Preliminary Design: Widening of Mississauga Road – Financial Drive to Queen Street West

Terrestrial Habitat Existing Conditions Report
TP115085

Prepared for:

The Regional Municipality of Peel

10 Peel Centre Drive, Suite A, Brampton, Ontario, L5Y 4B9

December 2018

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10 Peel Centre Drive, Suite A, Brampton, Ontario, L5Y 4B9

Prepared by:

Wood Environment & Infrastructure Solutions
a Division of Wood Canada Limited
160 Traders Blvd. E., Suite 110
Mississauga, Ontario, L4Z 3K7
Canada
T: (905) 568-2929
November 2018

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Executive Summary

To meet existing and future needs the Region of Peel is proposing the widening of approximately 2km of Mississauga Road (Regional Road 1) extending from 300 m north of Financial Drive to 300 m north of Queen Street West (Regional Road 6) and will be classified as a Schedule 'C' Municipal Class Environmental Assessment (EA).

Mississauga Road is a north-south arterial road under the jurisdiction of the Regional Municipality of Peel; it supports a considerable volume of commuter and truck traffic and is designated as a Primary Truck Route in the Region of Peel. This Terrestrial Habitat Existing Conditions Report will facilitate the preparation of an Environmental Study Report for the project and aid in the completion of the Municipal Class EA process. Based on the background information derived from secondary source information and field investigations, potential environmental effects from the project works have been identified and measures to mitigate these effects are identified.

The project area is under the jurisdiction of the Credit Valley Conservation Authority and the Aurora District Ministry of Natural Resources and Forestry. This report provides a summary of terrestrial existing conditions from both secondary source information and field investigations conducted on June 9, June 27 and September 30, 2016. Correspondence with Ministry of Natural Resources reports 16 Species at Risk have been recorded in the vicinity of the 4.5 km linear project area, 15 of which are terrestrial or semi-terrestrial. In addition to SAR concerns, the MNRF has provided a list of five natural heritage features that occur within the project area.

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1.0 Project Overview

To meet existing and future needs the Region of Peel is proposing the widening of approximately 2 km of Mississauga Road (Regional Road 1) extending from 300 m north of Financial Drive to 300 m north of Queen Street West (Regional Road 6). Wood Environment & Infrastructure Solutions, a Division of Wood Canada Limited (Wood) (previously Amec Foster Wheeler Environment & Infrastructure) has been retained to undertake the required Schedule 'C' Municipal Class EA for the proposed widening of Mississauga Road. This Terrestrial Habitat Existing Conditions Report will facilitate the preparation of an Environmental Study Report (ESR) for the project and aid in the completion of the Municipal Class EA Process.

1.1 Study Area

Mississauga Road is a north-south arterial road under the jurisdiction of the Regional Municipality of Peel. The study area extends from 300 m north of Financial Drive to 300 m north of Queen Street West (Regional Road 6) within the City of Brampton and includes the adjacent lands extending 120 m into the right-of-way (ROW) (Figure 1-1).

Path: P:\2015\Projects_Other\TP115085_Region of Peel_Widening of Mississauga Road\09_GIS\MXD\Aquatic_Project_Location_4.mxd, Author: Sandra.Marquez, modified by romer.abalos, 26 November 2018

LEGEND

- Watercourse Crossing
- Cross Drainage
- Project Location
- Permanent Watercourse
- Intermittent Watercourse
- Culvert / Bridge

NOTES:
- Background imagery from City of Brampton, Spring 2016
- Topographic features extracted from LIO, MNRF.

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MISSISSAUGA ROAD WIDENING PROJECT

Project Location

Datum & Projection: NAD 1983 UTM Zone 17N

0 0.2 0.4 0.6 0.8 1 Kilometres

N W E S

PROJECT N°: TP115085 | **FIGURE: 1-1**

SCALE: 1:10,000 | DATE: November 2018

2.0 Methodology

The terrestrial study area for the purpose of field investigation is described above in Section 1.1. Secondary source and data from field investigations were used to map vegetation communities and compile inventories of plant and wildlife species.

2.1 Secondary Source Review

Secondary sources and databases were reviewed to ascertain plant and wildlife species present in the project study area. Information provided by external agencies, publicly-available topographic data, and correspondence with external agencies allowed for assessment of Areas of Natural or Scientific Interest (ANSI), Environmentally Sensitive Areas (ESA), Provincially Significant Wetlands (PSW), other natural heritage features and Species at Risk (SAR) located within or adjacent to the project area. Sources reviewed include:

- Credit Valley Conservation (CVC) publications and online data
  - CVC website (CVC 2016)
- Reporting for projects conducted in the area
  - Natural Heritage Report: Mississauga Road from Queen Street to Bovaird Drive (LGL 2006)
- Correspondence with CVC and MNRF (Aurora district) (Appendix A)
- Environment Canada's Species at Risk Public Registry databased (EC 2016)
- The Ministry of Natural Resources (MNRF) Species at Risk in Ontario List (MNRF 2016)
- Species occurrence and natural areas records of the Ministry of Natural Resources' (MNRF) Natural Heritage Information Centre (NHIC) 2010 database 1 km2 search blocks encompassing the project area (17NJ96_32, 17NJ96_33, 17NJ97_32 and 17NJ97_33) (MNRF 2016)
- The Ontario Reptiles and Amphibian Atlas (ORAA) (Ontario Nature 2016)
- The Atlas of the Mammals of Ontario (AMO) (Dobbyn 1994)
- Bat species profiles and range maps for the province of Ontario provided by Bat Conservation International, Inc. (BCI 2016)
- The Second Atlas (2001-2005) of Breeding Birds of Ontario (ABBO) 10 x 10 km survey square 17NJ93 within Region 10 (Cadman et al. 2007)
- Topographic data extracted from Land Information Ontario
- Complementary topographic data from the Regional Municipality of Peel and Mississauga City under an Open Data License.

2.2 Field Surveys

To augment the secondary source review, Amec Foster Wheeler staff conducted terrestrial field investigations on June 9, June 27 and September 30, 2016. Data collected, in addition to photo records (Appendix B) is divided into the following sub-sections.

2.2.1 Vegetation Communities

Site investigations included identifying and mapping Ecological Land Classifications (ELC) (Lee et al. 1998) for accessible vegetation units within the study area. Boundaries of each distinct vegetation unit were delineated on maps.

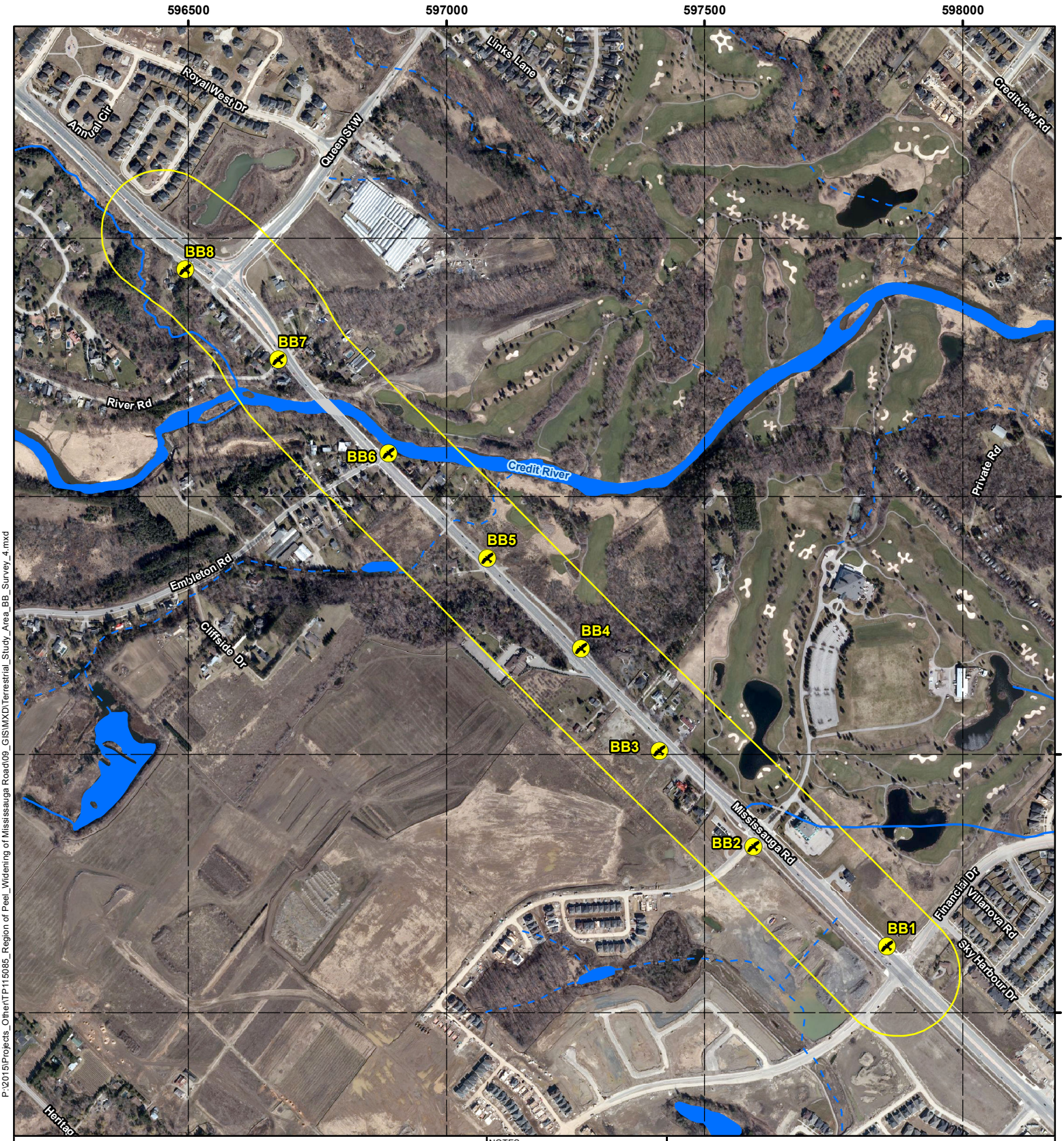
2.2.2 Wildlife

Breeding bird surveys were undertaken in accordance with the protocols described for the ABBO (Cadman et al. 2007). The protocol was modified slightly to include counts of 10 minutes in duration. Surveys were completed on June 9 and 27, 2016 between sunrise and 10:00 am at eight point count locations (Figure 2-1). All bird surveys were undertaken in good weather with warm temperatures, not precipitation and little or no wind. Species were identified through their unique vocalisations and visual observations.

No formal surveys were conducted for mammals, reptiles or amphibians. Additional wildlife searches were undertaken concurrently with other field investigations and included direct sightings and evidence such as prints, scat or significant wildlife habitat attributes such as vernal pooling, dens, burrows and tree cavities.

2.3 Species of Conservation Concern

Species of conservation concern include SAR and provincially rare species. A secondary source review was undertaken to determine any species of conservation concern had previously been recorded in the vicinity of the project area. Professional opinion utilized this information, and habitat knowledge, to determine whether these species are likely to occur within the project study area.



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LEGEND

- Breeding Bird Survey Locations
- Study Area (120m Buffer)
- Permanent Watercourse
- Intermittent Watercourse
- Culvert / Bridge

NOTES:
- Background imagery from City of Brampton, Spring 2016
- Topographic features extracted from LIO, MNRF.

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MISSISSAUGA ROAD WIDENING PROJECT

Survey Station Locations

Datum & Projection: NAD 1983 UTM Zone 17N

0 0.2 0.4 0.6 0.8 1 Kilometres

N W E S

PROJECT N°: TP115085

FIGURE: 2-1

SCALE: 1:10,000

DATE: November 2018

3.0 Results

3.1 Secondary Source Review

3.1.1 Vegetation Communities and Habitat

The Natural Heritage Report (LGL, 2006) notes that land use in the surrounding area is predominantly anthropogenic with extensive agriculture and residential land uses. The main natural/semi natural vegetated areas are generally associated with the watercourses throughout the study areas.

No rare plant species were observed during LGL field investigations and the majority of the plant species recorded are non-native. Four plant species of conservation concern are identified as being present within 1 km of the study area based on NHIC elemental occurrences. Three of these species are historic observations; Twisted Sedge (Carex torta, 1910), Honey Locust (Gleditsia triacanthos, 1911) and Northern Hawthorn (*Crataegus dissona, 1982*). The historical nature of these records indicate that the species are no longer viable and probability of occurrence within the study area is extremely low. Butternut (*Juglans cinerea*) was recorded in 2005 (MNR 2016b) though field investigations from within the Right-of-way by an Amec Foster Wheeler terrestrial biologist did not report finding this species within the study area. It is possible this species may be present outside of the Right-of-way within the study area.

3.1.2 Wildlife

Inventories of wildlife (Appendix C) were compiled from available literature and resources (listed in Section 2.1). Based on a review of background information, 161 species of birds, 44 species of mammals, 8 species of amphibians and 5 species of reptiles are reported to occur with the natural heritage squares encompassing the study area.

3.1.2.1 Birds

Within the vicinity of the project area 160 species of birds were reported in the Second addition of the ABBO (Cadman et al. 2007). It is important to note that the exact locations of species occurrences are not available from the atlas and are instead recorded from point count locations within the 10 x 10 km square encompassing the study area. Consequently, it is not certain that these species or their habitats are present within the more focused study area or surrounding area of Mississauga Road.

MNRF correspondence indicated four avian species are present within the vicinity of the study area and another two avian species have the potential to be present within the study area. The four species confirmed as present within the vicinity of the study area are; Eastern Meadow Lark (*Sturnella magna*), Bobolink (*Dolichonyx oryzivorus*), Chimney Swift (*Chaetura pelagica*) and Barn Swallow (*Hirundo rustica*). All of these species were also recorded in the ABBO or as an NHIC element occurrence. The two SAR which are reported as potentially present within the study area are Bank Swallow (*Riparia riparia*) and Peregrine Falcon (*Falco peregrinus*); of these only Bank Swallow has been recorded in the reviewed secondary sources.

Of the species reported to be present in the vicinity of the project study area, 21 of the 161 bird species recorded are of conservation concern (Section 3.1.3) with 33 species on the Ontario Partners in Flight (2008) priority species list (Appendix C).

3.1.2.2 Mammals

In total, 44 species of mammals were found to occur within the study area. This data was gathered from ranges maps in the AMO (Dobbyn 1994), and bat data has been supplemented by Bat Conservation International Inc. records (BCI 2016). Of the species reported to be present in the vicinity of the project study area, 4 of the 44 mammal species are of conservations concern (Section 3.1.3).

3.1.2.3 Reptiles and Amphibians

A review of the ORAA map indicated five species of reptiles and eight species of amphibians have been observed within the natural heritage square which encompasses the study area (Ontario Nature 2016). One reptile species is ranked a species of conservation concern (Section 3.1.3). It is important to note that the exact locations of these species records are not available through the ORAA and are instead recorded from point count locations within the 10 x 10 km square encompassing the study area. Consequently, it is not certain that these species or their habitats are present within the more focused study area or surrounding the Mississauga Road area.

3.1.3 Species at Risk and Provincially Rare Species

In Ontario, SAR are listed for 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). SAR and their critical habitat are regulated by the provincial *Endangered Species Act*, *2007* (*ESA*) and the federal *Species at Risk Act, 2003* (*SARA*).

In Ontario, if a species is listed under the *ESA* as Extirpated, Endangered or Threatened, 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 Section 9 and 10 of the *ESA*.

Provincially rare species are those with a provincial rank of S1, S2 or S3 and considered provincially vulnerable to provincially imperiled. Provincially rare species are tracked by the NHIC and are not protected under *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.

Secondary source review revealed the historic presence of 5 plant species, 21 bird species, 4 mammal species and 3 reptile SAR / provincially rare species documented within the vicinity of the study area (MNRF Correspondence, MNRF 2016b, Cadman et al. 2007, BCI 2013, Dobbyn 1994, Ontario Nature 2016). It is important to note that the exact locations of these species are not available through the reviewed sources. As a result, it is unknown if these species are present within the study area with the exception of the species MNRF confirmed were recorded from the study area and two bird species which were reported during Amec Foster Wheeler field investigations.

MNRF has confirmed that nine terrestrial SAR were recorded from the study area; two plant species, four bird species and three reptile species (Appendix A). Additionally six SAR have the potential to occur within the study area; three mammal species, two bird species and one invertebrate. NHIC searches within the

four natural heritage squares (1 km x 1 km) which encompass the study area indicate the potential presence of three additional plant species and two invertebrates which are provincially rare.

Previous field investigations completed immediately north of the study area did not report any plant or wildlife SAR or any species present which were not indicated by previously listed secondary sources (LGL 2006).

3.1.3.1 Birds

MNRF records report the presence of four avian SAR: Eastern Meadowlark (*Sturnella magna*, provincially Threatened status), Bobolink (*Dolichonyx oryzivorus*, provincially Threatened status), Chimney Swift (*Chaetura pelagica*, provincially and federally Threatened status) and Barn Swallow (*Hirundo rustica*, provincially Threatened status) within or adjacent to the study area (Appendix A). NHIC records also indicate the presence of Eastern Meadowlark within the vicinity of the study area. In addition to these recorded species MNRF correspondence indicates the potential for Bank Swallow (*Riparia riparia*) and Peregrine Falcon (*Falco peregrinus*) to be present within or adjacent to the study area as they have been observed in the wider region.

There are an additional 15 bird species recorded within the applicable ABBO 10 km square (Cadman et al. 2007) around the study area that are ranked as conservation concern – Western Meadlowlark (*Sturnella neglecta*), Henslow's Sparrow (*Ammodramus henslowii*), Yellow-breasted Chat (*Icteria virens*), Louisiana Waterthrush (*Parkesia motacilla*), Canada Warbler (*Cardellina canadensis*), Golden-winged Warbler (*Vermivora chrysoptera*), Wood Thrush (*Hylocichla mustelina*), Eastern Wood-pewee (*Contopus virens*), Olive-sided Flycatcher (*Contopus cooperi*), Red-headed Woodpecker (*Melanerpes erythrocephalus*), Eastern Whip-poor-will (*Antrostomus vociferus*), Common Nighthawk (*Chordeiles minor*), Black Tern (*Chlidonias niger*), Wilson's Phalarope (*Phalaropus tricolor*) and Northern Bobwhite (*Colinus virginianus*). See the compiled species list (Appendix C) for provincial rankings and SAR statuses. Including all avian species potentially present within the study area, twenty species are provincially ranked Endangered (3), Threatened (7) or Special Concern (10) under the *ESA*, fourteen of which are also Endangered (2), Threatened (9) or Special Concern (3) under *SARA*.

Also of high importance is the protection of bird species which are listed as "priority species" by the Ontario Partners in Flight (2008). See Appendix C for species from the priority species list, which were reported within the study area by Amec Foster Wheeler field staff during the June 2016 field investigations. A total of 33 "priority species" have the potential to be present within the study area.

Further information on those species confirmed to be in the vicinity of the study area by MNRF correspondence and NHIC searches, and the probability of their occurrence in the study area is included in Table 3-1.

3.1.3.2 Mammals

MNRF correspondence indicates the potential for Eastern Small-footed Myotis (*Myotis leibii*, provincially Endangered status), Little Brown Myotis (*Myotis lucifugus*, provincially and federally Endangered status) and Northern Myotis (*Myotis septentrionalis*, provincially and federally Endangered status) to be present within or adjacent to the study area.

Review of the AMO (Dobbyn 1994) and Bat Conservation International Inc. (BCI 2016) range maps also indicated the potential for Tri-colored Bat (*Perimyotis subflavus*, provincially and federally Endangered status) to be present in addition to the species provided by MNRF correspondence.

3.1.3.3 Reptiles and Amphibians

Review of ORAA (Ontario Nature 2016) species list for the natural heritage square encompassing the study area revealed a record of Common Snapping Turtle (*Chelydra sepentina*, provincially and federally Special Concern status) also reported as present by the MNRF. MNRF correspondence also reported the presence of an additional reptile SAR; Northern Map Turtle (*Graptemys geographica*, provincially and federally Special Concern status) within or adjacent to the study area (Appendix A).

Review of ORAA species list for the natural heritage square encompassing the study area, NHIC records (MNRF 2016b) and MNRF correspondence did not indicate any amphibian SAR/provincially rare species within or adjacent to the study area.

3.1.3.4 Invertebrates

MNRF correspondence indicates the potential for Monarch (*Danaus plexippus*, provincially and federally Special Concern status) within or adjacent to the study area. Additionally NHIC records indicate the occurrence of two dragonfly species of conservation concern which were reported in the 1 km natural heritage blocks encompassing and adjacent to the study area (MNRF 2016b). These species, Lilypad Clubtail (*Arigomphus furcifer*, provincial S3/rare to uncommon rank) and Amber-winged Spreadwing (*Lestes eruinus*, provincial S3/rare to uncommon rank) could therefore be present within the study area.

3.1.3.5 Plants

MNRF records report the presence of Butternut (*Juglans cinerea*, provincially and federally Endangered status) and American Chestnut (*Castanea dentata*, provincially and federally Endangered status) occurring on or adjacent to our study area.

Field investigations by an Amec Foster Wheeler terrestrial biologist were not permitted outside the ROW and therefore beyond site limits did not report any SAR within the study area. The historical nature of the NHIC records indicates that these species are likely no longer viable and probability of occurrence within the study area is low.

The probabilities provided in Table 3-1 are based on an assessment of each species' habitat preferences/needs in conjunction with existing conditions observed during 2016 field investigations and background information. These findings do not confirm presence or absence from the site. Furthermore, additional SAR may come into the area or species already occurring in the area may be up-listed at any time. For this reason ongoing communication with the MNRF is strongly recommended to ensure compliance with the ESA.

Species with a High probability of occurrence are those recorded in the vicinity of the project (typically within 10 km and recorded in the past 20 years) and whose preferred habitat is abundant within the study area. 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 of the study area (i.e., compared to other regions in Ontario).

Species with a Moderate probability of occurrence are those recorded in the vicinity of the project 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.

Species with a Low probability of occurrence are those recorded in the vicinity of the project and 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.

3.1.4 Significant Natural Areas

A review of MNRF's NHIC database and correspondence from MNRF indicates that there are a number of natural heritage features recorded in the vicinity of the project (Figure 3-1):

- Occupied Redside Dace habitat: Huttonville Creek
  - Located beyond the anticipated area of impact. Huttonville Creek converges with the Credit River approximately 0.9 km downstream of the Credit River bridge.
- Provincially Significant Churchville-Norval Wetland Complex
  - Immediately adjacent to Mississauga Road near the middle of the project, a total area of 47 hectares. This PSW is comprised of marsh (67%; frequently or continually inundated with water and characterized by emergent herbaceous vegetation) and swamp (33%; dominated by woody plants) and is one of the few remaining wetlands on the Peel Plain (CVC 2007).
- Locally Significant Springbrook Wetland Complex
  - Located approximately 2 km north of the project area and not shown in Figure 3-1.
- Huttonville Creek and Area Wetland Complex
  - It is assumed that this wetland complex is located adjacent to and/or in line with the Huttonville Creek, in which case it will not be impacted by project works. However, the precise location was not identified by MNRF or located through other means.
- Regionally Significant Georgetown Credit Valley ANSI (Appendix A)
  - Located approximately 5 km west of the project area and not shown in Figure 3-1.
- Arthur Warner Pond and Unnamed Parks
  - North of the Queen Street West intersection there is a small area unofficially designated as parkland associated with Arthur Warner Pond. Remnants of parkland are also located on the northwest end of the study area adjacent to the unnamed tributary of the Credit River and a portion of the Churchville-Norval Wetland Complex.

- Unnamed Woodlands
  - Three areas of unnamed woodlands are located within the terrestrial study area. One is at the northwest end of the study area, surrounding the unnamed tributary of Credit River. A second unnamed woodland is located on both sides of Mississauga Road adjacent to the Credit River. The third unnamed woodland is near the center of the project and associated with the Churchville-Norval Wetland Complex mentioned above.

A response concerning significant areas was received from CVC and associated data has been included in Figure 3-1. To ensure the necessary protection of these areas, further correspondence with MNRF and CVC may be necessary. During the Detailed Design phase a detailed assessment of potential impacts should be undertaken and site-specific mitigation measures developed.

3.2 Field Investigation

3.2.1 Physiography and Soils

The project is located within the Peel Plain physiographic region which extends across the central portions of the Regions of Halton, Peel, and York. The soils within and adjacent to the study area are classified as Oneida clay loam, Fox sandy loam, Chinguacousy clay loam and Bottom Lands (LGL 2006).

3.2.2 Vegetation Communities

The majority of the land within the study area includes residential areas, commercial areas, and cultural vegetation habitats. Many of the vegetation communities within the study area have been created by human disturbance and are classified as cultural. Natural/semi-natural habitats are mainly associated with the watercourses throughout the study area.

A summary table of the land use within the study area is presented in Table 3-2, and distribution of land use and ELC units are illustrated in Figure 3-2 (Maps A and B).

Access was not granted for surveys outside of the ROW at the time of field investigations so communities could not be investigated thoroughly. ELC designations were undertaken at a high level based on observations from the ROW and therefore species lists were not obtained.

A total of four wetland areas were documented during Amec Foster Wheeler surveys and are illustrated in Figure 3-2. Two of the wetlands are located near the middle of the study area and are both classified as Meadow Marsh (MAM). These wetlands are associated with an intermittent tributary of the Credit River. A third wetland is classified as Reed Canary Grass Mineral Meadow Marsh Type (MAM2-2). This area is associated with a tributary of the Credit River on the west end of the study area and is dominated by Reed-canary Grass (*Phalaris arundinacea*). The fourth wetland is classified as Cattail Mineral Shallow Marsh Type and is associated with a Stormwater Management Pond at the west end of the study area. This wetland was dominated by Cattail (*Typha latifolia*) with an abundance of willow and sedge species (presumably planted at the time of construction).

A total of 22 ELC community types / land uses were identified within the terrestrial study area. 78.4% of the study area was made up of community types / land uses considered anthropogenic or cultural in origin. The natural / semi-natural habitats are known to contain numerous non-native species due to their proximity to cultural habitats.

3.2.3 Wildlife

A detailed description of the survey processes used during field investigations is provided in Section 2.2.2 above. The following sub-sections provide details of the field investigations findings and relate them to the secondary source data gathered.

3.2.3.1 Birds

Of the 161 species reported in the secondary source review as potentially present within the study area, 33 of the species were identified within the study area during the Amec Foster Wheeler breeding bird point count survey and three species were recorded outside of the standardised surveys concurrent with other field investigations (Table 3-3, Appendix C). With the exception of the Barn Swallow and Chimney Swift, all species recorded during the Amec Foster Wheeler field investigations are considered common. One additional species, Ring-billed Gull (*Larus delawarensis*) was recorded that had not been recorded previously during ABBO surveys.

A total of 12 nests were observed under the Credit River Bridge during aquatic field investigations. These have been identified as 11 Cliff Swallow (*Petrochelidon pyrrhonota*) and 1 Barn Swallow nests (Appendix B, Photo 2).

3.2.3.2 Mammals

In total 44 species of mammals were found to occur within the natural heritage blocks which encompass the study area (see Section 3.1.2.2 for details on sources for this data). Of the 44 species, 4 were reported during field investigations (Appendix C). Raccoon (*Procyon lotor*), White-tailed Deer (*Odocoileus virginianus*), Red Squirrel (*Tamiasciurus hudsonicus*) and Eastern Chipmink (*Tamias striatus*), all urban tolerant species, were observed during site investigations. The species listed should not be considered an exhaustive list as field investigations were only conducted from the ROW and evidence of other species utilizing more natural areas beyond the ROW could not be observed. The majority of other potentially occurring species are small such as mice, voles and shrews, or nocturnal such as bats. These species are difficult to detect using standard, non-invasive methods.

3.2.3.3 Reptiles and Amphibians

A review of the ORAA map indicated five species of reptiles and eight species of amphibians have been observed within the natural heritage block which encompasses the study area (Ontario Nature 2016). No reptile or amphibian species were observed during Amec Foster Wheeler field investigations, however, CVC records report amphibians, tadpoles and reptiles in the wetland habitat. CVC has additionally reported "frogs" within the unnamed tributary and recognizes this tributary a providing wildlife habitat (CVC, 2018). A scarcity of fallen woody debris, wetlands and ponds within the study area indicate that there is limited potential habitat for feeding and nesting of reptiles and amphibians. This does not indicate that no reptiles or amphibians are present within the study area as field investigations were conducted from the ROW so evidence of species utilizing more natural areas within the study area could not be observed. The wetland feature (MAM) at the centre of the study area as well as the adjacent portion of deciduous lowland forest (FOD7) could both support a herpetile population. The woodland generally tracks the Credit River and contains some ponds outside the study area.

3.2.3.4 Invertebrates

An atlas for species in the *Insecta* class has not been published and it is therefore difficult to reference how many species of butterflies, moths and dragonflies inhabit the project area. No invertebrate species were reported during field investigations.

3.2.4 Species at Risk and Provincially Rare Species

The occurrence of SAR / provincially rare species is illustrated in Figure 3-1. Due to the large scale of the range maps and the lack of exact species occurrence locations from most secondary source reports, only those species confirmed by NHIC database records or field investigations are shown.

3.2.4.1 Birds

Of the avian SAR / provincially rare species potentially present within the vicinity of the study area (see Section 3.1.3.2) two were reported during the Amec Foster Wheeler field investigations – Barn Swallow and Chimney Swift (both provincially Threatened, Chimney Swift is also federally Threatened).

Barn Swallow was recorded at four breeding bird point count survey locations and one nest was observed under the Credit River Bridge. Barn Swallow, has become closely associated with human settlements and will nest in and on artificial structures, including garages, houses, bridges and road culverts (COSEWIC 2011a). This species also prefers various open habitats for foraging. The study area provides suitable habitat for the Barn Swallow as it is open habitat, with cleared ROW, road culverts and artificial structures. Watercourse crossing culverts and bridges were inspected and no Barn Swallow nests were observed inside culverts which are common locations for nesting.

Chimney Swift were recorded at three breeding bird point count survey locations. One survey location reported a group of 12 Chimney Swifts which were circling a historic brick building with a chimney which constitutes habitat for this species.

Chimney Swift prior to the arrival of European settlers, was associated with old growth forests where they nested and roosted in large hollow trees (COSEWIC, 2007a). As the availability of hollow trees declined with settlement and logging activities, the swifts adapted to nest in chimneys. As a result, the aptly named Chimney Swift is now primarily associated with urban and rural areas where chimney structures are available for nesting and roosting. Nesting sites are difficult to locate due to the secretive behaviour of the swifts as they approach the nest, though roosts are easier to identify due to the larger number of birds involved. Swifts are often commonly associated with bodies of water due to the higher abundance of insects, especially wetlands.

Also of high importance is the protection of species which are listed as “priority species” by the Ontario Partners in Flight (2008). See Table 3-2 for species from the priority list which were reported within the study area by Amec Foster Wheeler field staff during the June 2016 field investigations.

3.2.4.2 Mammals

Amec Foster Wheeler field investigation did not report any mammal SAR / provincially rare species within the study area.

3.2.4.3 Reptiles and Amphibians

Amec Foster Wheeler field investigation did not report any reptile or amphibian SAR / provincially rare species within the study area.

3.2.4.4 Invertebrates

Amec Foster Wheeler field investigation did not report any invertebrate SAR / provincially rare species within the study area.

3.2.4.5 Plants

Amec Foster Wheeler field investigations did not report any plant SAR / provincially rare species within the study area.

3.2.5 Significant Wildlife Habitat

The MNRF defines Significant Wildlife Habitat (SWH) as ecologically important in terms of features, functions, representation or amount and contributing to the quality and diversity of an identifiable geographic areas or Natural Heritage System (MNR 2000). SWH's are divided into four main categories: Seasonal Concentration Areas of Animals, Rare Vegetation Communities or Specialized Habitat for Wildlife, Habitat for Species of Conservation Concern (excluding Endangered or Threatened species) and Animal Movement Corridors. The SWH Criteria Schedules for Ecoregion 7E (MNRF 2015) and the Peel – Caledon Significant Woodlands and Significant Wildlife Habitat Study (SWSWH; North-South Environmental Inc. et. al. 2009) provide further information on determining the presence of SWH.

Candidate SWH which is determined to have the potential to occur within the study area is discussed below.

Seasonal Concentration Areas

Seasonal concentration areas are those habitats where large numbers of a single species or many species congregate at one (or several) times a year. The SWH Criterion Schedules for Ecoregion 7E outlines 14 wildlife habitats meeting the criteria for Seasonal Concentration Areas of Animals and an additional four are outlined in the Peel – Caledon SWSWH Study.

Based on a review of ecosites present and conditions observed during field investigations one Season Concentration Area is confirmed present and an additional four habitats could occur within the study area.

Field investigations confirmed Colonially Nesting Bird Breeding Habitat (Cliff and Bank) as 12 nests Cliff Swallow nests were observed under the Credit River Bridge during aquatic field investigations.

Bat Maternity Colonies, Deer Winter Congregation Areas, Reptile Hibernaculum and Turtle Wintering Areas were all considered to have a low potential to be present within the study area. Bat Maternity colonies could be present in tree cavities of snags or large diameter trees in any of the deciduous forest areas. Deer will congregate in large tracts of woodland in the winter, in areas where large woodlots are rare, criteria lists woodlots >50 ha as significant. The polygon classified as FOD7 near the centre (north) of the study area is connected to a large area (>50ha of forest) of woodland. It is possible deer would use

this area as it is a significant amount of woodland, especially at a landscape scale. Reptile Hibernacula and Turtle Nesting Areas could occur within the limited natural wetlands within the study area including the areas of meadow marsh and the permanent and intermittent watercourses present within the study area. No snakes or turtles were observed during field investigations. In general, suitable ecosites are present, however the areas which are actually located within the study area are small and the anthropogenic nature of the surroundings could mean these natural areas are degraded unlikely to be used. As field investigations were undertaken from the ROW the suitability of these habitats could not be confirmed.

Rare Vegetation Communities or Specialized Habitat for Wildlife

The SWH Criteria Schedules for Ecoregion 7E outlines seven habitats meeting the criteria for Rare Vegetation Communities and an additional three are outlined in the Peel – Caledon SWSWH Study.

Based on a review of ecosites present and conditions observed during field investigations three Rare Vegetation Communities could occur within the study area.

Rare Vegetation Communities, Forests Providing a High Diversity of Habitats and Foraging Areas with Abundant Mast were all considered to have a high potential to be present within the study area. Based on field investigations a small area of Dry – Fresh Oak – Hickory Deciduous Forest Type (FOD2-2) is present within the study area. Only 0.2 ha of this ecosite is located within the study area boundaries, the minimum size criterion for rare vegetation communities is 0.5 ha. Field investigations were restricted to the ROW, and it is unclear whether this ecosite extends far enough outside the study area boundary to be meet this criterion. Foraging Areas with Abundant Mast share this rationale, FOD2-2 meets the ecosite criterion however a small area of 0.2 ha would not be considered SWH. The large area of FOD7 which was referenced above as potential Deer Winter Congregation Area could also qualify as a Forest providing a High Diversity of Habitats. The classification of this woodland as Fresh – Moist Lowland Deciduous Forest Ecosite indicates no tree species was noted as dominant, which generally means a varied species composition. This combined with the large size of this forest (the majority of which is outside the study area) imply a diverse ecosite, however due to the field investigations restricted to the ROW, this cannot be confirmed.

The SWH Criteria Schedules for Ecoregion 7E outlines eight habitats meeting the criteria for Specialized Habitats for Wildlife and an additional two are outlined in the Peel – Caledon SWSWH Study.

Based on a review of ecosites present and conditions observed during field investigations four Specialized Habitats for Wildlife could occur within the study area.

Woodland Raptor Nesting Habitat and Amphibian Breeding Habitat (Woodland and Wetland) were considered to have a moderate potential to be present within the study area. While suitable habitats exist within the study area, no relevant species (raptors or amphibians) were detected during field investigations. Suitable habitat may be present beyond the ROW limits, and could not be confirmed during field investigations. Therefore, the moderate probability is mainly based on the evidence of habitat suitability within the ROW. Woodland Area-Sensitive Bird Breeding Habitat was considered to have a low potential to be present within the study area. While portions of larger woodlots do occur within the study area boundaries it is likely that area-sensitive birds avoid using these edge habitats and choose interior habitats deeper in the woodlots. No area-sensitive birds were detected during morning bird surveys or incidentally during field investigations.

Habitat for Species of Conservation Concern

The SWH Criteria Schedules for Ecoregion 7E outlines five habitats meeting the criteria for Habitat for Species of Conservation Concern and one additional distinct habitat is outlined in the Peel – Caledon SWSWH Study.

Based on a review of ecosites present and conditions observed during field investigations two Habitats for Species of Conservation Concern could occur within the study area.

Marsh Bird Breeding Habitat and Terrestrial Crayfish were considered to have a low potential to occur within the study area, but could occur within the marsh habitats present. These habitats are present in isolated areas and are anthropogenically impacted due to the proximity to roadways and development. No relevant species were observed during field investigations, however targeted surveys were not undertaken. Based on the presence of limited suitable habitat there is a low potential for these habitats to be present within the study area.

Animal Movement Corridors

The SWH Criteria Schedules for Ecoregion 7E outlines one habitat meeting the criteria for Animal Movement Corridors and the Peel – Caledon SWSWH Study.

Based on a review of ecosites present and conditions observed during field investigations indicates there is potential for an Animal Movement Corridor to occur within the study area. An Amphibian Movement Corridor has a moderate potential to be present as associated with localized Amphibian Breeding Habitat.

Table 3-1: Records of Terrestrial and Semi-Terrestrial Wildlife Species at Risk within the Vicinity of the Study Area and Probability of Occurrence

Species Name and Status (ESA, 2007)	Probability of Occurrence within the Study Area
Birds	
Eastern Meadowlark (*Sturnella magna*) Threatened Record Source: MNRF Correspondence and NHIC record	**Low/Moderate** - Reported in the study area by MNRF. Eastern Meadowlark is designated as Threatened by COSEWIC. As a ground nesting grassland specialist, the Eastern Meadowlark inhabits grassland habitats, native prairies and savannahs, as well as non-native pastures, hayfields, weedy meadows, herbaceous fencerows and airfields (COSEWIC 2011b). There is limited suitable habitat within the study area so there is a low probability of this species using the habitats available.
Bobolink (*Dolichonyx oryzivorus*) Threatened Record Source: MNRF Correspondence	**Low/Moderate** - Reported in the study area by MNRF. Originally the Bobolink nested in tallgrass prairies of south-central Canada. Most of tallgrass prairie lands have been converted for agricultural use and the Bobolink has adapted to nesting in forage crops. This species also occurs in various grassland habitats such as wet prairie, graminoid peatlands, abandoned fields dominated by tall grasses, and remnants of uncultivated virgin prairie (COSEWIC 2010). There is limited suitable habitat within the study area so there is a low probability of this species using the habitats available.
Chimney Swift (*Chaetura pelagica*) Threatened Record Source: MNRF Correspondence	**High** - Reported in the study area by MNRF and observed during AMEC field investigations. Due to the land clearing associated with colonization, hollow trees became increasingly rare, which led Chimney Swifts to move into house chimneys. Today, the species is mainly associated with areas where the birds can find chimneys to use as nesting and resting sites, however, it is likely that a small portion of the population continues to use hollow trees. Within the study area, Chimney Swifts have limited access to chimneys (COSEWIC 2007a).
Barn Swallow (*Hirundo rustica*) Threatened Record Source: MNRF Correspondence	**High** - Reported in the study area by MNRF and observed during AMEC field investigations. Barn Swallow is listed as Threatened under the *ESA* and designated as Threatened by COSEWIC. Similar to the Chimney Swift, the Barn Swallow has become closely associated with human settlements. Barn Swallows have shifted largely to nesting in and on artificial structures, including garages, houses, bridges and road culverts, and prefer various open habitats for foraging including grassy fields, pastures, agricultural crops, and cleared ROW (COSEWIC 2011a). The majority of the study area is suitable habitat with cleared ROW, road culverts and artificial structures.
Bank Swallow (*Riparia riparia*) Threatened Record Source: MNRF Correspondence	**Moderate** – Reported as potentially in the study area by MNRF. The Bank Swallow breeds in a wide variety of natural and artificial sites with vertical banks, including riverbanks, lake and ocean bluffs, aggregate pits, road cuts, and stock piles of soil. Sand-silt substrates are preferred for excavating nest burrows. Breeding sites are often situated near open terrestrial habitat used for aerial foraging (e.g., grasslands, meadows, pastures, and agricultural cropland). Large wetlands are used as communal nocturnal roost sites during post-breeding, migration, and wintering periods (COSEWIC, 2013). Suitable habitat exists for this species within the study area.

Species Name and Status (ESA, 2007)	Probability of Occurrence within the Study Area
Peregrine Falcon (*Falco peregrinus)* Special Concern Record Source: MNRF Correspondence	**Low** - Reported as potentially in the study area by MNRF. Peregrine Falcons naturally nest on ledges found on vertical cliff faces, yet will also utilize man-made structures such as tall buildings or bridges. In Ontario, suitable vertical faces are generally 50-200m tall and typically overlook water and forested areas (Ontario Peregrine Falcon Recovery Team, 2010). Nests are created as existing vegetation or soil on a ledge is scraped away or flattened, leaving a bare depression in which eggs are laid. Nests are generally found on the upper one third of the cliff face This species may periodically use the study area to hunt however there is no suitable nesting habitat present.
Mammals	
Eastern Small-footed Myotis (*Myotis leibii*) Endangered Record Source: MNRF Correspondence	**Low/Moderate** - 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. The lack of caves, mines, and the limited woodlands within the study area indicate that the probability of these species finding a home in the study area is Low; however, they may be seen foraging over open fields or local watercourses (MNR 2016a).
Little Brown Myotis (*Myotis lucifugus*) Endangered Record Source: MNRF Correspondence	**High** - 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).
Northern Myotis (*Myotis septentrionalis*) Endangered Record Source: MNRF Correspondence	**Low/Moderate** - The Northern Long-eared Bat is one of the less common species found to hibernate in Ontario. This species is closely associated with woodlands and use trees as maternity sites. The lack of caves, mines, and the limited woodlands within the study area indicate that the probability of these species finding a home in the study area is Low; however, they may be seen foraging over local watercourses (MNR 2016a).
Reptiles	
Northern Map Turtle (*Graptemys geographica*) Special Concern Record source: MNRF Correspondence	**Moderate** - Reported in the study area by MNRF. 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 2012). This species may be present within the Credit River and may use the adjacent terrestrial habitat for nesting.
Snapping Turtle (*Chelydra serpentine*); Special Concern Record Source: MNRF Correspondence	**Moderate** - Reported in the study area by MNRF. 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 2008). Within the study area, the sediment of the Credit River is primarily a mix of boulders, cobble, and gravel and is not well suited to Snapping Turtles preferences. This species may pass through the area but it is unlikely to be present within the study area or in the terrestrial habitat immediately adjacent to it.
Eastern Milksnake (*Lampropeltis triangulum*) Special Concern (federally) Record Source: MNRF Correspondence	**High** - Reported in the study area by MNRF. This species is found in a variety of habitats, including grasslands, pastures, rocky hillsides and forest edges (COSEWIC 2002). In southern Ontario, it is often found in old farm fields, farm buildings and residential properties where there is an abundance of mice. Important habitat features are proximity to water, and locations for basking and egg laying. Due to cultural and natural habitats existing side by side in the study area there is a high chance this species occurs.

Species Name and Status (ESA, 2007)	Probability of Occurrence within the Study Area
Invertebrates	
Monarch (*Danaus plexippus*) Special Concern Record Source: MNRF Correspondence	***High*** *- This species has been observed in the vicinity of the study area based on MNRF Correspondence. The primary food source of this species (when in its caterpillar life stage) is Common Milkweed (MNRF 2016a) which is often present in cultural meadow communities and therefore may be present within the study area.*
Plants	
Butternut (*Juglans cinerea*) Endangered Record Source: MNRF Correspondence and NHIC record	**Low** - MNRF records report the presence of Butternut and there are recent records of reported by NHIC element occurrences within 1km of the study area (MNR 2013). An Amec Foster Wheeler specialist surveyed the study area from the ROW for Butternut and did not report any findings. Butternut is widespread and relatively common in southern Ontario (more than 100 occurrences). Populations of this species are being devastated throughout its natural range by a fungal disease known as Butternut Canker (MNR 2013). It is possible this species exists within the study area outside the ROW.
American Chestnut (*Castanea dentata*) Endangered Record Source: MNRF Correspondence	**Low** - MNRF records report the presence of American Chestnut. An Amec Foster Wheeler specialist surveyed the study area from the ROW for American Chestnut and did not report any findings. It is possible this species exists within the study area outside the ROW.

Table 3-2: ELC Vegetation Communities and Land Uses

ELC Community / Land Use Code	ELC Community Description	Total Cover (ha)
CGL-1	Golf Course	3.5
CUM	Cultural Meadow	2.3
CUM1-1	Dry - Moist Old Field Meadow Type	0.2
CUT	Cultural Thicket	0.4
CUT1	Mineral Cultural Thicket Ecosite	0.6
CUW1	Cultural Woodlot	0.5
CVC	Commercial and Institutional	0.7
CVC-1	Business Sector	2.7
CVC-3	Heavy Industry	0.7
CVI-1	Transportation and Utilities	9.3
CVR	Residential	2.0
CVR-2	Low Density Residential	0.9
CVR-3	High Density Residential	10.7
FOD2-2	Dry - Fresh Oak - Hickory Deciduous Forest Type	0.2
FOD7	Fresh - Moist Lowland Deciduous Forest Ecosite	6.3
FOD7-4	Fresh – Moist Black Walnut Lowland Deciduous Forest Type	0.5
MAM	Meadow Marsh	2.2
MAM2-2	Reed Canary Grass Mineral Meadow Marsh Type	0.3
MAS2-1	Cattail Mineral Shallow Marsh Type	0.4
OAGM1	Annual Row Crop	0.3
Disturbed	Under construction at time of visit	6.9
Water	Open Water	1.6
	Total	**53.2**

Table 3-3: Breeding Bird Point Count Survey Results

Bird Species		Breeding Bird Survey Station								Incidental Record
		1	2	3	4	5	6	7	8	
American Crow	*Corvus brachyrhynchos*	X	X	X	X	X		X		
American Goldfinch	*Spinus tristis*	X	X	X	X	X	X	X	X	
American Redstart	*Setophaga ruticilla*					X				
American Robin	*Turdus migratorius*	X	X	X	X	X	X	X	X	
Barn Swallow	*Hirundo rustica*	X	X	X			X			
Black-capped Chickadee	*Poecile atricapilla*			X	X					
Blue Jay	*Cyanocitta cristata*					X		X	X	
Brown-headed Cowbird	*Molthrus ater*	X	X	X			X		X	
Canada Goose	*Branta canadensis*			X						
Cedar Waxwing	*Bombycilla cedrorum*	X	X			X	X	X	X	
Chimney Swift*	*Chaetura pelagica*						X	X	X	
Chipping Sparrow	*Spizella passerina*		X	X				X		
Clay-colored Sparrow	*Spizella pallida*			X						
Cliff Swallow	*Hirundo pyrrhonota*									X
Common Grackle	*Quiscalus quiscula*		X		X		X	X		
Common Yellowthroat	*Geothlypis trichas*				X	X	X			
Eastern Phoebe	*Sayornis phoebe*						X			
European Starling	*Sturnus vulgaris*	X	X	X	X	X	X	X	X	
Grey Catbird	*Dumetella carolinensis*						X	X		
Great Blue Heron	*Ardea herodias*			X		X	X			
House Finch	*Haemorhous mexicanus*			X						
House Sparrow	*Passer domesticus*	X	X	X						
House Wren	*Troglodytes aedon*				X					
Indigo Bunting	*Passerina cyanea*				X					
Killdeer	*Charadrius vociferus*	X	X							
Mourning Dove	*Zenaida macroura*	X	X	X			X	X		
Northern Cardinal	*Cardinalis cardinalis*				X		X			
Northern Flicker*	*Colaptes auratus*				X	X				
Red-eyed Vireo	*Vireo olivaceus*				X			X		
Red-winged Blackbird	*Agelaius phoeniceus*		X	X	X	X	X	X	X	
Ring-billed Gull	*Larus delawarensis*	X	X	X	X	X	X	X	X	
Rock Pigeon	*Columba livia*									X
Rose-breasted Grosbeak*	*Pheucticus ludovicianus*				X					
Savannah Sparrow*	*Passerculus sandwichensis*	X		X						
Song Sparrow	*Melospiza melodia*	X	X	X		X	X	X	X	
Tree Swallow	*Tachycineta bicolor*	X	X				X	X	X	
Yellow-rumped Warbler	*Setophaga coronata*									X

* Indicates "priority species" as listed by Ontario Partners in Flight 2008

LEGEND

- Study Area (120m Buffer)
- Barn Swallow
- Chimney Swift
- NHIC Squares (Terrestial SAR species observed within the past 20 years)
- Environmentally Sensitive Area (CVC)
- Provincially Significant Wetland
- Non-evaluated Wetland
- Credit Valley Conservation Authority Regulation Area
- Park
- Woodland
- Permanent Watercourse
- Intermittent Watercourse
- Culvert / Bridge
- Waterbody

NOTES:
- Background imagery from Bing maps.
- Topographic features extracted from LIO, MNRF.
- SAR information extracted from NHIC database 2015.
-- Georeferenced data representation of Regulation Limits derived from CVC.
- Topographic features extracted from LIO, MNR.
- Complementary topographic data from Peel Region and Mississauga City under Open Data Licence.

Datum & Projection: NAD 1983 UTM Zone 17N

0 100 200 300 400 500 Meters

Region of Peel Working for you

wood.

MISSISSAUGA ROAD WIDENING PROJECT

Significant Natural Areas and Terrestrial SAR Locations

PROJECT N°: TP115085	**FIGURE: 3-1**
SCALE: 1:9,000	DATE: November 2018

596600 4833600 596800 4833400 597000 4833200 597200 4833000

Queen St W
Agincourt Cir
Hurtonville Dr
Grandview Crt
River Rd
Mississauga Rd
Credit River
Embleton Rd
Huron St

MAS2-1 CUM CVC-3 CUT1 OAGM1 CUM CVR-3 CUM CVC CGL-1 FOD7 CVR-3 CGL-1 FOD7 MAM CGL-1 CGL-1
CUM1-1 MAM2-2 FOD7-4 CVR-3 FOD7-4 CVR-2 FOD7 CVR-3 FOD7 FOD7 CVI-1 CVR-3 CVR-3 CUM MAM CVR-3 FOD7 CVC-1
CVR-3 FOD2-2 FOD7-4 FOD7-4 CVR-3 CUW CUM CUM

597200 4832800 597000 4832600

Path: P:\2015\Projects_Other\TP115085_Region of Peel_Widening of Mississauga Road\09_GIS\MXD\Location1_ELC_6.mxd, Author: Sandra.Marquez, modified by romer.abalos, 18 December 2018

LEGEND

- Study Area (120m Buffer)
- Permanent Watercourse
- Intermittent Watercourse
- Culvert / Bridge

Ecological Land Classification

- CGL-1: Golf Course
- CUM: Cultural Meadow
- CUM1-1: Dry - Moist Old Field Meadow Typ
- CUT: Cultural Thicket
- CUT1: Mineral Cultural Thicket Ecosite
- CUW: Cultural Woodland
- CVC: Commercial and Institutional
- CVC-1: Business Sector
- CVC-3: Heavy Industry
- CVI-1 : Transportation and Utilities
- CVR: Residential
- CVR-2: Low Density Residential
- CVR-3: High Density Residential
- DISTURBED
- FOD2-2: Dry - Fresh Oak-Hickory Deciduous Forest Type
- FOD7: Fresh - Moist Lowland Deciduous Foreest Ecosite
- FOD7-4: Fresh - Moist Black Walnut Lowland Deciduous Forest Type
- MAM: Meadow Marsh
- MAM2-2: Reed - canary Grass Mineral Meadow Marsh Type
- MAS2-1: Cattail Mineral Shallow Marsh Type
- OAGM1: Annual Row Crop
- WATER

Map Overview

0 0.1 0.2 0.3 0.4 0.5 Kilometres

NOTES:
- Background imagery from City of Brampton, Spring 2016
- Topographic features extracted from LIO, MNRF.

Datum & Projection: NAD 1983 UTM Zone 17N

Region of Peel Working for you

wood.

MISSISSAUGA ROAD WIDENING PROJECT

Ecological Land Classification

PROJECT N°: TP115085	**FIGURE: 3a**
SCALE: 1:2,750	DATE: December 2018

597400 4832800 597600 4832600 597800 4832400 598000 4832200 598000 4832000 4831800 597800

Stonecrop Rd
Villanova Rd
Sky Harbour Dr
Financial Dr
Mississauga Rd
Lionhead Golf Club Rd

CGL-1
MAM
FOD7
CVR-3
CGL-1
CVC-1
CVC-1
CVR
CUM
CVR-3
CUM
MAM
CVI-1
FOD7
CVR-3
CVR-3
DISTRIBED
CVC-1
DISTURBED
DISTURBED
CVC-1
CUT

Path: P:\2015\Projects_Other\TP115085_Region of Peel_Widening of Mississauga Road\09_GIS\MXD\Location1_ELC_6.mxd, Author: Sandra.Marquez, modified by romer.abalos, 18 December 2018

LEGEND

- Study Area (120m Buffer)
- Permanent Watercourse
- Intermittent Watercourse
- Culvert / Bridge

Ecological Land Classification

- CGL-1: Golf Course
- CUM: Cultural Meadow
- CUM1-1: Dry - Moist Old Field Meadow Typ
- CUT: Cultural Thicket
- CUT1: Mineral Cultural Thicket Ecosite
- CUW: Cultural Woodland
- CVC: Commercial and Institutional
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- CVC-3: Heavy Industry
- CVI-1 : Transportation and Utilities
- CVR: Residential
- CVR-2: Low Density Residential
- CVR-3: High Density Residential
- DISTURBED
- FOD2-2: Dry - Fresh Oak-Hickory Deciduous Forest Type
- FOD7: Fresh - Moist Lowland Deciduous Foreest Ecosite
- FOD7-4: Fresh - Moist Black Walnut Lowland Deciduous Forest Type
- MAM: Meadow Marsh
- MAM2-2: Reed - canary Grass Mineral Meadow Marsh Type
- MAS2-1: Cattail Mineral Shallow Marsh Type
- OAGM1: Annual Row Crop
- WATER

0 0.1 0.2 0.3 0.4 0.5 Kilometres

Map Overview

a b

NOTES:
- Background imagery from City of Brampton, Spring 2016
- Topographic features extracted from LIO, MNRF.

Datum & Projection: NAD 1983 UTM Zone 17N

Region of Peel Working for you

wood.

MISSISSAUGA ROAD WIDENING PROJECT

Ecological Land Classification

PROJECT N°: TP115085	**FIGURE: 3b**
SCALE: 1:2,750	DATE: December 2018

4.0 Discussion

4.1 Ecological Significance and Function

The study area is characterized by large amounts of cultural land use and fragmentation. Approximately 78.4% of the study area includes these anthropogenic and cultural habitats and land uses in the form of developed lands and cultural vegetation communities. The majority of existing terrestrial vegetated are associated with the watercourses throughout the study area and even these features have become infested with exotic species.

There are a number natural heritage features recorded in the vicinity of the project, as illustrated in Figure 3-1. Only those features immediately adjacent to Mississauga Road have potential to be directly impacted by project works. The most notable areas within the study area are the fragments of woodland/forest, one of which is identified by CVC and environmentally sensitive areas, and the Churchville-Norval PSW. The fragments of forest, cultural plantation and cultural woodland buffer the watercourse and are a relatively significant feature in context of the project 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 habitat fragmentation (which limits the suitable forest interior habitat), indicates the limited functionality of these lands as wildlife habitat. As the Churchville-Norval Wetland Complex is a PSW and it lies in close proximity to Mississauga Road, further correspondence with MNRF and CVC may be necessary to ensure the necessary protection of these areas.

4.2 Species at Risk and Provincially Rare Species

Chimney Swift and Barn Swallow are listed as Threatened by COSEWIC and are protected under the provincial species at risk legislation (ESA), which prohibits destroying critical or essential habitat for Threatened and Endangered SAR. Additionally Chimney swift are listed as Threated, Schedule 1 under SARA, the federal legislation protecting designated SAR in Canada. The provincial ESA is similar to SARA, however, it applies to provincially designated SAR, including habitat regulation for each Endangered and Threatened species in Ontario.

A number of other species of conservation concern are known to occur in the greater region encompassing the study area. Table 3-1 discusses habitat requirements for those species known to be in the general vicinity of the project site and gives a prediction of the probability of their occurrence in future. Preliminary consultation with the Aurora district MNRF Species Biologist was initiated and ongoing consultation will be required regarding all protected species in the area and to ensure that any newly regulated SAR potentially interacting with construction activities are considered.

Although other species of conservation concern are much less likely to inhabit the study area, follow-up with MNRF will be conducted during the Detail Design phase of the project. At that time, the required Information Gathering Form and additional project work details will be discussed. The necessary measures needed to protect these species and their habitat, as well as the potential need for a permit under the ESA will also be discussed at that time.

4.3 Factors of Wildlife Passage

Wildlife passage through crossing structure is influenced by a wide variety of factors, including crossing structure height and width, light penetration under the structure, ground cover, availability of nearby

habitat, ambient noise conditions, and the presence of watercourses (Donaldson 2005, Sott 2012, Foresman 2003, Jackson 2003, Reed *et al*. 1997, MTO 2006, MTO 2015). Different factors tend to affect some species more than others and some species may prefer conditions that deter passage by others. A crossing example designed for snakes may include grates which provide sunlight penetration (Jackson 2003), whereas specialized rodent and salamander crossings may consist of narrow pipes which provide darker more confined surroundings preferred by these species (Cavallaro *et al.* 2005).

Favorable vegetation structure and availability of cover are also known to contribute to crossing use by wildlife (USDOT 2011). McDonald and St. Clair (2004) reported that vegetation cover was significantly more important than the size of the structure in determining frequency of use by small mammals. Small mammals will use a variety of underpass designs as long as the vegetation and substrate cover are sufficient.

As the structure to be replaced and enhanced at the Credit River is a large multi-span bridge many of these factors become less significant than when deciding on a wildlife crossing design for culverts (e.g., openness ratio, crossing height).

4.4 Wildlife Crossing Assessment Credit River Crossing C1

The Credit River bridge is currently a three span structure of 22.86 m each. The new structure will also consist of three spans, however, the proposed span lengths have been increased to a middle span of 46 m and 29 m spans on either end. A wildlife crossing assessment was completed for the Credit River crossing as it was recognized as a potential location where wildlife corridors may be present. There are sizeable areas of natural habitat on both sides of Mississauga Road tracking the Credit River which are connected via the Credit River structure. However, wildlife may also cross the road regularly in areas away from the bridge.

The assessment of the crossing was completed through a review of the specifications of replacement as well a desktop review of aerial photography and available Project-specific natural heritage reports (Amec Foster Wheeler 2017). The review was conducted to discern information regarding local natural heritage features, vegetation communities, and significant wildlife habitat which may influence wildlife passage. Similarly, aerial imagery was examined for connectivity with areas providing wildlife habitat to discern the nature of wildlife crossing at those locations. The presence of wildlife habitat, local species composition, and likelihood of wildlife crossing were also reviewed.

Assessment of changes in wildlife passage will be based on which crossing parameters will be changed as a result of execution of the project. Typical improvement to passage are associated with openness ratio, height of the structure, and the use of vegetation placement to create a funnelling effect and providing suitable substrates (introduced logs and stumps) to encourage crossing by a variety of species. Improving passage can also include removing crossing barriers, such as river bank grading, log jams or fencing in the vicinity of the crossing.

Wildlife conflict assessments for the Credit River crossing are summarized in the attached Table 4-1.

4.5 Wildlife Crossing Assessment Unnamed Tributary Crossing Culvert C2

To prevent the loss of biodiversity and protect the integrity of the landscape, CVC recommends the enhancement of the existing culvert at the crossing C2, (including appropriate fencing) to facilitate wildlife movement from wetland to wetland (i.e., amphibian and reptile passage) or incorporate separate crossing

structures. Several residential parcels with fencing exist between the PSW and the Credit River bridge, creating a barrier to wildlife movement and CVC recommends a designated eco-passage be installed in this area. Further consultation with CVC and MNRF regarding optimal location and design of the structure will be required at the detailed design stage. The CVC Fish Wildlife Crossing Guideline (CVC 2017) for fish and wildlife crossing design should be utilized for designing the crossing. Material type (steel not preferred), ambient light and moisture conditions, water depth, openness ratio, clear lines of sight and cover at entrance/exits are important design considerations for the passage of reptiles and amphibians.

Standard drainage culverts of a diameter of 1.0 m to 1.5 m may be adequate for medium-sized animals, whereas those with a diameter of 0.5 m to 1.0 m are likely adequate for small animals (MTO 2015). McDonald and St. Clair (2004) found that small mammals used structures that were 0.3 m to 3 m in diameter and, in other studies, a cross-sectional area of 2 to 4 square feet (0.2 to 0.4 m^2) for the structure entrance has been recommended (Clevenger *et al.* 2001, Goosem *et al.* 2001). Generally, the literature advises that smaller cross-sectional areas and openness ratios are more appealing for small animals (USDOT 2011).

'Openness ratio' is a measure of the "see thoroughness" of a wildlife crossing feature and takes into account the straight-line length of the crossing. The 'openness ratio' is expressed as "the ratio between the cross-sectional area of the structure opening and the length of the structure that must be traversed by wildlife" (MTO, 2006). While larger openness ratios of 0.6 and 1.0 have been recommended for white-tailed deer (Gunson and Seburn 2010, MTO 2015), there is insufficient data to recommend optimal openness ratio ranges or thresholds for most taxa (MTO 2006, USDOT 2011). Despite inconclusive applicability of 'openness ratio' for small wildlife such as rodents and reptiles, openness thresholds for different animal size-classes that have been used for other roadway projects have included the following (Gunson and Seburn 2010):

- 0.05 for smaller wildlife species that are adapted to nocturnal and/or tunnel like conditions;
- 0.1 for common reptiles and amphibians; and
- 0.25 movement corridors for turtles.

The openness ratio of culvert C2 will change at an inverse proportion to the change in crossing length. Where crossing length increases, a smaller openness ratio may continue to favor passage by small animals that prefer darker, narrower crossings.

Favorable vegetation structure and availability of cover are also known to contribute to crossing use by wildlife (USDOT 2011). McDonald and St. Clair (2004) found that vegetation cover was significantly more important than structure dimension in determining frequency of use by small mammals. Small mammals will use a variety of underpass designs as long as the vegetation and substrate cover are sufficient. The existing culvert is designed for watercourse passage and drainage and does not provide notable vegetative or other types of cover. Culvert C2 is typically wet and provides little to no dry ground for passage. These conditions are seasonably variable and are not necessarily dependent upon completion of Project modifications. Vegetation and ground cover at the inlet and outlet of the culvert will be changed as a result of culvert modifications; however, these changes may be temporary, but through vegetation restoration applications, suitable wildlife cover opportunities and ground conditions will persist. Such cover treatments will promote conditions that allow wildlife to easily find and enter the culvert openings if required.

Roadside fencing or vegetation planting should be considered at the area of meadow marsh and lowland deciduous forest which occurs in the centre of the study area adjacent to Crossing C2. Specialized animal fencing could facilitate funneling herpetiles and other small wildlife species to culvert C2 rather than risk road mortality. An additional dry cell could also provide improved wildlife passage during seasonably wet periods.

Table 4-1: Ecological Characteristics of Crossing Feature Credit River – C1

Ecological Characteristics of Crossing Feature	
Landscape elements	Crossing C1 is the main branch of the Credit River which crosses under Mississauga Road. In this location the Credit River remains a natural channel with residential areas beyond the riparian zone one the west side of Mississauga Road and remnant woodlots and golf greens at the top of its banks on the east side o Mississauga Road. For much of its length through the study area, the Credit River is tracked by a narrow wooded buffer of Lowland Deciduous Forest Ecosite (FOD7). Species composition within this ecosite was not determined due to access restriction at the time of field investigations. This wooded buffer acts as a connection between areas of natural habitat on either side of Mississauga Road and numerous species of wildlife could utilize the habitats and wildlife crossings in this location.
Wildlife conflict zones	There is no documented evidence that the location of this crossing is located within a high volume wildlife crossing area. However, targeted surveys for relevant species were not undertaken. At a landscape scale this crossing occurs where a wetland and riparian area intersect with the roadway. As such, this crossing is considered to occur within a potential Wildlife Conflict Zone.
Wildlife crossing zones	The movement corridor at the Credit River crossing represents the most likely crossing site for the majority wildlife species occurring within the nearby area as few other natural linkages are present.
Target species	Wildlife species likely to cross under the bridge at the Credit River include White-tailed Deer [*Odocoileus virginianus*], medium mammals (e.g., Coyote [*Canis latrans*], Red Fox [*Vulpes vulpes*], American Mink [*Neovison vison*], Raccoon [*Procyon lotor*], Eastern Cottontail [*Sylvilagus floridanus*], Virginia Opossum [*Didelphis virginiana*]), small mammals (such as shrews and rodents), herpetiles and fish.
Crossing Specifications	
Existing crossing type	Span Bridge: Length: 68.58 m (3 x 22.86 spans) Width: 18.76 m
Replacement crossing type	Extended Span Bridge Length: 104.0 m (46 m centre span, 2 x 29 side spans) Width: 29.20 m
Advantages of Crossing Type	Wildlife underpasses associated with span bridges typically enable crossing by a variety of wildlife including those likely to be present in the Project study area. The nature of the span bridge provides line of site between adjacent habitats and good light conditions which are conducive to use by most species.
Considerations	Small animals (mammals and herpetiles) can be encouraged to cross with favourable habitat conditions. Such conditions include increased cover and damp conditions for amphibians. Vegetation restoration applications should be used to promote conditions that allow wildlife to easily find and use the crossing. Light and moisture conditions under a span bridge can be unfavourable to vegetation growth, therefore, cover such as logs and stumps can be implemented to provide cover for small wildlife, these would need to be utilized and maintained in such a way to not block wildlife movement but encourage it (e.g., clear tunnelways through a log pile).

Road access reduction suggested solution	Fencing and/or vegetation plantings can be used to keep wildlife off the road and funnel them towards the crossing under the bridge. Vegetation plantings can include the placement of dense shrubs along the watercourse and trees on the floodplain to encourage the direction of movement to the culvert opening. The placement of cover items in the form of larger rock treatments, logs, stumps along the banks either side of the crossing may also promote cover opportunities for small animals.
Wildlife corridor maintenance	Care should be taken to avoid creating movement barriers such as steep or rocky river banks or rip rap with voids as an exclusive treatment. A matrix of soil materials to fill voids in any rip rap placements or providing vegetated areas will both provide a soft substrate where a degree of erosion protection is provided while still allowing small wildlife movement to the culvert opening. To the extent possible, vegetative conditions around the structure should be contiguous with those present along the riparian habitat leading to the crossing and should not prevent passage through the crossing point. In case of low vegetative restoration success (due to moisture and low light conditions) logs piles and stumps can be introduced to provide cover for smaller species to use, these would need to be utilized and maintained in such a way to not block wildlife movement but encourage it (e.g., clear tunnelways through a log pile).
Expected changes in wildlife passage	The expansion of the span bridge at the Credit River crossing will result in an increased area suitable for terrestrial wildlife crossing as it will span a terrestrial crossing zone in addition to the aquatic and riparian spanned by the current structure. Currently terrestrial crossings are likely only possible for larger animals (due to water depths) and at times of low water levels. The crossing area does link natural vegetation communities and it is likely this increased terrestrial access will be utilized by various species from White-tailed Deer to small herpetiles.

5.0 Conclusions and Recommendations

The majority of the study area is developed lands in the form of residential, commercial and institutional buildings. As such, the majority of lands to be impacted by the proposed project are impacted 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. Project activities may result in disturbance in the form of exhaust emissions, dust, and vegetation removal. The level of disturbance, however, would be comparable to current levels. General construction mitigation measures should be employed to minimize impacts.

The most notable areas within the study area are the woodlands and forests. These ecosites have the potential to host features such as vernal pools, standing snags, and deadfall/logs, which are excellent sources of wildlife habitat. The woodlands and forests, both natural and plantations, should be delineated and marked in the field prior to construction so that disturbance to these areas can be minimized or avoided. Potential sources of impact include: placement of lay down areas, vegetation removal/trimming, and other disruptive activities all of which will be considered during Detail Design.

The Migratory Birds Convention Act (MBCA 1994) makes it unlawful to pursue, hunt, take, capture, kill or sell birds listed therein ("migratory birds"). Compliance with the MBCA regulations and guidelines for vegetation clearing or demolition, as recommended by Environment Canada, needs to be considered during the project's construction and operation phases. In order to minimize the potential for incidental take of any nesting migratory birds, clearing of vegetation and any proposed work activities in migratory bird habitat must be undertaken outside of the active breeding season (April 1 to August 31 , as provided by MNRF for the region). If clearing (or other work) in migratory bird habitat is required during the nesting season, a nest survey must be conducted by a qualified avian biologist immediately (i.e., within two days) prior to commencement of the works to identify and locate active nests of species covered by the MBCA.

Any bird nests reported on structures which require maintenance, modification or removal will be required to be removed prior to the breeding bird window of April 1 to August 31. Any construction activities that disturb bird nesting during the nesting period must cease until the birds have fledged. Avian exclusion measures for preventing birds from returning to a known nesting area is recommended. These measures will likely be required at the Credit River bridge where there are 11 known Cliff Swallow nests. Exclusion measures cannot be used where SAR birds are present, prior to compensation habitat is established. Exclusion measures can include, annoyance devices (sound), netting, rubber matting.

Due to the confirmed presence of Barn Swallow nests at Credit River bridge, communication with the MNRF will be required during Detail Design. If the nests are still present during Detail Design, a Notice of Activity process will likely be required. If Barn Swallow nesting activity will be disturbed at the site a Kiosk nest replacement structure will be required prior to the nesting period. The criteria for compensation will be determined during Detail Design. Ongoing consultation with MNRF will be required to ensure that any newly regulated SAR potentially interacting with the project are considered.

6.0 Closure

Prepared by:

Becky Harris, B.Sc.
Environmental Biologist

Reviewed by:

Senior Biologist

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Appendix A

Correspondence

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

Ministère des
Richesses naturelles
et des Forets

Telephone: (905) 713-7400
Facsimile: (905) 713-7361

Ontario

Oct 9, 2015

Brittany Ferguson
Amec Foster Wheeler
160 Traders Blvd, Suite 110
Mississauga, ON L4Z 3K7
(905) 568 2929 x 4122
brittany.ferguson@amecfw.com

Re: Request for Information for Mississauga Road Widening (Location 1: Queen Street to Financial Drive & Location 2: Bovaird Drive to Queen Street)

Dear Miss. Ferguson,

In your email dated Oct 5, 2015 you requested information on natural heritage features and element occurrences occurring on or adjacent to the above mentioned location. There are Species at Risk recorded for your study area. As of the date of this letter, we have records of:

Redside Dace	END
Butternut	END
American Chestnut	END
Eastern Meadowlark	THR
Bobolink	THR
Chimney Swift	THR
Barn Swallow	THR
Northern Map Turtle	SC
Snapping Turtle	SC
Eastern Milksnake	SC

Additionally, the species listed below have the potential to occur in your study and may require further assessment or field studies to determine presence. We have records of the following species within the vicinity of your study area:

Eastern Small-footed Myotis	END
Little Brown Myotis	END
Northern Myotis	END
Bank Swallow	THR
Peregrine Falcon	SC
Monarch	SC

Natural heritage features recorded within your area include the:

- Occupied Redside Dace (END) habitat: Huttonville Creek
- Provincally Significant Churchville-Norval Wetland Complex
- Locally Significant Springbrook Wetland Complex
- Huttonville Creek & Area Wetland Complex
- Regionally Significant Georgetown Credit Valley ANSI

These species may receive protection under the *Endangered Species Act 2007* and thus, an approval from MNRF may be required if the work you are proposing could cause harm to these species or their habitats. If the Species at Risk in Ontario List is amended, additional species may be listed and protected under the *ESA 2007* or the status and protection levels of currently listed species may change.

Absence of information provided by MNRF for a given geographic area, or lack of current information for a given area or element, does not categorically mean the absence of sensitive species or features. Many areas in Ontario have never been surveyed and new plant and animal species records are still being discovered for many localities. For these reasons, the MNRF cannot provide a definitive statement on the presence, absence or condition of biological elements in any part of Ontario.

This species at risk information is highly sensitive and is not intended for any person or project unrelated to this undertaking. Please do not include any specific information in reports that will be available for public record. As you complete your fieldwork in these areas, please report all information related to any species at risk to our office. This will assist with updating our database and facilitate early consultation regarding your project.

If you have any questions or comments, please do not hesitate to contact ESA.aurora@ontario.ca.

Sincerely,

Catherine Wisniowski
Wildlife Technician
Ontario Ministry of Natural Resources and Forestry, Aurora District

October 6, 2015

Credit Valley Conservation
1255 Old Derry Road
Mississauga, Ontario
L5N 6R4

Dear Mr. James,

Re: Information Request for the Widening of Mississauga Road, City of Vaughan, ON

This memorandum and associated figures have been prepared by Amec Foster Wheeler Environment & Infrastructure (Amec Foster Wheeler), on behalf of the Region of Peel (Region), as a formal request for environmental information in the area of a proposed road widening project of Mississauga Road, from Queen Street to Financial Drive, in the City of Brampton, Regional Municipality of Peel (Figure 2). Location 1 (Figure 2) is currently in the initiation process of a Municipal Class EA.

Amec Foster Wheeler would like to take this opportunity to inquire if you hold any information with respect to natural heritage features along Mississauga Road, such as:

- Aquatic fish habitat mapping;
- Fish community data for watercourses;
- Terrestrial ELC (preference for shapefile access);
- Areas of Natural or Scientific Interest (ANSIs) (preference for shapefile access); and
- Significant Ecological Areas (SEAs) (preference for shapefile access).

Amec Foster Wheeler will identify and classify existing riparian/wetland and terrestrial habitat conditions, including potential for rare and endangered flora and associated habitats, through a secondary source information review and general field reconnaissance within the study limits. Fish and fish habitat conditions will also be identified.

Amec Foster Wheeler will also be in contact with the Ministry of Natural Resources and Forestry (MNRF) regarding the above noted environmental concerns within the vicinity of the Mississauga Road Widening Project. Amec Foster Wheeler is requesting that Credit Valley Conservation (CVC) review the project description and attached findings in conjunction with their own information on and provide comment related to any environmental concerns associated with this project.

We would be pleased to know if you have any issues relating to the proposed development of this site to which you would like to draw to our attention.

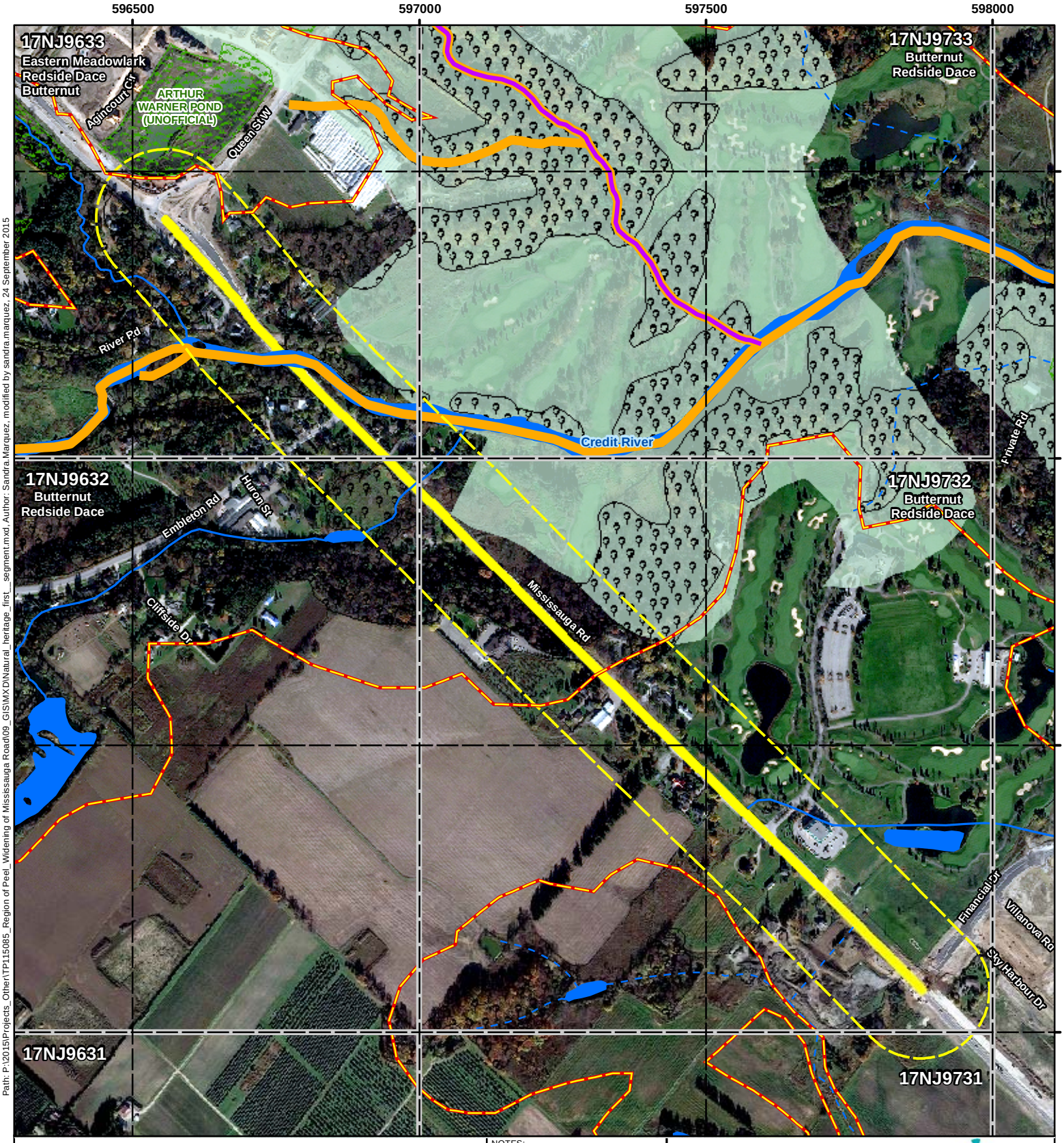
Thank you in advance for your time and assistance. If you have any questions or concerns relating to the proposed project please contact the undersigned at your convenience.

Sincerely,

Brittany Ferguson, B.Sc.
Environmental Biologist
Amec Foster Wheeler Environment & Infrastructure,
a Division of Amec Foster Wheeler Americas Limited
Direct Tel 905-568-2929
E-mail brittany.ferguson@amecfw.com

Enclosed: Project Figures

cc: Daryl Rideout, Amec Foster Wheeler



Path: P:\2015\Projects_Other\TP115085_Region of Peel_Widening of Mississauga Road\09_GIS\MXD\Natural_heritage_first__segment.mxd, Author: Sandra.Marquez, modified by sandra.marquez, 24 September 2015

LEGEND

- First Road Segment of Interest
- Study Area (120m Buffer)
- NHIC Squares (SAR species observed within the past 20 years)
- 2015 Occupied or Recovery Reaches for Redside Dace
- 2014 DFO SAR Fish Species: American Eel, Lake Sturgeon & Redside Dace
- Environmentally Sensitive Area
- Credit Valley Conservation Authority Regulation Area
- Permanent Watercourse
- Intermittent Watercourse
- Buried Watercourse
- Park
- woodland
- Waterbody

NOTES:
- Background imagery from Bing maps.
- Topographic features extracted from LIO, MNRF.
- SAR information extracted from NHIC database 2015.
-- Georeferenced data representation of Regulation Limits derived from CVC.
- Topographic features extracted from LIO, MNR.
- Complementary topographic data from Peel Region and Mississauga City under Open Data Licence.

Region of Peel Working for you

amec foster wheeler

MISSISSAUGA ROAD WIDENING PROJECT

DRAFT

Natural Heritage and SAR Location #1

Datum & Projection: NAD 1983 UTM Zone 17N

0 100 200 300 400 500 Meters

PROJECT N°: TP115085

FIGURE: 2

SCALE: 1:9,000

DATE: September 2015

Appendix B

Photo Record

Appendix B – Photo Record

Photo 1. Chimney Swift habitat at Breeding Bird Survey Location 6 with twelve Chimney Swifts circling.

Photo 2. Cliff Swallow nests under Credit River bridge (1 Barn Swallow nest was also observed).

Appendix C

Compiled Wildlife Species List

Compiled Wildlife Species List[1]

Species	Scientific Name	SRank	(SARA)*	(ESA)**
Avian[2]				
Canada Goose	*Branta canadensis*	S5		
Wood Duck	*Aix sponsa*	S5		
Gadwall	*Anas strepera*	S4		
American Wigeon	*Anas americana*	S4		
American Black Duck	*Anas rubripes*	S4		
Mallard	*Anas platyrhynchos*	S5		
Blue-winged Teal	*Anas discors*	S4		
Northern Shoveler	*Anas clypeata*	S4		
Northern Pintail	*Anas acuta*	S5		
Green-winged Teal	*Anas crecca*	S4		
Hooded Merganser	*Lophodytes cucullatus*	S5		
Common Merganser	*Mergus merganser*	S5		
Ring-necked Pheasant	*Phasianus colchicus*	SNA		
Ruffed Grouse	*Bonasa umbellus*	S4		
Wild Turkey	*Meleagris gallopavo*	S5		
Northern Bobwhite[α]	*Colinus virginianus*	S1	END	END
Pied-billed Grebe	*Podilymbus podiceps*	S4		
American Bittern	*Botaurus lentiginosus*	S4		
Least Bittern	*Ixobrychus exilis*	S4	THR	THR
Great Blue Heron	*Ardea herodias*	S4		
Green Heron	*Butorides virescens*	S4		
Yellow-crowned Night-Heron	*Nyctanassa violacea*	SNA		
Turkey Vulture	*Cathartes aura*	S5		
Osprey	*Pandion haliaetus*	S5		
Northern Harrier[α]	*Circus cyaneus*	S4		
Sharp-shinned Hawk	*Accipiter striatus*	S5		
Cooper's Hawk	*Accipiter cooperii*	S4		
Northern Goshawk	*Accipiter gentilis*	S4		
Red-shouldered Hawk[α]	*Buteo lineatus*	S4		
Broad-winged Hawk	*Buteo platypterus*	S5		
Red-tailed Hawk	*Buteo jamaicensis*	S5		
American Kestrel[α]	*Falco sparverius*	S4		
Peregrine Falcon[α6]	*Falco peregrinus*	S4	SC	SC
Virginia Rail	*Rallus limicola*	S5		
Sora	*Porzana carolina*	S4		
Common Moorhen	*Gallinula chloropus*	S4		
American Coot	*Fulica americana*	S4		
Killdeer	*Charadrius vociferus*	S5		
Rock Pigeon	*Columba livia*	SNA		
Spotted Sandpiper	*Actitis macularius*	S5		
Upland Sandpiper	*Bartramia longicauda*	S4		
Wilson's Snipe	*Gallinago delicate*	S5		
American Woodcock	*Scolopax minor*	S4		
Wilson's Phalarope	*Phalaropus tricolor*	S3		
Ring-billed Gull	*Larus delawarensis*	S5		
Herring Gull	*Larus argentatus*	S5		
Black Tern	*Chlidonias niger*	S4		SC

Species	Scientific Name	SRank	(SARA)*	(ESA)**
Mourning Dove	*Zenaida macroura*	S5		
Yellow-billed Cuckoo	*Coccyzus americanus*	S4		
Black-billed Cuckoo[α]	*Coccyzus erythropthalmus*	S5		
Eastern Screech-Owl	*Megascops asio*	S4		
Great Horned Owl	*Bubo virginianus*	S4		
Barred Owl	*Strix varia*	S5		
Long-eared Owl	*Asio otus*	S4		
Northern Saw-whet Owl	*Aegolius acadicus*	S4		
Common Nighthawk	*Chordeiles minor*	S4	THR	SC
Eastern Whip-poor-will[α]	*Antrostomus vociferus*	S4	THR	THR
Chimney Swift[α6]	*Chaetura pelagica*	S4	THR	THR
Ruby-throated Hummingbird	*Archilochus colubris*	S5		
Belted Kingfisher[α]	*Megaceryle alcyon*	S4		
Red-headed Woodpecker[α]	*Melanerpes erythrocephalus*	S4	THR	SC
Red-bellied Woodpecker	*Melanerpes carolinus*	S4		
Yellow-bellied Sapsucker	*Sphyrapicus varius*	S5		
Downy Woodpecker	*Picoides pubescens*	S5		
Hairy Woodpecker	*Picoides villosus*	S5		
Northern Flicker[α]	*Colaptes auratus*	S4		
Pileated Woodpecker	*Dryocopus pileatus*	S5		
Olive-sided Flycatcher	*Contopus cooperi*	S4	THR	SC
Eastern Wood-Pewee[α]	*Contopus virens*	S4		SC
Alder Flycatcher	*Empidonax alnorum*	S5		
Willow Flycatcher[α]	*Empidonax traillii*	S5		
Least Flycatcher	*Empidonax minimus*	S4		
Eastern Phoebe	*Sayornis phoebe*	S5		
Great Crested Flycatcher	*Myiarchus crinitus*	S4		
Eastern Kingbird[α]	*Tyrannus tyrannus*	S4		
Yellow-throated Vireo	*Vireo flavifrons*	S4		
Blue-headed Vireo	*Vireo solitarius*	S5		
Warbling Vireo	*Vireo gilvus*	S5		
Red-eyed Vireo	*Vireo olivaceus*	S5		
Blue Jay	*Cyanocitta cristata*	S5		
American Crow	*Corvus bracyrhynchos*	S5		
Horned Lark	*Eremophila alpestris*	S5		
Purple Martin	*Progne subis*	S4		
Tree Swallow	*Tachycineta bicolor*	S4		
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	S4		
Bank Swallow[α6]	*Riparia riparia*	S4		THR
Cliff Swallow	*Petrochelidon pyrrhonota*	S4		
Barn Swallow[6]	*Hirundo rustica*	S4		THR
Black-capped Chickadee	*Poecile atricapillus*	S5		
Red-breasted Nuthatch	*Sitta canadensis*	S5		
White-breasted Nuthatch	*Sitta carolinensis*	S5		
Brown Creeper	*Certhia americana*	S5		
Carolina Wren	*Thryothorus ludovicianus*	S4		
House Wren	*Troglodytes aedon*	S5		
Winter Wren	*Troglodytes hiemalis*	S5		

Species	Scientific Name	SRank	(SARA)*	(ESA)**
Sedge Wren	*Cistothorus platensis*	S4		
Marsh Wren	*Cistothorus palustris*	S4		
Golden-crowned Kinglet	*Regulus satrapa*	S5		
Blue-gray Gnatcatcher	*Polioptila caerulea*	S4		
Eastern Bluebird	*Sialia sialis*	S5		
Veery	*Catharus fuscescens*	S4		
Swainson's Thrush	*Catharus ustulatus*	S4		
Hermit Thrush	*Catharus guttatus*	S5		
Wood Thrush α	*Hylocichla mustelina*	S4		SC
American Robin	*Turdus migratorius*	S5		
Gray Catbird	*Dumetella carolinensis*	S4		
Northern Mockingbird	*Mimus polyglottos*	S4		
Brown Thrasher α	*Toxostoma rufum*	S4		
European Starling	*Sturnus vulgaris*	SNA		
Cedar Waxwing	*Bombycilla cedrorum*	S5		
Blue-winged Warbler α	*Vermivora cyanoptera*	S4		
Golden-winged Warbler α	*Vermivora chrysoptera*	S4	THR	SC
Nashville Warbler	*Oreothlypis ruficapilla*	S5		
Northern Parula	*Setophaga americana*	S4		
Yellow Warbler	*Setophaga petechial*	S5		
Chestnut-sided Warbler	*Setophaga pensylvanica*	S5		
Magnolia Warbler	*Setophaga magnolia*	S5		
Black-throated Blue Warbler	*Setophaga caerulescens*	S5		
Yellow-rumped Warbler	*Setophaga coronate*	S5		
Black-throated Green Warbler	*Setophaga virens*	S5		
Blackburnian Warbler	*Setophaga fusca*	S5		
Pine Warbler	*Setophaga pinus*	S5		
Black-and-white Warbler	*Mniotilta varia*	S5		
American Redstart	*Setophaga ruticilla*	S5		
Ovenbird	*Seiurus aurocapilla*	S4		
Northern Waterthrush	*Parkesia noveboracensis*	S5		
Louisiana Waterthrush α	*Parkesia motacilla*	S3	SC	SC
Mourning Warbler	*Geothlypis philadelphia*	S4		
Common Yellowthroat	*Geothlypis trichas*	S5		
Hooded Warbler α	*Setophaga citrina*	S4	THR	
Canada Warbler α	*Cardellina canadensis*	S4	THR	SC
Yellow-breasted Chat α	*Icteria virens*	S2	SC	END
Eastern Towhee α	*Pipilo erythrophthalmus*	S4		
Chipping Sparrow	*Spizella passerine*	S5		
Clay-colored Sparrow	*Spizella pallida*	S4		
Field Sparrow α	*Spizella pusilla*	S4		
Vesper Sparrow α	*Pooecetes gramineus*	S4		
Savannah Sparrow α	*Passerculus sandwichensis*	S4		
Grasshopper Sparrow α	*Ammodramus savannarum*	S4		
Henslow's Sparrow α	*Ammodramus henslowii*	SHB	END	END
Song Sparrow	*Melospiza melodia*	S5		
Lincoln's Sparrow	*Melospiza lincolnii*	S5		
Swamp Sparrow	*Melospiza georgiana*	S5		
White-throated Sparrow	*Zonotrichia albicollis*	S5		

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Scarlet Tanager	*Piranga olivacea*	S4		
Northern Cardinal	*Cardinalis cardinalis*	S5		
Rose-breasted Grosbeak [α]	*Pheucticus ludovicianus*	S4		
Indigo Bunting	*Passerina cyanea*	S4		
Bobolink [α6]	*Dolichonyx oryzivorus*	S4		THR
Red-winged Blackbird	*Agelaius phoeniceus*	S4		
Eastern Meadowlark [α56]	*Sturnella magna*	S4		THR
Western Meadowlark	*Sturnella neglecta*	S3		
Common Grackle	*Quiscalus quiscula*	S5		
Brown-headed Cowbird	*Molothrus ater*	S4		
Orchard Oriole	*Icterus spurius*	S4		
Baltimore Oriole [α]	*Icterus galbula*	S4		
Purple Finch	*Haemorhous purpureus*	S4		
House Finch	*Haemorhous mexicanus*	SNA		
Red Crossbill	*Loxia curvirostra*	S4		
Pine Siskin	*Spinus pinus*	S4		
American Goldfinch	*Spinus tristis*	S5		
House Sparrow	*Passer domesticus*	SNA		
Mammals[3]				
Big Brown Bat	*Eptesicus fuscus*	S4		
Silver-haired Bat	*Lasionycteris noctivagans*	S4		
Eastern Red Bat	*Lasiurus borealis*	S4		
Hoary Bat	*Lasiurus cinereus*	S4		
Eastern Small-footed Myotis[6]	*Myotis leibii*	S2S3		END
Little Brown Myotis[6]	*Myotis lucifugus*	S4	END	END
Northern Long-eared Myotis[6]	Myotis septentrionalis	S3	END	END
Tri-colored Bat	*Perimyotis subflavus*	S3	END	END
Coyote	*Canis latrans*	S5		
Red Fox	*Vulpes vulpes*	S5		
Raccoon	*Procyon lotor*	S5		
Ermine	*Mustela ermine*	S5		
Long-tailed Weasel	*Mustela frenata*	S4		
Mink	*Mustela vison*	S4		
Striped Skunk	*Mephitis mephitis*	S5		
White-tailed Deer	*Odocoileus virginianus*	S5		
Virginia Opossum	*Didelphis virginiana*	S4		
Eastern Cottontail	*Sylvilagus floridanus*	S5		
Snowshoe Hare	*Lepus americanus*	S5		
European Hare	*Lepus europaeus*	SNA		
Eastern Chipmunk	*Tamias striatus*	S5		
Woodchuck	*Marmota monax*	S5		
Gray Squirrel	*Sciurus carolinensis*	S5		
Red Squirrel	*Tamiasciurus hudsonicus*	S5		
Northern Flying Squirrel	*Glaucomys sabrinus*	S5		
Southern Flying Squirrel	*Glaucomys Volans*	S4		
Beaver	*Castor Canadensis*	S5		
White-footed Mouse	*Peromyscus leucopus*	S5		
Deer Mouse	*Peromyscus maniculatus*	S5		
Meadow Vole	*Microtus pennsylvanicus*	S5		

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Muskrat	*Ondatra zibethicus*	S5		
Southern Bog Lemming	*Synaptomys cooperi*	S4		
Norway Rat	*Rattus norvegicus*	SNA		
House Mouse	*Mus musculus*	SNA		
Meadow Jumping Mouse	*Zapus hudsonius*	S5		
Woodland Jumping Mouse	*Napaeozapus insignis*	S5		
Porcupine	*Erethizon dorsatum*	S5		
Common Shrew	*Sorex cinereus*	S5		
Smoky Shrew	*Sorex fumeus*	S5		
Pygmy Shrew	*Sorex hoyi*	S4		
Water Shrew	*Sorex palustris*	S5		
Northern Short-tailed Shrew	*Blarina brevicauda*	S5		
Hairy-tailed Mole	*Parascalops breweri*	S4		
Star-nosed Mole	*Condylura cristata*	S5		
Reptiles[4]				
Snapping Turtle[6]	*Chelydra septentina*	S3	SC	SC
Midland Painted Turtle	*Chrysemys picta marginata*	S4		
Northern Map Turtle[6]	*Graptemys geographica*	S3	SC	SC
Eastern Milksnake[6]	*Lampropeltis triangulum*	S4	SC	
Dekay's Brown Snake	*Storeria dekayi*	S5		
Red-bellied Snake	*Storeria occipitomaculata*	S5		
Eastern Gartersnake	*Thamnophis sirtalis*	S5		
Amphibians[4]				
American Toad	*Anaxyrus americanus*	S5		
Eastern Red-backed Salamander	*Plethodon cinereus*	S5		
Gray Treefrog	*Hyla versicolor*	S5		
Green Frog	*Lithobates clamitans*	S5		
Northern Leopard Frog	*Lithobates pipiens*	S5		
Wood Frog	*Lithobates sylvaticus*	S5		
Spring Peeper	*Pseudacris crucifer*	S5		
American Bullfrog	*Lithobates catesbianus*	S4		
Invertebrates				
Monarch[6]	*Danaus plexippus*	S2N,S4B	SC	SC
Lilypad Clubtail[5]	*Arigomphus furcifer*	S3		
Amber-winged Spreadwing[5]	*Lestes eruinus*	S3		

Notes:
1 Shaded species are those observed/reported during AMEC site investigations
2 Second (2001-2005) Atlas of the Breeding Birds of Ontario (Cadman et al. 2007)
3 Atlas of the Mammals of Ontario (Dobbyn 1994; Species reported in the vicinity during 1970 – 1993), bat data supplemented by Bat Conservation International (BCI 2013)
4 Ontario Reptile & Amphibian Atlas (Ontario Nature 2013)
5 NHIC Historical record. Last observed date was prior to 1980. (MNR 2013b)
6 MNRF Correspondence
*SARA Species at Risk Act
**ESA Endangered Species at Risk Act
α Indicates "priority species" as listed by Ontario Partners in Flight 2008

Provincial Rank: S2 Imperilled; S3 Vulnerable; S4 Apparently Secure; S5 Secure; SNA Not Applicable/Provincially non-native, not suitable target for conservation activities; S#B Breeding; S#N Non-breeding
SARA/ESA Designation: END Endangered, THR Threatened, SC Special Concern