Appendix D – Fish and Fish Habitat Report

407 TRANSITWAY – WEST OF BRANT STREET TO WEST OF HURONTARIO STREET

MINISTRY OF TRANSPORTATION - CENTRAL REGION

FISH AND FISH HABITAT – EXISTING CONDITIONS AND IMPACT ASSESSMENT REPORT

TRANSIT PROJECT ASSESSMENT PROCESS

407 TRANSITWAY

FROM WEST OF BRANT STREET TO WEST OF HURONTARIO STREET CITY OF MISSISSAUGA AND CITY OF BRAMPTON (PEEL REGION) AND TOWN OF HALTON HILLS, TOWN OF MILTON, TOWN OF OAKVILLE AND CITY OF BURLINGTON (HALTON REGION)

G.W.P. 16-20003

prepared for:

MINISTRY OF TRANSPORTATION
CENTRAL REGION

prepared by:

LGL LIMITED
environmental research associates

APRIL 2020

FISH AND FISH HABITAT – EXISTING CONDITIONS AND IMPACT ASSESSMENT REPORT

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FROM WEST OF BRANT STREET TO WEST OF HURONTARIO STREET CITY OF MISSISSAUGA AND CITY OF BRAMPTON (PEEL REGION) AND TOWN OF HALTON HILLS, TOWN OF MILTON, TOWN OF OAKVILLE AND CITY OF BURLINGTON (HALTON REGION)

G.W.P. 16-20003

prepared by:

JUDSON VENIER, M.SC.
SENIOR FISHERIES BIOLOGIST

reviewed by:

GRANT KAUFFMAN, M.E.S.
VICE PRESIDENT, ONTARIO REGION

LGL Limited
environmental research associates
22 Fisher Street, P.O. Box 280
King City, Ontario
L7B 1A6

APRIL 2020
LGL PROJECT TA #8733

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

APPENDICES

1.0 INTRODUCTION

The Ontario Ministry of Transportation (MTO) is undertaking the Planning, Preliminary Design and Transportation Project Assessment Process (TPAP) for the 407 Transitway from west of Brant Street in the City of Burlington to west of Hurontario Street in the City of Mississauga.

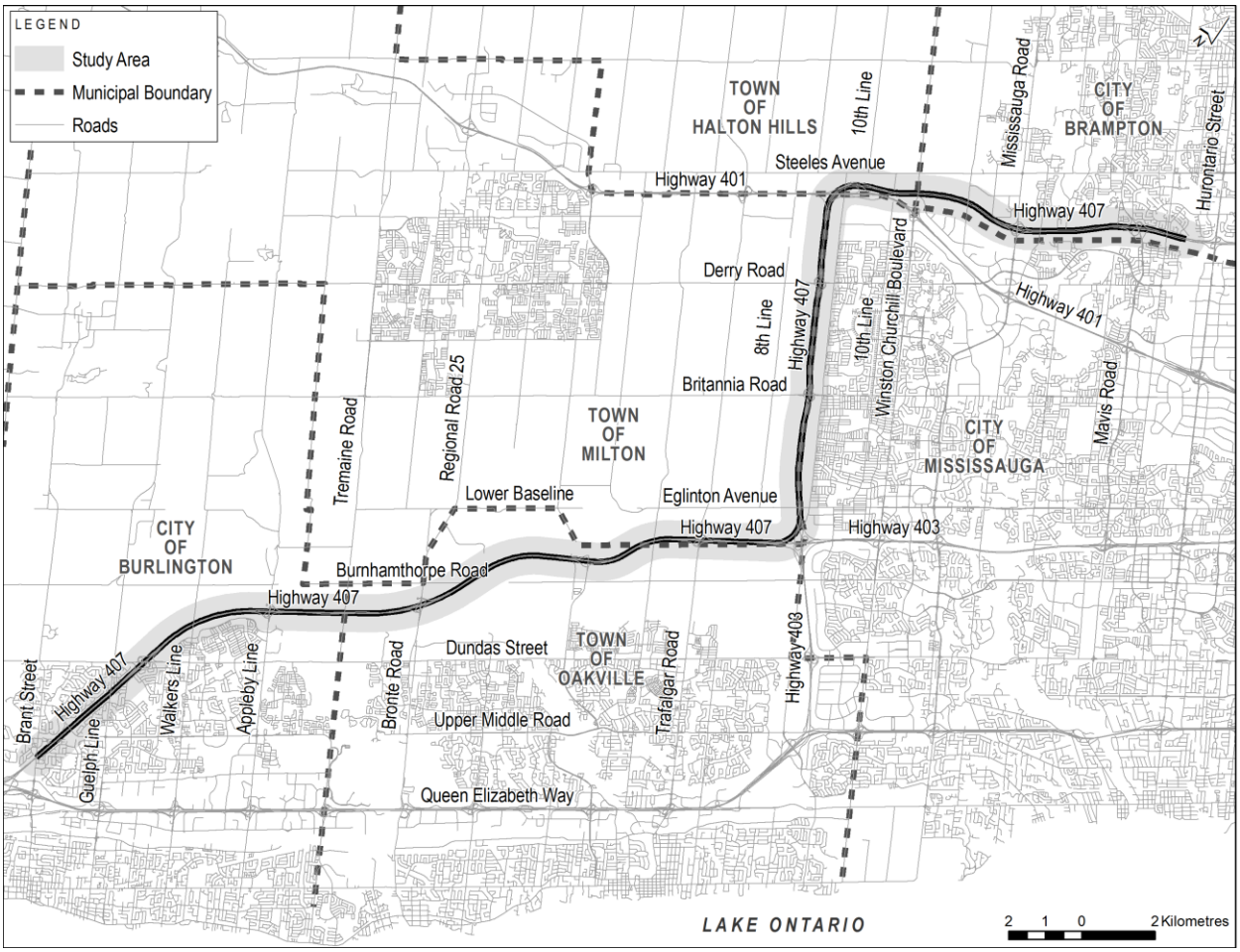


FIGURE 1. 407 TRANSITWAY WEST - KEY PLAN

The study will follow the Transit Project Assessment Process (TPAP) prescribed in *Ontario Regulation 231/08, Transit Projects and Metrolinx Undertakings* under the *Environmental Assessment Act*. The 407 Transitway will be a two-lane, fully grade-separated transit facility on an exclusive right-of-way, running along the Highway 407 Corridor. This section of the transitway facility will consist of 43 km of runningway and a number of stations whose locations will be determined as part of this study. The station layouts will include vehicular and pedestrian access(es), park and ride and passenger pick-up/drop off (PPUDO) facilities, bus lay-by facilities, on street integration with local transit, shelters, buildings and other amenities. The transitway and the stations will initially be designed to support a two-lane busway service with provisions for future conversion to a two-track, light-rail transit technology.

This 43 km segment forms part of the 150 km long high-speed interregional facility planned to be ultimately constructed on a separate right-of-way that parallels Highway 407 from Burlington to Highway

35/115, with stations, parking and access connections. This transitway is a component within the official plans of the stakeholder municipalities and of the Province's commitment to support transit initiatives in the Greater Golden Horseshoe through the Metrolinx Regional Transportation Plan.

This is a total project management (TPM) assignment, where the consultant delivers all aspects of the study on behalf of MTO. The TPM prime consultant is Parsons. Parsons has assembled a team of engineering and environmental specialists to provide the services required for this study. LGL Limited is providing environmental design and planning services on behalf of Parsons.

This report documents the results of the fish and fish habitat investigation undertaken by LGL Limited during 2018 and 2019, and includes a description of the existing aquatic habitat conditions within the study area, as well as information on species at risk, sensitivity and potential enhancement/compensation opportunities. This report has been prepared in accordance with the requirements of the MTO *Environmental Reference for Highway Design* (MTO 2013).

The study area for the fish and fish habitat existing conditions investigation includes a one-kilometre-wide corridor centred along Highway 407 within the study area (see **Figure 1**). For the planning stage, data was collected from secondary sources. During the preliminary design stage, the data presented in this report was updated and augmented through detailed field investigations conducted along the preferred Transitway alignment and in the vicinity of the potential station locations.

TABLE 1/TEMPLATE 10.1. LOCATION OF WORK TABLE

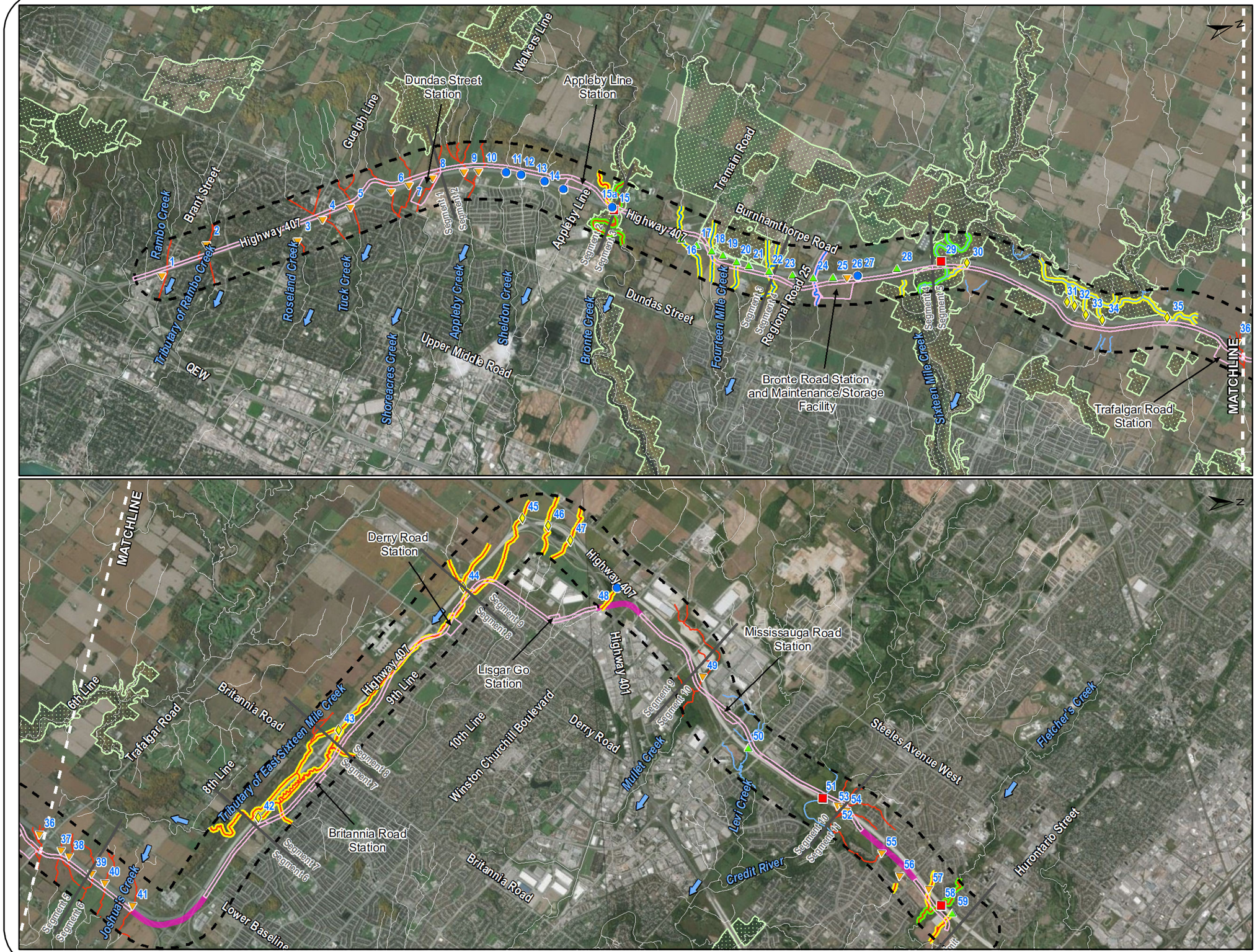
Waterbody	Highway	Municipality	Location of Stream (GPS Coordinates)
Site 1: Rambo Creek	407 TWY	Halton	594774 mE 4800120 mN
Site 2: Tributary of Rambo Creek	407 TWY	Halton	594468 mE 4801021 mN
Site 3: Roseland Creek	407 TWY	Halton	594842 mE 4802580 mN
Site 4: Tributary of Tuck Creek	407 TWY	Halton	594603 mE 4803103 mN
Site 5: Tuck Creek	407 TWY	Halton	594537 mE 4803636 mN
Site 6: Tributary of Shoreacres Creek	407 TWY	Halton	594464 mE 4804396 mN
Site 7: Tributary of Shoreacres Creek	407 TWY	Halton	594443 mE 4804734 mN
Site 8: Tributary of Shoreacres Creek	407 TWY	Halton	594433 mE 4805167 mN
Site 9: Appleby Creek	407 TWY	Halton	594485 mE 4805723 mN
Site 10: Tributary of Appleby Creek	407 TWY	Halton	594548 mE 4805971 mN
Site 11: Tributary of Sheldon Creek	407 TWY	Halton	594705 mE 4806407 mN
Site 12: Tributary of Sheldon Creek	407 TWY	Halton	594907 mE 4806806 mN
Site 13: Tributary of Sheldon Creek	407 TWY	Halton	595044 mE 4807017 mN
Site 14: Tributary of Sheldon Creek	407 TWY	Halton	595267 mE 4807294 mN
Site 15: Bronte Creek	407 TWY	Halton	595872 mE 4808053 mN
Site 15a: Tributary of Bronte Creek	407 TWY	Halton	595718 mE 4807965 mN
Site 16: Tributary of Fourteen Mile Creek	407 TWY	Halton	596677 mE 4809048 mN
Site 17: Tributary of Fourteen Mile Creek	407 TWY	Halton	596856 mE 4809275 mN
Site 18: Tributary of Fourteen Mile Creek	407 TWY	Halton	597023 mE 4809502 mN
Site 19: Tributary of Fourteen Mile Creek	407 TWY	Halton	597152 mE 4809671 mN
Site 20: Tributary of Fourteen Mile Creek	407 TWY	Halton	597329 mE 4809873 mN
Site 21: Tributary of Fourteen Mile Creek	407 TWY	Halton	597453 mE 4810057 mN
Site 22: Fourteen Mile Creek	407 TWY	Halton	597646 mE 4810373 mN
Site 23: Tributary of Fourteen Mile Creek	407 TWY	Halton	597823 mE 4810750 mN
Site 24: Tributary of Fourteen Mile Creek	407 TWY	Halton	597968 mE 4811087 mN
Site 25: Tributary of Fourteen Mile Creek	407 TWY	Halton	598059 mE 4811423 mN
Site 26: Tributary of McCraney Creek	407 TWY	Halton	598127 mE 4811681 mN
Site 27: Tributary of Taplow Creek	407 TWY	Halton	598156 mE 4811846 mN

TABLE 1/TEMPLATE 10.1. LOCATION OF WORK TABLE

Waterbody	Highway	Municipality	Location of Stream (GPS Coordinates)
Site 28: Tributary of Sixteen Mile Creek	407 TWY	Halton	598221 mE 4812550 mN
Site 29: Sixteen Mile Creek	407 TWY	Halton	598317 mE 4813322 mN
Site 30: Tributary of Sixteen Mile Creek	407 TWY	Halton	598459 mE 4813745 mN
Sites 31-32: Tributary of Sixteen Mile Creek	407 TWY	Halton	599612 mE 4815250 mN
Sites 33-34: Tributary of Sixteen Mile Creek	407 TWY	Halton	599915 mE 4815508 mN
Site 35: Tributary of Sixteen Mile Creek	407 TWY	Halton	600355 mE 4816860 mN
Site 36: Tributary of Joshua's Creek	407 TWY	Halton	601110 mE 4817950 mN
Site 37: Tributary of Joshua's Creek	407 TWY	Halton	601408 mE 4818313 mN
Site 38: Tributary of Joshua's Creek	407 TWY	Halton	601518 mE 4818446 mN
Site 39: Tributary of Joshua's Creek	407 TWY	Halton	601840 mE 4818832 mN
Site 40: Tributary of Joshua's Creek	407 TWY	Halton	602021 mE 4819053 mN
Site 41: Tributary of Joshua's Creek	407 TWY	Halton	602432 mE 4819528 mN
Site 42: Tributary of East Sixteen Mile Creek	407 TWY	Halton	600961 mE 4821785 mN
Site 43: Tributary of East Sixteen Mile Creek	407 TWY	Halton	599490 mE 4823263 mN
Site 44: Tributary of East Sixteen Mile Creek	407 TWY	Halton	597084 mE 4825561 mN
Site 45: Tributary of East Sixteen Mile Creek	407 TWY	Halton	595911 mE 4826650 mN
Site 46: Tributary of East Sixteen Mile Creek	407 TWY	Halton	596064 mE 4827097 mN
Site 47: Tributary of East Sixteen Mile Creek	407 TWY	Halton	596334 mE 4827475 mN
Site 48: Tributary of East Sixteen Mile Creek	407 TWY	Halton	597408 mE 4828150 mN
Site 49: Mullet Creek	407 TWY	Peel	598909 mE 4828150 mN
Site 50: Levi Creek	407 TWY	Peel	600215 mE 4830441 mN
Ste 51: Credit River	407 TWY	Peel	601074 mE 4831651 mN
Sites 52-54: Tributary of Credit River	407 TWY	Peel	601340 mE 4832061 mN
Site 55: Tributary of Credit River	407 TWY	Peel	602127 mE 4832657 mN
Site 56: Tributary of Fletcher's Creek	407 TWY	Peel	602329 mE 4833109 mN
Site 57: Tributary of Fletcher's Creek	407 TWY	Peel	602952 mE 4833539 mN
Site 58: Fletcher's Creek	407 TWY	Peel	603066 mE 4833695 mN
Site 59: Tributary of Fletcher's Creek	407 TWY	Peel	603378 mE 4833736 mN

2.0 CONSTRAINTS AND OPPORTUNITIES MAP

The purpose of the constraints and opportunities map is to show biological and physical constraints (for fish and fish habitat) to highway development. The study area was reviewed to identify opportunities and constraints using the criteria outlined in the MTO Environmental Guide for Fish and Fish Habitat (2009). See **Figure 2** for constraints/opportunities mapping for the study area.



LEGEND

- Study Area
- 407 Transitway Running Way
- 407 Transitway Tunnel Section
- Area of Scientific and Natural Interest
- Watercourse Flow Direction
- Watercourse - Coldwater
- Watercourse - Coolwater
- Watercourse - Warmwater
- Watercourse - Unknown
- Watercourse - Species at Risk Occupied
- Watercourse - Upstream of Species at Risk Occupied
- Watercourse - Upstream of Species at Risk Recovery

Habitat Sensitivity

- High with Opportunity for Enhancement
- Moderate with Opportunity for Enhancement
- Low-Moderate with Opportunity for Enhancement
- Low with Opportunity for Enhancement
- Unknown

Data Sources: LGL Limited, Ontario Ministry of Natural Resources and Forestry (LIO), MNRF Personal Correspondance 2017 & 2019.

0 740 1,480 2,220 2,960 m

FISHERIES OPPORTUNITIES AND CONSTRAINTS

LGL LIMITED environmental research associates

Project:	TA8733	**Figure:**	2
Date:	February, 2020	**Prepared By:**	JJP
Scale:	1 : 65,000	**Checked By:**	JMV

3.0 BACKGROUND DATA COLLECTION

3.1 Background Information and Methodology

3.1.1 Secondary Source Data

Data were obtained from published data sources and unpublished information made available by relevant stakeholders. These data were reviewed and used to identify data gaps and deficiencies, and to scope the type, location and level of detail for field investigations to take place in the spring/summer of 2018 and 2019.

Watercourses within the study area are within the watersheds of Rambo Creek, Roseland Creek, Tuck Creek, Shoreacres Creek, Appleby Creek, Sheldon Creek, Bronte Creek, Fourteen Mile Creek, McCraney Creek, Taplow Creek, Sixteen Mile Creek and Joshua's Creek. These watersheds are within the jurisdiction of the Ministry of Natural Resources and Forestry (MNRF) Aurora District and Conservation Halton (CH). In addition, several watercourses within the Credit Valley Conservation Authority (CVC) jurisdiction are located within the study area. These are Mullet Creek, Levi Creek, Credit River and Fletcher's Creek.

A search of the 'Make a Natural Heritage Area Map' of the Natural Heritage Information Centre (NHIC; MNRF 2017; 2019), the Fisheries and Oceans Canada (DFO) aquatic species at risk mapping (2017; 2019), watershed study reports and personal correspondence with MNRF (2017a; 2019), revealed three aquatic species at risk occurring within the study limits: Redside Dace (*Clinostomus elongatus*), Silver Shiner (*Notropis photogenis*) and American Eel (*Anguilla rostrata*).

In accordance with the MTO *Environmental Guide for Fish and Fish Habitat* (2009; Fish Guide), a project notification and MNRF information request letter was sent to the MNRF Aurora District Office on July 4, 2017 (and subsequently on August 19, 2019 for the Credit River watershed), requesting information regarding the thermal regime of the watercourses located within the study area, habitat information, available data, fisheries management considerations, sensitivity and in-water timing windows for construction. An email response was received on August 28, 2017 from Ben Keen, Management Biologist (MNRF 2017a) and from Mark Heaton, Management Biologist on August 19, 2019 (MNRF 2019). These fisheries data, including the MNRF interpretation of sensitivity, has been incorporated into the report and further details, including community information, are presented in **Table 2** and **Section 5.1** below.

In addition, CH and CVC were contacted to request background information related to fish and fish habitat. Data regarding fish and fish habitat were received from CVC on October 10, 2018. CH provided other data, but no data regarding fisheries.

3.1.2 Data Sources

The following data sources relevant to fish and fish habitat within the study area were reviewed:

- Aquafor Beech Limited. 2014. Schedule B Class EA: Roseland Creek Erosion Control Project- From Upper Middle Road to Guelph Line
- Aquafor Beech Limited. 2012. Tuck Creek Erosion Control Municipal Class Environmental Assessment.
- Cook, Michael. 2013. Daylighting Creeks in Southern Ontario. www.vanishingpoint.ca/daylighting creeks

- Cole Engineering. 2015. Shoreacres Creek Erosion Control Municipal Class Environmental Assessment.
- Conservation Halton. 2009a. Urban Creek and Supplemental Monitoring: Long Term Monitoring Program.
- Conservation Halton. 2009b. Bronte Creek and Supplemental Monitoring: Long Term Monitoring Program.
- Conservation Halton 2011. Grindstone Creek, Sixteen Mile Creek and Supplemental Monitoring: Long Term Monitoring Program.
- Conservation Halton. 2012. Bronte Creek, Urban Creek and Supplemental Monitoring. Long Term Environmental Monitoring Program.
- Conservation Halton. 2018. Fish data received via email from CH staff.
- Credit Valley Conservation. 2018. Fish data received via email from CVC staff.
- DFO. 2017; 2019. Aquatic Species at Risk Maps. http://www.dfo-mpo.gc.ca/species-especes/fpp-ppp/index-eng.htm.
- MNRF. 2017; 2019. Make a Natural Heritage Area Map. https://www.ontario.ca/page/make-natural-heritage-area-map.
- MNRF. 2017a. Personal Correspondence with Ben Keen, Management Biologist. August 28, 2017 via email;
- MNRF. 2019. Personal Correspondence with Mark Heaton, Management Biologist. August 19, 2019.
- TSH Engineers *et al*. 2006. North Oakville Creeks Subwatershed Study. Analysis Report.

TABLE 2. TEMPLATE 10.2 -
EXISTING FISH AND FISH HABITAT CONDITIONS SUMMARY TABLE

GWP or Project Name	Waterbody	Latitude	Longitude	Flow*	Thermal Regime	Fish Habitat	Fish Species Present	Substrate Type*	Vegetation*	Constraints and Opportunity	Important, Exceptional Fish Habitat	Species at Risk / Critical Habitat Present	In Water Works Timing Window***	MNRF Interpretation of Sensitivity
RAMBO CREEK WATERSHED														
16-20003	Site 1: Rambo Creek	4800120 mN	594774 mE	Piped/ unknown	Warmwater	None	Not provided (MNRF 2017a) Not sampled by LGL (piped)	N/A	N/A	Watercourse piped	N/A	N/A	July 1- March 31	Low
	Site 2: Tributary of Rambo Creek	4801021 mN	594468 mE	Permanent	Warmwater	Indirect	Not provided (MNRF 2017a) Not sampled by LGL (no fish present due to piped conditions downstream/barriers)	Boulder, cobble, gravel, sand, silt, concrete debris, armourstone	Some grasses & cattails downstream of Cavendish Drive. None upstream	N/A	N/A	N/A	July 1- March 31	Low
ROSELAND CREEK WATERSHED														
16-20003	Site 3: Roseland Creek	4802580 mN	594842 mE	Piped/ permanent downstream	Warmwater	None	Not provided (MNRF 2017a) No catch (CH 2018)	N/A	N/A	Watercourse piped	N/A	N/A	July 1- March 31	Low
TUCK CREEK WATERSHED														
16-20003	Site 4: Tributary of Tuck Creek	4803103 mN	594603 mE	Permanent/ piped upstream and downstream	Warmwater	Indirect	Creek Chub, Blacknose Dace, Fathead Minnow, Goldfish, White Sucker (MNRF 2017a; Aquafor Beech Ltd 2012) Common Shiner, Rainbow Trout (Aquafor Beech Ltd 2012)	Boulder, cobble, silt, gravel, concrete	Grasses	Watercourse piped	N/A	N/A	July 1- March 31	Low
	Site 5: Tuck Creek	4803636 mN	594537 mE	Piped/ unknown	Warmwater	None	Creek Chub, Blacknose Dace, Fathead Minnow, Goldfish, White Sucker (MNRF 2017a; Aquafor Beech Ltd 2012) Common Shiner, Rainbow Trout (Aquafor Beech Ltd 2012)	N/A	N/A	Watercourse piped	N/A	N/A	July 1-March 31	Low
SHOREACRES CREEK WATERSHED														
16-20003	Site 6: Tributary of Shoreacres Creek	4804396 mN	594464 mE	Intermittent	Warmwater	Direct	Not provided (MNRF 2017a) Fathead Minnow (CH 2018) White Sucker, Blacknose Dace, Creek Chub, Bluntnose Minnow, Brook Stickleback (Cole Engineering 2015)	Gravel, sand, silt, cobble, boulder	Grasses	Small CSP under laneway constricts flows; replacement with larger culvert would aid flow conveyance. Gabion basket drop forms barrier to fish	N/A	N/A	July 1- March 31	Low

TABLE 2. TEMPLATE 10.2 -
EXISTING FISH AND FISH HABITAT CONDITIONS SUMMARY TABLE

GWP or Project Name	Waterbody	Latitude	Longitude	Flow*	Thermal Regime	Fish Habitat	Fish Species Present	Substrate Type*	Vegetation*	Constraints and Opportunity	Important, Exceptional Fish Habitat	Species at Risk / Critical Habitat Present	In Water Works Timing Window***	MNRF Interpretation of Sensitivity
										passage. Removal would allow fish passage.				
	Site 7: Tributary of Shoreacres Creek	4804734 mN	594443 mE	Intermittent	Warmwater	Direct	Not provided (MNRF 2017a) Fathead Minnow (CH 2018) White Sucker, Blacknose Dace, Creek Chub, Bluntnose Minnow, Brook Stickleback (Cole Engineering 2015)	Gravel, silt, sand, boulder	Grasses	N/A	N/A	N/A	July 1- March 31	Low
	Site 8: Tributary of Shoreacres Creek	4805167 mN	594433 mE	Intermittent	Warmwater	Indirect	Not provided (MNRF 2017a) White Sucker, Blacknose Dace, Creek Chub, Bluntnose Minnow, Brook Stickleback (Cole Engineering 2015)	Gravel, silt, cobble, boulder	Grasses	Elevation drop a barrier to fish passage. Reduction in drop could allow fish passage.	N/A	N/A	July 1- March 31	Low
APPLEBY CREEK WATERSHED														
16-20003	Site 9: Appleby Creek	4805723 mN	594485 mE	Intermittent	Warmwater	Direct	Creek Chub, Fathead Minnow, Pumpkinseed, White Sucker (MNRF 2017a; CH 2009a; CH 2018) Brook Stickleback (CH 2018) Blacknose Dace, Goldfish, Green Sunfish, Largemouth Bass, (MNRF 2017a) Longnose Dace (CH 2009a)	Silt, detritus, boulder (rip rap)	Grasses	Laneway culvert buried and undersized and culverts under 407 ETR not embedded. Replacing laneway culvert with larger one and adding substrates to 407 ETR culverts could improve fish passage.	N/A	N/A	July 1- March 31	Low
	Site 10: Tributary of Appleby Creek	4805971 mN	594548 mE	Ephemeral	Warmwater	Indirect	Creek Chub, Fathead Minnow, Pumpkinseed, White Sucker (MNRF 2017a; CH 2009a) Blacknose Dace, Goldfish, Green Sunfish, Largemouth Bass (MNRF 2017a) Longnose Dace (CH 2009a)	Silt, detritus, boulders (rip rap)	Grasses	N/A	N/A	N/A	July 1- March 31	Low
SHELDON CREEK WATERSHED														

TABLE 2. TEMPLATE 10.2 -
EXISTING FISH AND FISH HABITAT CONDITIONS SUMMARY TABLE

GWP or Project Name	Waterbody	Latitude	Longitude	Flow*	Thermal Regime	Fish Habitat	Fish Species Present	Substrate Type*	Vegetation*	Constraints and Opportunity	Important, Exceptional Fish Habitat	Species at Risk / Critical Habitat Present	In Water Works Timing Window***	MNRF Interpretation of Sensitivity
16-20003	Site 11: Tributary of Sheldon Creek	4806407 mN	594705 mE	Ephemeral	Not provided	Indirect	Blacknose Dace, Brown Trout, Common Shiner, Creek Chub, Fantail Darter, Fathead Minnow, Green Sunfish, Hornyhead Chub, Longnose Dace, White Sucker (CH 2009a) Brook Stickleback, Pumpkinseed (CH 2018) Not provided (MNRF 2017a)	Silt, gravel, cobble, boulder	None upstream (agricultural), grasses near culvert	N/A	N/A	N/A	Not provided	Not provided
	Site 12: Tributary of Sheldon Creek	4806806 mN	594907 mE	Ephemeral	Not provided	Indirect	Blacknose Dace, Brown Trout, Common Shiner, Creek Chub, Fantail Darter, Fathead Minnow, Green Sunfish, Hornyhead Chub, Longnose Dace, White Sucker (CH 2009a) Brook Stickleback, Pumpkinseed (CH 2018) Not provided (MNRF 2017a)	Silt, gravel	Grasses	N/A	N/A	N/A	Not provided	Not provided
	Site 13: Tributary of Sheldon Creek	4807017 mN	595044 mE	Ephemeral	Not provided	Indirect	Blacknose Dace, Brown Trout, Common Shiner, Creek Chub, Fantail Darter, Fathead Minnow, Green Sunfish, Hornyhead Chub, Longnose Dace, White Sucker (CH 2009a) Brook Stickleback, Pumpkinseed (CH 2018) Not provided (MNRF 2017a)	Silt	Grasses, *Phragmites*	N/A	N/A	N/A	Not provided	Not provided
	Site 14: Tributary of Sheldon Creek	4807294 mN	595267 mE	Ephemeral	Not provided	Indirect	Blacknose Dace, Brown Trout, Common Shiner, Creek Chub, Fantail Darter, Fathead Minnow, Green Sunfish, Hornyhead Chub, Longnose Dace, White Sucker (CH 2009a) Not provided (MNRF 2017a)	Silt	Grasses	N/A	N/A	N/A	Not provided	Not provided
BRONTE CREEK WATERSHED														

TABLE 2. TEMPLATE 10.2 -
EXISTING FISH AND FISH HABITAT CONDITIONS SUMMARY TABLE

GWP or Project Name	Waterbody	Latitude	Longitude	Flow*	Thermal Regime	Fish Habitat	Fish Species Present	Substrate Type*	Vegetation*	Constraints and Opportunity	Important, Exceptional Fish Habitat	Species at Risk / Critical Habitat Present	In Water Works Timing Window***	MNRF Interpretation of Sensitivity
16-20003	Site 15: Bronte Creek	4808053 mN	595872 mE	Permanent	Warmwater	Direct	Common Shiner, Hornyhead Chub, River Chub, Spotfin Shiner, Fantail Darter, Johnny Darter, Tadpole Madtom, Blacknose Dace, Brown Trout, Fathead Minnow, White Perch, Pumpkinseed, Mimic Shiner, White Sucker, Rock Bass, Rainbow Smelt, Rosyface Shiner, Green Sunfish, Sea Lamprey, Common Carp, Black Crappie, Largemouth Bass, Smallmouth Bass, Cisco, Pearl Dace, Trout-Perch, Threespine Stickleback, Striped Shiner, Emerald Shiner, River Redhorse, American Eel, Logperch, Yellow Perch, Spottail Shiner, Bluntnose Minnow, Slimy Sculpin, Chinook Salmon, Golden Shiner, Brook Trout, Rainbow Darter, Central Mudminnow, Northern Pike, Longnose Dace, Silver Shiner, Rainbow Trout, Bluegill, Alewife, Stonecat, Round Goby, Creek Chub, Brook Stickleback, Brown Bullhead, Northern Redbelly Dace, Northern Hog Sucker, Striped Bass (CH 2012; MNRF 2017a) Atlantic Salmon (CH 2018)	Boulder, cobble, gravel, silt, shale bedrock	Grasses, bulrush, cattail, filamentous green algae	N/A	Migratory corridor; potential salmonid spawning habitat	(Silver Shiner and American Eel habitat and, at a minimum, it's at least a seasonal migratory corridor for Lake Ontario salmonids)	July 1 – September 15	High
	Site 15a: Tributary of Bronte Creek	4807965 mN	595718 mE	Ephemeral	Not provided	Indirect	Not provided (MNRF 2017a; CH 2018)	Boulder, cobble, gravel, silt	Grasses	N/A	N/A	N/A	Not provided	Not provided
FOURTEEN MILE CREEK WATERSHED														
16-20003	Site 16: Tributary of Fourteen Mile Creek	4809048 mN	596677 mE	Ephemeral	Coldwater	Indirect	Blacknose Dace, Bluntnose Minnow, Common Shiner, Creek Chub, Fathead Minnow, Largemouth Bass, Rainbow Darter, White Sucker, Brook Stickleback, Fantail Darter (CH 2009a; MNRF 2017a) Goldfish, Brown Bullhead,	Silt, boulder (rip rap)	Grasses, *Phragmites*, cattails	N/A	N/A	Contributing SAR habitat (Upstream of Redside Dace (RSD) occupied habitat)	July 1 – September 15 (Flexible on this window depending on type of works proposed around this crossing)	Moderate

TABLE 2. TEMPLATE 10.2 -
EXISTING FISH AND FISH HABITAT CONDITIONS SUMMARY TABLE

GWP or Project Name	Waterbody	Latitude	Longitude	Flow*	Thermal Regime	Fish Habitat	Fish Species Present	Substrate Type*	Vegetation*	Constraints and Opportunity	Important, Exceptional Fish Habitat	Species at Risk / Critical Habitat Present	In Water Works Timing Window***	MNRF Interpretation of Sensitivity
							Redside Dace, Pumpkinseed, Brassy Minnow, Johnny Darter, Northern Redbelly Dace, Longnose Dace, (MNRF 2017a)							
	Site 17: Tributary of Fourteen Mile Creek	4809275 mN	596856 mE	Ephemeral	Coldwater	Indirect	Bluntnose Minnow, Common Shiner, Creek Chub, Fathead Minnow, Largemouth Bass, Rainbow Darter, White Sucker, Fantail Darter (CH 2009a; MNRF 2017a) Blacknose Dace, Rainbow Darter, Brown Bullhead, Redside Dace, Pumpkinseed, Brassy Minnow, Johnny Darter, Northern Redbelly Dace, Longnose Dace, White Sucker, Fantail Darter, Fathead Minnow, Bluntnose Minnow, Common Shiner, Largemouth Bass, Creek Chub, Goldfish, Brook Stickleback (MNRF 2017a)	Silt, detritus	*Phragmites*	High gradient within CSP culvert under 407 with no substrates. Reduction in slope and the addition of substrates could provide fish passage.	N/A	Contributing SAR habitat (Upstream of Redside Dace (RSD) occupied habitat)	July 1 – September 15 (Flexible on this window depending on type of works proposed around this crossing)	Moderate
	Site 18: Tributary of Fourteen Mile Creek	4809502 mN	597023 mE	Ephemeral	Coldwater	Indirect	Blacknose Dace, Bluntnose Minnow, Common Shiner, Creek Chub, Fathead Minnow, Largemouth Bass, Rainbow Darter, White Sucker, Brook Stickleback, Fantail Darter (CH 2009a; MNRF 2017a) Rainbow Darter, Brown Bullhead, Redside Dace, Pumpkinseed, Brassy Minnow, Johnny Darter, Northern Redbelly Dace, Longnose Dace, Goldfish (MNRF 2017a)	Silt, gravel, cobble, boulder (rip rap)	Grasses	N/A	N/A	Contributing SAR habitat (Upstream of Redside Dace (RSD) occupied habitat)	July 1 – September 15 (Flexible on this window depending on type of works proposed around this crossing)	Moderate
	Site 19: Tributary of Fourteen Mile Creek	4809671 mN	597152 mE	Ephemeral	Not provided	Indirect	Blacknose Dace, Bluntnose Minnow, Common Shiner, Creek Chub, Fathead Minnow, Largemouth Bass, Rainbow Darter, White Sucker, Brook Stickleback, Fantail Darter (CH 2009a) Not Provided (MNRF 2017a)	Boulder (rip rap), silt, detritus	Grasses, *Phragmites*	N/A	N/A	Contributing SAR habitat (Upstream of Redside Dace (RSD) occupied habitat)	July 1 – September 15 (Flexible on this window depending on type of works proposed around this crossing)	Moderate

TABLE 2. TEMPLATE 10.2 -
EXISTING FISH AND FISH HABITAT CONDITIONS SUMMARY TABLE

GWP or Project Name	Waterbody	Latitude	Longitude	Flow*	Thermal Regime	Fish Habitat	Fish Species Present	Substrate Type*	Vegetation*	Constraints and Opportunity	Important, Exceptional Fish Habitat	Species at Risk / Critical Habitat Present	In Water Works Timing Window***	MNRF Interpretation of Sensitivity
	Site 20: Tributary of Fourteen Mile Creek	4809873 mN	597329 mE	Ephemeral	Coldwater	Indirect	Blacknose Dace, Bluntnose Minnow, Common Shiner, Creek Chub, Fathead Minnow, Largemouth Bass, Rainbow Darter, White Sucker, Brook Stickleback, Fantail Darter (CH 2009a MNRF 2017a) Rainbow Darter, Brown Bullhead, Redside Dace, Pumpkinseed, Brassy Minnow, Johnny Darter, Northern Redbelly Dace, Longnose Dace, Goldfish (MNRF 2017a)	Boulder (rip rap), silt, detritus	Grasses, *Phragmites*	N/A	N/A	Contributing SAR habitat (Upstream of Redside Dace (RSD) occupied habitat)	July 1 – September 15 (Flexible on this window depending on type of works proposed around this crossing)	Moderate
	Site 21: Tributary of Fourteen Mile Creek	4810057 mN	597453 mE	Ephemeral	Not provided	Indirect	Blacknose Dace, Bluntnose Minnow, Common Shiner, Creek Chub, Fathead Minnow, Largemouth Bass, Rainbow Darter, White Sucker, Brook Stickleback, Fantail Darter (CH 2009a) Not provided (MNRF 2017a)	Silt	Grasses, *Phragmites*, cattails	N/A	N/A	Contributing SAR habitat (Upstream of Redside Dace (RSD) occupied habitat)	July 1 – September 15 (Flexible on this window depending on type of works proposed around this crossing)	Moderate
	Site 22: Fourteen Mile Creek	4810373 mN	597646 mE	Intermittent	Coldwater	Indirect	Blacknose Dace, Bluntnose Minnow, Common Shiner, Creek Chub, Fathead Minnow, Largemouth Bass, Rainbow Darter, White Sucker, Brook Stickleback, Fantail Darter (CH 2009a; MNRF 2017a) Rainbow Darter, Brown Bullhead, Redside Dace, Pumpkinseed, Brassy Minnow, Johnny Darter, Northern Redbelly Dace, Longnose Dace, Goldfish (MNRF 2017a)	Clay, silt, cobble, boulder	Grasses, cattails	N/A	N/A	Contributing SAR habitat (Upstream of Redside Dace (RSD) occupied habitat)	July 1 – September 15 (Flexible on this window depending on type of works proposed around this crossing)	Moderate
	Site 23: Tributary of Fourteen Mile Creek	4810750 mN	597823 mE	Ephemeral	Coldwater	Indirect	Blacknose Dace, Bluntnose Minnow, Common Shiner, Creek Chub, Fathead Minnow, Largemouth Bass, Rainbow Darter, White Sucker, Brook Stickleback, Fantail Darter (CH 2009a) Not provided (MNRF 2017a)	Silt, detritus	*Phragmites*, cattails	N/A	N/A	Contributing SAR habitat (Upstream of Redside Dace (RSD) occupied habitat)	July 1 – September 15 (Flexible on this window depending on type of works proposed around this crossing)	Moderate

TABLE 2. TEMPLATE 10.2 -
EXISTING FISH AND FISH HABITAT CONDITIONS SUMMARY TABLE

GWP or Project Name	Waterbody	Latitude	Longitude	Flow*	Thermal Regime	Fish Habitat	Fish Species Present	Substrate Type*	Vegetation*	Constraints and Opportunity	Important, Exceptional Fish Habitat	Species at Risk / Critical Habitat Present	In Water Works Timing Window***	MNRF Interpretation of Sensitivity
	Site 24: Tributary of Fourteen Mile Creek	4811087 mN	597968 mE	Permanent	Coldwater	Direct	Blacknose Dace, Bluntnose Minnow, Common Shiner, Creek Chub, Fathead Minnow, Largemouth Bass, Rainbow Darter, White Sucker, Brook Stickleback, Fantail Darter (CH 2009a) Goldfish (MNRF 2017a)	Silt, cobble, boulders (rip rap)	Cattails, *Phragmites*, grasses	N/A	N/A	Contributing SAR habitat (Upstream of Redside Dace (RSD) occupied habitat)	July 1 – September 15 (Flexible on this window depending on type of works proposed around this crossing)	Moderate
	Site 25: Tributary of Fourteen Mile Creek	4811423 mN	598059 mE	Ephemeral	Coldwater	Indirect	Blacknose Dace, Bluntnose Minnow, Common Shiner, Creek Chub, Fathead Minnow, Largemouth Bass, Rainbow Darter, White Sucker, Brook Stickleback, Fantail Darter (CH 2009a) Not provided (MNRF 2017a)	Silt	Grasses	N/A	N/A	Contributing SAR habitat (Upstream of Redside Dace (RSD) occupied habitat)	July 1 – September 15 (Flexible on this window depending on type of works proposed around this crossing)	Moderate
MCCRANEY CREEK WATERSHED														
16-20003	Site 26: Tributary of McCraney Creek	4811681 mN	598127 mE	Ephemeral	Warmwater	Indirect	Common Shiner, Longnose Dace, Pumpkinseed, Rainbow Darter, Rainbow Trout, White Sucker (CH 2009a) Blacknose Dace, Fathead Minnow, Creek Chub (MNRF 2017a; CH 2009a)	Clay, gravel, cobbles	Grasses, *Phragmites*, cattails	N/A	N/A	N/A	July 1 – March 31	Low
TAPLOW CREEK WATERSHED														
16-20003	Site 27: Tributary of Taplow Creek	4811846 mN	598156 mE	Ephemeral	Not provided	None	No Information (CH 2009a) Not provided (MNRF 2017a; CH 2018))	Silt	*Phragmites*, grasses	N/A	N/A	N/A	Not provided	Not provided
SIXTEEN MILE CREEK WATERSHED														
16-20003	Site 28: Tributary of Sixteen Mile Creek	4812550 mN	598221 mE	Intermittent	Coolwater	Indirect	Longnose Dace, Brown Bullhead, Rock Bass, Largemouth Bass, Brook Trout, Brown Trout, Stonecat, Rainbow Darter, Blacknose Dace, Common Shiner,	Concrete, silt	*Phragmites*, grasses, cattails	N/A	N/A	Contributing SAR habitat (Upstream of occupied Silver Shiner habitat)	July 1 – September 15 (Flexible on this window depending on	Moderate

TABLE 2. TEMPLATE 10.2 -
EXISTING FISH AND FISH HABITAT CONDITIONS SUMMARY TABLE

GWP or Project Name	Waterbody	Latitude	Longitude	Flow*	Thermal Regime	Fish Habitat	Fish Species Present	Substrate Type*	Vegetation*	Constraints and Opportunity	Important, Exceptional Fish Habitat	Species at Risk / Critical Habitat Present	In Water Works Timing Window***	MNRF Interpretation of Sensitivity
							Redside Dace, Pumpkinseed, Common Carp, White Sucker, Smallmouth Bass, Johnny Darter, Brassy Minnow, Emerald Shiner, Northern Hog Sucker, Spottail Shiner, Bluntnose Minnow, Fathead Minnow, Northern Redbelly Dace, Sea Lamprey, River Chub, Fantail Darter, Golden Redhorse, Alewife, Brook Stickleback, Rosyface Shiner, Golden Shiner, Creek Chub (CH 2011) Not provided (MNRF 2017a)						type of works proposed around this crossing)	
	Site 29: Sixteen Mile Creek	4813322 mN	598317 mE	Permanent	Coolwater	Direct	Longnose Dace, Brown Bullhead, Rock Bass, Largemouth Bass, Brook Trout, Brown Trout, Stonecat, Rainbow Darter, Blacknose Dace, Common Shiner, Redside Dace, Pumpkinseed, Common Carp, White Sucker, Smallmouth Bass, Johnny Darter, Brassy Minnow, Emerald Shiner, Northern Hog Sucker, Spottail Shiner, Bluntnose Minnow, Fathead Minnow, Northern Redbelly Dace, Sea Lamprey, River Chub, Fantail Darter, Golden Redhorse, Alewife, Brook Stickleback, Rosyface Shiner, Golden Shiner, Creek Chub (MNRF 2017a; CH 2011) Chinook Salmon, Rainbow Trout, Goldfish, Striped Shiner, Black Crappie (CH 2018)	Shale boulders, cobbles, gravel, shale bedrock	Grasses, some patchy submerged	N/A	Migratory corridor, habitat for all life stages of various species	(Silver Shiner occupied habitat)	July 1 – September 15	High
	Site 30: Tributary of Sixteen Mile Creek	4813745 mN	598459 mE	Ephemeral	Coolwater	Indirect	Longnose Dace, Brown Bullhead, Rock Bass, Largemouth Bass, Brook Trout, Brown Trout, Stonecat, Rainbow Darter, Blacknose Dace, Common Shiner, Redside Dace, Pumpkinseed, Common Carp, White Sucker, Smallmouth Bass, Johnny Darter, Brassy Minnow, Emerald Shiner, Northern Hog Sucker, Spottail Shiner, Bluntnose Minnow, Fathead Minnow,	Rip rap boulders, silt	Grasses	N/A	N/A	Contributing SAR habitat (upstream of occupied Silver Shiner habitat)	July 1 – September 15	Low-Moderate

TABLE 2. TEMPLATE 10.2 -
EXISTING FISH AND FISH HABITAT CONDITIONS SUMMARY TABLE

GWP or Project Name	Waterbody	Latitude	Longitude	Flow*	Thermal Regime	Fish Habitat	Fish Species Present	Substrate Type*	Vegetation*	Constraints and Opportunity	Important, Exceptional Fish Habitat	Species at Risk / Critical Habitat Present	In Water Works Timing Window***	MNRF Interpretation of Sensitivity
							Northern Redbelly Dace, Sea Lamprey, River Chub, Fantail Darter, Golden Redhorse, Alewife, Brook Stickleback, Rosyface Shiner, Golden Shiner, Creek Chub (MNRF 2017a; CH 2011)							
	Site 31: Tributary of Sixteen Mile Creek	4815250 mN	599612 mE	Ephemeral	Coolwater	None	Longnose Dace, Brown Bullhead, Rock Bass, Largemouth Bass, Brook Trout, Brown Trout, Stonecat, Rainbow Darter, Blacknose Dace, Common Shiner, Redside Dace, Pumpkinseed, Common Carp, White Sucker, Smallmouth Bass, Johnny Darter, Brassy Minnow, Emerald Shiner, Northern Hog Sucker, Spottail Shiner, Bluntnose Minnow, Fathead Minnow, Northern Redbelly Dace, Sea Lamprey, River Chub, Fantail Darter, Golden Redhorse, Alewife, Brook Stickleback, Rosyface Shiner, Golden Shiner, Creek Chub (MNRF 2017a; CH 2011)	Silt, rip rap boulders	Grasses, *Phragmites*	N/A	N/A	Contributing SAR habitat (upstream of occupied Silver Shiner habitat)	July 1 – September 15	Low-Moderate
	Site 32: Tributary of Sixteen Mile Creek	4815360 mN	599711 mE	Ephemeral	Coolwater	None	Longnose Dace, Brown Bullhead, Rock Bass, Largemouth Bass, Brook Trout, Brown Trout, Stonecat, Rainbow Darter, Blacknose Dace, Common Shiner, Redside Dace, Pumpkinseed, Common Carp, White Sucker, Smallmouth Bass, Johnny Darter, Brassy Minnow, Emerald Shiner, Northern Hog Sucker, Spottail Shiner, Bluntnose Minnow, Fathead Minnow, Northern Redbelly Dace, Sea Lamprey, River Chub, Fantail Darter, Golden Redhorse, Alewife, Brook Stickleback, Rosyface Shiner, Golden Shiner, Creek Chub (MNRF 2017a, CH 2011)	Silt, rip rap boulders	Grasses, *Phragmites*	N/A	N/A	Contributing SAR habitat (upstream of occupied Silver Shiner habitat)	July 1 – September 15	Low-Moderate
	Site 33: Tributary of Sixteen Mile Creek	4815508 mN	599915 mE	Ephemeral	Coolwater	None	Longnose Dace, Brown Bullhead, Rock Bass, Largemouth Bass, Brook Trout, Brown Trout, Stonecat, Rainbow Darter, Blacknose Dace, Common Shiner, Redside Dace, Pumpkinseed, Common Carp, White Sucker,	Silt, rip rap boulders	Grasses, *Phragmites*	N/A	N/A	Contributing SAR habitat (upstream of occupied Silver Shiner habitat)	July 1 – September 15	Low-Moderate

TABLE 2. TEMPLATE 10.2 -
EXISTING FISH AND FISH HABITAT CONDITIONS SUMMARY TABLE

GWP or Project Name	Waterbody	Latitude	Longitude	Flow*	Thermal Regime	Fish Habitat	Fish Species Present	Substrate Type*	Vegetation*	Constraints and Opportunity	Important, Exceptional Fish Habitat	Species at Risk / Critical Habitat Present	In Water Works Timing Window***	MNRF Interpretation of Sensitivity
							Smallmouth Bass, Johnny Darter, Brassy Minnow, Emerald Shiner, Northern Hog Sucker, Spottail Shiner, Bluntnose Minnow, Fathead Minnow, Northern Redbelly Dace, Sea Lamprey, River Chub, Fantail Darter, Golden Redhorse, Alewife, Brook Stickleback, Rosyface Shiner, Golden Shiner, Creek Chub (MNRF 2017a, CH 2011)							
	Site 34: Tributary of Sixteen Mile Creek	4815757 mN	600082 mE	Ephemeral	Coolwater	None	Longnose Dace, Brown Bullhead, Rock Bass, Largemouth Bass, Brook Trout, Brown Trout, Stonecat, Rainbow Darter, Blacknose Dace, Common Shiner, Redside Dace, Pumpkinseed, Common Carp, White Sucker, Smallmouth Bass, Johnny Darter, Brassy Minnow, Emerald Shiner, Northern Hog Sucker, Spottail Shiner, Bluntnose Minnow, Fathead Minnow, Northern Redbelly Dace, Sea Lamprey, River Chub, Fantail Darter, Golden Redhorse, Alewife, Brook Stickleback, Rosyface Shiner, Golden Shiner, Creek Chub (MNRF 2017a, CH 2011)	Silt, rip rap boulders	Grasses, *Phragmites*	N/A	N/a	Contributing SAR habitat (upstream of occupied Silver Shiner habitat)	July 1 – September 15	Low-Moderate
	Site 35: Tributary of Sixteen Mile Creek	4816860 mN	600355 mE	Ephemeral	Coolwater	Indirect	Longnose Dace, Brown Bullhead, Rock Bass, Largemouth Bass, Brook Trout, Brown Trout, Stonecat, Rainbow Darter, Blacknose Dace, Common Shiner, Redside Dace, Pumpkinseed, Common Carp, White Sucker, Smallmouth Bass, Johnny Darter, Brassy Minnow, Emerald Shiner, Northern Hog Sucker, Spottail Shiner, Bluntnose Minnow, Fathead Minnow, Northern Redbelly Dace, Sea Lamprey, River Chub, Fantail Darter, Golden Redhorse, Alewife, Brook Stickleback, Rosyface Shiner, Golden Shiner, Creek Chub (MNRF 2017a, CH 2011)	Silt	Grasses	N/A	N/A	Contributing SAR habitat (upstream of occupied Silver Shiner habitat)	July 1 – September 15	Low-Moderate

TABLE 2. TEMPLATE 10.2 -
EXISTING FISH AND FISH HABITAT CONDITIONS SUMMARY TABLE

GWP or Project Name	Waterbody	Latitude	Longitude	Flow*	Thermal Regime	Fish Habitat	Fish Species Present	Substrate Type*	Vegetation*	Constraints and Opportunity	Important, Exceptional Fish Habitat	Species at Risk / Critical Habitat Present	In Water Works Timing Window***	MNRF Interpretation of Sensitivity
JOSHUA'S CREEK WATERSHED														
16-20003	Site 36: Tributary of Joshua's Creek	4817950 mN	601110 mE	Intermittent	Warmwater	Indirect	Bluntnose Minnow, Common Carp, Common Shiner, Goldfish, Johnny Darter, Longnose Dace, Rainbow Trout, River Chub, Rock Bass (CH 2009a). Creek Chub, Blacknose Dace, Fathead Minnow, White Sucker (MNRF 2017, CH 2009a).	Silt, rip rap boulders	Grasses, cattails, *Phragmites*	Create buffer of from active agriculture	N/A	N/A	July 1 – March 31	Low
	Site 37: Tributary of Joshua's Creek	4818313 mN	601408 mE	Ephemeral	Warmwater	Indirect	Bluntnose Minnow, Common Carp, Common Shiner, Goldfish, Johnny Darter, Longnose Dace, Rainbow Trout, River Chub, Rock Bass (CH 2009a). Creek Chub, Blacknose Dace, Fathead Minnow, White Sucker (MNRF 2017; CH 2009a).	Silt	*Phragmites*, grasses	Create buffer of from active agriculture	N/A	N/A	July 1 – March 31	Low
	Site 38: Tributary of Joshua's Creek	4818446 mN	601518 mE	Ephemeral	Warmwater	Indirect	Bluntnose Minnow, Common Carp, Common Shiner, Goldfish, Johnny Darter, Longnose Dace, Rainbow Trout, River Chub, Rock Bass (CH 2009a). Creek Chub, Blacknose Dace, Fathead Minnow, White Sucker (MNRF 2017; CH 2009a).	Silt	*Phragmites*, grasses	Create buffer of from active agriculture	N/A	N/A	July 1 – March 31	Low
	Site 39: Tributary of Joshua's Creek	4818832 mN	601840 mE	Ephemeral	Warmwater	Indirect	Bluntnose Minnow, Common Carp, Common Shiner, Goldfish, Johnny Darter, Longnose Dace, Rainbow Trout, River Chub, Rock Bass (CH 2009a). Creek Chub, Blacknose Dace, Fathead Minnow, White Sucker (MNRF 2017; CH 2009a).	Silt	*Phragmites*, grasses	Create buffer of from active agriculture	N/A	N/A	July 1 – March 31	Low
	Site 40: Tributary of Joshua's Creek	4819053 mN	602021 mE	Ephemeral	Warmwater	Indirect	Bluntnose Minnow, Common Carp, Common Shiner, Goldfish, Johnny Darter, Longnose Dace, Rainbow Trout, River Chub, Rock Bass (CH 2009a). Creek Chub, Blacknose Dace, Fathead Minnow, White Sucker (MNRF 2017; CH 2009a).	Silt	*Phragmites*, grasses, cattails	Create buffer of from active agriculture	N/A	N/A	July 1 – March 31	Low

TABLE 2. TEMPLATE 10.2 -
EXISTING FISH AND FISH HABITAT CONDITIONS SUMMARY TABLE

GWP or Project Name	Waterbody	Latitude	Longitude	Flow*	Thermal Regime	Fish Habitat	Fish Species Present	Substrate Type*	Vegetation*	Constraints and Opportunity	Important, Exceptional Fish Habitat	Species at Risk / Critical Habitat Present	In Water Works Timing Window***	MNRF Interpretation of Sensitivity
	Site 41: Tributary of Joshua's Creek	4819528 mN	602432 mE	Ephemeral	Warmwater	Indirect	Bluntnose Minnow, Common Carp, Common Shiner, Goldfish, Johnny Darter, Longnose Dace, Rainbow Trout, River Chub, Rock Bass (CH 2009a). Creek Chub, Blacknose Dace, Fathead Minnow, White Sucker (MNRF 2017; CH 2009a).	Silt	Grasses, *Phragmites*	N/A	N/A	N/A	July 1 – March 31	Low
SIXTEEN MILE CREEK WATERSHED - EAST SIXTEEN MILE CREEK SUBWATERSHED														
16-20003	Site 42: Tributary of East Sixteen Mile Creek	4821785 mN	600961 mE	Permanent	Warmwater	Direct	Fathead Minnow, Bluntnose Minnow, River Chub, Northern Hog Sucker, Common Carp, Creek Chub, Smallmouth Bass, Mimic Shiner, Common Shiner, Brown Bullhead, Yellow Bullhead, Rock Bass, Goldfish, Emerald Shiner, Northern Pike, Fantail Darter, Brook Stickleback, Largemouth Bass, Blacknose Dace, Johnny Darter, Golden Shiner, Rosyface Shiner, Bluegill, Pumpkinseed, Black Crappie, White Sucker (MNRF 2017; CH 2011). Finescale Dace, Northern Redbelly Dace (CH 2018)	Unknown	Unknown	N/A	N/A	Contributing SAR habitat (upstream of occupied Silver Shiner habitat)	July 1 – March 31	Low-Moderate
	Site 43: Tributary of East Sixteen Mile Creek	4823263 mN	599490 mE	Permanent	Warmwater	Direct	Fathead Minnow, Bluntnose Minnow, River Chub, Northern Hog Sucker Common Carp, Creek Chub, Smallmouth Bass, Mimic Shiner, Common Shiner, Brown Bullhead, Yellow Bullhead, Rock Bass, Goldfish, Emerald Shiner, Northern Pike, Fantail Darter, Brook Stickleback, Largemouth Bass, Blacknose Dace, Johnny Darter, Golden Shiner, Rosyface Shiner, Bluegill, Pumpkinseed, Black Crappie, White Sucker (MNRF 2017; CH 2011). Finescale Dace, Northern Redbelly Dace (CH 2018)	Concrete (in channel from SWM ponds to east), silt, boulder	Cattails, grasses	N/A	N/A	Contributing SAR habitat (upstream of occupied Silver Shiner habitat)	July 1 – March 31	Low-Moderate

TABLE 2. TEMPLATE 10.2 -
EXISTING FISH AND FISH HABITAT CONDITIONS SUMMARY TABLE

GWP or Project Name	Waterbody	Latitude	Longitude	Flow*	Thermal Regime	Fish Habitat	Fish Species Present	Substrate Type*	Vegetation*	Constraints and Opportunity	Important, Exceptional Fish Habitat	Species at Risk / Critical Habitat Present	In Water Works Timing Window***	MNRF Interpretation of Sensitivity
	Site 44: Tributary of East Sixteen Mile Creek	4825561 mN	597084 mE	Permanent	Warmwater	Direct	Fathead Minnow, Bluntnose Minnow, River Chub, Northern Hog Sucker Common Carp, Creek Chub, Smallmouth Bass, Mimic Shiner, Common Shiner, Brown Bullhead, Yellow Bullhead, Rock Bass, Goldfish, Emerald Shiner, Northern Pike, Fantail Darter, Brook Stickleback, Largemouth Bass, Blacknose Dace, Johnny Darter, Golden Shiner, Rosyface Shiner, Bluegill, Pumpkinseed, Black Crappie, White Sucker (MNRF 2017; CH 2011). Finescale Dace, Northern Redbelly Dace (CH 2018)	Silt	Cattails, grasses	N/A	N/A	Contributing SAR habitat (upstream of occupied Silver Shiner habitat)	July 1 – March 31	Low-Moderate
	Site 45: Tributary of East Sixteen Mile Creek	4826650 mN	595911 mE	Intermittent	Warmwater	Direct	Fathead Minnow, Bluntnose Minnow, River Chub, Northern Hog Sucker Common Carp, Creek Chub, Smallmouth Bass, Mimic Shiner, Common Shiner, Brown Bullhead, Yellow Bullhead, Rock Bass, Goldfish, Emerald Shiner, Northern Pike, Fantail Darter, Brook Stickleback, Largemouth Bass, Blacknose Dace, Johnny Darter, Golden Shiner, Rosyface Shiner, Bluegill, Pumpkinseed, Black Crappie, White Sucker (MNRF 2017; CH 2011). Finescale Dace, Northern Redbelly Dace (CH 2018)	Silt	Cattails, grasses	N/A	N/A	Contributing SAR habitat (upstream of occupied Silver Shiner habitat)	July 1 – March 31	Low-Moderate
	Site 46: Tributary of East Sixteen Mile Creek	4827097 mN	596064 mE	Permanent	Warmwater	Indirect	Fathead Minnow, Bluntnose Minnow, River Chub, Northern Hog Sucker Common Carp, Creek Chub, Smallmouth Bass, Mimic Shiner, Common Shiner, Brown Bullhead, Yellow Bullhead, Rock Bass, Goldfish, Emerald Shiner, Northern Pike, Fantail Darter, Brook Stickleback, Largemouth Bass, Blacknose Dace, Johnny Darter, Golden Shiner, Rosyface Shiner, Bluegill, Pumpkinseed, Black Crappie, White Sucker (MNRF 2017; CH 2011).	Detritus, silt, muck	Cattails, *Phragmites*, grasses	Replace culvert at downstream end of channel under lane with larger one to alleviate flooding upstream and re-grade rip rap slope to remove barrier	N/A	Contributing SAR habitat (upstream of occupied Silver Shiner habitat)	July 1 – March 31	Low-Moderate

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EXISTING FISH AND FISH HABITAT CONDITIONS SUMMARY TABLE

GWP or Project Name	Waterbody	Latitude	Longitude	Flow*	Thermal Regime	Fish Habitat	Fish Species Present	Substrate Type*	Vegetation*	Constraints and Opportunity	Important, Exceptional Fish Habitat	Species at Risk / Critical Habitat Present	In Water Works Timing Window***	MNRF Interpretation of Sensitivity
							Finescale Dace, Northern Redbelly Dace (CH 2018)							
	Site 47: Tributary of East Sixteen Mile Creek	4827475 mN	596334 mE	Permanent	Warmwater	Indirect	Fathead Minnow, Bluntnose Minnow, River Chub, Northern Hog Sucker Common Carp, Creek Chub, Smallmouth Bass, Mimic Shiner, Common Shiner, Brown Bullhead, Yellow Bullhead, Rock Bass, Goldfish, Emerald Shiner, Northern Pike, Fantail Darter, Brook Stickleback, Largemouth Bass, Blacknose Dace, Johnny Darter, Golden Shiner, Rosyface Shiner, Bluegill, Pumpkinseed, Black Crappie, White Sucker (MNRF 2017; CH 2011). Finescale Dace, Northern Redbelly Dace (CH 2018)	Silt, detritus	Cattails	Grade downstream end of channel where steep rip rap slope creates barrier to fish to alleviate drop	N/A	Contributing SAR habitat (upstream of occupied Silver Shiner habitat)	July 1 – March 31	Low-Moderate
	Site 48: Tributary of East Sixteen Mile Creek	4828150 mN	597408 mE	Ephemeral	Warmwater	Indirect	Unknown	Silt	Cattails	N/A	N/A	Contributing SAR habitat (upstream of occupied Silver Shiner habitat)	July 1 - March 31	Low-Moderate
CREDIT RIVER WATERSHED - MULLETT CREEK SUBWATERSHED														
16-20003	Site 49: Mullet Creek	4828150 mN	598909 mE	Permanent	Warmwater	Direct	Blacknose Dace, Creek Chub (CVC 2018); Cyprinids (LGL 2018; 2019); Warmwater baitfish (MNRF 2019)	Silt, gravel, boulder, cobble	Grasses, cattails	N/A	N/A	N/A	July 1 - March 31	Low
CREDIT RIVER WATERSHED - LEVI CREEK SUBWATERSHED														
16-20003	Site 50: Levi Creek	4830441 mN	600215 mE	Permanent	Coolwater	Direct	White Sucker, Rainbow Darter, Fantail Darter, Johnny Darter, Common Shiner, Bluntnose Minnow, Blacknose Dace, Creek Chub, Northern Hog Sucker, Longnose Dace, Brown Bullhead, Golden Shiner, Stonecat, Fathead Minnow, Brassy Minnow, Rock Bass, Brook Stickleback, Pumpkinseed, Hornyhead Chub,	Sand, boulder, cobble, gravel, silt	Grasses	N/A	N/A	N/A	July 1 - March 31	Moderate

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EXISTING FISH AND FISH HABITAT CONDITIONS SUMMARY TABLE

GWP or Project Name	Waterbody	Latitude	Longitude	Flow*	Thermal Regime	Fish Habitat	Fish Species Present	Substrate Type*	Vegetation*	Constraints and Opportunity	Important, Exceptional Fish Habitat	Species at Risk / Critical Habitat Present	In Water Works Timing Window***	MNRF Interpretation of Sensitivity
							Rainbow Trout, River Chub, Largemouth Bass (CVC 2018); Rainbow and Brown Trout (MNRF 2019); Cyprinids, Largemouth Bass (LGL 2018; 2019)							
CREDIT RIVER WATERSHED														
16-20003	Site 51: Credit River	4831651 mN	601074 mE	Permanent	Coolwater	Direct	Rock Bass, Brown Bullhead, White Sucker, Common Carp, Rainbow Darter, Fantail Darter, Johnny Darter, Northern Hog Sucker, Common Shiner, Largemouth Bass, Stonecat, Bluntnose Minnow, Blacknose Dace, Longnose Dace, Creek Chub, Pumpkinseed, Hornyhead Chub, Brook Stickleback, River Chub, Rainbow Trout, Chinook Salmon, Sea Lamprey, Brown Trout (CVC 2018); Cyprinids; White Sucker (LGL 2019)	Boulder, cobble, gravel	Grasses	N/A	Spawning habitat present, migratory salmonid corridor	N/A	July 1 - September 15	High
	Sites 52-54: Tributary of Credit River	4832061 mN	601340 mE	Intermittent	Warmwater	Indirect	N/A	Silt, muck, gravel	Grasses, cattails	N/A	N/A	N/A	July 1 - March 31	Low
	Site 55: Tributary of Credit River	4832657 mN	602127 mE	Ephemeral	Warmwater	Indirect	N/A	Silt	Grasses	N/A	N/A	N/A	July 1 - March 31	Low
CREDIT RIVER WATERSHED - FLETCHER'S CREEK SUBWATERSHED														
16-20003	Site 56: Tributary of Fletcher's Creek	4833109 mN	602329 mE	Ephemeral	Warmwater	Indirect	N/A	Silt	Grasses	N/A	N/A	N/A	July 1 - March 31	Low
	Site 57: Tributary of Fletcher's Creek	4833539 mN	602952 mE	Ephemeral	Warmwater	Indirect	N/A	Silt	Grasses	N/A	N/A	Contributing SAR habitat (upstream of occupied Redside Dace habitat)	July 1 - March 31	Low

TABLE 2. TEMPLATE 10.2 -
EXISTING FISH AND FISH HABITAT CONDITIONS SUMMARY TABLE

GWP or Project Name	Waterbody	Latitude	Longitude	Flow*	Thermal Regime	Fish Habitat	Fish Species Present	Substrate Type*	Vegetation*	Constraints and Opportunity	Important, Exceptional Fish Habitat	Species at Risk / Critical Habitat Present	In Water Works Timing Window***	MNRF Interpretation of Sensitivity
	Site 58: Fletcher's Creek	4833695 mN	603066 mE	Permanent	Warmwater	Direct	White Sucker, Brook Stickleback, Common Shiner, Bluntnose Minnow, Fathead Minnow, Blacknose Dace, Creek Chub, Pumpkinseed, Hornyhead Chub, Brown Bullhead, Longnose Dace, Rainbow Darter, Fantail Darter, Johnny Darter, Brassy Minnow, Stonecat, Northern Hog Sucker, Rainbow Trout, Central Mudminnow, Largemouth Bass, Goldfish, River Chub, Chinook Salmon (CVC 2018); Cyprinids (LGL 2018; 2019)	Sand, silt, gravel, boulder	Grasses, floating-leaved	N/A	N/A	Occupied Redside Dace	July 1 - September 15	High
	Site 59: Tributary of Fletcher's Creek	4833736 mN	603378 mE	Ephemeral	Warmwater	Indirect	Large colony of chimney crayfish located downstream	Silt	Grasses, cattails	N/A	N/A	Contributing SAR habitat (upstream of occupied Redside Dace habitat)	July 1 - March 31	Moderate

* Data based on LGL field investigations completed during Spring/Summer of 2018 and 2019.
** Fish Point Data based on secondary source review including personal correspondence/data provided by/with the Ministry of Natural Resources and Forestry (2017a; 2019) and CVC (2018).
*** Thermal regime, in-water timing window, Species at Risk/Critical habitat and sensitivity provided by the Ministry of Natural Resources and Forestry (2017a; 2019).

4.0 FIELD INVESTIGATIONS

Field investigations focused on the facility footprint, including the proposed preferred Transitway alignments/station location and adjacent lands up to 120 m (north and south) from the future infrastructure footprint (see **Figure 2**), located both north and south of the 407 ETR.

LGL Fisheries Specialists conducted fisheries surveys on August 14, 23, 31, September 19, 2018 and April 18, 24, 25, 29, 30, May 8, 9, June 14, 17, 19, July 31 and August 15, 2019 to identify and document fish habitat along and adjacent to the proposed Transitway alignments and station locations.

Physical features within 50 m of the Transitway corridor and station locations (facility footprint) were surveyed in sufficient detail to enable mapping and identification of key habitat types. The fisheries investigations by LGL Limited staff were carried out in accordance with the MTO Fish Guide (2009), MTO Pilot Fisheries Protocol (2016) and MTO Environmental Reference for Highway Design (2013). The physical habitat attributes assessed included: (a) instream cover; (b) bank stability; (c) substrate characteristics; (d) stream dimensions and depths; (e) barriers; (f) stream morphology; (g) terrain characteristics; (h) stream canopy cover; (i) stream gradient; (j) aquatic vegetation; (k) ground water seepage; and (l) general comments. Visual fish sampling was conducted (at all watercourses with flow during the field surveys where possible) to confirm and augment existing fish community data obtained from secondary source review. Sampling was not conducted by LGL at the ephemeral watercourses (with no flow) within the study area. Formal electrofishing surveys were not necessary for this project due to the abundance of existing fish data that exists for the watercourses within the study area. Fish data for all major watercourses within the study limits were provided to LGL by MNRF, CVC and CH. Watercourses where data was not available from secondary source review are small contributing intermittent/ephemeral features directly connected to the well documented communities. The results of LGL's visual observations and sampling are provided in **Table 2** (under Fish Species Present column) and are discussed in **Section 5.1**.

5.0 EXISTING FISH AND FISH HABITAT CONDITIONS

Aquatic habitat for each of the individual watercourse crossings within the study area is described in detail below based on the review of secondary source information and field investigations during the summer of 2018 and the spring/summer of 2019. A summary of this information, which includes habitat and fish community information, can be found in **Table 2**. The thermal regime, fish community, in-water timing window, important/exceptional habitat and species at risk information for each watercourse in **Table 2** is based on data received from MNRF (and LGL's field investigation where no data was available from MNRF). Data collection followed the *PILOT MTO/DFO/OMNR Protocol* (2016), specifically Section 4 of the *Environmental Guide for Fish and Fish Habitat* (MTO 2009). Photos of the watercourse crossings and Watercourse Field Record Forms and Habitat Mapping are included in **Appendices B** and **C**, respectively.

5.1 General Description of Watercourses within the Study Area

Watercourses within the study area flow in a generally northwest to southeast direction, and ultimately drain into Lake Ontario. There is a total of 59 watercourse crossings occurring within the study area: two within the Rambo Creek watershed, one in Roseland Creek, two in Tuck Creek, three in Shoreacres Creek, two in Appleby Creek, four in Sheldon Creek, two in the Bronte Creek watershed, ten in Fourteen Mile Creek, one in McCraney Creek, one in Taplow Creek, fifteen within the Sixteen Mile Creek watershed, six within Joshua's Creek and eleven within the Credit River watershed. The locations of these watercourses can be found in **Figure 2.** The watercourse labels are numbered in ascending order from west to east.

A total of 31 new structure/culvert watercourse crossings along the Transitway facility are proposed based on the Transitway design. All of the proposed structure/culvert crossings support fish or fish habitat either directly or indirectly (see **Table 2** and **Figure 2**). All the crossings within the study area, including those affected by the Transitway footprint, are summarized in **Table 2/Template 10.2**, and are described in detail below.

5.1.1 Rambo Creek Watershed

Rambo Creek, and one tributary occur within the 407 Transitway study area (Sites 1-2 on **Figure 2**). There is a general lack of secondary source information available for these watercourses. One source however, states that much of Rambo Creek has been hardened, buried and diverted (Cook 2013).

Personal correspondence with MNRF (2017a) indicated that the Rambo Creek (Site 1) and a tributary of Rambo Creek (Site 2) are classified as warmwater and **low** sensitivity. No fish species list was available from MNRF. A species at risk screening using the DFO Aquatic Species at Risk Mapping (DFO 2017; 2019) and NHIC Make a Map (MNRF 2017; 2019) indicated no aquatic species at risk are present in these watercourses.

5.1.1.1 Site 1 Rambo Creek

Rambo Creek is a historic watercourse that no longer exists at the surface within the study area. It has been piped under the urban developments on both sides of the 407 ETR. It is not discussed further within this report as it does not constitute fish habitat.

5.1.1.2 Site 2 Tributary of Rambo Creek

This tributary of Rambo Creek flows at the surface on the upstream side of the 407 ETR only. It enters a culvert approximately 65 m downstream (east) of Cavendish Drive and does not daylight again within the study area. The channel downstream of Cavendish Drive is straight and armoured with boulders and armourstone plunge pools. The banks are comprised of vertical armourstone walls for much of its length. The channel curves at the end to enter a large concrete culvert that has a large, smooth concrete drop structure at its entrance. It also has a large steel grate to keep debris from entering what is assumed to be a storm water system downstream of 407 ETR.

Upstream of Cavendish Drive, the channel is in a more natural state with vegetated banks, coarse substrates (boulder, cobble, gravel) and a deciduous riparian forested floodplain. The Cavendish Drive culvert is a large concrete structure with steel debris grates on the upstream end. It contains coarse substrates.

MNRF originally classified this watercourse as warmwater and **low** sensitivity. Based on the results of the field investigation, and the available secondary source information, LGL agrees with the MNRF **low** sensitivity designation. This channel constitutes indirect fish habitat. No fish were observed. A local resident informed LGL that small fish used to inhabit the watercourse at this location, but that none have been observed since it was piped downstream.

5.1.2 Roseland Creek Watershed

Roseland Creek occurs within the 407 Transitway study area (Site 3 on **Figure 2**). According to the secondary source review, which included an Environmental Assessment that occurred for the Roseland Creek Rehabilitation Study from Upper Middle Road to Guelph Line (Aquafor Beech Limited 2014), Roseland Creek is highly urbanized, with many barriers to fish movement. Electrofishing sampling undertaken for this study in 2014 resulted in no fish captured between Upper Middle Road and Guelph Line. Personal correspondence with MNRF (2017a) indicated that Roseland Creek is warmwater and **low** sensitivity. No fish species list was available from MNRF.

A species at risk screening using the DFO Aquatic Species at Risk Mapping (DFO 2017) and NHIC Make a Map (MNRF 2017) indicated no aquatic species at risk are present in this watercourse.

5.1.2.1 Roseland Creek

This watercourse does not flow at the surface within most of the study area. Upstream of 407 ETR it is completely underground/piped. Downstream the watercourse daylights/emerges approximately 230 m from the edge of the 407 ETR right-of-way (ROW) into an engineered channel flowing through residential developments. This watercourse is not discussed further within this report as effects from this project on this watercourse are unlikely.

5.1.3 Tuck Creek Watershed

Two crossings of Tuck Creek occur within the 407 Transitway study area. These crossings include Tuck Creek, and one tributary (Sites 4-5 on **Figure 2**).

According to the secondary source review, which included an Environmental Assessment that occurred for the Tuck Creek Erosion Control Project (Aquafor Beech 2012), Tuck Creek supports a resident warmwater fish community, and migratory Rainbow Trout (CH 2009a). This report stated Tuck Creek is designated as a coldwater fishery by Conservation Halton.

Personal Correspondence with MNRF (2017a) indicated that Tuck Creek and the tributary are classified as warmwater and **low** sensitivity. Fish community data from the secondary source review are presented in **Table 1**.

A species at risk screening using the DFO Aquatic Species at Risk Mapping (DFO 2017) and NHIC Make a Map (MNRF 2017) indicated no aquatic species at risk are present in this watercourse.

5.1.3.1 Site 4 Tributary of Tuck Creek

This watercourse is piped throughout the study area with the exception of a 30 m long open channel located between Guelph Line and the 407 ETR ROW. This engineered channel contains a large plunge pool, a riffle section and is lined with concrete at its downstream end. It emerges from a corrugated steel pipe (CSP) and enters another CSP downstream. The watercourse does not flow at the surface for greater than 530 m downstream of this section.

MNRF originally classified this watercourse as warmwater and **low** sensitivity. Based on the results of the field investigation, and the available secondary source information, LGL agrees with the MNRF **low** sensitivity designation. It constitutes indirect fish habitat only.

5.1.3.2 Site 5 Tuck Creek

Tuck Creek is mostly piped through the study area. The creek enters the underground system approximately 85 m upstream of the 407 ETR ROW and emerges approximately 275 m downstream of the ROW (total piped length approximately 505 m).

MNRF originally classified this watercourse as warmwater and **low** sensitivity. Based on the results of the field investigation, and the available secondary source information, LGL agrees with the MNRF **low** sensitivity designation. However, because this watercourse is piped for such a long section under residential areas, it is unlikely that a crossing structure will be needed for the Transitway. Therefore, this watercourse is not discussed further within this report.

5.1.4 Shoreacres Creek Watershed

Three tributaries of Shoreacres Creek occur within the 407 Transitway study area (Sites 6-8 on **Figure 2**).

According to the secondary source review, which included an Environmental Assessment that occurred for the Shoreacres Creek Erosion Control Project (Cole Engineering 2015), Shoreacres Creek supports a warmwater forage fish community. Habitat conditions were noted to be degraded with a low productive capacity. Fish community data from the secondary source review is presented in **Table 1**.

Personal correspondence with MNRF (2017a) indicated that all three tributaries of Shoreacres Creek are classified as warmwater and **low** sensitivity. No fish species list was available from MNRF.

A species at risk screening using the DFO Aquatic Species at Risk Mapping (DFO 2017) and NHIC Make a Map (MNRF 2017) indicated no aquatic species at risk are present in this watercourse.

5.1.4.1 Site 6 Tributary of Shoreacres Creek

This watercourse was likely realigned in the past to travel between agricultural fields within a narrow strip of deciduous trees. During the spring visit, the watercourse was flowing with clear water, but was dry during the summer site visit with some standing water. There is an access lane that crosses the channel upstream of 407 ETR. Flows were restricted here as the CSP under the laneway was small. Downstream of the laneway the channel is straight, rocky and well-vegetated with both riparian and instream herbaceous vegetation. The rocks in this section are large and angular. Approximately 7 m upstream of the 407 ETR crossing, the channel drops over an approximately 2 m high gabion basket wall to a riffle below. The gabion forms a barrier to fish passage. The CSP was embedded with gravel and cobble substrates. The channel is incised near the laneway crossing, but is wider and shallower upstream in the area between the agricultural fields. Morphology was comprised mainly of runs with pools and riffles comprising the remainder. Wetted widths vary from 0.5 m to 1.5 m and depths from 10 cm to 30 cm. Bankfull widths range from 2.5 m to 5.0 m and bankfull depths from 50 cm to 100 cm. Substrates are mainly coarse and are comprised of gravel, cobble, boulder, sand and silt.

MNRF originally classified this watercourse as warmwater and **low** sensitivity. Based on the results of the field investigation, and the available secondary source information, LGL agrees with the MNRF **low** sensitivity designation. This watercourse constitutes indirect fish habitat from the gabion baskets upstream. Fish (cyprinids) were observed in the pool at the upstream end of the 407 ETR culvert. Therefore, from the gabion basket downstream, this watercourse becomes direct fish habitat.

5.1.4.2 Site 7 Tributary of Shoreacres Creek

This tributary of Shoreacres Creek is very similar to the watercourse at Site 6: it flows between agricultural fields, drops approximately 2 m upstream of the 407 ETR culvert and contains direct fish habitat. The drop at Site 7 is a rocky ramp comprised of angular stones instead of gabion baskets. As such, it does not comprise a permanent barrier to fish passage as a cyprinid was observed in the channel upstream of it during the spring site visit. Cyprinids were also observed at the upstream end of the culvert both during the spring and summer visits. Like Site 6, water flows intermittently, but a refuge pool exists at the upstream end of the 407 ETR culvert (embedded corrugated steel pipe arch - CSPA). Upstream of the rocky ramp, the channel meanders through deciduous trees where there is a lot of bank undercutting, but no evidence of erosion. Further upstream the channel splits where it flows through a meadow marsh between the trees and the agricultural field. Some of the flow goes into the drainage ditch to the west/south of the 407 ETR culvert and some spreads out within the marsh vegetation. A main low flow channel continues upstream, however. Morphology is comprised mainly of runs (65%) with riffles (25%) and pools (10%) making up the remainder. Substrates are generally coarse (boulder, cobble, gravel, sand) at the downstream end near the 407 ETR and finer in the marsh habitat upstream (silt). Channel width ranges from 0.4 m to 1.5 m and depths from 5 cm to 30 cm. Bankfull width is estimated at 2.0 m and bankfull depth at 35 cm to 100 cm.

MNRF originally classified this watercourse as warmwater and **low** sensitivity. Based on the results of the field investigation, and the available secondary source information, LGL agrees with the MNRF **low** sensitivity designation. This watercourse constitutes direct fish habitat. Fish (cyprinids) were observed in the pool at the upstream end of the 407 ETR culvert during both the spring and summer site visits. Unlike the gabion baskets at Site 6, the rocky ramp at this site does not constitute an absolute barrier to fish passage as a fish was observed upstream of it. As such, it is likely only a partial barrier that is potentially navigable by fish during periods of high flows.

5.1.4.3 Site 8 Tributary of Shoreacres Creek

The watercourse at Site 8 crosses the 407 ETR through twin CSPAs, the northern/eastern of which conveys the majority of the flows with the other culvert perched approximately 30 cm higher. Flows from upstream come from two separate channels, the smaller of which is located to the north/east and the larger of which is located to the south/west. Both channels are defined, although the smaller one is less so. Both are located in treed areas between agricultural fields and both were flowing during the spring site visit and were dry during the summer visit. Thus, flows are intermittent. The smaller channel meanders through a small deciduous forest and originates in a large wet area at the east end of a plowed field. It travels under the ROW fence and enters the 407 ETR roadside ditch from where it flows to the upstream end of the culvert. The larger, more defined channel travels directly to the culvert. As it approaches the crossing, there is a relatively steep drop in elevation down a slope lined with large angular stone (similar to Site 7 and likely a barrier to fish passage). The channel through deciduous trees is slightly incised with a morphology mainly of runs with some riffles. Large woody debris is common. Substrates are comprised of gravel, silt, cobble and boulder.

MNRF originally classified this watercourse as warmwater and **low** sensitivity. Based on the results of the field investigation, and the available secondary source information, LGL agrees with the MNRF **low** sensitivity designation. This watercourse likely constitutes indirect fish habitat as no fish were observed during field investigations, as they were at Sites 6 and 7.

5.1.5 Appleby Creek Watershed

Two crossings of watercourses within the Appleby Creek watershed occur within the 407 Transitway study area: Appleby Creek and one tributary (Sites 9-10 on **Figure 2**). According to the secondary source review, which included a review of the Urban Creeks and Supplemental Monitoring Report (CH 2009a), Appleby Creek is reported to be in "good condition" according to the Index of Biotic Integrity (IBI). The fish community reported from this source is reflective of a tolerant warmwater/coolwater fish community.

Personal correspondence with MNRF (2017a) indicated that the two crossings in the Appleby Creek watershed are warmwater and **low** sensitivity. The fish species list from the secondary source review and MNRF is presented in **Table 1.**

A species at risk screening using the DFO Aquatic Species at Risk Mapping (DFO 2017) and NHIC Make a Map (MNRF 2017) indicated no aquatic species at risk are present in this watercourse.

5.1.5.1 Site 9 Appleby Creek

The watercourse at this site is located in a marshy area between two agricultural fields and parallels a farm access laneway. It travels in a generally east to west direction toward the corner of the field where it turns near the base of the Walker's Line road slope prior to entering the twin CSPA culverts that convey flows under the 407 ETR. The watercourse was flowing during the spring site visit but was dry during the summer visit. Thus, it is an intermittent watercourse. The floodplain is generally well-vegetated with grasses and was very saturated during the spring visit. Upstream the channel meanders through a meadow marsh. The majority of the flows are contained within the channel (spring conditions) but there

are several places where water leaves the channel and spreads out into the adjacent fields. The channel is deeply incised and consists mostly of runs with a few pools. Water was clear, but no fish were observed. The laneway culvert is buried and undersized, though it still conveys flows. However, much overtopping occurs during high flow periods. The channel runs through dense trees/shrubs before entering the culvert. Rip rap was the main substrate in this section upstream of the crossing with a concrete pad located within the first meter upstream of the culvert. During the spring visit water was flowing through both culverts, although the western (higher) culvert received flows mainly from a small marsh located along the fence line of the ROW. Some overflow from the main channel also entered this culvert. Neither culvert is embedded and flows through them were very shallow during the spring visit which would make fish passage difficult.

MNRF originally classified this watercourse as warmwater and **low** sensitivity. Based on the results of the field investigations, and the available secondary source information, LGL agrees with the MNRF **low** sensitivity designation. It constitutes indirect fish habitat only.

5.1.5.2 Site 10 Tributary of Appleby Creek

Due to property access issues, this site was only visited once during the summer season. The watercourses that crosses through the lined (with black smooth plastic) CSP culvert conveys flows from two small channels/swales through/between agricultural fields combined with ditch flows from the 407 ETR roadside ditch. The channel and the culvert were dry during the summer site visit. As a result, this watercourse should be considered intermittent. Due to thick vegetation growth, a defined channel could not be discerned from the ROW. Both channels, however, convey flows to the roadside ditch through the ROW fencing and there was no debris evident on the fence indicating that large flows are not common. Both channels were lined with grasses with a few sparse cattails in places. The ditch vegetation was similar. It is likely that this watercourse constitutes indirect fish habitat only.

MNRF originally classified this watercourse as warmwater and **low** sensitivity. Based on the results of the field investigation, and the available secondary source information, LGL agrees with the MNRF **low** sensitivity designation.

5.1.6 Sheldon Creek Watershed

Four tributaries of Sheldon Creek occur within the 407 Transitway study area (Sites 11-14 on **Figure 2**). According to the secondary source review, which included a review of the Urban Creeks and Supplemental Monitoring Report (CH 2009a), the thermal regime of Sheldon Creek is classified as warmwater, based on temperature logger data. The fish community reported; however, is reflective of a wamwater/coolwater fish community. Brown Trout (*Salmo trutta*) were also recorded in this watershed; however, the annual sampling location is in close proximity to Lake Ontario. It is assumed that due to the high summer temperatures recorded by the temperature logger data, Brown Trout could not be supported in this watershed.

No information on Sheldon Creek was provided from MNRF (2017a). The fish species list from the secondary source review is presented in **Table 1.**

A species at risk screening using the DFO Aquatic Species at Risk Mapping (DFO 2017) and NHIC Make a Map (MNRF 2017) indicated no aquatic species at risk are present in this watercourse.

5.1.6.1 Site 11 Tributary of Sheldon Creek

The watercourse at Site 11 is a swale through an agricultural field. During the spring site visit flow was present, although very little. The swale upstream of the ROW fence was plowed through and did not contain any habitat features or riparian vegetation. Water accumulates at the edge of the field and then flows into a steeply-sloped, grassy swale toward the culvert. There is no defined channel at this location.

Most of the flow entering the lined (with black smooth plastic pipe) CSP culvert was from the roadside ditch to the north/east. This conveys water from Site 12 (discussed below). The flow through the culvert was very narrow and shallow with no substrates. The channel and ditch were dry during the summer site visit.

MNRF did not assign a classification or a sensitivity category for this watercourse. Based on the results of the field investigation, and the available secondary source information, LGL proposes that this feature be classified as warmwater and **low** sensitivity. It flows ephemerally and constitutes indirect fish habitat only.

5.1.6.2 Site 12 Tributary of Sheldon Creek

The watercourse at Site 12 travels along the edge of deciduous forest that gradually narrows towards the 407 ETR and divides two agricultural fields. The watercourse travels under the ROW fence and enters the ditch from where it flows to the crossing at Site 11. There is no crossing of the 407 ETR at this location. The watercourse was flowing during the spring site visit and dry during the summer visit. The channel is very poorly defined upstream and gradually becomes defined as the gradient increases closer to the ROW fence line where it receives additional swale flow from the adjacent agricultural field. Downstream of the fence, a rip rap slope conveys flows into the roadside ditch.

MNRF did not assign a classification or a sensitivity category for this watercourse. Based on the results of the field investigation, and the available secondary source information, LGL proposes that this feature be classified as warmwater and **low** sensitivity. It flows ephemerally and constitutes indirect fish habitat only.

5.1.6.3 Site 13 Tributary of Sheldon Creek

The watercourse at this site consists of an undefined drainage swale located between two agricultural fields. There was a small amount of flow during the spring site visit and no flow during the summer visit. Upstream, water flows through an undefined channel at the edge of a deciduous wooded strip separating the two fields. Water then enters a large area of *Phragmites* from which it flows diffusely through grasses to a lined (with smooth black plastic), small diameter CSP culvert that conveys flows across the 407 ETR.

MNRF did not assign a classification or a sensitivity category for this watercourse. Based on the results of the field investigation, and the available secondary source information, LGL proposes that this feature be classified as warmwater and **low** sensitivity. It flows ephemerally and constitutes indirect fish habitat only.

5.1.6.4 Site 14 Tributary of Sheldon Creek

The watercourse at this site consists of an undefined swale conveying surface drainage through grasses between two agricultural fields. Very little flow was evident during the spring site visit and no flow during the summer visit. Water is conveyed under the 407 ETR through a smooth black plastic pipe culvert.

MNRF did not assign a classification or a sensitivity category for this watercourse. Based on the results of the field investigation, and the available secondary source information, LGL proposes that this feature be classified as warmwater and **low** sensitivity. It flows ephemerally and constitutes indirect fish habitat only.

5.1.7 Bronte Creek Watershed

One crossing of Bronte Creek (Lower Main Branch) occurs within the 407 Transitway study area (Site 15 on **Figure 2**). According to the secondary source review, which included a review of the Bronte Creek Monitoring Report (CH 2012), Bronte Creek in the vicinity of the study area is a coolwater watercourse

with a high diversity of fish species. Bronte Creek supports seasonal salmonid runs, and is a candidate watershed for the second phase of the Atlantic Salmon (*Salmo salar*) reintroduction program. The Bronte Creek monitoring report indicated that Silver Shiner, a species at risk, are present (CH 2012).

The Bronte Creek monitoring report also indicated this watercourse historically supported populations of Redside Dace in 17 locations throughout the watershed. It is reported that Redside Dace were only captured at 3 locations since the late 1990s (CH 2009b), and these locations are upstream of the 407 Transitway study area. Redside Dace is listed as "Endangered" provincially under the *Endangered Species Act* (ESA) and listed as "Endangered" federally under the *Species at Risk Act* (SARA).

In addition, a small tributary of Bronte Creek (Site 15a on **Figure 2**) flows through the agricultural field to the south/west of the main branch. It does not support direct fish habitat although it is located upstream of species at risk habitat (see below).

A species at risk screening using the NHIC Make a Map (MNRF 2017; 2019) revealed Silver Shiner and American Eel as occurring within this watercourse. DFO Aquatic Species at Risk Mapping (DFO 2019) indicates that Silver Shiner is present, but that no critical habitat for this species occurs within the study area.

Personal correspondence with MNRF (2017a) indicated that Silver Shiner and American Eel are present within this watercourse. Silver Shiner is listed as "Threatened" provincially and federally under the ESA SARA, respectively. American Eel is listed as "Endangered" provincially under the ESA, but is not listed federally. This watercourse has been given a **high** sensitivity designation by MNRF and classified as warmwater.

The fish species list from the secondary source review and MNRF is presented in **Table 1**.

5.1.7.1 Site 15 Bronte Creek

Bronte Creek is a large river that flows within a wide valley system through the study area. Valley slopes and the floodplain are well-vegetated with mature deciduous forests and wetlands. Vertical, or near-vertical, slopes are present at the outside bends where the wetted channel abuts against them. Two relatively large islands/bars lie within the channel upstream of the 407 ETR crossing. Morphology is a mix of runs and riffles. Substrates are mainly coarse and comprised of cobble, boulder, gravel, exposed shale bedrock and silt. Some emergent vegetation is present along the banks of the river. No submerged vegetation was observed during the site visits, but much algae growth was present. Instream cover is provided by instream and overhanging vegetation, woody debris, boulder and cobble. Widths vary with the areas around island/bar locations generally wider than the sharper bends that abut the vertical slopes. The widest point in the study area was approximately 27 m in a run-riffle-run reach located between the two islands/bars. The narrowest area was approximately 16 m where the run habitat abuts the vertical bank upstream of the 407 ETR bridge. Depths ranged from 10 cm in riffles to 30 cm in runs. Bronte Creek crosses under the 407 ETR through two three-span bridges situated high above the watercourse.

Downstream of the crossing riparian habitats are similar to upstream. Channel morphology is also similar, although there are no islands/bars. Runs and riffles dominate here and channel widths range from 10 m to 22 m. Water depths ranged from 10 cm in riffles to 40 cm in runs. There is a sharp bend in the river approximately 50 m downstream of the crossing where the channel abuts a large and relatively long vertical slope.

MNRF classified this watercourse as warmwater with **high** sensitivity. Based on the results of the field investigation, and the available secondary source information, LGL agrees with the **high** sensitivity designation as Silver Shiner, American Eel and migratory salmonids have been reported or are known to

occur. This watercourse flows permanently and supports direct fish habitat. Many fish were observed during LGL's field investigations, including migratory Chinook Salmon, Fathead Minnow, Creek Chub, Common Shiner, White Sucker, *Lepomis* sp. and Johnny Darter.

5.1.7.2 Site 15a Tributary of Bronte Creek

This watercourse was not mapped on historic MNRF mapping. It consists of a deeply incised channel that meanders through an active agricultural field to the west of Bronte Creek. The 407 ETR ROW is wide in this location and a small section of deciduous forest exists downstream (south) of the fence line through which this feature flows. A small amount of flow was present during the spring visit but the channel was dry in the summer. The gradient is large enough that the channel has cut a deep swathe through both the upstream field and the downstream forest. Slopes are near vertical along much of its length and the banks are heavily eroded throughout. Although it is likely that this feature can be considered to have ephemeral flows, they are large and powerful enough to cause the erosion that is evident at the site. Substrates consist of boulders cobbles and gravel with some silt and exposed clay. The feature crosses under the 407 ETR through a lined (with smooth black plastic pipe) CSP that is on a skew. Water then enters the end of the roadside ditch that runs along the south side of the highway and is heavily lined with large, angular stone, before being conveyed over the high vertical bank that forms the bank of Bronte Creek downstream of the bridge crossing (see section above). At this location, flows have eroded the vertical slope such that it is set back from the Bronte Creek water's edge.

MNRF did not assign a classification or a sensitivity category for this watercourse. Based on the results of the field investigation, and its proximity to Bronte Creek, LGL proposes that this feature be classified as warmwater and **low-moderate** sensitivity. It flows ephemerally and constitutes indirect fish habitat only, but is located upstream of species at risk habitat.

5.1.8 Fourteen Mile Creek Watershed

Ten crossings of watercourses within the Fourteen Mile Creek watershed occur within the 407 Transitway study area: nine tributaries and the main branch (Sites 16-25 on **Figure 2**). A secondary source review was conducted, which included a review of the Urban Creeks and Supplemental Monitoring Report (CH 2009a). According to the CH (2009a), Fourteen Mile Creek has diverse habitat and supports a variety of species including Redside Dace. Rainbow Trout (*Oncorhynchus mykiss*) and Brown Trout have also been recorded in this watershed (likely in close proximity to Lake Ontario). However, temperature data indicates this watercourse supports a warmwater thermal regime.

A review of the North Oakville Creeks Subwatershed Study (TSH *et al* 2006) indicates that the Transitway corridor intersects the headwater regions of Fourteen Mile Creek. This report classified the habitat quality of each of these tributaries in the vicinity of Highway 407. Sites 16, 17, 18 and 21 were reported to provide "marginal habitat". Sites 20, 22 and 24 were reported to provide "important habitat". Sites 19, 23 and 25 were reported as "not fish habitat".

A species at risk screening using the NHIC Make a Map (MNRF 2017) and DFO Aquatic Species at Risk Mapping (DFO 2017) indicated Redside Dace are present in Fourteen Mile Creek.

Personal correspondence with MNRF indicated that Sites 16-23 are upstream of Redside Dace occupied habitat and Sites 24-25 are upstream of Redside Dace recovery habitat, indicating that the Fourteen Mile Creek watercourses within the Transitway study area may not be within regulated habitat. Sites 16-18, 20, 22, and 23-25 are classified by MNRF as coldwater and **moderate** sensitivity. Sites 19, and 21 are classified by MNRF as an unknown thermal regime and **moderate** sensitivity.

The fish species list from the secondary source review and MNRF is presented in **Table 1.**

5.1.8.1 Site 16 Tributary of Fourteen Mile Creek

The feature at this crossing consists of a swale densely vegetated with grasses, *Phragmites* and cattails. There is no defined channel and no flow was observed during both the spring and summer site visits, although there were wet areas during spring and evidence of recent flows. The feature crosses the 407 ETR through twin CSP culverts that both have corroded bottoms. Flow is directed through the west culvert as the eastern culvert is blocked with sandbags.

MNRF classified this watercourse as coldwater with **moderate** sensitivity because of the presence of Redside Dace downstream. MNRF also stated that the in-water work timing window is flexible and dependent upon the type of work being proposed. Based on the results of the field investigation, and the available secondary source information, LGL agrees with the **moderate** sensitivity and the flexibility regarding the in-water work timing window. This watercourse flows ephemerally and constitutes indirect fish habitat only.

5.1.8.2 Site 17 Tributary of Fourteen Mile Creek

The feature at Site 17 consists of an undefined swale that originates upstream (west) of Tremaine Road that passes through a small diameter CSP culvert and enters the ditch at the bottom of the Tremaine Road slope. From there, water is conveyed southward through this *Phragmites*-lined ditch and into a CSP culvert that passes under the 407 ETR. There is a high gradient within the CSP culvert, the culvert is not countersunk and there is evidence of corrosion along its bottom. A small amount of flow was observed during the spring site visit and the feature was dry during the summer.

MNRF classified this watercourse as coldwater with **moderate** sensitivity because of the presence of Redside Dace downstream. MNRF also stated that the in-water work timing window is flexible and dependent upon the type of work being proposed. Based on the results of the field investigation, and the available secondary source information, LGL agrees with the **moderate** sensitivity and the flexibility regarding the in-water work timing window. This watercourse flows ephemerally and constitutes indirect fish habitat only.

5.1.8.3 Site 18 Tributary of Fourteen Mile Creek

The feature at Site 18 consists of a narrow, grass-lined swale between agricultural fields. Just upstream of the 407 ETR ROW it flows along the edge of a small meadow marsh before passing under the fence and into three lined (with smooth black plastic) CSP culverts for conveyance under the highway. The culverts are longer than normal as they pass under a truck inspection station and the highway. Flows were observed during the spring visit and the feature was dry in the summer. Active agriculture (plowing, planting, etc.) is within 1 m of the feature in many locations upstream and evidence of vehicle fording is present at the upstream end of the meadow marsh. There is a small drop in the elevation of the channel immediately downstream of the ROW fence and the water spreads out evenly across rip rap into all three culverts when flowing.

MNRF classified this watercourse as coldwater with **moderate** sensitivity because of the presence of Redside Dace downstream. MNRF also stated that the in-water work timing window is flexible and dependent upon the type of work being proposed. Based on the results of the field investigation, and the available secondary source information, LGL agrees with the **moderate** sensitivity and the flexibility regarding the in-water work timing window. This watercourse flows ephemerally and constitutes indirect fish habitat only.

5.1.8.4 Site 19 Tributary of Fourteen Mile Creek

This feature consists of an undefined swale located between two agricultural fields. The swale is grass-lined and contained very little flow during the spring site visit and was dry during the summer visit.

Flows are conveyed across the 407 ETR through a lined (with smooth black plastic) CSP culvert. Immediately downstream of the culvert is a large patch of *Phragmites*.

MNRF classified this watercourse as coldwater with **moderate** sensitivity because of the presence of Redside Dace downstream. MNRF also stated that the in-water work timing window is flexible and dependent upon the type of work being proposed. Based on the results of the field investigation, and the available secondary source information, LGL agrees with the **moderate** sensitivity and the flexibility regarding the in-water work timing window. This watercourse flows ephemerally and constitutes indirect fish habitat only.

5.1.8.5 Site 20 Tributary of Fourteen Mile Creek

This feature consists of a swale with a poorly defined located between two agricultural fields. The swale is grass-lined and contained flow during the spring site visit and was dry during the summer visit. Flows are conveyed across the 407 ETR through a lined (with smooth black plastic) CSP culvert. Immediately downstream of the culvert is a large patch of *Phragmites*. A permanent pool of water exists in the small patch of trees just downstream of the ROW. It contained water during both visits and was vegetated with *Sphagnum* moss. No fish were observed during the site visits and the farmer, who has been on this land for 65 years, has never observed fish within this feature.

MNRF classified this watercourse as coldwater with **moderate** sensitivity because of the presence of Redside Dace downstream. MNRF also stated that the in-water work timing window is flexible and dependent upon the type of work being proposed. Based on the results of the field investigation, and the available secondary source information, LGL agrees with the **moderate** sensitivity and the flexibility regarding the in-water work timing window. This watercourse flows ephemerally and constitutes indirect fish habitat only

5.1.8.6 Site 21 Tributary of Fourteen Mile Creek

This feature consists of an undefined swale located between two agricultural fields. The swale is grass- and cattail-lined and contained flow during the spring site visit and was dry during the summer visit. Flows are conveyed across the 407 ETR through a lined (with smooth black plastic) CSP culvert. Immediately downstream of the culvert is a small patch of *Phragmites*. A wider patch of cattails and grasses exists further downstream, downstream of which is a plowed-through section that contained tire tracks of vehicles that had traversed the swale. Further downstream, the gradient increases and a defined channel begins to form prior to the drainage feature entering a deciduous forest.

MNRF classified this watercourse as coldwater with **moderate** sensitivity because of the presence of Redside Dace downstream. MNRF also stated that the in-water work timing window is flexible and dependent upon the type of work being proposed. Based on the results of the field investigation, and the available secondary source information, LGL agrees with the **moderate** sensitivity and the flexibility regarding the in-water work timing window. This watercourse flows ephemerally and constitutes indirect fish habitat only.

5.1.8.7 Site 22 Fourteen Mile Creek

Fourteen Mile Creek at the 407 ETR crossing is a small, intermittent and well-defined watercourse that passes under the highway through three lined (with smooth black plastic) CSP culverts. The channel is poorly defined immediately downstream of the culverts as it is wide (water is conveyed through all three culverts) and contains dense marsh vegetation (cattails and grasses). A defined channel begins just downstream of this area (just downstream of the ROW fence) and meanders through a shallow valley vegetated mainly with grasses. The channel was flowing during the spring visit and was not during the summer. However, there was standing water throughout the watercourse during the summer site visit. Morphology is mostly riffles and runs with few pools. The channel is narrow with wetted widths ranging

from 0.4 m to 1.0 m. Depths ranged from 10 cm to 50 cm. Bankfull widths ranged from 1.0 m to 1.2 m and bankfull depths from 30 cm to 80 cm. Substrates are comprised of silt, cobble, boulder and gravel. The grassy banks were eroding at outside bends and in some locations had slumped into the channel. No fish were observed during the site visits.

MNRF classified this watercourse as coldwater with **moderate** sensitivity because of the presence of Redside Dace downstream. MNRF also stated that the in-water work timing window is flexible and dependent upon the type of work being proposed. Based on the results of the field investigation, and the available secondary source information, LGL agrees with the **moderate** sensitivity and the flexibility regarding the in-water work timing window, as this watercourse flows intermittently and constitutes indirect fish habitat only.

5.1.8.8 Site 23 Tributary of Fourteen Mile Creek

This feature consists of a swale located within an agricultural field. The swale is lined with *Phragmites* at the upstream end which transitions to cattails, then grasses and finally becomes plowed-through. This feature contained very little flow during the spring site visit and was dry during the summer visit. Flows are conveyed across the 407 ETR through twin-lined (with smooth black plastic) CSP culverts.

MNRF classified this watercourse as coldwater with **moderate** sensitivity because of the presence of Redside Dace downstream. MNRF also stated that the in-water work timing window is flexible and dependent upon the type of work being proposed. Based on the results of the field investigation, and the available secondary source information, LGL agrees with the **moderate** sensitivity and the flexibility regarding the in-water work timing window. This watercourse flows ephemerally and constitutes indirect fish habitat only.

5.1.8.9 Site 24 Tributary of Fourteen Mile Creek

The watercourse at Site 24 is permanently flowing with a well-defined channel that is conveyed under the 407 ETR through four lined (with smooth black plastic) CSP culverts. Water was flowing during both the spring and summer site visits and fish were observed. Flow is conveyed through all four culverts and, as a result, the channel is very wide at this location. At the downstream end of the culverts, the channel is lined with rip rap and there is dense growth of cattails and some *Phragmites*. The channel quickly narrows and flows in a straight line for 40 m to 50 m. In this section wetted width is fairly wide (2 m) and shallow (10 cm) and is lined with cattails. The banks are grassy and there is an area of rip rap that appears to be used as a ford for vehicles. From the end of this section, the channel narrows further (1 m wide, 10 cm deep) as it enters an area with more natural vegetation (cattails and dense grasses) which extends for another 30 m. There it enters a cattail marsh with a large open water pond. The pond is approximately 38 m long and 18 m wide and is ringed with cattails. From the pond, the channel reforms and meanders away from the 407 ETR in a relatively narrow (1.5 m wide), incised channel approximately 20 cm deep. With the exception of the pond, almost the entire channel is comprised of run habitat with very few riffles. Instream cover is mainly provided by emergent vegetation. Recent restoration (plantings and fencing) is evident along the channel downstream of the pond and around the pond itself.

MNRF classified this watercourse as coldwater with **moderate** sensitivity because of the presence of Redside Dace downstream. MNRF also stated that the in-water work timing window is flexible and dependent upon the type of work being proposed. Based on the results of the field investigation, and the available secondary source information, LGL agrees with the **moderate** sensitivity and the flexibility regarding the in-water work timing window, as this watercourse is located far upstream of SAR habitat. This watercourse flows permanently and constitutes direct fish habitat.

5.1.8.10 Site 25 Tributary of Fourteen Mile Creek

This feature consists of an undefined swale located within an agricultural field. The swale is completely plowed through and contained very little flow during the spring site visit and was dry during the summer visit. In addition, there is no crossing of the 407 ETR at this location.

MNRF classified this watercourse as coldwater with **moderate** sensitivity because of the presence of Redside Dace downstream. MNRF also stated that the in-water work timing window is flexible and dependent upon the type of work being proposed. Based on the results of the field investigation, and the available secondary source information, LGL agrees with the **moderate** sensitivity and the flexibility regarding the in-water work timing window. This drainage feature flows ephemerally and constitutes indirect fish habitat only.

5.1.9 McCraney Creek Watershed

One crossing of a tributary of McCraney Creek occurs within the 407 Transitway study area (Site 26 on **Figure 2**). According to the secondary source review, which included a review of the Urban Creeks and Supplemental Monitoring Report (CH 2009a), the thermal regime of McCraney Creek is classified as warmwater, based on temperature logger data. The fish community reported; however, is reflective of a wamwater/coolwater fish community and includes Rainbow Trout (likely in close proximity to Lake Ontario).

A review of the North Oakville Creeks Subwatershed Study (TSH *et al* 2006) indicates that this tributary is reported as "not fish habitat".

A species at risk screening using the NHIC Make a Map (MNRF 2017) and DFO Aquatic Species at Risk Mapping (DFO 2017) indicated no aquatic species at risk are present in this watercourse.

Personal correspondence with MNRF (2017a) indicated that this tributary of McCraney Creek within the study area is warmwater and **low** sensitivity.

The fish species list from the secondary source review and MNRF is presented in **Table 1.**

5.1.9.1 Site 26 Tributary of McCraney Creek

This feature consists of a poorly-defined swale located within an agricultural field. The swale is incised and lined with cattails and grasses intermittently. There are eroding banks along most of the swale and plowing occurs to the swale's edge for much of the reach investigated. The drainage feature contained very little flow during the spring site visit and was dry during the summer visit, with some pockets of standing water. Flows are conveyed across the 407 ETR through a lined (with smooth black plastic) CSP culvert. Immediately downstream of the culvert the channel consists of the roadside ditch at the base of the 407 ETR road slope. This area, and the area immediately downstream of the ROW fence is lined with *Phragmites*.

MNRF classified this watercourse as warmwater with **low** sensitivity. Based on the results of the field investigation, and the available secondary source information, LGL agrees with the **low** sensitivity designation. This watercourse flows ephemerally and constitutes indirect fish habitat only.

5.1.10 Taplow Creek Watershed

One crossing of Taplow Creek occurs within the 407 Transitway study area (Site 27 on **Figure 2**). This watercourse was not included in the initial request for data from MNRF since the mapping used for secondary source screening did not show a watercourse extending within the study area. A review of the

North Oakville Creeks Subwatershed Study (TSH *et al* 2006) indicated this watercourse extends up to the 407 Transitway study area. This report, however, also indicated Taplow Creek within the study area reach is reported as an agricultural swale, and "not fish habitat". No other secondary source information for this watercourse was available.

A species at risk screening using the DFO Aquatic Species at Risk Mapping (DFO 2017) and NHIC Make a Map (MNRF 2017) indicated that no aquatic species at risk are present in this watercourse.

5.1.10.1 Site 27 Tributary of Taplow Creek

No channel or swale was located in the vicinity of this site. During the spring visit, a small area of wet ground was observed south/east of the woodlot where water may flow away from the ROW in a hedgerow between two agricultural fields. In addition, there is no crossing of the 407 ETR for this feature. This features does not constitute fish habitat and is not discussed further in this report.

5.1.11 Sixteen Mile Creek Watershed

Fifteen crossings of watercourses within the Sixteen Mile Creek watershed occur within the 407 Transitway study area: two tributaries of the Sixteen Mile Creek main branch, the main branch of Sixteen Mile Creek, and 11 tributaries of East Sixteen Mile Creek. (Sites 28-35 & 42-48 on **Figure 2**). A secondary source review was conducted, which included a review of the Sixteen Mile Creek, Grindstone Creek and Supplemental Monitoring Report (CH 2011). This report states that fish species within this watershed range from warmwater forage species to coldwater sportfish, and reports the species diversity within this watershed is high.

A species at risk screening using the NHIC Make a Map (MNRF 2017) and DFO Aquatic Species at Risk Mapping (DFO 2017) indicated no aquatic species at risk are present in the watercourses within the study area. Personal correspondence with MNRF (2017a), however, revealed that Silver Shiner are present in Sixteen Mile Creek within the study area.

Personal correspondence with MNRF (2017a) reported that Site 28 is classified as coolwater and **moderate** sensitivity (upstream of Silver Shiner habitat), Site 29 is classified as coolwater and **high** sensitivity (Silver Shiner habitat), Sites 30-35 are classified as coolwater and **low-moderate** sensitivity (upstream of Silver Shiner habitat), Sites 42-48 are classified as warmwater and **low-moderate** sensitivity (upstream of Silver Shiner habitat). Fish community data from the secondary source review and MNRF is presented in **Table 2**.

5.1.11.1 Site 28 Tributary of Sixteen Mile Creek

The small watercourse at this site is conveyed under the 407 ETR through a large, lined (with smooth black plastic) CSP culvert. The downstream end of the culvert discharges onto a concrete pad and there are metal pillars in this location, likely to prevent the use of the culvert by ATVs or other motorized vehicles. The culvert is not embedded and it contains no substrates. There was a small amount of flow through the culvert during the spring visit and it was not flowing during the summer site visit. There is a large area of *Phragmites* downstream of the concrete pad through which water flows diffusely. The remainder of the channel investigated is poorly defined and meanders through grassy vegetation. There is a crossing of the old Burnhamthorpe Road remnant approximately 80 m downstream of the 407 ETR culvert. Here there are three buried CSP culverts that convey flow under the old roadway. Water is pooled at the upstream side due to poor conveyance. Downstream of this area, the channel bends toward Sixteen Mile Creek and continues flowing along the edge of a grassy field.

MNRF classified this watercourse as coolwater with **moderate** sensitivity because of the presence of Silver Shiner downstream. MNRF also stated that the in-water work timing window is flexible and dependent upon the type of work being proposed. Based on the results of the field investigation, and the

available secondary source information, LGL agrees with the **moderate** sensitivity and the flexibility regarding the in-water work timing window. This drainage feature flows ephemerally and constitutes indirect fish habitat only.

5.1.11.2 Site 29 Sixteen Mile Creek

Sixteen Mile Creek is a large watercourse that meanders through a large, steeply-sloped valley. The 407 ETR passes over this watercourse via two very long, multi-span bridges. The watercourse morphology is comprised of riffles and runs in the reach investigated. Wetted widths range from 16 m to 30 m, but average 18 m. Depths are fairly shallow and range from 15 cm to 30 cm. Substrates are coarse and comprised of shale boulders, cobble and gravel with shale bedrock exposed in some areas. Eroding, vertical shale banks are abundant along the watercourse. There is very little instream vegetation which is limited to sparse emergent species growth along the channel margins with some overhanging grasses and trees. Filamentous green algae is very common and grows on the shale boulders. Instream cover is provided by boulders, cobbles, filamentous green algae and some patchy submerged vegetation. Riparian vegetation is comprised of meadow and deciduous forest.

MNRF classified this watercourse as coolwater with **high** sensitivity. Based on the results of the field investigation, and the available secondary source information, LGL agrees with the **high** sensitivity designation as Silver Shiner and migratory salmonids have been reported or are known to occur. This watercourse flows permanently and supports direct fish habitat. Many fish were observed during LGL's field investigation, including Smallmouth Bass, Blacknose Dace, Creek Chub, Common Shiner, White Sucker, Northern Hog Sucker, *Notropis* sp. and Johnny Darter.

5.1.11.3 Site 30 Tributary of Sixteen Mile Creek

The feature at Site 30 consists of a very steeply sloped, large angular stone-lined drainage channel that conveys flows from the storm water pond located on the north/east side of the 407 ETR. At the bottom of the slope, the angular stone ends and the water travels overland to the south/east parallel to Sixteen Mile Creek. There is no defined channel or swale in this location.

MNRF classified this watercourse as coolwater with **low-moderate** sensitivity. Based on the results of the field investigation, and the available secondary source information, LGL agrees with the **low-moderate** sensitivity designation as Silver Shiner and migratory salmonids have been reported or are known to occur downstream. This watercourse flows ephemerally and supports indirect fish habitat only.

5.1.11.4 Site 31 Tributary of Sixteen Mile Creek

The drainage features at Site 31 no longer exists. Road modifications along Fourth Line and the construction of a large berm and a storm water management pond have altered the overland flow in this area. As such, the upstream reaches of the Site 31 and Site 32 drainage features have been removed and replaced with roadside ditches along Fourth Line that convey flows into a storm water pond that has been constructed upslope from the Sixteen Mile Creek valley. These ditches do not constitute fish habitat and are not discussed further in this report.

5.1.11.5 Site 32 Tributary of Sixteen Mile Creek

See section above.

5.1.11.6 Site 33 Tributary of Sixteen Mile Creek

Similar to Sites 31 and 32 above, the drainage feature at Site 33 no longer exists due to the construction of the Neyagawa Boulevard exit from the 407 ETR. As such, this feature is not discussed further within this report.

5.1.11.7 Site 34 Tributary of Sixteen Mile Creek

This feature appears to begin in the forest outside of the 407 ETR ROW north/west of the 407 ETR westbound exit lane to Neyagawa Boulevard. Ditch drainage likely contributes flows to this feature. However, it does not constitute fish habitat and, therefore, is not discussed further in this report.

5.1.11.8 Site 35 Tributary of Sixteen Mile Creek

The feature at this site consists of a drainage swale/ditch that conveys overland site drainage from the topsoil facility north/west of the 407 ETR, east of Sixth Line and the agricultural fields south/east of the 407 ETR. There is a lined (with smooth black plastic) CSP that conveys flows from south/east to north/west across the 407 ETR adjacent to Sixth Line. These flows enter the ditch that travels along the ROW from the east (where the flows from the topsoil facility originate) and crosses under Sixth Line through a small culvert. From there it travels through a grassy swale that bends back into the 407 ETR ROW. From there it travels in a straight swale/ditch that is bermed on both sides from where flows are conveyed into the forest habitat further to the south.

MNRF classified this watercourse as coolwater with **low-moderate** sensitivity. Based on the results of the field investigation, and the available secondary source information, LGL agrees with the **low-moderate** sensitivity designation as Silver Shiner and migratory salmonids have been reported or are known to occur downstream. This watercourse flows ephemerally and supports indirect fish habitat only.

5.1.11.9 Site 42 Tributary of East Sixteen Mile Creek

The watercourse at Site 42 has been modified in the past into a riverine wetland with significant ponding. It crosses under the 407 ETR via a single-span bridge. This area was not examined in detail due to the severe restrictions on constructing the runningway through this inundated area. This watercourse, however, is discussed in detail in the following sections.

MNRF classified this feature at Site 42 as warmwater and with **low-moderate** sensitivity. Based on the results of the field investigations and the available secondary source information, LGL agrees with the **low-moderate** sensitivity designation as Silver Shiner have been reported or are known to occur downstream. This watercourse flows permanently and supports direct fish habitat.

5.1.11.10 Site 43 Tributary of East Sixteen Mile Creek

This section will describe the watercourse that parallels the 407 ETR from the confluence of the watercourse that enters the creek from the east from the large storm water ponds east of Ninth Line, north of Britannia Road. The next section will describe the watercourse upstream of this confluence. It should be noted that there is no 407 ETR crossing at Site 43 (at least one was not located during field investigations). However, this watercourse and the watercourse that emanates from the storm water ponds will be considered Site 43.

Approximately 265 m upstream (north) of Britannia Road, the watercourse from the storm water ponds east of Ninth Line converges with the watercourse that parallels the 407 ETR. The channel from the storm water ponds is approximately 400 m long, of which 250 m is channelized within concrete or rip rap. The downstream 150 m is in a more natural state with tight meanders and natural banks. The channelized section is approximately 1.5 m wide and its depth is approximately 50 cm. It is comprised solely of run habitat and no instream vegetation is present. The more natural section is wider (2 m to 5 m) and contains submerged vegetation and cattails along the banks and within the channel. Riparian vegetation is comprised mainly of grasses throughout both the channelized and natural areas. Fish were observed in both the upstream storm water pond and in the channel (cyprinids, Common Carp, Black Crappie). Water was turbid and flowing during both the spring and the summer site visits.

The natural channel at the end of the channelized section is very similar to the remainder of the combined channel downstream of the confluence. Most of the flow comes from the storm water ponds upstream rather than the channel that parallels the highway upstream of the confluence. This upstream channel was flowing during both site visits, however, and the water was clear. The main channel downstream of the confluence meanders significantly and contains mainly run habitat. Widths range from 4 m to 7.5 m. Cattails are prevalent throughout the reach from the confluence to south of Britannia Road: they are growing both within the channel in many locations and along the banks. Submerged vegetation was also common throughout the reach examined. A large ponded section exists upstream of the Britannia Road crossing that is approximately 40 m by 40 m. Although it contains much open water, cattail growth is significant. The channel downstream of the pond narrows slightly as it passes under the Britannia Road westbound to 407 ETR northbound ramp bridge. It then widens under the Britannia Road structure before narrowing again as it exits the bridge. The gradient increases in this reach with riffles becoming common. As a result, channel widths are narrower and range from 2 m to 4.5 m. Fewer cattails are growing in the riparian area here and there are more shrubs (mainly willows). Instream cover throughout the watercourses is provided by submerged and emergent vegetation, overhanging vegetation and some boulders. Substrates are mainly fine (silt) with some boulders and cobbles under the bridges and in the downstream riffles.

MNRF classified this feature as warmwater and with **low-moderate** sensitivity. Based on the results of the field investigations and the available secondary source information, LGL agrees with the **low-moderate** sensitivity designation as Silver Shiner have been reported or are known to occur downstream. This watercourse flows permanently and supports direct fish habitat.

5.1.11.11 Site 44 Tributary of East Sixteen Mile Creek

This next section describes the watercourse both upstream and downstream of the confluence of a tributary that conveys flows across the 407 ETR through a twin-cell concrete box culvert at Site 44. The description extends from approximately 165 m upstream of the confluence downstream to the large online ponds south of Derry Road. The watercourse in this description is the one that parallels the 407 ETR and joins the channel emanating from the storm water pond described in the previous section.

A pool exists throughout and just downstream of the twin-cell concrete box culvert at Site 44. The pool is approximately 30 cm deep and the water was clear at the times of the surveys. Very little flow was noted during the spring visit and it was not flowing during the summer site visit. Brook Stickleback were observed in the pool during the spring site visit. The pool contains floating vegetation (duckweed) and submerged vegetation. The channel narrows significantly and becomes a 1 m wide, cattail- and grass-lined swale.

Approximately 80 m downstream of the culvert, the swale is joined by another, smaller swale from the north. This swale had very little flow during the spring visit and is also lined with grasses. Upstream there is a relatively large online meadow marsh through which it flows diffusely. This feature will be described further in the next section.

Further downstream of the confluence mentioned above, the swale gradually widens. It has been straightened and likely used to run between agricultural fields along a hedgerow. These fields are overgrown now. Trees line the swale, but many have fallen. As a result, woody debris is very common. Water was flowing during the spring site visit and was approximately 20 cm deep in many locations. Instream vegetation was comprised of grasses and purple loosestrife. Substrates are fine and comprised of silt and detritus. An old farm lane crosses the channel and the buried, undersized culvert restricts flow causing a pool to form on its upstream side. Downstream of this laneway, water flows diffusely for approximately 65 m through grasses, *Phragmites* and cattails. After this section, the channel becomes more incised, narrower and deeper as there is an elevation drop for approximately 30 m before the swale

flattens again upstream of the Derry Road culvert. The channel then widens and flows through all three cells of the triple-cell concrete culvert (main flow is through middle cell). The water in the middle cell is approximately 30 cm deep throughout.

The channel downstream of Derry Road is similar to that found upstream. It is relatively narrow (1.5 m to 3 m wide) and shallow (10 cm to 15 cm deep). It is mainly comprised of run habitat through *Phragmites* and cattails. Substrates are fine (silt, detritus) and instream cover is the same as that found upstream. The watercourse was found to be flowing during both the spring and summer site visits.

Further downstream (approximately 535 m), the watercourse enters two large, online storm water ponds. The first pond is smaller (approximately 68 m by 120 m) than the second (370 m by 135 m). There is a small channel connecting the two ponds. The ponds outlet via a CSP culvert with a control valve attached to it located at the south end of the larger pond. The outlet discharges into a small pond (27 m by 24 m) and then the watercourse continues for another 1.6 km before it reaches the confluence with the larger watercourse described above in **Section 5.1.11.10**.

MNRF classified this feature as warmwater and with **low-moderate** sensitivity. Based on the results of the field investigations and the available secondary source information, LGL agrees with the **low-moderate** sensitivity designation as Silver Shiner have been reported or are known to occur downstream. This watercourse flows permanently and supports direct fish habitat.

5.1.11.12 Site 45 Tributary of East Sixteen Mile Creek

The feature at this site consists of a small channel that emanates from a concrete box culvert that crosses the 407 ETR at the south end of the interchange with Highway 401. It conveys flows from a storm water pond located between the two highways. Water then enters another storm water pond on the east side of the 407 ETR and exits into a channel at the pond's south end. The channel widens at the ROW fence at which is a large pool with dense cattail growth. The wide swale that emanates from this pool gradually narrows and the cattails become replaced by grasses. This swale travels across a meadow for approximately 190 m before traveling under a driveway through a very small black plastic culvert. From there it travels another 420 m to a railroad crossing. Once crossing under the railroad tracks, it parallels them for approximately 50 m before turning 90 degrees and traversing 330 m where it enters the meadow marsh mentioned in **Section 5.1.11.11** above. This feature was flowing during the spring visit, but was not flowing during the summer site visit.

MNRF classified this feature as warmwater and with **low-moderate** sensitivity. Based on the results of the field investigations and the available secondary source information, LGL agrees with the **low-moderate** sensitivity designation as Silver Shiner have been reported or are known to occur downstream. This watercourse flows intermittently and supports direct fish habitat.

5.1.11.13 Site 46 Tributary of East Sixteen Mile Creek

This small watercourse is conveyed across the eastbound 407 ETR to eastbound Highway 401 ramp via a concrete box culvert. Downstream of the culvert, the channel is wide, densely vegetated with cattails and undefined. There are two direct connections to a small, dug pond that had both inflow and outflow. The channel then leaves this wide area and enters a driving range where it rapidly narrows and flows through manicured grass. Cattails and *Phragmites* are present within the channel. At the south end of the driving range the watercourse passes under a laneway that has an undersized culvert. As a result of this culvert, water is backed up upstream and the channel is wider here. Downstream of this crossing, the channel loses definition as it enters an area of dense cattails and *Phragmites*. There is a rip rap slope located within the *Phragmites* patch over which the watercourse flows. It is relatively steep and forms a barrier to fish passage. The channel then turns 90 degrees to the east and flows toward its confluence with the watercourse described in the next section.

MNRF classified this feature as warmwater and with **low-moderate** sensitivity. Based on the results of the field investigations and the available secondary source information, LGL agrees with the **low-moderate** sensitivity designation as Silver Shiner have been reported or are known to occur downstream. This watercourse flows permanently and supports indirect fish habitat.

5.1.11.14 Site 47 Tributary of East Sixteen Mile Creek

This small watercourse is conveyed across the eastbound Highway 401 to eastbound 407 ETR ramp via CSP culverts. The watercourse downstream of this crossing is a straight, cattail channel with no definition or low flow channel. Flow was observed during both the spring and summer site visits. The channel converges with a wetland channel from road drainage to the west. There are steep banks until the channels merge. The straight channel is approximately 7 m wide with water depth of 10 cm to 15 cm. Adjacent uplands are cultural meadow to the west and agricultural to the east. Steep rip-rap (likely a barrier to fish passage) is present at the end of the combined channel where it meets the channel coming from the west (mentioned in previous section). Here flows from Site 47 join flows from Site 46. Water in this watercourse travels to the east for approximately 170 m before turning 90 degrees to the south. From the bend south, the watercourse has been realigned between two properties and the floodplain has been planted with trees and shrubs. No fish were observed.

MNRF classified this feature as warmwater and with **low-moderate** sensitivity. Based on the results of the field investigations and the available secondary source information, LGL agrees with the **low-moderate** sensitivity designation as Silver Shiner have been reported or are known to occur downstream. This watercourse flows permanently and supports indirect fish habitat.

5.1.11.15 Site 48 Tributary of East Sixteen Mile Creek

This feature is comprised of a large wetland dominated by cattails and *Phragmites* that lies adjacent to a large storm water pond from which it receives water. Water flows out of it via a concrete box culvert under Highway 401. The site was very wet during the spring site visit, but flows were not observed. It was dry during the summer site visit.

MNRF did not provide a classification or sensitivity for this feature. However, as it is located within the East Sixteen Mile Creek subwatershed and in close proximity to the watercourse at Site 47, LGL has classified it as warmwater and with **low-moderate** sensitivity based on the results of the field investigations and the available secondary source information, and because Silver Shiner have been reported or are known to occur downstream. This watercourse flows ephemerally and supports indirect fish habitat.

5.1.12 Joshua's Creek Watershed

Six crossings of watercourses within the Joshua's Creek watershed occur within the 407 Transitway study area (Sites 36-41 on **Figure 2**). A secondary source review was conducted, which included a review of the Urban Creeks and Supplemental Monitoring Report (CH 2009a). This report states that the species composition and diversity is low in this watershed. Tolerant, warmwater species are present, and temperature monitoring indicates warmwater conditions. Rainbow Trout appeared on the Urban Creeks Report species list; however, these likely would have been captured in close proximity to Lake Ontario.

A review of the North Oakville Creeks Subwatershed Study (TSH *et al* 2006) indicates that the 407 Transitway study area is in a headwater region of this watershed. Habitat conditions were reported for these tributaries of Joshua's Creek in the area of the 407 Transitway: Sites 36-39 were reported to not support fish habitat, Site 40 was reported as "marginal habitat" and no information was available for Site 41.

A species at risk screening using the DFO Aquatic Species at Risk Mapping (DFO 2017) and NHIC Make a Map (MNRF 2017) indicated no aquatic species at risk are present in this watercourse.

Personal correspondence with MNRF (2017a) indicated that all crossings of watercourses within the Joshua's Creek watershed within the study area are classified as warmwater and **low** sensitivity. Fish community data from the secondary source review and MNRF is presented in **Table 2**.

5.1.12.1 Site 36 Tributary of Joshua's Creek

Water flow at Site 36 has been modified historically through the construction of the 407 ETR and the Trafalgar Road interchange, and the construction of the GO Bus station and parking lot south of the interchange. As such, water flow is directed along a series of ditches within the west side of the cloverleaf, with some flows originating on the north side of the highway. Flows are generally conveyed from west to east and cross Trafalgar Road through a CSP culvert south of the GO Bus station bus entrance. Water also travels from a storm water pond in the southeast quadrant of the interchange through a cattail- and *Phragmites*-lined ditch to a confluence with the water coming from the west side of Trafalgar Road just downstream of the CSP culvert. From there, water is conveyed to the east through an agricultural field. There is a ford comprised of concrete cinder blocks and rip rap downstream of this confluence. The swale traverses the agricultural field within a small, vegetated (grasses, *Phragmites*) corridor and is not plowed through. Another source of water to this feature originated is a small wetland pond situated north of a driveway. The pond is bermed and contains mainly cattails with *Phragmites* as well. Water exits the pond and travels under the driveway via a very small concrete culvert. It then enters the agricultural field and travels approximately 150 m to its confluence with the swale discussed above. The swale that emanates from the pond is plowed through, but not planted with crops, so it does not have any riparian vegetation associated with it. The majority of flows travel through the first channel discussed. Both were flowing during the spring visit and were not flowing during the summer site visit. Standing water was present in several locations during the summer visit, however.

MNRF classified this feature as warmwater and **low** sensitivity. Based on the results of the field investigations, and the available secondary source information, LGL agrees with the **low** sensitivity designation. This watercourse flows intermittently and supports indirect fish habitat only.

5.1.12.2 Site 37 Tributary of Joshua's Creek

The feature at Site 37 consists of a small swale that originates in the southern ditch of the 407 ETR. At the edge of the ROW to approximately 30 m downstream, the swale flows through a very dense stand of *Phragmites*. From there the swale traverses an area of grasses and sparse *Phragmites* before entering an agricultural field. The entire swale is approximately 200 m long and much of it is plowed through. At its downstream end, as it nears its confluence with the swale associated with Site 38 (see below), the gradient increases and the swale downcuts into the soil. Only here is there any riparian vegetation (grasses). There was a small amount of flow observed during the spring site visit and the swale was dry during the summer visit.

MNRF classified this feature as warmwater and **low** sensitivity. Based on the results of the field investigations, and the available secondary source information, LGL agrees with the **low** sensitivity designation. This watercourse flows ephemerally and supports indirect fish habitat only.

5.1.12.3 Site 38 Tributary of Joshua's Creek

The feature at Site 38 consists of a larger swale than that described above at Site 37. This feature is conveyed under the 407 ETR via a small concrete box culvert. At the downstream end of the culvert through the ROW to approximately 40 downstream, the swale flows through very dense *Phragmites*. Similar to Site 37, the swale continues through an area of grasses, sparse *Phragmites* and cattails before

entering an agricultural field. Likely due to a higher gradient than at the previous site, this swale is not plowed through, but is incised from the edge of the field southward. As such, a narrow riparian area exists along its banks and consists of grasses, *Phragmites* and some cattails. The swale ends approximately 330 m downstream at the edge of the agricultural field. From this point onward, water is conveyed as sheet flow through a hay field for another approximately 285 m where it meets flows coming south from Site 39. From this confluence, flows travel south out of the study area. There was a small amount of flow observed during the spring site visit and the swale was dry during the summer visit.

MNRF classified this feature as warmwater and **low** sensitivity. Based on the results of the field investigations, and the available secondary source information, LGL agrees with the **low** sensitivity designation. This watercourse flows ephemerally and supports indirect fish habitat only.

5.1.12.4 Site 39 Tributary of Joshua's Creek

The feature at Site 39 is conveyed across the 407 ETR via a small concrete box culvert. Within the first 40 m of the culvert, water flows through dense *Phragmites*. After emerging from the *Phragmites*, a short section (<20 m) of defined channel occurs bordered by meadow marsh. From there, the channel becomes diffuse again and water flows through another stand of *Phragmites*. From there it exits the *Phragmites* into a hay field. There is a barely discernable swale through this field where water travels southward away from the road for approximately 175 m to the confluence with the swale from Site 38. From there, water travels to the south out of the study area. There was a very small amount of flow in this feature during the spring site visit and it was dry during the summer visit.

MNRF classified this feature as warmwater and **low** sensitivity. Based on the results of the field investigations, and the available secondary source information, LGL agrees with the **low** sensitivity designation. This watercourse flows ephemerally and supports indirect fish habitat only.

5.1.12.5 Site 40 Tributary of Joshua's Creek

The feature at Site 40 is conveyed across the 407 ETR via a small concrete box culvert. Within the first 35 m of the culvert water flows diffusely through dense grasses. From there it exits the vegetation into a hay field. The swale acquires some definition here, but appears to have been plowed through in the past: there are patches of natural riparian vegetation in between these plowed through areas. There was a very small amount of flow in this feature during the spring site visit and it was dry during the summer visit.

MNRF classified this feature as warmwater and **low** sensitivity. Based on the results of the field investigations, and the available secondary source information, LGL agrees with the **low** sensitivity designation. This watercourse flows ephemerally and supports indirect fish habitat only.

5.1.12.6 Site 41 Tributary of Joshua's Creek

The feature at Site 41 is conveyed under the 407 ETR via a concrete box culvert. The channel appears to originate in the agricultural fields to the north as a plowed through swale. At the southeast corner of the field, the swale loses its definition and water spreads out, but continues to flow toward the culvert. Upstream of the culvert, which is located at the edge of a grassy area between two fields, two narrow channels form within approximately 40 m of the culvert entrance. These channels are incised and convey flows into the culvert from the water that accumulates from overland drainage from the north. There was flow in through the culvert during the spring visit and standing water during the summer visit.

MNRF classified this feature as warmwater and **low** sensitivity. Based on the results of the field investigations, and the available secondary source information, LGL agrees with the **low** sensitivity designation. This watercourse flows ephemerally and supports indirect fish habitat only.

5.1.13 Credit River Watershed

Nine crossings of watercourses within the Credit River watershed occur within the 407 Transitway study area: Mullet Creek, Levi Creek, the main branch of the Credit River, two tributaries of the main branch (Sites 52-54 are one crossing), three tributaries of Fletcher's Creek and Fletcher's Creek (Sites 49-59 on **Figure 2**).

A species at risk screening using the NHIC Make a Map (MNRF 2019) indicated no aquatic species at risk are present in the watercourses within the study area. DFO Aquatic Species at Risk Mapping (DFO 2019); however, showed an extirpated, endangered or threatened species within both Levi and Fletcher's Creek within the study area. Personal correspondence with MNRF (2019) also indicates that Redside Dace is present in Fletcher's Creek within the study area., but did not indicate that any species at risk is present in Levi Creek.

Personal correspondence with MNRF (2019) reported that Sites 50 and 59 are classified as coolwater and warmwater, respectively, and that both are of **moderate** sensitivity; Sites 51 and 58 are classified as coolwater and warmwater, respectively, and that both are of **high** sensitivity; Sites 49, 52-54, 55, 56 and 57 are classified as warmwater and **low** sensitivity. Fish community data from the secondary source review and MNRF is presented in **Table 1**.

5.1.13.1 Site 49 Mullet Creek

Mullet Creek is a small, permanently-flowing watercourse that passes under the 407 ETR via two single span bridges. Riparian vegetation is generally open (cultural meadow and meadow marsh) with some deciduous tree cover further downstream. The channel is narrow and incised with a mean width of 0.5 m and a mean depth of 15 cm. Morphology consists almost exclusively of runs with a small open wetland (marsh) off a side channel near the bridge. Substrates are comprised of boulders, gravel and cobble near the bridge and gravel and silt further downstream. Riparian vegetation growth is robust and overhanging grasses, cattails and other emergent species are common. Bank undercutting is prevalent and provides instream covert, along with emergent vegetation. Mullet Creek receives outflow from a storm water pond located to the west via a short (30 m) channel. Fish (cyprinids) were observed during both the spring and summer site visits.

MNRF classified this feature as warmwater and **low** sensitivity. Based on the results of the field investigations, and the available secondary source information, LGL agrees with the **low** sensitivity designation. This watercourse flows permanently and supports direct fish habitat.

5.1.14.2 Site 50 Levi Creek

Levi Creek is a medium-sized, permanently flowing watercourse that passes under the 407 ETR via three single-span bridges. It is bordered by cultural meadow and cultural woodland (deciduous) vegetation communities and is mainly only partially shaded by overhanging riparian grasses in the section examined downstream of the highway. Morphology is a mix of mainly runs and riffles, with two pools observed during the site investigations. Depths ranged from 10 cm in riffles to 40 cm in pools and widths from 3 m to 5.5 m. Substrates were comprised of sand, boulder, cobble, gravel and silt and the water during both the spring and summer visits was clear. Instream cover is comprised of overhanging vegetation, boulders and woody debris. Instream vegetation was not common and comprised of a few emergent species. Many cyprinids were observed during both the spring and summer visits. During the spring site visit, Common Shiner were observed spawning and during the summer visit, juvenile Largemouth Bass were observed.

MNRF classified this feature as coolwater and **moderate** sensitivity. Based on the results of the field investigations, and the available secondary source information, LGL agrees with the **moderate** sensitivity designation. This watercourse flows permanently and supports direct fish habitat.

5.1.14.3 Site 51 Credit River

The Credit River is a large watercourse that passes under the 407 ETR via two multi-span bridges. It flows through a wide valley dominated by cultural meadow and meadow marsh vegetation communities. Morphology in the section examined is dominated by riffles and runs with one pool observed approximately 150 m upstream and another immediately downstream of the highway crossing in a side channel. Two islands are located within the channel immediately upstream of the crossing structures. Channel widths average between 20 m and 24 m (with a few wider areas up to 50 m where there are islands) and depths from 20 cm to 40 cm. The upstream pool is approximately 45 m long and 30 m wide and the downstream pool measures 30 m long and 20 m wide. Both pools are up to 50 cm deep. While the downstream pool contains some emergent vegetation, the main channel does not. Substrates are comprised of boulder, cobble, gravel and sand with some silt in the pool and behind current breaks. Instream cover is provided by boulders and cobble and some submerged vegetation. Banks are mainly stable with the exception being the long bend in the river downstream of the crossing that has exposed vertical banks. Many fish were observed (cyprinids) and this river is known for migratory salmonids.

MNRF classified this feature as coolwater and **high** sensitivity. Based on the results of the field investigations, and the available secondary source information, LGL agrees with the **high** sensitivity designation. This watercourse flows permanently and supports direct fish habitat.

5.1.14.4 Sites 52-54 Tributary of Credit River

Historically, this site was comprised of three separate watercourses that converged downstream (south) of the 407 ETR. These sites now comprise two engineered channels that merge into one feature that crosses under the 407 ETR via twin CSP culverts. Upstream the two channels drain toward the 407 ETR culverts diagonally and do not meet until the upstream end of the culverts. The west channel is very small and narrow and appears to originate in a large pond within a cemetery. The eastern watercourse is larger and consists of a straightened channel with a series of weirs. Upstream of the straightened section (which is approximately 290 m long), the channel appears to be piped. Riparian vegetation is grassy for the western channel and consists of a narrow strip of riparian deciduous trees for the eastern channel. During the site visits, flow was coming through the eastern culvert only, although the western culvert was wet. There is a defined, but braided channel downstream through dense thicket vegetation. Flow blockages are common throughout the first 75 m downstream of the crossing and were made by logs and woody debris. A light-colored gravel spill appears to have occurred recently as this material was deposited within 50 m of the culverts. Several short riffles and stagnant pools are present within this section. Organic and woody debris are very common as is evidence of high flows which were up to 60 cm above the water level during the spring visit. Some of the water passing through the culvert appears to go to a cattail marsh located adjacent to the channels to the east. Flow is generally constricted within the first 75 m of the crossing due to the presence of a dirt road/track that crosses the watercourse. It has been built up and blocks all overland flows and directs it to a low point where water flows at the surface across the road/track. Downstream of the road/track, an incised channel through meadow marsh habitat continues for approximately 50 m before flows appear to spread out into the very large meadow marsh located north of the Credit River.

MNRF classified this feature as warmwater and **low** sensitivity. Based on the results of the field investigations, and the available secondary source information, LGL agrees with the **low** sensitivity designation. This watercourse flows intermittently and supports indirect fish habitat.

5.1.14.5 Site 55 Tributary of Credit River

The feature at this site is an ephemeral swale that appears to begin south of the 407 ETR. It contains some *Phragmites* growth at its upstream end (likely where it receives road run off), but is vegetated with terrestrial vegetation further downstream. It crosses under a condominium access road via a CSP culvert and enters a wooded area. This feature is located south of the project footprint and is not discussed further in this report.

5.1.14.6 Site 56 Tributary of Fletcher's Creek

The feature at this site consists of a swale between agricultural fields. Its origin appears to be the 407 ETR ROW upstream (north) of the highway, where it only conveys surface drainage. It passes under the highway via a concrete box culvert. It travels across the power line corridor and enters the storm water system of the residential development west of McLaughlin Road. It is not fish habitat and is, therefore, not discussed further in this report.

5.1.14.7 Site 57 Tributary of Fletcher's Creek

This feature no longer receives flows from upstream (north) of the 407 ETR and there is no crossing associated with it. It is an ephemeral swale that contains little aquatic/wetland vegetation at its upstream end (within the runningway footprint area), but does further downstream near its confluence with Fletcher's Creek (where there are willows and some cattails). There is no defined channel and the feature was dry during both the spring and summer site visits. It appears to only convey surface drainage from the surrounding cultural meadows and agricultural lands. Its contribution to the habitat in Fletcher's Creek is likely negligible.

MNRF classified this feature as warmwater and **low** sensitivity. Based on the results of the field investigations, and the available secondary source information, LGL agrees with the **low** sensitivity designation. This watercourse flows ephemerally and supports indirect fish habitat only.

5.1.14.8 Site 58 Fletcher's Creek

Fletcher's Creek is a medium-sized, permanently flowing watercourse that passes under the 407 ETR via two two-span bridges. It meanders through a relatively small valley bordered by agricultural fields, an electrical yard and residential subdivision. Riparian vegetation is generally herbaceous and consists of grasses and other meadow/wet meadow species. There are a few large willow trees that provide shade and cover to the watercourse. Giant hogweed was present during the summer visit, but had been cleared the following spring. Morphology consists mainly of runs and pools with very few riffles. Water was clear during the summer site visit, but turbid in the spring. There is an abundance of submerged aquatic vegetation throughout the watercourse. Substrates consists of gravel, cobble, detritus, boulders and silt. Some armoring of the bends has occurred with large, angular boulders. Instream cover is provided by submerged aquatic vegetation, boulders, undercut banks and some woody debris. A few areas of bank erosion were noted where the watercourse bends at high, steep bank areas. Channel widths ranged from 3 m to 7 m and depths from 15 cm to over 50 cm. Fish (cyprinids) were observed throughout the section examined.

MNRF classified this feature as warmwater and **high** sensitivity due to the presence of Redside Dace. Based on the results of the field investigations, and the available secondary source information, LGL agrees with the **high** sensitivity designation. This watercourse flows permanently and supports direct fish habitat.

5.1.14.9 Site 59 Tributary of Fletcher's Creek

This tributary of Fletcher's Creek was dry during the spring and summer field investigations during the previous 407 Transitway study (it was not re-examined for this project). The channel within the limits of the study area is not defined, and vegetation is predominately terrestrial, consisting of grasses and

Phragmites. Construction for utilities has recently occurred in the area, and a wetted depression was present within this works area. Downstream of the transitway corridor a more defined channel, densely vegetated with cattails is present. No evidence of any critical habitat features was noted. This watercourse functions as ephemeral drainage and does not appear to constitute as fish habitat within the study limits. Flow/standing water was not present; therefore, sampling was not conducted by LGL.

MNRF classified this watercourse as warmwater, **moderate** sensitivity due to the proximity to Redside Dace habitat and because there is a large colony of a chimney crayfish species present. Based on the results of the previous field investigations, and the available secondary source information, LGL agrees with the **moderate** sensitivity designation. This watercourse flows ephemerally and supports indirect fish habitat.

5.2 Aquatic Species at Risk

5.2.1 Rambo Creek Watershed

According to a review of secondary source data, no aquatic species at risk occur within the Rambo Creek watershed within the vicinity of the study area (DFO 2017; 2019; MNRF 2017; 2019).

5.2.2 Roseland Creek Watershed

According to a review of secondary source data, no aquatic species at risk occur within the Roseland Creek watershed within the vicinity of the study area (Aquafor Beech Limited 2014; DFO 2017; 2019; MNRF 2017; 2019).

5.2.3 Tuck Creek Watershed

According to a review of secondary source data, no aquatic species at risk occur within the Tuck Creek watershed within the vicinity of the study area (Aquafor Beech 2012; DFO 2017; 2019; MNRF 2017; 2019).

5.2.4 Shoreacres Creek Watershed

According to a review of secondary source data, no aquatic species at risk occur within the Shoreacres Creek watershed within the vicinity of the study area (Cole Engineering 2015; CH 2009a; DFO 2017; 2019; MNRF 2017; 2019).

5.2.5 Appleby Creek Watershed

According to a review of secondary source data, no aquatic species at risk occur within the Appleby Creek watershed within the vicinity of the study area (CH 2009a; DFO 2017; 2019; MNRF 2017; 2019).

5.2.6 Sheldon Creek Watershed

According to a review of secondary source data, no aquatic species at risk occur within the Sheldon Creek watershed within the vicinity of the study area (CH 2009a; DFO 2017; 2019; MNRF 2017; 2019).

5.2.7 Bronte Creek Watershed

According to a review of secondary source data, three species at risk have been identified in this watershed in the vicinity of the study area: Redside Dace, Silver Shiner and American Eel.

Redside Dace has been historically present in reaches upstream of the study area (CH 2009b), and personal correspondence with MNRF did not indicate any Redside Dace habitat is currently present. It is therefore unlikely that Redside Dace are present within the study limits.

Personal correspondence with MNRF (2017a) indicated that Silver Shiner and American Eel are present in Bronte Creek within the study limits.

5.2.8 Fourteen Mile Creek Watershed

According to a review of secondary source data, Redside Dace has been identified in Fourteen Mile Creek in the vicinity of the study area (CH 2009a; DFO 2017; 2019; MNRF 2017; 2019).

Personal correspondence with MNRF indicated that Sites 16-23 are upstream of Redside Dace occupied habitat and Sites 24-25 are upstream of Redside Dace recovery habitat, indicating that the Fourteen Mile Creek watercourses within the Transitway study area may not be within regulated habitat.

5.2.9 McCraney Creek Watershed

According to a review of secondary source data, no aquatic species at risk occur within the McCraney Creek watershed within the vicinity of the study area (CH 2009a; TSH *et al.* 2006; DFO 2017; 2019; MNRF 2017; 2019).

5.2.10 Taplow Creek Watershed

According to a review of secondary source data, no aquatic species at risk occur within the Taplow Creek watershed within the vicinity of the study area (CH 2009a; TSH *et al.* 2006; DFO 2017; 2019; MNRF 2017; 2019).

5.2.11 Sixteen Mile Creek Watershed

According to a review of secondary source data, Silver Shiner has been identified in Sixteen Mile Creek in the vicinity of the study area (CH 2011; DFO 2019; MNRF 2017; 2019).

According to personal correspondence with MNRF (2017a), Sites 28, 30-35, 42-47 are upstream of Silver Shiner habitat and are, therefore, potentially not regulated habitat. Site 29 is direct Silver Shiner habitat and is regulated as such.

5.2.12 Joshua's Creek Watershed

According to a review of secondary source data, no aquatic species at risk occur within the Joshua's Creek watershed within the vicinity of the study area (CH 2009a; TSH *et al.* 2006; DFO 2017; 2019; MNRF 2017; 2019).

5.2.13 Credit River Watershed

According to a review of secondary source data, Redside Dace has been identified in Fletcher's Creek in the vicinity of the study area (DFO 2017; 2019; MNRF 2017; 2019).

Personal correspondence with MNRF indicated that Site 58 is occupied Redside Dace habitat, indicating that the Fletcher's Creek within the Transitway study area is within regulated habitat for this species.

5.3 Critical Fish Habitat

The study limits were reviewed for the potential presence of critical habitat (i.e., spawning areas, groundwater discharge, nursery habitat, seasonal refugia, etc.). There was no evidence of critical habitat within any of the watercourses investigated.

5.4 Sensitivity/Significance

The watercourses within the study area support a diversity of warmwater, coolwater and coldwater fish communities; however, all of the watercourses in the study area have experienced some type of impact from urbanization.

Based on personal correspondence with MNRF (2017a; 2019), the habitat sensitivities of the watercourses located within the study limits range from low to moderate to high. No data regarding habitat sensitivity was provided for five of the watercourses. Details regarding interpretation of sensitivity are described above in **Section 5.1** and are presented in **Table 2** and **Figure 2.**

Redside Dace is listed provincially as an 'Endangered' species and is regulated by the Ontario ESA, 2007. Watercourses which support this species will require specialized mitigation measures to prevent negative impacts to this species and/or its habitat. All best management practices (BMPs) outlined in the *Draft Guidance for Development Activities in Redside Dace Protected Habitat* (MNR 2011) will need to be incorporated into the project design. An ESA 17(2)(c) overall benefit permit may be required from the MECP during detail design if proposed works will detrimentally affect the regulated habitat. In addition, because Redside Dace are listed on Schedule 1 under SARA, a permit under that regulation may also be required.

Silver Shiner is listed provincially as a "Threatened" species and is regulated by the Ontario ESA, 2007. Silver Shiner is also listed as "Threatened" federally under the (SARA). Specialized mitigation for this species may be required, and an ESA 17(2)(c) overall benefit permit may be required from the MECP and a SARA permit from DFO during detail design if proposed works will detrimentally affect the regulated habitat.

American Eel is listed as "Endangered" provincially under the ESA. American Eel is not listed federally. Specialized mitigation for this species may be required, and an ESA 17(2)(c) overall benefit permit may be required from the MECP during detail design if proposed works will detrimentally affect the regulated habitat.

5.5 Thermal Regime

The watercourses within the study area support a mix of warmwater, coolwater and coldwater fish communities. In-water works timing windows were provided by MNRF in accordance with the protocol. Warmwater watercourses are subject to an in-water timing window of July 1 to March 31. Coldwater and Redside Dace watercourses are subject to an in-water timing window of July 1 to September 15.

6.0 IMPACT ASSESSMENT

6.1 Fisheries Act, 2014, Species at Risk Act, 2019, Endangered Species Act, 2007

This assessment outlines the fish habitat and fisheries resources that will be affected by the Transitway corridor and stations. This project will directly affect the watercourses listed in **Table 1** and discussed above in **Section 5.1.** "Serious Harm to Fish" could result as a result of the proposed works with the addition of new watercourse crossings, clearing of vegetation within the riparian areas (including wetland species), modifications to drainage due to increased impermeable surfaces in the vicinity of the watercourses, and the addition of storm water management features.

In addition to the impacts above, potential impacts to fish and fish habitat during construction could include erosion and sediment inputs to the watercourses, temporary disruption of flows, increased water temperatures and barriers to fish movement.

"Serious Harm to Fish", according to DFO, is considered to occur based on the following;

- the **death of fish;**

- a **permanent alteration** to fish habitat of a spatial scale, duration or intensity that limits or diminishes the ability of fish to use such habitats as spawning grounds, or as nursery, rearing, or food supply areas, or as a migration corridor, or any other area in order to carry out one or more of their life processes;
- the **destruction of fish habitat** of a spatial scale, duration, or intensity that fish can no longer rely upon such habitats for use as spawning grounds, or as nursery, rearing, or food supply areas, or as a migration corridor, or any other area in order to carry out one or more of their life processes. (DFO 2015).

The impact assessment below assesses the potential for causing "Serious Harm to Fish" based on proposed impacts, and the sensitivity classifications provided by the MNRF and LGL's field investigations.

Three watercourses (Sites 15, 29 and 58) are regulated under the *Endangered Species Act*, *2007* and *Species at Risk Act* due to the presence of occupied habitat for Silver Shiner (15 and 29) and Redside Dace (58). According to the ESA, "No person shall damage or destroy the habitat of a species that is listed on the Species at Risk in Ontario List as an endangered or threatened species." Regulated Redside Dace habitats, by definition, includes the bankfull stream width, in addition to the meander belt width and associated riparian habitat that is a minimum of 30 m from the meander belt measured horizontally. Silver Shiner habitat is broken into three categories: two within the watercourse and one in the floodplain. Works affecting any of these habitats (and, for SARA, the fish themselves through collection/rescue) may trigger the need for permitting under the ESA and SARA. Works at these three watercourses will likely affect the habitat of these species and permitting may need to occur prior to construction in consultation with the MECP (see **Section 6.2**). Also, any in-water works that would trigger the need for fish collection/rescue would require permitting under SARA from DFO.

6.2 Summary of Proposed Works at Watercourse Crossings

The proposed new structures or realignments to new structures will result in temporary and permanent impacts at thirty-four (34) watercourses supporting fish or fish habitat described above. However, through proper mitigation measures and careful planning, the impacts can be minimized to prevent negative effects to fish and fish habitat.

Culvert/structure type should be designed in accordance with Section 5.5.3 in the MTO Fish Guide, to avoid causing "Serious Harm to Fish". At watercourses supporting direct fish habitat, passage and habitat provision are important and thus open bottomed culverts or box culverts that are embedded and backfilled with substrates should be considered throughout design.

In addition, impacts will be avoided at six locations as a result of changes to the alignment of the runningway.

Table 3 below provides a summary of the proposed works/impacts for each individual watercourse crossing. Also included are site-specific mitigation measures, and potential net environmental effects for each watercourse based on the Transitway design. Net environmental effects are calculated assuming all general proposed mitigation measures outlined in **Section 6.3** are applied. Watercourses that are not addressed in **Table 3** either do not support fish habitat or will not be affected by the 407 Transitway.

6.2.1 In-water Works

Where possible, structures shall be constructed outside of the watercourse banks, eliminating the need for in-water works. However, at some of the crossings, in-water work may be necessary. At all locations where in-water work is proposed, cofferdams (pea gravel bags, sheet piles, etc.) will be used to isolate the work area from the watercourse to enable work to be done in-the-dry (OPSS 517 Construction

Specification for Dewatering). Flow will be maintained through either damming and pumping or fluming. If possible, work shall be done during the driest part of the year when the lowest flows are present. This will minimize disturbance to fish habitat at the site and downstream. To further reduce the potential for serious harm, the following environmental protection measures will be implemented:

1. No in-water work (or work on watercourse banks) will be permitted from April 1 to June 30 to protect spawning warmwater fish, incubating eggs and fry emergence and from September 16 to June 30 to protect cool and coldwater fish spawning, egg incubation and fry emergence, and to protect Redside Dace and Silver Shiner.
2. Where cofferdams are to be employed, dewatering effluent will be treated prior to discharge to receiving watercourse (OPSS 517 Construction Specification for Dewatering).
3. Cofferdams will be constructed using pea gravel bags, sheet piling or other appropriate material to isolate the work area: flow will be maintained at all stations.
4. Only clean material free of particulate matter will be placed in the watercourse (OPSS 1005 Streambed Material).
5. Fish isolated by construction activities (if present) will be captured by a qualified fisheries specialist and safely released to the watercourse (OPSS 182 Construction in and Around Waterbodies and on Waterbody Banks). Permitting under SARA will likely be required for activities occurring in occupied Redside Dace (Site 58) and Silver Shiner habitat (Sites 15 and 29).

6.2.2 Standard Mitigation Measures

Standard erosion and sedimentation control measures will be implemented prior to soil disturbance / ground breaking, as necessary, to mitigate impacts on water quality of the surface drainage features adjacent to the study area. In addition, best management / construction practices will be implemented during construction to reduce the potential for spills or other materials to exit the work area. Mitigation measures which shall be implemented to avoid impacts to fish and fish habitat are described below.

Standard mitigation measures will also apply to the three tunnel sections (Sites 40-41; Sites 44-48; Sites 55-56) and to the works within, or directly adjacent to, the ROW (Sites 1-5). At the tunneling sections, all works will occur deep underground below the parent materials underlying the watercourses and, as such, no effects are expected. Standard mitigation measures at the tunnel entrances will apply. At the ROW section, all works will occur over existing pipes/culverts and, as such, no effects are expected. In this area, standard mitigation measures to prevent erosion and sediment/deleterious substance transport into the existing 407 ETR storm water system will apply.

TABLE 3. SUMMARY OF PROPOSED IN-STREAM WORK, MITIGATION MEASURES & NET ENVIRONMENTAL EFFECTS

Name	Proposed Works	Net Environmental Effects	Site Specific Mitigation
Site 6: Tributary of Shoreacres Creek	• Concrete Box Culvert • Length 30 m • Width 3.0 m • Realignment 130 m	• Permanent enclosure of ~600 m^2 of indirect, warmwater fish habitat if upstream of barrier. No effect to direct habitat downstream of barrier.	• In-water works to be conducted within the warmwater timing window (July 1 to March 31). • Work will be done "in the dry". • An open footed structure, or box structure with embedded natural substrates should be considered.
Site 7: Tributary of Shoreacres Creek	• Concrete Box Culvert • Length 20 m • Width 3.0 m	• Permanent enclosure of ~40 m^2 of seasonal, warmwater fish habitat.	• In-water works to be conducted within the warmwater timing window (July 1 to March 31). • Work will be done "in the dry". • An open footed structure, or box structure with embedded natural substrates should be considered.
Site 8: Tributary of Shoreacres Creek	• Concrete Box Culvert • Length 25 m • Width 4.0 m • Realignment 300 m	• Permanent enclosure of ~540 m^2 of indirect, warmwater fish habitat.	• In-water works to be conducted within the warmwater timing window (July 1 to March 31). • Work will be done "in the dry".
Site 9: Appleby Creek	• Concrete Box Culvert • Length 40 m • Width 4.0 m	• Permanent enclosure of ~60 m^2 of indirect, warmwater fish habitat.	• In-water works to be conducted within the warmwater timing window (July 1 to March 31). • Work will be done "in the dry".
Site 10: Tributary of Appleby Creek	• Concrete Box Culvert • Length 25 m • Width 2.4 m	• Permanent enclosure of ~25 m^2 of indirect, warmwater fish habitat.	• In-water works to be conducted within the warmwater timing window (July 1 to March 31). • Work will be done "in the dry".
Site 11: Tributary of Sheldon Creek	• Concrete Box Culvert • Length 20 m • Width 3.0 m	• Permanent enclosure of ~20 m^2 of indirect, warmwater fish habitat.	• In-water works to be conducted within the warmwater timing window (July 1 to March 31). • Work will be done "in the dry".
Site 12: Tributary of Sheldon Creek	• Realignment to Site 11 (200 m)	• Alteration of ~200 m2 of indirect, warmwater fish habitat.	• In-water works to be conducted within the warmwater timing window (July 1 to March 31). • Work will be done "in the dry".
Site 13: Tributary of Sheldon Creek	• Concrete Box Culvert • Length 20 m • Width 4.0 m	• Permanent enclosure of ~20 m^2 of indirect, warmwater fish habitat.	• In-water works to be conducted within the warmwater timing window (July 1 to March 31). • Work will be done "in the dry".
Site 14: Tributary of Sheldon Creek	• No in-water works (road tunnel)	• No impacts within bankfull channel.	• Tunneling should be deep enough to avoid potential for effects to channel bed.

TABLE 3. SUMMARY OF PROPOSED IN-STREAM WORK, MITIGATION MEASURES & NET ENVIRONMENTAL EFFECTS

Name	Proposed Works	Net Environmental Effects	Site Specific Mitigation
Site 15: Bronte Creek	• Bridge • Span 160 m • Width 13 m	• No impacts within bankfull channel.	• All works must follow MTO Fisheries BMP for Clear Span Bridges and **Section 6.3** below.
Site 15a: Tributary of Bronte Creek	• Circular Pipe Culvert • Length 35 m • Diameter 1.6 m	• Permanent enclosure of ~105 m^2 of indirect, warmwater fish habitat.	• In-water works to be conducted within the warmwater timing window (July 1 to March 31). • Work will be done "in the dry".
Site 16: Tributary of Fourteen Mile Creek	• Concrete Box Culvert • Length 20 m • Width 2.4 m	• Permanent enclosure of ~20 m^2 of indirect, coldwater fish habitat.	• In-water works to be conducted within the Redside Dace timing window (July 1 to September 15), but flexible. • Work will be done "in the dry".
Site 17: Tributary of Fourteen Mile Creek	• Concrete Box Culvert • Length 20 m • Width 2.4 m	• Permanent enclosure of ~20 m^2 of indirect, coldwater fish habitat.	• In-water works to be conducted within the Redside Dace timing window (July 1 to September 15), but flexible. • Work will be done "in the dry".
Site 18: Tributary of Fourteen Mile Creek	• Bridge (over 407 ETR & watercourse) • Span 325 m • Width 13 m	• No impacts within bankfull channel.	• All works must follow MTO Fisheries BMP for Clear Span Bridges and **Section 6.3** below.
Site 19: Tributary of Fourteen Mile Creek	• Concrete Box Culvert • Length 25 m • Width 1.8 m	• Permanent enclosure of ~25 m^2 of indirect, warmwater fish habitat.	• In-water works to be conducted within the Redside Dace timing window (July 1 to September 15), but flexible. • Work will be done "in the dry".
Site 20: Tributary of Fourteen Mile Creek	• Concrete Box Culvert • Length 20 m • Width 2.4 m	• Permanent enclosure of ~20 m^2 of indirect, coldwater fish habitat.	• In-water works to be conducted within the Redside Dace timing window (July 1 to September 15), but flexible. • Work will be done "in the dry".
Site 21: Tributary of Fourteen Mile Creek	• Concrete Box Culvert • Length 20 m • Width 2.4 m	• Permanent enclosure of ~20 m^2 of indirect, coldwater fish habitat.	• In-water works to be conducted within the Redside Dace timing window (July 1 to September 15), but flexible. • Work will be done "in the dry".
Site 22: Fourteen Mile Creek	• Concrete Box Culvert • Length 20 m • Width 3.0 m	• Permanent enclosure of ~22 m^2 of indirect, coldwater fish habitat.	• In-water works to be conducted within the Redside Dace timing window (July 1 to September 15), but flexible. • Work will be done "in the dry".
Site 23: Tributary of Fourteen Mile Creek	• Concrete Box Culvert • Length 20 m • Width 1.8 m	• Permanent enclosure of ~20 m^2 of indirect, coldwater fish habitat.	• In-water works to be conducted within the Redside Dace timing window (July 1 to September 15), but flexible. • Work will be done "in the dry".

TABLE 3. SUMMARY OF PROPOSED IN-STREAM WORK, MITIGATION MEASURES & NET ENVIRONMENTAL EFFECTS

Name	Proposed Works	Net Environmental Effects	Site Specific Mitigation
Site 24: Tributary of Fourteen Mile Creek	• Bridge (over Bronte Rd & watercourse) • Span 450 m • Width 13 m	• No impacts within bankfull channel.	• All works must follow MTO Fisheries BMP for Clear Span Bridges and **Section 6.3** below.
Site 26: Tributary of McCraney Creek	• Concrete Box Culvert • Length 30 m • Width 2.4 m	• Permanent enclosure of ~30 m^2 of indirect, warmwater fish habitat.	• In-water works to be conducted within the warmwater timing window (July 1 to March 31). • Work will be done "in the dry".
Site 28: Tributary of Sixteen Mile Creek	• Concrete Box Culvert • Length 15 m • Width 3.0 m	• Permanent enclosure of ~15 m^2 of indirect, coolwater fish habitat.	• In-water works to be conducted within the Silver Shiner timing window (July 1 to September 15), but flexible. • Work will be done "in the dry".
Site 29: Sixteen Mile Creek	• Bridge • Span 440 m • Width 13 m	• No impacts within bankfull channel.	• All works must follow MTO Fisheries BMP for Clear Span Bridges and **Section 6.3** below.
Site 36: Tributary of Joshua's Creek	• CSP • Length 20 m • Diameter 0.9 m	• Permanent enclosure of ~20 m^2 of indirect, warmwater fish habitat.	• In-water works to be conducted within the warmwater timing window (July 1 to March 31). • Work will be done "in the dry".
Site 37: Tributary of Joshua's Creek	• Concrete Box Culvert • Length 30 m • Width 1.8 m	• Permanent enclosure of ~30 m^2 of indirect, warmwater fish habitat.	• In-water works to be conducted within the warmwater timing window (July 1 to March 31). • Work will be done "in the dry".
Site 39: Tributary of Joshua's Creek	• Concrete Box Culvert • Length 30 m • Width 3.0 m	• Permanent enclosure of ~30 m^2 of indirect, warmwater fish habitat.	• In-water works to be conducted within the warmwater timing window (July 1 to March 31). • Work will be done "in the dry".
Site 40: Tributary of Joshua's Creek	• Concrete Box Culvert • Length 30 m • Width 2.4 m	• Alteration of ~30 m2 of indirect, warmwater fish habitat.	• In-water works to be conducted within the warmwater timing window (July 1 to March 31). • Work will be done "in the dry".
Site 41: Tributary of Joshua's Creek	• No in-water works (road tunnel)	• No impacts within bankfull channel.	• Tunneling should be deep enough to avoid potential for effects to channel bed.
Site 44: Tributary of East Sixteen Mile Creek	• Bridge • Span 40 m • Width 13 m	• No impacts within bankfull channel.	• All works must follow MTO Fisheries BMP for Clear Span Bridges and **Section 6.3** below.

TABLE 3. SUMMARY OF PROPOSED IN-STREAM WORK, MITIGATION MEASURES & NET ENVIRONMENTAL EFFECTS

Name	Proposed Works	Net Environmental Effects	Site Specific Mitigation
Site 49: Mullet Creek	• Bridge (over 407 ETR & watercourse) • Span 470 m • Width 13 m	• No impacts within bankfull channel.	• All works must follow MTO Fisheries BMP for Clear Span Bridges and **Section 6.3** below.
Site 50: Levi Creek	• Bridge • Span 215 m • Width 13 m	• No impacts within bankfull channel.	• All works must follow MTO Fisheries BMP for Clear Span Bridges and **Section 6.3** below.
Site 51: Credit River	• Bridge (over CPR & watercourse) • Span 290 m • Width 13 m	• No impacts within bankfull channel.	• All works must follow MTO Fisheries BMP for Clear Span Bridges and **Section 6.3** below.
Site 52-54: Tributary of the Credit River	• Concrete Box Culvert • Length 20 m • Width 4.0 m	• Permanent enclosure of ~150 m^2 of indirect, warmwater fish habitat.	• In-water works to be conducted within the warmwater timing window (July 1 to March 31). • Work will be done "in the dry".
Site 58: Fletcher's Creek	• Bridge • Span 90 m • Width 13 m	• No impacts within bankfull channel.	• All works must follow MTO Fisheries BMP for Clear Span Bridges and **Section 6.3** below.

6.3 Mitigation Measures

To mitigate for the harmful alteration of fish habitat, the measures identified below will be implemented pre-, during and post-construction at the locations where work is proposed.

TABLE 4/TEMPLATE 10.3. AQUATIC EFFECTS ASSESSMENT SUMMARY TABLE

Waterbody	Pathway of Effect (s)	Stressor (Potential Impact)	Mitigation Measures	Residual Effects	Serious Harm Y/N
All sites with new culverts	L1- Vegetation clearing	• Alteration of riparian vegetation • Addition or removal of in stream organic structure • Change in shade • Change in external nutrient/energy inputs • Changes to bank stability / exposed soils	Removal of riparian vegetation shall be in accordance with OPSS 182 and OPSS 804. • Minimize vegetation removal and disturbances on embankments and surface drainage ditches adjacent to the watercourse. • Seed and mulch disturbed banks with appropriate seed mixture. • Limit the duration that areas are left disturbed/exposed. • Erosion and Sediment Control (ESC) will be used to contain/isolate the construction zone during and following vegetation clearing and to manage site drainage to prevent erosion and sedimentation to the waterbody. ESC measures will be in place until all areas are stabilized.	• Change in habitat structure and cover • Change in food supply • Change in nutrient concentrations The residual effects of vegetation clearing for the new culvert structures will result in permanent alteration or change in habitat structure and cover of the affected area. Residual effects, however, are not likely to result in serious harm.	N
	L2 – Grading	• Addition or removal of in stream organic structure • Changes to bank stability / exposed soils • Changes in slope / land drainage patterns • Increased erosion potential	Installation, monitoring, maintenance, and removal of temporary erosion and sediment control measures shall be according to OPSS 182 and OPSS 805. Removal of riparian vegetation shall be in accordance with OPSS 182 and OPSS 804. Vegetation protection and rehabilitation shall be in accordance with OPSS 182 and OPSS 804.	There will be minor residual effects in habitat structure and cover from the removal of the instream organic material, however not likely to result in serious harm.	N
	L3 – Excavation	• Alteration of groundwater flow to surface water • Creations of pond, pit	The installation, monitoring, maintenance, and removal of temporary erosion and sediment control measures shall be according to OPSS 182 and OPSS 805.	No permanent residual effects are expected.	N

TABLE 4/TEMPLATE 10.3. AQUATIC EFFECTS ASSESSMENT SUMMARY TABLE

Waterbody	Pathway of Effect (s)	Stressor (Potential Impact)	Mitigation Measures	Residual Effects	Serious Harm Y/N
		or trench • Dewatering of pit or trench • Removal of topsoil • Changes to bank stability / exposed soils • Changes in slope / land drainage patterns • Increased erosion potential			
	B2 – Industrial equipment	• Changes to bank stability / exposed soils • Increased erosion potential • Re-suspension and entrainment of sediment • Oil / grease / fuel leaks	Use of equipment shall be in accordance with OPSS 182. The installation, monitoring, maintenance, and removal of temporary erosion and sediment control measures shall be according to OPSS 182 and OPSS 805. All equipment will be operated, stored, and maintained in a manner that prevents the entry of any deleterious substances to the waterbody. Any part of equipment entering the waterbody or operating on the bank shall be free of fluid leaks and externally cleaned/degreased.	No permanent residual effects are expected.	N
	W1 – Placement of Material or Structures in Water	• Partial constriction of flow • Change in channel morphology • Change in hydraulics • Change in substrate composition • Change in aquatic macrophytes • Complete constriction	Design crossing structures to appropriate flow regime to protect banks and not to constrict flows. Embed culverts using native materials to prevent a barrier to fish passage. Design temporary and permanent water management system and dewatering operations to maintain flows in adjacent waterbody and to prevent erosion and/or release of sediment-laden or contaminated water to the waterbody.	• Change in habitat structure and cover • Change in food supply • Change in nutrient concentrations There will be minor residual effects from the change in the native substrates, however not likely to result in serious harm.	N

TABLE 4/TEMPLATE 10.3. AQUATIC EFFECTS ASSESSMENT SUMMARY TABLE

Waterbody	Pathway of Effect (s)	Stressor (Potential Impact)	Mitigation Measures	Residual Effects	Serious Harm Y/N
		of flow			
	W3 – Water extraction	• Reduced flow • Entrainment of fish in pumps	Dewatering activities and the use of pumps shall be conducted in accordance with OPSS 517. Temporary flow diversions shall be conducted in accordance with OPSS 517. Fish salvage operations shall be conducted in accordance with OPSS 182. Any water intakes or outlet pipes in fish bearing waters shall have screens to prevent entrainment or impingement of fish as per OPSS 182 and follow the measures as outlined in the DFO Freshwater Intake End-of-Pipe Fish Screen Guideline.	No permanent residual effects are expected.	N
	W5 – Aquatic Vegetation Management	• Change in light penetration • Change in primary productivity • Change in nutrient inputs • Re-suspension and entrainment of sediment	Isolate the work site. Minimize vegetation removal to the amount which is necessary to maintain proper and safe fish passage.	Minor change in habitat structure and cover, change in light penetration, change in primary productivity, and change in nutrient inputs, however not likely to result in serious harm.	N
	W7 –Change in timing, duration and frequency of flow	• Dewatering • Bank erosion • Scouring of channel beds • Change in substrate composition	Flow diversion via a bypass channel adjacent to the waterbody will be applied for channel and crossing works, to facilitate in the dry construction, maintain existing flow conditions and provide fish passage through the reach. Design crossing structures in new drainage channel to appropriate flow regime to protect banks and not to constrict flows, and embed culverts to prevent a barrier to fish passage.	No permanent residual effects are expected.	N

TABLE 4/TEMPLATE 10.3. AQUATIC EFFECTS ASSESSMENT SUMMARY TABLE

Waterbody	Pathway of Effect (s)	Stressor (Potential Impact)	Mitigation Measures	Residual Effects	Serious Harm Y/N
	W8 – Fish Passage	• Channel obstructions • Upstream/downstream passage of fish • Alteration of migration patterns • Change in water chemistry • Change in temperature • Flow alteration • Diversion channels	Adhere to appropriate in-water work timing windows. Temporary flow diversions shall be conducted in accordance with OPSS 517. Dewatering activities and the use of pumps shall be conducted in accordance with OPSS 517. Any water intakes or outlet pipes in fish bearing waters shall have screens to prevent entrainment or impingement of fish as per OPSS 182 and follow the measures as outlined in the DFO Freshwater Intake End-of-Pipe Fish Screen Guideline.	No permanent residual effects are expected.	N
Sites 6, 8 & 12 Channel realignments	L1- Vegetation clearing	• Alteration of riparian vegetation • Addition or removal of in stream organic structure • Change in shade • Change in external nutrient/energy inputs • Changes to bank stability / exposed soils	Removal of riparian vegetation shall be in accordance with OPSS 182 and OPSS 804. • Minimize vegetation removal and disturbances on embankments and surface drainage ditches adjacent to the watercourse. • Seed and mulch disturbed banks with appropriate seed mixture. • Limit the duration that areas are left disturbed/exposed. • Erosion and Sediment Control (ESC) will be used to contain/isolate the construction zone during and following vegetation clearing and to manage site drainage to prevent erosion and sedimentation to the waterbody. ESC measures will be in place until all areas are stabilized.	• Change in habitat structure and cover • Change in food supply • Change in nutrient concentrations The residual effects of vegetation clearing for the channel infilling will result in permanent alteration of ~1,227.5 m^2 of fish habitat that may limit or diminish the ability of the fish to carry out their life processes	Potential serious harm due to infilling of indirect fish habitat that may have effects on downstream direct habitat. DFO review will be needed during detailed design to determine if serious harm will occur.
	L2 –	• Addition or removal of	Installation, monitoring, maintenance, and removal of temporary erosion and sediment control	There will be minor residual effects in habitat structure and cover from	N

TABLE 4/TEMPLATE 10.3. AQUATIC EFFECTS ASSESSMENT SUMMARY TABLE

Waterbody	Pathway of Effect (s)	Stressor (Potential Impact)	Mitigation Measures	Residual Effects	Serious Harm Y/N
	Grading	in stream organic structure • Changes to bank stability / exposed soils • Changes in slope / land drainage patterns • Increased erosion potential	measures shall be according to OPSS 182 and OPSS 805. Removal of riparian vegetation shall be in accordance with OPSS 182 and OPSS 804. Vegetation protection and rehabilitation shall be in accordance with OPSS 182 and OPSS 804.	the removal of the instream organic material, however not likely to result in serious harm.	
	L3 – Excavation	• Alteration of groundwater flow to surface water • Creations of pond, pit or trench • Dewatering of pit of trench • Removal of topsoil • Changes to bank stability / exposed soils; • Changes in slope / land drainage patterns • Increased erosion potential	The installation, monitoring, maintenance, and removal of temporary erosion and sediment control measures shall be according to OPSS 182 and OPSS 805.	No permanent residual effects are expected.	N

TABLE 4/TEMPLATE 10.3. AQUATIC EFFECTS ASSESSMENT SUMMARY TABLE

Waterbody	Pathway of Effect (s)	Stressor (Potential Impact)	Mitigation Measures	Residual Effects	Serious Harm Y/N
	B2 – Industrial equipment	• Changes to bank stability / exposed soils • Increased erosion potential • Re-suspension and entrainment of sediment • Oil / grease / fuel leaks	Use of equipment shall be in accordance with OPSS182. The installation, monitoring, maintenance, and removal of temporary erosion and sediment control measures shall be according to OPSS 182 and OPSS 805. All equipment will be operated, stored, and maintained in a manner that prevents the entry of any deleterious substances to the waterbody. Any part of equipment entering the waterbody or operating on the bank shall be free of fluid leaks and externally cleaned/degreased.	No permanent residual effects are expected.	N
	W1 – Placement of Material	• Partial constriction of flow • Entrainment fish in pumps • Change in channel morphology • Change in hydraulics • Change in substrate composition • Change in aquatic macrophytes • Complete constriction of flow	Design temporary and permanent water management system and dewatering operations to maintain flows in adjacent waterbody and to prevent erosion and/or release of sediment-laden or contaminated water to the waterbody. Replant and restore exposed areas to original or better conditions.	• Change in habitat structure and cover • Change in food supply • Change in nutrient concentrations The residual effects from infilling the existing channels will result in destruction of ~1,227.5 m^2 of indirect fish habitat.	Potential serious harm due to infilling of indirect fish habitat that may have effects on downstream direct habitat. DFO review will be needed during detailed design to determine if serious harm will occur.

TABLE 4/TEMPLATE 10.3. AQUATIC EFFECTS ASSESSMENT SUMMARY TABLE

Waterbody	Pathway of Effect (s)	Stressor (Potential Impact)	Mitigation Measures	Residual Effects	Serious Harm Y/N
	W3 – Water extraction	• Reduced flow • Entrainment of fish in pumps	Dewatering activities and the use of pumps shall be conducted in accordance with OPSS 517. Temporary flow diversions shall be conducted in accordance with OPSS 517. Fish salvage operations shall be conducted in accordance with OPSS 182. Any water intakes or outlet pipes in fish bearing waters shall have screens to prevent entrainment or impingement of fish as per OPSS 182 and follow the measures as outlined in the DFO Freshwater Intake End-of-Pipe Fish Screen Guideline.	No permanent residual effects are expected.	N
	W7 –Change in timing, duration and frequency of flow	• Dewatering • Bank erosion • Scouring of channel beds • Change in substrate composition	Flow diversion via a bypass channel adjacent to the waterbody will be applied for channel works, to facilitate in the dry construction, maintain existing flow conditions and provide fish passage through the reach.	No permanent residual effects are expected.	N
	W8 – Fish Passage	• Channel obstructions • Upstream/downstream passage of fish • Alteration of migration patterns • Change in water chemistry • Change in temperature • Flow alteration • Diversion channels	Adhere to appropriate in-water work timing windows. Temporary flow diversions shall be conducted in accordance with OPSS 517. Dewatering activities and the use of pumps shall be conducted in accordance with OPSS 517. Any water intakes or outlet pipes in fish bearing waters shall have screens to prevent entrainment or impingement of fish as per OPSS 182 and follow the measures as outlined in the DFO Freshwater Intake End-of-Pipe Fish Screen Guideline.	No permanent residual effects are expected.	N

6.3.1 Best Construction Practices

Implementation of best construction practices during construction will reduce the potential for spills or other materials / equipment entering the water. The following measures will be employed:

1. All equipment maintenance and refuelling will be controlled to prevent any discharge of petroleum products. Vehicular maintenance and refuelling will be conducted at least 30 m distance from any surface drainage feature to prevent the entry of petroleum, oil or lubricants (POL) to the watercourses.
2. Storage, stockpiling and staging areas will be delineated prior to construction and inspected in accordance with the current MTO Construction Administration and Inspection Task Manual.
3. Construction material, excess material, construction debris, and empty containers will be stored at least 30 m distance from any surface drainage features to prevent their entry into the watercourse.
4. Local Regulatory Authorities will be identified in the contract package for the purpose of reporting spills. All spills that could potentially cause damage to the environment will be reported to the Spills Action Centre of the MECP. In the event of a spill, containment and clean-up shall be completed quickly and effectively. A "Spill Response Plan" and the appropriate contingency materials to absorb or contain a spill will be on the site at all times.
5. No construction machinery or vehicles will cross any watercourse at any time during construction.

6.3.2 Erosion and Sedimentation Control

Effective erosion and sedimentation control will be achieved throughout the project with careful planning and design, stringent construction supervision, monitoring of the site, and maintenance of control works throughout their operational life. The following temporary erosion and sedimentation control measures will be implemented prior to soil disturbance / ground breaking to mitigate impacts on water quality and fish habitat:

1. The extent and duration that disturbed soils are exposed to the elements will be kept to a minimum.
2. Disturbed areas will be stabilized through seeding, mulching or use of an erosion control blanket, as appropriate, to provide slope protection and long-term slope stabilization.
3. Silt fencing will be placed along the watercourse margins in areas of disturbance to prevent the entry of sediment into the watercourses.
4. Flow checks will be placed at appropriate intervals in lateral ditches down gradient from areas of soil disturbance to trap suspended sediments and reduce the erosive force of runoff.

These erosion and sedimentation control measures shall remain in place until soils have been re-stabilized. A number of special provisions related to erosion and sedimentation control are recommended to be included in the contract package to ensure that the above measures are implemented including:

1. General Specification for Environmental Protection for Construction In and Around Waterbodies and on Waterbody Banks (OPSS 182) to cover the environmental protection requirements and mitigation measures that apply to construction involving work in and around waterbodies and on waterbody banks;
2. Construction Specification for Seed and Cover (OPSS 804) to stabilize disturbed areas.
3. Construction Specification for Topsoil (OPSS 802) and Sodding (OPSS 803) to address the requirements for stockpiling, placing and supplying topsoil and to cover the requirements for sodding.

4. Construction Specification for Temporary Erosion and Sediment Control Measures (OPSS 805) to cover the installation, maintenance, monitoring and removal of the temporary erosion and sediment control measures and the removal of sediment accumulated by the control measures.
5. Amendments to the Construction Specification for Temporary Erosion and Sediment Control Measures to specify the type of temporary erosion and sedimentation control measures to be installed and the timing constraints for the installation and removal of the control measures.
6. Any Non-Standard Special Provisions (NSSPs) required to stipulate the time interval (i.e., maximum of 20 calendar days) between the commencement and completion of any work that disturbs earth surfaces, and to provide direction for seeding, mulching or use of an erosion control blanket to be placed in areas of soil disturbance to provide slope protection and long-term slope stabilization.
7. General Specification for the Management of Excess Materials (OPSS 180) to ensure material generated during maintenance of sediment control measures will be taken off-site for disposal.

In addition to the OPSSs described above, the Environmental Guide for Erosion and Sediment Control During Construction of Highway Projects (MTO 2015) will be adhered to. Best management practices (BMP) and an Erosion and Sediment Control Plan (ESCP) will be prepared during later design phases for implementation during construction. The approach taken in accordance with the Environmental Guide will be determined during later design phases following a risk assessment that considers erosion potential and the consequences of a sediment spill.

Erosion and sedimentation will have a minor effect on surface water quality provided these measures are installed pre-construction, maintained during construction and removed post-construction following soil re-stabilization.

6.3.3 Maintenance of Riparian Vegetation

Maintaining riparian vegetation to the extent possible will help to stabilize the watercourse banks, provide shading/cover for the watercourse, filter contaminants, and improve wildlife habitat and aesthetics. The Contractor will be responsible for vegetation management.

1. Prior to construction, trees/shrubs to be retained will be clearly identified in the field by the installation of tree/shrub protection barrier in accordance with OPSS 801 (Construction Specification for the Protection of Trees).
2. Trees/shrubs identified to remain, which become damaged by construction activities, will be repaired or replaced in accordance with MTO's NSSP - landscaping specifications.
3. In areas where riparian vegetation removal is necessary to accommodate construction, measures to protect the local fish communities shall include the following: no clearing of matures trees providing a bank stabilization function; no felling of trees into the watercourse; minimize the amount of debris produced from entering the watercourse; and, only clearing the vegetation required to complete the necessary works.

6.3.4 Storm Water Management

A storm water management study is ongoing to ensure construction and post-construction conditions maintain flow to downstream habitats, maintain existing water temperatures and ensure water quality is not impaired.

1. Prior to construction, a storm water management plan will be prepared that will address both water quantity and quality, in accordance with MTO guidelines and in consultation with regulatory agencies.

2. The proponent will strive to design storm water management ponds to detain the minimum of a 2-hour 25 mm storm event for 24 hours to address water quality and erosion concerns. Where agencies demonstrate a need, other detention times or additional quantity sizing requirements will be considered prior to construction in consultation with stakeholders.
3. When designing BMPs, consideration will be given to measures for reducing adverse environmental impacts to surface and groundwater, including those related to temperature and salt.
4. Bridge runoff will be discharged to storm water management facilities (preferably a pond or swale) prior to discharge to watercourses where this can be achieved and will not cause unacceptable environmental, highway design, safety or operational problems.
5. Where feasible, opportunities for providing ease of containment of accidental spills will be provided during the design of storm water management facilities

6.4 Assessment of Negative Residual Effects

An assessment of negative residual effects for the watercourses is outlined below.

For watercourses at locations where clear span bridges are proposed and no works are expected to occur within the high water mark, no further assessment was undertaken. These crossings are expected to meet all the conditions of the MTO Fisheries Best Management Practice for Clear Span Bridges and are therefore "not likely to result in serious harm". Watercourses which meet these criteria are Sites 15, 18, 19, 24, 29, 44, 49, 50, 51 and 58.

For watercourses in which culvert structures are proposed, the assessment of negative effects are as follows:

- extent (size) for culvert installations are classified as "low", as these installations affect a site, or segment, and effects are localized;
- duration for these structure installations are "high", as the residual changes to the fish habitat will be permanent; and,
- intensity is classified as "low" as the altered habitat is expected to remain at a similar level of productivity as the baseline condition.

Overall, negative residual effects at these watercourse locations should be classified as "low". No permanent impacts to fishes' ability to carry out life processes will result from these works due to the habitat's indirect nature. However, potential "serious harm" could occur to downstream direct habitat, although these effects are not expected. Details regarding specific stressors and residual effects related to the works are outlined in **Table 4/Template 10.3** above.

For watercourses for which tunneling underneath them is proposed, no further assessment was undertaken. These are Sites 14 and 41.

For the features for which a channel realignment is proposed (Sites 12 and 40), the assessment of negative effects are as follows;

- extent (size) for realignment is "low";
- duration for the channel realignment is "high", as the residual changes to the fish habitat will be permanent; and,
- intensity is classified as "low" as the altered habitat has undergone significant change (infilling) but is used as water conveyance only which will not be altered.

Overall, negative residual effects at these watercourse locations should be classified as "low", will not permanently impact fishes' ability to carry out life processes and cause no "serious harm". Both of these features are ephemeral and indirect fish habitat. Details regarding specific stressors and residual effects related to the works are outlined in **Table 4/Template 10.3** above.

6.5 Analysis of Fish and Fish Habitat Sensitivity

Based on a combination of the fisheries assessment by LGL fisheries staff and input by MNRF regarding the interpretation of sensitivity, watercourse sensitivities within the 407 Transitway corridor range from Low to High. In addition, two watercourses are identified as habitat for Silver Shiner (Sites 15 and 29) and one as habitat for Redside Dace (Site 58), which are regulated under the Ontario *Endangered Species Act, 2007*. Consultation with MECP will need to occur during later design phases of this project as necessary. Details regarding interpretation of sensitivity for each individual watercourse are provided in **Section 5.0**: Existing Fish and Fish Habitat Conditions.

6.6 Categorization of Project Risk

6.6.1 "No Likelihood of Causing Serious Harm" Step 4

Risk assessments were conducted to determine which works would result in "No Likelihood of Causing Serious Harm" and do not require review from DFO. The applicable pathway of effects assessments were undertaken, and mitigation measures were applied, in order to overcome negative effects. With all mitigation measures taken into account, an assessment of the residual negative effects was conducted for each crossing.

The proposed works at the following watercourses meet the conditions of the MTO Fisheries Best Management Practice for Clear Span Bridges, thus are considered not likely to result in serious harm; Sites 15, 18, 19, 24, 29, 44, 49, 50, 51 and 58. The proposed structure designs meet the criteria as they will be placed above the high water mark. Clear span bridge construction must meet all the operational constraints and protection measures in order to be in compliance with the MTO Fish Guide (MTO 2013). Review by DFO is not required at these locations. A MTO Project Notification Form will likely be required prior to construction.

New crossing structures are proposed at the following watercourses; Sites 6-11, 13, 16-17, 20-23, 26, 28, 26-37, 29 and 53. The results of the assessment for these watercourses determined "No Likelihood of Causing Serious Harm" based on the Transitway design as no permanent impacts to fishes' ability to carry out life processes are expected to take place. Site specific mitigation measures are included in **Table 3** and general mitigation measures are outlined in **Section 6.3**.

Although channel realignments often have a "Likelihood of Causing Serious Harm", the two realignments proposed for this project are at features that are ephemeral swales that are indirect habitat only (they convey water to downstream habitats). As fish do not require these features to carry out life processes directly, or indirectly, their alteration will have no effect on fish. Because they will still convey water to downstream habitats, and they are low sensitivity, their alteration will not cause "serious harm." Site specific mitigation measures are included in **Table 3** and general mitigation measures are outlined in **Section 6.3**.

"No Likelihood of Causing Serious Harm" will apply at all of the above crossings as long as the site specific (**Table 3**) and general mitigation measures outlined in **Section 6.3** are implemented (except for Sites 12 and 40 due to the realignments, which may potentially require review by DFO and should be revisited during detail design). Review by DFO is likely not required at these locations. A MTO Project Notification Form will likely be required prior to construction.

7.0 POTENTIAL ENHANCEMENT/COMPENSATION

Rambo Creek Watershed

The main enhancing opportunity for Rambo Creek is to "daylight" the creek. According to the secondary source review, much of Rambo Creek has been hardened, buried and diverted. The mouth of Rambo Creek at Lake Ontario is natural (Cook 2013). No fisheries community information was available from secondary source review because the upstream reaches of this watercourse are not passable to fish.

Roseland Creek Watershed

According to the secondary source review, Roseland Creek has historically had alterations to the natural channel form due to urbanization, hardening and channelization. The hydrology is reported to be unstable and is resulting in accelerated channel enlargement and erosion. The following enhancement opportunities were presented in the Roseland Creek Erosion EA (Aquafor Beech Limited 2014): replacement of failed bank treatments with alternative treatments such as armourstone, natural roundstone, and native bank vegetation; changes to channel planform but maintenance of the existing alignment where property constraints dictate; improvement of riparian buffer through planting of native trees and shrubs.

Tuck Creek Watershed

According to the secondary source review, Tuck Creek has historically had alterations to the natural channel form due to urbanization, hardening and channelization. The hydrology is reported to be unstable and is resulting in accelerated channel enlargement and erosion. The following enhancement opportunities were presented in the Tuck Creek Erosion EA (Aquafor Beech Limited 2012): replacement of failing bank treatments with alternative treatments including armourstone, vegetated stone bank treatment, rock toe protection, and/or vegetated banks; restoration of watercourse floodplain access through cutting back of channel banks; improvement of riparian cover through planting of native trees and shrubs.

Shoreacres Creek Watershed

According to the secondary source review, Shoreacres Creek is experiencing accelerated erosion which is presenting environmental issues, in addition to risk to private property and municipal infrastructure. Some reaches of this watercourse have been hardened and channelized, and others remain in a naturalized state (Cole Engineering 2015). Specific enhancement opportunities for this watershed were not stated in the secondary source review (Cole Engineering 2015; CH 2009a). General enhancement measures for this watershed could be considered for a watercourse which has experienced a degree of urbanization. These may include, but not be limited to, reconnecting partially or fully disconnected creeks from adjacent floodplains, bank stabilization, removals of barriers to fish movement, buffer enhancement, invasive species management, riparian plantings, and implementation of storm water management techniques for new construction.

Appleby Creek Watershed

Specific issues to this watercourse were not found during secondary source review (CH 2009a); however, it can be assumed that this watercourse has experienced effects of urbanization. General enhancement measures for this watershed could be considered for a watercourse which has experienced a degree of urbanization. These may include, but not be limited to, reconnecting partially or fully disconnected creeks from adjacent floodplains, bank stabilization, removals of barriers to fish movement, buffer enhancement, invasive species management, riparian plantings, and implementation of storm water management techniques for new construction.

Sheldon Creek Watershed

Specific issues to this watercourse were not found during secondary source review (CH 2009a); however, it can be assumed that this watercourse has experienced effects of urbanization. General enhancement measures for this watershed could be considered for a watercourse which has experienced a degree of urbanization. These may include, but not be limited to, reconnecting partially or fully disconnected creeks from adjacent floodplains, bank stabilization, removals of barriers to fish movement, buffer enhancement, invasive species management, riparian plantings, and implementation of storm water management techniques for new construction.

Bronte Creek Watershed

A review of secondary source information indicates Bronte Creek has experienced effects of urbanization including erosion, loss of riparian vegetation and old storm water infrastructure in the watershed. Specific enhancement opportunities at this creek include: streambank restoration and plantings; low impact development controls (LIDs); upgrades to old storm water infrastructure; and, removal of in-stream barriers.

Fourteen Mile Creek Watershed

According to secondary source review, the study area occurs within the headwater reaches of Fourteen Mile Creek. The current land use in this area is agricultural and rural-recreational. Impacts to urban development must provide reasonable protection for significant natural areas such as floodplains, environmentally sensitive areas and provincially significant wetlands against changes in the use of land either in or adjacent to them. Erosion, flooding and water quality are issues in the lower reaches of Fourteen Mile Creek. Recommended enhancement features may be limited to maintaining, and if possible, improving form and function of headwater features (TSH *et al.* 2006).

McCraney Creek Watershed

According to secondary source review, the study area occurs within the headwater reaches of McCraney Creek. The current land use in this area is agricultural and rural-recreational. Impacts to urban development must provide reasonable protection for significant natural areas such as floodplains, environmentally sensitive areas and provincially significant wetlands against changes in the use of land either in or adjacent to them. Erosion, flooding and water quality are issues in the lower reaches of McCraney Creek. Recommended enhancement features may be limited to maintaining, and if possible, improving form and function of headwater features. (TSH *et al*. 2006).

Taplow Creek Watershed

According to secondary source review, the study area occurs within the headwater reaches of Taplow Creek. The current land use in this area is agricultural and rural-recreational. Impacts to urban development must provide reasonable protection for significant natural areas such as floodplains, environmentally sensitive areas and provincially significant wetlands against changes in the use of land either in or adjacent to them. Erosion, flooding and water quality are issues in the lower reaches of Taplow Creek. Recommended enhancement features may be limited to maintaining, and if possible, improving form and function of headwater features. (TSH *et al*. 2006).

Sixteen Mile Creek Watershed

According to the secondary source review, this watershed has experienced varied effects of urbanization including bank instability, flooding, old storm water infrastructure, channelization and loss of instream and riparian cover. Watershed-specific enhancement opportunities presented include removal of online ponds, phosphate reduction, improved storm water management techniques, improve in-stream habitat, and increased/improved riparian habitats (CH 2011).

Joshua's Creek Watershed

According to secondary source review, the study area occurs within the headwater reaches of Joshua's Creek. The current land use in this area is agricultural and rural-recreational. Impacts to urban development must provide reasonable protection for significant natural areas such as floodplains, environmentally sensitive areas and provincially significant wetlands against changes in the use of land either in or adjacent to them. Erosion, flooding and water quality are issues in the lower reaches of Joshua's Creek. Recommended enhancement features may be limited to maintaining, and if possible, improving form and function of headwater features. (TSH *et al*. 2006).

Credit River Watershed

The Fletchers Creek Restoration Report (CVC 2012b) presents many enhancement and compensation opportunities to benefit the health of the watershed. Some of the general enhancement opportunities presented in this report include: reconnecting partially or fully disconnected creeks from adjacent floodplains, bank stabilization, removals of barriers to fish movement greater than 12 cm, buffer enhancement, invasive species management, and addition of aquatic habitat improvement structures (CVC 2012b).

8.0 CONCLUSIONS

The proposed works identified at each of the crossings which include bridge and culvert installations will result in a temporary alteration and disruption of fish habitat. The mitigation measures proposed in this document will minimize negative impacts to fish and fish habitat, and offsetting opportunities are presented above in **Section 7.0**. The proposed works will take place between July 1 and September 15 in accordance with the coldwater/Silver Shiner/Redside Dace fisheries timing window, and July 1 and March 31 in accordance with the warmwater timing window. Works are also to be conducted during a period of low flow and precipitation to further reduce the potential impacts. **Templates 10.1, 10.2,** and **10.3** summarize the process through which the "Likelihood of Causing Serious Harm" at each crossing location was determined. The assessments discussed herein will need to be reviewed during detail design to account for any changes that may occur in the future to the *Fisheries Act*.

9.0 REFERENCES

Aquafor Beech Limited. 2014. Schedule B Class EA: Roseland Creek Erosion Control Project- From Upper Middle Road to Guelph Line

Aquafor Beech Limited. 2012. Tuck Creek Erosion Control Municipal Class Environmental Assessment.

Cook Michael. 2013. Daylighting Creeks in Southern Ontario. www.vanishingpoint.ca/daylighting creeks

Cole Engineering. 2015. Shoreacres Creek Erosion Control Municipal Class Environmental Assessment.

Conservation Halton. 2009a. Urban Creek and Supplemental Monitoring: Long Term Monitoring Program.

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Conservation Halton 2011. Grindstone Creek, Sixteen Mile Creek and Supplemental Monitoring: Long Term Monitoring Program.

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Credit Valley Conservation. 2012a. Draft Fletchers Creek Restoration Study. Appendix 1: Characterization Report.

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Department of Fisheries and Oceans. 2019. Aquatic Species at Risk Maps. http://www.dfo-mpo.gc.ca/species-especes/fpp-ppp/index-eng.htm.

Ministry of Natural Resources and Forestry 2017. Make a Natural Heritage Area Map. https://www.ontario.ca/page/make-natural-heritage-area-map.

Ministry of Natural Resources and Forestry. 2017a. Personal Correspondence with Ben Keen, Management Biologist. August 28, 2017 via email;

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Ministry of Transportation. 2013. Ministry of Transportation/Department of Fisheries and Oceans/Ontario Ministry of Natural Resources Protocol for Protecting Fish and Fish Habitat on Provincial Highway Undertakings (Fish Guide).

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TSH Engineers *et al.* 2006. North Oakville Creeks Subwatershed Study. Analysis Report.

APPENDICES

APPENDIX A
CORRESPONDENCE WITH MNRF, CH and CVC

From: Brad Rennick
Sent: November-16-17 11:49 AM
To: Garron, Gus <Gus.Garron@parsons.com>; Graham.DeRose@ontario.ca; skang@lgl.com
Cc: Matt Howatt <mhowatt@hrca.on.ca>; Kerslake, Holly <Holly.Kerslake@parsons.com>; Brown, Vernon <Vernon.Brown@parsons.com>; Maleki, Roshanak <Roshanak.Maleki@parsons.com>
Subject: RE: Data Request - MTO 407 Transitway Winston Churchill Blvd. to Brant Street

Hello all,

Attached is the requested data, and associated metadata for the 407 Transitway project. As discussed previously, the floodplain data will be delivered at a later date due to the scope of the request.

If you have any questions feel free to contact me,

Regards,

Brad Rennick

GIS Analyst

Conservation Halton
2596 Britannia Road West, Burlington, ON L7P 0G3
905.336.1158 ext. 2327 | Fax 905.336.7014 | brennick@hrca.on.ca
conservationhalton.ca[conservationhalton.ca]

From: Garron, Gus [mailto:Gus.Garron@parsons.com]
Sent: November-08-17 9:42 AM
To: Brad Rennick <brennick@hrca.on.ca>; Graham.DeRose@ontario.ca
Cc: Matt Howatt <mhowatt@hrca.on.ca>; Kerslake, Holly <Holly.Kerslake@parsons.com>; Brown, Vernon <Vernon.Brown@parsons.com>; Maleki, Roshanak <Roshanak.Maleki@parsons.com>
Subject: RE: Data Request - MTO 407 Transitway Winston Churchill Blvd. to Brant Street

Hello Brad,

Attached is the signed Licensing Agreement.

Thanks

Gus

From: Brad Rennick [mailto:brennick@hrca.on.ca]
Sent: Tuesday, November 07, 2017 2:11 PM
To: Garron, Gus <Gus.Garron@parsons.com>; Graham.DeRose@ontario.ca
Cc: Matt Howatt <mhowatt@hrca.on.ca>; Kerslake, Holly <Holly.Kerslake@parsons.com>
Subject: RE: Data Request - MTO 407 Transitway Winston Churchill Blvd. to Brant Street

Hello

I have attached our data licensing agreement, please review, sign and return it at your convenience.

Regards,

Brad Rennick

GIS Analyst

Conservation Halton
2596 Britannia Road West, Burlington, ON L7P 0G3
905.336.1158 ext. 2327 | Fax 905.336.7014 | brennick@hrca.on.ca
conservationhalton.ca[conservationhalton.ca]

From: Brown, Vernon [mailto:Vernon.Brown@parsons.com]
Sent: November-07-17 12:50 PM
To: Garron, Gus <Gus.Garron@parsons.com>; Brad Rennick <brennick@hrca.on.ca>
Cc: Matt Howatt <mhowatt@hrca.on.ca>; Kerslake, Holly <Holly.Kerslake@parsons.com>; Maleki, Roshanak <Roshanak.Maleki@parsons.com>
Subject: RE: Data Request - MTO 407 Transitway Winston Churchill Blvd. to Brant Street

Hi Brad,

Yes, we will also need the hydraulic and hydrologic models. As Gus noted below, the study includes a preliminary design, which requires a preliminary assessment of freeboard and clearance requirements at structures (i.e. culverts and bridges) that might be modified/impacted by the implementation of the transitway. In addition, we will need to assess potential hydraulic impacts to adjacent structures and properties along the corridor.

To facilitate the data processing/delivery timeline, if you could provide the floodplain hazard data first and then the engineering models after in a separate package, it would be appreciated.

Regards,
Vernon Brown, M.Sc., P.Eng.
Principal Engineer, Drainage
vernon.brown@parsons.com - P: +1 905.943.0589

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From: Garron, Gus
Sent: Tuesday, November 07, 2017 11:10 AM
To: Brad Rennick <brennick@hrca.on.ca>
Cc: Matt Howatt <mhowatt@hrca.on.ca>; Kerslake, Holly <Holly.Kerslake@parsons.com>; Brown, Vernon <Vernon.Brown@parsons.com>; Maleki, Roshanak <Roshanak.Maleki@parsons.com>
Subject: RE: Data Request - MTO 407 Transitway Winston Churchill Blvd. to Brant Street

Hi Brad,

It is for an EA and Preliminary Design. I'm verifying with the Drainage team if the level of detail engineering requested is consistent with the scope of work.

Many thanks for the cooperation.

Gus

From: Brad Rennick [mailto:brennick@hrca.on.ca]
Sent: Tuesday, November 07, 2017 10:32 AM
To: Garron, Gus <Gus.Garron@parsons.com>
Cc: Matt Howatt <mhowatt@hrca.on.ca>
Subject: RE: Data Request - MTO 407 Transitway Winston Churchill Blvd. to Brant Street

Hi Gus,

I sent this to Holly yesterday but received her "out-of-office" notification, could you please advise on how you would like to proceed?

Regards,

Brad

From: Brad Rennick
Sent: November-06-17 12:39 PM
To: 'Kerslake, Holly' <Holly.Kerslake@parsons.com>
Cc: Matt Howatt <mhowatt@hrca.on.ca>
Subject: RE: Data Request - MTO 407 Transitway Winston Churchill Blvd. to Brant Street

Hi Holly,

One last question before I complete your data request: In the data list below, you've included Hydraulic and Hydrologic models; do you require this detailed engineering dataset for an EA? Our regulated floodplain hazard data is included as part of the Regulated Hazard package I will be sending, however the engineering data is more appropriate for a detail-design stage rather an EA. We can provide the data as part of the request but it will increase the data processing/delivery timeframe.

How would you like to proceed?

Brad
From: Kerslake, Holly [mailto:Holly.Kerslake@parsons.com]
Sent: November-02-17 5:02 PM
To: Brad Rennick <brennick@hrca.on.ca>
Cc: Matt Howatt <mhowatt@hrca.on.ca>; Sowel Kang <skang@lgl.ca>; DeRose, Graham (MTO) <Graham.DeRose@ontario.ca>; Garron, Gus <Gus.Garron@parsons.com>; Leung, Winnie

<Winnie.Leung@parsons.com>
Subject: RE: Data Request - MTO 407 Transitway Winston Churchill Blvd. to Brant Street

Ok thanks Brad! The MTO project manager for this assignment is Graham DeRose, his contact information is noted below.

Graham DeRose
Project Manager
Route Planning & Transit Initiatives
Ministry of Transportation, Central Region
Tel: 416.235.5255
Graham.DeRose@ontario.ca

Holly

Holly Kerslake
Desk : +1 905.943.0446
Cell : +1 647.467.8379

From: Brad Rennick [mailto:brennick@hrca.on.ca]
Sent: Thursday, November 02, 2017 10:51 AM
To: Kerslake, Holly <Holly.Kerslake@parsons.com>
Cc: Matt Howatt <mhowatt@hrca.on.ca>
Subject: RE: Data Request - MTO 407 Transitway Winston Churchill Blvd. to Brant Street

Hi Holly,

Thank you for providing the table, this will help.

I will start processing your request, however I will require the contact information for the MTO project contact as they will have to sign the data licensing agreement.

For #6 – "North Oakville Subwatershed Study Mapping Files" you will have to contact the Town of Oakville directly to obtain this data set.

Regards

Brad Rennick

GIS Analyst

Conservation Halton
2596 Britannia Road West, Burlington, ON L7P 0G3
905.336.1158 ext. 2327 | Fax 905.336.7014 | brennick@hrca.on.ca
conservationhalton.ca[conservationhalton.ca]

From: Kerslake, Holly [mailto:Holly.Kerslake@parsons.com]
Sent: November-01-17 9:25 PM
To: Matt Howatt <mhowatt@hrca.on.ca>
Cc: Garron, Gus <Gus.Garron@parsons.com>; Sowel Kang <skang@lgl.ca>; Brad Rennick <brennick@hrca.on.ca>; Brown, Vernon <Vernon.Brown@parsons.com>
Subject: RE: Data Request - MTO 407 Transitway Winston Churchill Blvd. to Brant Street

Hi Matt & Brad,

I have confirmed with our Environmentalists and Drainage staff and if you could provide us with all the items in the scope listed below, would be great. I also have included a table below, provided by our drainage team, outlining the specific information they are looking for to compliment the list you provided.

Item	Data	Preferred Format	Remarks
1	Hydrologic and Hydraulic Models. Required for all sub-watersheds traversed by the study area: Upper Rambo, Roseland, Tuck, Shoreacres, Appleby, Sheldon, Bronte, Fourteen Mile, McCraney, Sixteen Mile, Joshua's Creeks, Morrison Creek.	HEC-RAS and Visual OTTHYMO	This will be required for all tributaries/creeks located within the project limits, if available.
2	Conservation Halton's Approximate Regulatory Limit Mapping (includes watercourses, floodplain, top of bank and meander belt erosion hazards, wetlands and associated hazard allowance setbacks)	PDF, DWG and GIS Shapefiles	
3	Subwatershed Boundaries	PDF, DWG and GIS Shapefiles	Required for all sub-watersheds listed in **Item#1**, i.e. Upper Rambo, Roseland, Tuck, Shoreacres, Appleby, Sheldon, Bronte, Fourteen Mile, McCraney, Sixteen Mile, Joshua's Creeks, Morrison Creek.
4	Topographic Contour Information	DWG and GIS Shapefiles	Maximum contour interval should be 1 m
5	Hydrological Features	DWG or GIS Shapefiles	
6	North Oakville Subwatershed Study Mapping Files	DWG or GIS Shapefiles	

To answer your second question, LGL Consultants has put in data requests to both MNRF and to Fisheries.

Thanks for your help on pulling this data together – it is greatly appreciated.

Holly

Holly Kerslake
Desk : +1 905.943.0446
Cell : +1 647.467.8379

From: Matt Howatt [mailto:mhowatt@hrca.on.ca]
Sent: Wednesday, October 25, 2017 3:20 PM
To: Kerslake, Holly <Holly.Kerslake@parsons.com>
Cc: Garron, Gus <Gus.Garron@parsons.com>; Sowel Kang <skang@lgl.ca>; Brad Rennick <brennick@hrca.on.ca>
Subject: RE: Data Request - MTO 407 Transitway Winston Churchill Blvd. to Brant Street

Good afternoon Holly,

Thank you for submitting your data request. We've reviewed the request and I've gathered input from our technical staff on the specific information that we believe would be pertinent to provide.

However, prior to processing the data request further, we wanted to confirm the scope of data with you.

Given the size of the study area and the amount of natural hazard and natural heritage lands it traverses, there is a substantial amount of information that could be provided such as:

- Conservation Halton's Approximate Regulatory Limit Mapping (includes watercourses, floodplain, top of bank and meander belt erosion hazards, wetlands and associated hazard allowance setbacks)
- Hydrologic and Hydraulic Modelling (the study area traverses 11 subwatersheds and we would need to determine if modelling is available for every area)
- Subwatershed Boundaries for Upper Rambo, Roseland, Tuck, Shoreacres, Appleby, Sheldon, Bronte, Fourteen Mile, McCraney, Sixteen Mile, Joshua's Creeks
- Topographic Contour Information
- Conservation Halton's Long-Term Environmental Monitoring Program Aquatic and Terrestrial station/site locations (and corresponding data, if required)
- Fish Community and Distribution Information
- Stream Temperature Stations
- Benthic Monitoring Stations
- Ontario Stream Assessment Protocol Sites
- Stream Barriers
- Water Quality Stations
- Groundwater Monitoring Wells
- Hydrological Features
- North Oakville Subwatershed Study Mapping Files

We also wanted to confirm if you have data requests in with the Ministry of Natural Resources and Forestry for information regarding Provincially Significant Wetlands, Areas of Natural and Scientific Interest, Species at Risk records and Halton Region for Significant Woodlands. Their environmental information should also be considered in the study and some of this information may be able from Conservation Halton subject to confirmation with our GIS staff.

Please let us know if you wish to include all of the above items in your data request or if you wish to scope them down.

If you have any questions regarding the above, please contact me or Brad Rennick, Senior GIS Analyst, who is copied on this email or at extension 2327.

Thank you,
Matt

Matt Howatt
Environmental Planner

Conservation Halton
2596 Britannia Road West, Burlington, ON L7P 0G3
905.336.1158 ext. 2311 | Fax 905.336.6684 | mhowatt@hrca.on.ca
conservationhalton.ca[conservationhalton.ca]

From: Kerslake, Holly [mailto:Holly.Kerslake@parsons.com]
Sent: October-19-17 1:28 PM
To: Kirby Childerhose <kchilderhose@hrca.on.ca>
Cc: Garron, Gus <Gus.Garron@parsons.com>; Sowel Kang <skang@lgl.ca>; Matt Howatt <mhowatt@hrca.on.ca>
Subject: Data Request - MTO 407 Transitway Winston Churchill Blvd. to Brant Street

Hello,

Please see attached Parsons's data request and Data License agreement for MTO's 407 Transitway Winston Churchill Blvd. to Brant Street. Please let me know if you have any questions or concerns or need anything else from us – **you can reach me at 905-943-0446**.

Thanks!

Holly

Holly Kerslake
Rail & Transit, Parsons Transportation Group
625 Cochrane Drive, Suite 500, Markham, ON, Canada L3R 9R9
holly.kerslake@parsons.com
Desk : +1 905.943.0446
Cell : +1 647.467.8379

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From: Kerslake, Holly
Sent: June 14, 2018 2:13 PM
To: 'lmarray@creditvalleyca.ca' <lmarray@creditvalleyca.ca>
Cc: 'James, Eric' <ejames@creditvalleyca.ca>; 'Sowel Kang' <skang@lgl.ca>; Maleki, Roshanak <Roshanak.Maleki@parsons.com>; Garron, Gus <Gus.Garron@parsons.com>; Graham.DeRose@ontario.ca; Sarris, Larry (MTO) <Larry.Sarris@ontario.ca>
Subject: MTO 407 Transitway - Brant Street to Hurontario Street - Data Request

Dear Mr. Marray,

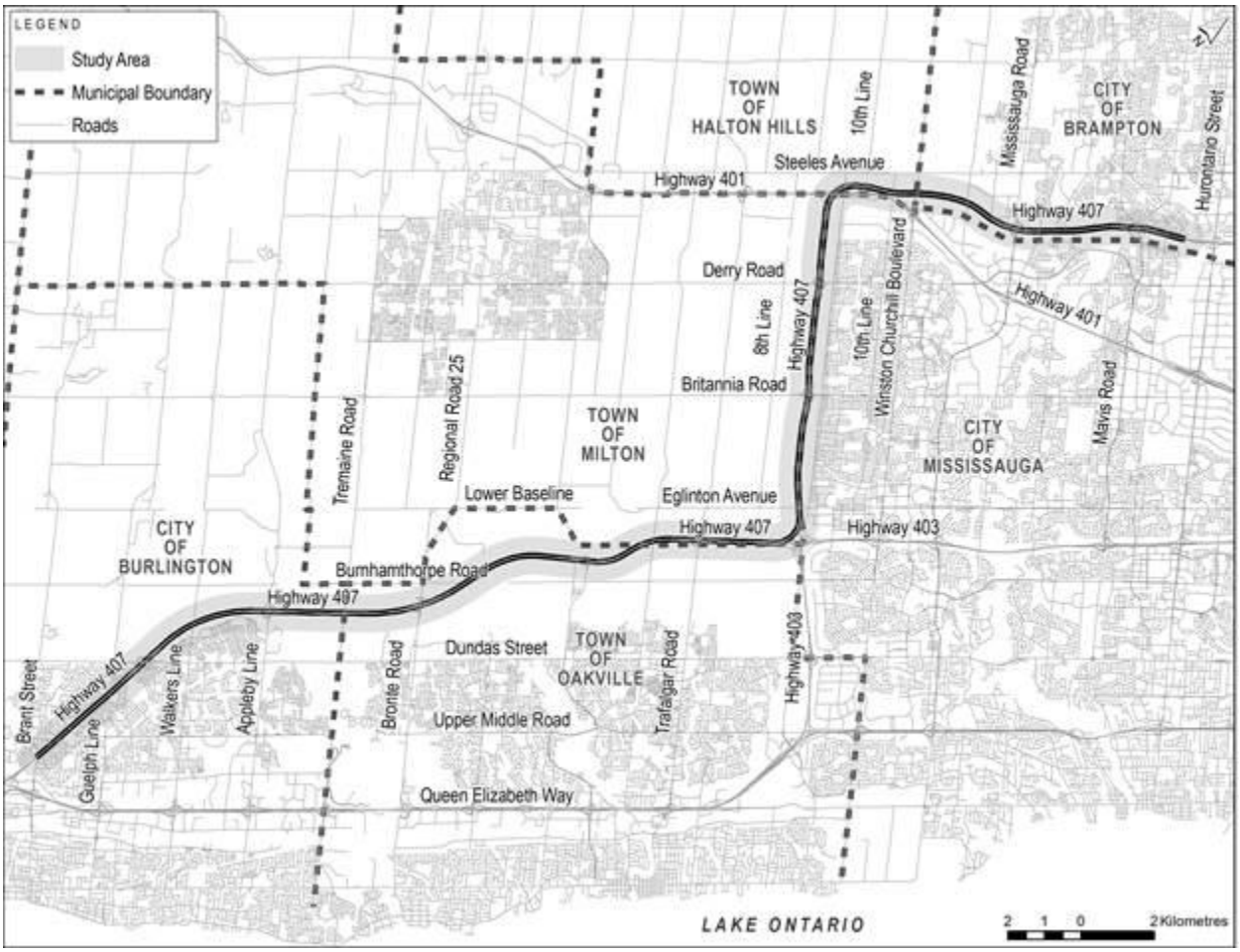
The Ontario Ministry of Transportation (MTO) is commencing the Environmental Assessment, and Preliminary Design of the 407 Transitway from west of Brant Street in the City of Burlington to west of Hurontario Street in the City of Mississauga (study area map below). The 407 Transitway will consist of a 43 kilometre, two-lane, fully grade separated road on an exclusive right-of-way, running along the Highway 407 Corridor, and several station sites that will include parking, pick-up/drop-off, bus integration, and active transportation facilities. This 43 kilometre segment forms part of the 150 kilometre long high-speed interregional facility planned to be ultimately constructed on a separate right-of-way that parallels Highway 407 from Burlington to Highway 35/115, with stations, parking and access connections. This transitway is a component within the official plans of the stakeholder municipalities and of the Province's commitment to support transit initiatives in the Greater Golden Horseshoe through the Metrolinx Regional Transportation Plan.

The project is currently in the data collection phase and the purpose of this email is to request from your authority, any available information and data that may be relevant to the project. Your input with respect to constraints, opportunities, specific concerns, etc. will be most valuable to our project team throughout the study phases. The study area is illustrated in the map below. We have prepared the list shown below, of the data that we hope you will be able to provide; however, any other information that you consider relevant to the project will be most appreciated.

- **Environmental Requirements**
  - Fisheries
    - Fish collection records (fish dots) – includes mussels
    - Habitat data (usually collected during the Watershed Monitoring Program using OSAP)
    - Thermal regime
    - Barrier locations in general proximity to study area (if available)
    - Flow regime (permanent, intermittent, ephemeral)
    - Significant groundwater discharge areas
  - Wildlife
    - SAR
    - Species occurrences (birds, mammals, amphibians)
    - Significant habitat (deer yards, amphibian breeding, interior forest, etc.)
    - Stick nest locations
  - Botany
    - ELC communities
    - Flora
    - Fauna
    - Rare plant occurrences

        - Tree inventories (if available)
    - Significant Natural Areas
        - ESA
        - Wetlands
        - Forest cover
        - ANSIs, PSWs (if available)

- **Water Requirements**
    - Hydrology
        - Drainage Area maps/Catchment boundaries of each watershed (CAD files if available)
        - Hydrologic models for all watersheds within the study boundaries
        - Rainfall files used in the hydrologic models
        - Hydrologic modelling documentation (reports)
    - Hydraulics
        - All available HEC-RAS models
        - All available floodplain maps (CAD files is available)
        - CAD file of all watercourses



Key Plan of the Study Area

Please advise if you have any questions. Your support will be greatly appreciated.

Thanks!

Holly

Holly Kerslake
Rail & Transit, Parsons Transportation Group
625 Cochrane Drive, Suite 500, Markham, ON, Canada L3R 9R9
holly.kerslake@parsons.com
Desk : +1 905.943.0446
Cell : +1 647.467.8379

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From: Vir, Aanchal <aanchal.vir@cvc.ca>
Sent: Tuesday, October 02, 2018 11:43 AM
To: Kerslake, Holly <Holly.Kerslake@parsons.com>
Subject: RE: Holly Kerslake has shared the folder 'TW4 - CVC Data' with you.

Hi Holly,

I uploaded the files. It is a zipped folder which contains 4 other folders. Let me know if you can access them

Regards,

Aanchal Vir
Technician, Planning | Credit Valley Conservation
905.670.1615 ext 304 | 1-800-668-5557
aanchal.vir@cvc.ca | http://cvc.ca[na01.safelinks.protection.outlook.com]

From: Kowalyk, Bohdan (MNRF) <bohdan.kowalyk@ontario.ca>
Sent: November 8, 2018 4:47 PM
To: Kerslake, Holly <Holly.Kerslake@parsons.com>
Cc: DeRose, Graham (MTO) <Graham.DeRose@ontario.ca>; Sarris, Larry (MTO) <Larry.Sarris@ontario.ca>; Bishop, Chris <Chris.Bishop@parsons.com>; Leung, Winnie <Winnie.Leung@parsons.com>; Garron, Gus <Gus.Garron@parsons.com>; Sowel Kang <skang@lgl.ca>
Subject: RE: Feedback - MTO 407 Transitway (Brant St. to Hurontario St.) Technical Resource Group Meeting #1

Hello Holly,

Here are some initial comments:

1. There is habitat of Silver Shiner (threatened) at the proposed crossings of Bronte Creek and Sixteen Mile Creek.

2. There is occupied habitat of Redside Dace (endangered) in Fourteen Mile Creek downstream from Tremaine Road. Therefore, in the Tremaine Road vicinity there is some preference for the northwestern alignment option 1 as it may minimize potential impacts on Redside Dace habitat compared to the southeastern alignment option 2.

3. There is occupied habitat of Redside Dace in the proposed crossing of Fletcher's Creek and recovery habitat of Redside Dace in the proposed crossing of Levi's Creek, both being tributaries of the Credit River.

4. Habitat of American Eel (endangered) may occur in the watercourses mentioned above.

5. The proposed route may affect the provincially significant Churchville-Norval Wetland Complex to the northeast of the Credit River.

6. There are significant woodlands along the main (Bronte Creek, Sixteen Mile Creek and Credit River) valleys as well as: northwest of Highway 407 between the CNR track and Tremaine Road; southeast of Highway 407 east of Bronte Road (Regional Road 25) at the site of a potential maintenance storage yard; between Bronte Creek and Neyagawa Boulevard; between Sixth Line and Trafalgar Road; east of Trafalgar Road; possibly between Highway 407 and Ninth Line; at the site of the Derry Road Station Option B; and east of Mavis Road.

7. All treed areas should be investigated for potential habitat of endangered bats and for the presence of endangered Butternut trees of all sizes, including seedlings.

Endangered and threatened species and their habitats are protected by the *Endangered Species Act*. Appropriate approvals may be required if the work you will be proposing could cause harm to these species and their habitats.

Absence of information provided by MNRF does not categorically mean the absence of sensitive species or features. As you complete fieldwork, please report all information related to natural heritage to our office. This will facilitate consultation regarding your project.

If there are any questions, please let me know.

Regards,

Bohdan Kowalyk, R.P.F.
District Planner, Aurora District, Ontario Ministry of Natural Resources and Forestry
50 Bloomington Road, Aurora, Ontario L4G 0L8
Phone: 905-713-7387; Email: Bohdan.Kowalyk@Ontario.ca

From: Kerslake, Holly [mailto:Holly.Kerslake@parsons.com]
Sent: November-08-18 12:04 PM
To: brennick@hrca.on.ca; Liam.Marray@cvc.ca; pkelly@oakville.ca; Strong, Steven (MNRF); Scott Johnston; curt.benson@halton.ca; kirk.biggar@oakville.ca; Webb, Tim (MECP); Martins, Frank (MTO); Grace, Patrick (IO); Michael Vallins; greg.gowan@hydroone.com; martin.powell@mississauga.ca; Susan.Tanabe@mississauga.ca; Matt Howatt; cwhite@407etr.com; Malcolm.Mackay@Metrolinx.com; Alice Ho; Hank.Wong@brampton.ca; Kowalyk, Bohdan (MNRF); Roban Kupenthirarajan; lisa.deangelis@halton.ca; Abraham, Ernest (IO); Tony.DAlessandro@milton.ca; O'Hara, Charles (MMA); Wang, Hank; Vir, Aanchal; jennifer_benedict@cpr.ca; Ivanic, Erika (MMAH); Gonzalez, Alejandra (MMA/MHO); Melissa Ricci; Mohammad, Ghazanfar; krista.garcia@peelregion.ca; Romas Juknevicius; David.Szwarc@peelregion.ca; Turnbull, Jen (OMAFRA); liz.panacci@peelregion.ca; cary.clark@burlington.ca; Jeff Booker; Allan Ortlieb; Desautels, Solange (MECP); rbacquie@407etr.com; Dagssie, Yves (MECP); Abdul.Shaikh@mississauga.ca; Barb.Koopmans@milton.ca; Lyons, Darryl (MMAH); Dundas, Peter (Peel Regional Paramedic Services); Meghan Bratt; Williams, Andrea (MTCS); frank.dale@peelregion.ca; jane.clohecy@oakville.ca; colm.lynn@burlington.ca; Kaylan.Edgcumbe@burlington.ca; kwab.ako-adjei@burlington.ca; David Wong; dmrkela@407etr.com; Sherwin.Gumbs@Metrolinx.com; Andrea; Jason.Ryan@metrolinx.com; Jill.Hogan@milton.ca; Kuczynski, Roman; Mel.Kayama@mississauga.ca; Kissel, Alex (MNRF); Helfinger, Michael (MEDJCT); steveb@haltonhills.ca; Minkin, Dan (MTCS); rick.schatz@HydroOne.com; lana.kegel@HydroOne.com; tami.kitay@burlington.ca; Sowel Kang; Becca.Nagorsky@metrolinx.com; Poad, Karyn; gordon.hui@peelregion.ca; r.minnesconsulting@gmail.com; sabbir.saiyed@peelregion.ca; andrea.smith@burlington.ca; paul.cripps@milton.ca; bveale@hrca.on.ca; scott.hamilton@burlington.ca; Knuckle, Mark; Bernard Au; Motala, Imran; Fantin, Steven; Parkes, Brian; Weller, Jennie (MECP); Gibson, Brian; Nieuwenhuysen, Bob; Megan.Lovell@milton.ca; Van de Valk, Jackie (OMAFRA); Thomsen, Jeanne; David.Twigg@milton.ca; Steve Burke; Mahmood, Tareq; Wedderburn, Duran; Bennington, Dan; Robert Stribbell; Jamroz, Damian; Van Boxmeer, Kyle; Kellie McCormack; Zubair Naseer; Turner, William; Desmond Chan; rosalind.mingi@burlington.ca; umar.malik@burlington.ca
Cc: DeRose, Graham (MTO); Sarris, Larry (MTO); Bishop, Chris; Leung, Winnie; Garron, Gus; Sowel Kang
Subject: Feedback - MTO 407 Transitway (Brant St. to Hurontario St.) Technical Resource Group Meeting #1

Hello Everyone,

Below is a link to the alignment alternatives shown in the TRG #1 presentation back on September 25th. Please let me know if you have any issues accessing the files.

https://www.dropbox.com/sh/t7qjzd5ljrm9mwf/AAAS4X2PFit8HkWxcfnVCiSOa?dl=0[dropbox.com]

We would appreciate any **comments you have to the TRG presentation by November 14th**. This will allow us to consider your comments for the upcoming PIC's on November 28th and 29th. The type of feedback we are looking for includes any known conflicts with existing municipal infrastructure and planned land use activities that could be impacted by the alternatives presented, municipal benefits of the project as well as any other useful land use/utility information, and any major environmental impact concerns.

Thank-you in advance. Please give myself or anyone from the project team a call if you have any questions or concerns.

Thanks!

Holly

Holly Kerslake
Rail & Transit, Parsons Transportation Group
625 Cochrane Drive, Suite 500, Markham, ON L3R 9R9
holly.kerslake@parsons.com
Phone : +1 647.467.8379

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Hello Judson,

Here you go….fish community table attached.

Natural heritage information is available to NHIC portal. Levi Creek Wetland Complex is in vicinity of 407

Regards

Mark Heaton
OMNRF Aurora

From: Judson Venier <jvenier@lgl.ca>
Sent: August 19, 2019 2:17 PM
To: Heaton, Mark (MNRF) <mark.heaton@ontario.ca>
Cc: Keen, Ben (MNRF) <Ben.Keen@ontario.ca>; Sowel Kang <skang@lgl.ca>
Subject: FW: MNRF Information Request- 407 Transitway Brant Street to Winston Churchill Boulevard

Hi Mark,

Please find attached a MNRF Data Request (part of the MTO/DFO/MNRF Fisheries Protocol), the Aurora District Info Request Form and a watercourse/site map for an additional section of the 407 Transitway project from Brant Street to Hurontario Street. As you can see from below, the original project did not include the section east of Winston Churchill to Hurontario, which was added later. For this additional area, a data request was never sent. Hence this request now. It's all in the Credit River watershed, so hopefully it's easy. We need the information you can provide for the fisheries reporting, as per the protocol. The watercourse sensitivity is particularly important.

If you have any questions, please let me know.

Thank, Mark. I hope all is well.

Judson

Judson Venier
Senior Fisheries Biologist
LGL Limited
22 Fisher Street, P.O. Box 280
King City, ON L7B 1A6
905-833-1244
jvenier@lgl.ca

From: stephanie Lillie <StephanieLillie@lgl.ca>
Sent: July-04-17 10:26 AM
To: esa.aurora@ontario.ca
Cc: Ben.Keen@ontario.ca; Judson Venier <jvenier@lgl.ca>; Sowel Kang <skang@lgl.ca>; holly.kerslake@parsons.com
Subject: MNRF Information Request- 407 Transitway Brant Street to Winston Churchill Boulevard

Hi Ben,

Please see attached, an MNRF Data request (in accordance with the MTO fisheries Protocol), the standard Aurora Distract information request form, and a labelled watercourse figure for the 407 Transitway from Brant Street to Winston Churchill Boulevard located within the Regional Municipalities of Peel and Halton.

Please let myself or Judson Venier (cc'd) know if you have any questions regarding this request.

Thanks,
Stephanie

Stephanie Lillie B.Sc.
Fisheries Biologist, LGL Limited
22 Fisher Street, P.O. Box 280 King City, ON L7B 1A6
Tel: (905) 833-1244 E-mail: stephanielillie@lgl.com

APPENDIX B
PHOTOGRAPHIC RECORD

PROJECT #TA8733
Spring and Summer 2018/19

PHOTO APPENDIX
407 Transitway from Brant Street to Hurontario Street

LGL LIMITED
environmental research associates

Site 2: Facing west (upstream) from upstream of 407 ETR culvert (Spring 2019).

Site 2: Facing west (upstream) from upstream end of Cavendish Drive culvert (Spring 2019).

Site 4: Facing south (upstream) at downstream end of pipe outlet at Guelph Line (Spring 2019).

Site 4: Facing northeast (downstream) from the pipe outlet at Guelph Line (Spring 2019).

Site 6: Facing southwest (upstream) along the preferred runningway (Spring 2019).

Site 6: Facing northwest (upstream) at the upstream end of the 407 ETR culvert. Note gabion basket barrier to fish passage (Summer 2019).

PROJECT #TA8733
Spring and Summer 2018/19

PHOTO APPENDIX
407 Transitway from Brant Street to Hurontario Street

LGL LIMITED
environmental research associates

Site 7: Facing west (upstream) in vicinity of the upstream edge of the preferred runningway (Spring 2019).

Site 7: Facing east (downstream) at upstream end of 407 ETR culvert downs rocky ramp (Spring 2019).

Site 8: Facing west (upstream) from the upstream end of 407 ETR culvert (Spring 2019).

Site 8: Facing southwest (upstream) from the vicinity of the preferred runningway (Spring 2019).

Site 9: Facing southwest (downstream) from the vicinity of the preferred runningway (Spring 2019).

Site 9: Facing east (downstream) at the upstream ends of the 407 ETR culverts (Spring 2019).

PROJECT #TA8733
Spring and Summer 2018/19

PHOTO APPENDIX
407 Transitway from Brant Street to Hurontario Street

LGL LIMITED
environmental research associates

Site 10: Facing northwest (upstream) from the upstream end of the 407 ETR culvert (Summer 2019).

Site 10: Facing northwest (upstream) in the vicinity of the preferred runningway (Summer 2019).

Site 11: Facing northwest (upstream) from the 407 ETR shoulder (Summer 2019).

Site 11: Facing northwest (upstream) from upstream of the 407 ETR culvert (Spring 2019).

Site 12: Facing northeast at where drainage feature crosses into the ROW (Spring 2019).

Site 12: Facing northwest (upstream) in the vicinity of the preferred runningway (Spring 2019).

PROJECT #TA8733
Spring and Summer 2018/19

PHOTO APPENDIX
407 Transitway from Brant Street to Hurontario Street

LGL LIMITED
environmental research associates

Site 13: Facing south at downstream end of drainage feature and upstream end of 407 ETR culvert (Spring 2019).

Site 13: Facing northwest (upstream) from the 407 ETR ROW at downstream end of drainage feature (Summer 2019).

Site 14: Facing northwest (upstream) from 407 ETR culvert (Spring 2019).

Site 14: Facing northwest (upstream) from 407 ETR culvert (Summer 2019).

Site 15a: Facing northwest (upstream) from the vicinity of the preferred runningway (Spring 2019).

Site 15a: Facing northwest (upstream) from the upstream end of the 407 ETR culvert (Spring 2019).

PROJECT #TA8733
Spring and Summer 2018/19

PHOTO APPENDIX
407 Transitway from Brant Street to Hurontario Street

LGL LIMITED
environmental research associates

Site 15: Facing northwest (upstream) from the vicinity of the preferred runningway (Summer 2019).

Site 15: Facing south (downstream) at the 407 ETR bridges (Summer 2019).

Site 16: Facing southwest at drainage feature upstream of the 407 ETR crossing (Spring 2019).

Site 16: Facing east (downstream) at the 407 ETR culverts (Spring 2019).

Site 17: Facing west (upstream) from the Tremaine Road crossing (Spring 2019).

Site 17: Facing east (downstream) from downstream end of the Tremaine Road crossing at the short channel upstream of the 407 ETR culvert (Spring 2019).

PROJECT #TA8733
Spring and Summer 2018/19

PHOTO APPENDIX
407 Transitway from Brant Street to Hurontario Street

LGL LIMITED
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Site 18: Facing east (downstream) at the upstream end of the 407 ETR culverts (Spring 2019).

Site 18: Facing west (upstream) from the edge of the 407 ETR ROW (Spring 2019).

Site 19: Facing southeast (downstream) from the 407 ETR culvert (Spring 2019).

Site 19: Facing southeast (downstream) in the vicinity of the preferred runningway (Spring 2019).

Site 20: Facing east (downstream) from the edge of the 407 ETR ROW (Spring 2019).

Site 20: Facing northwest (upstream) from the vicinity of the preferred runningway (Spring 2019).

PROJECT #TA8733
Spring and Summer 2018/19

PHOTO APPENDIX
407 Transitway from Brant Street to Hurontario Street

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Site 21: Facing southeast (downstream) from the 407 ETR culvert (Spring 2019).

Site 21: Facing northwest (upstream) at the preferred runningway (Spring 2019).

Site 22: Facing east (downstream) from the 407 ETR culverts (Spring 2019).

Site 22: Facing east (downstream) from the vicinity of the preferred runningway (Spring 2019).

Site 23: Facing south (downstream) from the 407 ETR EBL lane offramp culverts (Spring 2019).

Site 23: Facing south (downstream) from the vicinity of the preferred runningway (Spring 2019).

PROJECT #TA8733
Spring and Summer 2018/19

PHOTO APPENDIX
407 Transitway from Brant Street to Hurontario Street

LGL LIMITED
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Site 24: Facing east (downstream) from 407 ETR culverts (Summer 2018).

Site 24: Facing west (upstream) at the online pond just downstream of the preferred runningway (Spring 2019).

Site 25: Facing northwest (upstream) in the vicinity of the preferred runningway (Spring 2019).

Site 25: Facing southeast (downstream) from the vicinity of the preferred runningway (Summer 2018).

Site 26: Facing northwest (upstream) within the proposed runningway and station location (Spring 2019).

Site 26: Facing southeast (downstream) within the proposed runningway and station location (Summer 2018).

PROJECT #TA8733
Spring and Summer 2018/19

PHOTO APPENDIX
407 Transitway from Brant Street to Hurontario Street

LGL LIMITED
environmental research associates

Site 28: Facing east (downstream) from 407 ETR culvert (Summer 2019).

Site 28: Facing east (downstream) from the vicinity of the preferred runningway (Spring 2019).

Site 29: Facing southwest (upstream) from the vicinity of the preferred runningway (Summer 2019).

Site 29: Facing east (downstream) from the vicinity of the preferred runningway (Summer 2019).

Site 30: Facing north (upstream) from top of rip rap slope that constitutes Site 30 (Summer 2019).

Site 30: Facing south (downstream) at rip rap slope further downhill (Summer 2019).

PROJECT #TA8733
Spring and Summer 2018/19

PHOTO APPENDIX
407 Transitway from Brant Street to Hurontario Street

LGL LIMITED
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Site 35: Facing south (downstream) from Sixth Line (Summer 2018).

Site 35: Facing east (upstream) from Sixth Line at downstream end of 407 ETR culvert (Summer 2018).

Site 36: Facing northeast (downstream) in the vicinity of the preferred runningway and station (Spring 2018).

Site 36: Facing east (downstream) from the downstream end of the Trafalgar Road culvert in the runningway and station location (Spring 2019).

Site 36: Facing east (downstream) at the wetland pond to east of Trafalgar Road in the station location (Spring 2019).

Site 36: Facing southeast (downstream) from the driveway downstream of wetland pond in station location (Summer 2018).

PROJECT #TA8733
Spring and Summer 2018/19

PHOTO APPENDIX
407 Transitway from Brant Street to Hurontario Street

LGL LIMITED
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Site 37: Facing west (upstream) from the runningway and station location (Spring 2019).

Site 37: Facing east (downstream) at station location (Summer 2018).

Site 38: Facing west (upstream) from the runningway and station location (Summer 2018).

Site 38: Facing northeast (downstream) from the station location. Flow spreads out in hay field (Spring 2019).

Site 39: Facing east (downstream) from the 407 ETR culvert (Spring 2019).

Site 39: Facing east (downstream) from the vicinity of the preferred runningway (Spring 2019).

PROJECT #TA8733
Spring and Summer 2018/19

PHOTO APPENDIX
407 Transitway from Brant Street to Hurontario Street

LGL LIMITED
environmental research associates

Site 40: Facing east (downstream) from 407 ETR culvert (Spring 2019).

Site 40: Facing east (downstream) from the vicinity of the preferred runningway (Summer 2018).

Site 41: Facing west (upstream) from 407 ETR culvert (Spring 2019).

Site 41: Facing west (upstream) from 407 ETR culvert (Spring 2019).

Site 43: Facing southeast (downstream) from the Britannia Road bridge (Spring 2019).

Site 43: Facing northwest (upstream) from the Britannia Road to EBL 407 ETR bridge (Spring 2019).

PROJECT #TA8733
Spring and Summer 2018/19

PHOTO APPENDIX
407 Transitway from Brant Street to Hurontario Street

LGL LIMITED
environmental research associates

Site 43: Facing southwest (downstream) from the Ninth Line bridge. Proposed runningway will cross this channelized section (Spring 2019).

Site 43: Facing west at confluence with channel from the north downstream of the runningway (Spring 2019).

Site 43: Facing south (downstream) from the downstream end of the online ponds south of Union Gas (Summer 2018).

Site 43: Facing northwest (upstream) at the online ponds south of Union Gas (Summer 2018).

Site 44: Facing southwest (downstream) from the Derry Road culvert (Spring 2019).

Site 44: Facing northeast (upstream) from the Derry Road culvert (Summer 2018).

PROJECT #TA8733
Spring and Summer 2018/19

PHOTO APPENDIX
407 Transitway from Brant Street to Hurontario Street

LGL LIMITED
environmental research associates

Site 44: Facing southwest (downstream) along the small channel coming from the north at convergence with feature coming from Site 44 culvert (Spring 2019).

Site 44: Facing south (downstream) along channel coming from culvert at Site 44 with convergence with channel from north in background (Spring 2019).

Site 45: Facing northwest (upstream) from the edge of the 407 ETR ROW (Summer 2018).

Site 45: Facing south (downstream) from downstream of the 407 ETR ROW (Spring 2019).

Site 46: Facing north (upstream) at the 407 ETR NBL to Hwy 401 EBL ramp culvert (Spring 2019).

Site 46: Facing south (downstream) from the downstream of the 407 ETR ROW (Summer 2018).

PROJECT #TA8733
Spring and Summer 2018/19

PHOTO APPENDIX
407 Transitway from Brant Street to Hurontario Street

LGL LIMITED
environmental research associates

Site 47: Facing south (downstream) from the Hwy 401 EBL to 407 ETR EBL ramp culverts (Summer 2018).

Site 47: Facing northeast (downstream) along channel/ditch that conveys flows from both Sites 46 and 47 (Spring 2019).

Site 48: Facing north (upstream) from the Hwy 401 ROW (Spring 2019).

Site 48: Facing west at the upstream end of the culvert conveying flows under Hwy 401 (Spring 2019).

Site 49: Facing south (downstream) from the downstream end of the 407 ETR bridge (Summer 2018).

Site 49: Facing southeast (downstream) from the vicinity of the preferred runningway (Summer 2018).

PROJECT #TA8733
Spring and Summer 2018/19

PHOTO APPENDIX
407 Transitway from Brant Street to Hurontario Street

LGL LIMITED
environmental research associates

Site 50: Facing north (upstream) from under 407 ETR bridges (Summer 2018).

Site 50: Facing south (downstream) from downstream of 407 ETR bridges (Summer 2018).

Site 51: Facing northwest (upstream) from under 407 ETR bridge (Summer 2019).

Site 51: Facing southeast (downstream) towards the vicinity of the preferred runningway (Summer 2019).

Site 52-54: Facing southwest (downstream) from the 407 ETR culverts (Summer 2019).

Site 52-54: Facing southwest (downstream) where the watercourse spreads out in a large meadow marsh downstream of the 407 ETR crossing (Summer 2019).

PROJECT #TA8733
Spring and Summer 2018/19

PHOTO APPENDIX
407 Transitway from Brant Street to Hurontario Street

LGL LIMITED
environmental research associates

Site 57: Facing north (upstream) from vicinity of the preferred runningway (Summer 2018).

Site 57: Facing northeast at downstream end of feature at confluence with Fletcher's Creek downstream of preferred runningway (Summer 2018).

Site 58: Facing north (upstream) at channel under and downstream of 407 ETR bridges (Summer 2018).

Site 58: Facing south (downstream) from vicinity of the preferred runningway (Summer 2018).

Site 59: Facing north (upstream) from south of the runningway (Spring 2016).

Site 59: Facing north (upstream) from south of the runningway (Summer 2016).

APPENDIX C
WATERCOURSE FIELD RECORD FORMS AND HABITAT MAPPING

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
8733		24	04	2019

Is STREAM REALIGNMENT required for this section:

O Yes O No O Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
JMV	Sunny		

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
12°C		

PHOTO NUMBERS AND DESCRIPTIONS:

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
Trib of Rembo Cr.	Rembo Cr.	2	

LOCATION OF CROSSING:

B/w Cavendish Dr. & 407 ETR, b/w Brant & Upper Middle

UTM ZONE, EASTING & NORTHING:	MTO CHAINAGE:
TOWNSHIP:	**MNR DISTRICT:** Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Residential/Urban, Hwy	residential + hwy runoff

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert ✓	Open Foot Culvert O	CSP O	N/A O

Other O Describe:

Size (w x h) m^2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
	U/S of 407

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	✓	✓	O	O	

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):

SUB-SECTION(S)	Run O	Pool O	Riffle O	Flats O	Inside culvert O	Other
Percentage of area	80		20			
Mean depth wetted (m)	0.15		0.10			
Mean width wetted (m)	4		3.5			
Mean bankfull width (m)	5		5			
Mean bankfull depth(m)						
Substrate	Bo, Co, Gr, Sa, Si		Bo, Co, Gr, Sa, Si			

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	✓	O	O	O
Right Upstream Bank	✓	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
		60	20	Instream Overhanging	10	Instream 10 Overhanging	

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O	O	O	✓

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
			70	
Predominant Species			cattail/Phrag.	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
			Pipe d/s, concrete spillway

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other

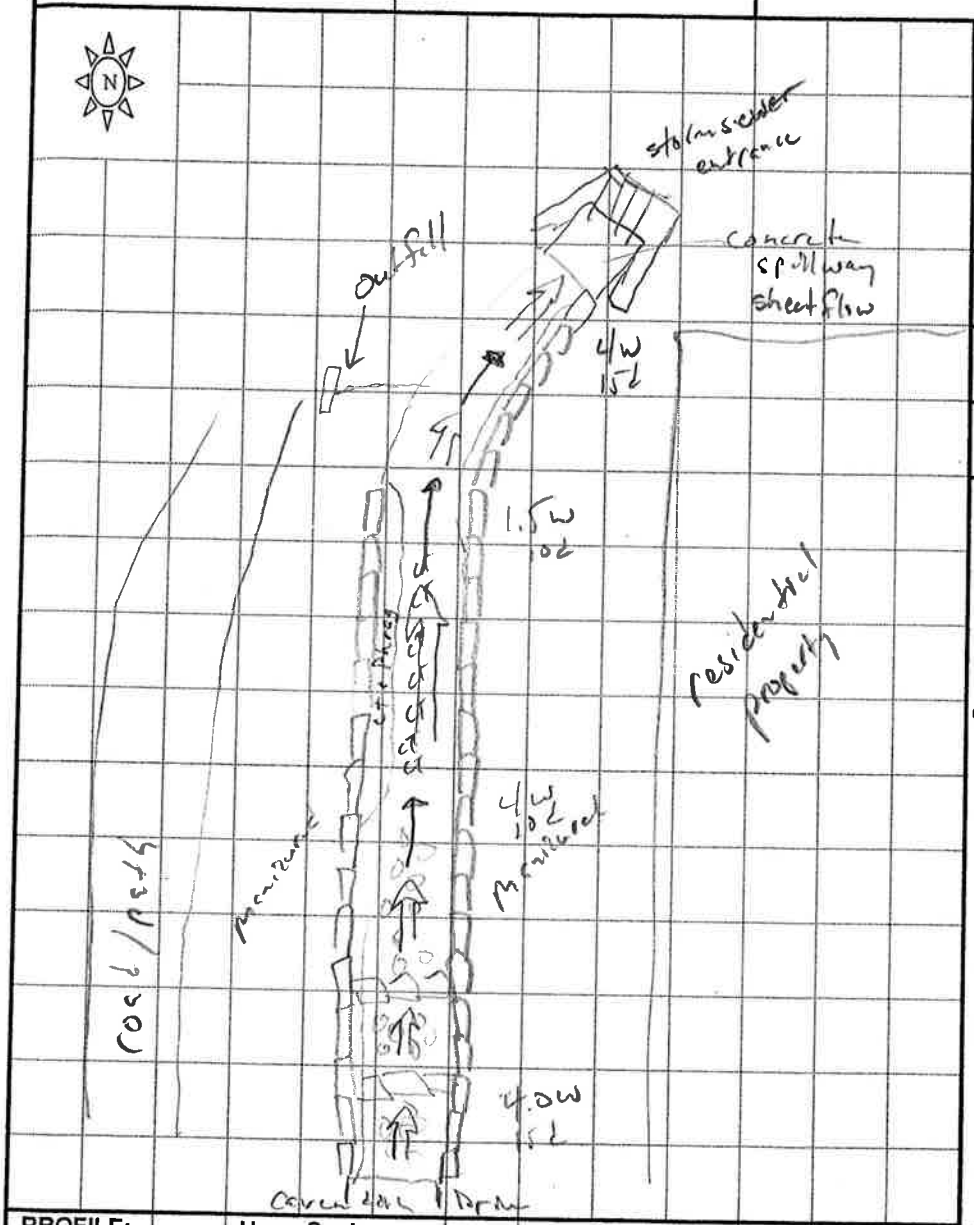
POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

Straight channel w/ armorstone walls. Armorstone plunge pools not really functioning, but overall, this is ok. some sediment build up in channel w/ instream emergent growth (CT). Some Phrag along the banks. manicured on both sides adjacent to residential properties. Park to main natural watercourse u/s. Resident said that there used to be fish here, but not since it was piped d/s. Pipe + concrete spillway barrier to fish.

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):



PROFILE: Horz. Scale Vert. Scale

PROJECT #: 8733

MAPPER: JMV

NAME OF WATERBODY: Trib to Rambo Cr

CROSSING #: 2

STATION #:

DATE: DD-MMM-YY: 24 APR 19

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

⁘ Fine Substrate
Gravel Substrate
oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

⊢▶ Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
17-33-04		24	04	2019

Is STREAM REALIGNMENT required for this section:

O Yes O No O Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
JMV	Sunny, Wind Slight W		

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
12°C		

PHOTO NUMBERS AND DESCRIPTIONS:

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
Trib of Shingacres	Shingacres Cr.	Site 6	

LOCATION OF CROSSING:

GPS COORDINATES:	MTO CHAINAGE:

TOWNSHIP:	MNR DISTRICT:
	Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Ag, Hwy	

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert O	Open Foot Culvert O	CSP ✓	N/A O

Other O Describe: Size (w x h) m^2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
US of 407	

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	✓	O	✓	O	

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	O	O	O	O	O	
Percentage of area	50	20	30			
Mean depth wetted (m)	0.15	0.3	0.1			
Mean width wetted (m)	0.75	1.5	0.5			
Mean bankfull width (m)	4	5	2.5			
Mean bankfull depth(m)	0.75	1	0.5			
Substrate	Gr, Sa, Si, Co	Gr, Co, Bo, Sa, Si	Gr, Sa, Co, Bo			

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	O	~~O~~ (marked)	O	O
Right Upstream Bank	O	~~O~~ (marked)	O	O

HABITAT

IN-STREAM COVER (% surface area):	**Undercut banks**	**Boulders**	**Cobble**	**Woody Debris**	**Organic debris**	**Vascular Macrophytes**	**None**
	5	5	10	**Instream** 20 **Overhanging** 10	30	**Instream** **Overhanging**	

SHORE COVER (% stream shaded):	**100 – 90 %**	**90 – 60%**	**60- 30%**	**30 – 1%**	**None**
	O	~~O~~ (marked)	O	O	O

VEGETATION TYPE (%):	**Submergent**	**Floating**	**Emergent**	**None**
			20	~~100~~
Predominant Species			~~20~~ grasses	

MIGRATORY OBSTRUCTIONS:	**None**	**Seasonal**	**Permanent**
			gabion

POTENTIAL CRITICAL HABITAT LIMITING:	**Spawning**	**Evidence of Groundwater**	**Other**

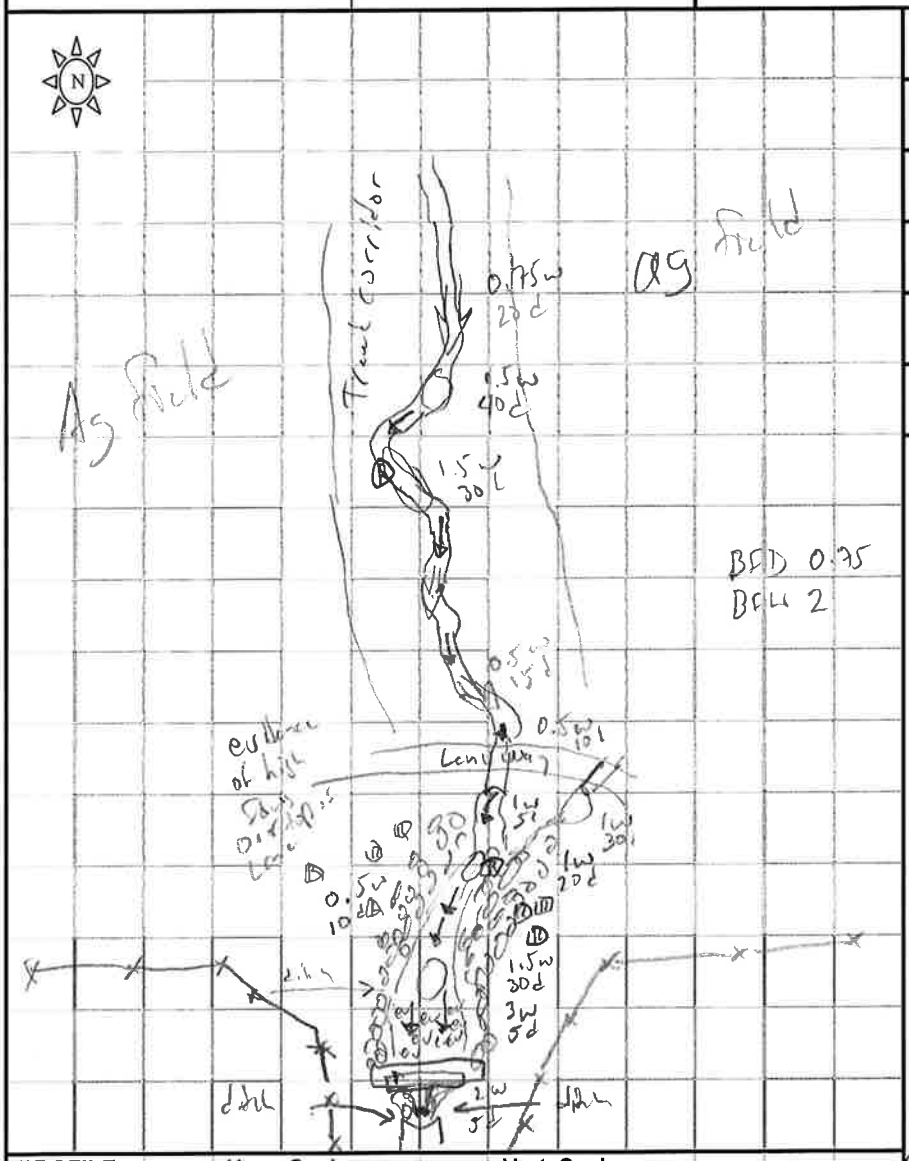
POTENTIAL ENHANCEMENT OPPORTUNITIES:

Realigned watercourse flowing thru trees b/w agricultural fields. Access lane crosses near 407 thru CSP – another small swale (plowed) also crosses here & joins. D/s of lane, channel straight running & well vegetated, Drops over gabion baskets ≈ 2m to riffle below then travels ≈ 7m to CSP. CSP - long run w/ gravel/cobble substrate. Fish (especially observed here). After drop, N & S ditches join u/s of CSP. They are vegetated w/ Phrag. & cattails, & were flowing @ time of survey. Channel u/s of drop, d/s of lane is armored w/ large angular stone along both banks. Channel more incised near lane - wider u/s thru deciduous corridor.

COMMENTS:

Additional Notes Appended? O No O Yes number of pages ________

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):



PROFILE: **Horz. Scale** **Vert. Scale**

PROJECT #:

MAPPER:

NAME OF WATERBODY:

CROSSING #:

STATION #:

DATE: DD-MMM-YY

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
//////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├► Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
8733-04		24	04	2019

Is STREAM REALIGNMENT required for this section:

O Yes O No O Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
JMV	Sunny wind 15km/h W		

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
13°C		

PHOTO NUMBERS AND DESCRIPTIONS:

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
Trib of Shannean,	Shannean Cr.	Sh 7	

LOCATION OF CROSSING:

GPS COORDINATES:	MTO CHAINAGE:

TOWNSHIP:	MNR DISTRICT:

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Ag Hwy	

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert O	Open Foot Culvert O	CSP O	N/A O

Other ~~O~~ Describe: CSPA — Size (w x h) m^2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	~~O~~	~~O~~	O	~~O~~	O	

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):

SUB-SECTION(S)	Run O	Pool O	Riffle O	Flats O	Inside culvert O	Other
Percentage of area	65	10	25			
Mean depth wetted (m)	0.15	0.3	0.05			
Mean width wetted (m)	0.4	1.5	0.4			
Mean bankfull width (m)	2	2	2			
Mean bankfull depth(m)	0.55	1.0	0.35			
Substrate	Gr, Si	Si, Gr, Sa, Br	Bo, Gr, Co			

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	O	✓	O	O
Right Upstream Bank	O	✓	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	20			Instream 10 Overhanging 10	50	Instream Overhanging	

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O	O	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
			10%	
Predominant Species			grass	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
			rocky ramp

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other

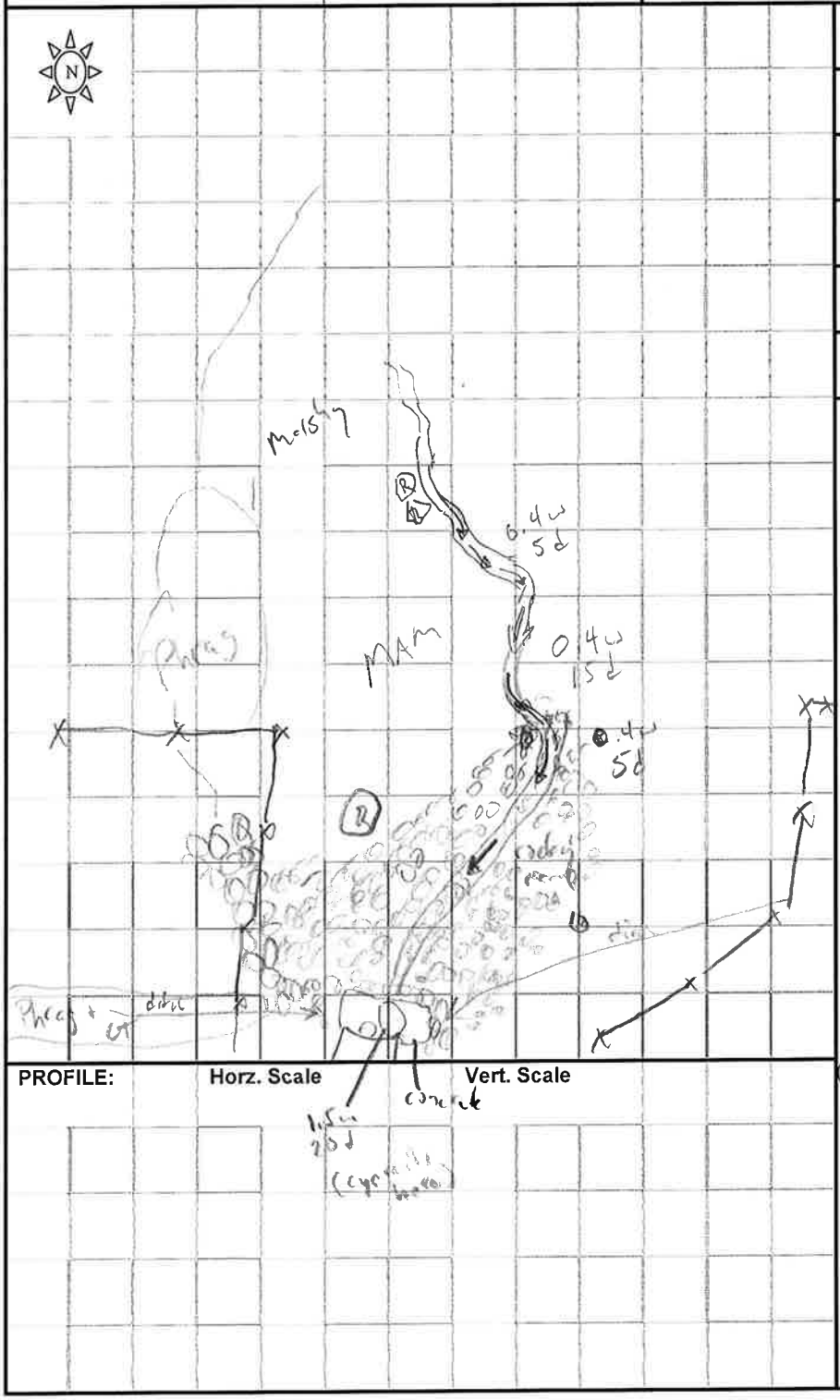
POTENTIAL ENHANCEMENT OPPORTUNITIES:

Similarly to site 6, 1g drop near 407. this time steep, rock channel, Drop about some (~2m). Fish just u/s of w/in culvert (CSPA) when stream flattens. Rocky ramp angular stone. A lot of flow coming in from field adjacent to site 7 (south). All flows are clear. Cyprinid observed u/s of rocky ramp - Direct Habitat - Incised channel / thin treed area b/w fields. Meanders well w/ good bank undercutting but stable banks. Larger treed than @ site 6. Ducks nearby u/s - still a low flow channel, but flows are also spread across MAM. Some of the flow splits off + enters ditch adjacent to culvert. More than one split

COMMENTS:

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):



PROFILE: **Horz. Scale** **Vert. Scale**

PROJECT #:

MAPPER:

NAME OF WATERBODY:

CROSSING #:

STATION #:

DATE: DD-MMM-YY

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├► Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
⌙⌙ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
8753-04		25	04	2019

Is STREAM REALIGNMENT required for this section:

O Yes O No O Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
JMV JSP	~~Rain~~, 9km/h E		

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
13°C		

PHOTO NUMBERS AND DESCRIPTIONS:

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
Trib to Shrieking	Shrieking Cr	SAC 8	

LOCATION OF CROSSING:

UTM ZONE, EASTING & NORTHING:	MTO CHAINAGE:
TOWNSHIP:	MNR DISTRICT:

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert O	Open Foot Culvert O	CSP ✓	N/A O

Other ✓ Describe: CSPA - turn - one higher than other — Size (w x h) m^2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (Include on habitat map)

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	✓	O	✓	O	

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):

SUB-SECTION(S)	Run O	Pool O	Riffle O	Flats O	Inside culvert O	Other
Percentage of area	70	5	25			
Mean depth wetted (m)	0.15	0.25	0.1			
Mean width wetted (m)	0.8	0.5	0.5			
Mean bankfull width (m)	1.8	1.8	1.8			
Mean bankfull depth(m)	0.45	0.55	0.4			
Substrate	Gr, Si, Co	Gr, Si, Co	Bo, Co, Gr			

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	O	✓	O	O
Right Upstream Bank	O	✓	O	O

HABITAT

IN-STREAM COVER (% surface area):	**Undercut banks**	**Boulders**	**Cobble**	**Woody Debris**	**Organic debris**	**Vascular Macrophytes**	**None**
	10	30		Instream 10 Overhanging 5	10	Instream Overhanging	

SHORE COVER (% stream shaded):	**100 – 90 %**	**90 – 60%**	**60- 30%**	**30 – 1%**	**None**
	✓	O	O	O	O

VEGETATION TYPE (%):	**Submergent**	**Floating**	**Emergent**	**None**
			100	
Predominant Species			grasses	

MIGRATORY OBSTRUCTIONS:	**None**	**Seasonal**	**Permanent**
		Steep drops d/s of culvert	

POTENTIAL CRITICAL HABITAT LIMITING:	**Spawning**	**Evidence of Groundwater**	**Other**

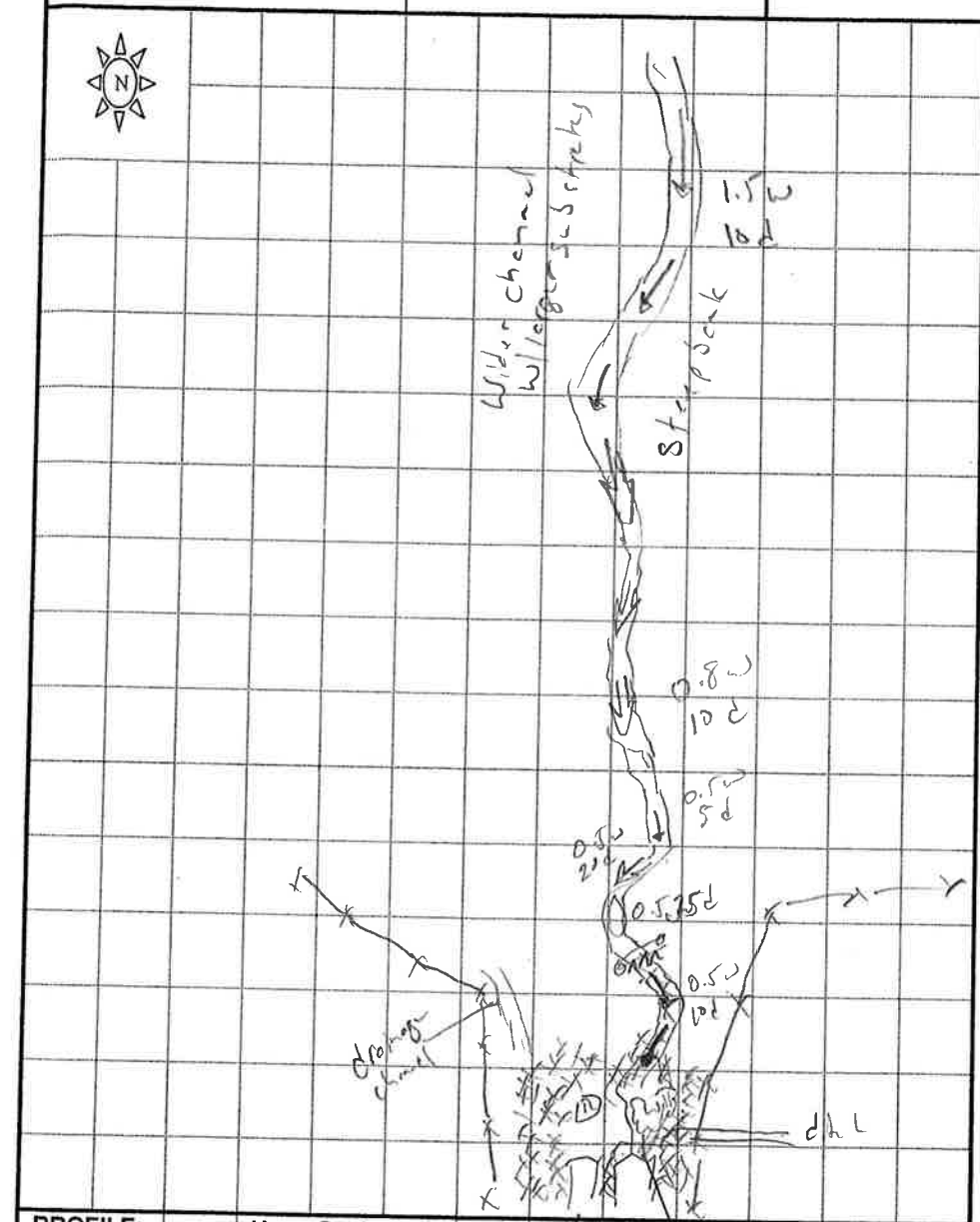
POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

Small channel thru forested strip toward site ? going under fence & enters this channel @ culvert then ditch. Another ditch comes in from southeast flowing. Watercourse has well-defined channel thru treed strip b/w fields. Slightly incised channel consists mainly of runs w/some riffles. Lg woody debris common.

Additional Notes Appended? O No O Yes number of pages ________

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):



PROFILE: Horz. Scale Vert. Scale

PROJECT #:	8733-04
MAPPER:	SMJ
NAME OF WATERBODY:	
CROSSING #:	Site 8
STATION #:	
DATE: DD-MMM-YY	25 APR 19

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⬭ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├► Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
8733-04		25	04	2019

Is STREAM REALIGNMENT required for this section:

O Yes O No O Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
JMU JJP	Partly Cl, 2km/h SE		

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
12°C		

PHOTO NUMBERS AND DESCRIPTIONS:

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
Appleby Creek		Sta. 9	

LOCATION OF CROSSING:

UTM ZONE, EASTING & NORTHING:	MTO CHAINAGE:
TOWNSHIP:	**MNR DISTRICT:** Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:

EXISTING STRUCTURE TYPE

Bridge O	Box CulvertO	Open Foot Culvert O	CSP O	N/A O

Other ✓ Describe: Twin CSPA - one higher invert — Size (w x h) m^2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	O	O	✓	O	

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):

SUB-SECTION(S)	Run ✓	Pool ✓	Riffle ✓	Flats O	Inside culvert O	Other
Percentage of area	85	5	10			
Mean depth wetted (m)	0.3	0.4	0.1			
Mean width wetted (m)	0.5	0.75	0.5			
Mean bankfull width (m)	1.5	1.5	1.5			
Mean bankfull depth(m)	0.45	0.55	0.25			
Substrate	Si D	Si D	ripr			

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	O ✓	O	O	O
Right Upstream Bank	O ✓	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
				Instream 5 Overhanging 5	80	Instream Overhanging	

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O	O	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
			100	
Predominant Species			grasses	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	✓		

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other

POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

Evidence of high flows coming from Walker roadside ditch, Grassy wet flood-plain. Rip rap w/in the 1st several meters u/s of CSPAs. Right d/s CSPA @ higher elevation than left. Flow thru both. Right receives flows from small marsh b/w fence + lane. Some overflow into main channel. Culvert under lane buried, but still conveying flows. Some flows overtopping + going over lane. Channel u/s meanders thru meadow marsh. Heavily vegetated + incised. Mostly run. A couple of pools present. No fish observed. Several frogs.

Additional Notes Appended? O No O Yes number of pages ________

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):

PROJECT #: 8732-04

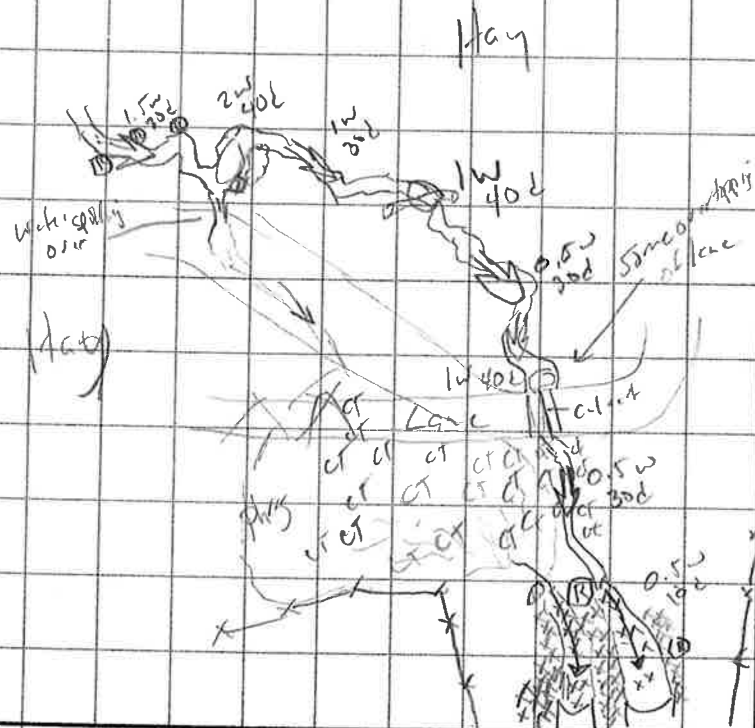
MAPPER: JMW JJP

NAME OF WATERBODY:

CROSSING #: Site 9

STATION #:

DATE: DD-MMM-YY 25 APR 2019



PROFILE: **Horz. Scale** **Vert. Scale**

LEGEND

- **10d** depth (cm)
- **6w** width
- ➡ Riffle
- ⇨ Run/Glide
- ⬭ Pool
- ▮ Island/Bar
- ▒ Fine Substrate
- **###** Gravel Substrate
- **oOooO** Cobble /Boulder
- *** Debris
- **CT** Cattail
- **SV/FV** Submerg/Float Veg
- **EV** Emergent Vegetation
- **W** Watercress
- **Fe** Iron Staining
- ***//////*** Eroded Bank
- **XXX** Riprap / Other Stabilization
- Instream Log/Tree
- **^^^** Dam/Weir/Obstruction
- ® Riparian Tree
- |▶ Seep/Spring
- -------- Undercut Bank
- ▬ Barrier to Fish Movement
- **-S-** Seasonal Barrier
- **-x--x-** Fence line
- └┘ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
8733-04		29	04	2019

Is STREAM REALIGNMENT required for this section:

O Yes O No ☑ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
JMV JJP	4°C overcast wind: 21 km/h E	9:27	

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
4.0 C		

PHOTO NUMBERS AND DESCRIPTIONS:

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
Trib of Shallow Cr	Shelda Cr.	11	

LOCATION OF CROSSING:

UTM ZONE, EASTING & NORTHING:	MTO CHAINAGE:

TOWNSHIP:	MNR DISTRICT:
	Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Ag.	

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert O	Open Foot Culvert O	CSP ☑	N/A O

Other ☑ Describe: CSP lined with black ABS plastic

Size (w x h) m^2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	☑	O	O	☑	O	

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):

SUB-SECTION(S)	Run O	Pool O	Riffle O	Flats O	Inside culvert O	Other
Percentage of area	10%	5%	85%			
Mean depth wetted (m)	10cm	0.2m	0.05m			
Mean width wetted (m)	0.3m	1.5m	0.30m			
Mean bankfull width (m)	0.3m	1.8m	~~30cm~~ 0.3m			
Mean bankfull depth(m)	30cm	0.25m	1m			
Substrate	Si, Gr, Co	Si	Si, Gr, Co, BO			

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	O	O	O	O
Right Upstream Bank	O	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris none Instream Overhanging	Organic debris	Vascular Macrophytes Instream 5 Overhanging O	None
	O	10	5		10		

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O	O	O	⊗

VEGETATION TYPE (%):	Submergent	Floating	Emergent 100 %	None
Predominant Species			grasses	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other

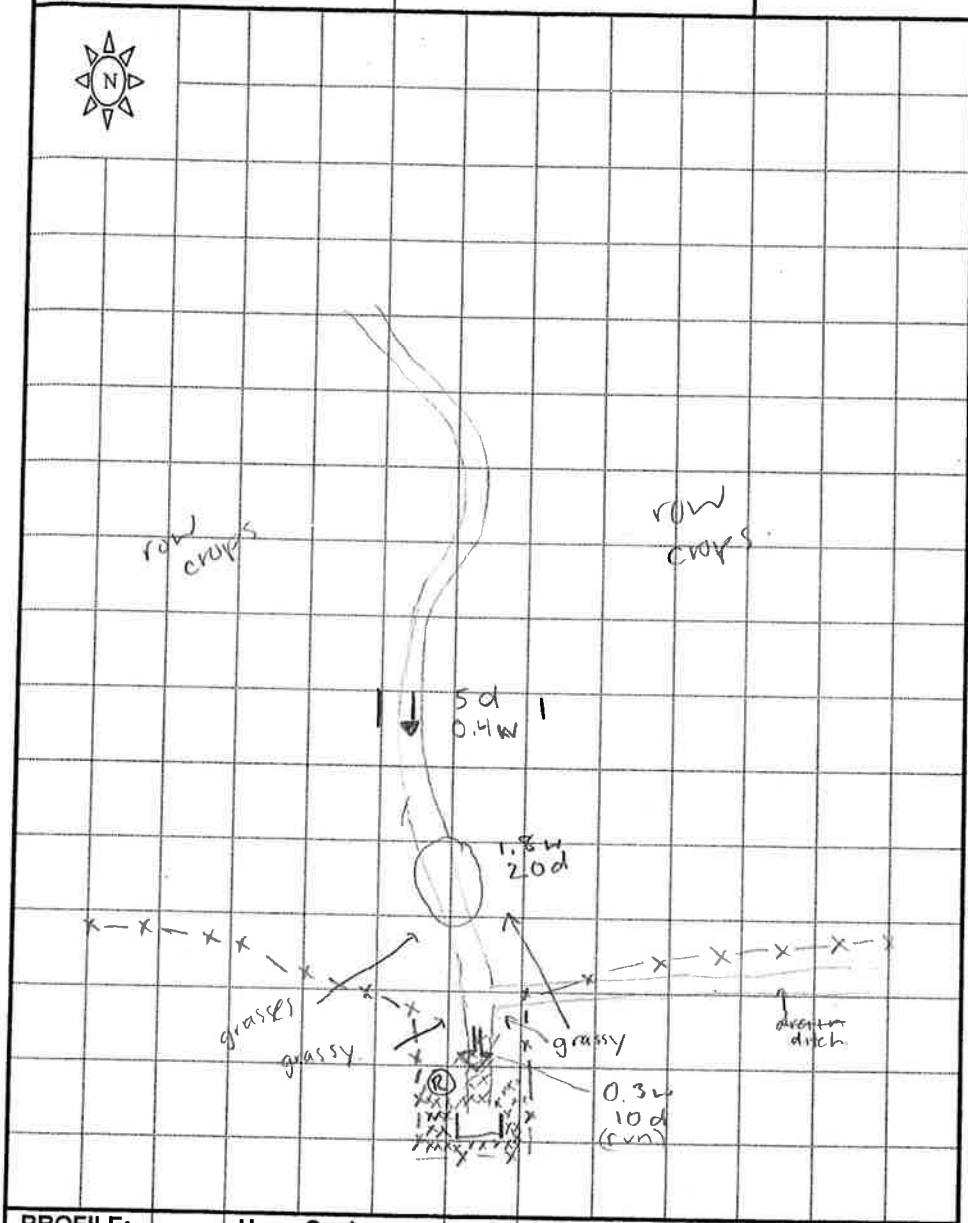
POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

- swale through active agricultural field, plowed through / to edge of watercourse. Located on low spot between fields. Fairly steep gradient to culvert just upstream of fence majority of flow from ditch from site 12

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):



PROFILE:	Horz. Scale	Vert. Scale

PROJECT #:	8733-04
MAPPER:	JJP
NAME OF WATERBODY:	
CROSSING #:	11
STATION #:	11
DATE: DD-MMM-YY	29-04-19

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

⊢► Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
⊔ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
8733-04		29	04	2019

Is STREAM REALIGNMENT required for this section:

O Yes O No Ø Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
JMV JJP	partly cloudy wind 21 km/h E	1014	

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
5°C		

PHOTO NUMBERS AND DESCRIPTIONS:

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
		12	

LOCATION OF CROSSING:

UTM ZONE, EASTING & NORTHING:	MTO CHAINAGE:
TOWNSHIP:	**MNR DISTRICT:** Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Ag.	

EXISTING STRUCTURE TYPE

Bridge O	Box CulvertO	Open Foot Culvert O	CSP O	N/A Ø

Other O Describe: Size (w x h) m^2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (Include on habitat map)

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	Ø	Ø	O	O	Ø	

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	O	O	O	O	O	
Percentage of area	80		20			
Mean depth wetted (m)	0.1m		0.05m			
Mean width wetted (m)	0.5m		1m			
Mean bankfull width (m)	1m		1m			
Mean bankfull depth(m)	0.4m		0.4m			
Substrate	Si		Si, Gr			

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY				
	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	O	O	O	O
Right Upstream Bank	O	O	O	O

HABITAT							
IN-STREAM COVER (% surface area):	**Undercut banks** 1%	**Boulders** 1%	**Cobble** 1%	**Woody Debris** Instream 0 Overhanging 50%	**Organic debris**	**Vascular Macrophytes** Instream 50% Overhanging 50%	**None**

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O	X	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
			100%	
Predominant Species			grasses	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other

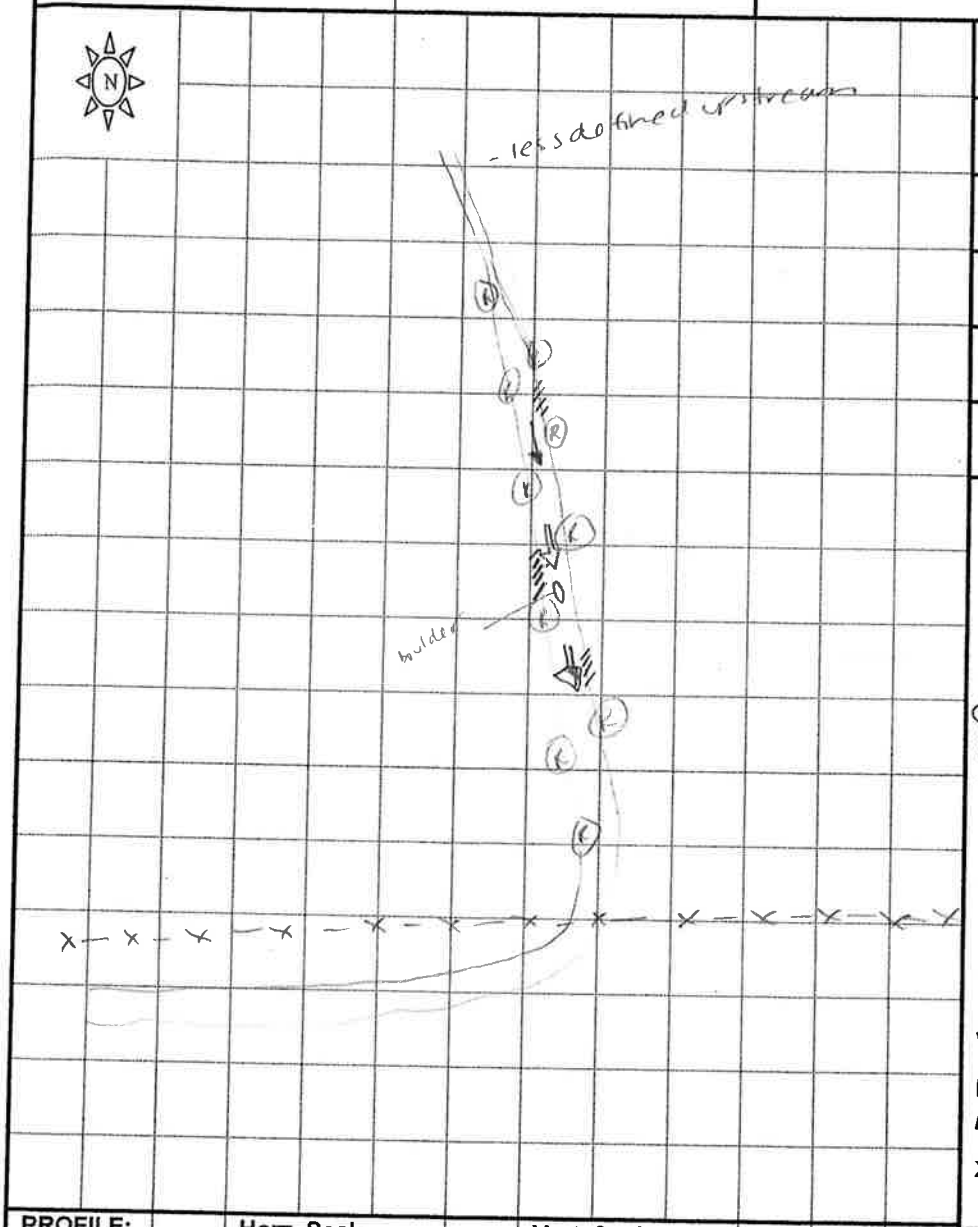
POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

-Defined watercourse that becomes less defined upstream and turns into grassy swale. Diffuse flow upstream becomes more channelized d/s. Channel fluctuates b/w incides from steep eroding banks to wide shallow flows. Lots of instream grass. NOT much flow through watercourse. All flows enter roadside ditch and travel to crossing 11.

Additional Notes Appended? O No O Yes number of pages ________

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):



PROFILE:	Horz. Scale	Vert. Scale

PROJECT #:

MAPPER:

NAME OF WATERBODY:

CROSSING #:

STATION #:

DATE: DD-MMM-YY

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
8733-04		29	04	2019

Is STREAM REALIGNMENT required for this section:

O Yes O No ☒ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
JMV JSR	overcast mild 20 km/hr	11:53	

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
6°C		

PHOTO NUMBERS AND DESCRIPTIONS:

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
Tributary of Brunette Creek	Bronte Cr	15A	

LOCATION OF CROSSING:

UTM ZONE, EASTING & NORTHING:	MTO CHAINAGE:
TOWNSHIP:	**MNR DISTRICT:** Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
agricultural	

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert O	Open Foot Culvert O	CSP O	N/A O

Other ☒ Describe: Lined CSP — Size (w x h) m^2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	☒	☒	O	O	☒	

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	O	O	O	O	O	
Percentage of area	15%	10%	75%			
Mean depth wetted (m)	0.4m	0.5m	0.3m			
Mean width wetted (m)	0.7m	1m	1m			
Mean bankfull width (m)	3m	3m	3m			
Mean bankfull depth(m)	2m	2m	2m ~~0.7m~~			
Substrate	Gr, Bo, Si, Co	Si, Co, Gr	Co, Gr, Bo			

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	O	O	O	⊗
Right Upstream Bank	O	O	O	⊗

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	30%	40%	60%	Instream 35% Overhanging 50%	85%	Instream 80 Overhanging 20	

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O	O	⊗	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
			100%	
Predominant Species			grasses	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other

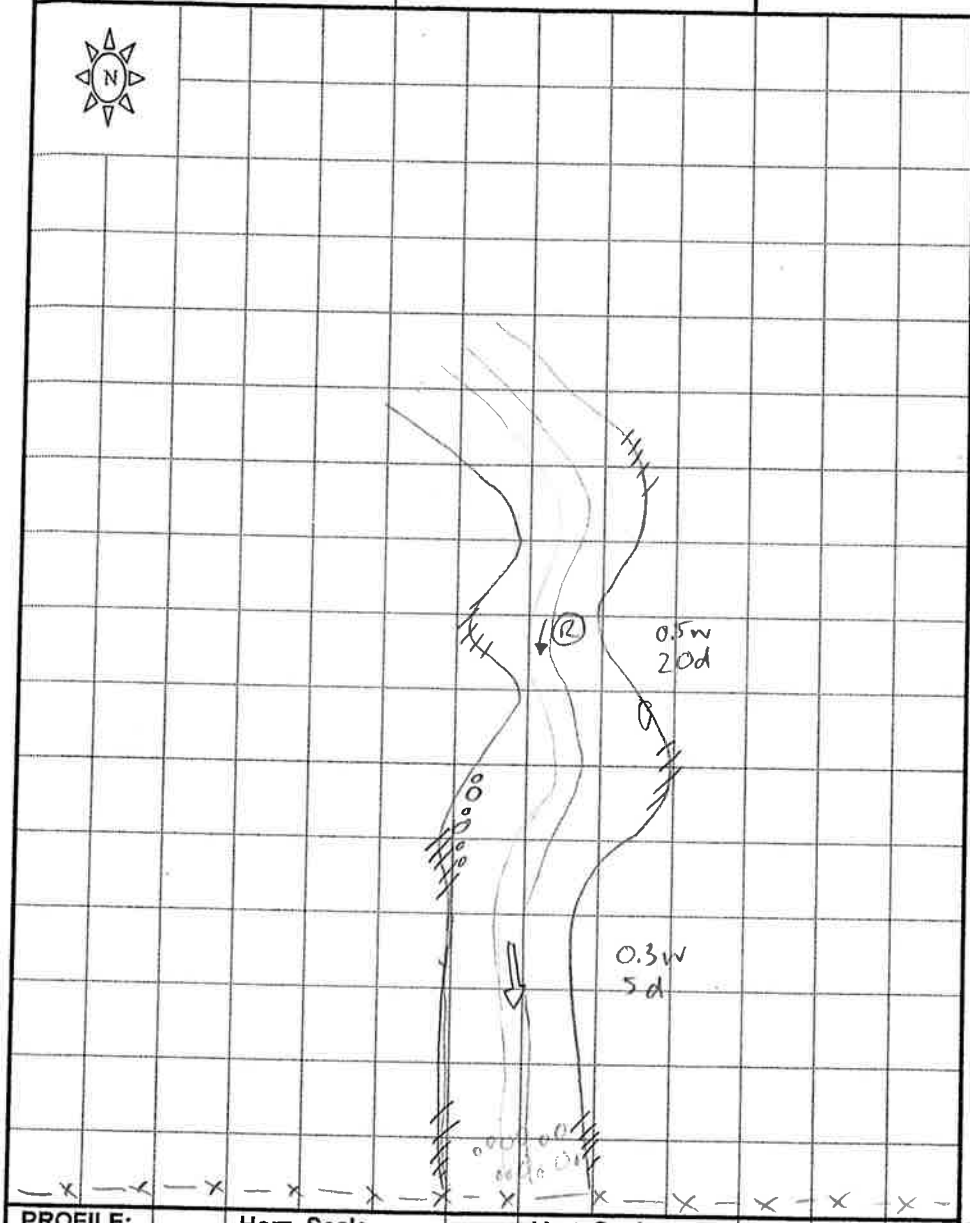
POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

Banks very unstable with eroded banks and undercut banks. comprised of multiple riffles and few runs + A couple pools. Upstream channel is narrow and as you move downstream it widens. substrate changes from silt and some gravel upstream to large boulders and cobble stone downstream. In stream vegetation comprised mainly of grasses and woody debris. culvert at end of downstream channel at Appleby Road. Ditch contributes to flow in channel

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
upstream			



PROFILE: Horz. Scale Vert. Scale

PROJECT #: 8733-04

MAPPER: JJP

NAME OF WATERBODY: Tributary of Bramic Creek

CROSSING #: 15A

STATION #:

DATE: DD-MMM-YY 29-04-2019

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⬭ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├▶ Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
8733		15	08	2019

Is STREAM REALIGNMENT required for this section:

O Yes O No O Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
JMV	Sunny		

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
20 °C		

PHOTO NUMBERS AND DESCRIPTIONS:

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
Bronte Cr.	Bronte Cr	15	

LOCATION OF CROSSING: u/s + d/s of 407 ETR

UTM ZONE, EASTING & NORTHING:	MTO CHAINAGE:
TOWNSHIP:	**MNR DISTRICT:** Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Forest, Ag.	Agriculture, Hwy

EXISTING STRUCTURE TYPE

Bridge ✓	Box Culvert O	Open Foot Culvert O	CSP O	N/A O

Other O Describe: | Size (w x h) m^2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	O	✓	O	O	

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	O	O	O	O	O	
Percentage of area	60		40			
Mean depth wetted (m)	0.3		0.1			
Mean width wetted (m)	15		15			
Mean bankfull width (m)						
Mean bankfull depth(m)						
Substrate	Co, Bo, Gr Si, Br		Co, Bo, Gr			

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	✓	O	O	O
Right Upstream Bank	O	✓	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
		40	40	Instream 10 Overhanging 10		Instream / Overhanging	

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O	O	✓	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
Predominant Species			rushes	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other

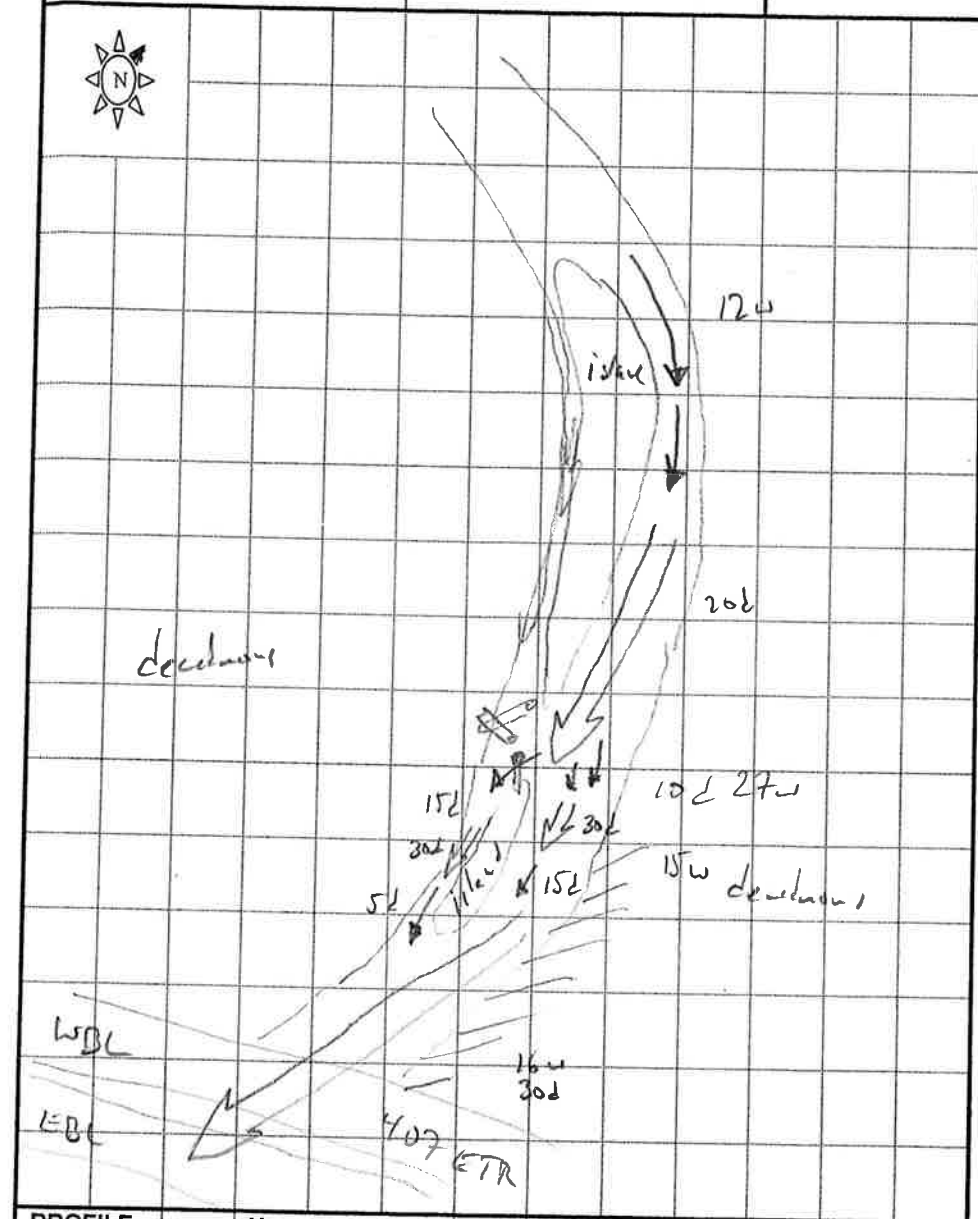
POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

Large watercourse in a deep, wide valley. Valley slopes are well vegetated w/ a mature deciduous forest. Some vertical shale banks u/s & d/s of bridges. Mainly runs + riffles - no pools. Salmon observed during late summer visit in 2018. Many fish observed - fathead Minnow, Creek Chub, Lepomis sp., white sucker, Johnny Darter, common Shiner.

Additional Notes Appended? ✓ No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
US			



PROFILE:	Horz. Scale	Vert. Scale

PROJECT #:	8733
MAPPER:	JMV
NAME OF WATERBODY:	Bronte Cr.
CROSSING #:	15
STATION #:	
DATE: DD-MMM-YY	15 AUG 19

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⬭ Instream Log/Tree
^^^ Dam/Weir/Obstruction

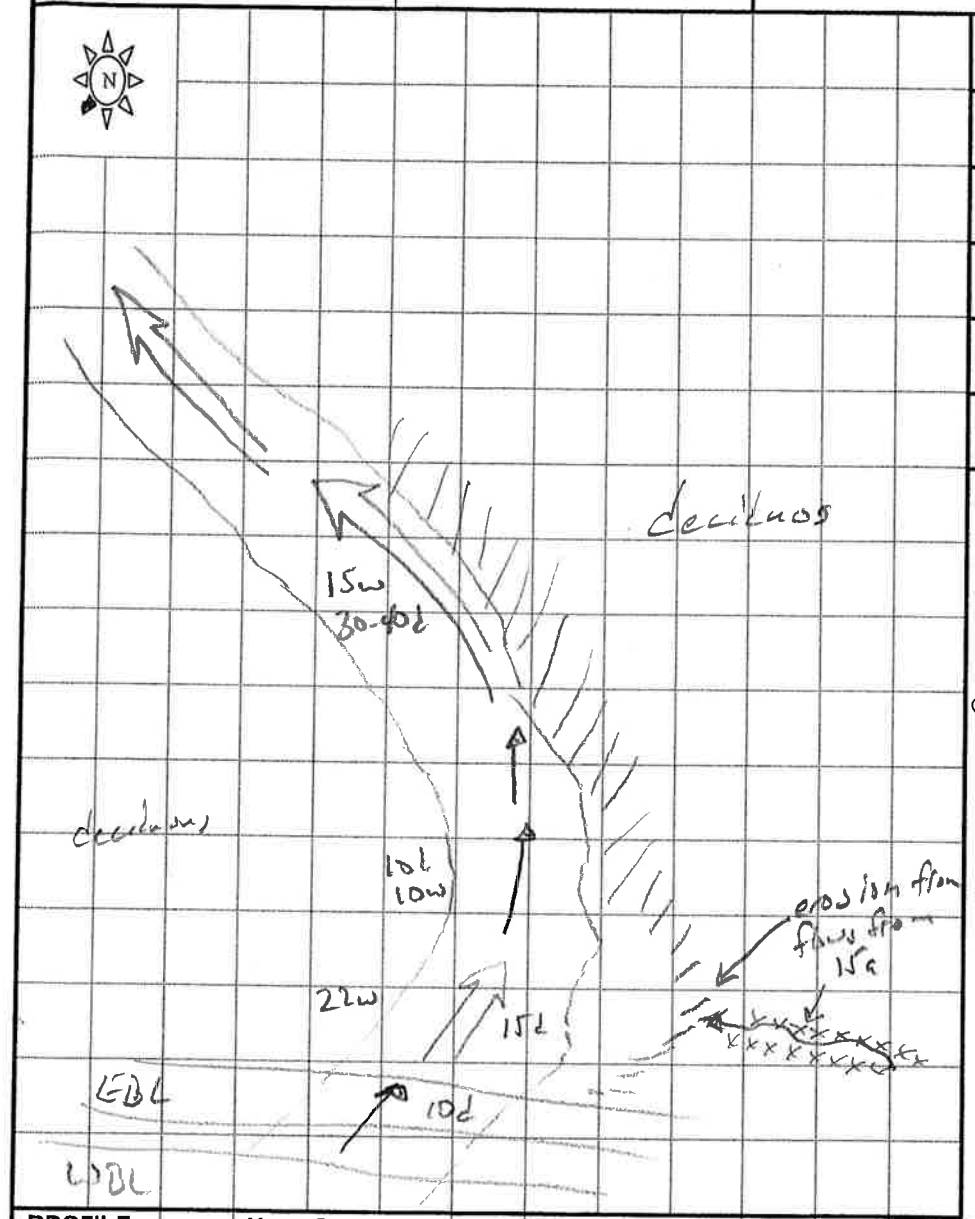
® Riparian Tree

⊢► Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
dls			



PROFILE:	Horz. Scale	Vert. Scale

PROJECT #: 8733
MAPPER: JMV
NAME OF WATERBODY: Bonte Creek
CROSSING #: 15
STATION #:
DATE: DD-MMM-YY: 5-AUG-19

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate
oOooO Cobble /Boulder
*** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

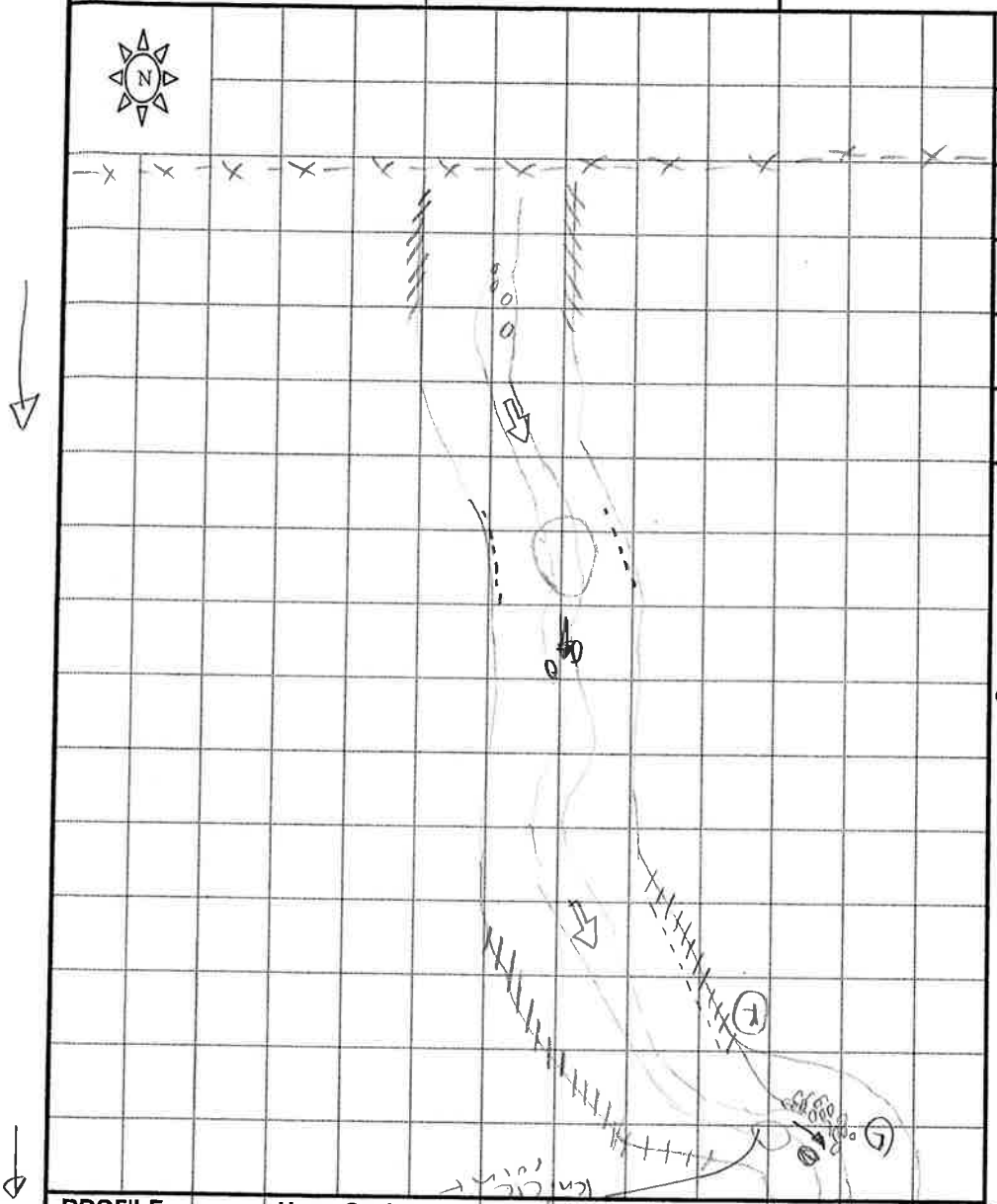
® Riparian Tree

├► Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
downstream			



PROJECT #: 8733-04

MAPPER: JJP

NAME OF WATERBODY: Trib of Bronte Creek

CROSSING #: 15A

STATION #: downstream

DATE: DD-MMM-YY 29-04-2019

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

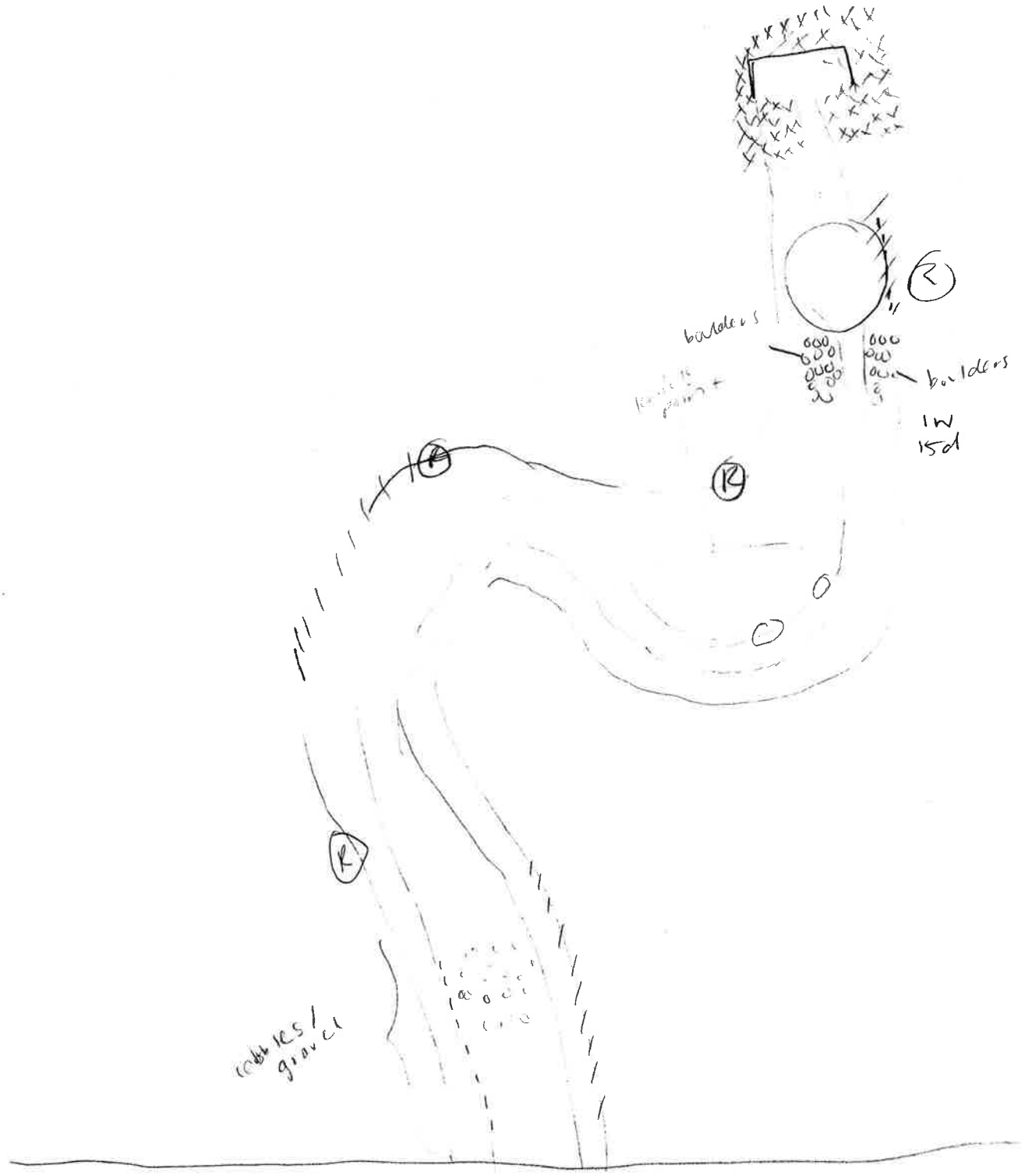
Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
Culvert


boulders
boulders
IW
15d
cobbles/
gravel

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
2723-04		30	04	2019

Is STREAM REALIGNMENT required for this section:

O Yes O No O Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
JMV JJP	Overcast 6deg from N		

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
6 °C		

PHOTO NUMBERS AND DESCRIPTIONS:

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
Trib of 14 mile	14 mile Cr.	18	

LOCATION OF CROSSING:

UTM ZONE, EASTING & NORTHING:	MTO CHAINAGE:
TOWNSHIP:	**MNR DISTRICT:**

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:

EXISTING STRUCTURE TYPE

Bridge O	Box CulvertO	Open Foot Culvert O	CSP O	N/A O

Other O Describe: 3 Plastic Pipes — Size (w x h) m^2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	O	O	O	O	O	

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	O	O	O	O	O	
Percentage of area	55	5	40			
Mean depth wetted (m)	± 0.1	± 0.4	± 0.1			
Mean width wetted (m)	1.5	1	1			
Mean bankfull width (m)						
Mean bankfull depth(m)						
Substrate	Si, Gr	Si, Gr, Co, Bo	Gr, Si, Co			

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	O	O	O	O
Right Upstream Bank	O	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	**Undercut banks**	**Boulders**	**Cobble**	**Woody Debris** **Instream** **Overhanging**	**Organic debris**	**Vascular Macrophytes** **Instream** **Overhanging**	**None**

SHORE COVER (% stream shaded):	**100 – 90 %**	**90 – 60%**	**60- 30%**	**30 – 1%**	**None**
	O	O	O	O	O

VEGETATION TYPE (%):	**Submergent**	**Floating**	**Emergent**	**None**
Predominant Species				

MIGRATORY OBSTRUCTIONS:	**None**	**Seasonal**	**Permanent**

POTENTIAL CRITICAL HABITAT LIMITING:	**Spawning**	**Evidence of Groundwater**	**Other**

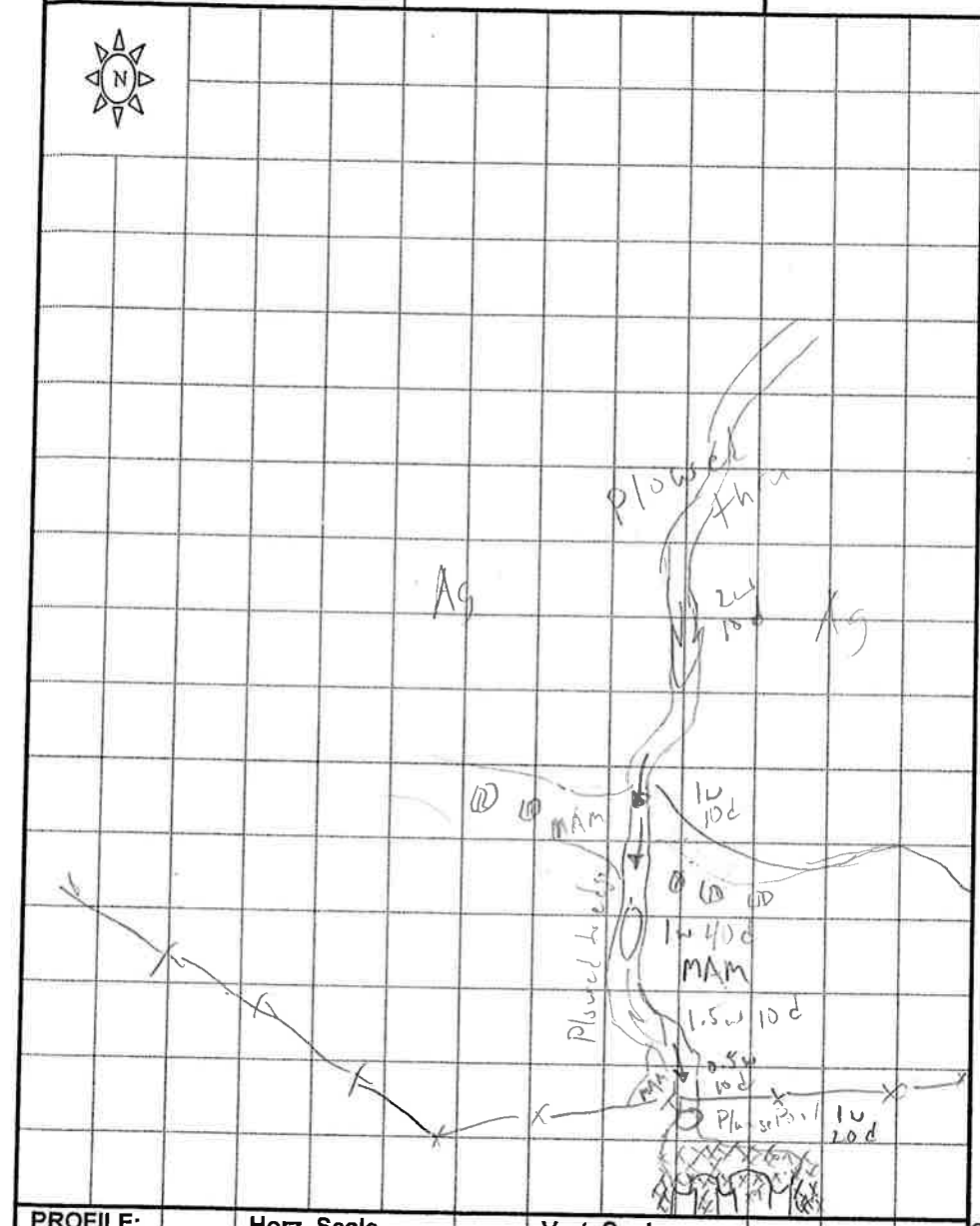
POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

BFW + BFD difficult to discern - plowed thru in many areas or otherwise affected by agriculture, fairly well-defined swale b/w active fields. Grassy. Coarser substrate than other eg. swales. No fish. Drop at end of channel just d/s of fence ≈ 30 cm. Chan thru all 3 culverts. No substrate in culverts. Riprap d/s of fence & channel spread some here.

Additional Notes Appended? O No O Yes number of pages ________

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):



PROFILE:	Horz. Scale	Vert. Scale

PROJECT #: 8733.04

MAPPER: JMV JJP

NAME OF WATERBODY: Trib of 14-Mile

CROSSING #: 18

STATION #:

DATE: DD-MMM-YY 30 APR 19

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

⊢▶ Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
⊔ Culvert

GENERAL INFORMATION

PROJECT #: 8733-04	PROJECT DESCRIPTION:	DAY: 30	MONTH: 04	YEAR: 2019

Is STREAM REALIGNMENT required for this section:

O Yes O No ☒ Unknown

COLLECTORS: JMV JJP	WEATHER CONDITIONS: overcast + wind 10 km/h N	TIME STARTED: 10:26	TIME FINISHED:

AIR TEMP: 6°C	WATER TEMP:	CONDUCTIVITY (µS/cm):

PHOTO NUMBERS AND DESCRIPTIONS:

LOCATION

NAME OF WATERBODY: 14-mile Cr.	DRAINAGE SYSTEM: 14-mile cr	CROSSING #: 22	STATION #:

LOCATION OF CROSSING:

UTM ZONE, EASTING & NORTHING:	MTO CHAINAGE:
TOWNSHIP:	MNR DISTRICT: Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE: Agricultural	SOURCES OF POLLUTION:

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert O	Open Foot Culvert O	CSP ☒	N/A ☒

Other ☒ Describe: plastic lined CSPs x 4 — Size (w x h) m^2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	☑	O	O	☑	O	

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):

SUB-SECTION(S)	Run O	Pool O	Riffle O	Flats O	Inside culvert O	Other
Percentage of area	40	20	40			
Mean depth wetted (m)	0.2m	0.5m	0.1			
Mean width wetted (m)	0.4 m	1 m	0.4			
Mean bankfull width (m)	1 m	1.2 m	1			
Mean bankfull depth(m)	0.4	0.8m	0.3			
Substrate	Si, Co, Bo, Gr	Si	Si, Co, Bo			

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	O	O	O	O
Right Upstream Bank	O	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris / 5	Organic debris	Vascular Macrophytes	None
	0	5	35	Instream 5 Overhanging 10	90	Instream 80 Overhanging 5	

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O	O	X	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent 80	None
Predominant Species			grasses	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other

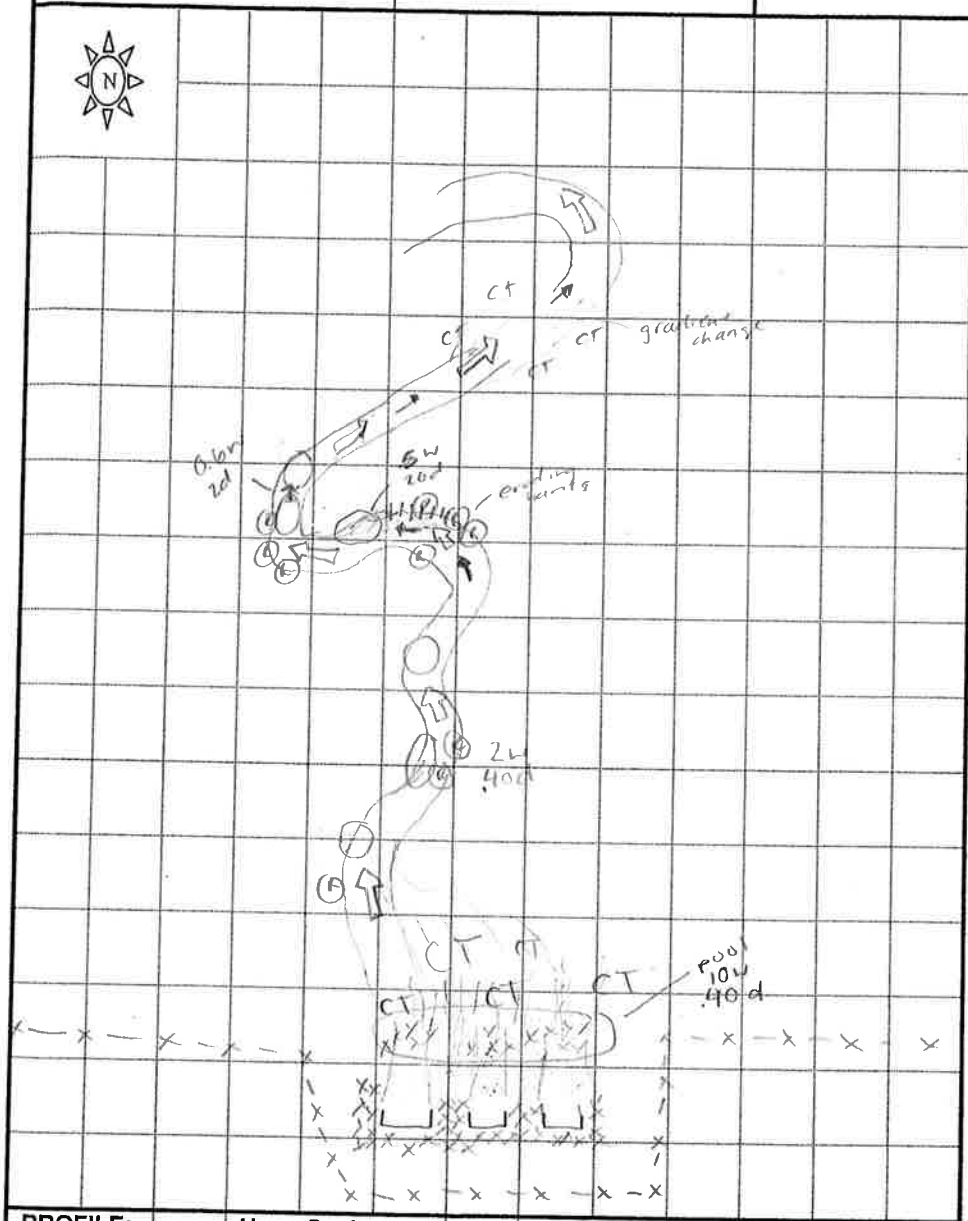
POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

Three plastic lined CSP culverts lined w riprap. Pool directly after outlet of culverts. Each culvert has flow draining through cattail and mixed grass marsh area with diffuse flow. Multiple channels through wetland that converge to form main watercourse. Mostly run, riffle sequences with a few pools. Natural channel with silty substrate, cobble and boulders. Banks slightly eroded at meanders. Eventually enters another vegetated cattail/grass wetland area. Gradient drops slightly at meanders.

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):



PROFILE:	Horz. Scale	Vert. Scale

PROJECT #: 8733-04

MAPPER: JJP

NAME OF WATERBODY: Fourteen Mile Cr

CROSSING #: 22

STATION #:

DATE: DD-MMM-YY 30-04-19

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⬭ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

⊢▶ Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
⌴ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
8733-04		30	04	2019

Is STREAM REALIGNMENT required for this section:

O Yes O No O Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
JMV JSP	sunny	3:30	

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
10°C		

PHOTO NUMBERS AND DESCRIPTIONS:

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
Trib of 14-Mile	14-Mile		24

LOCATION OF CROSSING:

UTM ZONE, EASTING & NORTHING:	MTO CHAINAGE:
TOWNSHIP:	**MNR DISTRICT:** Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert O	Open Foot Culvert O	CSP ☒	N/A O

Other ☒ Describe: 4 CSP lined with plastic culverts — Size (w x h) m^2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	☒	O	☒	O	O	

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):

SUB-SECTION(S)	Run O	Pool O	Riffle O	Flats O	Inside culvert O	Other
Percentage of area	85	10	15			
Mean depth wetted (m)	0.2m		0.1m			
Mean width wetted (m)	1.5m		1.5m			
Mean bankfull width (m)	1.5m		1.5m			
Mean bankfull depth(m)	0.3m		0.2m			
Substrate	Si, Co, Bo		Bo, Si			

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	O	O	O	O
Right Upstream Bank	O	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	O	5	5	Instream Overhanging		Instream 90 Overhanging	

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	⊘	O	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent 90	None
Predominant Species			cattails (phrag)	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other

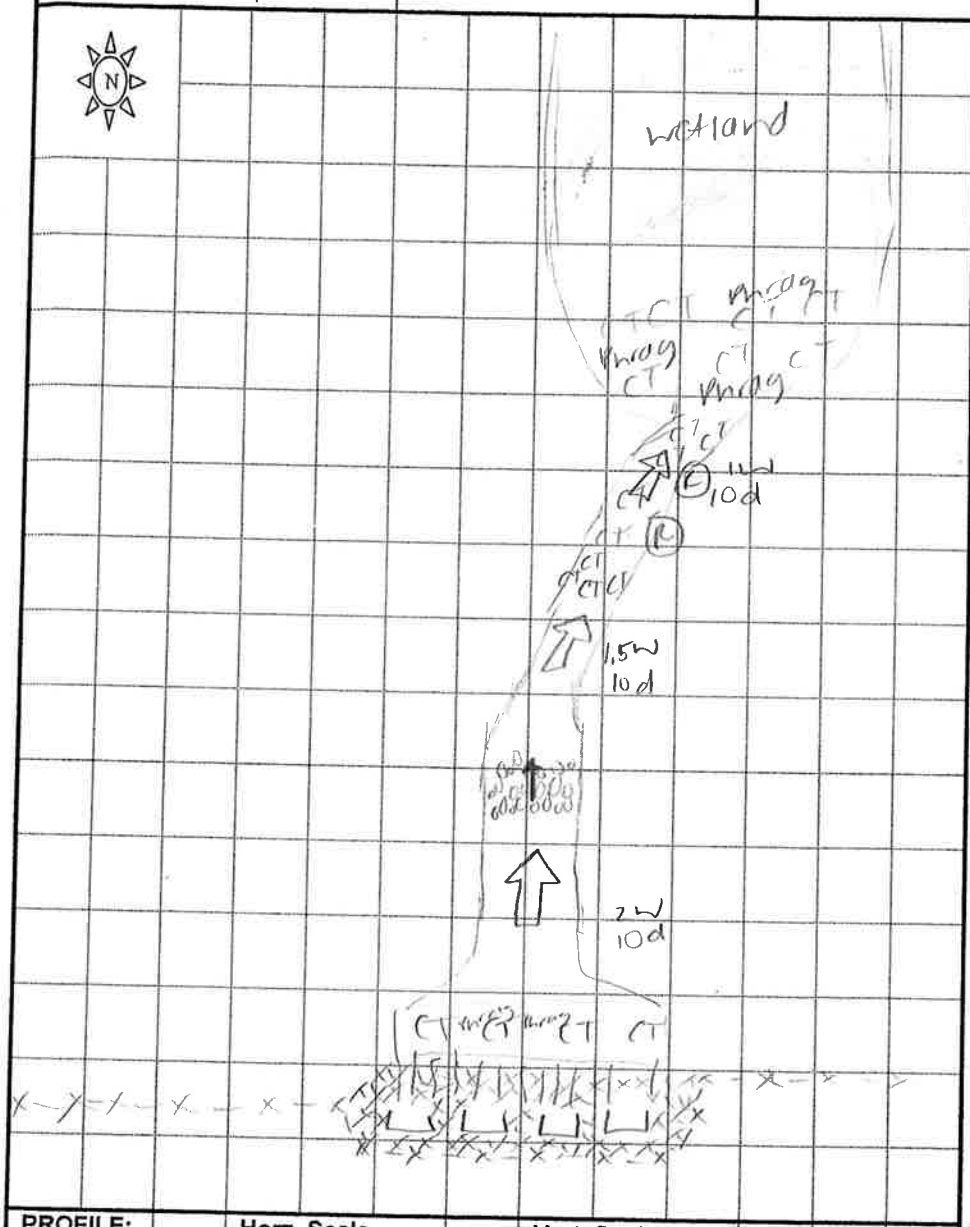
POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

Four plastic lined CSP culverts. Rip rap directly at outlet of culverts. Flow observed from each culvert. Diffuse flow into wetted proved area filled with cattails. Mostly runs with one riffle over installed boulders. Channel lined with cattails / phrag with emergent vegetation. channel enters into cattail / phrag wetland and into pond. Bankfull width same as channel, a little deeper for bankfull depth.

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
24			



PROFILE:	Horz. Scale	Vert. Scale

PROJECT #: 8733-04

MAPPER: JJF

NAME OF WATERBODY:

CROSSING #: 24

STATION #:

DATE: DD-MMM-YY 30-04-2019

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate
oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg
EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank
XXX Riprap / Other Stabilization
Instream Log/Tree
^^^ Dam/Weir/Obstruction
® Riparian Tree

Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
8733		31	07	2019

Is STREAM REALIGNMENT required for this section:

O Yes O No O Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
JMV	Sunny		

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
19 °C		

PHOTO NUMBERS AND DESCRIPTIONS:

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
Sixteen Mile Cr.	Sixteen Mile Cr	29	

LOCATION OF CROSSING:
U/s + d/s of 407ETR bridges

UTM ZONE, EASTING & NORTHING:	MTO CHAINAGE:

TOWNSHIP:	MNR DISTRICT:
	Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
deciduous forest	Hwy

EXISTING STRUCTURE TYPE

Bridge ✓	Box Culvert O	Open Foot Culvert O	CSP O	N/A O

Other O Describe:	Size (w x h) m^2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (Include on habitat map)

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	O	✓	O	O	

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	O	O	O	O	O	
Percentage of area	45	10	45			
Mean depth wetted (m)	0.3	0.4	0.15			
Mean width wetted (m)	17	17	17			
Mean bankfull width (m)						
Mean bankfull depth(m)						
Substrate	Bo, Co, Gr, Br	Bo Co Gr Si	Bo, Co, Gr, Br			

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	✓	O	O	O
Right Upstream Bank	✓	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
		50	20	Instream	60	Instream	
				Overhanging	green algae	Overhanging	

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O	O	✓	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
Predominant Species	Potamogeton sp.		grasses	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other

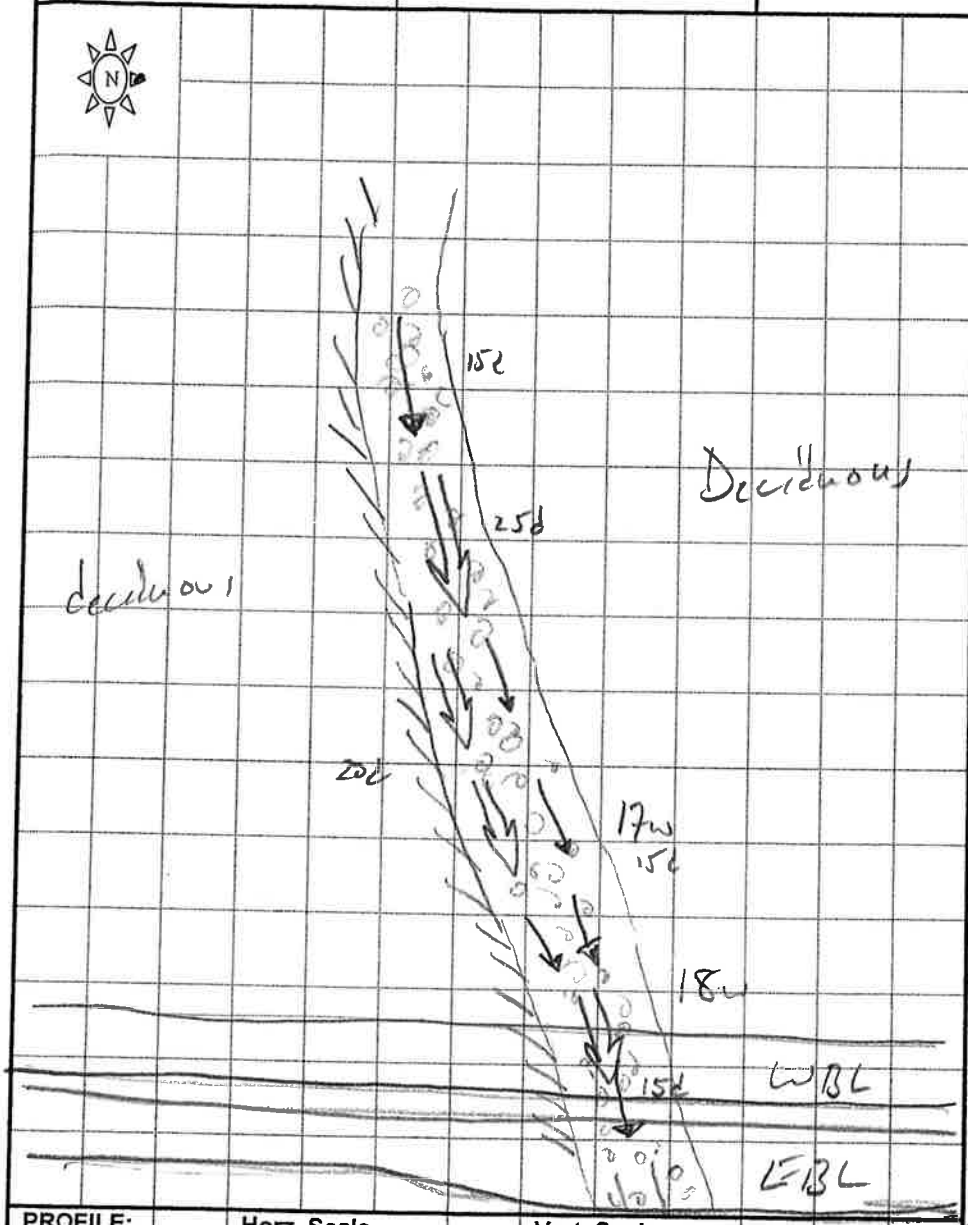
POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

Large, wide, shallow watercourse w/coarse substrates (incl. shale bedrock) + mainly runs + riffles. Almost entirely exposed (not shaded), so abundant filamentous green algae. ~~Some~~ Eroding clay-shale banks along downstream left bank. Some patches of submerged vegetation downstream of bridges. Many fish observed: White Sucker, Smallmouth Bass, Johnny Darter, Blacknose Dace, Northern Hog Sucker, Creek Chub, Common Shiner, Notropis sp.

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
U/S			



PROFILE:	Horz. Scale	Vert. Scale

PROJECT #: 8733

MAPPER: JMV

NAME OF WATERBODY: Sixteen Mile Cr.

CROSSING #: 29

STATION #:

DATE: DD-MMM-YY: 31 JUL 19

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate
oOooO Cobble /Boulder
*** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

Instream Log/Tree
^^^ Dam/Weir/Obstruction

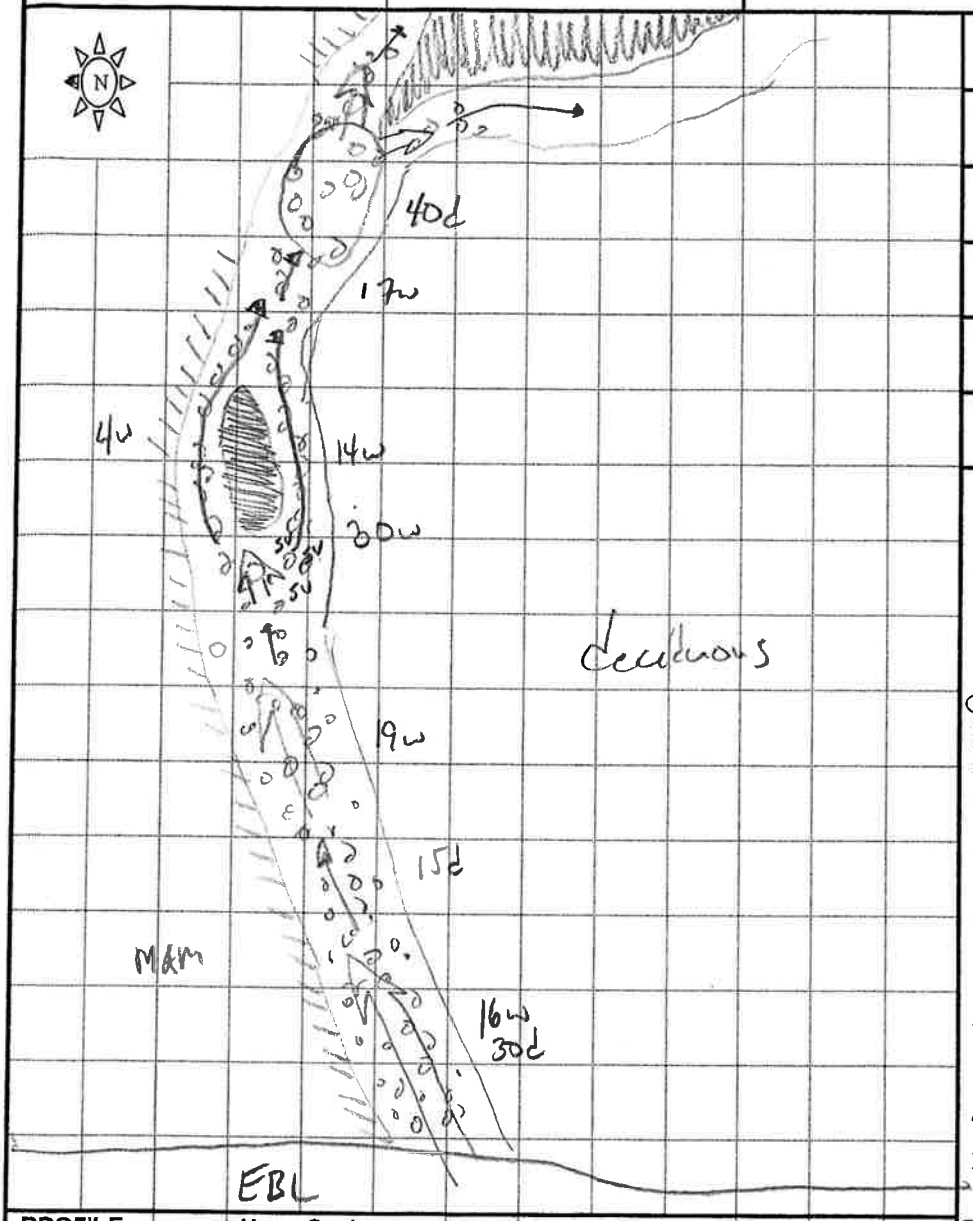
® Riparian Tree

Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
d/s			



PROJECT #:	8733
MAPPER:	JMV
NAME OF WATERBODY:	Sixteen Mile Cr
CROSSING #:	29
STATION #:	
DATE: DD-MMM-YY	31 Jul 19

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
* * * Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
//////// Eroded Bank

XXX Riprap / Other Stabilization

⬭ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├► Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

PROFILE:	Horz. Scale	Vert. Scale

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
8733		14	06	2019

Is STREAM REALIGNMENT required for this section:

O Yes O No O Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
JW	Sunny		

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
20°C		

PHOTO NUMBERS AND DESCRIPTIONS:

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
Trib to E. 16-mile Cr.	Sixteen Mile Cr.	D/S of 43	

LOCATION OF CROSSING:
D/s of Britannia Rd.

UTM ZONE, EASTING & NORTHING:	MTO CHAINAGE:

TOWNSHIP:	MNR DISTRICT:
	Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Hwy, rocks	rocks

EXISTING STRUCTURE TYPE

Bridge ✓	Box Culvert O	Open Foot Culvert O	CSP O	N/A O

Other O Describe: 2 structures - 1 for ramp + 1 for Britannia — Size (w x h) m^2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	✓	✓	O	O	

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):

SUB-SECTION(S)	Run O	Pool O	Riffle O	Flats O	Inside culvert O	Other
Percentage of area	80		20			
Mean depth wetted (m)	4		2			
Mean width wetted (m)	0.3		0.15			
Mean bankfull width (m)						
Mean bankfull depth(m)						
Substrate	Si, Gr, D		Gr, Co, Si			

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	☑	O	O	O
Right Upstream Bank	☑	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris Instream Overhanging	Organic debris	Vascular Macrophytes Instream 60 Overhanging 30	None

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O	☑	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
Predominant Species			cattails	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other

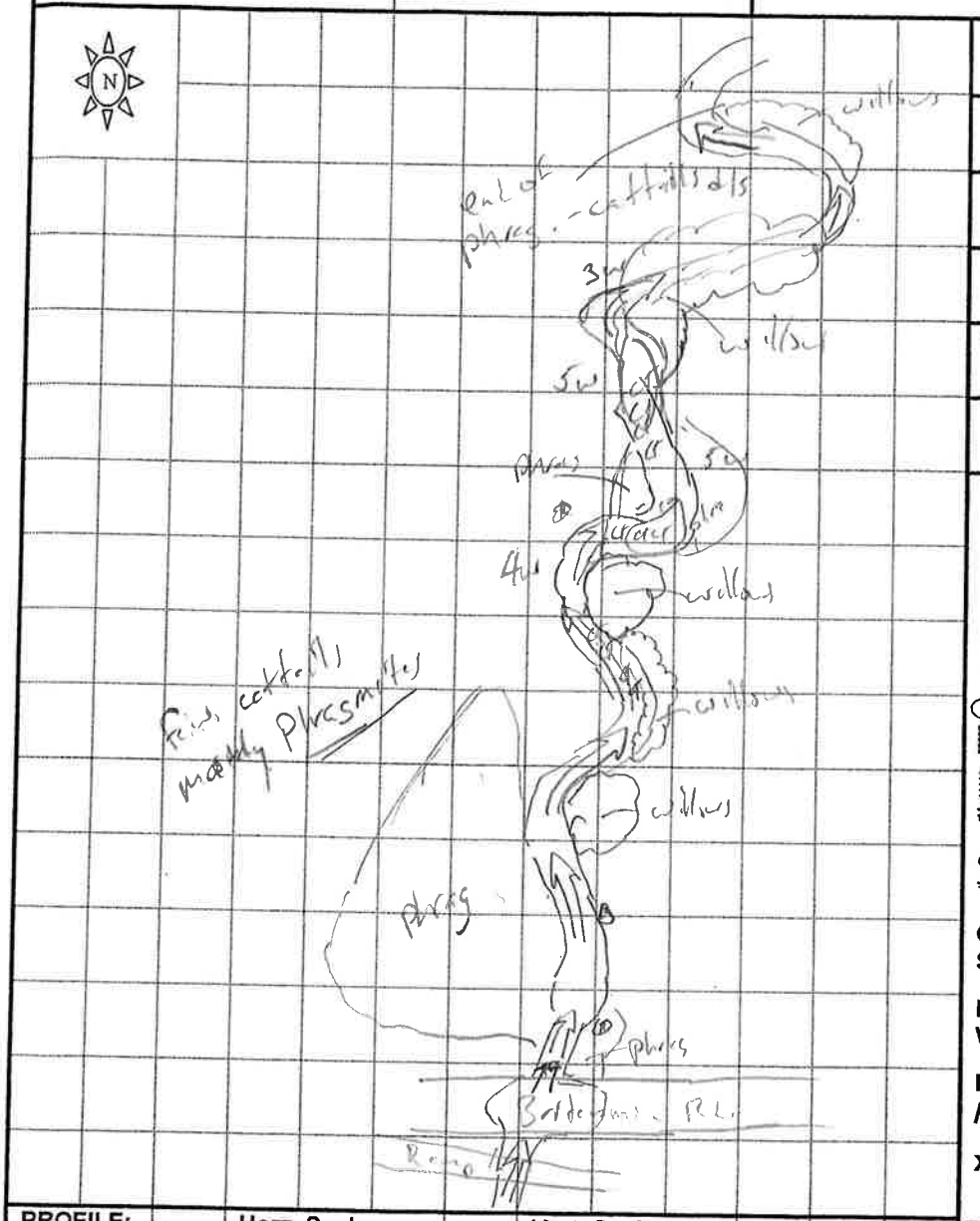
POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

Realigned channel continues from u/s. Meanders parallel to 427 ETR eventually leading into lower wetland d/s. Riparian veg. - willows, dogwood, grasses, cattails, Phragmites. More riffles here than u/s, but still dominated by runs. Fairly wide, grassy valley bounded by North Line properties + 427 ETR road slope.

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):



PROFILE:	Horz. Scale	Vert. Scale

PROJECT #: 8732

MAPPER: JMV

NAME OF WATERBODY:

CROSSING #:

STATION #:

DATE: DD-MMM-YY 14 June 19

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

⁘ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

⊢▶ Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
⊔ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
8733		14	06	2019

Is STREAM REALIGNMENT required for this section:

O Yes O No O Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
JMW	Pt. Sunny, 12°C		

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
12°C		

PHOTO NUMBERS AND DESCRIPTIONS:

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
		dkss#43	

LOCATION OF CROSSING: North of Britannia - crosses 9th Line. Runs perpendicular to 407 + enters parallel watercourse u/s of Britannia. (runs from big sunpark)

UTM ZONE, EASTING & NORTHING:	MTO CHAINAGE:
TOWNSHIP:	**MNR DISTRICT:** Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Agricultural, residential, commercial	Garden Centre, residential subdivision

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert ✓	Open Foot Culvert O	CSP O	N/A O

Other O Describe: 3-cell box @ 9th Line

Size (w x h) m^2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	✓	✓	O	O	no

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):

SUB-SECTION(S)	Run ✓	Pool O	Riffle O	Flats O	Inside culvert O	Other
Percentage of area	90	10				
Mean depth wetted (m)	0.3	0.4				
Mean width wetted (m)	5	5				
Mean bankfull width (m)						
Mean bankfull depth(m)						
Substrate	D, Si	D, Si				

Bedrock	Boulder	Cobble	Gravel	Sand	Silt	Clay	Muck	Detritus
Br	Bo	Co	Gr	Sa	Si	Cl	Mu	D

BANK STABILITY				
	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	O ✓	O	O	O
Right Upstream Bank	O ✓	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
				Instream		Instream 80	
				Overhanging		Overhanging	

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O	O	O ✓	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
Predominant Species	Pondweed		Cattails	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other

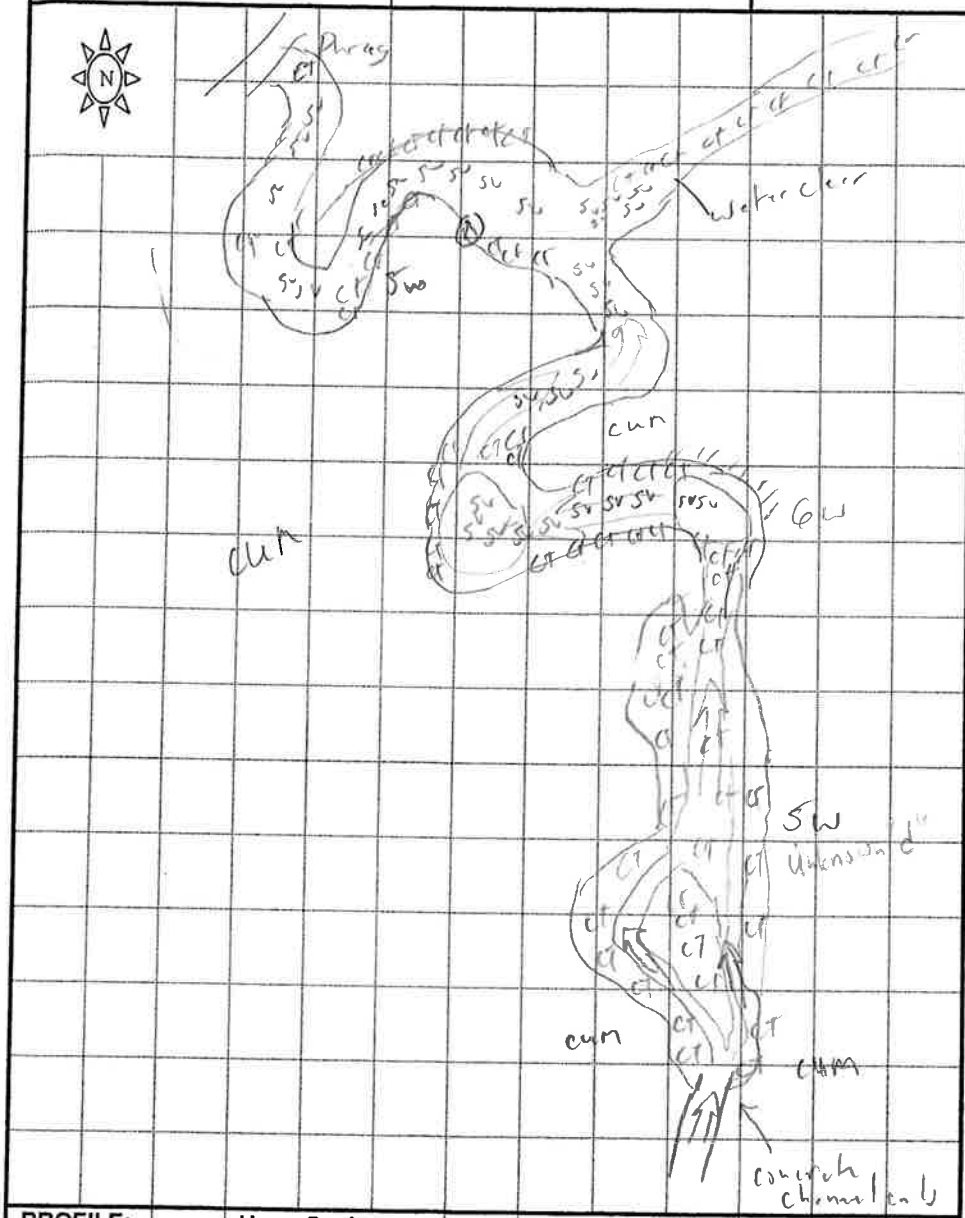
POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

Concrete channel conveys H_2O from SWM ponds on east side of 9th Line towards 407. Channel straight & approx. 1.5m wide. Located b/w agricultural field to north & garden centre to south. Becomes more naturalized u/s of the confluence. Small floodplain mainly grasses. Culvert (CSP) coming from garden centre & creates small plume of more turbid H_2O. Mod flow turbid as well as it rained previous day. Another concrete line entering just d/s of CSP from north. Not much flow & clean. Dead Black Crappie. Adult Common Carp seen

Additional Notes Appended? O No O Yes number of pages ________

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
	U/S of Confluence		



PROFILE:	Horz. Scale	Vert. Scale

PROJECT #: 8733

MAPPER: JMV

NAME OF WATERBODY:

CROSSING #:

STATION #:

DATE: DD-MMM-YY 14 Jun 19

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
//////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

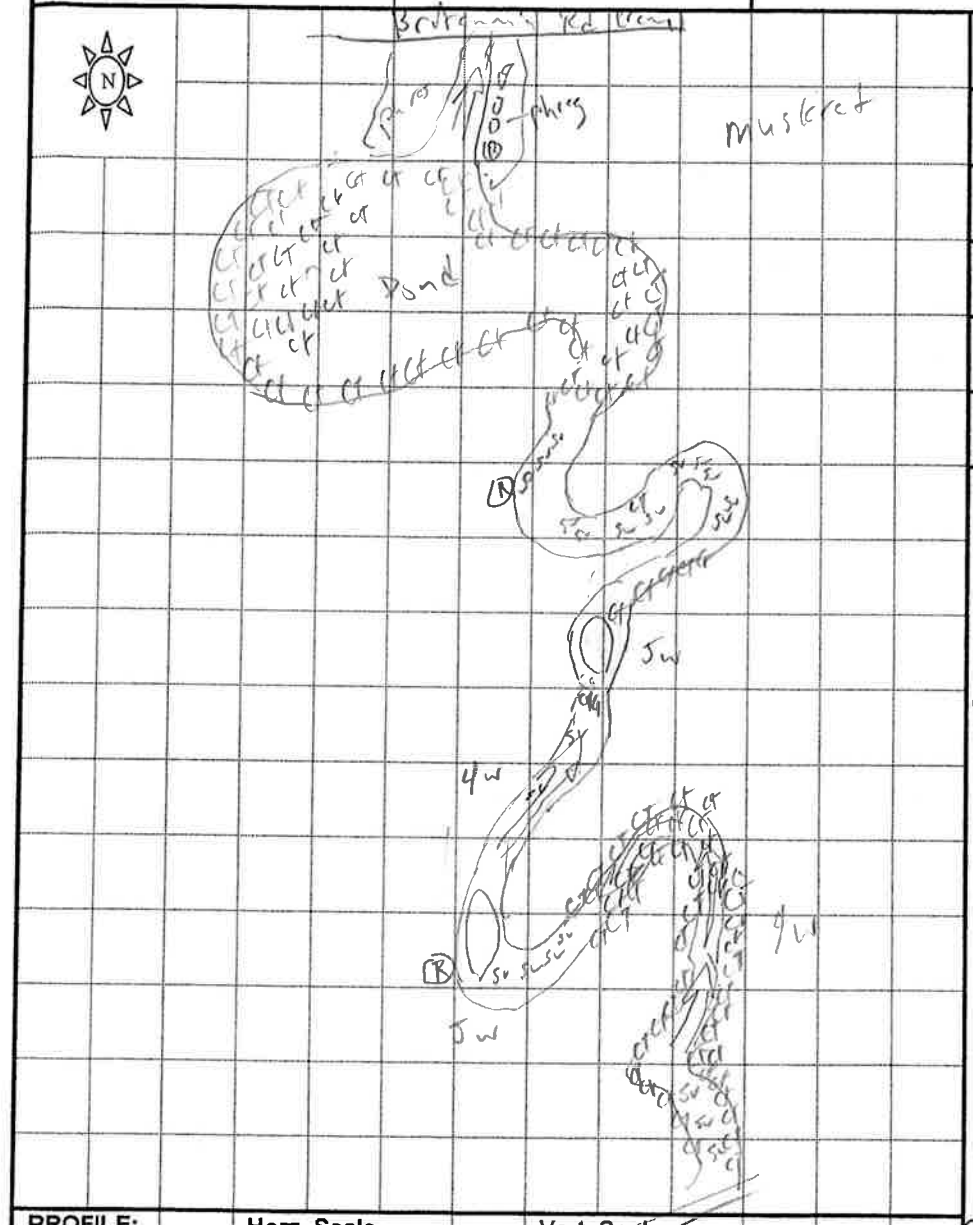
® Riparian Tree

├▶ Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):



PROJECT #: 8733

MAPPER: JMW

NAME OF WATERBODY:

CROSSING #:

STATION #:

DATE: DD-MMM-YY
14 June 19

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├► Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
⊔ Culvert

PROFILE:	Horz. Scale	Vert. Scale

GENERAL INFORMATION				
PROJECT #: 8733	PROJECT DESCRIPTION:	DAY: 14	MONTH: 06	YEAR: 19
Is STREAM REALIGNMENT required for this section: O Yes O No O Unknown				
COLLECTORS:	WEATHER CONDITIONS: Sunny, windy	TIME STARTED:	TIME FINISHED:	
AIR TEMP: 15°C	WATER TEMP:	CONDUCTIVITY (µS/cm):		
PHOTO NUMBERS AND DESCRIPTIONS:				

LOCATION			
NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #: u/s of Derry	STATION #:
LOCATION OF CROSSING: @ north edge of structure - u/s of Derry d/s of Derry			
UTM ZONE, EASTING & NORTHING:		MTO CHAINAGE:	
TOWNSHIP:		MNR DISTRICT:	

LAND USE AND POLLUTION	
SURROUNDING LAND USE:	SOURCES OF POLLUTION:

EXISTING STRUCTURE TYPE				
Bridge O	Box Culvert O	Open Foot Culvert O	CSP O	N/A O
Other O Describe:			Size (w x h) m^2	

SECTION TYPE AND MORPHOLOGY						
SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)					
TYPE:	Stream / river O	Channelized O	Permanent O	Intermittent O	Ephemeral O	ASSOCIATED WETLAND:
TOTAL SECTION LENGTH (m):		CURRENT VELOCITY (m/s):				

SUB-SECTION(S)	Run O	Pool O	Riffle O	Flats O	Inside culvert O	Other
Percentage of area	100					
Mean depth wetted (m)	2					
Mean width wetted (m)	0.10					
Mean bankfull width (m)						
Mean bankfull depth(m)						
Substrate	Si, D					

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	✓	O	O	O
Right Upstream Bank	✓	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	**Undercut banks**	**Boulders**	**Cobble**	**Woody Debris**	**Organic debris**	**Vascular Macrophytes**	**None**
				Instream 10 Overhanging		Instream 80 Overhanging	

SHORE COVER (% stream shaded):	**100 – 90 %**	**90 – 60%**	**60- 30%**	**30 – 1%**	**None**
	O	O	O	✓	O

VEGETATION TYPE (%):	**Submergent**	**Floating**	**Emergent**	**None**
Predominant Species			Cattails, grasses, Phrag	

MIGRATORY OBSTRUCTIONS:	**None**	**Seasonal**	**Permanent**
POTENTIAL CRITICAL HABITAT LIMITING:	**Spawning**	**Evidence of Groundwater**	**Other**

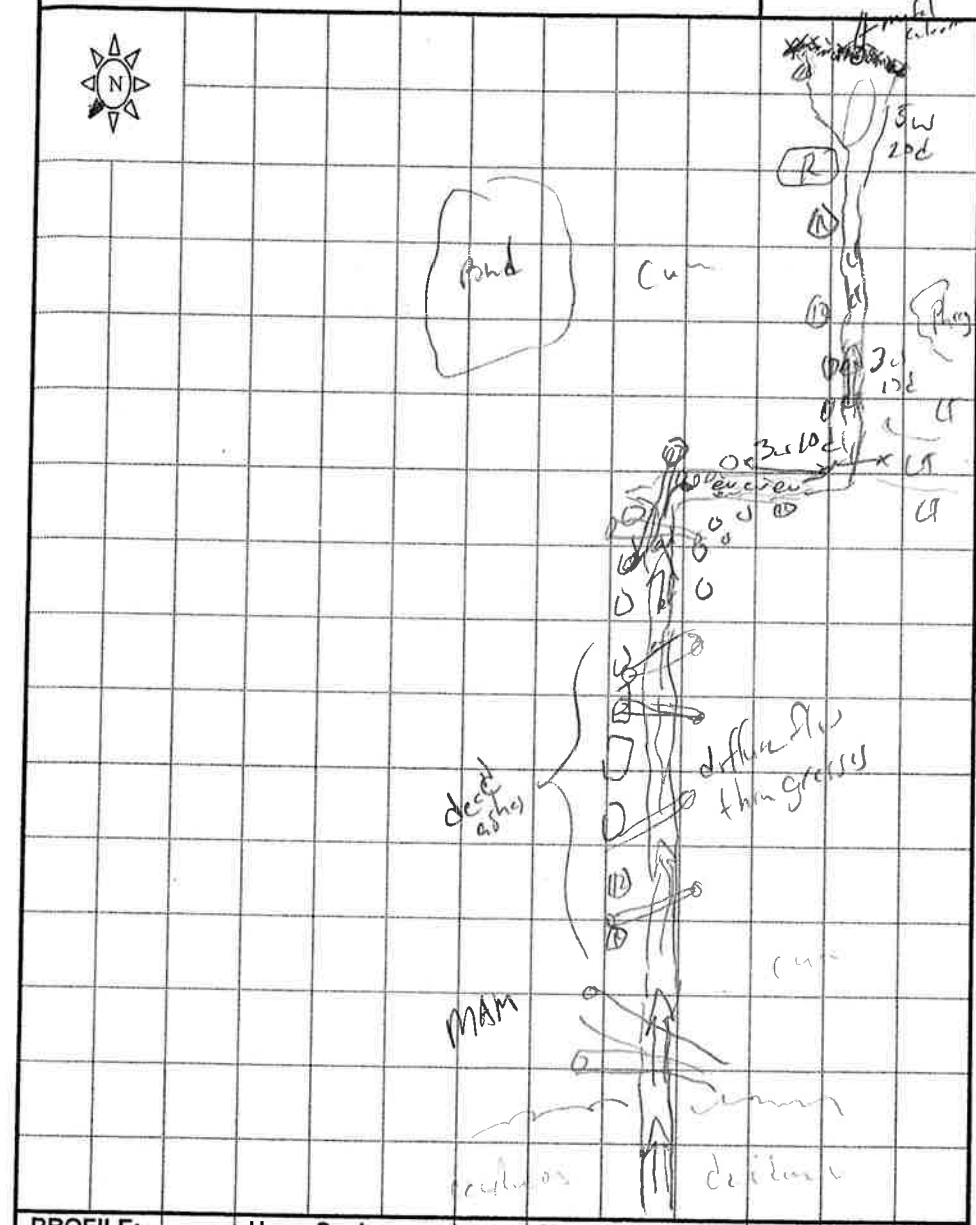
POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

Wide swale (4m) thru what used to be ag. fields. Area around swale treed w/ deciduous veg. Water flowing & clear ≈ 20 cm deep. Instream veg. grasses, loosestrife. Much instream & overhanging woody & organic debris. No fish seen. Substrate, fine - silt, detritus. Pond on property to east is fish habitat rectangular & fringed w/ cattails & willows. Brook stickleback seen. Water clear. Pond not natural. Old farm lane crosses channel & restricts flows, water ponded u/s. Metal pipe culvert. Diffuse flow thru grasses, phrag. & some cattails d/s for ≈ 65 m then channel becomes more incised, narrower & deeper. Flow within deep is greater for the ~~first~~ next 30 m before 3 cell culvert @ Derry. Channel widens here & again flows diffusely thru vegetation. Derry culvert full of H_2O - all 3 cells - although flow is mainly thru middle. Water is about at least 30 cm deep

Additional Notes Appended? O No O Yes number of pages ________

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):



PROJECT #:	8733
MAPPER:	JMV
NAME OF WATERBODY:	
CROSSING #:	Ulster Derry
STATION #:	
DATE: DD-MMM-YY	14 Jun 19

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

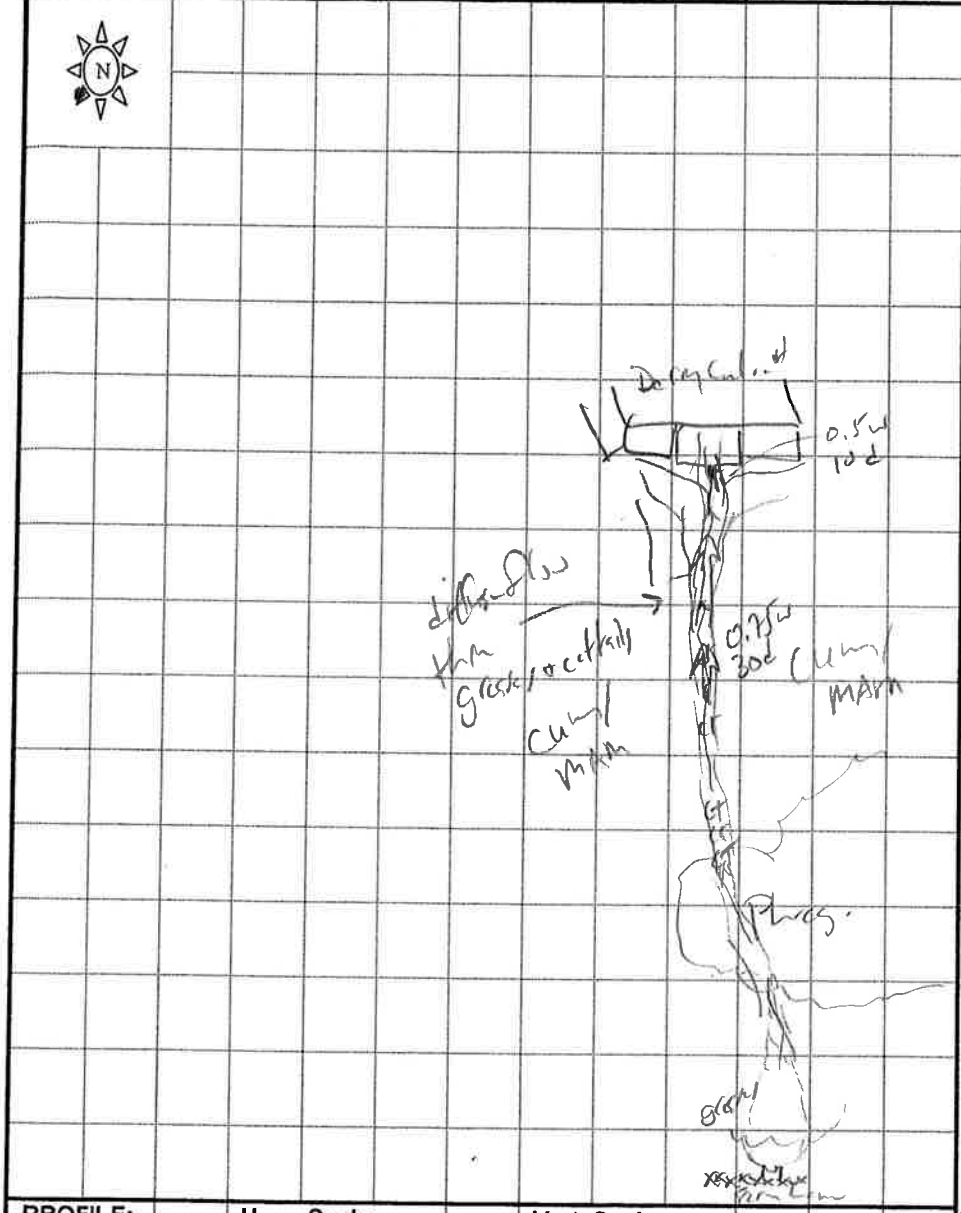
├► Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
⊔ Culvert

PROFILE:	Horz. Scale	Vert. Scale

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):



PROJECT #:
8733
MAPPER:
JMW
NAME OF WATERBODY:
CROSSING #:
STATION #:
DATE: DD-MMM-YY
14 Jun 19

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⬭ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

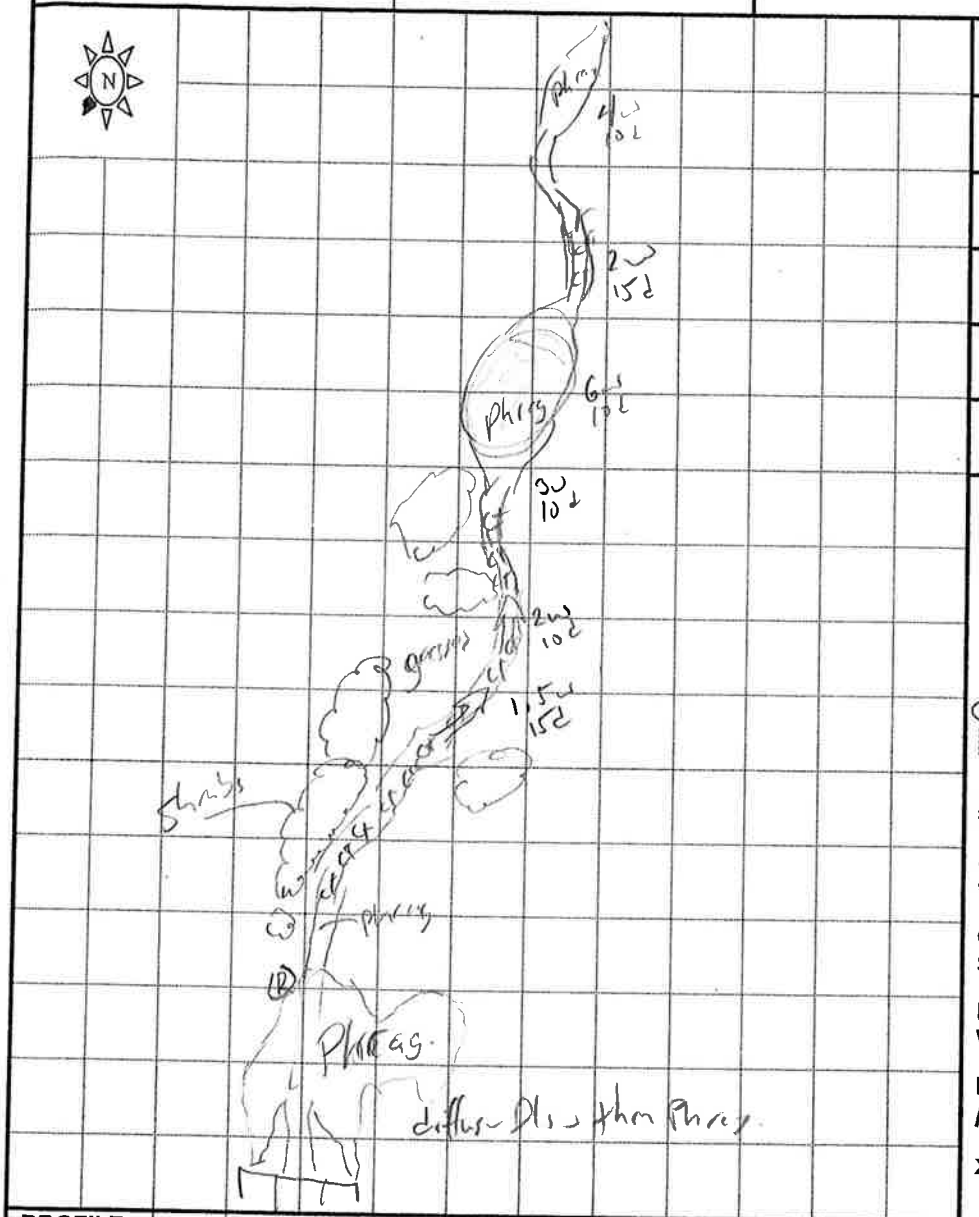
├► Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
⊔ Culvert

PROFILE:	Horz. Scale	Vert. Scale

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):



PROFILE: Horz. Scale Vert. Scale

PROJECT #: 8733

MAPPER: JMV

NAME OF WATERBODY:

CROSSING #: d/s of Derry

STATION #: 1

DATE: DD-MMM-YY 14 June 19

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate
oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

Ⓡ Riparian Tree

├▶ Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
⊔ Culvert

GENERAL INFORMATION

PROJECT #: 8733	PROJECT DESCRIPTION:	DAY: 17	MONTH: 06	YEAR: 2019

Is STREAM REALIGNMENT required for this section:

O Yes O No O Unknown

COLLECTORS:	WEATHER CONDITIONS: Rain	TIME STARTED:	TIME FINISHED:

AIR TEMP: 17°C	WATER TEMP:	CONDUCTIVITY (µS/cm):

PHOTO NUMBERS AND DESCRIPTIONS:

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #: 44

LOCATION OF CROSSING: West of 9/2 Line, South of RR tracks, North of Derry

UTM ZONE, EASTING & NORTHING:	MTO CHAINAGE:
TOWNSHIP:	MNR DISTRICT:

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Hwy through agricultural	

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert ✓	Open Foot Culvert ✓	CSP O	N/A O

Other O Describe: Twin culverts - don't know if box or CSP Size (w x h) m^2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	O	O	✓	O	

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):

SUB-SECTION(S)	Run ✓	Pool ✓	Riffle O	Flats O	Inside culvert O	Other
Percentage of area	99	1				
Mean depth wetted (m)		0.3				
Mean width wetted (m)		6-7				
Mean bankfull width (m)	1.5	8-9				
Mean bankfull depth(m)		0.6				
Substrate		Mu, D, Si				

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	✓	O	O	O
Right Upstream Bank	✓	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris Instream Overhanging	Organic debris ~~100~~ 99	Vascular Macrophytes Instream 99 Overhanging	None

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O	O	✓	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
	~~0~~ 0.5	0.5	99	
Predominant Species	?	duckweed	cattail	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other

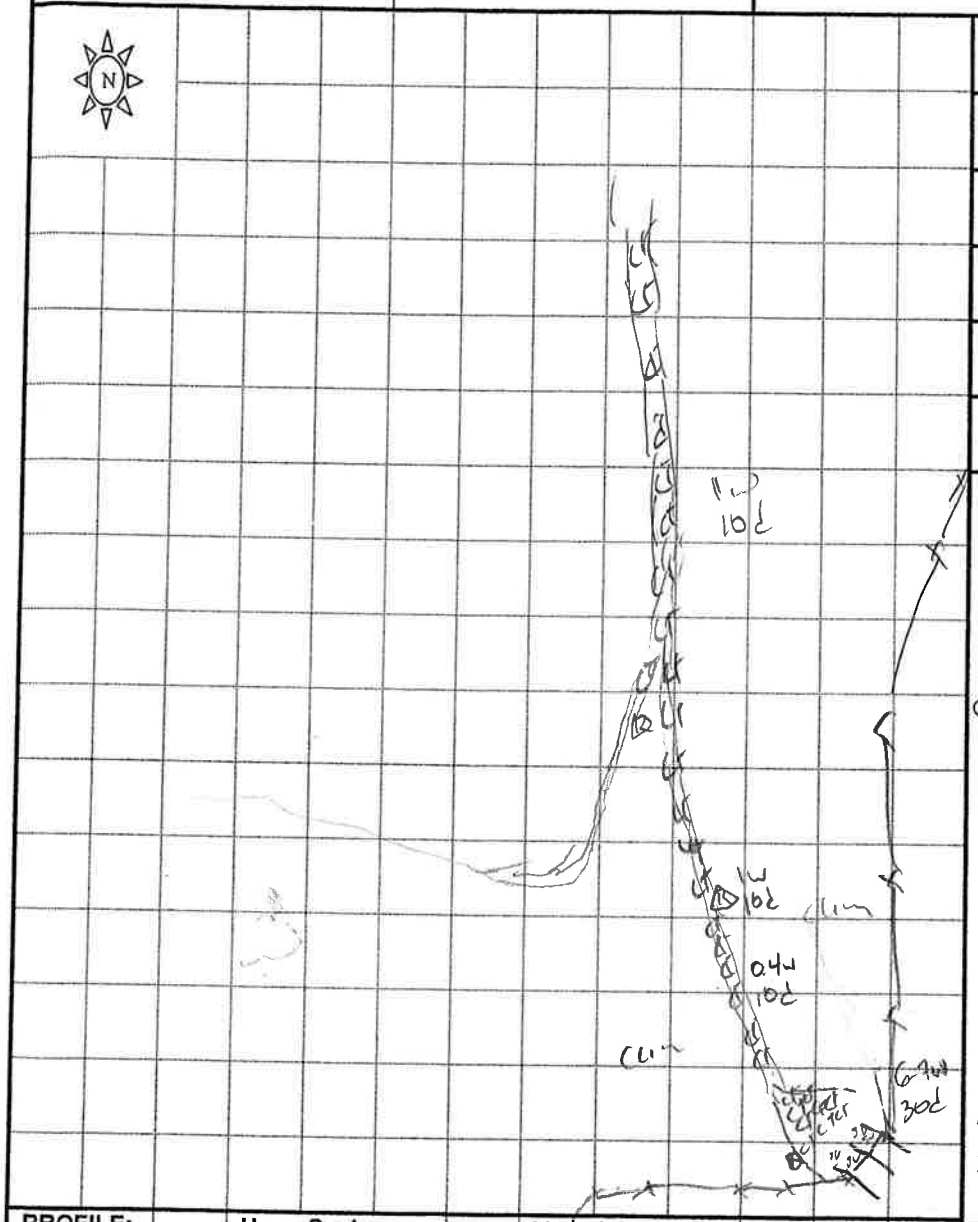
POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

Twin creek culverts likely permanently wet. Braided flow. Pool @ + thwart culvert 30cm deep Submergent + floating veg. Brook Stickleback seen - adult + juv. Channel quickly narrows to be (some) < 1m wide cattail swale. Joined by med smaller swale from N. Diffuse. Slow thru cattails.

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):



PROFILE: Horz. Scale Vert. Scale

PROJECT #: 8733

MAPPER: JMW

NAME OF WATERBODY:

CROSSING #:

STATION #: 44

DATE: DD-MMM-YY 17 Jun 19

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other
, Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├▶ Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
2733-04		18	04	2019

Is STREAM REALIGNMENT required for this section:

O Yes O No ⊘ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
JMV	Sunny 8°C windy		

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
8°C		

PHOTO NUMBERS AND DESCRIPTIONS:

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
Trib of 16 Mile	16 Mile	46	

LOCATION OF CROSSING:

1st crossing east of 9th line @ driving range

UTM ZONE, EASTING & NORTHING:	MTO CHAINAGE:

TOWNSHIP:	MNR DISTRICT:

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Golf driving range	

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert ⊘	Open Foot Culvert O	CSP O	N/A O

Other O Describe:

Size (w x h) m^2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	⊘	⊘	⊘	O	O	

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):

SUB-SECTION(S)	Run O	Pool O	Riffle O	Flats O	Inside culvert O	Other
Percentage of area	85	~~15~~		15		
Mean depth wetted (m)	0.10			0.25		
Mean width wetted (m)	0.5			5.0		
Mean bankfull width (m)	1.0			7.0		
Mean bankfull depth(m)	0.30			0.4		
Substrate	D, Si, Mu			D, Mu		

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	✓	O	O	O
Right Upstream Bank	✓	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris Instream Overhanging	Organic debris 15	Vascular Macrophytes Instream 90 Overhanging	None

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O	O	✓	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
			100	
Predominant Species			Cattail	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent Possible
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other

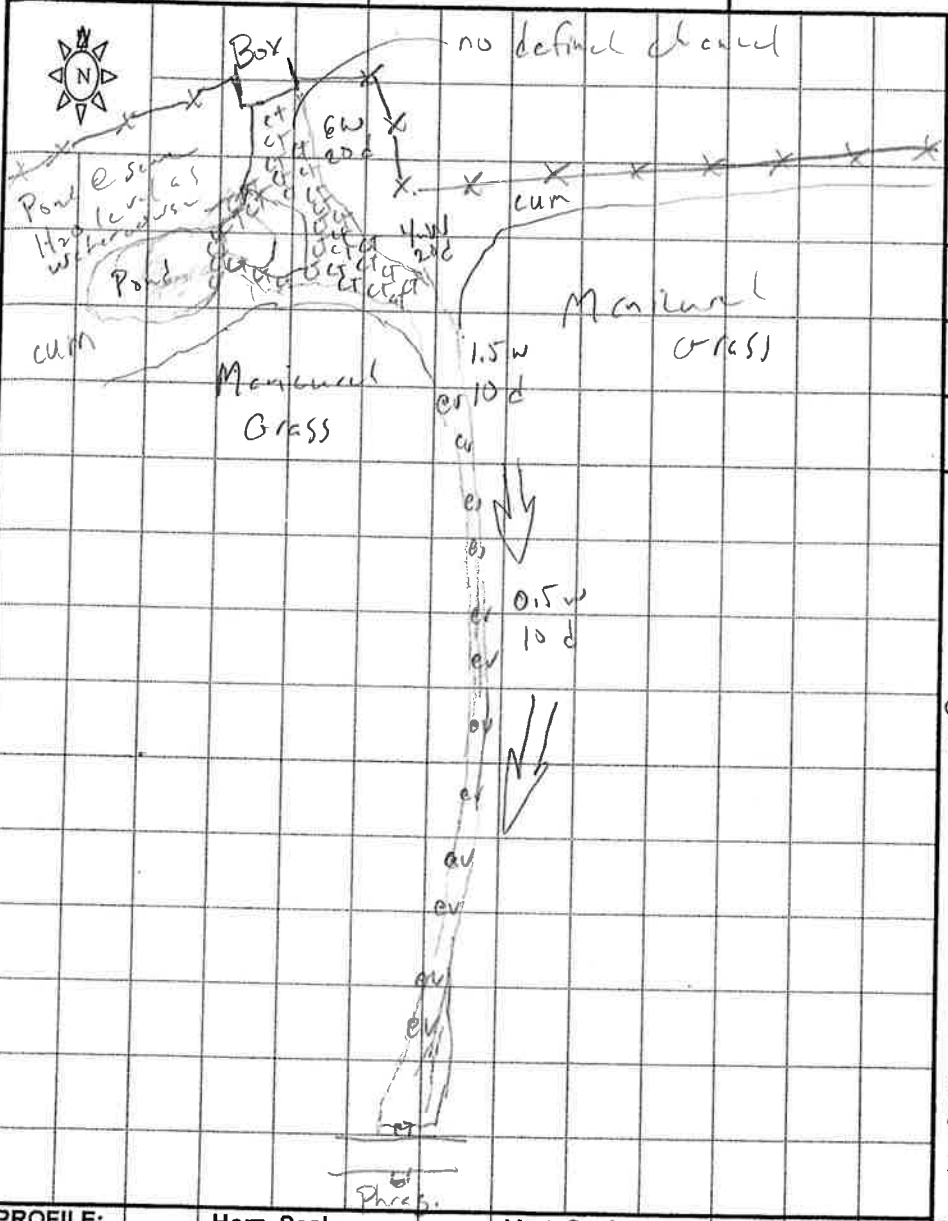
POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

Just d/s of box culvert, channel is wide, full of cattails + undefined. There are 2 distinct connections w/ small, dug pond which had some inflow and outflow. Muskrat lodge + muskrat observed. Channel narrows and enters driving range where manicured grass forms the banks + the channel is defined. Cattails end + are likely cut back thru driving range maintenance. Channel crosses the active area of driving range. Water ponded a bit e small crossing as small CSP is restricting flows. D/S of crossing, cattails + Phragmites choke channel + it once more becomes undefined. There is rip rap here and it is likely similar to d/stream of 47. However, photos. is too thick to observe whether there is a significant drop.

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):



PROFILE:	Horz. Scale	Vert. Scale

PROJECT #:	8733-04
MAPPER:	JMV
NAME OF WATERBODY:	Tributary 16 Mile
CROSSING #:	46
STATION #:	
DATE: DD-MMM-YY	18/APR/19

LEGEND

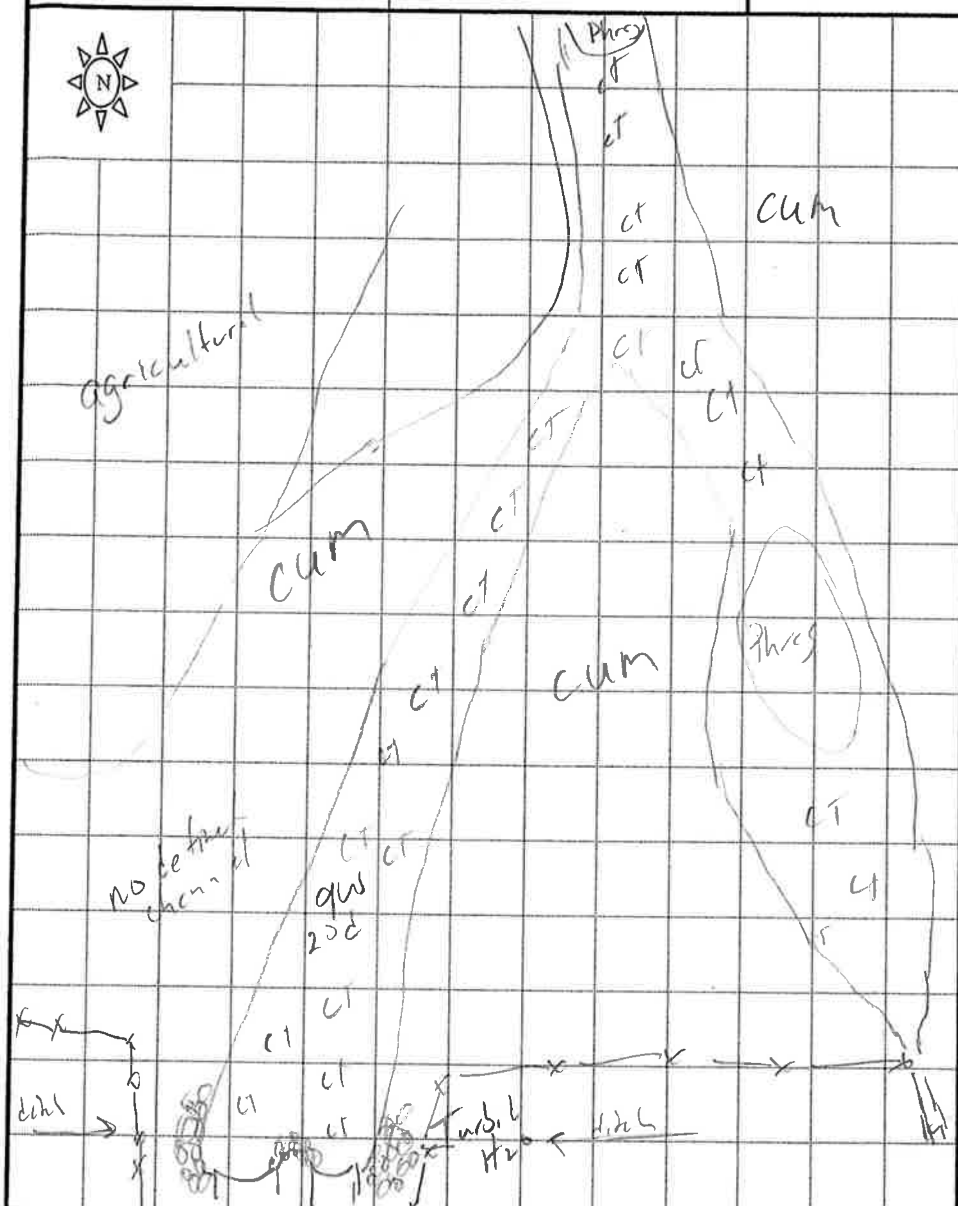
10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate
oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg
EV Emergent Vegetation
W Watercress
Fe Iron Staining
/////// Eroded Bank
XXX Riprap / Other Stabilization
⬭ Instream Log/Tree
^^^ Dam/Weir/Obstruction
® Riparian Tree
⊢▶ Seep/Spring
-------- Undercut Bank
— Barrier to Fish Movement
-S- Seasonal Barrier
-x--x- Fence line
└┘ Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):



PROJECT #: 8733-04

MAPPER: JMW

NAME OF WATERBODY: Trib of 16 Mile

CROSSING #: 47

STATION #:

DATE: DD-MMM-YY 18/APR/19

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

░ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

|▶ Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

PROFILE: **Horz. Scale** **Vert. Scale**

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
8733-04		18	04	2019

Is STREAM REALIGNMENT required for this section:

O Yes O No ✓ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
JMV	Sunny ~5M 11 km/h S		

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
15°C		

PHOTO NUMBERS AND DESCRIPTIONS:

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
Trib of 16 Mile Cr.	16 Mile	47	

LOCATION OF CROSSING:

UTM ZONE, EASTING & NORTHING:	MTO CHAINAGE:

TOWNSHIP:	MNR DISTRICT:

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Hwy, Agriculture, Gold Driving Range, Police Fire Training Facility	Hwy; Agriculture

EXISTING STRUCTURE TYPE

Bridge O	Box CulvertO	Open Foot Culvert O	CSP ✓	N/A O

Other O Describe: Twin CSPs Size (w x h) m^2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
d/s of 407	

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	✓	O	✓	O	

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	O	O	O	✓	O	
Percentage of area				100		
Mean depth wetted (m)				0.20		
Mean width wetted (m)				9.10		
Mean bankfull width (m)				12.0		
Mean bankfull depth(m)				1.5		
Substrate				Si, D, Cl		

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	Ø	O	O	O
Right Upstream Bank	Ø	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris Instream Overhanging	Organic debris 100	Vascular Macrophytes Instream 100 Overhanging	None

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O	O	O	Ø

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
			100	
Predominant Species			Cattails	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
			Rip rap drop

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other

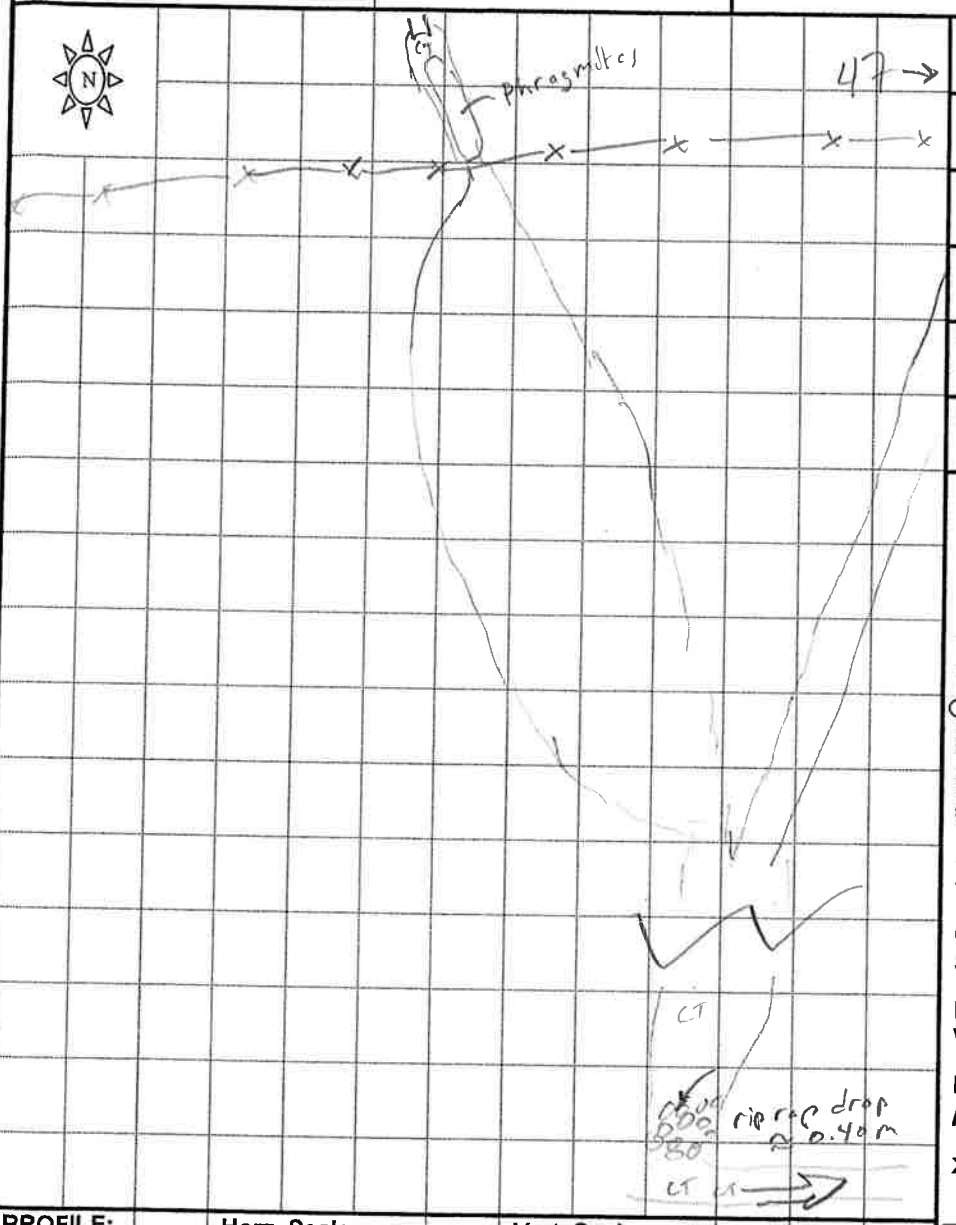
POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

Straight, cattail channel w/no defined/low flow channel. Some flow on Apr. 18, 2019. Converges w/ wetland channel from road drainage to north. Steep banks (riparian) until merge. Bordered by CUM until convergence, then active agriculture on East bank. Rip rap @ end of channel where it meets ditch @ South end of property - drops ~ 40 cm - likely a barrier to fish passage. Joins ditch which contains flows from Site 46. Travels to east, then turns 90° to south where channel/habitat works have meandered channel, created low flow channel + floodplain has been planted. No fish observed

Additional Notes Appended? Ø No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):



PROFILE: Horz. Scale: Vert. Scale:

PROJECT #: 8733-04

MAPPER: JMV

NAME OF WATERBODY:

CROSSING #:

STATION #:

DATE: DD-MMM-YY 18/APR/19

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

⊢▶ Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
⌴ Culvert

GENERAL INFORMATION

PROJECT #: 8737	PROJECT DESCRIPTION:	DAY: 19	MONTH: 06	YEAR: 2015

Is STREAM REALIGNMENT required for this section:

O Yes O No O Unknown

COLLECTORS: JMV	WEATHER CONDITIONS: Mostly Cloudy	TIME STARTED:	TIME FINISHED:

AIR TEMP: 24°C	WATER TEMP:	CONDUCTIVITY (µS/cm):

PHOTO NUMBERS AND DESCRIPTIONS:

LOCATION

NAME OF WATERBODY: Mullet Cr	DRAINAGE SYSTEM: Credit River	CROSSING #: 49	STATION #:

LOCATION OF CROSSING:

UTM ZONE, EASTING & NORTHING:	MTO CHAINAGE:
TOWNSHIP:	MNR DISTRICT: Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE: Ag	SOURCES OF POLLUTION:

EXISTING STRUCTURE TYPE

Bridge ✓	Box Culvert O	Open Foot Culvert O	CSP O	N/A O

Other O Describe: | Size (w x h) m^2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	O	✓	O	O	

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):

SUB-SECTION(S)	Run O	Pool O	Riffle O	Flats O	Inside culvert O	Other
Percentage of area	100					
Mean depth wetted (m)	0.15					
Mean width wetted (m)	0.5					
Mean bankfull width (m)						
Mean bankfull depth(m)						
Substrate	Gr, Si, Bo, Co					

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	✓	O	O	O
Right Upstream Bank	✓	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	30	1	1	Instream Overhanging	20	Instream 30 Overhanging 50	

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O	✓	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
Predominant Species			grasses	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other

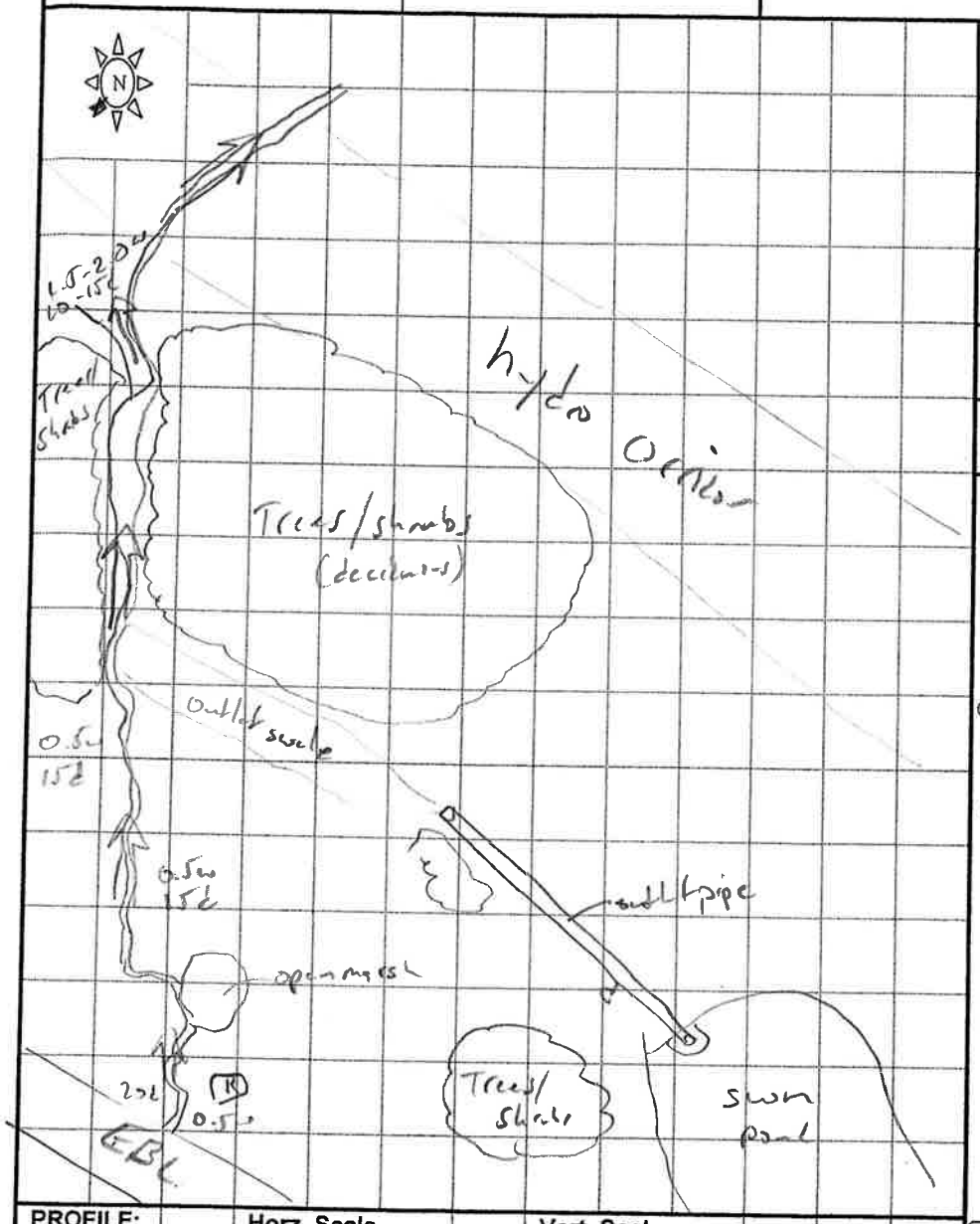
POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

Grass-lined, mixed channel w/ much bank undercutting. Some cattails in channel, but channel is defined throughout section examined. Gravel + silt substrate w/ boulders + cobble added near bridges. Fish observed - adult + YOY cyprinids.

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):



PROFILE: Horz. Scale: Vert. Scale:

PROJECT #: 8733

MAPPER: JMW

NAME OF WATERBODY: Mullet Creek

CROSSING #: 49

STATION #:

DATE: DD-MMM-YY: 19 JUN 19

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▇ Island/Bar

▒ Fine Substrate
Gravel Substrate
oOooO Cobble /Boulder
*** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
//////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├► Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
8733		19	June	2019

Is STREAM REALIGNMENT required for this section:

O Yes O No O Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
	Cldy		

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
23°C		

PHOTO NUMBERS AND DESCRIPTIONS:

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
Lesi Creek	Crd AR	50	

LOCATION OF CROSSING:

UTM ZONE, EASTING & NORTHING:	MTO CHAINAGE:
TOWNSHIP:	MNR DISTRICT: Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Ag, Hwy, residential, industrial	

EXISTING STRUCTURE TYPE

Bridge ✓	Box Culvert O	Open Foot Culvert O	CSP O	N/A O

Other O Describe: | Size (w x h) m^2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	O	✓	O	O	

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):

SUB-SECTION(S)	Run O	Pool O	Riffle O	Flats O	Inside culvert O	Other
Percentage of area	50	10	40			
Mean depth wetted (m)	0.25	0.4	0.1			
Mean width wetted (m)	4	5	4			
Mean bankfull width (m)						
Mean bankfull depth(m)						
Substrate	Sa, Bo, Co, Gr, Si	Bo, Co, Gr, Si	Bo, Co, Gr, Sa			

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	✓	O	O	O
Right Upstream Bank	✓	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
		25		Instream 15 Overhanging		Instream Overhanging 60	

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O	✓	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
Predominant Species			rushes	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other

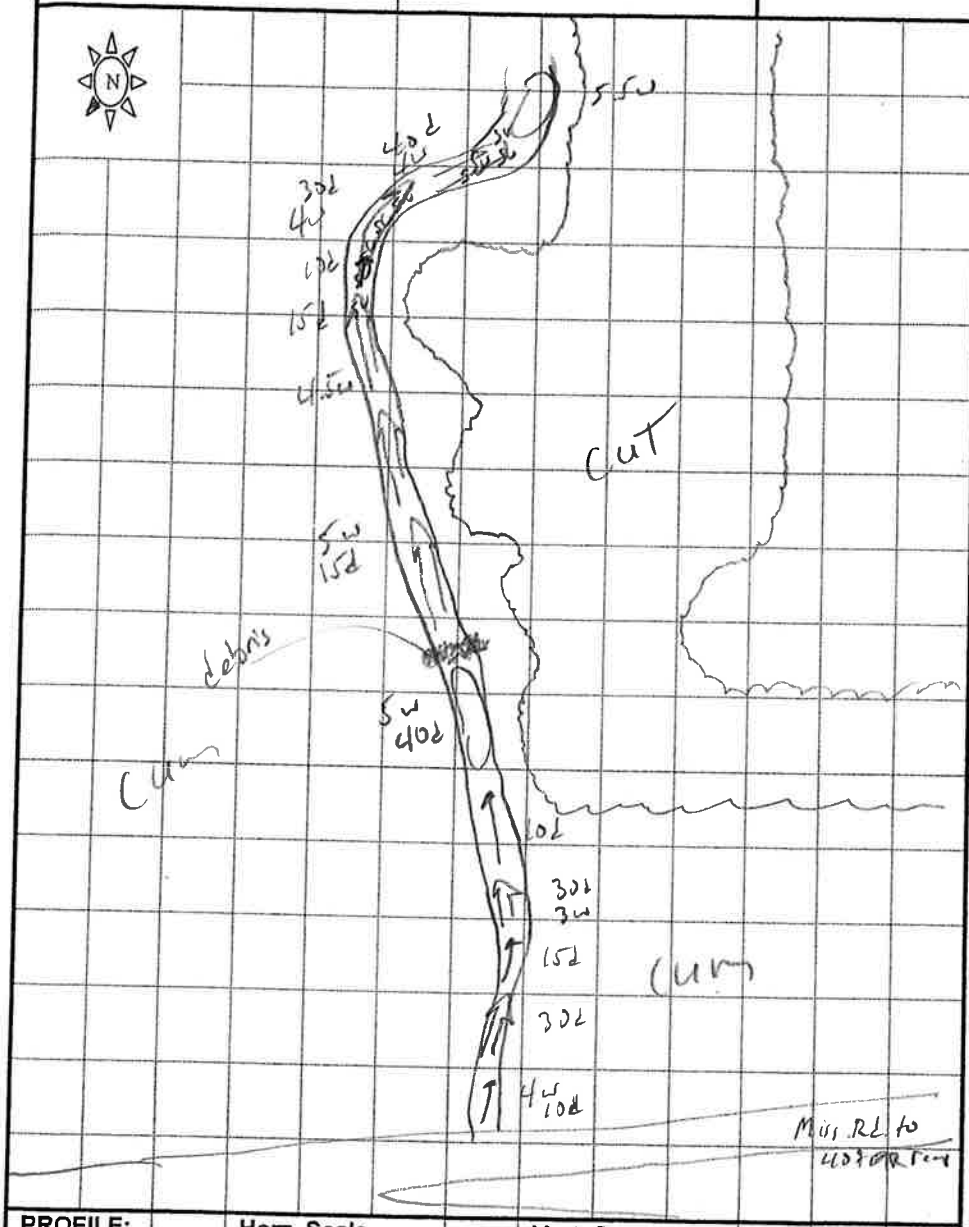
POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

Medium sized channel comprised mainly of runs + riffles w/ a couple of pools. One of these is u/s of a debris jam. Substrate is coarse (boulders, cobbles, sand) + substrate cover is good. Riparian veg. is comprised of Cedar + CUT. Many crayfish observed in the clear water.

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):



PROFILE: Horz. Scale: Vert. Scale:

PROJECT #: 8733

MAPPER: JMV

NAME OF WATERBODY: Levi Creek

CROSSING #: 50

STATION #:

DATE: DD-MMM-YY 19 JUN 19

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate
oOooO Cobble /Boulder
*** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
//////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├► Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
⊔ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
8733		19	JUN	2019

Is STREAM REALIGNMENT required for this section:

O Yes O No O Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
	Phy Cldy		

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
24°C		

PHOTO NUMBERS AND DESCRIPTIONS:

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
Credit River	Credit River	51	

LOCATION OF CROSSING:

UTM ZONE, EASTING & NORTHING:	MTO CHAINAGE:
TOWNSHIP:	**MNR DISTRICT:** Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Hwy	Hwy

EXISTING STRUCTURE TYPE

Bridge O✓	Box CulvertO	Open Foot Culvert O	CSP O	N/A O

Other O Describe: Size (w x h) m^2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	O✓	O	O✓	O	O	

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):

SUB-SECTION(S)	Run O	Pool O	Riffle O	Flats O	Inside culvert O	Other
Percentage of area	58	3	39			
Mean depth wetted (m)	0.3	0.5	0.2			
Mean width wetted (m)	20	19	20			
Mean bankfull width (m)						
Mean bankfull depth(m)						
Substrate	Bo, Co, Gr, Sa, Si	Si, Sa, Bo, Co, Gr	Bo, Co, Gr, Sa			

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	✓	O	O	O
Right Upstream Bank	✓	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris / Instream / Overhanging	Organic debris	Vascular Macrophytes / Instream / Overhanging	None
		40	40				

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O	O	✓	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
Predominant Species			rushes	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other

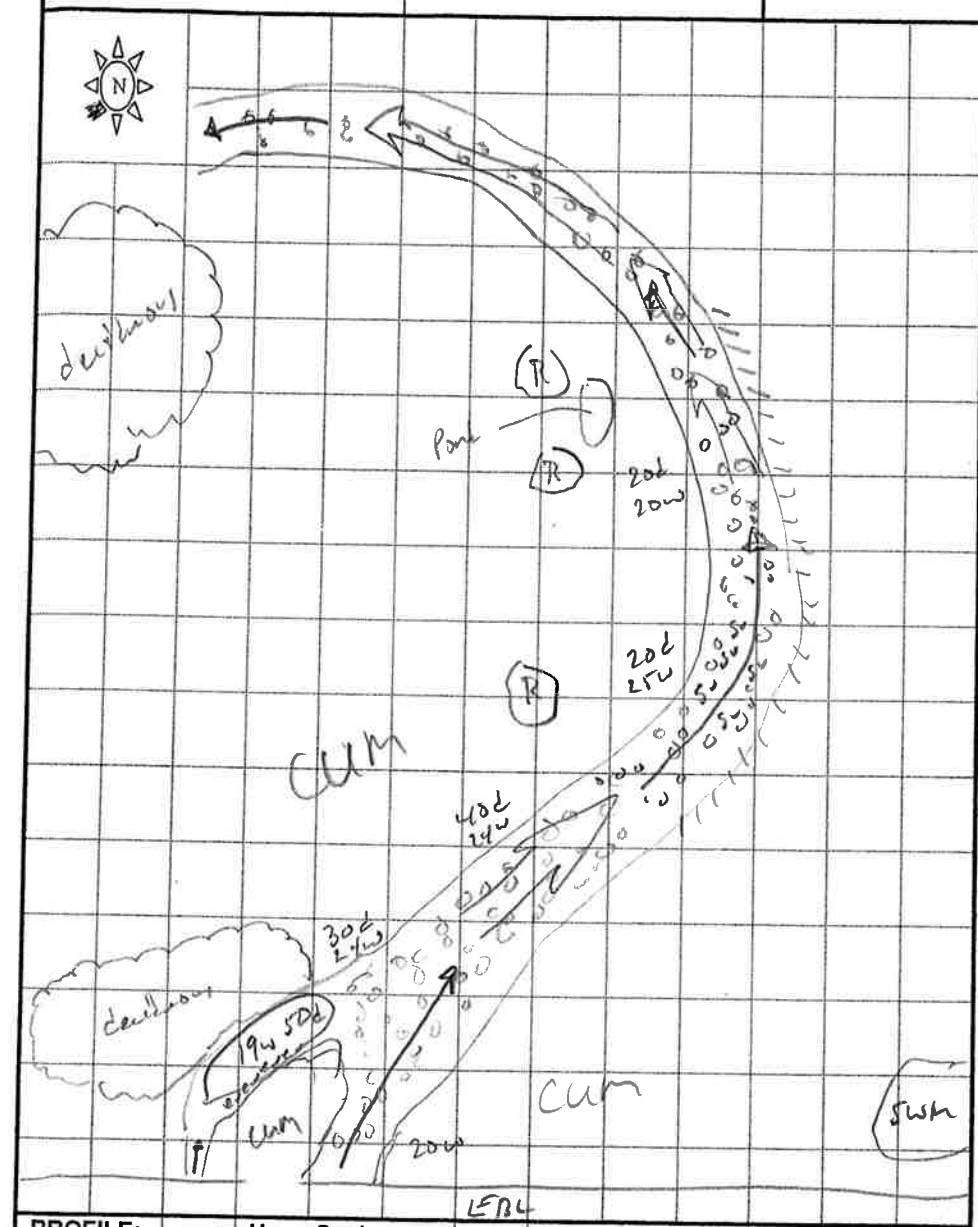
POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

Large river. Clear flow. Coarse substrates. Riffles + runs. Cultural meadow riparian areas. Some eroding d/s bank @ bend. Large pool directly d/s of bridge on east side channel. No instream veg. Many fish observed - cyprinids. River known for migratory salmonids.

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):



PROFILE:	Horz. Scale	Vert. Scale

PROJECT #: 8733

MAPPER: JMW

NAME OF WATERBODY: Credit River

CROSSING #: 51

STATION #:

DATE: DD-MMM-YY: 19 JUN 19

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
//////// Eroded Bank

XXX Riprap / Other Stabilization

⬭ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├► Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
8733		19	06	2019

Is STREAM REALIGNMENT required for this section:

O Yes O No O Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
JMW	Pty Cldy		

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
24°C		

PHOTO NUMBERS AND DESCRIPTIONS:

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
Fletchers Creek	Credit River	58	

LOCATION OF CROSSING:

UTM ZONE, EASTING & NORTHING:	MTO CHAINAGE:
TOWNSHIP:	**MNR DISTRICT:** Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Hwy	

EXISTING STRUCTURE TYPE

Bridge ✓	Box Culvert O	Open Foot Culvert O	CSP O	N/A O

Other O Describe: Size (w x h) m^2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (Include on habitat map)

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	O	✓	O	O	

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):

SUB-SECTION(S)	Run O	Pool O	Riffle O	Flats O	Inside culvert O	Other
Percentage of area	80	15	5			
Mean depth wetted (m)	0.25	0.5	0.15			
Mean width wetted (m)	4	6	4			
Mean bankfull width (m)						
Mean bankfull depth(m)						
Substrate	Bo, Gr, Co, Si	D, Bo, Gr, Co Si	Bo, Co, Gr, Si			

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	✓	O	O	O
Right Upstream Bank	✓	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	5	10		Instream 5 Overhanging		Instream 60 Overhanging	

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O	✓	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
Predominant Species	Pondweed			

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other

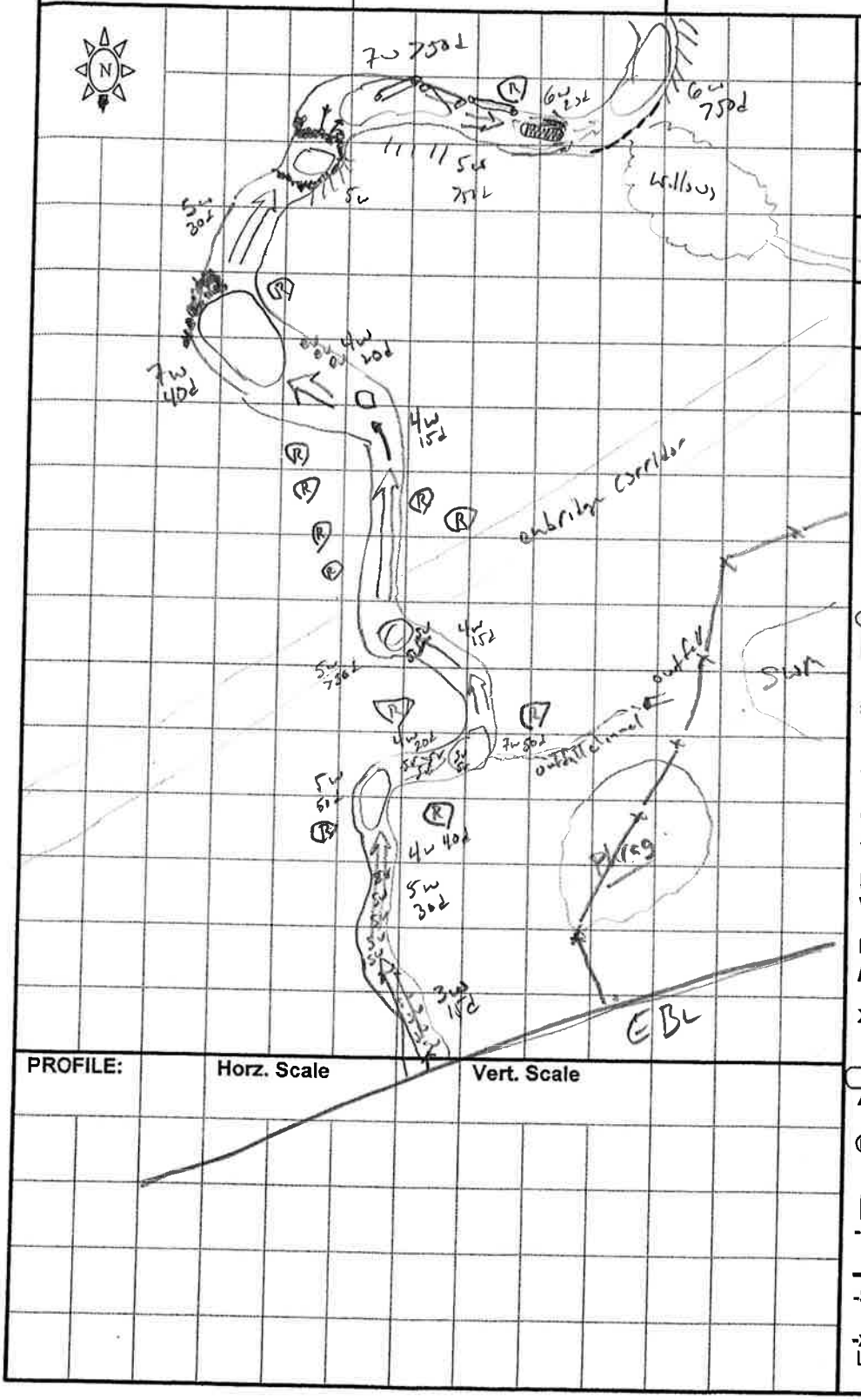
POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

Meandering channel thru mainly meadow/wet meadow vegetation, w/ a few large willows. An abundance of submerged aquatic vegetation thruout channel. Mainly runs + pools w/ few riffles. Some areas of erosion, but banks mostly stable. Mainly coarse substrate. A few debris jams. Turbid flow, but clear last summer. Many Cyprinids observed.

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):



PROJECT #:

MAPPER:

NAME OF WATERBODY:

CROSSING #:

STATION #:

DATE: DD-MMM-YY

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
//////// Eroded Bank

XXX Riprap / Other Stabilization

Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
Culvert