



FINAL (Rev. 1)

Municipal Class Environmental Assessment

**PRELIMINARY DESIGN
WIDENING OF MISSISSAUGA ROAD FROM FINANCIAL
DRIVE TO QUEEN STREET WEST
BRAMPTON, ONTARIO**

**AQUATIC HABITAT
EXISTING CONDITIONS REPORT**

Submitted to:

**The Regional Municipality of Peel
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Submitted by:

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**November 2018
TP115085**

EXECUTIVE SUMMARY

The Region of Peel is proposing the widening of approximately 4.5 km of Mississauga Road (Regional Road 1) extending from 300 metres (m) north of Financial Drive to 100 m south of Bovaird Drive (Regional Road 107), within the City of Brampton. The project works associated with this project extend approximately 2.0 km from Financial Drive to 150 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 Aquatic 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 located within the Credit River watershed under the jurisdiction of the Credit Valley Conservation Authority and the Aurora District Ministry of Natural Resources and Forestry (MNR). This report provides a summary of aquatic existing conditions from both secondary source information and field investigations conducted on September 30, 2016. Two watercourse crossings were identified in the study area and two cross drainage culverts. Data from background sources identify the Credit River as a permanent watercourse with a coolwater thermal regime and 'High' sensitivity in the vicinity of the project area, and identify an unnamed tributary to the Credit River which has intermittent flow and provides indirect fish habitat only. The second drainage system supports a warmwater fish community (CVC, 2018). These two watercourses have been assessed as described in the *Environmental Guide for Fish and Fish Habitat* (MTO 2009). One aquatic Species at Risk (SAR) have been recorded in the vicinity of the 2.0 km project area.



<u>TABLE OF CONTENTS</u>		<u>Page</u>
1.0	PROJECT OVERVIEW	1
1.1	Study Area	1
2.0	METHODOLOGY	5
2.1	Secondary Source Review	5
2.2	Field Surveys	6
3.0	RESULTS.....	6
3.1	Credit River Watershed.....	6
3.2	Potential Constraints.....	7
3.2.1	Aquatic Species at Risk.....	7
3.3	Fish and Fish Habitat	9
3.3.1	Crossing C1 - Credit River.....	9
3.3.1.1	Origin and Flow	9
3.3.1.2	Community and Fisheries Classification.....	11
3.3.1.3	Water Chemistry	13
3.3.1.4	Watercourse Sensitivity.....	14
3.3.2	Crossing C2 - Unnamed Tributary to Credit River.....	14
3.3.2.1	Origin and Flow	14
3.3.2.2	Community and Fisheries Classification.....	14
4.0	POTENTIAL IMPACTS TO FISH	15
5.0	POTENTIAL MITIGATION	15
6.0	ENHANCEMENT OPPORTUNITIES.....	16
7.0	REFERENCES.....	18

LIST OF TABLES

Table 3-2	Fish Species of the Credit River Watershed (Riverine Habitats).....	11
Table 3-3	Amec Foster Wheeler Water Chemistry Results	14

LIST OF FIGURES

Figure 1-1	Project Location	2
Figure 1-2	Crossing C1 Study Area.....	3
Figure 1-3	Crossing C2 Study Area.....	4
Figure 3-1	Natural Heritage Features and Species at Risk.....	8

LIST OF APPENDICES

Appendix A	Correspondence
Appendix B	Photo Record

1.0 PROJECT OVERVIEW

To meet existing and future needs, the Region of Peel is proposing the widening of approximately 2.0 kilometres (km) of Mississauga Road (Regional Road 1) extending from Financial Drive to 150 m north of Queen Street West (Regional Road 6), within the City of Brampton (Figure 1-1). This project will be classified as a Schedule 'C' Municipal Class Environmental Assessment (EA). Additional work includes improvements to other infrastructure, such as transit and active transportation facilities to provide efficient movement of people and goods.

Amec Foster Wheeler Environment & Infrastructure, a Division of Amec Foster Wheeler Americas Limited (Amec Foster Wheeler) has been retained to undertake the required Schedule 'C' Municipal Class EA for the proposed widening of Mississauga Road. This Aquatic 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

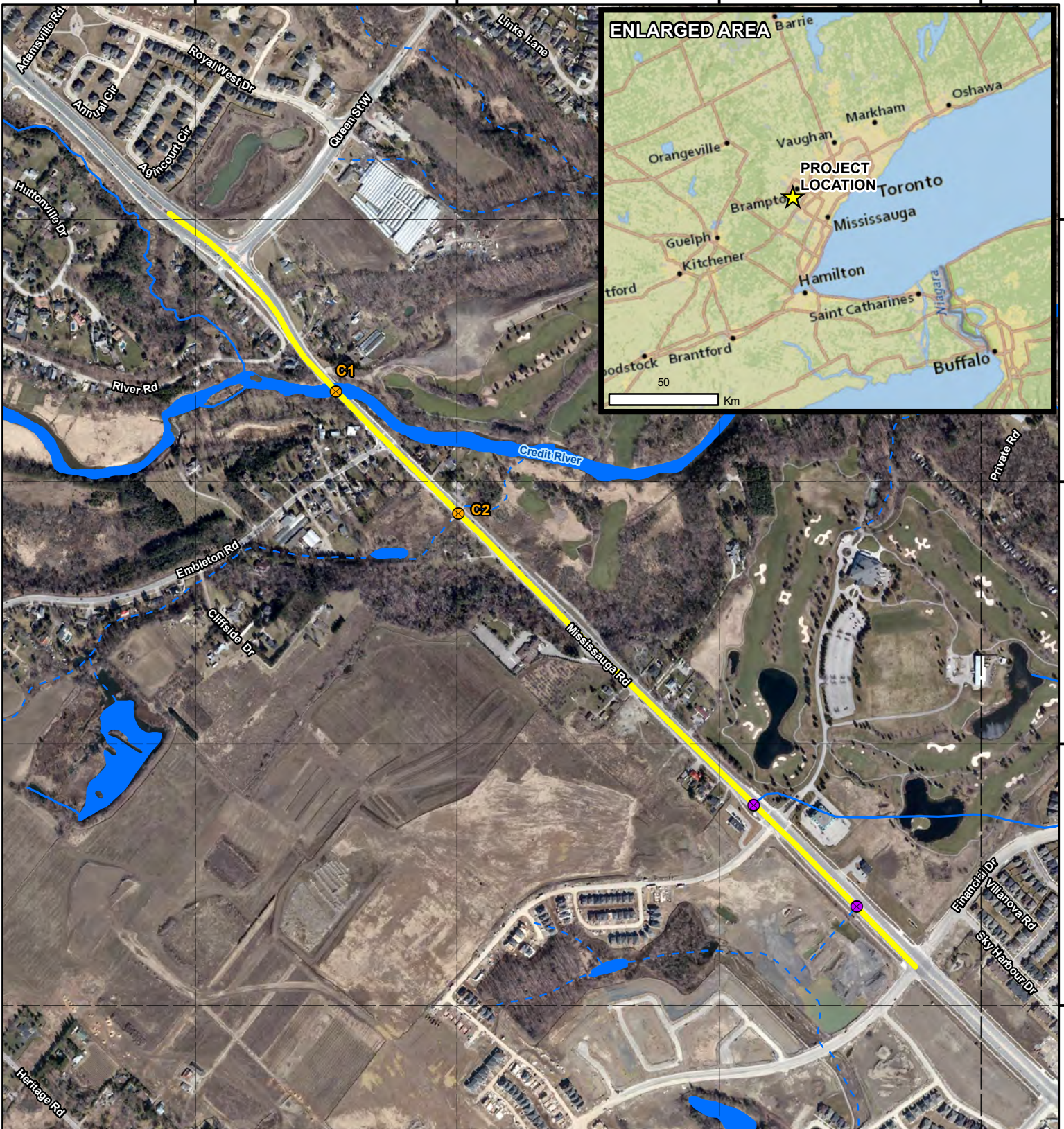
Mississauga Road is a north-south arterial road under the jurisdiction of the Regional Municipality of Peel. The project area encompasses approximately 2.0 km of Mississauga Road and is located within the Credit River watershed under the jurisdiction of the Credit Valley Conservation Authority (CVC) and Aurora District Ministry of Natural Resources and Forestry (MNR) (Figure 1-1). Two watercourse crossings and two cross drainage ditches were identified in the study area. The two watercourses include: a bridge structure with two piers at the Credit River (Crossing C1) and a corrugated steel pipe culvert at an unnamed tributary to the Credit River (Crossing C2). At Crossing C1, the aquatic study area included the right-of-way (i.e., under the bridge) as well as 50 m upstream and 200 m downstream (Figure 1-2). At Crossing C2, due to the undefined channel of the drainage feature the aquatic study area included a shorter area approximately 30 m upstream and 40 m downstream of the culvert inlet and outlet, respectively (Figure 1-3). The two cross drainage culvert areas were identified as Crossing C3 and C4 and are indicated in Figure 1-1. Crossings C3 and C4 were identified as only cross drainage and therefore no further investigations or references to these locations are made in this report.

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Path: P:\2015\Projects_Other\TP115085_Region of Peel_Widening of Mississauga Road\09_GIS\MXD\Aerial\Project_Location_3.mxd, Author: Sandra Marquez, modified by monica devesu, 16 November 2016

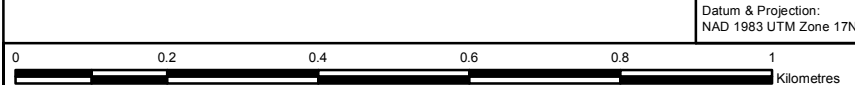
LEGEND

- 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.



MISSISSAUGA ROAD WIDENING PROJECT



Datum & Projection:
 NAD 1983 UTM Zone 17N



PROJECT N^o: TP115085

FIGURE: 1-1

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DATE: November 2016

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LEGEND

-  Watercourse Crossing
-  Contours - 1 metre interval (City of Brampton)
- Aquatic Study Limits**
-  Upstream (50 m)
-  Downstream (200 m)

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



MISSISSAUGA ROAD WIDENING PROJECT

Crossing C1 Study Area

Datum & Projection:
NAD 1983 UTM Zone 17N



PROJECT N^o: TP115085

FIGURE: 1-2

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DATE: November 2016



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LEGEND

-  Watercourse Crossing
-  Contours - 1 metre interval (City of Brampton)
-  Intermittent Watercourse
-  Culvert / Bridge
- Aquatic Study Limits**
-  Upstream (30 m)
-  Downstream (40 m)

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



MISSISSAUGA ROAD WIDENING PROJECT

Crossing C2 Study Area

Datum & Projection:
NAD 1983 UTM Zone 17N

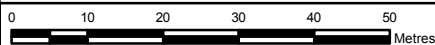


PROJECT N^o: TP115085

FIGURE: 1-3

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DATE: November 2016



2.0 METHODOLOGY

The aquatic study area, for the purpose of field investigation, is described above in Section 1.1. Findings within the study area were documented on September 30, 2016 and this information was used in conjunction with secondary source information covering a larger area to identify the fish community, existing conditions of aquatic habitat, and probability for Species at Risk (SAR) presence.

2.1 Secondary Source Review

Secondary sources and databases were reviewed to ascertain fish community and aquatic habitat data for the watercourses within the project limits. Information provided by external agencies, publicly-available topographic data, and correspondence with external agencies regarding terrestrial ecological components are provided in the Amec Foster Wheeler's (2017) *Terrestrial Habitat Existing Conditions Report*. Sources for background data review included:

- Credit Valley Conservation (CVC) publications and online data:
 - CVC website (CVC 2016);
 - 2013 Credit River Watershed Report Card (CVC 2013);
 - Credit River Water Management Strategy Update (CVC 2007);
 - Credit River Fisheries Management Plan (CVC 2002a); and
 - Fishes of the Credit River Watershed (CVC 2002b).
- Reporting for projects conducted in the area:
 - Natural Heritage Report: Mississauga Road from Queen Street to Bovaird Drive (LGL 2006); and
 - Class Environmental Assessment Study: Mississauga Road from Queen Street to Bovaird Drive (Trow 2006).
- Aerial imagery from Bing Maps (Bing 2016);
- Species occurrence and natural heritage feature records extracted from the MNRF's Natural Heritage Information Centre (NHIC) including four 1 km² squares encompassing the project area – 17NJ9633, 17NJ9733, 17NJ9632, 17NJ9732 (MNRF 2015);
- Correspondence with the Aurora District MNRF (Appendix A);
- Fisheries and Oceans Canada's (DFO) Distribution of Aquatic SAR mapping (DFO 2015);
- Topographic data extracted from Land Information Ontario (Government of Ontario 2015);
- Complementary topographic data from the Regional Municipality of Peel and City of Mississauga under an Open Data License; and
- Project meeting minutes.

2.2 Field Surveys

To augment the secondary source review, Amec Foster Wheeler staff conducted aquatic field investigations on September 30, 2016. Field conditions were assessed following methods described and required by the Ontario Ministry of Transportation's *Environmental Guide for Fish and Fish Habitat* (MTO 2009). This guide was used for the sampling protocol as it applies appropriate sampling criteria related specifically to linear corridors and roadway-based facilities. In fall 2016, observations were largely from a reconnaissance perspective to confirm site specific conditions related to flows and associated habitat availability, and potential impediments to upstream fish movement.

Photo documentation is provided in Appendix B and watercourse field record forms are provided in Appendix C.

Fish sampling was deemed unnecessary for this project as sufficient data is available for the Credit River (Crossing C1) and water depth in the unnamed tributary to the Credit River (Crossing C2) was insufficient for sampling. Habitat assessment data was recorded for the two crossings; results are summarized in Section 3.0.

3.0 RESULTS

3.1 Credit River Watershed

The study area is located in the Credit River watershed which is within the regulated flood limits of the CVC and is within the Aurora District MNR. Crossing C1 is the main branch of the Credit River, and Crossing C2 is an undefined tributary of the Credit River and drains approximately 1.2 km and crosses Mississauga Road just before discharging into the Credit River. The Credit River watershed is located within the most densely populated region of Canada and drains an area of approximately 870 km² that is divided into three physiographic zones: Upper Watershed, Middle Watershed, and Lower Watershed (CVC 2002a; CVC 2007). The project area is located at the northern end of the Lower Watershed. The Lower Watershed is largely characterized by urbanized lands, and of the three watershed zones has the highest concentration of anthropogenic impacts, where land use and climate change represent the two dominant stressors influencing the health of the watershed (CVC 2013).

Through implementation of their Integrated Watershed Monitoring Program (IWMP), CVC monitors key aquatic and terrestrial indicators to track the health of the Credit River watershed. Initiated in 1999, this program monitors key factors such as climate, streamflow, groundwater quality and quantity, forest integrity, wetland integrity, riparian integrity, stream geomorphology, water quality, benthic invertebrates and fish at 150 locations throughout the watershed (CVC 2007). These studies have shown that in the Lower Watershed, the urban designation represents 60% of the watershed area, with natural areas making up only 17%: upland forest (7%), meadow/successional (8%), wetland (1%), and water (1%). The remaining 23% of land is occupied by agriculture and open space. Urbanization in the Lower Watershed continues to have a significant impact on the Credit River ecosystems and to mitigate the impacts, CVC works closely with its municipal partners to adapt and mitigate the challenges that arise (CVC 2013).

CVC's 2007 *Credit River Water Management Strategy Update* report identifies the Lower Watershed as providing 'fair quality' coldwater fish habitat and 'good quality' warmwater fish habitat as well as a migratory coldwater fishery that includes Chinook Salmon (*Oncorhynchus tshawytscha*), Rainbow Trout (*Oncorhynchus mykiss*), and Brown Trout (*Salmo trutta*), some of which are stocked annually (CVC 2007). Surficial soils in the Lower Watershed have low infiltration rates in comparison to the remainder of the watershed and the coverage of impervious surfaces continues to grow each year. The increased amounts of runoff in this zone have resulted in a reduced supply of water to the groundwater system, a lowered water table, and a reduced supply of cold, clear, upwelling baseflow to the watercourses in this zone (CVC 2007).

The Credit River watershed is divided into 22 subwatersheds which are also monitored and assessed by CVC. The project location is located within the Norval to Port Credit subwatershed; at the time of this report's submission, CVC's Norval to Port Credit subwatershed study was in progress and results were not yet publicly available.

3.2 Potential Constraints

General watercourse mapping including potential constraints such as aquatic SAR and SAR habitat, and natural heritage features. These constraints are included in Figure 3-1. Further discussion of aquatic SAR is included below. For details related to natural heritage features please refer to Amec Foster Wheeler's (2017) *Terrestrial Habitat Existing Conditions Report*.

3.2.1 Aquatic Species at Risk

A review of secondary sources (as listed in Section 2.1) indicates that there are records of Redside Dace (*Clinostomus elongates*) within the project area (MNR 2015; Appendix A). This species is listed under the *Endangered Species Act, 2007* as provincially Endangered. In Canada, the Redside Dace is found only in southern Ontario where it most frequently occurs in streams flowing into western Lake Ontario. This species requires cool, clear flowing water with riffle-pool sequences and overhanging streamside vegetation (Redside Dace Recovery Team 2010). Investigations to locate critical habitat and record occurrences of this species are on-going. To date this species has not been recorded in the Credit River; however, it is present in tributaries to the Credit River including Huttonville Creek. Huttonville Creek Occupied Redside Dace Habitat, as confirmed through MNR correspondence (Appendix A), converges with the Credit River approximately 0.9 km downstream of Crossing C1. Within the study area, the Credit River's large size and limited overhanging stream side vegetation makes it unlikely for Redside Dace to be present.

Please note, these findings do not confirm presence or absence of Redside Dace at the site or any other SAR that may move through the area, or other species already occurring in the area that may be up-listed at any time. For this reason ongoing communication with the MNR is strongly recommended to ensure compliance with the *Endangered Species Act, 2007* (ESA, 2007).

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LEGEND

- Project Location
- NHIC Squares (Aquatic SAR species observed within the past 20 years)
- 2015 Occupied or Recovery Reaches for Redside Dace
- Environmentally Sensitive Area (CVC)
- Provincially Significant Wetland
- Non-evaluated Wetland
- Credit Valley Conservation Authority Regulation Area
- Permanent Watercourse
- Intermittent Watercourse
- Park
- Woodland
- Waterbody

NOTES:

- Background imagery from Bing Maps.
- Topographic features extracted from LIO, MNR.
- 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.



MISSISSAUGA ROAD WIDENING PROJECT

Natural Heritage and Species at Risk

Datum & Projection:
NAD 1983 UTM Zone 17N

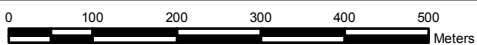


PROJECT N^o: TP115085

FIGURE: 3-1

SCALE: 1:9,000

DATE: November 2016



3.3 Fish and Fish Habitat

The project area includes two watercourse crossings (C1 and C2), which are both located within the Norval to Port Credit subwatershed, of the Credit River watershed (CVC 2016). This site is under the jurisdiction of the CVC and Aurora District MNRF.

The aquatic habitat conditions as classified by secondary sources and observed during the 2016 field investigations are summarized below. The extent of the fisheries investigations is illustrated in Figure 1-2 and Figure 1-3.

3.3.1 Crossing C1 - Credit River

3.3.1.1 Origin and Flow

Over its 90 km length, the Credit River is a permanent watercourse ranging in thermal regimes from coldwater headwaters in the north, to warmwater thermal regimes at its mouth at Lake Ontario. The Credit River originates in the vicinity of Orangeville and the majority of its length flows southward through mixed agricultural and rural residential land use. Approaching Georgetown in the Town of Halton Hills, the land use begins to shift to more urban development primarily composed of commercial and residential areas. Review of scientific literature reveals that channel enlargement is the most common response of a watercourse to changes in flow regime, especially as a result of urbanization. As such, review of morphological data that are collected throughout the watershed provide invaluable insight into overall watershed trends and responses to upstream changes in land use and subwatershed processes (CVC 2007).

In the vicinity of the project area the Credit River remains a natural channel with residential areas beyond the riparian zone on the west side of Mississauga Road and remnant wood lots and golf greens at the top of its banks on the east side of Mississauga Road. An aerial view of the Crossing C1 study area is provided in Figure 1-2 and a photo record of the Credit River study area is provided in Appendix B.

General Morphology and Habitat Conditions

The following sub-sections provide an overview of the watercourse morphology and habitat conditions within 0-50 m upstream of the right-of-way (ROW), within the ROW (i.e., under the bridge), and 0-200 m downstream of the ROW. Photos of these reaches are provided in Appendix B and additional field data can be found in Appendix C.

0 – 50 m Upstream of ROW

Within the 0-50 m upstream reach, the stream morphology was primarily runs (60%) with substrate comprised of boulder (25%), cobble (30%), gravel (15%) and silt (30%), additionally riffle (40%) habitat was also present with a cobble (80%) substrate. The mean wetted width within the run morphology was approximately 25 m with a mean wetted depth of 0.56 m measured during the 2016 field investigations. Both banks were stable, with a mean bankfull width of approximately 28 m and a mean bankfull depth of 1.06 m. Overhead vegetation provided less than 30% cover and in-stream cover was provided primarily by cobble with limited amounts of

submergent vegetation near the edge of the water. Emergent vegetation was present in the study area along the length of the left bank and was abundant within the 0-20 m reach of the right bank (Appendix B – Photos 1-5).

Within ROW

The Credit River bridge crossing at the Mississauga Road ROW has two elongated piers within the channel that span the width of the bridge. At the time of the 2016 field investigations flow was below the high water mark and the channel north of the north pier was dry. Under the bridge, the morphology was 100% run with the river's thalweg located between the two piers. The flows within the thalweg had a mean wetted depth of 0.45 m and the substrate was a mixture of cobble (50%), gravel (30%), sand (10%), and silt (10%). No vegetation was observed within the channel or on the banks under the bridge. In-stream cover was provided by some boulders and cobble. Four fish, likely salmonid species were observed during field investigations (Appendix B – Photo 22).

0 – 200 m Downstream of ROW

The 0-200 m downstream reach was dominated by a run morphology, with small pools associated with the meander of the thalweg. One riffle (approximately 30 m long) was observed within the reach. The substrate was comprised of cobble (70%) with an approximately equal amount of boulder, gravel, and sand (each making up roughly 10% of the total sediment) throughout the run sections of the reach. The mean wetted depth was 0.55 m with a wetted width of 20 m. Bankfull width was estimated at 28 m with bankfull depth of 1.15 m.

A concrete wall at the left bank (relative to flow facing downstream) confined the channel resulting in some pooling near the wall and a constricted bankfull width (estimated at 22 m) within the riffle morphology. The mean wetted depth within the riffle was approximately 0.40 m; however, depth measurements were highly variable due to the large cobble and boulder substrate throughout the section. While the left bank was protected by a concrete wall along the length of the riffle (Appendix B – Photo 13), the right banks were densely vegetated and stable in this area. Bank erosion is quite extensive and mitigation measures have been taken to protect the right bank with a gabion wall further downstream where there is an adjacent golf course and residential properties that have mowed lawn to the top of bank (Appendix B – Photo 18). Overhead vegetation was estimated to provide less than 30% cover and in-stream cover provided primarily by approximately 85% cobble within the reach.

Fisheries Limitations

The Credit River is a permanent, coolwater, High sensitivity watercourse supporting a resident warmwater and coolwater fish community (MNR 2011 - Appendix B; CVC 2002b). Numerous schools of more than 50 individuals were observed within the Credit River during the site investigation, as well as four individuals likely members of the salmonid family (estimated 40-60 cm total length), and one dead Rainbow Trout. No obstructions to flow were observed and the presence of salmonids moving upstream suggests it is unlikely that permanent barriers exist in the immediate vicinity.

Garbage and sedimentation from the adjacent land and eroding banks was apparent within the study area (Appendix B – Photo 19). Runoff from the adjacent lands and roadways, and storm sewer outlets (Appendix B – Photo 23 and 24) also provide a potential source of various nutrients and contaminants. These inputs can impair water quality and impact benthic organisms with potential affects to higher level trophic levels within this area.

3.3.1.2 Community and Fisheries Classification

Fish community data for this project were available from secondary sources, as such the 2016 field investigations did not include fish community sampling. Fisheries data reported in the *Credit River Fisheries Management Plan* (CVC 2002a) and *Fishes of the Credit River Watershed* (CVC 2002b) indicates there are 62 species of fish found within the riverine habitats of the Credit River watershed. Fish communities are recognized as indicators of the health of a watershed and its watercourses. Within the Credit River, it is suspected that many of the coolwater and warmwater fish are present year-round, while coldwater fish such as Rainbow Trout (*Oncorhynchus mykiss*) use the Norval to Port Credit subwatershed for spawning and migration. Although several of these coldwater and coolwater species are likely to occur in the vicinity of the study area, many including Redside Dace (discussed in Section 3.2.1), would preferably inhabit the smaller tributaries (CVC 2002a) for some of their lifecycle.

Table 3-1 Fish Species of the Credit River Watershed (Riverine Habitats)

Common Name	Scientific Name	G-Rank	S-Rank	Water Temperature		
				Cold ¹	Cool ²	Warm ³
Lamprey Family (Family Petromyzontidae)						
American Brook Lamprey	<i>Lampetra lamottei</i>	G4	S3	P		
Sea Lamprey	<i>Petromyzon marinus</i>	G5	SE	P		
Freshwater Eel Family (Family Anguillidae)						
American Eel	<i>Anguilla rostrata</i>	G5	S5	U	U	P
Sturgeon Family (Family Acipenseridae)						
Lake Sturgeon	<i>Acipenser fulvescens</i>	G3	S3	P		
Bowfin Family (Family Amiidae)						
Bowfin	<i>Amia calva</i>	G5	S4			P
Herring Family (Family Clupeidae)						
Gizzard Shad	<i>Dorosoma cepedianum</i>	G5	S4	P		
Salmon Family (Family Salmonidae)						
Pink Salmon*	<i>Oncorhynchus gorbuscha</i>	G5	SE	P		
Coho Salmon*	<i>Oncorhynchus kisutch</i>	G4	SE	P	U	
Chinook Salmon*	<i>Oncorhynchus tshawytscha</i>	G5	SE		U	
Rainbow Trout*	<i>Oncorhynchus mykiss</i>	G5	SE	P	U	
Atlantic Salmon	<i>Salmo salar</i>	G5	SE	P		
Brown Trout*	<i>Salmo trutta</i>	G5	SE	P	U	
Brook Trout	<i>Salvelinus fontinalis</i>	G5	S5	P	U	
Smelt Family (Family Osmeridae)						
Rainbow Smelt	<i>Osmerus mordax</i>	G5	S5	P	U	
Pike Family (Family Esocidae)						
Northern Pike	<i>Esox lucius</i>	G5	S5	U	U	P
Mudminnow Family (Family Umbridae)						
Central Mudminnow	<i>Umbra limi</i>	G5	S5		P	P
Sucker Family (Family Catostimidae)						

Common Name	Scientific Name	G-Rank	S-Rank	Water Temperature		
				Cold ¹	Cool ²	Warm ³
White Sucker	<i>Catostomus commersonii</i>	G5	S5	P	U	P
Northern Hog Sucker	<i>Hypentelium nigricans</i>	G5	S4	P	P	P
Minnow Family (Family Cyprinidae)						
Silver Redhorse	<i>Moxostoma anisurum</i>	G5	S4	P		
Goldfish*	<i>Carassius auratus</i>	G5	SE		U	U
Northern Redbelly Dace	<i>Phoxinus eos</i>	G5	S5	P	P	P
Finescale Dace	<i>Phoxinus neogaeus</i>	G5	S5	P	P	U
Redside Dace	<i>Clinostomus elongates</i>	G4	S3	P	U	
Common Carp*	<i>Cyprinus carpio</i>	G5	SE		U	P
Brassy Minnow	<i>Hybognathus hankinsoni</i>	G5	S5		P	
Hornyhead Chub	<i>Nocomis biguttatus</i>	G5	S4			P
River Chub	<i>Nocomis micropogon</i>	G5	S4			P
Golden Shiner	<i>Notemigonus crysoleucas</i>	G5	S5	P	P	P
Common Shiner	<i>Luxilus cornutus</i>	G5	S5			P
Blacknose Shiner	<i>Notropis heteroiepis</i>	G5	S5			P
Spottail Shiner	<i>Notropis hudsonius</i>	G5	S5	P	P	P
Rosyface Shiner	<i>Notropis rubellus</i>	G5	S4	P	P	P
Spotfin Shiner	<i>Cyprinella spilopterus</i>	G5	S4	P		P
Mimic Shiner	<i>Notropis volucellus</i>	G5	S5	P	P	P
Sand Shiner	<i>Notropis stramineus</i>	G5	S4	P	P	P
Redfin Shiner	<i>Notropis umbratilis</i>	G4	S4	P		P
Bluntnose Minnow	<i>Pimephales notatus</i>	G5	S5	P	P	P
Fathead Minnow	<i>Pimephales promelas</i>	G5	S5	P	P	P
Blacknose Dace	<i>Rhinichthys atratulus</i>	G5	S5	P	P	P
Longnose Dace	<i>Rhinichthys cataractae</i>	G5	S5	P	P	P
Creek Chub	<i>Semotilus atromaculatus</i>	G5	S5		U	P
Pearl Dace	<i>Semotilus margarita</i>	G5	S5		P	P
Catfish Family (Family Ictaluridae)						
Brown Bullhead	<i>Ameiurus nebulosus</i>	G5	S5			P
Channel Catfish	<i>Ictalurus punctatus</i>	G5	S4		P	P
Stonecat	<i>Noturus flavus</i>	G5	S4	P		
Stickleback Family (Family Gasterosteidae)						
Brook Stickleback	<i>Culaea inconstans</i>	G5	S5		P	P
Threespine Stickleback	<i>Gasterosteus aculeatus</i>	G5	S4	P	U	U
Trout-Perch Family (Family Percopsidae)						
Trout-perch	<i>Percopsis omiscomaycus</i>	G5	S5		P	
Temperate Bass Family (Family Percichthyidae)						
White Bass	<i>Morone chrysops</i>	G5	S4			P
Sunfish Family (Family Centrarchidae)						
Rock Bass	<i>Ambloplites rupestris</i>	G5	S5		U	P
Pumpkinseed	<i>Lepomis gibbosus</i>	G5	S5			P
Smallmouth Bass	<i>Micropterus dolomieu</i>	G5	S5		P	U
Largemouth Bass	<i>Micropterus salmoides</i>	G5	S5		U	P
Black Crappie*	<i>Pomoxis nigromaculatus</i>	G5	S4		U	P
Perch Family (Family Percidae)						
Yellow Perch	<i>Perca flavescens</i>	G5	S5			P
Rainbow Darter	<i>Etheostoma caeruleum</i>	G5	S4		P	U
Iowa Darter	<i>Etheostoma exile</i>	G5	S5	U	P	U
Fantail Darter	<i>Etheostoma flabellare</i>	G5	S4	P	P	U
Johnny Darter	<i>Etheostoma nigrum</i>	G5	S5	P	P	P
Drum or Croaker Family (Family Sciaenidae)						
Freshwater Drum	<i>Aplodinotus grunniens</i>	G5	S5			P



Common Name	Scientific Name	G-Rank	S-Rank	Water Temperature		
				Cold ¹	Cool ²	Warm ³
Sculpin Family (Family Cottidae)						
Slimy Sculpin	<i>Cottus cognatus</i>	G5	S5	P		
Mottled Sculpin	<i>Cottus bairdii</i>	G5	S5	P		

Source: CVC 2002a, CVC 2002b (species identified as not occurring in riverine habitats have been excluded)

* Indicates species not native to the Credit River watershed.

¹ Cold = Water that is < 14°C on average ² Cool = Water that is < 18°C on average ³ Warm = Water that is < 23°C on average
 Water Temperature: P = Preferred, U = Utilized

G-Rank: A network of natural heritage programs, scientific experts and The Nature Conservancy develops G-Rank or global ranks. The ranking is based on the range-wide status of a species, subspecies or variety.

- G1 Extremely Rare; usually 5 or fewer occurrences in the overall range or very few remaining individuals; or because of some factor(s) making it especially vulnerable to extinction.
- G2 Very Rare; usually between 5 and 20 occurrences in the overall range or with many individuals in fewer occurrences; or because of some factor(s) making it vulnerable to extinction.
- G3 Rare to uncommon; usually between 20 and 100 occurrences; may have fewer occurrences, but with a large number of individuals in some populations; may be susceptible to large-scale disturbances.
- G4 Common; usually more than 100 occurrences; usually not susceptible to immediate threats.
- G5 Very common; demonstrable secure under present conditions.
- GU Status uncertain; often because of low search efforts or cryptic nature of the species; more data needed.
- G? Unranked; or, if following a ranking, rank tentatively assigned (e.g. G3?)

S-Rank: S-Rank - are provincial ranks (or Sub national ranks) that are used by the Natural Heritage Information Centre to set protection priorities for rare species and natural communities. The ranks are assigned based upon recent records.

- S1 Extremely Rare; usually 5 or fewer occurrences in the province or very few remaining individuals; often especially vulnerable to extirpation.
- S2 Very Rare; usually between 5 and 20 occurrences in the province or with many individuals in fewer occurrences; often susceptible to extirpation.
- S3 Rare to Uncommon; usually between 20 and 100 occurrences in the province; may have fewer occurrences, but with a large number of individuals in some populations; may be susceptible to large-scale disturbances.
- S4 Common; usually more than 100 occurrences; usually not susceptible to immediate threats.
- S5 Very Common; demonstrably secure under present conditions.
- SE Exotic. Not believed to be a part of Ontario's natural fauna.

3.3.1.3 Water Chemistry

The CVC analyses various water quality parameters in their monitoring program including ammonia, aluminum, chloride, copper, iron, nitrate, phosphorus, total suspended solids, and zinc. These parameters are used to determine the water's score using a Water Quality Index (WQI). CVC's results in 2011, for the reach of the Credit River nearest Mississauga Road identify the water quality status as "Fair" or within the 65-79 WQI score range (CVC 2013). Water quality measured at this location only included three parameters to determine this score: 1) Phosphorus concentration - the primary contributor of this contaminant is excessive fertilizer use and effluent discharge; 2) *E. coli* bacteria concentration – found in the intestines of humans and other animals; and 3) Benthic macroinvertebrates species – these small animals live at the bottom of streams and some species are highly sensitive to water quality making them excellent indicators of stream health.

Results of Amec Foster Wheeler's *in situ* water quality sampling at Credit River are included in the table below. Sampling was conducted on September 30, 2016 within each reach. Results are averaged in the table below. Weather conditions at the time of the site visit were cloudy.

Table 3-2 Amec Foster Wheeler Water Chemistry Results

Parameter	Measurement
Air Temperature	18 °C
Water Temperature	14.5 °C
Conductivity	739 µS/cm
Total Suspended Solids	443 ppm

3.3.1.4 Watercourse Sensitivity

Sensitivity rankings inform planning, design, and construction considerations with respect to the potential impact of fish habitat under the policies of the federal *Fisheries Act*. Road and highway crossing locations or areas of works in ‘High’ sensitivity watercourses have a greater possibility of resulting in ‘*Moderate/High Risk*’ of impact to fish and fish habitat.

The Credit River has been identified by Aurora District MNRF as having ‘High’ sensitivity, undoubtedly due to its coolwater thermal regime and utilization by migratory coldwater species. Reproduction of these migratory species is suspected to occur within the tributaries in the upper reaches of the Credit River watershed; however, the Credit River can also provide important refuge habitat for the young of these migratory species (CVC 2002a).

3.3.2 Crossing C2 - Unnamed Tributary to Credit River

3.3.2.1 Origin and Flow

The unnamed tributary to the Credit River associated with Crossing C2 originates approximately 1 km west of Mississauga Road and south of Embleton Road in the agricultural field across the road from Huttonville Public School. This tributary is directly associated with the Churchville-Norval Wetland Complex (Figure 3-1) and it connects with two ponds as it travels east to Mississauga Road. Immediately upstream of Crossing C2, the channel is undefined and flow is braided through Common Reed (*Phragmites australis*) and other emergent wetland species. The tributary passes through an irregular shaped corrugated steel pipe culvert under Mississauga Road. On the east side of Mississauga Road, the tributary flows underground approximately 180 m before draining into an open wetland and ultimately discharging into the Credit River at a location downstream of the Crossing C1. This tributary did not have sufficient flow to provide direct fish habitat at the time of field inspection. Water depth was measured at 0.06 m upstream, 0.02 m within the culvert, and 0.02 m downstream. A photo record for this tributary is included in Appendix B and field notes are included in Appendix C.

3.3.2.2 Community and Fisheries Classification

The unnamed tributary has been classified as a warmwater thermal regime with an in-water timing window for construction extending from July 1 to March 31. The fish community is classified as small warmwater, with fish records including Pumpkinseed (*Lepomis gibbosus*), Brown Bullhead (*Ameiurus nebulosus*) collected in the fall of 2004 (CVC, 2018).

4.0 POTENTIAL IMPACTS TO FISH

The proposed scope of work may include the following potential impacts to fish and fish habitat:

- Removal of riparian vegetation could result in increased water temperatures and instability in channel banks;
- Conducting improvements to the bridge at Crossing C1 will likely require temporary ‘in-water’ works to access the bridge.
- A culvert extension at Crossing C1 or in channel work can result in a net productivity of fish habitat; and
- Construction activity can have potential negative impacts to resident fish populations which can include:
 - Increased siltation;
 - Changes in stream channel structure and water clarity;
 - Increase in-stream temperatures as a result of the removal of riparian vegetation; and
 - Roadside drainage could increase input of pollutants.

5.0 POTENTIAL MITIGATION

The following general mitigation measures are expected to be implemented to protect and minimize impacts to the watercourse and aquatic wildlife species during construction:

- The Credit River supports warmwater, coolwater, and coldwater species within the Crossing C1 study area. The construction timing windows outlined in the Credit River Fisheries Management Plan (CVC 2002a) indicate that in-water works are not permitted from April 1 to June 14 (spring spawning period), or from September 16 to May 31 (fall spawning period). Contrary to DFO and provincial MNR timing constraints which are applied to general regions, typical timing constraints applied by Aurora District MNR for both cold and warmwater combined species is July 1 to September 30.
- If in-water works are required beyond the timing constraints, a formal request to DFO for exemption to work during the constraint period may be appropriate.
- All works within a 30 m buffer of the Credit River will also observe the in-water construction window as suggested by the Credit River Fisheries Management Plan (CVC 2002a).
- Standard Erosion and Sediment Control (ESC) measures will be applied and will meet or exceed Ontario Provincial Standards and Specifications (OPSS). The control measures shall be implemented prior to work and shall be maintained during construction and until disturbed areas have been effectively stabilized with permanent vegetation cover. The following standards will be followed as a minimum:
 - Installation of silt fencing consisting of geotextile and wooden stakes. Fencing is installed such that a minimum of 600 mm of geotextile is above ground and a minimum of 300 mm is buried; and

- Dewatering stations shall be located a minimum of 30 m from the channel edge in a vegetated area.
- All operations are to be controlled to prevent entry of deleterious materials to the watercourse that could be toxic to fish or fish habitat.
- Equipment maintenance and refueling shall be controlled so as to prevent any discharge of petroleum products, and shall be conducted a minimum of 30 m from the bank of the watercourse.
- The escape of any visible emission, settlement of dust or debris, including abrasive media which may enter a watercourse while conducting structural repairs over or in the vicinity of watercourse shall be prevented to the extent possible.
- Construction material and excess materials shall be stored / stockpiled greater than 30 m away from any watercourse, drainage feature, and top of steep slope.
- A spill control and response plan shall be in place with a spill kit on site.
- An environmental monitor is expected to be on site during project works to identify potential risks to the natural environment and ensure ESC measures remain functional at all times.
- The disturbance or removal of riparian vegetation shall be minimized.
- All disturbed areas of the work site shall be stabilized and re-vegetated promptly, and/or treated with appropriate erosion protection materials. In riparian and aquatic habitats, all temporarily disturbed areas will be reinstated to original condition, or better, upon completion of works.

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

Refer to Amec Foster Wheeler's (2017) *Terrestrial Habitat Existing Conditions Report* for mitigation measures related to the protection of terrestrial habitat regarding this project.

6.0 ENHANCEMENT OPPORTUNITIES

CVC has developed a number of aquatic monitoring programs including hydrometric and water quality studies that are implemented throughout the Credit River watershed to protect and improve conditions for native species and their habitat. The design team can work with the CVC and MNRF to improve habitat opportunities.

As a component of project works, aquatic habitat can be improved through:

- Enhancement of watercourse buffers through riparian restoration and revegetation;
- Shading of the Credit River will help maintain cool water temperatures;
- Tree plantings located sufficiently distant from the channel will (in time) provide shade while allowing shrubs to become well established;

- Incorporation of habitat diversity into the final design;
- This can include diversity of natives species planted along the banks;
- Use of suitable substrate for any scour protection requirements;
- Protection of existing natural areas to provide refuge for sensitive coldwater fish species; and
- Enhancement of stormwater management:
 - Reduce or prevent water heated from flowing over impervious surfaces from draining directly into the Credit River; and
 - Decrease direct inputs of runoff laden with nutrients, such as nitrates and total phosphorus, from lands adjacent to the river. This improvement has potential to decrease algae growth and increase dissolved oxygen levels, thereby protecting fish habitat.

Additional enhancement measures, many of which are promoted by the *Credit River Water Management Strategy Update (CVC 2007)*, beyond those directly related to project works include:

- Identification and removal of instream barriers to fish migration;
- Implementation of instream habitat enhancement projects to improve pool/riffle morphology, and increase instream cover and spawning habitat;
- Protection and enhancement of neighbouring wetlands by ensuring the wetland's hydrological function is maintained and wetlands are sufficiently isolated from project activities;
- Monitoring and enforcement of sediment controls during development and maintenance;
- Maintenance, enhancement or restoration of natural stream processes to achieve a balance of flow and sediment transport;
- Identification and protection of critical habitats such as salmonid spawning areas;
- Identification and treatment of areas of bank erosion which lead to increased suspended solids;
- Recognition of the value of rainwater, groundwater, and snowmelt, and management of precipitation where it falls – prior to entering sewers and streams; and
- Regulation of road salt as a toxic substance (as recommended by Environment and Climate Change Canada; CVC 2007). Chloride is potentially toxic to fish in addition to being a drinking water issue in groundwater.

Further correspondence with the appropriate regulatory agencies (e.g., CVC, MNRF, and DFO) may be necessary to determine if additional site-specific environmental protection measures may be required. Refer to Amec Foster Wheeler's (2017) *Terrestrial Habitat Existing Conditions Report* for enhancement opportunities related to terrestrial habitat and the needs of terrestrial species for this project.

7.0 REFERENCES

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- Ontario Ministry of Transportation (MTO). 2009. Environmental Guide for Fish and Fish Habitat. Ontario Ministry of Transportation, St. Catharines. 581 pp.
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APPENDIX A
CORRESPONDENCE

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
- Provincially Significant Churchville-Norval Wetland Complex
- Locally Significant Springbrook Wetland Complex
- Huttonville Creek & Area Wetland Complex
- Regionally Significant Georgetown Credit Valley ANSI

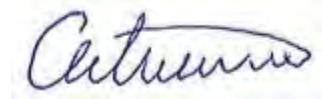
These species may receive protection under the *Endangered Species Act 2007* and thus, an approval from MNRF may be required if the work you are proposing could cause harm to these species or their habitats. If the Species at Risk in Ontario List is amended, additional species may be listed and protected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

A handwritten signature in black ink, appearing to read "Brittany Ferguson". The signature is fluid and cursive, with a long horizontal stroke at the end.

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

596500

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597500

598000



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4832000

Path: P:\2015\Projects_Other\TP115085_Region of Peel Widening of Mississauga Road09_CIS\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, MNR.
- 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.



MISSISSAUGA ROAD WIDENING PROJECT

Natural Heritage and SAR Location #1

DRAFT

Datum & Projection: NAD 1983 UTM Zone 17N

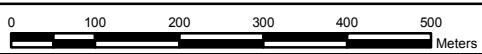


PROJECT N^o: TP115085

FIGURE: 2

SCALE: 1:9,000

DATE: September 2015



Rideout, Daryl T

From: Heaton, Mark (MNR) [mark.heaton@ontario.ca]
Sent: Tuesday, May 10, 2011 3:53 PM
To: Rideout, Daryl T
Cc: Ruthven, Mark C; Pisapio, John (MNR)
Subject: RE: Fish Community Information - MTO Hwy 401 - Trafalgar Road to Credit.

Hello Daryl,

For the Credit River, please consult the Credit River Fisheries Management Plan at located at http://www.ontariostreams.on.ca/fisheries_management_plans.html

Credit River is coolwater – high sensitivity.

Regards,

Mark Heaton



APPENDIX B
PHOTO RECORD



Crossing C1

Credit River



Photo 1: 0-50m upstream reach.



Photo 2: Upstream reach, left bank (relative to water flow).



Photo 3: Upstream reach, emergent vegetation along left bank.



Photo 4: Upstream reach, right bank.



Photo 5: Upstream reach, right bank with little in-stream vegetation.



Photo 6: ROW mostly dry channel on north side of northern pier (left channel). Photo looking upstream.



Photo 7: ROW main channel between the two bridge piers. Two fish (family: Salmonidae) visible in photo.



Photo 8: ROW channel on south side of southern pier (right channel). Photo looking downstream.



Photo 9: Outlet at top of bank on southeast side of bridge.



Photo 10: Left bank immediately downstream of bridge.



Photo 11: In-stream vegetation at left bank.



Photo 12: Emergent vegetation at left bank.



Photo 13: Concrete wall along left bank at downstream riffle.



Photo 14: 0-200 m downstream reach, view upstream from riffle.



Photo 15: 0-200 m downstream reach, boulders and large cobble at riffle.



Photo 16: 0-200 m downstream reach, view downstream from riffle.



Photo 17: 0-200 m downstream reach, right bank immediately upstream of gabion wall and river-front residential properties.



Photo 18: 0-200 m downstream reach, gabion wall erosion protection.



Photo 19: 0-200 m downstream reach, pollution and bank erosion on right bank.



Photo 20: 0-200 m downstream reach, overhead cover.



Photo 21: 0-200 m downstream reach, debris and aggradation along left bank.



Photo 22: Dead Rainbow Trout



Photo 23: Outlet on right bank.



Photo 24: Outlet on right bank.



Crossing C2

Unnamed Tributary to the Credit River



Photo 1: Looking down at inlet.



Photo 2: Upstream reach. Channel was braided and not well-defined. Intermittent flow. Indirect fish habitat.



Photo 3: Discarded vegetation south of inlet.



Photo 4: Discarded vegetation south of inlet.



Photo 5: Looking down at outlet.



Photo 6: Downstream reach from top of outlet.



Photo 7: Placed riprap at outlet.



Photo 8: Looking down at outlet of CSP parallel to Mississauga Road passing under a driveway north of C2 on east side.



Photo 9: View of tributary from left bank (relative to flow).



Photo 10: View of tributary from left bank (relative to flow).



Photo 11: View of tributary in wooded area. Understory dominated by Common Reed (*Phragmites australis*).



Photo 12: Channel approximately 20 m downstream. Mean wetted depth 0.02 m, mean wetted width 1.2 m.