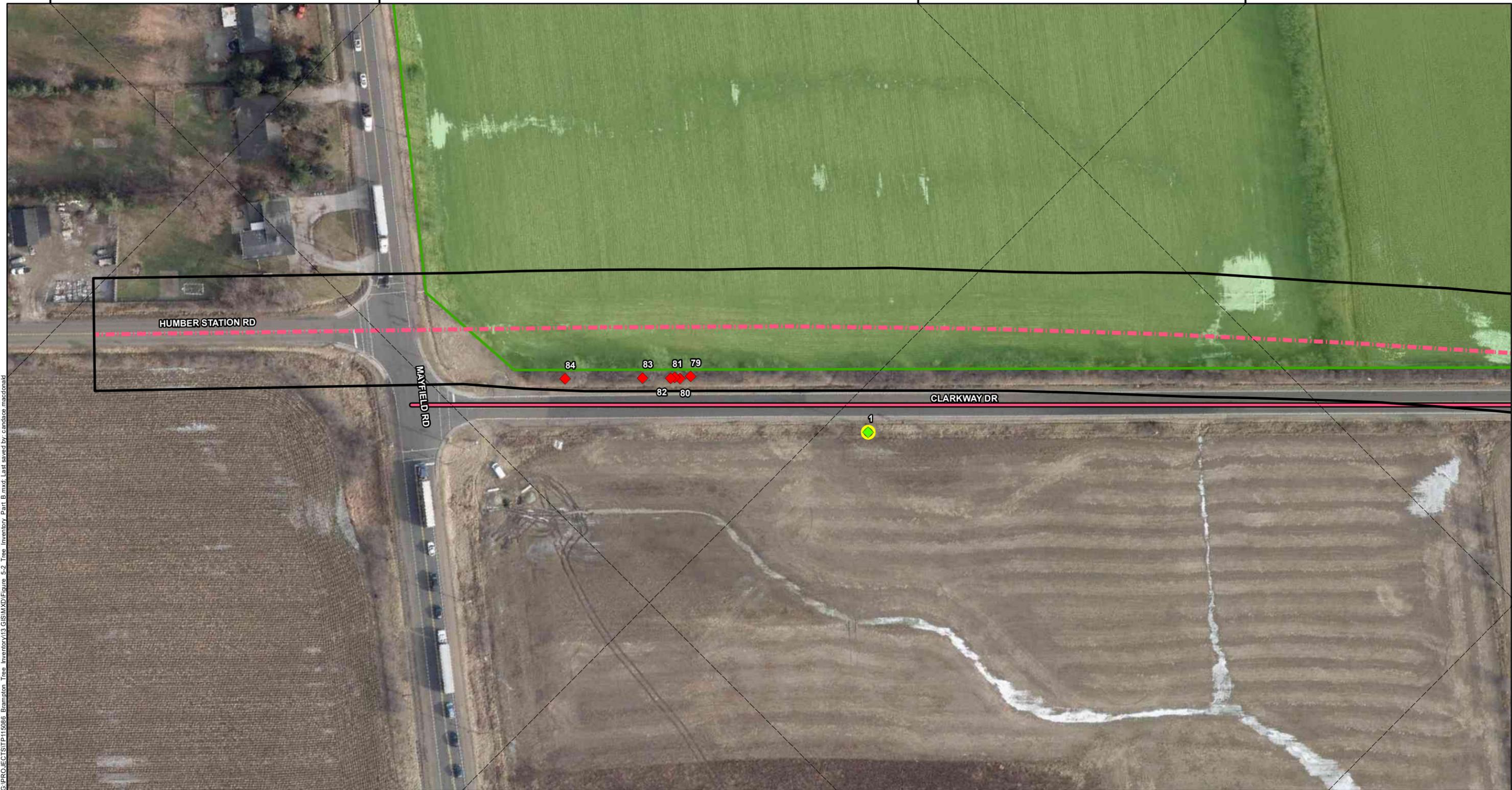


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G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MXD\Figure 5-2 Tree Inventory Part B.mxd. Last saved by: candace.mactdonald

603400

**LEGEND**

**Tree Inventory**

- Injure
- Retain
- Remove



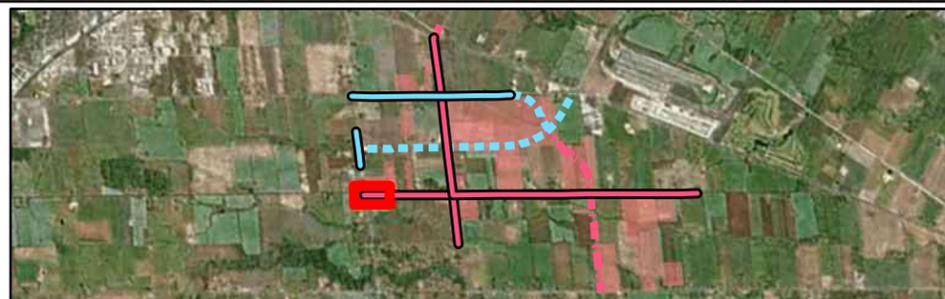
Tree Protection Zone



Road Footprint



PTE Area



NOTES:  
 - Basedata from MNR/LIO, 2019  
 - ESRI Clarity Basemap - 2018  
 \* Proposed roadway widening.



**BRAMPTON HWY 427 EA**

**Tree Inventory  
PART B**

Datum: NAD83  
Projection: UTM Zone 17N



PROJECT N<sup>o</sup>: TP115086

FIGURE: 5-2A

SCALE: 1:1,200

DATE: September 2021



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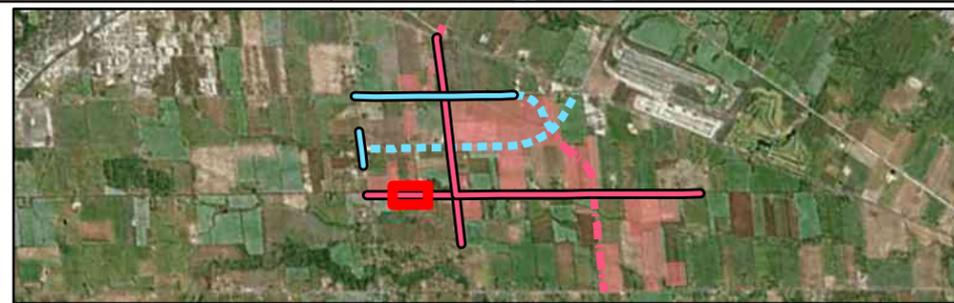


G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MXD\Figure 5-2 Tree Inventory Part B.mxd. Last saved by: candace.mactdonald

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**LEGEND**

<b>Tree Inventory</b>	 Tree Protection Zone
 Injure	 Road Footprint
 Retain	 PTE Area
 Remove	



NOTES:  
 - Basedata from MNR LIO, 2019  
 - ESRI Clarity Basemap - 2018  
 \* Proposed roadway widening.

Datum: NAD83  
 Projection: UTM Zone 17N



	
<b>BRAMPTON HWY 427 EA</b>	
<b>Tree Inventory PART B</b>	
PROJECT N <sup>o</sup> : TP115086	FIGURE: 5-2B
SCALE: 1:1,200	DATE: September 2021



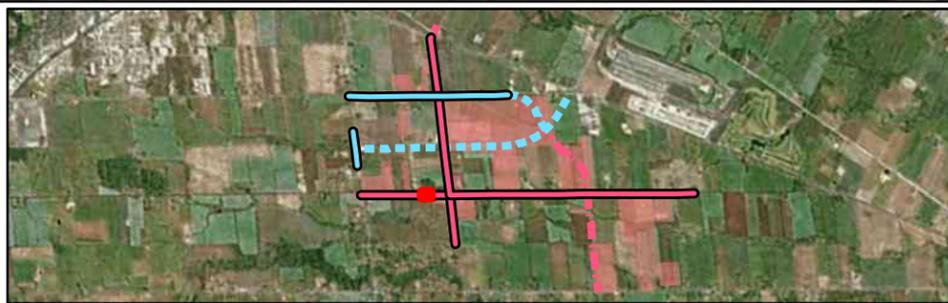
G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MXD\Figure 5-2 Tree Inventory Part B.mxd. Last saved by: candace.mactdonald



**LEGEND**

<b>Tree Inventory</b>	 <b>Tree Protection Zone</b>
 <b>Injure</b>	 <b>Road Footprint</b>
 <b>Retain</b>	 <b>PTE Area</b>
 <b>Remove</b>	

0 5 10 20 30 40 Metres



**NOTES:**  
 - Basedata from MNRF LIO, 2019  
 - ESRI Clarity Basemap - 2018  
 \* Proposed roadway widening.

Datum: NAD83  
 Projection: UTM Zone 17N



**wood.**

**BRAMPTON HWY 427 EA**

**Tree Inventory  
PART B**

PROJECT N <sup>o</sup> : TP115086	FIGURE: 5-2C
SCALE: 1:300	DATE: September 2021

4863000

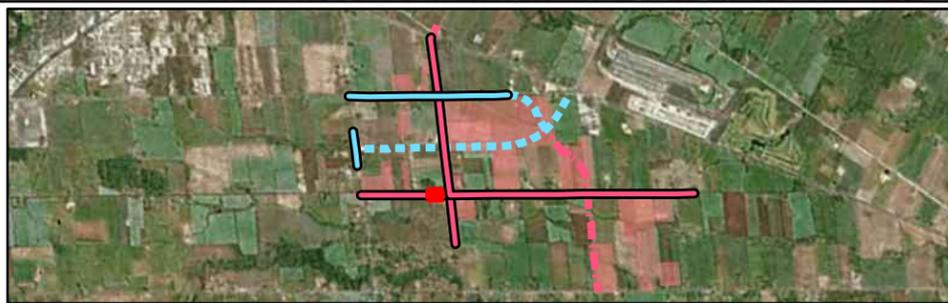
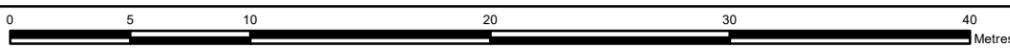
G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MapXFigure 5-2 Tree Inventory Part B.mxd. Last saved by: candace.mactdonald



**LEGEND**

- Tree Inventory
- Injure
- Retain
- Remove

- Tree Protection Zone
- Road Footprint
- PTE Area



NOTES:  
 - Basedata from MNR LIO, 2019  
 - ESRI Clarity Basemap - 2018  
 \* Proposed roadway widening.

Datum: NAD83  
 Projection: UTM Zone 17N



BRAMPTON HWY 427 EA

Tree Inventory  
PART B

PROJECT N<sup>o</sup>: TP115086

FIGURE: 5-2D

SCALE: 1:300

DATE: September 2021

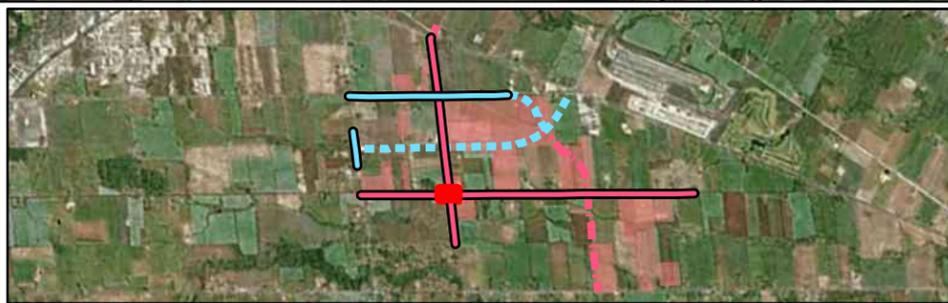
G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MXD\Figure 5-2 Tree Inventory Part B.mxd. Last saved by: candace.macdonald



4852800

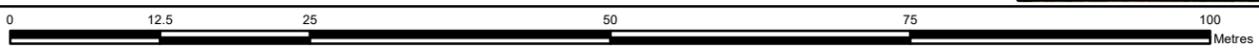
**LEGEND**

- |  |   |                             |
|--|---|-----------------------------|
| <b>Tree Inventory</b>  |  | <b>Tree Protection Zone</b> |
|  Injure |  | <b>Road Footprint</b>       |
|  Retain |  | <b>PTE Area</b>             |
|  Remove |   |                             |



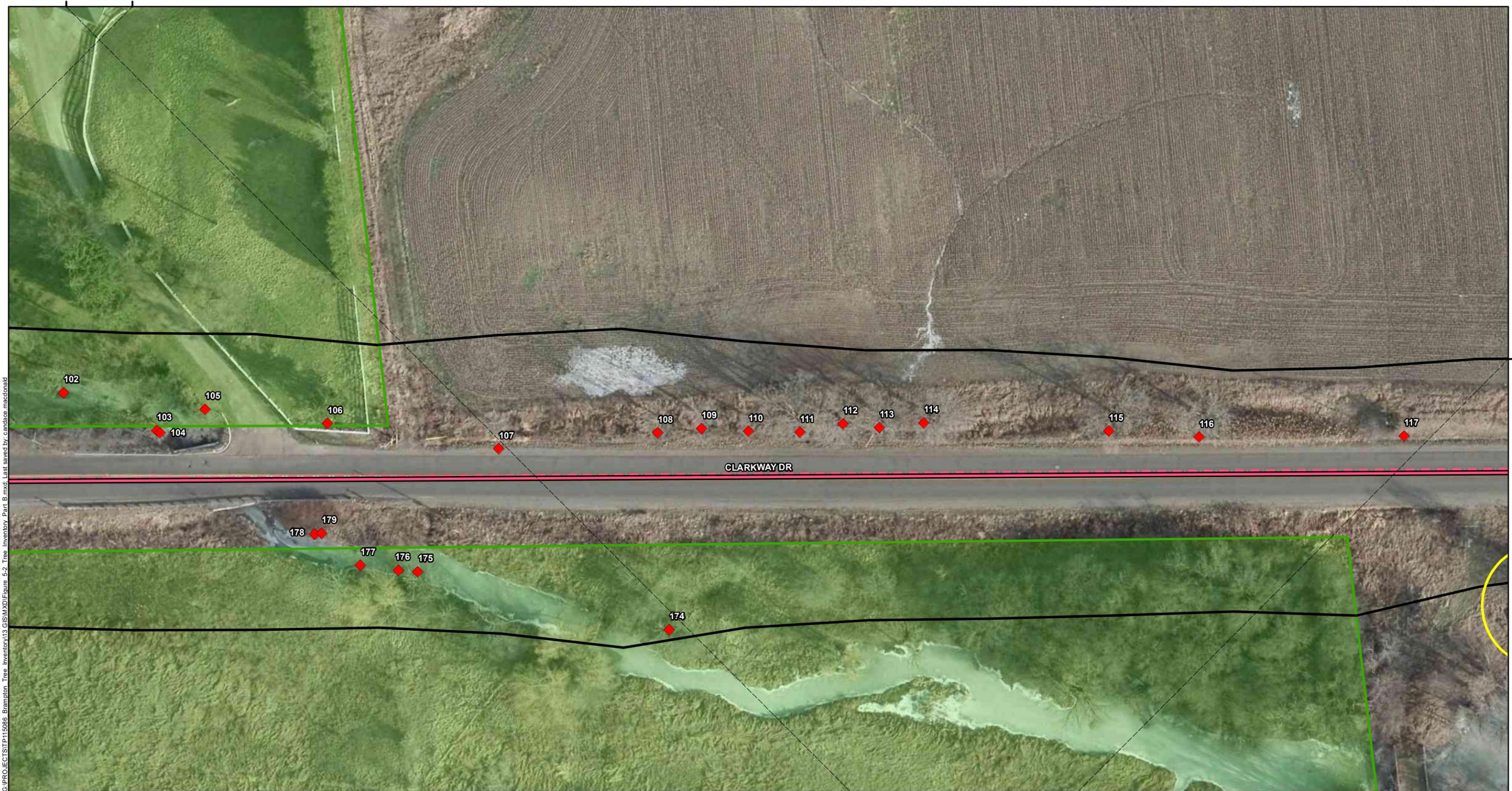
NOTES:  
 - Basedata from MNR/LIO, 2019  
 - ESRI Clarity Basemap - 2018  
 \* Proposed roadway widening.

	
<b>BRAMPTON HWY 427 EA</b>	
<b>Tree Inventory PART B</b>	
Datum: NAD83 Projection: UTM Zone 17N	
PROJECT N <sup>o</sup> : TP115086	FIGURE: 5-2E
SCALE: 1:600	DATE: September 2021



604200 4852800

4852600



G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MXD\Figure 5-2 Tree Inventory Part B.mxd. Last saved by: candace.mactdonald

**LEGEND**

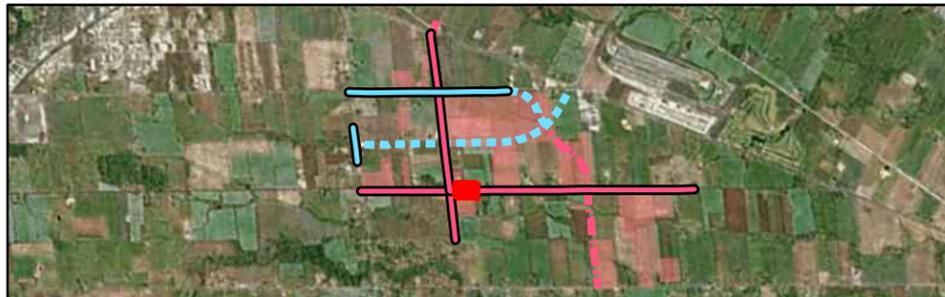
**Tree Inventory**

- Injure
- Retain
- Remove

Tree Protection Zone

Road Footprint

PTE Area



NOTES:  
 - Basedata from MNRF LIO, 2019  
 - ESRI Clarity Basemap - 2018  
 \* Proposed roadway widening.



**BRAMPTON HWY 427 EA**

**Tree Inventory  
PART B**

Datum: NAD83  
Projection: UTM Zone 17N

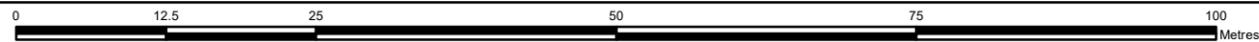


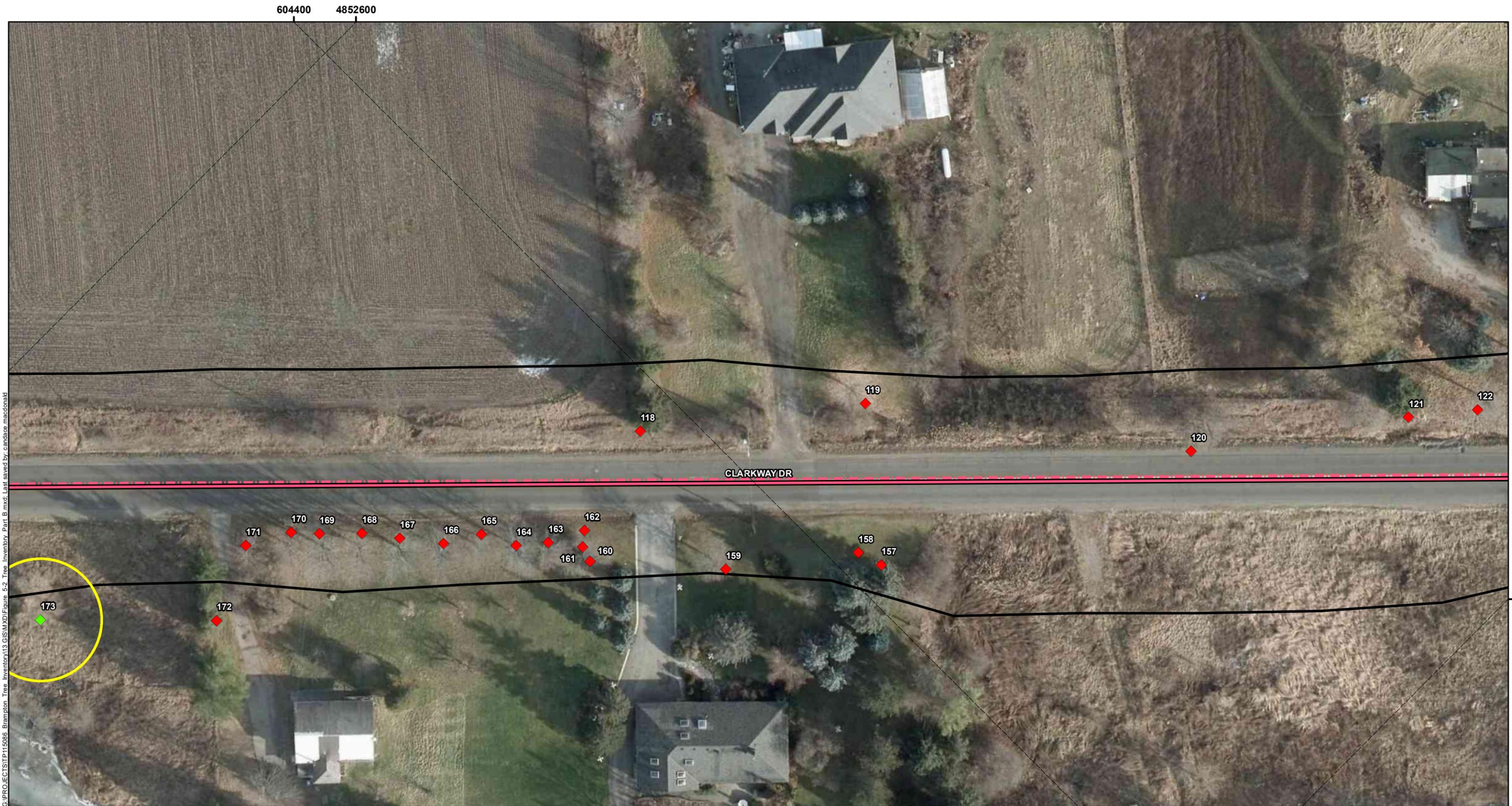
PROJECT N<sup>o</sup>: TP115086

FIGURE: 5-2F

SCALE: 1:600

DATE: September 2021





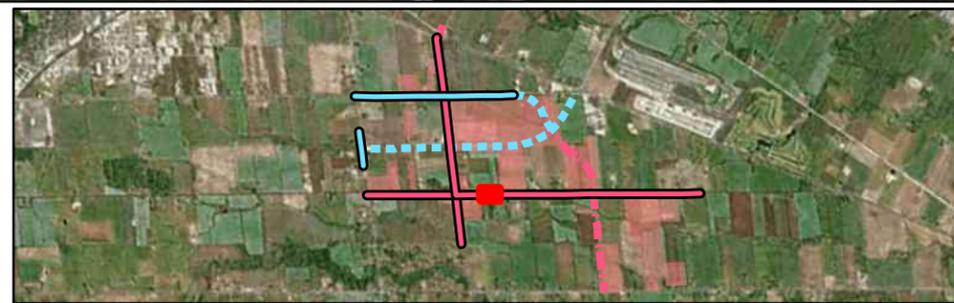
G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MapXFigure 5-2 Tree Inventory Part B.mxd. Last saved by: candace.mactdonald

604400 4852600

4852400

**LEGEND**

<b>Tree Inventory</b>	 <b>Tree Protection Zone</b>
 <b>Injure</b>	 <b>Road Footprint</b>
 <b>Retain</b>	 <b>PTE Area</b>
 <b>Remove</b>	

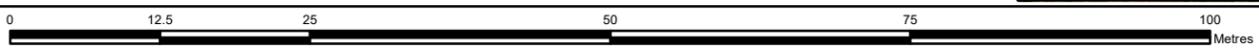


**NOTES:**  
 - Basedata from MNR LIO, 2019  
 - ESRI Clarity Basemap - 2018  
 \* Proposed roadway widening.

Datum: NAD83  
 Projection: UTM Zone 17N



	
<b>BRAMPTON HWY 427 EA</b>	
<b>Tree Inventory PART B</b>	
PROJECT N <sup>o</sup> : TP115086	FIGURE: 5-2G
SCALE: 1:600	DATE: September 2021

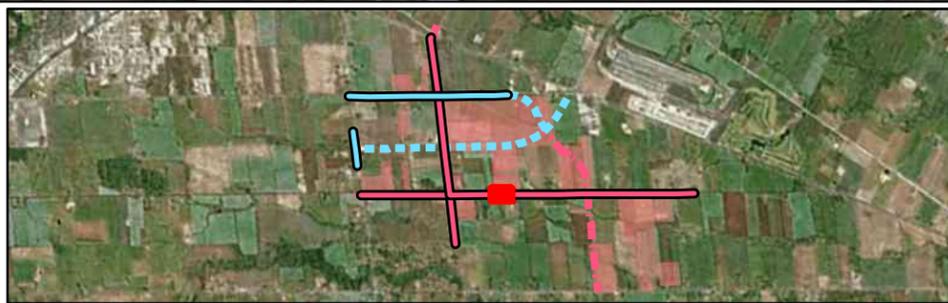


604600 4852400



**LEGEND**

<b>Tree Inventory</b>	 <b>Tree Protection Zone</b>
 <b>Injure</b>	 <b>Road Footprint</b>
 <b>Retain</b>	 <b>PTE Area</b>
 <b>Remove</b>	



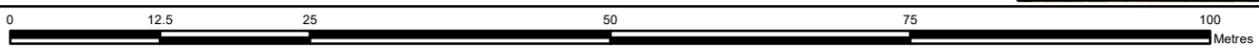
**NOTES:**  
 - Basedata from MNR LIO, 2019  
 - ESRI Clarity Basemap - 2018  
 \* Proposed roadway widening.

Datum: NAD83  
 Projection: UTM Zone 17N

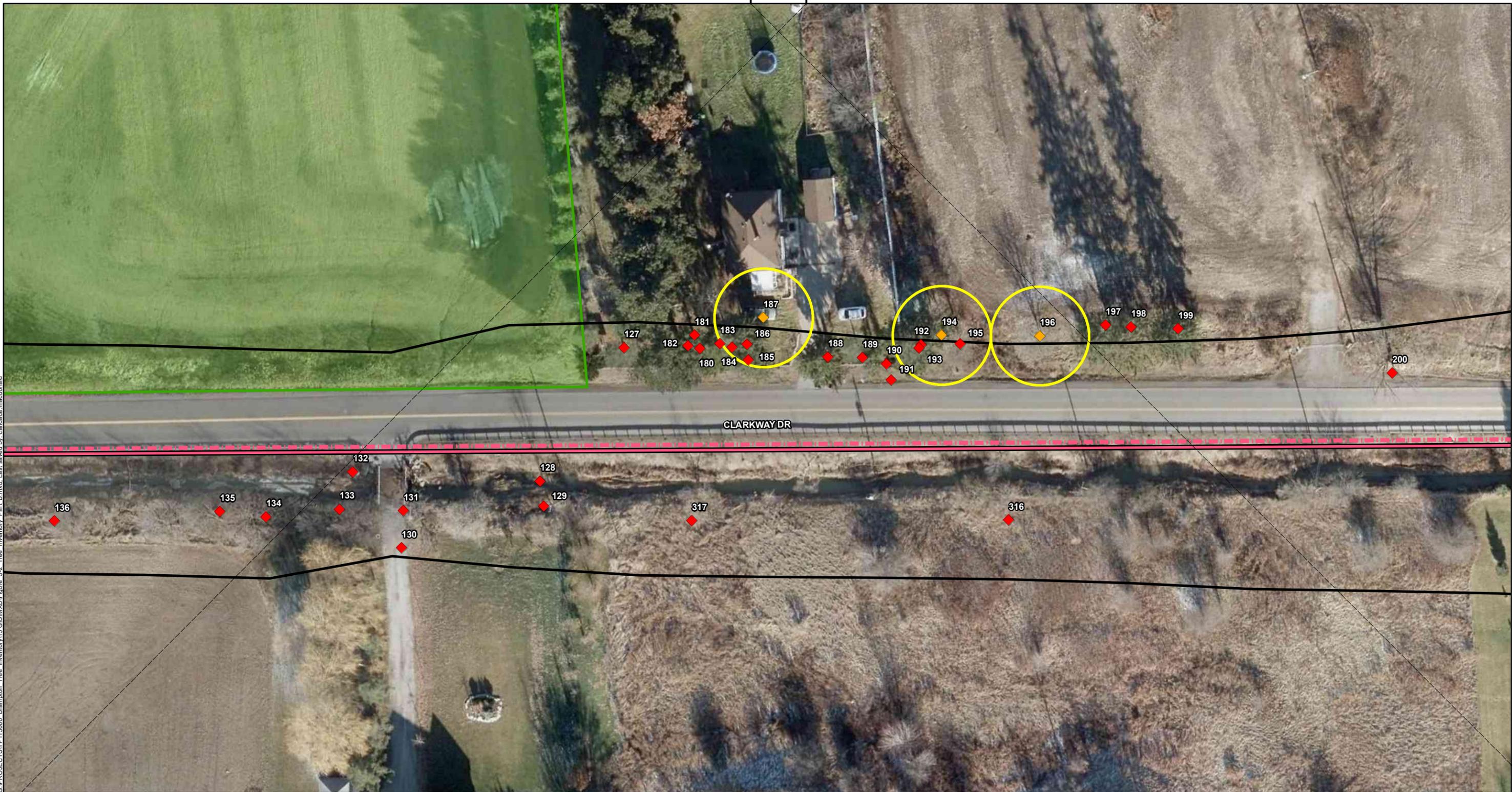


	
<b>BRAMPTON HWY 427 EA</b>	
<b>Tree Inventory PART B</b>	
PROJECT N <sup>o</sup> : TP115086	FIGURE: 5-2H
SCALE: 1:600	DATE: September 2021

G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MapXFigure 5-2 Tree Inventory Part B.mxd. Last saved by: candace.mactdonald



604800 4852200



G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MapXFigure 5-2 Tree Inventory Part B.mxd. Last saved by: candace.mactdonald

604800

**LEGEND**

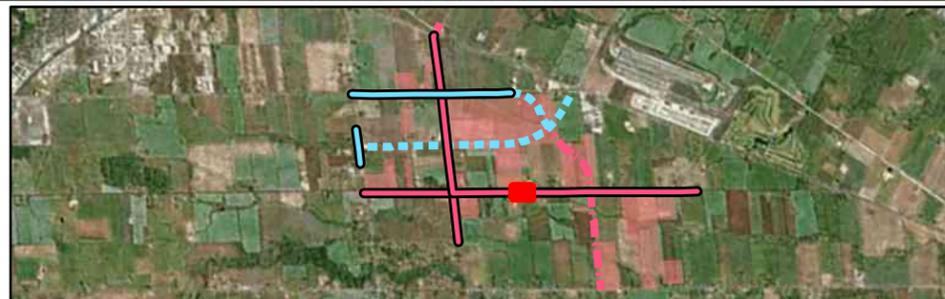
**Tree Inventory**

- Injure
- Retain
- Remove

Tree Protection Zone

Road Footprint

PTE Area



NOTES:  
 - Basedata from MNR/LIO, 2019  
 - ESRI Clarity Basemap - 2018  
 \* Proposed roadway widening.



**BRAMPTON HWY 427 EA**

**Tree Inventory  
PART B**

Datum: NAD83  
Projection: UTM Zone 17N

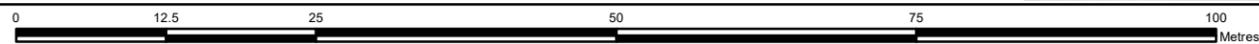


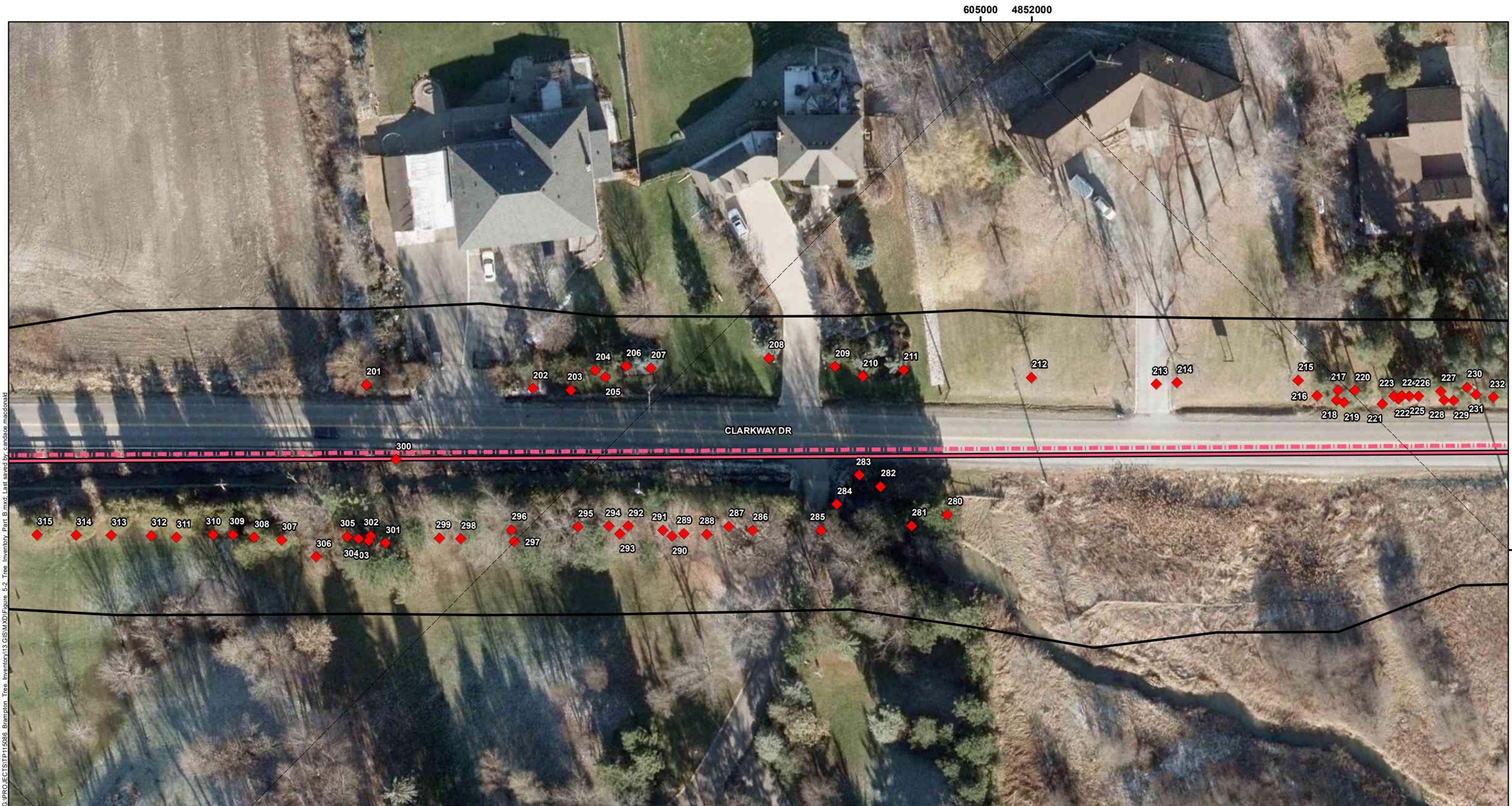
PROJECT N<sup>o</sup>: TP115086

FIGURE: 5-2I

SCALE: 1:600

DATE: September 2021

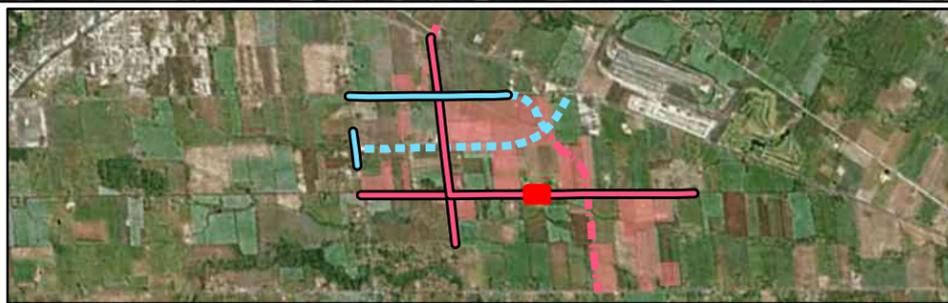




G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MapXFigure 5-2 Tree Inventory Part B.mxd. Last saved by: candace.mactdonald

**LEGEND**

<b>Tree Inventory</b>	 <b>Tree Protection Zone</b>
 <b>Injure</b>	 <b>Road Footprint</b>
 <b>Retain</b>	 <b>PTE Area</b>
 <b>Remove</b>	

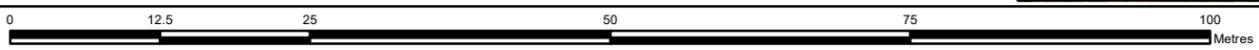


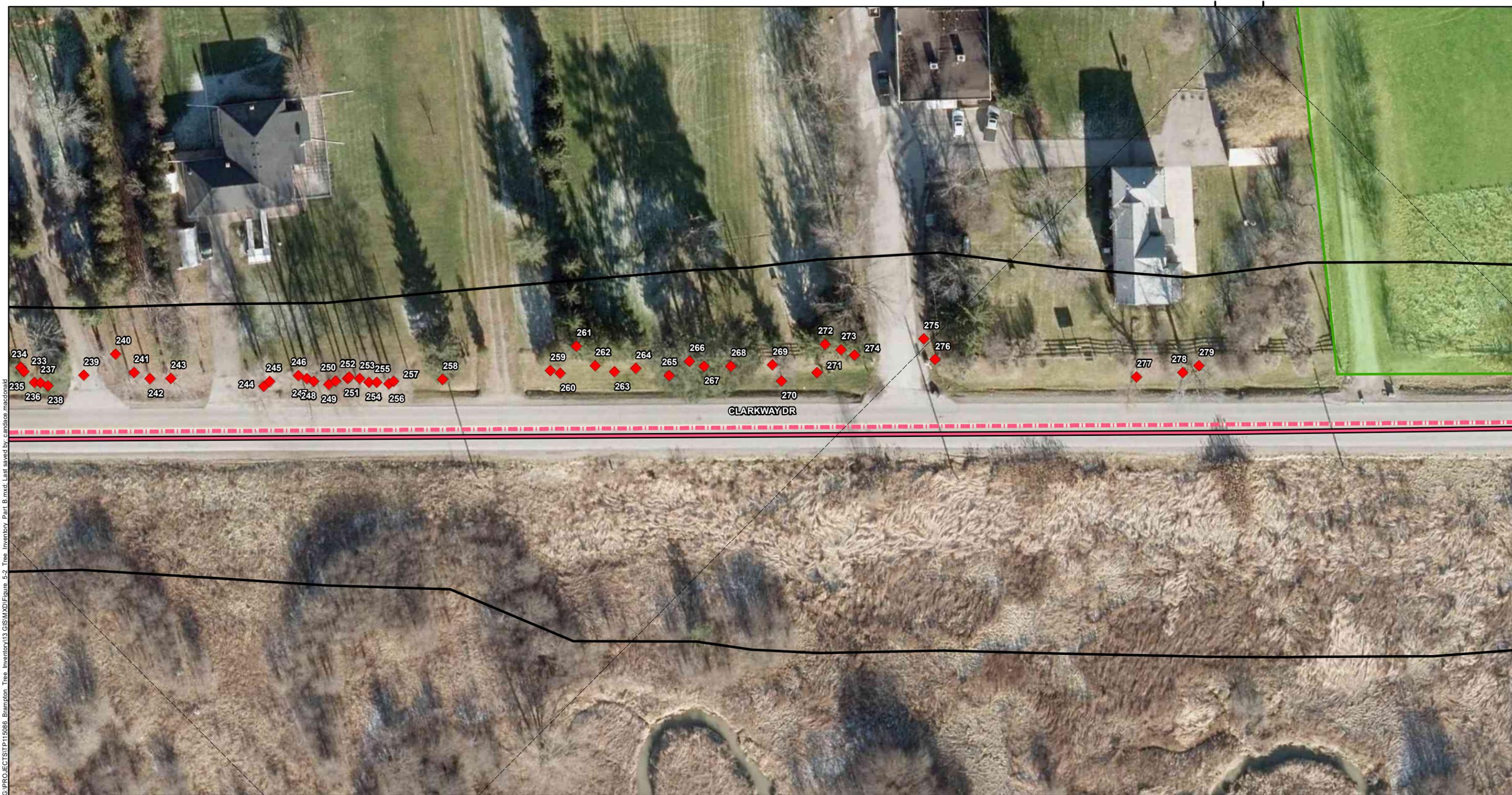
**NOTES:**  
 - Basedata from MNR LIO, 2019  
 - ESRI Clarity Basemap - 2018  
 \* Proposed roadway widening.

Datum: NAD83  
 Projection: UTM Zone 17N



	
<b>BRAMPTON HWY 427 EA</b>	
<b>Tree Inventory PART B</b>	
PROJECT N <sup>o</sup> : TP115086	FIGURE: 5-2J
SCALE: 1:600	DATE: September 2021



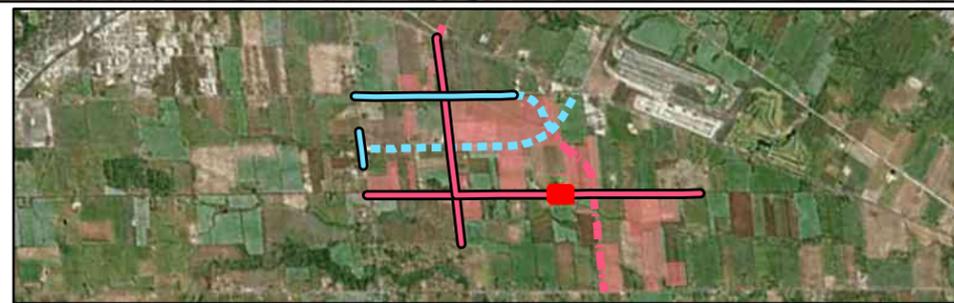


G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MapXFigure 5-2 Tree Inventory Part B.mxd. Last saved by: candace.mackdonald

605200

**LEGEND**

<b>Tree Inventory</b>	 Tree Protection Zone
 Injure	 Road Footprint
 Retain	 PTE Area
 Remove	



NOTES:  
 - Basedata from MNRF LIO, 2019  
 - ESRI Clarity Basemap - 2018  
 \* Proposed roadway widening.

Datum: NAD83  
 Projection: UTM Zone 17N

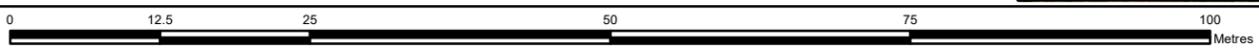


**wood.**

**BRAMPTON HWY 427 EA**

**Tree Inventory PART B**

PROJECT N <sup>o</sup> : TP115086	FIGURE: 5-2K
SCALE: 1:600	DATE: September 2021

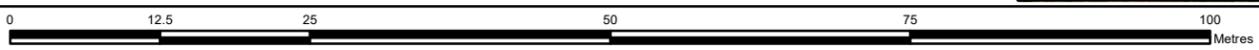
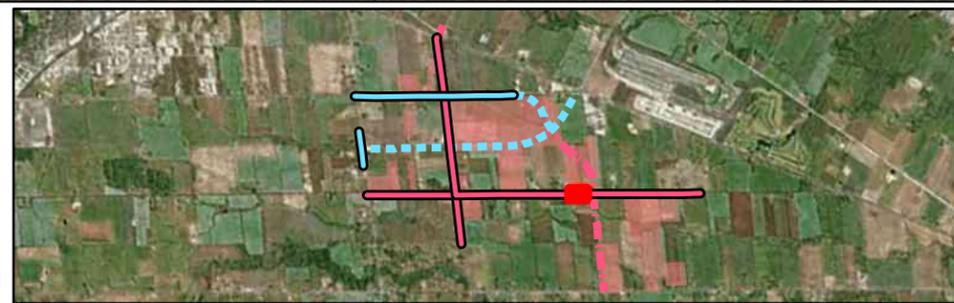




G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MXD\Figure 5-2 Tree Inventory Part B.mxd. Last saved by: candace.mactdonald

**LEGEND**

<b>Tree Inventory</b>	 Tree Protection Zone
 Injure	 Road Footprint
 Retain	 PTE Area
 Remove	



**NOTES:**  
 - Basedata from MNR/LIO, 2019  
 - ESRI Clarity Basemap - 2018  
 \* Proposed roadway widening.

Datum: NAD83  
 Projection: UTM Zone 17N



	
<b>BRAMPTON HWY 427 EA</b>	
<b>Tree Inventory PART B</b>	
PROJECT N <sup>o</sup> : TP115086	FIGURE: 5-2L
SCALE: 1:600	DATE: September 2021

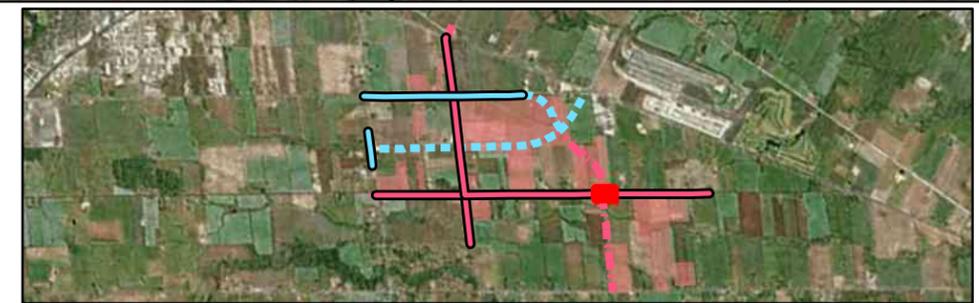
G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MXD\Figure 5-2 Tree Inventory Part B.mxd. Last saved by: candace.mactdonald

4851400



**LEGEND**

- Tree Inventory**
- Injure
- Retain
- Remove
- Tree Protection Zone
- Road Footprint
- PTE Area



NOTES:  
 - Basedata from MNRF LIO, 2019  
 - ESRI Clarity Basemap - 2018  
 \* Proposed roadway widening.



**BRAMPTON HWY 427 EA**

**Tree Inventory  
PART B**

Datum: NAD83  
Projection: UTM Zone 17N

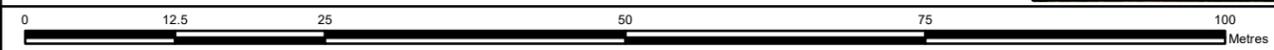


PROJECT N<sup>o</sup>: TP115086

FIGURE: 5-2M

SCALE: 1:600

DATE: September 2021





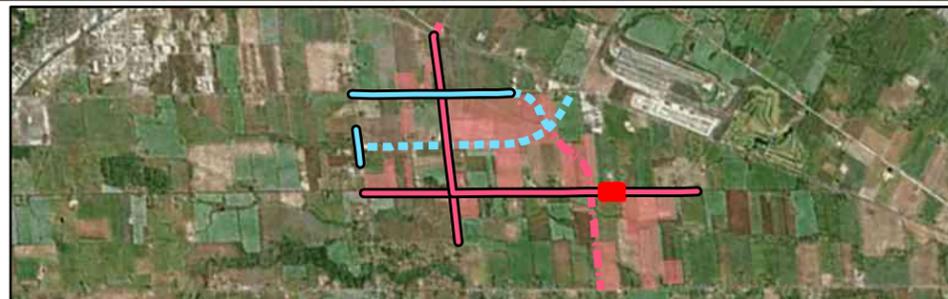
G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MapXFigure 5-2 Tree Inventory Part B.mxd. Last saved by: candace.mactdonald

**LEGEND**

**Tree Inventory**

- Injure
- Retain
- Remove

- Tree Protection Zone
- Road Footprint
- PTE Area



NOTES:  
 - Basedata from MNR LIO, 2019  
 - ESRI Clarity Basemap - 2018  
 \* Proposed roadway widening.

Datum: NAD83  
 Projection: UTM Zone 17N



**BRAMPTON HWY 427 EA**

**Tree Inventory  
PART B**

PROJECT N<sup>o</sup>: TP115086

FIGURE: 5-2N

SCALE: 1:600

DATE: September 2021

605800 4851200

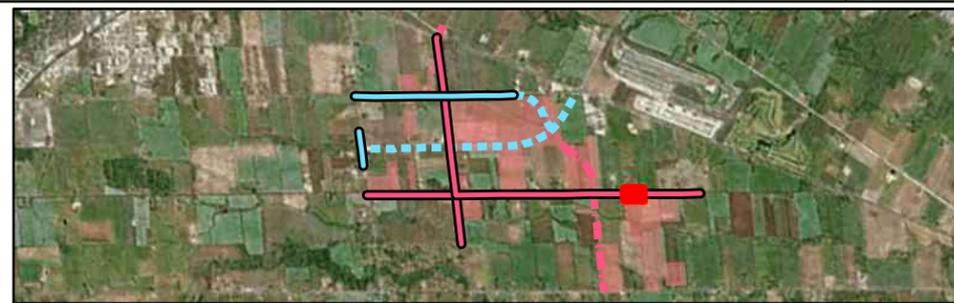


G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MapXFigure 5-2 Tree Inventory Part B.mxd: Last saved by: candace.mactdonald

4851000

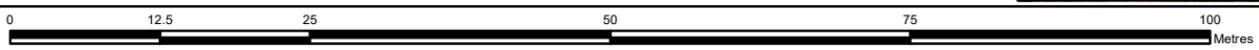
**LEGEND**

<b>Tree Inventory</b>	 Tree Protection Zone
 Injure	 Road Footprint
 Retain	 PTE Area
 Remove	



**NOTES:**  
 - Basedata from MNR LIO, 2019  
 - ESRI Clarity Basemap - 2018  
 \* Proposed roadway widening.

Datum: NAD83  
 Projection: UTM Zone 17N



	
<b>BRAMPTON HWY 427 EA</b>	
<b>Tree Inventory PART B</b>	
PROJECT N <sup>o</sup> : TP115086	FIGURE: 5-20
SCALE: 1:600	DATE: September 2021

606000 4851000



G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MapXFigure 5-2 Tree Inventory Part B.mxd: Last saved by: candace.mackdonald

4850800

**LEGEND**

**Tree Inventory**

- Injure
- Retain
- Remove



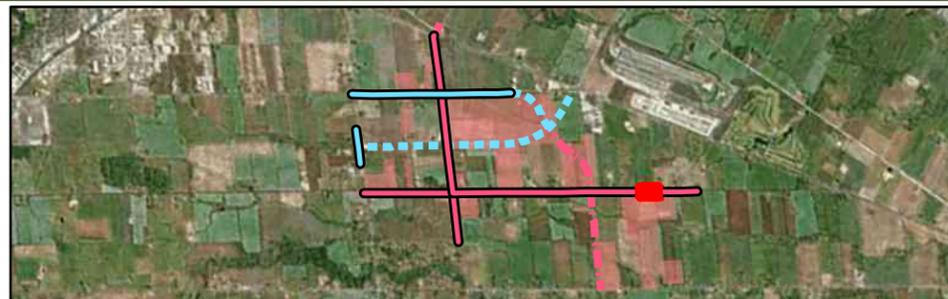
Tree Protection Zone



Road Footprint



PTE Area



NOTES:  
 - Basedata from MNR LIO, 2019  
 - ESRI Clarity Basemap - 2018  
 \* Proposed roadway widening.



**BRAMPTON HWY 427 EA**

**Tree Inventory  
PART B**

Datum: NAD83  
Projection: UTM Zone 17N

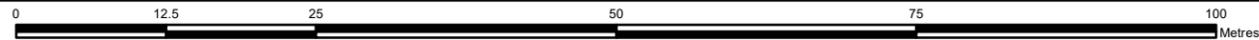


PROJECT N<sup>o</sup>: TP115086

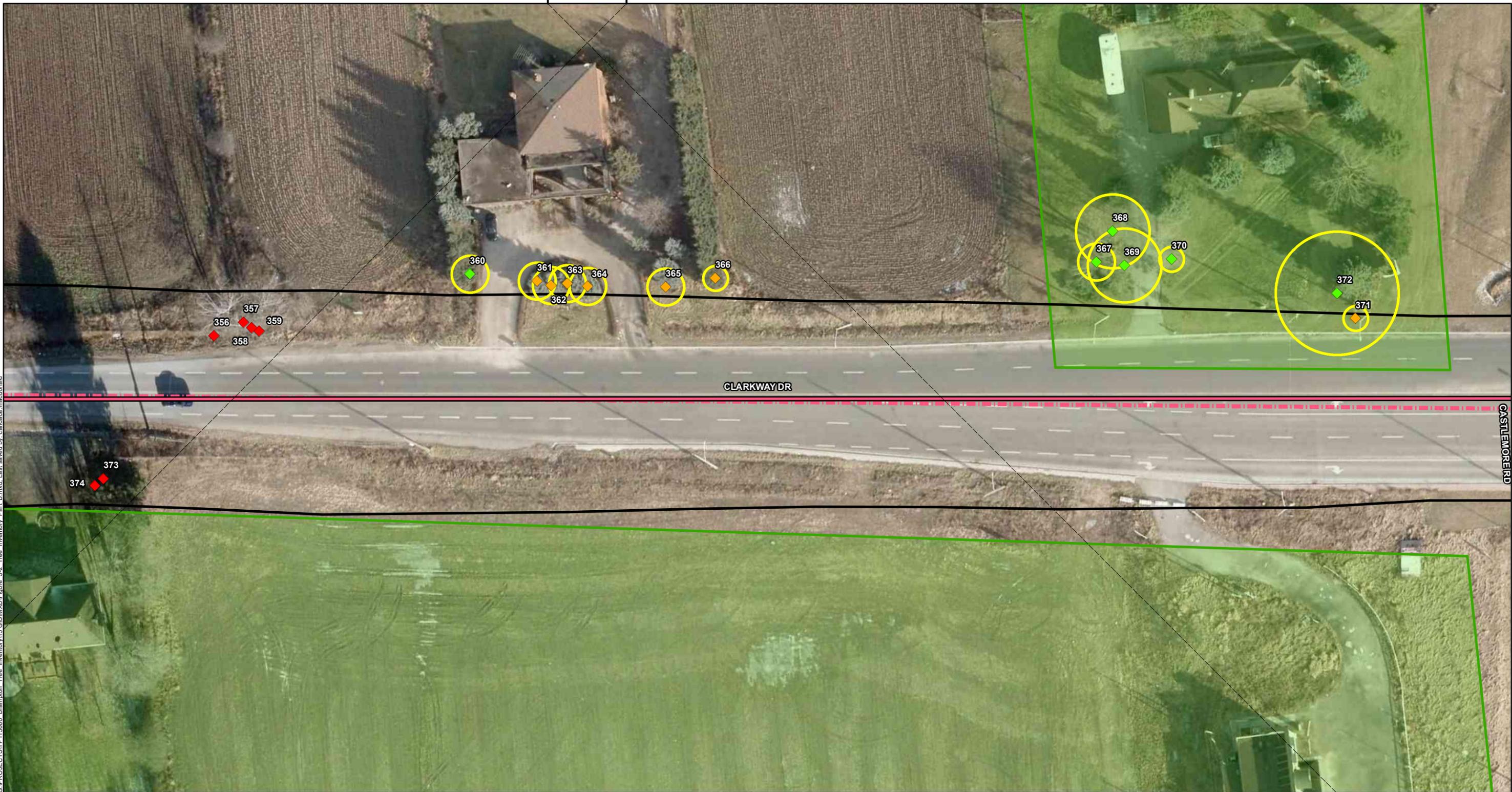
FIGURE: 5-2P

SCALE: 1:600

DATE: September 2021



606200 4850800



G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\Map\Figure 5-2 Tree Inventory Part B.mxd. Last saved by: candace.macedonald

CASTLEMORE RD

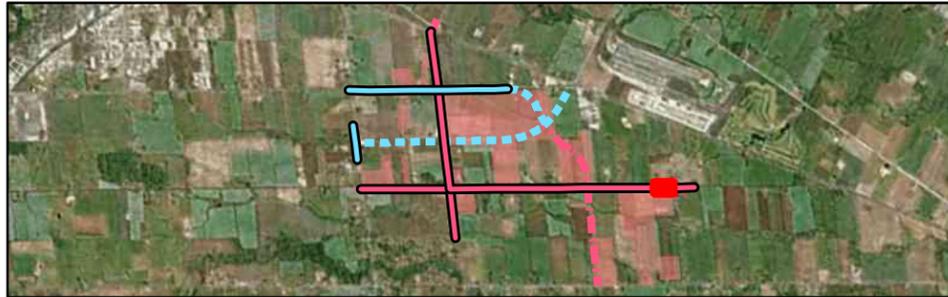
CLARKWAY DR

**LEGEND**

**Tree Inventory**

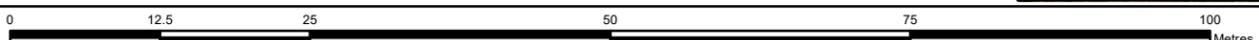
- ◆ Injure
- ◆ Retain
- ◆ Remove

- Tree Protection Zone
- Road Footprint
- PTE Area



NOTES:  
 - Basedata from MNR/LIO, 2019  
 - ESRI Clarity Basemap - 2018  
 \* Proposed roadway widening.

Datum: NAD83  
 Projection: UTM Zone 17N



**BRAMPTON HWY 427 EA**

**Tree Inventory  
PART B**

PROJECT N<sup>o</sup>: TP115086

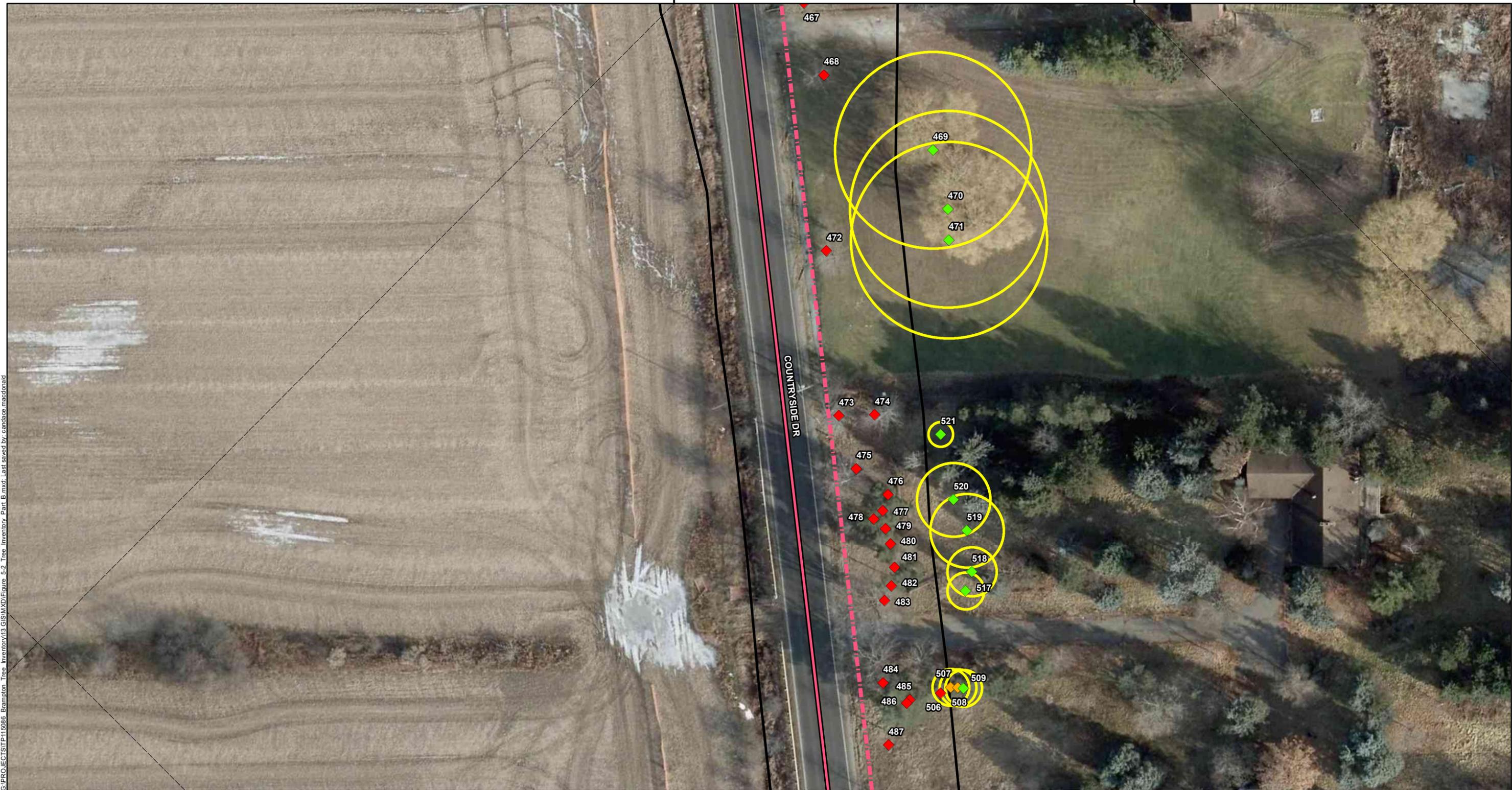
FIGURE: 5-2Q

SCALE: 1:600

DATE: September 2021

4853200

604400



G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MapXFigure 5-2 Tree Inventory Part B.mxd. Last saved by: candace.mactdonald

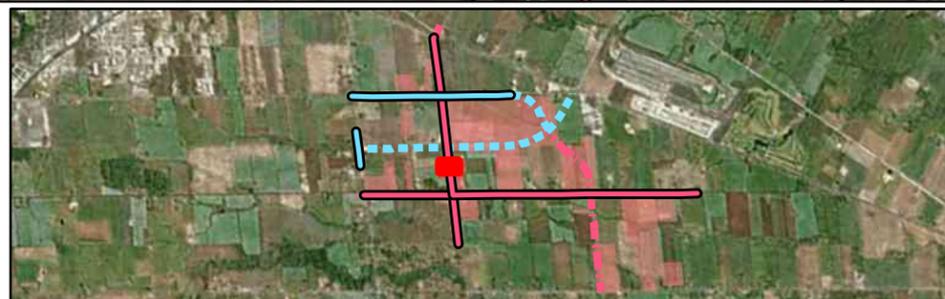
604400

**LEGEND**

**Tree Inventory**

- Injure
- Retain
- Remove

- Tree Protection Zone
- Road Footprint
- PTE Area



NOTES:  
 - Basedata from MNR LIO, 2019  
 - ESRI Clarity Basemap - 2018  
 \* Proposed roadway widening.



**BRAMPTON HWY 427 EA**

**Tree Inventory  
PART B**

Datum: NAD83  
 Projection: UTM Zone 17N

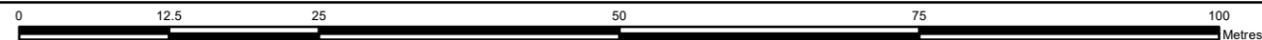


PROJECT N°: TP115086

FIGURE: 5-2R

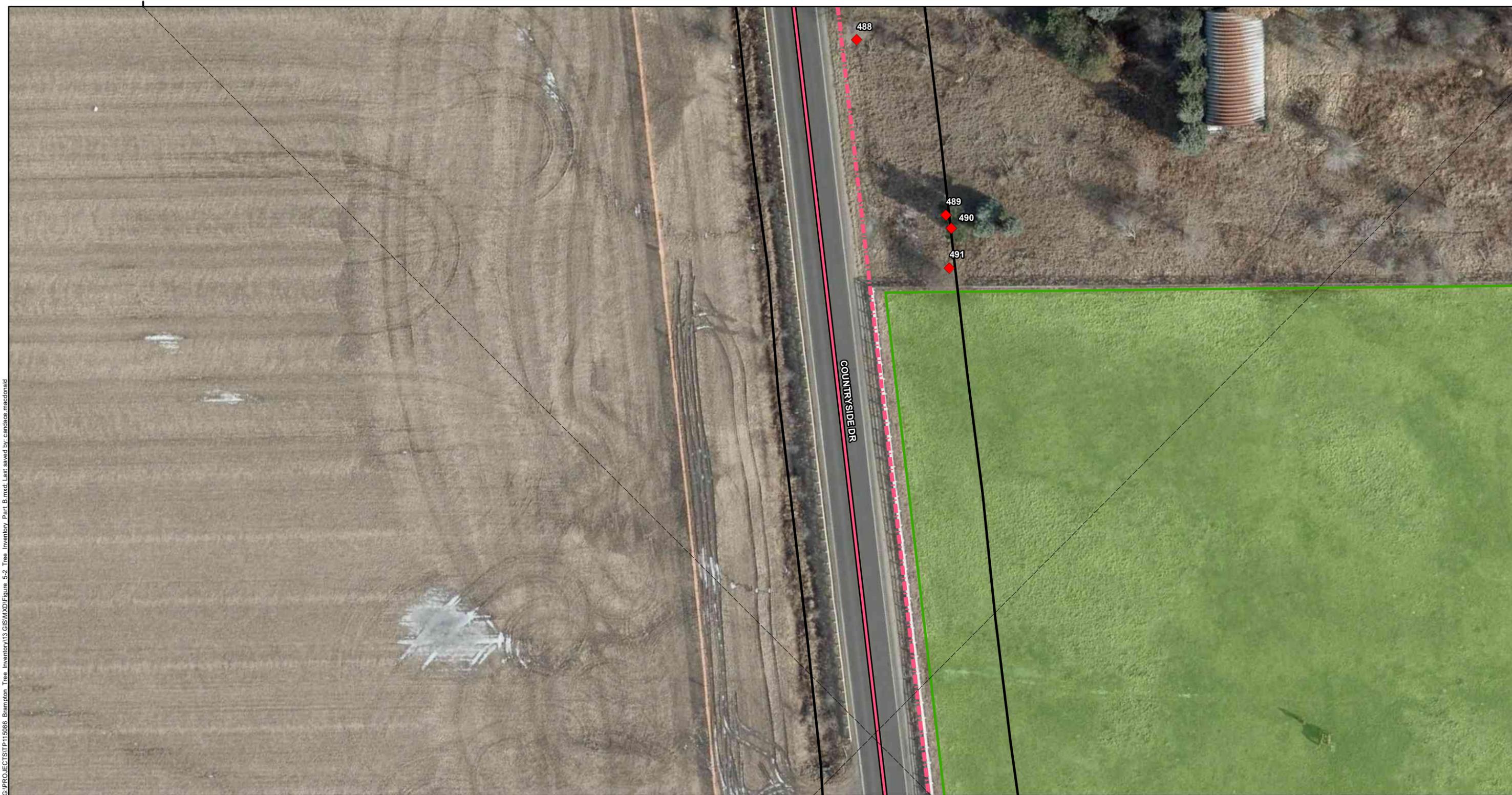
SCALE: 1:600

DATE: September 2021



604200

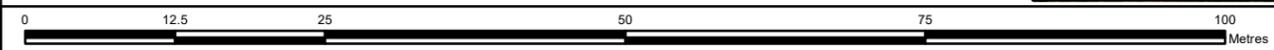
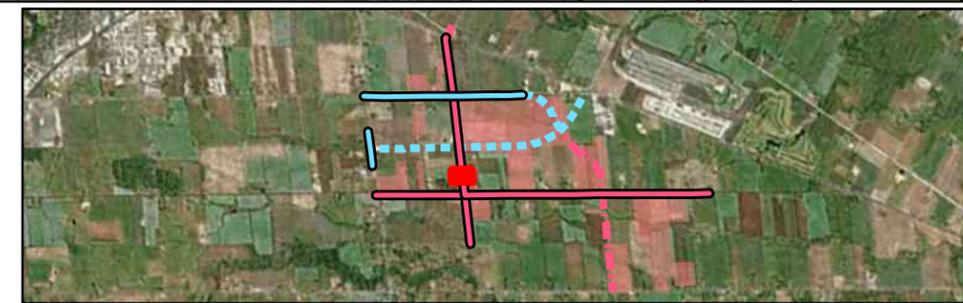
4853000



G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MapXFigure 5-2 Tree Inventory Part B.mxd: Last saved by: candace.mactdonald

**LEGEND**

- |   |   |
|---|---|
| <b>Tree Inventory</b>   |  <b>Tree Protection Zone</b> |
|  <b>Injure</b> |  <b>Road Footprint</b>       |
|  <b>Retain</b> |  <b>PTE Area</b>             |
|  <b>Remove</b> |   |



NOTES:  
 - Basedata from MNR LIO, 2019  
 - ESRI Clarity Basemap - 2018  
 \* Proposed roadway widening.

Datum: NAD83  
 Projection: UTM Zone 17N



	
<b>BRAMPTON HWY 427 EA</b>	
<b>Tree Inventory PART B</b>	
PROJECT N <sup>o</sup> : TP115086	FIGURE: 5-2S
SCALE: 1:600	DATE: September 2021

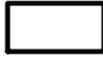
4853000 604200

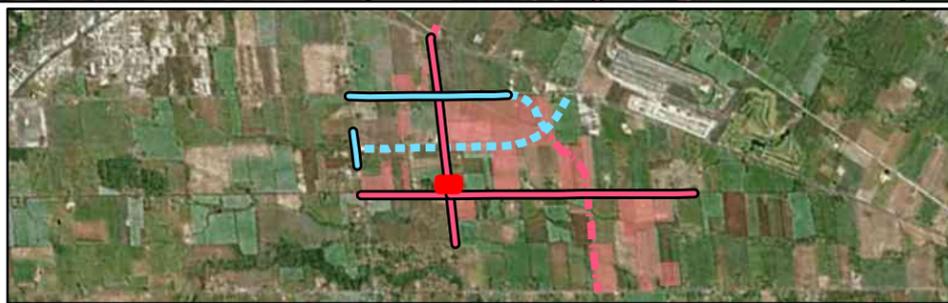


G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MapXFigure 5-2 Tree Inventory Part B.mxd. Last saved by: candace.mactdonald

604200

**LEGEND**

- |   |   |
|---|---|
| <b>Tree Inventory</b>   |  <b>Tree Protection Zone</b> |
|  <b>Injure</b> |  <b>Road Footprint</b>       |
|  <b>Retain</b> |  <b>PTE Area</b>             |
|  <b>Remove</b> |   |



NOTES:  
 - Basedata from MNRF LIO, 2019  
 - ESRI Clarity Basemap - 2018  
 \* Proposed roadway widening.



**BRAMPTON HWY 427 EA**

**Tree Inventory  
PART B**

Datum: NAD83  
Projection: UTM Zone 17N

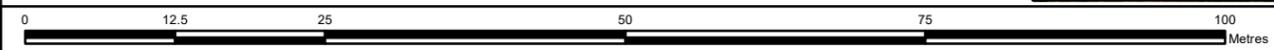


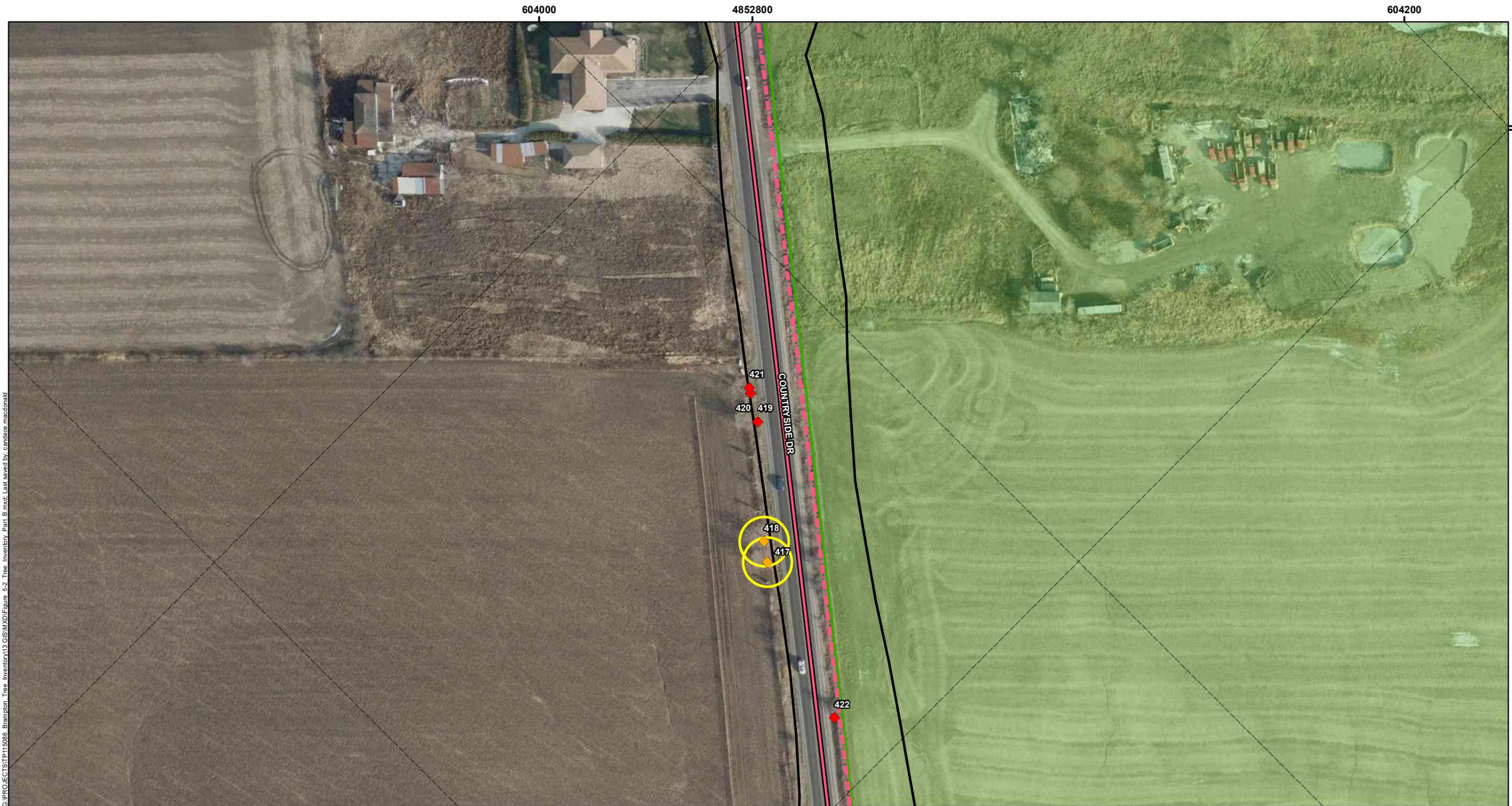
PROJECT N<sup>o</sup>: TP115086

FIGURE: 5-2T

SCALE: 1:600

DATE: September 2021

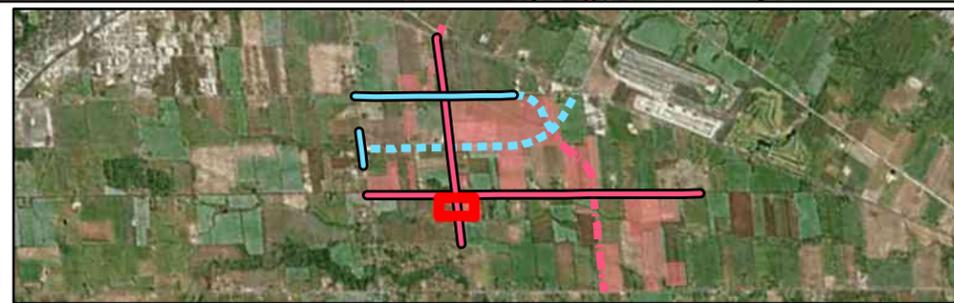




G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MXD\Figure 5-2 Tree Inventory Part B.mxd. Last saved by: candace.mactdonald

**LEGEND**

<b>Tree Inventory</b>	 <b>Tree Protection Zone</b>
 <b>Injure</b>	 <b>Road Footprint</b>
 <b>Retain</b>	 <b>PTE Area</b>
 <b>Remove</b>	



**NOTES:**  
 - Basedata from MNR LIO, 2019  
 - ESRI Clarity Basemap - 2018  
 \* Proposed roadway widening.

Datum: NAD83  
 Projection: UTM Zone 17N



	
<b>BRAMPTON HWY 427 EA</b>	
<b>Tree Inventory PART B</b>	
PROJECT N <sup>o</sup> : TP115086	FIGURE: 5-2U
SCALE: 1:1,200	DATE: September 2021



603800

4852600

604000

4852400

604000

G:\PROJECTS\TP115086 Brampton Tree Inventory\GIS\MapXFigure 5.2 Tree Inventory Part B.mxd: Last saved by: candace.mactdonald



**LEGEND**

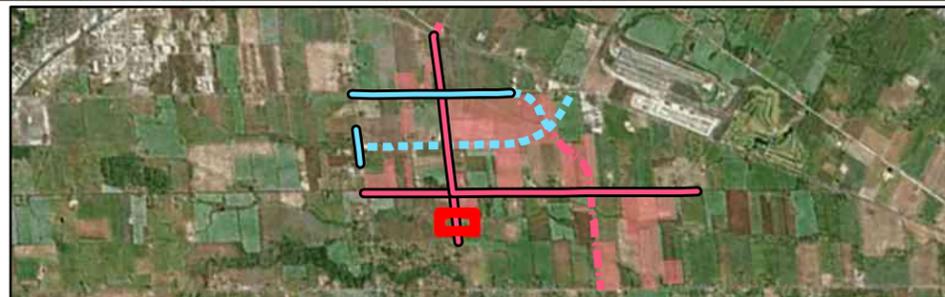
**Tree Inventory**

- Injure
- Retain
- Remove

Tree Protection Zone

Road Footprint

PTE Area



NOTES:  
 - Basedata from MNR LIO, 2019  
 - ESRI Clarity Basemap - 2018  
 \* Proposed roadway widening.



**BRAMPTON HWY 427 EA**

**Tree Inventory  
PART B**

Datum: NAD83  
Projection: UTM Zone 17N



PROJECT N<sup>o</sup>: TP115086

FIGURE: 5-2V

SCALE: 1:1,200

DATE: September 2021

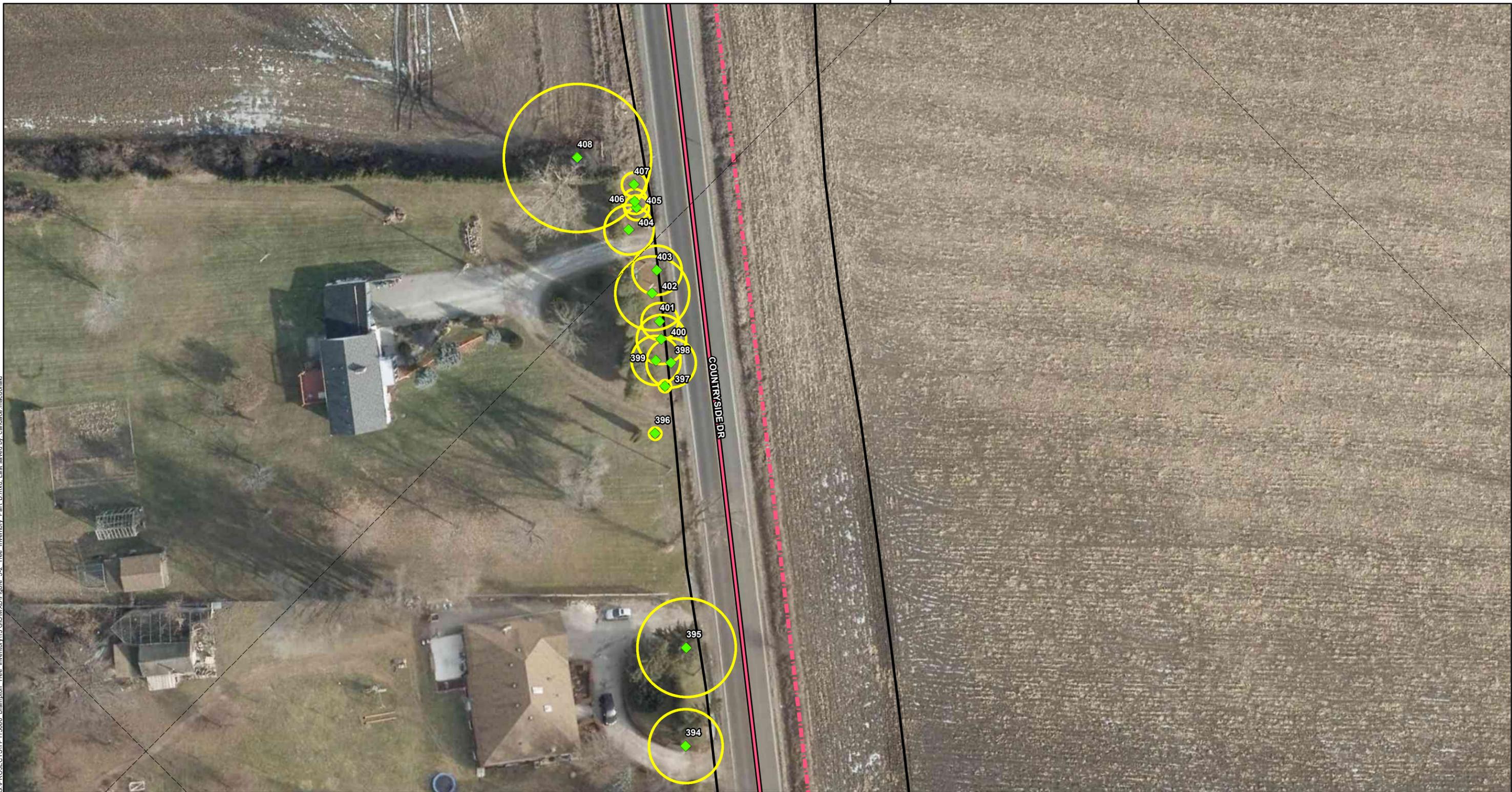


4852400

603800

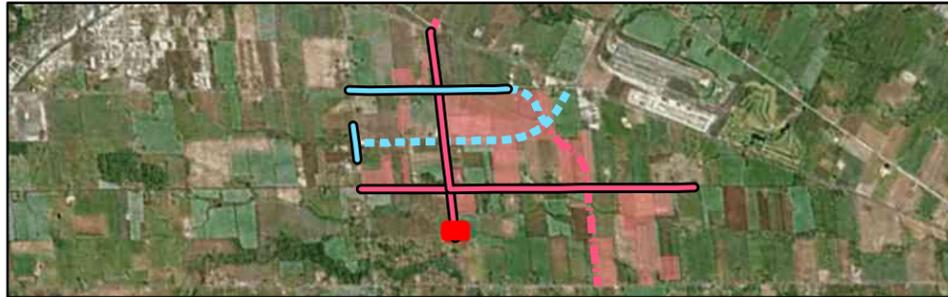
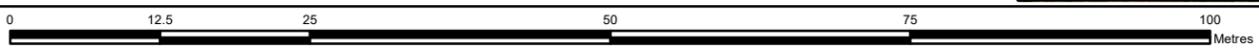
603800

G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MXD\Figure 5-2 Tree Inventory Part B.mxd. Last saved by: candace.macdonald



**LEGEND**

- Tree Inventory**
- Injure
- Retain
- Remove
- Tree Protection Zone
- Road Footprint
- PTE Area



NOTES:  
 - Basedata from MNRF LIO, 2019  
 - ESRI Clarity Basemap - 2018  
 \* Proposed roadway widening.

Datum: NAD83  
 Projection: UTM Zone 17N



**BRAMPTON HWY 427 EA**

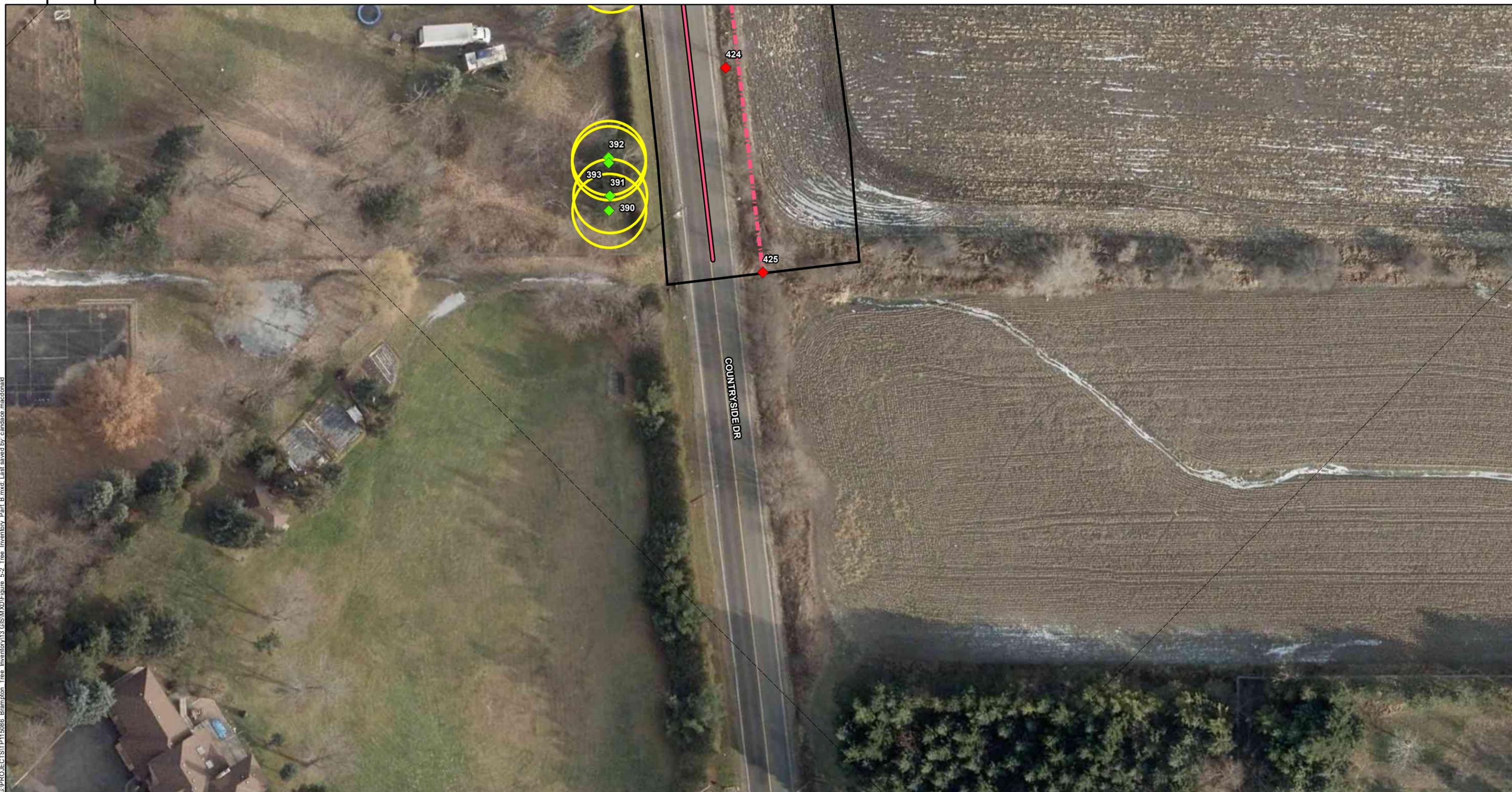
**Tree Inventory  
PART B**

PROJECT N<sup>o</sup>: TP115086

FIGURE: 5-2W

SCALE: 1:600

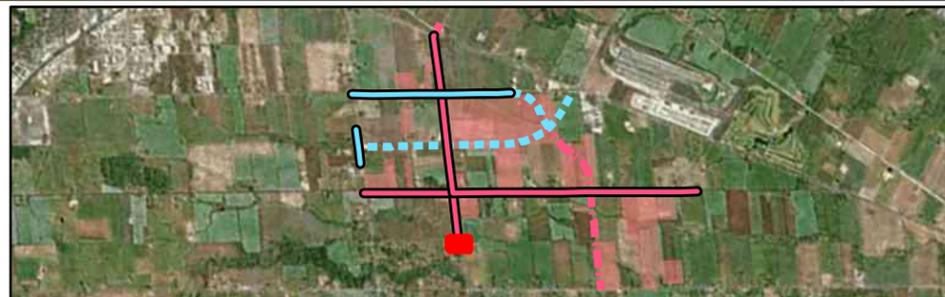
DATE: September 2021



G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MapXFigure 5-2 Tree Inventory Part B.mxd: Last saved by: candace.mactdonald

**LEGEND**

- |  |   |                             |
|--|---|-----------------------------|
| <b>Tree Inventory</b>  |  | <b>Tree Protection Zone</b> |
|  Injure |  | <b>Road Footprint</b>       |
|  Retain |  | <b>PTE Area</b>             |
|  Remove |   |                             |



NOTES:  
 - Basedata from MNR LIO, 2019  
 - ESRI Clarity Basemap - 2018  
 \* Proposed roadway widening.



**BRAMPTON HWY 427 EA**

**Tree Inventory  
PART B**

Datum: NAD83  
 Projection: UTM Zone 17N

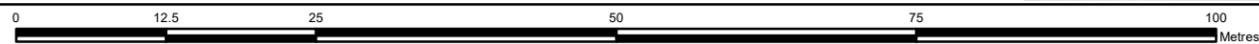


PROJECT N<sup>o</sup>: TP115086

FIGURE: 5-2X

SCALE: 1:600

DATE: September 2021

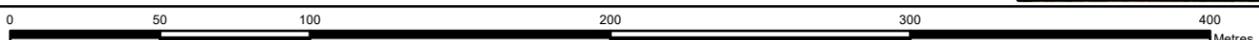
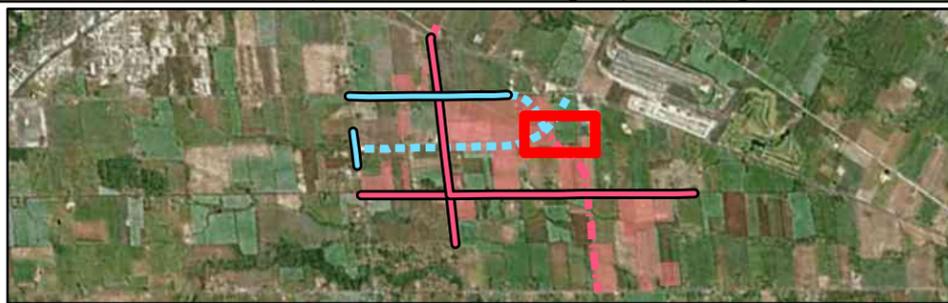




G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MapXFigure 5-2 Tree Inventory Part B.mxd. Last saved by: candace.mactdonald

**LEGEND**

<b>Tree Inventory</b>	 <b>Tree Protection Zone</b>
 <b>Injure</b>	 <b>Road Footprint</b>
 <b>Retain</b>	 <b>PTE Area</b>
 <b>Remove</b>	

**NOTES:**  
 - Basedata from MNR LIO, 2019  
 - ESRI Clarity Basemap - 2018  
 \* Proposed roadway widening.

Datum: NAD83  
 Projection: UTM Zone 17N



	
<b>BRAMPTON HWY 427 EA</b>	
<b>Tree Inventory PART B</b>	
PROJECT N <sup>o</sup> : TP115086	FIGURE: 5-2Y
SCALE: 1:2,400	DATE: September 2021

4852200

605600

4852000

605800

4851800

606000

4851600



G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MapXFigure 5-2 Tree Inventory Part B.mxd. Last saved by: candace.mactdonald

606000

605800

**LEGEND**

**Tree Inventory**

- Injure
- Retain
- Remove



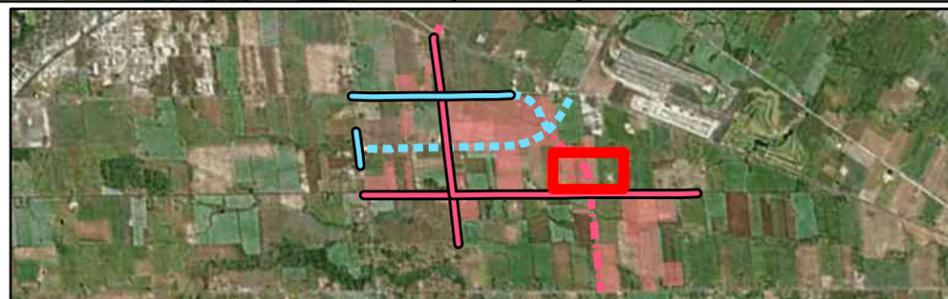
Tree Protection Zone



Road Footprint



PTE Area



NOTES:  
 - Basedata from MNR LIO, 2019  
 - ESRI Clarity Basemap - 2018  
 \* Proposed roadway widening.



**BRAMPTON HWY 427 EA**

**Tree Inventory  
PART B**

Datum: NAD83  
Projection: UTM Zone 17N



PROJECT N<sup>o</sup>: TP115086

FIGURE: 5-2Z

SCALE: 1:2,400

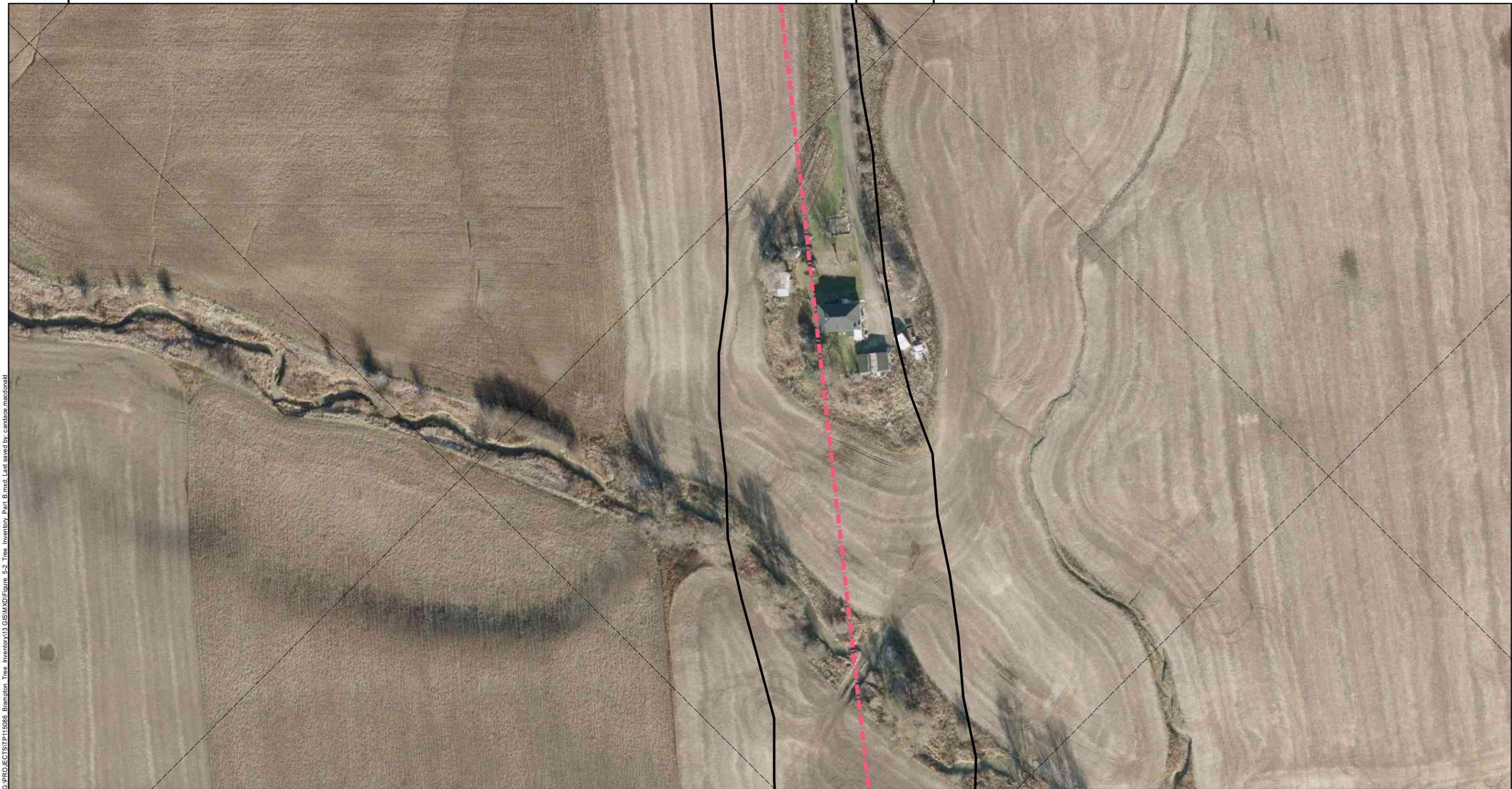
DATE: September 2021



4851600

605400

4851400



4851200

605400

G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MapXFigure 5.2 Tree Inventory Part B.mxd. Last saved by: candace.mactdonald

**LEGEND**

**Tree Inventory**

- Injure
- Retain
- Remove



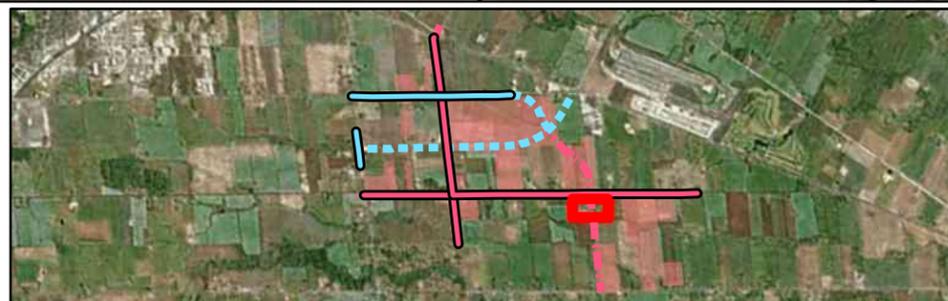
Tree Protection Zone



Road Footprint



PTE Area



NOTES:  
 - Basedata from MNR LIO, 2019  
 - ESRI Clarity Basemap - 2018  
 \* Proposed roadway widening.



**BRAMPTON HWY 427 EA**

**Tree Inventory  
PART B**

Datum: NAD83  
 Projection: UTM Zone 17N



PROJECT N<sup>o</sup>: TP115086

FIGURE: 5-2ZA

SCALE: 1:1,200

DATE: September 2021



605000

4851400

605200

4851200

605400

4851000



4850800

605400

4850600

G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MXD\Figure 5-2 Tree Inventory Part B.mxd. Last saved by: candace.mactdonald

**LEGEND**

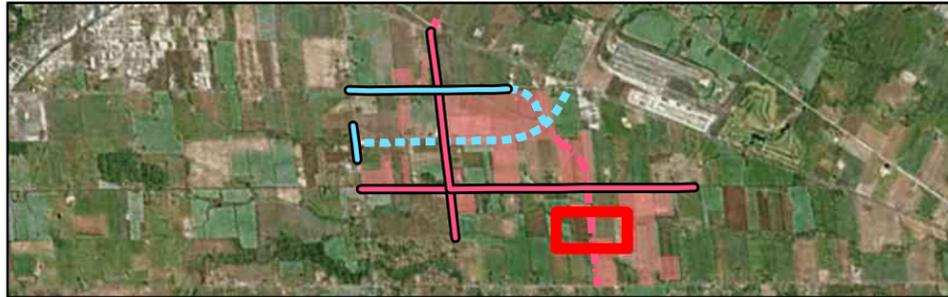
**Tree Inventory**

- Injure
- Retain
- Remove

Tree Protection Zone

Road Footprint

PTE Area



**NOTES:**  
 - Basedata from MNR LIO, 2019  
 - ESRI Clarity Basemap - 2018  
 \* Proposed roadway widening.



**BRAMPTON HWY 427 EA**

**Tree Inventory  
PART B**

Datum: NAD83  
Projection: UTM Zone 17N



PROJECT N<sup>o</sup>: TP115086

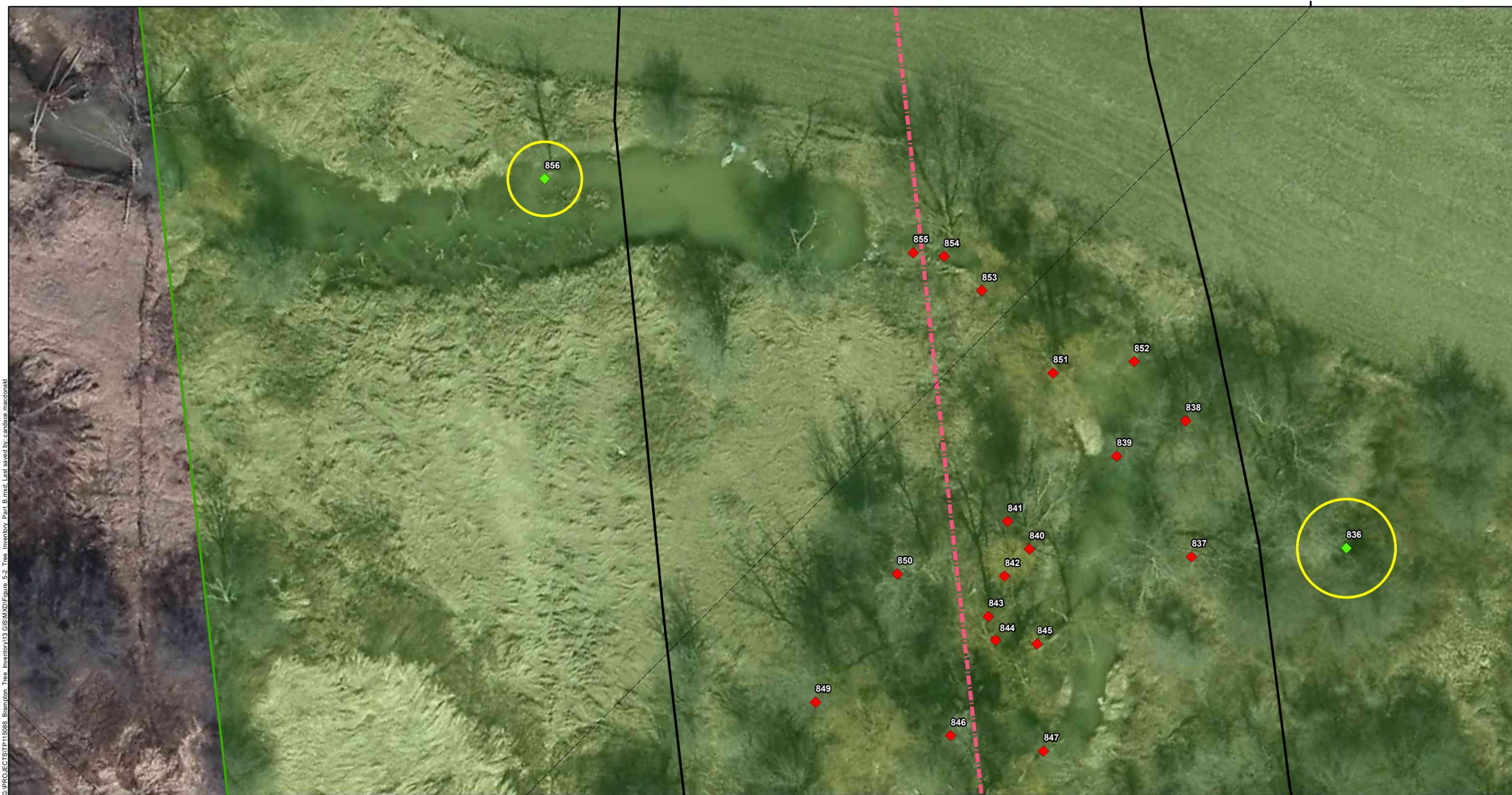
FIGURE: 5-2ZB

SCALE: 1:2,400

DATE: September 2021

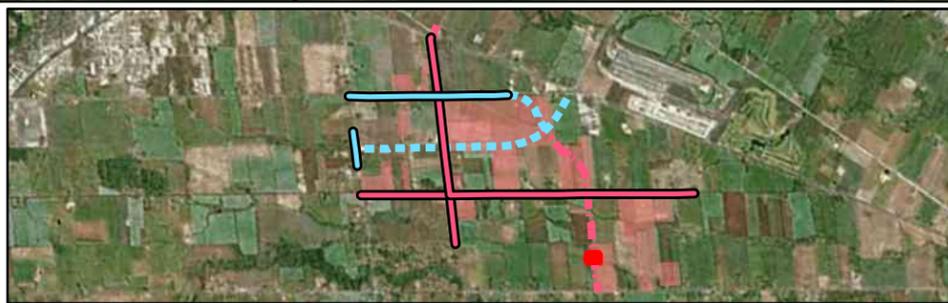


G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MapXFigure 5-2 Tree Inventory Part B.mxd; Last saved by: candace.mactdonald



**LEGEND**

Tree Inventory	Tree Protection Zone
Injure	Road Footprint
Retain	PTE Area
Remove	



NOTES:  
 - Basedata from MNR LIO, 2019  
 - ESRI Clarity Basemap - 2018  
 \* Proposed roadway widening.

Datum: NAD83  
 Projection: UTM Zone 17N



**wood.**

**BRAMPTON HWY 427 EA**

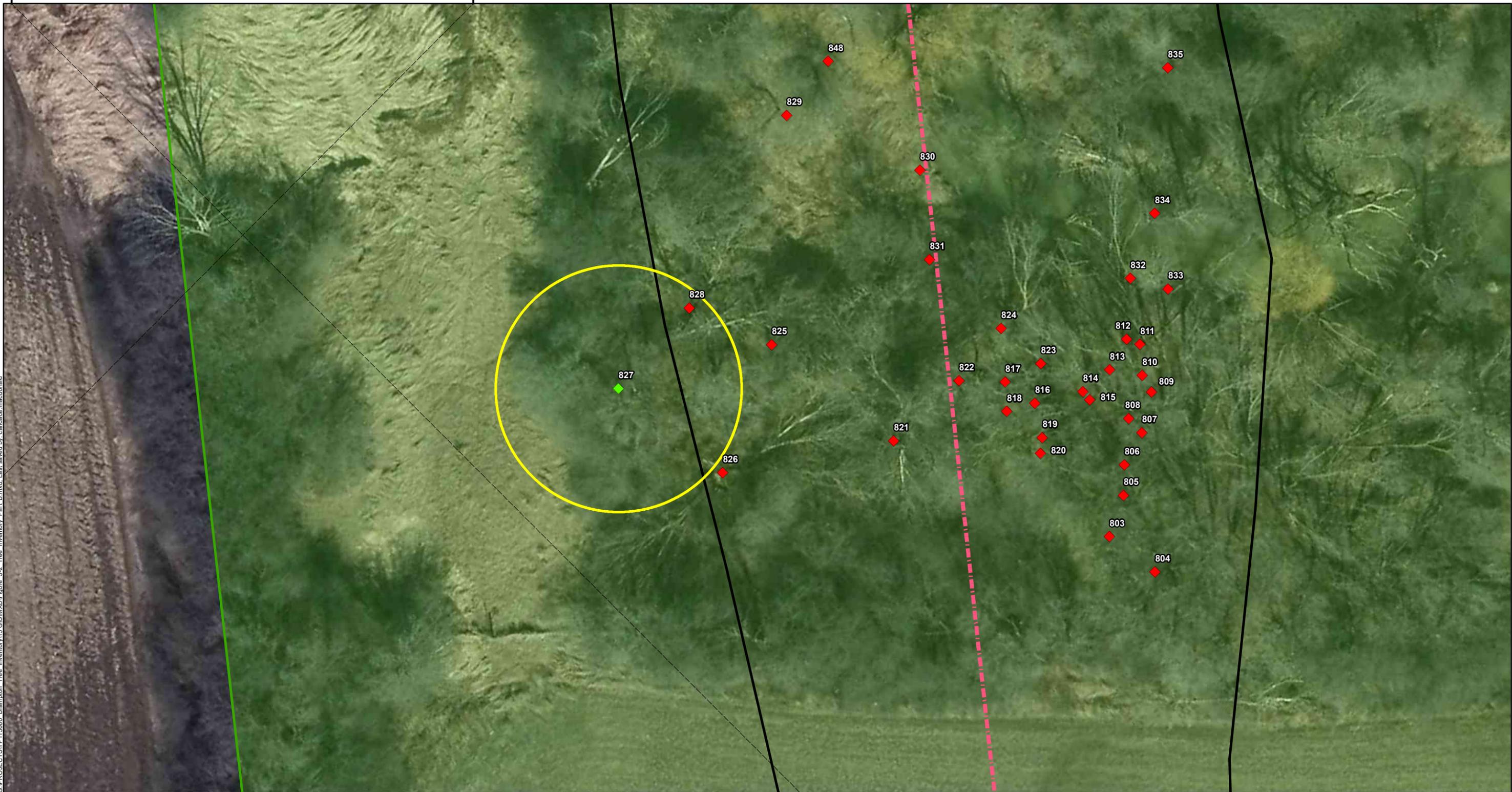
**Tree Inventory PART B**

PROJECT N <sup>o</sup> : TP115086	FIGURE: 5-2ZC
SCALE: 1:300	DATE: September 2021

604800

4850800

G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MapXFigure 5.2 Tree Inventory Part B.mxd. Last saved by: candace.mactdonald



**LEGEND**

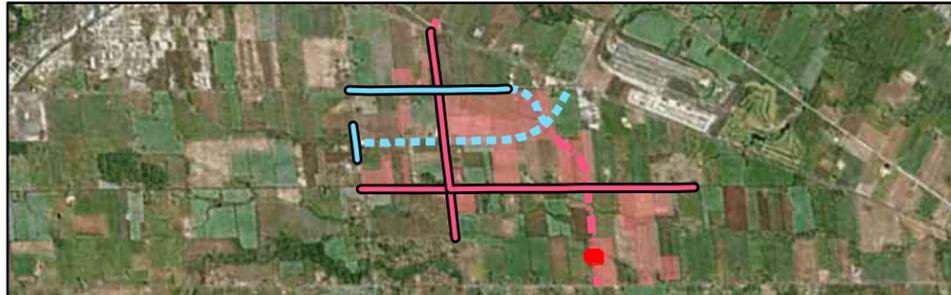
**Tree Inventory**

- Injure
- Retain
- Remove

Tree Protection Zone

Road Footprint

PTE Area



NOTES:  
 - Basedata from MNR LIO, 2019  
 - ESRI Clarity Basemap - 2018  
 \* Proposed roadway widening.



**BRAMPTON HWY 427 EA**

**Tree Inventory  
PART B**

Datum: NAD83  
Projection: UTM Zone 17N

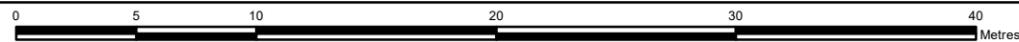


PROJECT N<sup>o</sup>: TP115086

FIGURE: 5-2ZD

SCALE: 1:300

DATE: September 2021



4851000

604600

4850800

604800

4850600

605000

4850400



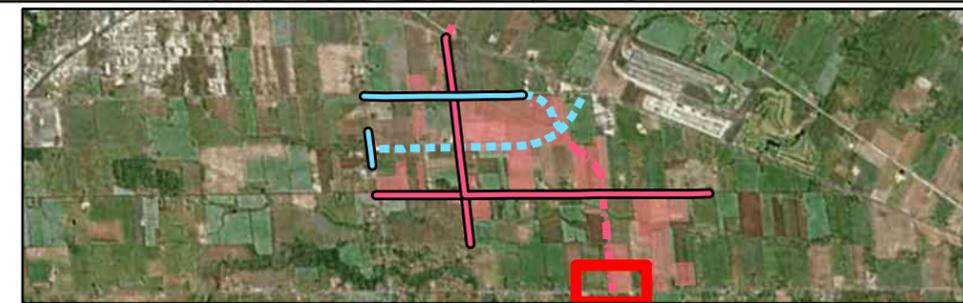
G:\PROJECTS\TP115086 Brampton Tree Inventory\13 GIS\MXD\Figure 5-2 Tree Inventory Part B.mxd. Last saved by: candace.mactdonald

EDGEFOREST/DR

605000

**LEGEND**

	Tree Protection Zone
	Road Footprint
	PTE Area
	Injure
	Remove



NOTES:  
 - Basedata from MNR LIO, 2019  
 - ESRI Clarity Basemap - 2018  
 \* Proposed roadway widening.

Datum: NAD83  
 Projection: UTM Zone 17N



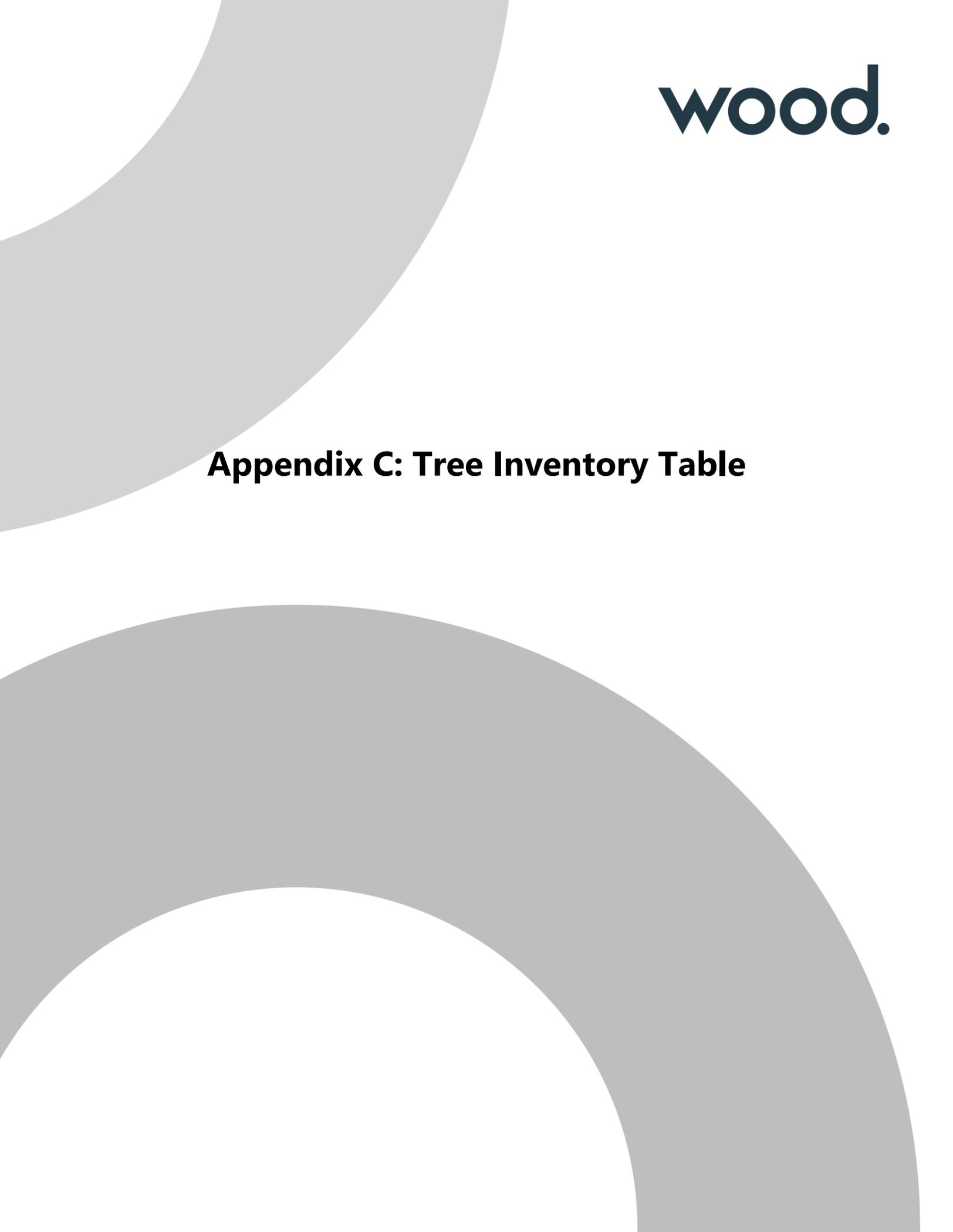
<b>BRAMPTON HWY 427 EA</b>	
<b>Tree Inventory PART B</b>	
PROJECT N <sup>o</sup> : TP115086	FIGURE: 5-2ZE
SCALE: 1:2,400	DATE: September 2021





## **Appendix B: Properties with Permission to Enter Figure**





**wood.**

## **Appendix C: Tree Inventory Table**

Tree #	Scientific Name	Common Name	Assessment	Offset	DBH	DBH	DBH	Total	Approx.	TPZ	Health	Health	Comments	In TRCA	Recommend
			Approx. or No PTE	Distance (m)	(CM) Stem 1	(CM) Stem 2	(CM) Stem 3	DBH (CM)	Dripline Radius (m)	Radius (m)	Structure	Crown		Reg. Area?	
1	<i>Acer negundo</i>	Manitoba Maple			11			11	2	2	F	F		No	Retain
2	<i>Juniperus virginiana</i>	Eastern Red Cedar			12			12	2	2	G	G		No	Remove
3	<i>Morus alba</i>	White Mulberry			19	20	13	52	3	6	G	G	3 stems	No	Remove
4	<i>Salix species</i>	Willow Species	X	4	80			80	5	10	G	G		No	Remove
5	<i>Salix species</i>	Willow Species	X	4	85			85	5	10	G	G		No	Remove
6	<i>Picea glauca</i>	White Spruce	X	5	15			15	3	3	G	G		No	Remove
7	<i>Thuja occidentalis</i>	Eastern White Cedar			10			10	1	1	G	G	40 Individuals	No	Remove
8	<i>Salix species</i>	Willow Species	X	6	30	25		55	3	6	G	G	2 stems	Yes	Remove
9	<i>Thuja occidentalis</i>	Eastern White Cedar			13			13	1	1	G	G		No	Remove
10	<i>Thuja occidentalis</i>	Eastern White Cedar			14			14	1	1	G	G		No	Remove
11	<i>Acer saccharinum</i>	Silver Maple	X	8	12			12	3	3	G	G		No	Remove
12	<i>Acer saccharinum</i>	Silver Maple	X	7	14			14	2	2	G	G		No	Remove
13	<i>Acer saccharinum</i>	Silver Maple	X	7	10			10	2	2	G	G		No	Remove
14	<i>Elaeagnus angustifolia</i>	Russian Olive			13	11		24	3	3	F	G	2 stems	No	Remove
15	<i>Acer saccharinum</i>	Silver Maple		6	10			10	2	2	G	G		No	Remove
16	<i>Acer saccharinum</i>	Silver Maple	X	6	11			11	3	3	G	G		No	Remove
17	<i>Acer saccharinum</i>	Silver Maple	X	6	23			23	3	3	G	G		No	Remove
18	<i>Acer saccharinum</i>	Silver Maple	X	6	10			10	3	3	G	G		No	Remove
19	<i>Pinus strobus</i>	Eastern White Pine	X	4	19			19	4	4	P	G		No	Remove
20	<i>Acer saccharinum</i>	Silver Maple	X	6	10			10	3	3	G	G		No	Remove
21	<i>Pinus nigra</i>	Austrian Pine	X	4	27			27	5	5	P	P		No	Remove
22	<i>Thuja occidentalis</i>	Eastern White Cedar	X	4	15	14		29	2	2	P	G	2 stems	No	Remove
23	<i>Pinus nigra</i>	Austrian Pine	X	4	30			30	5	10	P	F		No	Remove
24	<i>Thuja occidentalis</i>	Eastern White Cedar	X	4	20	17		37	2	4	P	F	2 stems	No	Remove
25	<i>Pinus strobus</i>	Eastern White Pine	X	4	30			30	2	4	P	G		No	Remove
26	<i>Pinus nigra</i>	Austrian Pine	X		25			25	0	0	D	D		No	Remove
27	<i>Pinus nigra</i>	Austrian Pine			27			27	3	3	P	P		No	Remove
28	<i>Ulmus pumila</i>	Siberian Elm	X	4	35			35	3	6	P	P		No	Remove
29	<i>Acer platanoides</i>	Norway Maple	X		30			30	3	6	P	P		Yes	Remove
30	<i>Ulmus pumila</i>	Siberian Elm	X		15	10	9	34	3	6	P	P	3 stems	Yes	Remove
31	<i>Ulmus pumila</i>	Siberian Elm	X		20			20	3	3	P	P		Yes	Remove
32	<i>Pinus nigra</i>	Austrian Pine	X		12			12	2	2	P	P		Yes	Remove
33	<i>Pinus nigra</i>	Austrian Pine	X	1	20			20	1	1	F	F		Yes	Remove
34	<i>Pinus nigra</i>	Austrian Pine	X	1	25			25	1	1	F	F		Yes	Remove
35	<i>Pinus nigra</i>	Austrian Pine	X	1	30			30	1	2	F	F		Yes	Remove
36	<i>Pinus nigra</i>	Austrian Pine	X	1	17			17	1	1	P	P		Yes	Remove

37	<i>Pinus nigra</i>	Austrian Pine	X	1	20		20	2	2	F	F		Yes	Remove	
38	<i>Pinus nigra</i>	Austrian Pine	X	1	10		10	2	2	P	P		Yes	Remove	
39	<i>Pinus nigra</i>	Austrian Pine	X	2	15		15	2	2	F	F		Yes	Remove	
40	<i>Pinus nigra</i>	Austrian Pine	X	1	17		17	2	2	P	P		Yes	Remove	
41	<i>Pinus nigra</i>	Austrian Pine	X	1	25		25	2	2	F	F		Yes	Remove	
42	<i>Pinus nigra</i>	Austrian Pine	X		12		12	2	2	P	P		Yes	Remove	
43	<i>Pinus nigra</i>	Austrian Pine	X	1	12		12	2	2	F	F		Yes	Remove	
44	<i>Pinus nigra</i>	Austrian Pine	X	1	15		15	2	2	P	P		Yes	Remove	
45	<i>Pinus nigra</i>	Austrian Pine	X	2	19		19	2	2	F	F		Yes	Remove	
46	<i>Pinus nigra</i>	Austrian Pine	X	4	21		21	2	2	F	F		Yes	Remove	
47	<i>Pinus nigra</i>	Austrian Pine	X		20		20	2	2	P	P		Yes	Remove	
48	<i>Pinus nigra</i>	Austrian Pine	X		10		10	2	2	P	P		Yes	Remove	
49	<i>Pinus nigra</i>	Austrian Pine	X	2	20		20	2	2	F	F		Yes	Remove	
50	<i>Pinus nigra</i>	Austrian Pine	X		11		11	2	2	P	P		Yes	Remove	
51	<i>Pinus nigra</i>	Austrian Pine	X	2	23		23	2	2	F	F		Yes	Remove	
52	<i>Pinus nigra</i>	Austrian Pine	X	1	12		12	2	2	P	P		Yes	Remove	
53	<i>Pinus nigra</i>	Austrian Pine	X	1	17		17	2	2	F	F		Yes	Remove	
54	<i>Pinus nigra</i>	Austrian Pine	X	1	15		15	2	2	P	P		Yes	Remove	
55	<i>Pinus nigra</i>	Austrian Pine	X	2	20		20	2	2	F	F		Yes	Remove	
56	<i>Pinus nigra</i>	Austrian Pine	X	5	15		15	3	3	F	F		Yes	Remove	
57	<i>Picea pungens</i>	Blue Spruce	X		17		17	3	3	P	G		Yes	Remove	
58	<i>Malus Sp.</i>	Ornamental Crabapple Tree	X	6	40	30	70	4	8	G	G	2 stems	Yes	Remove	
59	<i>Malus Sp.</i>	Ornamental Crabapple Tree	X	6	25		25	2	2	G	G		Yes	Remove	
60	<i>Thuja occidentalis</i>	Eastern White Cedar	X	4	10	12	11	33	2	4	G	G	3 stems	No	Remove
61	<i>Thuja occidentalis</i>	Eastern White Cedar	X	4	13	12		25	2	2	G	G	2 stems	No	Remove
62	<i>Thuja occidentalis</i>	Eastern White Cedar	X	4	10	10		20	2	2	G	G	2 stems	No	Remove
63	<i>Picea abies</i>	Norway Spruce	X	5	40		40	5	10	G	P		No	Remove	
64	<i>Picea glauca</i>	White Spruce	X	5	31	30		61	4	8	F	F	2 stems	No	Remove
65	<i>Picea glauca</i>	White Spruce			29			29	4	4	G	G		No	Remove
66	<i>Picea pungens</i>	Blue Spruce			35	20		55	4	8	F	G	2 stems	No	Remove
67	<i>Picea pungens</i>	Blue Spruce			34	31		65	4	8	F	G	2 stems	No	Remove
68	<i>Picea pungens</i>	Blue Spruce			24			24	3	3	G	G		No	Remove
69	<i>Picea pungens</i>	Blue Spruce			26			26	3	3	G	G		No	Remove
70	<i>Picea pungens</i>	Blue Spruce			17			17	0	0	D	D		No	Remove
71	<i>Picea pungens</i>	Blue Spruce			25			25	3	3	G	F		No	Remove
72	<i>Fraxinus americana</i>	White Ash			26			26	1	1	P	P		No	Remove
73	<i>Robinia pseudoacacia</i>	Black Locust			27			27	3	3	F	G		No	Remove
74	<i>Fraxinus americana</i>	White Ash			26			26	1	1	P	P		No	Remove

## Appendix C: Tree Inventory Table

TP115086

75	<i>Robinia pseudoacacia</i>	Black Locust			30			30	4	8	G	G	No	Remove
76	<i>Fraxinus americana</i>	White Ash			32			32	1	2	P	P	No	Remove
77	<i>Picea pungens</i>	Blue Spruce			30			30	3	6	F	G	No	Remove
78	<i>Picea abies</i>	Norway Spruce	X	7	40			40	4	8	G	G	No	Remove
79	<i>Quercus macrocarpa</i>	Bur Oak	X	2	30			30	3	6	F	G	No	Remove
80	<i>Quercus macrocarpa</i>	Bur Oak	X	3	29	28	22	79	3	6	F	G	No	Remove
81	<i>Quercus macrocarpa</i>	Bur Oak	X	3	25			25	3	3	F	G	No	Remove
82	<i>Quercus macrocarpa</i>	Bur Oak	X	3	24			24	3	3	F	G	No	Remove
83	<i>Quercus macrocarpa</i>	Bur Oak	X	4	40	37		77	4	8	G	G	No	Remove
84	<i>Quercus macrocarpa</i>	Bur Oak	X	5	50			50	6	12	G	G	No	Remove
85	<i>Salix species</i>	Willow Species	X	5	45			45	4	8	F	G	Yes	Remove
86	<i>Morus alba</i>	White Mulberry	X	5	90			90	7	14	G	G	Yes	Remove
87	<i>Juglans nigra</i>	Black Walnut	X	5	17			17	3	3	G	F	Yes	Remove
88	<i>Juglans nigra</i>	Black Walnut	X	5	50			50	4	8	F	F	Yes	Remove
89	<i>Juglans nigra</i>	Black Walnut	X	5	30			30	4	8	G	G	Yes	Remove
90	<i>Picea glauca</i>	White Spruce	X	7	70			70	4	8	G	F	Yes	Remove
91	<i>Salix species</i>	Willow Species	X	7	80			80	5	10	G	G	Yes	Remove
92	<i>Juglans nigra</i>	Black Walnut	X	6	23			23	3	3	G	G	Yes	Remove
93	<i>Tilia cordata</i>	Little-leaved Linden	X	7	40			40	4	8	G	G	Yes	Remove
94	<i>Ulmus americana</i>	American Elm	X	6	29			29	3	3	G	F	Yes	Remove
95	<i>Juglans nigra</i>	Black Walnut	X	6	10			10	4	4	G	G	Yes	Remove
96	<i>Juglans nigra</i>	Black Walnut	X	8	140			140	7	14	G	G	Yes	Remove
97	<i>Juglans nigra</i>	Black Walnut	X	6	15			15	4	4	G	G	Yes	Remove
98	<i>Juglans nigra</i>	Black Walnut	X	6	21			21	4	4	G	G	Yes	Remove
99	<i>Acer negundo</i>	Manitoba Maple	X	6	25			25	3	3	P	F	Yes	Remove
100	<i>Tilia americana</i>	American Basswood			10			10	3	3	G	F	Yes	Remove
101	<i>Salix species</i>	Willow Species	X	6	21			21	3	3	G	G	Yes	Remove
102	<i>Tilia americana</i>	American Basswood	X	7	42			42	3	6	P	P	Yes	Remove
103	<i>Acer negundo</i>	Manitoba Maple			10			10	2	2	P	P	Yes	Remove
104	<i>Acer negundo</i>	Manitoba Maple			29			29	2	2	P	P	Yes	Remove
105	<i>Morus alba</i>	White Mulberry			32			32	3	6	G	G	Yes	Remove
106	<i>Picea abies</i>	Norway Spruce	X	3	34			34	3	6	G	G	Yes	Remove
107	<i>Juglans nigra</i>	Black Walnut			10	9	6	25	3	3	G	G	Yes	Remove
108	<i>Juglans nigra</i>	Black Walnut	X	3	34			34	3	6	G	P	Yes	Remove
109	<i>Juglans nigra</i>	Black Walnut			45			45	4	8	G	P	Yes	Remove
110	<i>Juglans nigra</i>	Black Walnut			43			43	3	6	P	P	Yes	Remove
111	<i>Juglans nigra</i>	Black Walnut			90			90	5	10	G	G	Yes	Remove
112	<i>Juglans nigra</i>	Black Walnut			92			92	5	10	G	G	Yes	Remove
113	<i>Juglans nigra</i>	Black Walnut			85			85	5	10	G	G	Yes	Remove
114	<i>Juglans nigra</i>	Black Walnut			86			86	7	14	G	G	Yes	Remove

115	<i>Juglans nigra</i>	Black Walnut		84	84	6	12	F	G	Yes	Remove			
116	<i>Juglans nigra</i>	Black Walnut	1	90	90	6	12	F	G	Yes	Remove			
117	<i>Juniperus virginiana</i>	Eastern Red Cedar		12	12	2	2	G	G	Yes	Remove			
118	<i>Picea glauca</i>	White Spruce		25	25	3	3	G	G	No	Remove			
119	<i>Acer saccharinum</i>	Silver Maple	X	8	27	4	4	G	G	No	Remove			
120	<i>Morus alba</i>	White Mulberry		30	30	5	10	G	G	Yes	Remove			
121	<i>Picea abies</i>	Norway Spruce		40	40	5	10	G	G	No	Remove			
122	<i>Acer saccharum</i>	Sugar Maple		35	35	4	8	G	G	No	Remove			
123	<i>Acer platanoides</i>	Norway Maple		25	25	3	3	F	F	No	Remove			
124	<i>Picea glauca</i>	White Spruce		30	30	3	6	G	G	No	Remove			
125	<i>Picea glauca</i>	White Spruce		19	19	3	3	G	G	No	Remove			
126	<i>Picea glauca</i>	White Spruce		18	18	3	3	F	F	No	Remove			
127	<i>Pinus sylvestris</i>	Scots Pine	X	6	20	2	2	G	G	Yes	Remove			
128	<i>Pinus sylvestris</i>	Scots Pine	X	6	11	3	3	G	G	Yes	Remove			
129	<i>Populus tremuloides</i>	Trembling Aspen	X	10	15	4	4	G	G	Yes	Remove			
130	<i>Tilia cordata</i>	Little-leaved Linden	X	10	30	5	10	G	G	Yes	Remove			
131	<i>Juglans nigra</i>	Black Walnut	X	3	32	4	8	G	G	Yes	Remove			
132	<i>Juglans nigra</i>	Black Walnut	X	4	20	4	4	G	G	Yes	Remove			
133	<i>Juglans nigra</i>	Black Walnut	X	10	35	4	8	G	G	Yes	Remove			
134	<i>Juglans nigra</i>	Black Walnut	X	11	45	7	14	G	G	Yes	Remove			
135	<i>Juglans nigra</i>	Black Walnut	X	10	47	8	16	G	G	Yes	Remove			
136	<i>Sorbus decora</i>	Showy Mountain-ash	X	11	30	10	40	4	8	G	G	2 stems	Yes	Remove
137	<i>Populus deltoides</i>	Eastern Cottonwood	X	10	20	4	4	G	F	Yes	Remove			
138	<i>Populus deltoides</i>	Eastern Cottonwood	X	10	80	3	6	P	P	Yes	Remove			
139	<i>Carya cordiformis</i>	Bitternut Hickory	X	16	45	4	8	P	G	Yes	Remove			
140	<i>Carya cordiformis</i>	Bitternut Hickory	X	10	62	5	10	G	G	Yes	Remove			
141	<i>Picea pungens</i>	Blue Spruce		46	46	4	8	G	G	Yes	Remove			
142	<i>Picea abies</i>	Norway Spruce		55	55	5	10	G	G	Yes	Remove			
143	<i>Acer negundo</i>	Manitoba Maple		32	29	61	4	8	G	G	2 stems	Yes	Remove	
144	<i>Acer saccharinum</i>	Silver Maple	X	3	40	4	8	G	G	Yes	Remove			
145	<i>Acer platanoides</i>	Norway Maple	X	3	38	4	8	F	G	Yes	Remove			
146	<i>Acer saccharum</i>	Sugar Maple	X	3	40	4	8	F	G	Yes	Remove			
147	<i>Acer saccharinum</i>	Silver Maple	X	3	51	4	8	F	G	Yes	Remove			
148	<i>Acer saccharinum</i>	Silver Maple	X	3	42	4	8	F	G	No	Remove			
149	<i>Acer saccharinum</i>	Silver Maple	X	3	39	4	8	F	G	No	Remove			
150	<i>Pinus nigra</i>	Austrian Pine	X	4	32	4	8	F	G	No	Remove			
151	<i>Picea pungens</i>	Blue Spruce		29	29	3	3	G	G	No	Remove			
152	<i>Picea abies</i>	Norway Spruce		39	39	3	6	G	G	No	Remove			
153	<i>Pinus sylvestris</i>	Scots Pine		37	37	4	8	G	G	No	Remove			

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154	<i>Pinus nigra</i>	Austrian Pine			24	22	19	65	3	6	G	G	3 stems	No	Remove
155	<i>Pinus nigra</i>	Austrian Pine			35	34		69	3	6	G	G	2 stems	No	Remove
156	<i>Pinus nigra</i>	Austrian Pine			33			33	3	6	G	G		No	Remove
157	<i>Picea pungens</i>	Blue Spruce			37			37	4	8	G	G		Yes	Remove
158	<i>Picea pungens</i>	Blue Spruce			38			38	4	8	G	G		Yes	Remove
159	<i>Acer platanoides</i>	Norway Maple	X	5	40			40	4	8	G	G		No	Remove
160	<i>Malus Sp.</i>	Ornamental Crabapple Tree			29	28		57	4	8	G	G	2 stems	No	Remove
161	<i>Malus Sp.</i>	Ornamental Crabapple Tree			27	27		54	4	8	G	G	2 stems	No	Remove
162	<i>Malus Sp.</i>	Ornamental Crabapple Tree			19			19	3	3	F	F		No	Remove
163	<i>Acer saccharum</i>	Sugar Maple			29			29	4	4	F	G		No	Remove
164	<i>Acer saccharum</i>	Sugar Maple			31			31	4	8	G	G		No	Remove
165	<i>Acer saccharum</i>	Sugar Maple			28			28	4	4	G	G		No	Remove
166	<i>Acer saccharum</i>	Sugar Maple			32			32	4	8	G	F		No	Remove
167	<i>Acer saccharum</i>	Sugar Maple			43			43	4	8	G	F		No	Remove
168	<i>Acer saccharum</i>	Sugar Maple			44			44	4	8	G	F		No	Remove
169	<i>Acer saccharum</i>	Sugar Maple			31	29		60	4	8	G	G	2 stems	No	Remove
170	<i>Acer saccharum</i>	Sugar Maple			33			33	4	8	G	F		No	Remove
171	<i>Acer saccharum</i>	Sugar Maple			35			35	4	8	G	G		No	Remove
172	<i>Pinus strobus</i>	Eastern White Pine		10	41			41	4	8	G	G		No	Remove
173	<i>Salix species</i>	Willow Species	X	10	40	40		80	5	10	G	G	2 stems	Yes	Retain
174	<i>Betula papyrifera</i>	Paper Birch	X	10	39			39	6	12	F	F		Yes	Remove
175	<i>Salix species</i>	Willow Species	X	10	108			108	6	12	F	G		Yes	Remove
176	<i>Betula papyrifera</i>	Paper Birch	X	10	41			41	4	8	G	G		Yes	Remove
177	<i>Betula papyrifera</i>	Paper Birch	X	10	30			30	3	6	G	G		Yes	Remove
178	<i>Betula papyrifera</i>	Paper Birch	X	6	20			20	3	3	G	G		Yes	Remove
179	<i>Betula papyrifera</i>	Paper Birch	X	5	19			19	3	3	G	G		Yes	Remove
180	<i>Pinus nigra</i>	Austrian Pine	X	6	60			60	4	8	G	G		Yes	Remove
181	<i>Pinus nigra</i>	Austrian Pine	X	7	55			55	5	10	G	G		Yes	Remove
182	<i>Pinus nigra</i>	Austrian Pine	X	4	10			10	2	2	G	G		Yes	Remove
183	<i>Picea abies</i>	Norway Spruce	X	4	32			32	4	8	G	G		Yes	Remove
184	<i>Picea abies</i>	Norway Spruce	X	5	33			33	3	6	G	G		Yes	Remove
185	<i>Pinus nigra</i>	Austrian Pine	X	3	10			10	2	2	G	G		Yes	Remove
186	<i>Picea abies</i>	Norway Spruce	X	5	45			45	4	8	G	G		Yes	Remove
187	<i>Picea abies</i>	Norway Spruce	X	9	50			50	4	8	G	G		Yes	Injure
188	<i>Picea abies</i>	Norway Spruce	X		49			49	4	8	G	G		Yes	Remove
189	<i>Pinus nigra</i>	Austrian Pine	X	5	15			15	2	2	G	G		Yes	Remove
190	<i>Picea pungens</i>	Blue Spruce	X	3	19			19	3	3	F	F		Yes	Remove

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191	<i>Picea abies</i>	Norway Spruce			15		15	2	2	F	F	Yes	Remove
192	<i>Picea abies</i>	Norway Spruce			55		55	4	8	G	G	Yes	Remove
193	<i>Picea abies</i>	Norway Spruce			51		51	4	8	G	G	Yes	Remove
194	<i>Picea abies</i>	Norway Spruce			60		60	4	8	G	G	Yes	Injure
195	<i>Acer platanoides</i>	Norway Maple			33		33	4	8	G	G	Yes	Remove
196	<i>Acer platanoides</i>	Norway Maple		25	10	65	4	8	G	G	3 stems	Yes	Injure
197	<i>Picea abies</i>	Norway Spruce			75		75	5	10	G	G	Yes	Remove
198	<i>Picea abies</i>	Norway Spruce			74		74	5	10	G	G	Yes	Remove
199	<i>Picea abies</i>	Norway Spruce			74		74	5	10	G	G	Yes	Remove
200	<i>Juglans nigra</i>	Black Walnut			80		80	4	8	F	F	Yes	Remove
201	<i>Salix species</i>	Willow Species		19	20	60	5	10	G	G	3 stems	Yes	Remove
202	<i>Pinus nigra</i>	Austrian Pine			2		2	2	2	G	G	Yes	Remove
203	<i>Pinus sylvestris</i>	Scots Pine			31		31	3	6	F	G	Yes	Remove
204	<i>Taxus cuspidat</i>	Japanese Yew			11		11	2	2	F	G	Yes	Remove
205	<i>Pinus sylvestris</i>	Scots Pine			34		34	3	6	G	G	Yes	Remove
206	<i>Picea pungens</i>	Blue Spruce			10		10	2	2	G	G	Yes	Remove
207	<i>Picea pungens</i>	Blue Spruce			24		24	3	3	G	G	Yes	Remove
208	<i>Picea pungens</i>	Blue Spruce			25		25	3	3	G	G	Yes	Remove
209	<i>Picea pungens</i>	Blue Spruce			26		26	2	2	G	G	Yes	Remove
210	<i>Picea pungens</i>	Blue Spruce			19		19	2	2	G	G	Yes	Remove
211	<i>Picea pungens</i>	Blue Spruce			10		10	2	2	G	G	Yes	Remove
212	<i>Acer saccharum</i>	Sugar Maple			27		27	4	4	G	G	Yes	Remove
213	<i>Acer saccharinum</i>	Silver Maple			30		30	3	6	F	F	Yes	Remove
214	<i>Acer saccharinum</i>	Silver Maple			25		25	3	3	F	F	Yes	Remove
215	<i>Acer platanoides</i>	Norway Maple			33		33	4	8	G	G	Yes	Remove
216	<i>Picea pungens</i>	Blue Spruce			25		25	3	3	G	G	Yes	Remove
217	<i>Pinus nigra</i>	Austrian Pine			29		29	3	3	G	G	Yes	Remove
218	<i>Pinus nigra</i>	Austrian Pine			12		12	2	2	G	G	Yes	Remove
219	<i>Pinus nigra</i>	Austrian Pine			13		13	2	2	G	G	Yes	Remove
220	<i>Pinus nigra</i>	Austrian Pine			26		26	3	3	F	F	Yes	Remove
221	<i>Pinus nigra</i>	Austrian Pine			15		15	2	2	F	F	Yes	Remove
222	<i>Pinus nigra</i>	Austrian Pine			14		14	2	2	F	F	Yes	Remove
223	<i>Pinus nigra</i>	Austrian Pine			20		20	3	3	F	G	Yes	Remove
224	<i>Thuja occidentalis</i>	Eastern White Cedar			10		10	2	2	G	G	Yes	Remove
225	<i>Thuja occidentalis</i>	Eastern White Cedar			13		13	2	2	G	G	Yes	Remove
226	<i>Thuja occidentalis</i>	Eastern White Cedar			11		11	2	2	G	G	Yes	Remove
227	<i>Pinus nigra</i>	Austrian Pine	X	2	20		20	3	3	G	G	No	Remove
228	<i>Thuja occidentalis</i>	Eastern White Cedar			12		12	3	3	G	G	No	Remove
229	<i>Thuja occidentalis</i>	Eastern White Cedar			13		13	2	2	G	G	No	Remove
230	<i>Pinus nigra</i>	Austrian Pine			23		23	3	3	G	G	No	Remove

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231	<i>Pinus nigra</i>	Austrian Pine			33	33	4	8	G	G		No	Remove
232	<i>Pinus nigra</i>	Austrian Pine			34	34	3	6	G	G		No	Remove
233	<i>Pinus nigra</i>	Austrian Pine			35	35	3	6	G	G		No	Remove
234	<i>Pinus nigra</i>	Austrian Pine			19	19	2	2	G	G		No	Remove
235	<i>Pinus nigra</i>	Austrian Pine			20	20	3	3	G	G		No	Remove
236	<i>Pinus nigra</i>	Austrian Pine			19	19	2	2	F	F		No	Remove
237	<i>Pinus nigra</i>	Austrian Pine			23	23	3	3	G	G		No	Remove
238	<i>Pinus nigra</i>	Austrian Pine			25	25	3	3	G	G		No	Remove
239	<i>Thuja occidentalis</i>	Eastern White Cedar			14	14	2	2	G	G		No	Remove
240	<i>Acer saccharinum</i>	Silver Maple		36	38	74	2	4	P	P	2 stems	No	Remove
241	<i>Acer saccharinum</i>	Silver Maple			29	29	3	3	G	G		No	Remove
242	<i>Acer saccharinum</i>	Silver Maple			32	32	3	6	G	G		No	Remove
243	<i>Acer saccharinum</i>	Silver Maple			36	36	3	6	G	G		No	Remove
244	<i>Ulmus pumila</i>	Siberian Elm			55	55	4	8	G	G		No	Remove
245	<i>Ulmus pumila</i>	Siberian Elm			41	41	4	8	G	G		No	Remove
246	<i>Ulmus pumila</i>	Siberian Elm			28	28	4	4	G	G		No	Remove
247	<i>Ulmus pumila</i>	Siberian Elm			27	27	4	4	G	G		No	Remove
248	<i>Ulmus pumila</i>	Siberian Elm			51	51	4	8	G	G		No	Remove
249	<i>Ulmus pumila</i>	Siberian Elm			20	20	4	4	G	G		No	Remove
250	<i>Ulmus pumila</i>	Siberian Elm			31	31	4	8	G	G		No	Remove
251	<i>Ulmus pumila</i>	Siberian Elm			28	28	4	4	G	G		No	Remove
252	<i>Ulmus pumila</i>	Siberian Elm			35	35	4	8	G	G		No	Remove
253	<i>Ulmus pumila</i>	Siberian Elm			40	40	4	8	G	G		No	Remove
254	<i>Ulmus pumila</i>	Siberian Elm			28	28	4	4	G	G		No	Remove
255	<i>Ulmus pumila</i>	Siberian Elm			30	30	4	8	G	G		No	Remove
256	<i>Ulmus pumila</i>	Siberian Elm			32	32	3	6	G	G		No	Remove
257	<i>Ulmus pumila</i>	Siberian Elm			31	31	3	6	G	G		No	Remove
258	<i>Picea glauca</i>	White Spruce			29	29	3	3	G	G		No	Remove
259	<i>Thuja occidentalis</i>	Eastern White Cedar			12	12	2	2	G	G	In front of fence is the regulated area	No	Remove
260	<i>Thuja occidentalis</i>	Eastern White Cedar			19	19	2	2	G	G	In front of fence is the regulated area	No	Remove
261	<i>Picea abies</i>	Norway Spruce	X	3	25	25	3	3	G	G	In front of fence is the regulated area	No	Remove
262	<i>Picea abies</i>	Norway Spruce			30	30	4	8	G	G	In front of fence is the regulated area	No	Remove

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263	<i>Picea abies</i>	Norway Spruce			29	29	3	3	G	G	In front of fence is the regulated area	No	Remove
264	<i>Picea abies</i>	Norway Spruce			20	20	3	3	G	G	In front of fence is the regulated area	No	Remove
265	<i>Pinus nigra</i>	Austrian Pine			61	61	5	10	G	G	In front of fence is the regulated area	Yes	Remove
266	<i>Pinus nigra</i>	Austrian Pine			58	58	5	10	G	G	In front of fence is the regulated area	No	Remove
267	<i>Pinus nigra</i>	Austrian Pine			40	40	5	10	G	G	In front of fence is the regulated area	Yes	Remove
268	<i>Pinus nigra</i>	Austrian Pine			62	62	5	10	G	G	In front of fence is the regulated area	No	Remove
269	<i>Fraxinus americana</i>	White Ash			57	57	0	0	D	D	In front of fence is the regulated area	No	Remove
270	<i>Fraxinus americana</i>	White Ash			58	58	0	0	D	D	In front of fence is the regulated area	No	Remove
271	<i>Fraxinus americana</i>	White Ash			61	61	0	0	D	D	In front of fence is the regulated area	Yes	Remove
272	<i>Picea abies</i>	Norway Spruce	X	2	27	27	3	3	G	G	In front of fence is the regulated area	No	Remove
273	<i>Picea abies</i>	Norway Spruce	X	2	28	28	3	3	G	G	In front of fence is the regulated area	No	Remove
274	<i>Picea abies</i>	Norway Spruce	X	2	30	30	4	8	G	G	In front of fence is the regulated area	Yes	Remove
275	<i>Picea abies</i>	Norway Spruce			48	48	4	8	G	G	In front of fence is the regulated area	No	Remove

276	<i>Picea abies</i>	Norway Spruce		50		50	4	8	F	F	In front of fence is the regulated area	No	Remove	
277	<i>Acer platanoides</i>	Norway Maple		70		70	4	8	G	G	In front of fence is the regulated area	Yes	Remove	
278	<i>Fraxinus americana</i>	White Ash		54		54	0	0	D	D	In front of fence is the regulated area	Yes	Remove	
279	<i>Acer platanoides</i>	Norway Maple		23		23	1	1	P	P	In front of fence is the regulated area	Yes	Remove	
280	<i>Pinus sylvestris</i>	Scots Pine	X	2	67	67	4	8	F	G		Yes	Remove	
281	<i>Pinus sylvestris</i>	Scots Pine	X	7	40	40	3	6	P	G		Yes	Remove	
282	<i>Pinus sylvestris</i>	Scots Pine	X	1	64	64	4	8	G	G		Yes	Remove	
283	<i>Picea pungens</i>	Blue Spruce			22	22	2	2	G	G		Yes	Remove	
284	<i>Acer negundo</i>	Manitoba Maple	X	5	31	20	51	3	6	G	G	2 stems	Yes	Remove
285	<i>Acer negundo</i>	Manitoba Maple	X	10	37		37	2	4	G	G		Yes	Remove
286	<i>Pinus strobus</i>	Eastern White Pine	X	10	36		36	3	6	G	G		Yes	Remove
287	<i>Thuja occidentalis</i>	Eastern White Cedar	X	10	12		12	2	2	G	G		Yes	Remove
288	<i>Acer platanoides</i>	Norway Maple	X	11	29		29	4	4	G	G		Yes	Remove
289	<i>Pinus strobus</i>	Eastern White Pine	X	11	27		27	3	3	F	G		Yes	Remove
290	<i>Pinus strobus</i>	Eastern White Pine	X	11	26		26	3	3	F	G		Yes	Remove
291	<i>Pinus strobus</i>	Eastern White Pine	X	11	27		27	3	3	F	G		Yes	Remove
292	<i>Thuja occidentalis</i>	Eastern White Cedar	X	11	19		19	2	2	G	G		Yes	Remove
293	<i>Thuja occidentalis</i>	Eastern White Cedar	X	11	16		16	2	2	G	G		Yes	Remove
294	<i>Thuja occidentalis</i>	Eastern White Cedar	X	11	15		15	2	2	G	G		Yes	Remove
295	<i>Pinus strobus</i>	Eastern White Pine	X	11	26		26	4	4	F	F		Yes	Remove
296	<i>Pinus strobus</i>	Eastern White Pine	X	11	25		25	3	3	F	G		Yes	Remove
297	<i>Robinia pseudoacacia</i>	Black Locust	X	13	62		62	5	10	F	G		Yes	Remove
298	<i>Robinia pseudoacacia</i>	Black Locust	X	13	70		70	5	10	F	G		Yes	Remove
299	<i>Pinus strobus</i>	Eastern White Pine	X	13	30		30	4	8	F	G		Yes	Remove
300	<i>Salix species</i>	Willow Species			31	26	57	4	8	G	G	2 stems	Yes	Remove
301	<i>Juglans nigra</i>	Black Walnut		13	17		17	3	3	G	G		Yes	Remove
302	<i>Pinus strobus</i>	Eastern white Pine		13	29		29	2	2	F	G		Yes	Remove
303	<i>Pinus strobus</i>	Eastern white Pine	X	13	26		26	2	2	F	G		Yes	Remove
304	<i>Pinus strobus</i>	Eastern white Pine	X	13	27		27	2	2	F	G		Yes	Remove
305	<i>Pinus strobus</i>	Eastern white Pine	X	13	28		28	3	3	F	G		Yes	Remove
306	<i>Acer platanoides</i>	Norway maple	X	13	21		21	3	3	G	G		Yes	Remove
307	<i>Thuja occidentalis</i>	Eastern White Cedar	X	13	19		19	2	2	G	G		Yes	Remove

308	<i>Thuja occidentalis</i>	Eastern White Cedar	X	13	19		19	2	2	G	G		Yes	Remove	
309	<i>Thuja occidentalis</i>	Eastern White Cedar	X	13	19		19	2	2	G	G		Yes	Remove	
310	<i>Thuja occidentalis</i>	Eastern White Cedar	X	13	19		19	2	2	G	G		Yes	Remove	
311	<i>Thuja occidentalis</i>	Eastern White Cedar	X	13	19		19	2	2	G	G		Yes	Remove	
312	<i>Thuja occidentalis</i>	Eastern White Cedar	X	13	19		19	2	2	G	G		Yes	Remove	
313	<i>Thuja occidentalis</i>	Eastern White Cedar	X	13	19		19	2	2	G	G		Yes	Remove	
314	<i>Thuja occidentalis</i>	Eastern White Cedar	X	13	19		19	2	2	G	G		Yes	Remove	
315	<i>Thuja occidentalis</i>	Eastern White Cedar	X	13	19		19	2	2	G	G		Yes	Remove	
316	<i>Juglans nigra</i>	Black Walnut	X	13	17		17	3	3	G	G		Yes	Remove	
317	<i>Salix species</i>	Willow Species	X	13	20	19	39	4	8	G	G	2 stems	Yes	Remove	
318	<i>Acer negundo</i>	Manitoba Maple	X	6	41	30	71	6	12	F	G	2 stems	No	Remove	
319	<i>Picea glauca</i>	White Spruce	X	3	29		29	6	6	D	D		No	Remove	
320	<i>Acer platanoides</i>	Norway Maple	X	10	30		30	5	10	G	G		No	Remove	
321	<i>Populus tremuloides</i>	Trembling Aspen	X	10	25		25	4	4	F	F		No	Remove	
322	<i>Populus tremuloides</i>	Trembling Aspen	X	5	10		10	2	2	G	G		No	Remove	
323	<i>Populus tremuloides</i>	Trembling Aspen	X	5	12		12	2	2	G	G		No	Remove	
324	<i>Populus tremuloides</i>	Trembling Aspen	X	5	15		15	2	2	G	G		No	Remove	
325	<i>Populus tremuloides</i>	Trembling Aspen	X	5	16		16	2	2	G	G		No	Remove	
326	<i>Populus tremuloides</i>	Trembling Aspen	X	5	14		14	2	2	G	G		No	Remove	
327	<i>Populus tremuloides</i>	Trembling Aspen	X	5	13		13	2	2	G	G		No	Remove	
328	<i>Populus tremuloides</i>	Trembling Aspen	X	5	17		17	2	2	G	G		No	Remove	
329	<i>Acer platanoides</i>	Norway Maple	X		36		36	4	8	G	G		No	Remove	
330	<i>Acer platanoides</i>	Norway Maple	X		30		30	4	8	G	G		No	Remove	
331	<i>Acer platanoides</i>	Norway Maple	X		37		37	4	8	G	G		No	Remove	
332	<i>Acer platanoides</i>	Norway Maple	X		32		32	3	6	G	G		No	Remove	
333	<i>Acer platanoides</i>	Norway Maple	X	2	33		33	4	8	G	G		No	Remove	
334	<i>Acer platanoides</i>	Norway Maple	X	3	26		26	3	3	G	G		No	Remove	
335	<i>Acer platanoides</i>	Norway Maple	X		32		32	4	8	G	G		No	Remove	
336	<i>Acer saccharinum</i>	Silver Maple			33		33	3	6	P	G		No	Remove	
337	<i>Acer negundo</i>	Manitoba Maple			27		27	3	3	G	G		No	Remove	
338	<i>Juniperus virginiana</i>	Eastern Red Cedar	X		28		28	2	2	G	G		No	Remove	
339	<i>Juniperus virginiana</i>	Eastern Red Cedar	X	4	20		20	2	2	G	G		No	Remove	
340	<i>Juniperus virginiana</i>	Eastern Red Cedar	X	8	23		23	2	2	G	G		No	Remove	
341	<i>Juniperus virginiana</i>	Eastern Red Cedar	X	12	20		20	2	2	G	G		No	Remove	
342	<i>Picea abies</i>	Norway Spruce	X	5	43		43	3	6	G	G		No	Remove	
343	<i>Malus Sp.</i>	Ornamental Crabapple Tree			15	10	9	34	3	6	G	G	3 stems	No	Remove
344	<i>Populus alba</i>	White Poplar			14	10	9	33	4	8	G	G	3 stems	No	Remove
345	<i>Populus alba</i>	White Poplar			32		32	4	8	G	G		No	Remove	
346	<i>Populus alba</i>	White Poplar	X	4	34		34	4	8	G	G		No	Remove	

347	<i>Populus alba</i>	White Poplar			55		55	4	8	P	P		No	Remove
348	<i>Populus alba</i>	White Poplar	X	2	21		21	3	3	G	G		No	Remove
349	<i>Populus alba</i>	White Poplar	X	2	19		19	3	3	G	G		No	Remove
350	<i>Populus alba</i>	White Poplar			31	25	19	6	12	G	G	3 stems	No	Remove
351	<i>Populus alba</i>	White Poplar			64		64	5	10	G	G		No	Remove
352	<i>Populus alba</i>	White Poplar			71		71	4	8	G	G		No	Remove
353	<i>Populus alba</i>	White Poplar			62		62	3	6	F	P		No	Remove
354	<i>Populus alba</i>	White Poplar			59		59	3	6	P	P		No	Remove
355	<i>Populus alba</i>	White Poplar			85		85	5	10	G	G		No	Remove
356	<i>Pinus sylvestris</i>	Scots Pine	X	3	65	63	128	4	8	G	G	2 stems	No	Remove
357	<i>Pinus sylvestris</i>	Scots Pine	X	4	51		51	3	6	F	F		No	Remove
358	<i>Pinus sylvestris</i>	Scots Pine	X	4	53		53	3	6	F	F		No	Remove
359	<i>Pinus sylvestris</i>	Scots Pine	X	3	59		59	3	6	F	F		No	Remove
360	<i>Pinus strobus</i>	Eastern White Pine	X	10	26		26	3	3	G	G		No	Retain
361	<i>Picea pungens</i>	Blue Spruce	X	10	19		19	3	3	G	G		No	Injure
362	<i>Picea pungens</i>	Blue Spruce	X	10	22		22	3	3	G	G		No	Injure
363	<i>Picea pungens</i>	Blue Spruce	X	10	17		17	3	3	G	G		No	Injure
364	<i>Picea pungens</i>	Blue Spruce	X	10	25		25	3	3	G	G		No	Injure
365	<i>Picea pungens</i>	Blue Spruce	X	10	21		21	3	3	G	G		No	Injure
366	<i>Picea glauca</i>	White Spruce	X	10	19		19	2	2	G	G		No	Injure
367	<i>Betula papyrifera</i>	Paper Birch	X	10	10		10	3	3	G	F		No	Retain
368	<i>Acer saccharinum</i>	Silver Maple	X	15	21		21	6	6	G	G		No	Retain
369	<i>Picea glauca</i>	White Spruce	X	10	32		32	3	6	G	G		No	Retain
370	<i>Picea glauca</i>	White Spruce	X	10	10		10	2	2	G	G		No	Retain
371	<i>Morus alba</i>	White Mulberry			17		17	2	2	G	G		No	Injure
372	<i>Picea pungens</i>	Blue Spruce			42		42	5	10	G	G		No	Retain
373	<i>Pinus nigra</i>	Austrian Pine	X	8	61		61	6	12	G	G		No	Remove
374	<i>Pinus nigra</i>	Austrian Pine	X	10	63		63	6	12	G	G		No	Remove
375	<i>Populus grandidentata</i>	Large-toothed Aspen			53		53	4	8	G	G		No	Remove
376	<i>Acer saccharinum</i>	Silver Maple			32		32	4	8	G	G		No	Remove
377	<i>Morus alba</i>	White Mulberry			21		21	3	3	G	G		No	Remove
378	<i>Acer saccharinum</i>	Silver Maple	X	5	31	26	57	4	8	G	G	2 stems	No	Remove
379	<i>Populus alba</i>	White Poplar			11		11	2	2	G	G		No	Remove
380	<i>Populus alba</i>	White Poplar			32		32	3	6	G	G		No	Remove
381	<i>Populus alba</i>	White Poplar			22		22	3	3	G	G		No	Remove
382	<i>Populus alba</i>	White Poplar			35		35	4	8	F	F		No	Remove
383	<i>Acer saccharinum</i>	Silver Maple			52		52	6	12	G	G		No	Remove
384	<i>Acer saccharinum</i>	Silver Maple			49	47	96	6	12	G	G	2 stems	No	Remove
385	<i>Acer saccharinum</i>	Silver Maple			50		50	6	12	G	G		No	Remove
386	<i>Acer saccharinum</i>	Silver Maple			102	52	154	6	12	G	G	2 stems	No	Remove

387	<i>Picea glauca</i>	White Spruce			19			19	2	2	G	F	No	Remove	
388	<i>Juniperus virginiana</i>	Eastern Red Cedar	X	5	20			20	2	2	G	G	No	Remove	
389	<i>Juniperus virginiana</i>	Eastern Red Cedar			10			10	2	2	G	G	No	Remove	
390	<i>Picea glauca</i>	White Spruce	X	6	35			35	3	6	G	G	Yes	Retain	
391	<i>Picea glauca</i>	White Spruce	X	6	36			36	3	6	G	G	Yes	Retain	
392	<i>Betula papyrifera</i>	Paper Birch	X	6	46			46	3	6	G	G	Yes	Retain	
393	<i>Picea glauca</i>	White Spruce	X	6	37			37	3	6	G	G	Yes	Retain	
394	<i>Picea glauca</i>	White Spruce	X		39			39	3	6	G	G	No	Retain	
395	<i>Picea glauca</i>	White Spruce			53			53	4	8	G	G	No	Retain	
396	<i>Thuja occidentalis</i>	Eastern White Cedar			13			13	1	1	G	G	No	Retain	
397	<i>Thuja occidentalis</i>	Eastern White Cedar			19			19	1	1	G	G	No	Retain	
398	<i>Thuja occidentalis</i>	Eastern White Cedar			32	29	25	86	2	4	P	G	3 stems	No	Retain
399	<i>Thuja occidentalis</i>	Eastern White Cedar			26	25		51	2	4	G	G	2 stems	No	Retain
400	<i>Thuja occidentalis</i>	Eastern White Cedar			28	27		55	2	4	G	G	2 stems	No	Retain
401	<i>Thuja occidentalis</i>	Eastern White Cedar			26			26	3	3	P	G		No	Retain
402	<i>Thuja occidentalis</i>	Eastern White Cedar			34			34	3	6	P	G		No	Retain
403	<i>Thuja occidentalis</i>	Eastern White Cedar			32			32	2	4	G	G		No	Retain
404	<i>Thuja occidentalis</i>	Eastern White Cedar			36			36	2	4	G	G		No	Retain
405	<i>Thuja occidentalis</i>	Eastern White Cedar			27			27	2	2	G	G		No	Retain
406	<i>Thuja occidentalis</i>	Eastern White Cedar			15			15	2	2	G	G		No	Retain
407	<i>Thuja occidentalis</i>	Eastern White Cedar			16			16	2	2	G	G		No	Retain
408	<i>Populus grandidentata</i>	Large-toothed Aspen	X	12	98			98	6	12	F	P	No	Retain	
409	<i>Malus Sp.</i>	Ornamental Crabapple Tree	X	3	23	17	10	50	4	8	G	G	3 stems	No	Injure
410	<i>Gleditsia triacanthos</i>	Honey Locust	X	3	41			41	3	6	G	F	Yes	Injure	
411	<i>Gleditsia triacanthos</i>	Honey Locust	X	3	39			39	3	6	G	F	Yes	Injure	
412	<i>Betula papyrifera</i>	Paper Birch	X	3	13	12	10	35	3	6	G	G	3 stems	Yes	Injure
413	<i>Betula papyrifera</i>	Paper Birch			27			27	4	4	G	G		Yes	Remove
414	<i>Betula papyrifera</i>	Paper Birch			13	12		25	3	3	G	G	2 stems	Yes	Remove
415	<i>Betula papyrifera</i>	Paper Birch	X	2	15			15	3	3	G	G		Yes	Injure
416	<i>Betula papyrifera</i>	Paper Birch	X	2	14			14	3	3	G	G		Yes	Injure
417	<i>Acer platanoides</i>	Norway Maple			32			32	4	8	G	G		Yes	Injure
418	<i>Acer negundo</i>	Manitoba Maple			45			45	4	8	P	P		Yes	Injure
419	<i>Acer negundo</i>	Manitoba Maple			31			31	3	6	P	P		Yes	Remove
420	<i>Acer saccharinum</i>	Silver Maple			32	9	8	49	3	6	G	G	3 stems	Yes	Remove
421	<i>Acer platanoides</i>	Norway Maple			11	10		21	3	3	G	G	2 stems	Yes	Remove
422	<i>Malus Sp.</i>	Ornamental Crabapple Tree			27			27	3	3	G	G		Yes	Remove
423	<i>Salix species</i>	Willow Species			65	54		119	6	12	G	G	2 stems	Yes	Remove
424	<i>Fraxinus americana</i>	White Ash			15	14		29	2	2	P	P	2 stems	Yes	Remove

## Appendix C: Tree Inventory Table

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425	<i>Acer negundo</i>	Manitoba Maple	X	3	21		21	3	3	G	F		Yes	Remove
426	<i>Fraxinus americana</i>	White Ash	X	6	25		25	2	2	P	P		Yes	Remove
427	<i>Salix species</i>	Willow Species	X	6	36		36	3	6	G	G		Yes	Remove
428	<i>Juglans nigra</i>	Black Walnut			17		17	2	2	P	P		Yes	Remove
429	<i>Juglans nigra</i>	Black Walnut			16		16	3	3	G	G		Yes	Remove
430	<i>Salix species</i>	Willow Species	X	6	36	29	65	4	8	G	G	2 stems	Yes	Remove
431	<i>Salix species</i>	Willow Species	X	6	37		37	4	8	G	G		Yes	Remove
432	<i>Salix species</i>	Willow Species	X	6	36		36	4	8	G	G		Yes	Remove
433	<i>Acer negundo</i>	Manitoba Maple			12		12	3	3	G	G		Yes	Remove
434	<i>Acer negundo</i>	Manitoba Maple			19		19	3	3	G	G		Yes	Remove
435	<i>Carya cordiformis</i>	Bitternut Hickory			92		92	4	8	G	G		Yes	Remove
436	<i>Carya cordiformis</i>	Bitternut Hickory			103		103	6	12	G	G		Yes	Remove
437	<i>Elaeagnus angustifolia</i>	Russian Olive			11		11	3	3	F	G		Yes	Remove
438	<i>Salix species</i>	Willow Species			22	19	41	3	6	G	G	2 stems	No	Remove
468	<i>Populus tremuloides</i>	Trembling Aspen			25		25	4	4	G	G		No	Remove
469	<i>Salix babylonica</i>	Weeping Willow	X	20	60		60	8	16	G	G		No	Retain
470	<i>Salix babylonica</i>	Weeping Willow	X	20	42		42	8	16	G	G		No	Retain
471	<i>Salix babylonica</i>	Weeping Willow	X	20	72		72	8	16	G	G		No	Retain
472	<i>Acer platanoides</i>	Norway Maple			30	29	59	4	8	G	G	2 stems	No	Remove
473	<i>Fraxinus americana</i>	White Ash			4		4	2	2	D	D		No	Remove
474	<i>Acer platanoides</i>	Norway Maple			19		19	3	3	G	G		No	Remove
475	<i>Acer saccharinum</i>	Silver Maple			43		43	4	8	G	G		No	Remove
476	<i>Pinus nigra</i>	Austrian Pine			23		23	3	3	G	G		No	Remove
477	<i>Pinus nigra</i>	Austrian Pine			44		44	4	8	G	G		No	Remove
478	<i>Acer platanoides</i>	Norway Maple			23		23	3	3	F	F		No	Remove
479	<i>Pinus nigra</i>	Austrian Pine			33		33	3	6	G	G		No	Remove
480	<i>Pinus nigra</i>	Austrian Pine			39		39	2	4	G	G		No	Remove
481	<i>Pinus nigra</i>	Austrian Pine			42		42	3	6	G	G		No	Remove
482	<i>Pinus nigra</i>	Austrian Pine			33		33	3	6	G	G		No	Remove
483	<i>Acer saccharinum</i>	Silver Maple			123		123	6	12	G	G		No	Remove
484	<i>Acer saccharinum</i>	Silver Maple			90		90	4	8	P	P		No	Remove
485	<i>Pinus nigra</i>	Austrian Pine			34		34	4	8	G	G		No	Remove
486	<i>Pinus nigra</i>	Austrian Pine			41		41	5	10	G	G		No	Remove
487	<i>Acer platanoides</i>	Norway Maple			29		29	3	3	G	G		No	Remove
488	<i>Fraxinus americana</i>	White Ash			23		23	1	1	D	D		No	Remove
489	<i>Pinus nigra</i>	Austrian Pine	X	15	23		23	3	3	G	G		No	Remove
490	<i>Pinus nigra</i>	Austrian Pine	X	16	26		26	3	3	G	G		No	Remove
491	<i>Malus Sp.</i>	Ornamental Crabapple Tree	X	15	27		27	4	4	G	G		No	Remove
492	<i>Elaeagnus angustifolia</i>	Russian Olive			15	14	29	3	3	G	G	2 stems	No	Remove

493	<i>Picea glauca</i>	White Spruce	X	5	21		21	3	3	G	G		No	Remove
494	<i>Picea glauca</i>	White Spruce	X	6	31		31	3	6	G	G		No	Remove
495	<i>Pinus nigra</i>	Austrian Pine	X	4	51		51	3	6	G	G		Yes	Remove
496	<i>Pinus nigra</i>	Austrian Pine	X	6	49		49	2	4	G	G		Yes	Remove
497	<i>Pinus nigra</i>	Austrian Pine	X	4	62		62	3	6	G	G		Yes	Remove
498	<i>Pinus nigra</i>	Austrian Pine	X	4	50		50	3	6	G	G		Yes	Remove
499	<i>Tilia americana</i>	American Basswood	X	3	42	36	78	5	10	F	F	2 stems	Yes	Remove
500	<i>Picea glauca</i>	White Spruce	X	4	50		50	2	4	F	F		Yes	Remove
501	<i>Picea glauca</i>	White Spruce	X	1	29		29	5	5	G	G		Yes	Remove
502	<i>Picea glauca</i>	White Spruce	X	3	30		30	2	4	G	G		Yes	Remove
503	<i>Ulmus americana</i>	American Elm	X	4	30		30	4	8	F	P		Yes	Remove
504	<i>Acer saccharinum</i>	Silver Maple	X	15	41		41	3	6	G	G		Yes	Remove
505	<i>Acer saccharinum</i>	Silver Maple	X	15	42	33	75	4	8	G	G	2 stems	Yes	Remove
506	<i>Pinus nigra</i>	Austrian Pine	X	10	25		25	3	3	G	G		No	Remove
507	<i>Pinus nigra</i>	Austrian Pine	X	12	25		25	3	3	G	G		No	Injure
508	<i>Pinus nigra</i>	Austrian Pine	X	14	25		25	3	3	G	G		No	Injure
509	<i>Pinus nigra</i>	Austrian Pine	X	15	25		25	3	3	G	G		No	Retain
510	<i>Picea glauca</i>	White Spruce	X	12	25		25	3	3	G	G		No	Remove
511	<i>Picea glauca</i>	White Spruce	X	13	25		25	3	3	G	G		No	Remove
512	<i>Juglans nigra</i>	Black Walnut	X	14	25		25	3	3	P	P		No	Remove
513	<i>Pinus nigra</i>	Austrian Pine	X	15	30		30	3	6	G	G		Yes	Remove
514	<i>Pinus nigra</i>	Austrian Pine	X	16	30		30	3	6	G	G		Yes	Remove
515	<i>Pinus nigra</i>	Austrian Pine	X	17	30		30	3	6	G	G		Yes	Remove
516	<i>Salix species</i>	Willow Species	X	16	25		25	3	3	G	G		Yes	Remove
517	<i>Juniperus virginiana</i>	Eastern Red Cedar	X	16	15		15	3	3	G	G		No	Retain
518	<i>Acer platanoides</i>	Norway Maple	X	17	23		23	4	4	G	G		No	Retain
519	<i>Picea pungens</i>	Blue Spruce	X	15	30		30	3	6	G	G		No	Retain
520	<i>Picea pungens</i>	Blue Spruce	X	15	30		30	3	6	G	G		No	Retain
521	<i>Pinus nigra</i>	Austrian Pine	X	15	25		25	2	2	G	G		No	Retain
802	<i>Fraxinus americana</i>	White Ash			46		46	2	4	P	P		Yes	Remove
803	<i>Acer negundo</i>	Manitoba Maple			25		25	4	4	G	G		Yes	Remove
804	<i>Acer negundo</i>	Manitoba Maple			34		34	4	8	G	G		Yes	Remove
805	<i>Acer negundo</i>	Manitoba Maple			12		12	3	3	G	G		Yes	Remove
806	<i>Acer negundo</i>	Manitoba Maple			27		27	4	4	G	G		Yes	Remove
807	<i>Acer negundo</i>	Manitoba Maple			30		30	4	8	G	G		Yes	Remove
808	<i>Acer negundo</i>	Manitoba Maple			39		39	5	10	G	G		Yes	Remove
809	<i>Acer negundo</i>	Manitoba Maple			33		33	4	8	G	G		Yes	Remove
810	<i>Acer negundo</i>	Manitoba Maple			24	10	34	4	8	G	G	2 stems	Yes	Remove
811	<i>Acer negundo</i>	Manitoba Maple			26		26	4	4	G	G		Yes	Remove
812	<i>Acer negundo</i>	Manitoba Maple			27		27	3	3	F	F		Yes	Remove

813	<i>Acer negundo</i>	Manitoba Maple	20		20	3	3	G	G		Yes	Remove	
814	<i>Acer negundo</i>	Manitoba Maple	32		32	4	8	G	G		Yes	Remove	
815	<i>Acer negundo</i>	Manitoba Maple	19		19	3	3	G	G		Yes	Remove	
816	<i>Acer negundo</i>	Manitoba Maple	15		15	3	3	G	G		Yes	Remove	
817	<i>Acer negundo</i>	Manitoba Maple	26		26	4	4	G	G		Yes	Remove	
818	<i>Acer negundo</i>	Manitoba Maple	15		15	3	3	G	G		Yes	Remove	
819	<i>Acer negundo</i>	Manitoba Maple	22		22	4	4	G	G		Yes	Remove	
820	<i>Acer negundo</i>	Manitoba Maple	27		27	4	4	G	G		Yes	Remove	
821	<i>Acer negundo</i>	Manitoba Maple	35	27	62	5	10	G	G	2 stems	Yes	Remove	
822	<i>Acer negundo</i>	Manitoba Maple	26		26	4	4	G	G		Yes	Remove	
823	<i>Acer negundo</i>	Manitoba Maple	24		24	4	4	G	G		Yes	Remove	
824	<i>Acer negundo</i>	Manitoba Maple	35		35	5	10	F	G		Yes	Remove	
825	<i>Acer negundo</i>	Manitoba Maple	29		29	4	4	G	G		Yes	Remove	
826	<i>Acer negundo</i>	Manitoba Maple	30	27	57	6	12	F	F	2 stems	Yes	Remove	
827	<i>Acer negundo</i>	Manitoba Maple	27	25	19	71	5	10	F	G	3 stems	Yes	Retain
828	<i>Acer negundo</i>	Manitoba Maple	31		31	4	8	F	F		Yes	Remove	
829	<i>Acer negundo</i>	Manitoba Maple	19		19	3	3	G	G		Yes	Remove	
830	<i>Juglans nigra</i>	Black Walnut	12		12	3	3	G	G		Yes	Remove	
831	<i>Malus Sp.</i>	Ornamental Crabapple Tree	11		11	2	2	G	G		Yes	Remove	
832	<i>Fraxinus americana</i>	White Ash	17		17	2	2	P	P		Yes	Remove	
833	<i>Acer negundo</i>	Manitoba Maple	24		24	4	4	G	G		Yes	Remove	
834	<i>Fraxinus americana</i>	White Ash	34		34	3	6	P	P		Yes	Remove	
835	<i>Fraxinus americana</i>	White Ash	10		10	2	2	G	G		Yes	Remove	
836	<i>Acer negundo</i>	Manitoba Maple	24		24	4	4	G	G		Yes	Retain	
837	<i>Acer negundo</i>	Manitoba Maple	35		35	4	8	F	G		Yes	Remove	
838	<i>Acer negundo</i>	Manitoba Maple	27		27	4	4	F	G		Yes	Remove	
839	<i>Fraxinus americana</i>	White Ash	15		15	2	2	P	P		Yes	Remove	
840	<i>Acer negundo</i>	Manitoba Maple	21		21	3	3	G	G		Yes	Remove	
841	<i>Acer negundo</i>	Manitoba Maple	22	19	41	4	8	G	G	2 stems	Yes	Remove	
842	<i>Salix species</i>	Willow Species	52		52	4	8	G	G		Yes	Remove	
843	<i>Acer negundo</i>	Manitoba Maple	15		15	2	2	G	G		Yes	Remove	
844	<i>Salix species</i>	Willow Species	26		26	3	3	G	G		Yes	Remove	
845	<i>Salix species</i>	Willow Species	28		28	3	3	F	G		Yes	Remove	
846	<i>Salix species</i>	Willow Species	105	80	185	6	12	F	G	2 stems	Yes	Remove	
847	<i>Salix species</i>	Willow Species	92		92	5	10	P	G		Yes	Remove	
848	<i>Acer negundo</i>	Manitoba Maple	14		14	2	2	G	G		Yes	Remove	
849	<i>Acer negundo</i>	Manitoba Maple	42		42	4	8	G	G		Yes	Remove	
850	<i>Acer negundo</i>	Manitoba Maple	30		30	3	6	G	G		Yes	Remove	
851	<i>Salix species</i>	Willow Species	45	46	47	138	6	12	G	G	3 stems	Yes	Remove

Appendix C: Tree Inventory Table

TP115086

852	<i>Acer negundo</i>	Manitoba Maple	10		10	2	2	G	G		Yes	Remove
853	<i>Salix species</i>	Willow Species	32	27	59	4	8	G	G	2 stems	Yes	Remove
854	<i>Salix species</i>	Willow Species	23	22	45	2	4	G	G	2 stems	Yes	Remove
855	<i>Salix species</i>	Willow Species	33	29	27	89	4	8	G	G	Yes	Remove
856	<i>Salix species</i>	Willow Species	28		28	3	3	G	G		Yes	Retain



**wood.**

## **Appendix D: Site Photograph Log**

Appendix D

**Project Photos**

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

 A photograph showing a two-lane asphalt road with a white shoulder on the left. A black car is driving away in the right lane. The left side of the road is lined with tall grasses and some trees. The sky is clear and blue.	<p>Trees along Coleraine Drive, south of Coleraine Drive's intersection with Countryside Drive, facing north.</p>
 A photograph of a wooded area with a concrete barrier in the foreground. The trees are mostly evergreens and some deciduous trees with green leaves. The sky is blue with some light clouds.	<p>Trees along the west side Coleraine Drive, south of Coleraine Drive's intersection with Countryside Drive, facing south.</p>
 A photograph of a large, flat, open field, likely a field of dry grass or a recently harvested field. The field is brown and stretches to the horizon under a blue sky with white clouds.	<p>Vegetation in the ROW of the east-west Arterial road between Countryside Drive and Castlemore Road.</p>

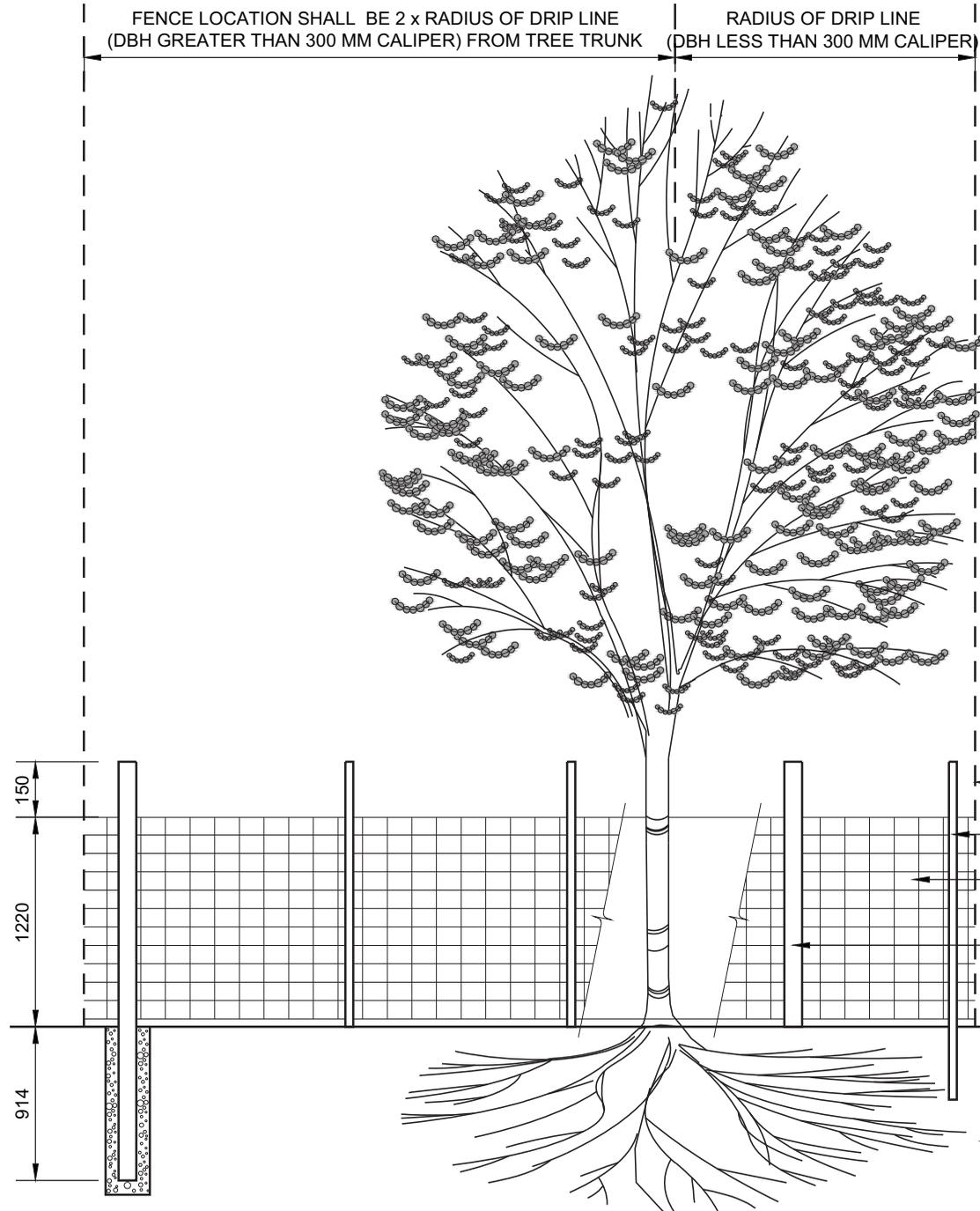
	<p>Vegetation within the ROW of the new intersection of the east-west Arterial road and Arterial A2 near Highway 50.</p>
	<p>Vegetation around a swim pond in the north south section of the new Arterial A2 road</p>
	<p>Vegetation within a hedgerow the north south section of the new Arterial A2 road, near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

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



**wood.**

**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 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.

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**ENVIRONMENTAL PROTECTION**

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**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.

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**ENVIRONMENTAL PROTECTION**

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**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.

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**ENVIRONMENTAL PROTECTION**

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**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 15<sup>th</sup> and September 15<sup>th</sup> 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.

**ENVIRONMENTAL PROTECTION**

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- .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**

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**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 <a href="#">01561</a> | Environmental Protection            |
| .3 | Section <a href="#">02231</a> | Clearing & Grubbing                 |
| .4 | Section <a href="#">02232</a> | Tree Pruning                        |
| .5 | Section <a href="#">02311</a> | Site Grading                        |
| .6 | Section <a href="#">02315</a> | Excavating, Trenching & Backfilling |
| .7 | Section <a href="#">02911</a> | 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.

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**TREE & SHRUB PRESERVATION**

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- .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.

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**TREE & SHRUB PRESERVATION**

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- .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 to 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 practices 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 damaged 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**

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**TREE PRUNING**

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**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.

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**TREE PRUNING**

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**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.

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**TREE PRUNING**

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- .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:

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**TREE PRUNING**

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- .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):

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**TREE PRUNING**

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- .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

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**TREE PRUNING**

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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**

**Appendix D Bat Detector  
Photos**

Appendix D – Photos



Detector 61 Placement



Detector 65 Placement



Detector 70 Placement

## **Appendix E Species Lists**

## 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 E1**  
**Flora Species List**

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

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

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

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

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

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

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

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

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

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

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

**Appendix E2**  
**Fauna- Bird Species List**

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

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

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

**Appendix E3**  
**Fauna- Mammal Species List**

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

**Appendix E4**  
**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	<i>Lithobates catesbeiana</i>	G5	S4			x				x
American Toad	<i>Anaxyrus americanus</i>	G5	S5			x			x	x
Eastern Gartersnake	<i>Thamnophis sirtalis sirtalis</i>	G5T5	S5			x			x	
Eastern Red-backed Salamander	<i>Plethodon cinereus</i>	G5	S5			x				
Eastern Ribbonsnake	<i>Thamnophis sauritus</i>	G5	S5	SC	SC	x				
Gray Treefrog	<i>Hyla versicolor</i>	G5	S5			x				x
Green Frog	<i>Lithobates clamitans</i>	G5	S5			x			x	x
Midland Painted Turtle	<i>Chrysemys picta marginata</i>	G5T5	S4			x				
Milksnake	<i>Lampropeltis triangulum</i>	G5	S4	SC		x				
Northern Leopard Frog	<i>Lithobates pipiens</i>	G5	S5			x			x	x
Northern Map Turtle	<i>Graptemys geographica</i>	G5	S3	SC	SC	x				
Red-bellied Snake	<i>Storeria occipitomaculata</i>	G5	S5			x				
Red-eared Slider	<i>Trachemys scripta</i>	G5	SNA			x				
Eastern Newt	<i>Notophthalmus viridescens</i>	G5	S5			x				
Snapping Turtle	<i>Chelydra serpentina</i>	G5	S3	SC		x		x	x	
Spotted Salamander	<i>Ambystoma maculatum</i>	G5	S4			x				
Spring Peeper	<i>Pseudacris crucifer</i>	G5	S5			x				
Western Chorus Frog (Great Lakes/St. Lawrence-Canadian Shield Population)	<i>Pseudacris triseriata</i>	G5TNR	S3	THR		x				
Wood Frog	<i>Lithobates sylvatica</i>	G5	S5			x				x

**Appendix E5**  
**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	<i>Danaus plexippus</i>	G4	S2N,S4B	SC	SC			x	x
Digger Crayfish OR Calico Crayfish	<i>Creaserinus fodiens</i> OR <i>Faxonius immunis</i>	G5 OR G5	S3 OR S4					x	
Giant Floater	<i>Pyganodon grandis</i>	G5	G5	S5				x	
Cylindrical Papershell	<i>Anodontoides ferussacianus</i>	G5	G5	S4				x	
Eastern Elliptio	<i>Elliptio complanata</i>	G5	G5	S5				x	
Blackchin Shiner	<i>Notropis heterodon</i>	G5	G5	S5			x	x	
Blacknose Dace	<i>Rhinichthys atratulus</i>	G5	G5	S5	x		x	x	
Bluntnose Minnow	<i>Pimephales notatus</i>	G5	G5	S5	x			x	
Brook Stickleback	<i>Culaea inconstans</i>	G5	G5	S5	x		x	x	
Creek Chub	<i>Semotilus atromaculatus</i>	G5	G5	S5	x		x	x	
Fantail Darter	<i>Etheostoma flabellare</i>	G5	G5	S5			x	x	
Fathead Minnow	<i>Pimephales promelas</i>	G5	G5	S5	x		x	x	
Johnny Darter	<i>Etheostoma nigrum</i>	G5	G5	S5	x			x	
Longnose Dace	<i>Rhinichthys cataractae</i>	G5	G5	S5			x	x	
Northern Hogsucker	<i>Hypentelium nigricans</i>	G5	G5	S4			x	x	
Northern Pearl Dace	<i>Margariscus nachtriebi</i>	G5	G5	S5			x	x	
Pumpkinseed	<i>Lepomis gibbosus</i>	G5	G5	S5	x			x	
White Sucker	<i>Catostomus commersonii</i>	G5	G5	S5	x			x	