



wood.

Appendix J

Aquatic Report



**CLASS ENVIRONMENTAL ASSESSMENT STUDY
AND
PRELIMINARY DESIGN
LAKESHORE ROAD WEST IMPROVEMENTS
FROM MISSISSAGA STREET TO DORVAL DRIVE
TOWN OF OAKVILLE, ONTARIO**

**AQUATIC HABITAT
EXISTING CONDITIONS REPORT**

Submitted to:

**Corporation of the Town of Oakville
1225 Trafalgar Road
Oakville, ON L6H 0H3**

Submitted by:

**Amec Foster Wheeler Environment & Infrastructure
a Division of Amec Foster Wheeler Americas Limited
160 Traders Blvd., Suite 110
Mississauga, Ontario
L4Z 3K7**

October 2017

TPB166147

EXECUTIVE SUMMARY

The Town of Oakville has initiated a Municipal Class Environmental Assessment (Class EA) for improvements to Lakeshore Road West from Mississaga Street to Dorval Drive. The improvements are required to meet the needs of the town to the year 2031. The town is considering a wide range of options to satisfy vehicular transportation demand within the Lakeshore Road West corridor and within the study area.

Lakeshore Road West is a minor east-west arterial road under the jurisdiction of the Town of Oakville which supports a considerable volume of traffic, and pedestrian and cycling activity. This Aquatic Habitat Existing Conditions Report will facilitate and inform the preparation of an Environmental Study Report for the project and aid in the completion of the Municipal Class EA process. Based on the background information derived from secondary source information and field investigations, potential environmental effects from the project works have been assessed and measures to mitigate these effects have been identified.

Within the study area, Lakeshore Road West crosses four (4) permanent watercourses including Bronte Creek, Fourteen Mile Creek, McCraney Creek, and an unnamed tributary to Lake Ontario which flows through Sedgewick Forest, located to the east of the water treatment plant. There is one intermittent watercourse (unnamed tributary located at Crossing C17) and thirteen (13) additional drainage features which have ephemeral flow. The study area is under the jurisdiction of Conservation Halton and the Aurora District Ministry of Natural Resources and Forestry. A secondary source review, as well as correspondence with regulatory authorities revealed records of American Eel (*Anguilla rostrata*) and Silver Shiner (*Notropis photogenis*) in Bronte Creek, and Redside Dace (*Clinostomus elongatus*) within Fourteen Mile Creek.

This report provides a summary of aquatic habitat existing conditions from secondary source information and field investigations. The watercourses on site range from areas providing no discernable fish habitat (i.e. ephemeral drainage features) to areas of high sensitivity habitat that supports the above mentioned species at risk. Recommended design considerations and mitigation measures reflect these sensitivities for the individual watercourses and are provided herein.



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1.0 INTRODUCTION

To meet existing and future needs, the Town of Oakville is proposing roadway and intersection improvements for approximately 6.2 kilometers (km) of Lakeshore Road West from Mississauga Street to Dorval Drive (herein referred to as the 'Project'). Potential improvements may include; intersection improvements, provision of pedestrian and cycle facilities, urban design streetscape improvements, and the provision of other transit-related infrastructure.

The proposed works will involve potential replacements or modifications to some of the existing crossings on site. The proposed work plan as currently proposed is considering the replacement of the existing crossing and potential channel realignments at McCraney Creek; and the modification (i.e. expansion or replacement) of the existing structure present at Fourteen Mile Creek. The existing crossing structures at Crossing C8 and Crossing C17 may also be modified (i.e. replaced or extended) to accommodate the widening of the roadway in this area. No modifications or rehabilitation activities are proposed at the Bronte Creek crossing at this time.

Amec Foster Wheeler Environment & Infrastructure, a Division of Amec Foster Wheeler Americas Limited (Amec Foster Wheeler) has been retained by the Town of Oakville to undertake the required Schedule 'C' Municipal Class Environmental Assessment (EA) for the proposed improvements to Lakeshore Road West.

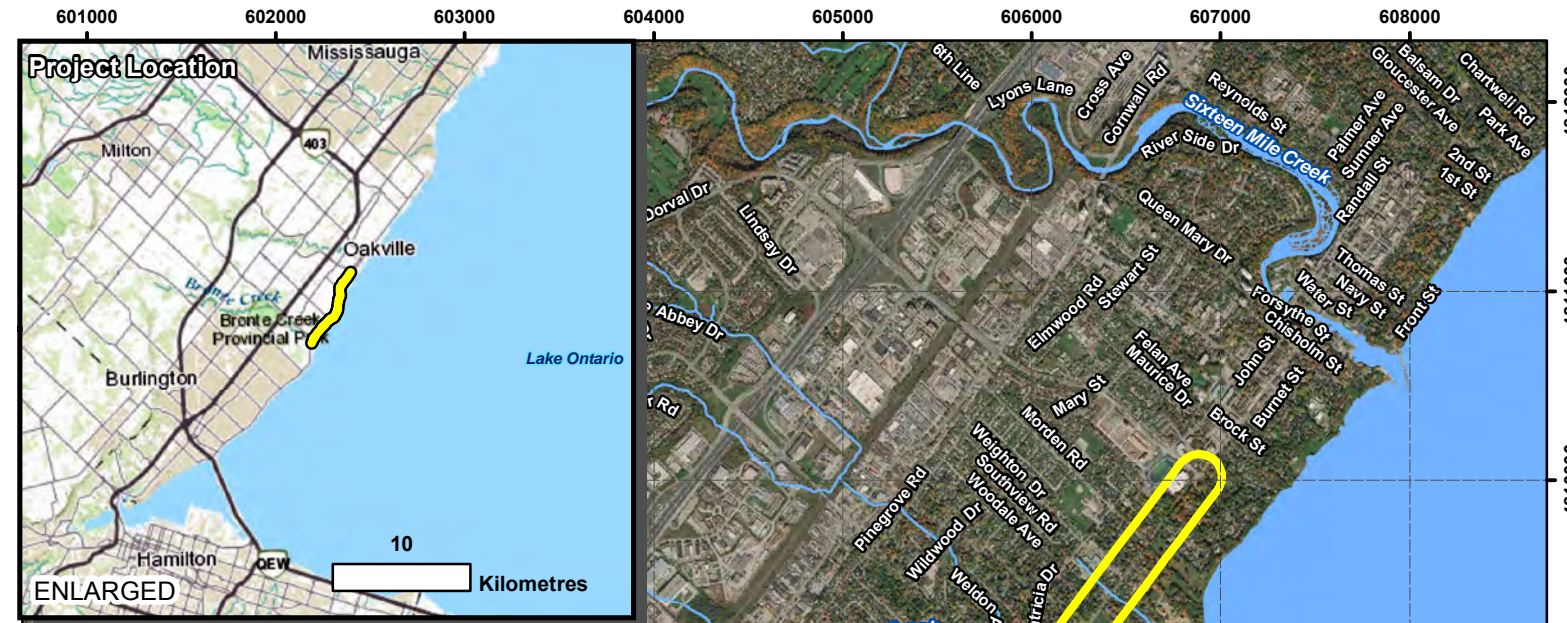
This Aquatic Habitat Existing Conditions Report will facilitate the preparation of an Environmental Study Report (ESR) for the project and inform the Municipal Class EA Process.

1.1 Study Area

Lakeshore Road West is a minor east-west arterial roadway under the jurisdiction of the Town of Oakville. The project area encompasses approximately 6.2 km of Lakeshore Road West from Mississauga Street to Dorval Drive (herein referred to as the 'study area') (Figure 1-1). The study area contains drainage for Bronte Creek, Fourteen Mile Creek, McCraney Creek and several other Oakville West Urban Creeks. These watersheds are under the jurisdiction of Conservation Halton (CH) and the Aurora District Ministry of Natural Resources and Forestry (MNR).





Data gathered from both secondary source information and field investigations identified 18 crossings within the study area (Figure 1-2 to 1-6). Four (4) permanent watercourse crossings, one (1) intermittent watercourse crossing and thirteen (13) ephemeral drainage feature crossings are present within the study area. The four (4) permanent watercourses include Bronte Creek (C2), Fourteen Mile Creek (C11), McCraney Creek (C16) and an unnamed tributary located to the east of the water treatment plant (C8). The watercourse at Crossing C17 has an intermittent flow. The thirteen (13) ephemeral drainage features surveyed include C1, C3, C4 - C7, C9, C10, C12 - C15 and C18.

The aquatic study area for the Project includes each location where a watercourse/drainage feature crosses the Project centerline, as well as the areas adjacent to the centerline and within the Project right-of-way.



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LEGEND

-  **Approximate Study Area**
-  **Watercourse**
-  **Wetland**
-  **Waterbody**

NOTES:

- Background imagery from Google Earth.
- Topographic features extracted from LIO, MNRF.
- * Scale when printed 8.5 x 11 in. letter size



**TOWN OF OAKVILLE
LAKESHORE ROAD WEST IMPROVEMENTS**

Project Location

Datum & Projection:
NAD 1983 UTM Zone 17N



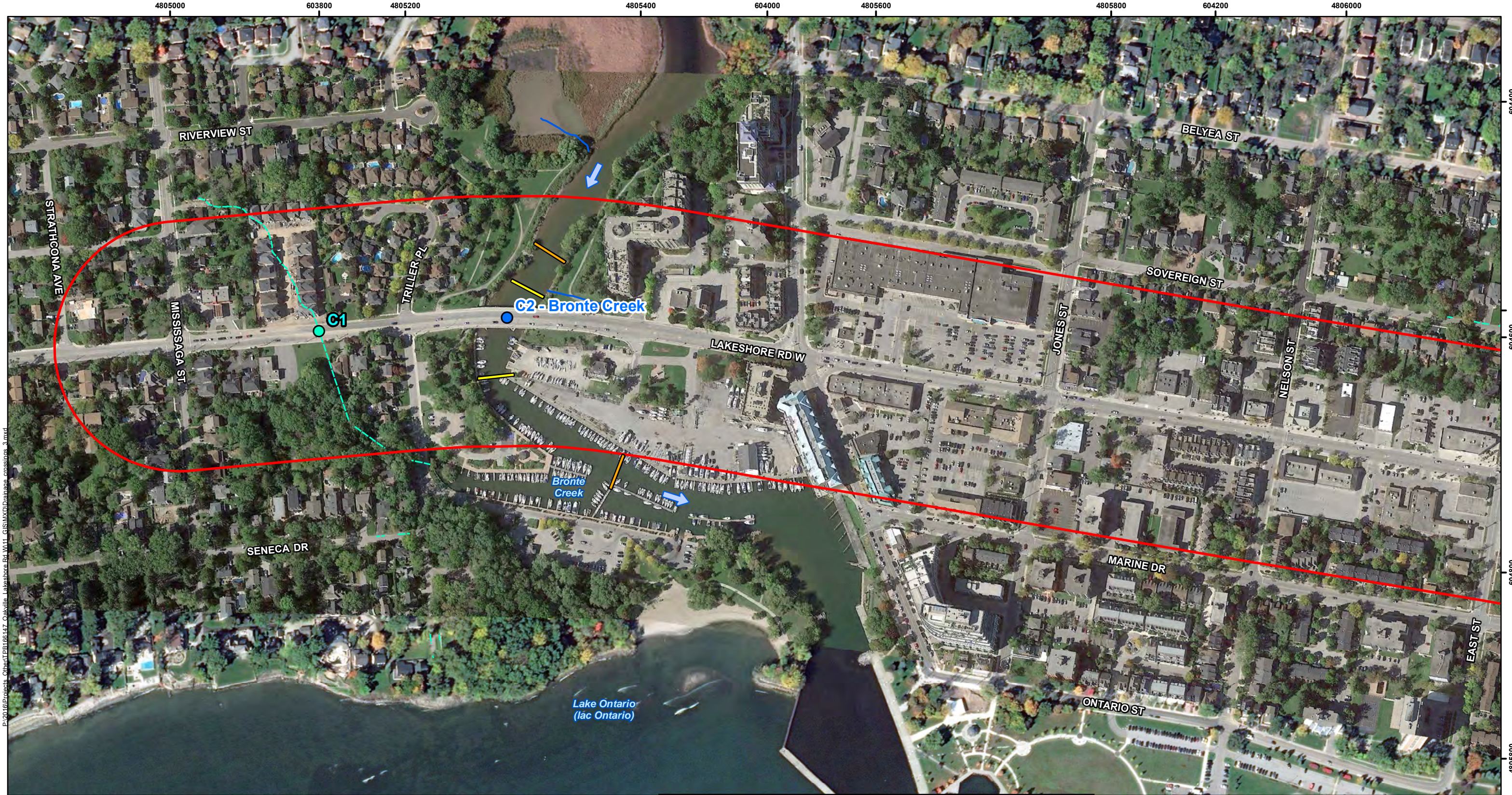
PROJECT N^o: TPB166147

FIGURE: 1-1

SCALE: 1:40,000

DATE: September 2017





LEGEND



- Approximate Study Area
- Ephemeral Drainage Crossing
- Permanent Drainage Crossing
- General Assessment Limits
- Detailed Assessment Limits
- Ephemeral Watercourse
- Permanent Watercourse

0 100 200 300 400 500 Metres



NOTES:
 - Aerial Imagery extracted from Google Earth, date is 2016.
 * Scale when printed 11 x 17 in. tabloid size.

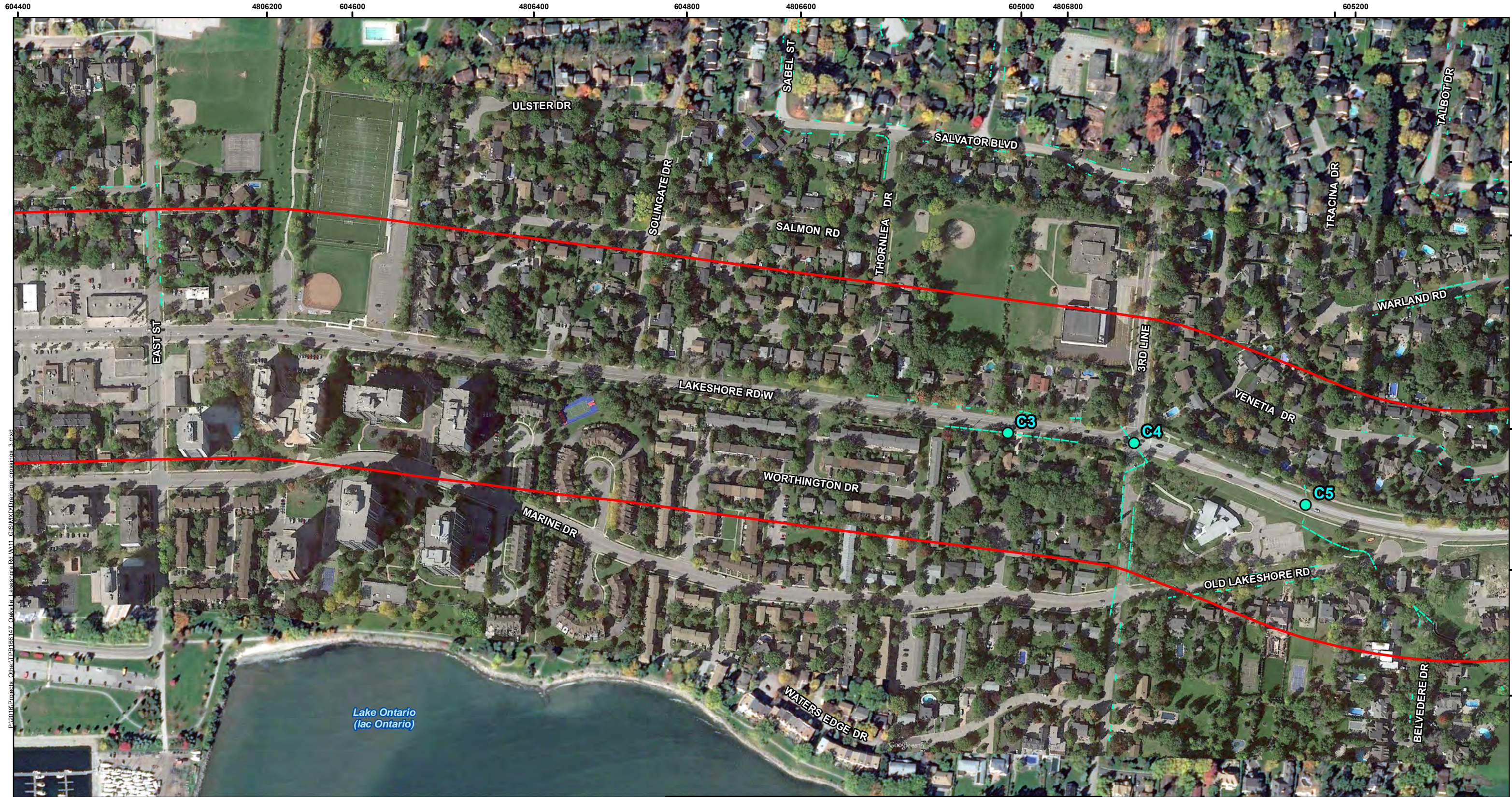
Datum & Projection:
 NAD 1983 UTM Zone 17N

**TOWN OF OAKVILLE
 LAKESHORE ROAD WEST IMPROVEMENTS**

**Drainage Crossings
 C1, C2**

PROJECT N ^o : TPB166147	FIGURE: 1-2
SCALE: 1:3,500	DATE: October 2017



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LEGEND

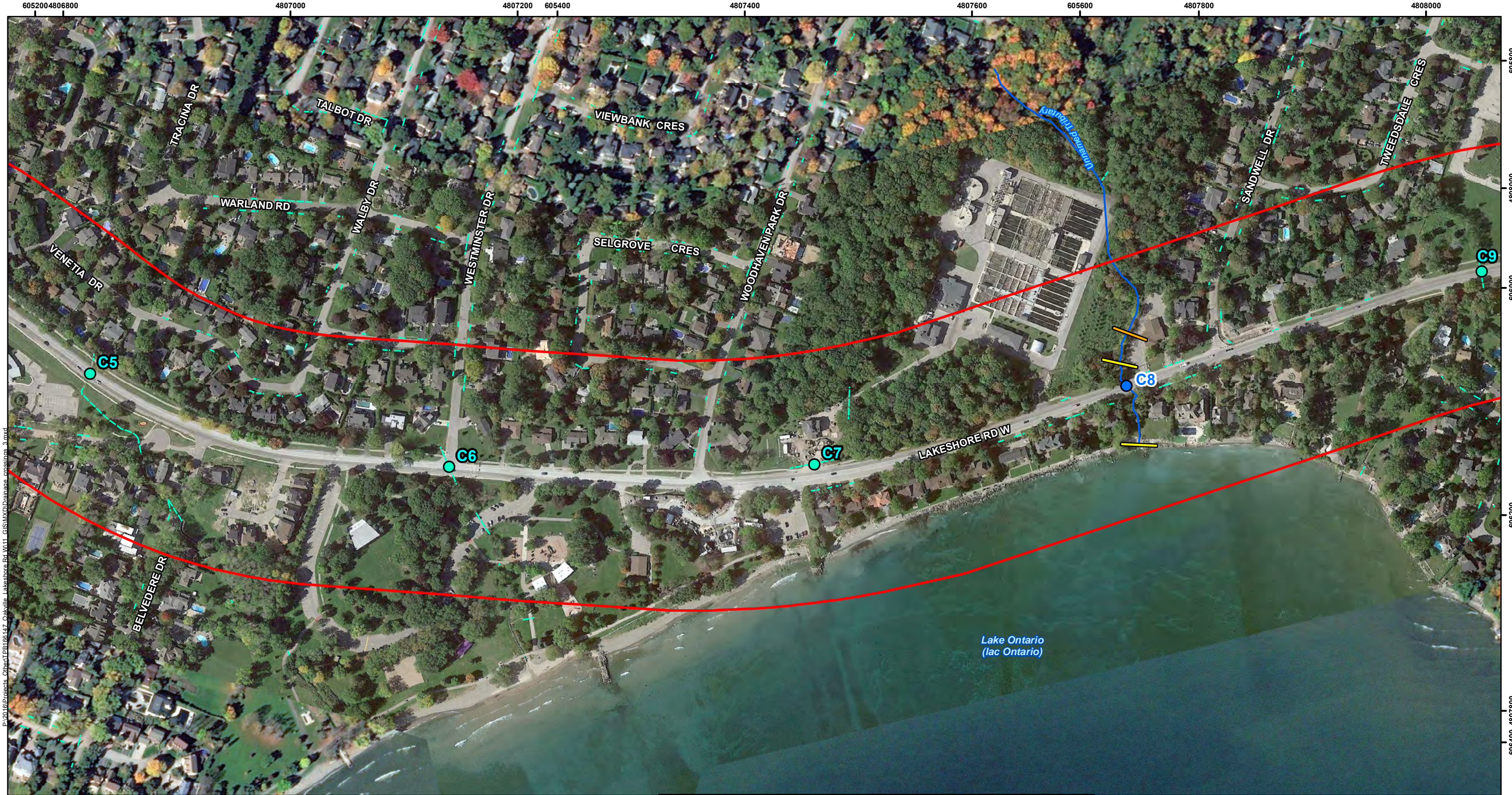
- Approximate Study Area
- Ephemeral Drainage Crossing
- Ephemeral Watercourse



NOTES:
 - Aerial Imagery extracted from Google Earth, date is 2016.
 * Scale when printed 11 x 17 in. tabloid size.

Datum & Projection:
 NAD 1983 UTM Zone 17N

 OAKVILLE	 amec foster wheeler
TOWN OF OAKVILLE LAKESHORE ROAD WEST IMPROVEMENTS	
Drainage Crossings C3, C4, C5	
PROJECT N ^o : TPB166147	FIGURE: 1-3
SCALE: 1:3,500	DATE: October 2017



LEGEND

- Approximate Study Area
- Ephemeral Drainage Crossing
- Permanent Drainage Crossing
- General Assessment Limits
- Detailed Assessment Limits
- Ephemeral Watercourse
- Permanent Watercourse

0 100 200 300 400 500 Metres



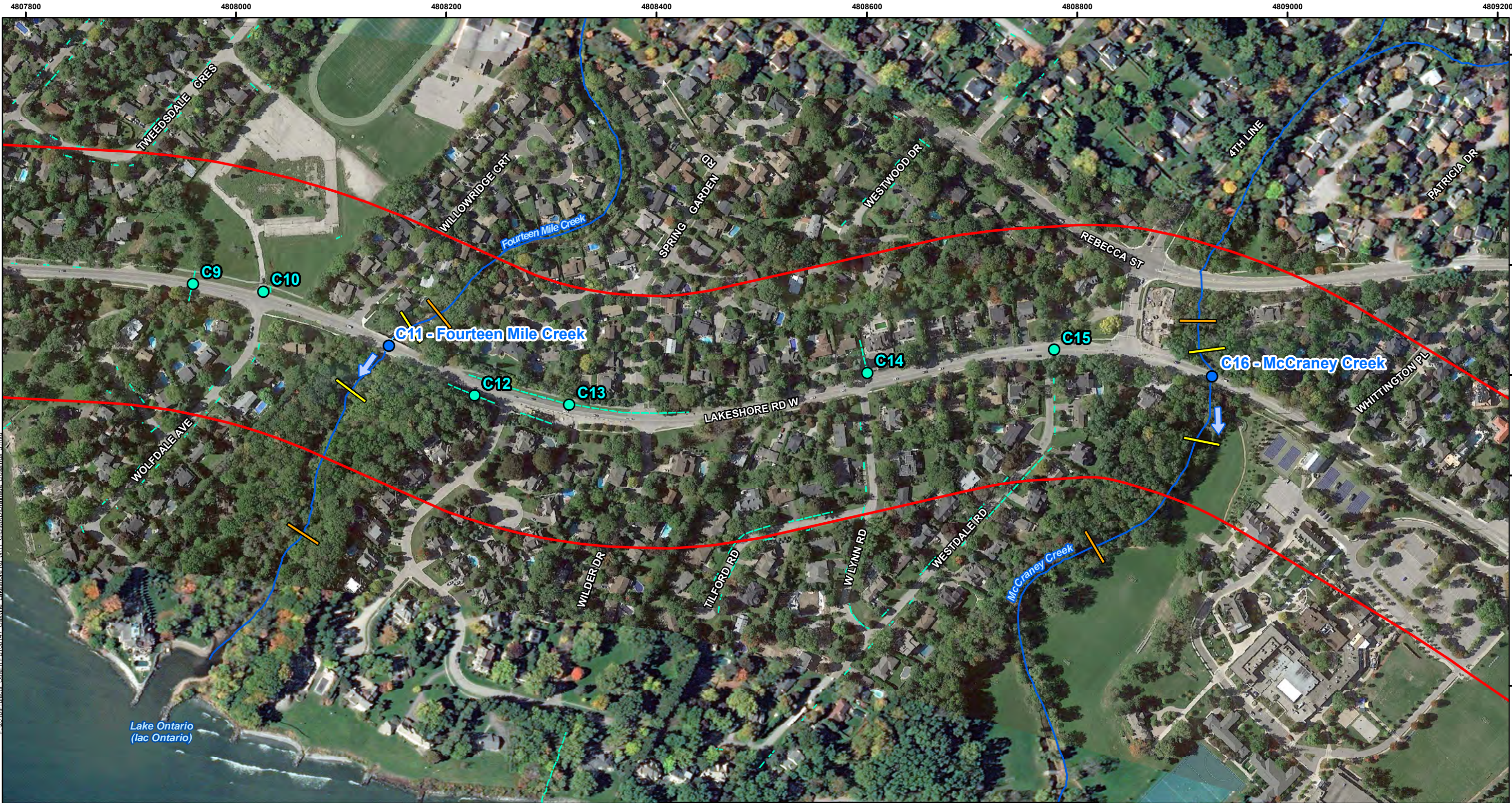
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 - Aerial Imagery extracted from Google Earth, date is 2016.
 * Scale when printed 11 x 17 in. tabloid size.

Datum & Projection:
 NAD 1983 UTM Zone 17N

TOWN OF OAKVILLE
LAKESHORE ROAD WEST IMPROVEMENTS

Drainage Crossings
C5, C6, C7, C8

PROJECT N ^o : TPB166147	FIGURE: 1-4
SCALE: 1:3,500	DATE: October 2017



LEGEND

- Approximate Study Area
- Ephemeral Drainage Crossing
- Permanent Drainage Crossing
- General Assessment Limits
- Detailed Assessment Limits
- Ephemeral Watercourse
- Intermittent Watercourse
- Permanent Watercourse

0 100 200 300 400 500 Metres



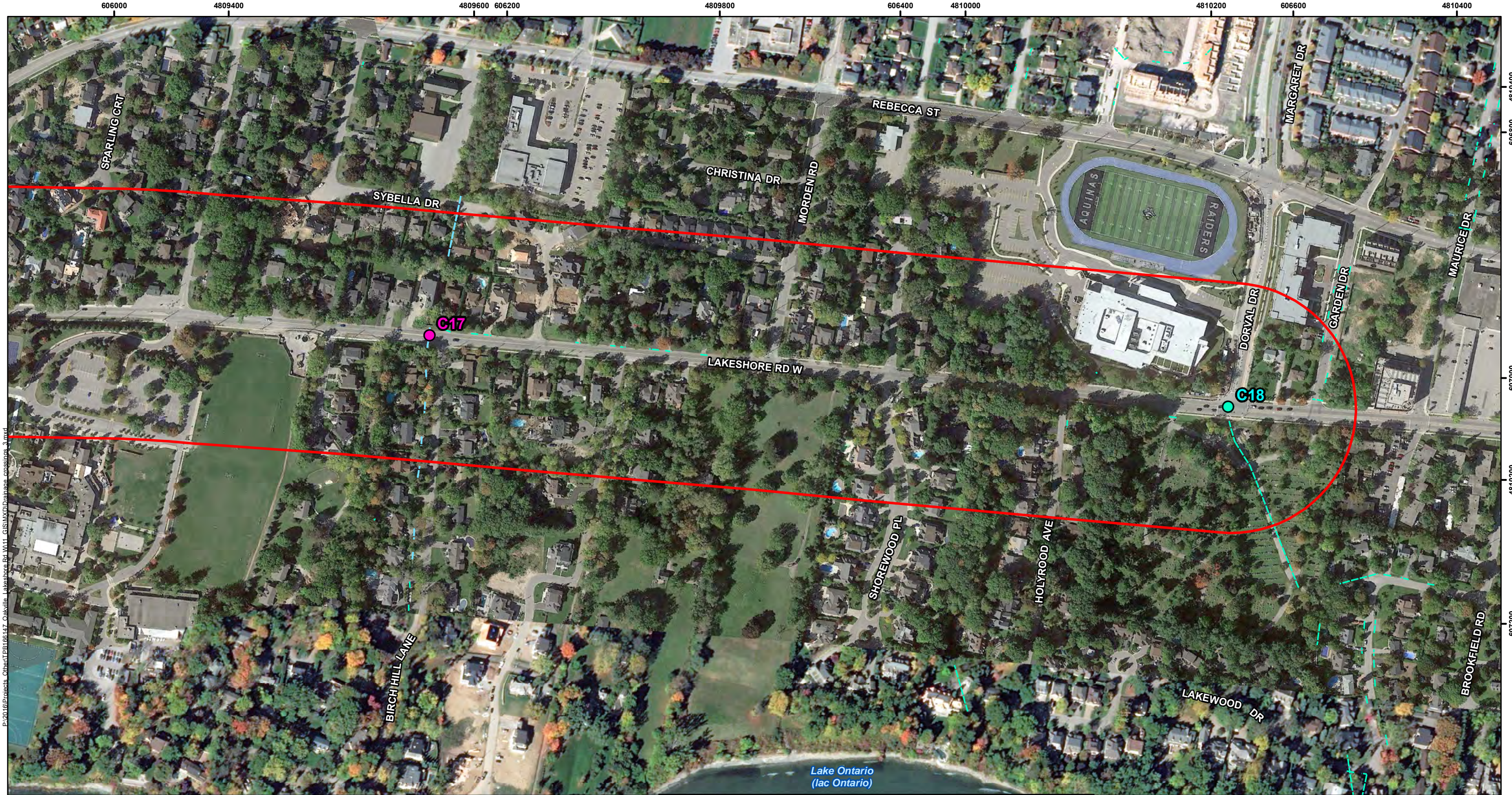
NOTES:
 - Aerial Imagery extracted from Google Earth, date is 2016.
 * Scale when printed 11 x 17 in. tabloid size.

Datum & Projection:
 NAD 1983 UTM Zone 17N

TOWN OF OAKVILLE
LAKESHORE ROAD WEST IMPROVEMENTS

Drainage Crossings
C9, C10, C11, C12, C13, C14, C15, C16

PROJECT N ^o : TPB166147	FIGURE: 1-5
SCALE: 1:3,500	DATE: October 2017



- LEGEND**
- Approximate Study Area
 - Ephemeral Drainage Crossing
 - Intermittent Drainage Crossing
 - Ephemeral Watercourse
 - Intermittent Watercourse

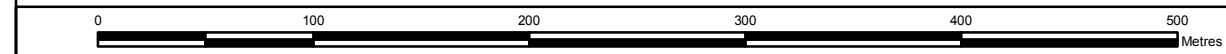


NOTES:
 - Aerial Imagery extracted from Google Earth, date is 2016.
 * Scale when printed 11 x 17 in. tabloid size.



**TOWN OF OAKVILLE
 LAKESHORE ROAD WEST IMPROVEMENTS**

**Drainage Crossings
 C17, C18**



Datum & Projection:
 NAD 1983 UTM Zone 17N



PROJECT N^o: TPB166147

FIGURE: 1-6

SCALE: 1:3,500

DATE: October 2017

2.0 METHODOLOGY

Field surveys were conducted on June 5 and June 7, 2017. Additional field surveys were completed on September 21, 2017 to confirm late summer/ early fall conditions at each of the sites.

Information collected from the field was used in conjunction with secondary source information to identify fish community, existing conditions and sensitivity of the aquatic habitat, and probability for aquatic Species at Risk (SAR) presence.

2.1 Secondary Source Review

Secondary sources and databases were reviewed to ascertain fish community and aquatic habitat data for the watercourses within the project limits. Information provided by external agencies, publicly-available topographic data, and correspondence with external agencies, which were reviewed included:

- Conservation Halton (CH) publications and online data:
 - Conservation Halton website (HRCA 2017);
 - 2013 Conservation Halton Watershed Report Card (CH 2013);
 - Urban Creeks and Supplemental Monitoring – Long Term Environmental Monitoring Program (CH 2009e); and
 - 2012 Bronte Creek, Urban Creeks and Supplemental Monitoring – Long Term Environmental Monitoring Program;
- Aerial imagery from Bing Maps (Bing 2017);
- MNRF's Natural Heritage Information Centre (NHIC) (MNRF 2017);
- Correspondence with the Aurora District MNRF (Appendix A);
- Fisheries and Oceans Canada's (DFO) Distribution of Aquatic SAR mapping (DFO 2016); and
- Topographic data extracted from Land Information Ontario (Government of Ontario 2015).

The MNRF NHIC database utilizes a 1 km x 1 km grid system. The Project study area overlaps with the following 17 NHIC atlas squares: 17PJ0304; 17PJ0305; 17PJ0404; 17PJ0405; 17PJ0406; 17PJ0505; 17PJ0506; 17PJ0507; 17PJ0508; 17PJ0509; 17PJ0606; 17PJ0607; 17PJ0608; 17PJ0609; 17PJ0610; 17PJ0709; and, 17PJ0710.

Terrestrial ecological components are provided in the Amec Foster Wheeler's (2017) *Terrestrial Habitat Existing Conditions Report*.

2.2 Field Surveys

To augment the secondary source information identified above, Amec Foster Wheeler conducted fish habitat field assessments on June 5 and June 7, 2017. Field conditions were assessed in accordance with the MTO Environmental Guide to Fish and Fish Habitat (MTO, 2009). The study area at each site included a zone of detailed assessment extending from 20 m upstream to 50 m downstream of the Lakeshore Road West Right-of-Way (ROW). Where accessible from the ROW, general habitat mapping was also conducted an additional 30 m upstream (20 m to 50 m upstream of the ROW) and 150 m downstream (50 m to 200 m downstream of the ROW) of the detailed mapping zones. Biophysical habitat conditions were recorded for each station exhibiting a permanent or intermittent flow and results are presented in Section 5.0. Detailed habitat mapping and field collection sheets are provided in Appendix C. Photographic records from both June, 2017 site visits are provided in a photographic log (Appendix B). An additional site visit was performed on September 21, 2017 to confirm flow conditions and flow permanency within the watercourses on site during summer conditions.

Fish sampling was not conducted during the studies, as there was sufficient community information available as provided by the MNRF to develop watercourse sensitivities and appropriate mitigation strategies.

3.0 RESULTS

3.1 Potential Constraints

General watercourse mapping including potential constraints such as aquatic SAR and SAR habitat, and natural heritage features are included in Figure 3-1. Further discussion of aquatic SAR and natural heritage features recorded in the vicinity of the project area has been included below.

3.1.1 Significant Natural Areas

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

- Occupied American Eel and Silver Shiner habitat: Bronte Creek;
- Occupied Redside Dace habitat: Fourteen Mile Creek;
- Lower Bronte Creek Wetland Complex:
 - Located approximately 170 m north of the Bronte Creek Bridge on Lakeshore Road (not shown in Figure 3-1); and
- Riverview Park, Bronte Athletic Park, Coronation Park lands.

Correspondence with MNRF and Conservation Halton is currently ongoing to ensure guidelines are met to provide necessary protection of these areas. During the Detailed Design phase, a

comprehensive assessment of potential impacts should be undertaken and site-specific mitigation measures developed.

3.1.2 Aquatic Species at Risk

A review of secondary sources (as listed in Section 2.1) and an online search of the MNRF NHIC database was conducted for the immediate vicinity of the site to identify potential SAR within the watercourses. A search of the 1 km NHIC squares encompassing the Project study area determined that four (4) aquatic SAR had been recorded in the vicinity of the Project study area, including American Eel (*Anguilla rostrata*), Redside Dace (*Clinostomus elongatus*), Silver Shiner (*Notropis photogenis*) and Lake Sturgeon (*Acipenser fulvescens*).

To confirm these findings MNRF, Aurora District, was solicited for further SAR records and fish community information. Correspondence with MNRF confirmed records of Redside Dace, Silver Shiner, Lake Sturgeon and American Eel in the vicinity of the proposed work sites (Appendix A).

DFO was also contacted to confirm the presence of federally listed SAR within the study area. DFO also indicated the potential presence of American Eel (under consideration for federal listing), as well as Deepwater Sculpin (*Myoxocephalus thompsonii*), federally listed as a special concern species. Upper Great Lakes Kiyi (*Coregonus kiyi kiyi*) were also indicated as being potentially present in the vicinity of the site; however, a search of DFO's website indicated that while this species is endemic to all of the Laurentian Great Lakes except Lake Erie, the Lake Ontario population (*Coregonus kiyi orientalis*) is considered extinct, last recorded in 1964 (DFO, 2017). As such, this species will not be discussed further within this report.

As of May 3, 2017, Redside Dace has been up-listed to federal protection under the Species at Risk Act (SARA) (2007), which now protects the species and habitat under sections 32 and 33 of the SARA. Previously this species was only protected provincially as endangered under Ontario's Endangered Species Act (2007). Communication with DFO will be required at the detailed design stage, and will entail submission of a 'Request for Review' to facilitate permitting requirements under SARA. The new process entails parallel communication with both MNRF and DFO to meet the requirements of both agencies.

Based on the aforementioned communications with MNRF and DFO, as well as the secondary source review, it was determined that Bronte Creek and Fourteen Mile Creek are the only watercourses which host SAR within the study area. The remaining watercourses and drainage features found on site do not contain SAR; however, these areas do outlet to Lake Ontario, where some of the identified SAR (i.e. Deepwater Sculpin, Lake Sturgeon) likely reside. The occurrences of SAR within the watercourse features on site are summarized in Table 3-1 below.

Table 3-1: Potential Occurrence of SAR within the Study Area

Watercourse Crossing ID and Watercourse Name (Where Applicable)	SAR Occurrence(s)
C1	N/A
C2 (Bronte Creek)	American Eel ^{1, 2} Silver Shiner ^{1, 2} Lake Sturgeon ¹ Deepwater Sculpin ²
C3	N/A
C4	N/A
C5	N/A
C6	N/A
C7	N/A
C8	None
C9	N/A
C10	N/A
C11 (Fourteen Mile Creek)	Redside Dace (‘occupied’ habitat) ¹
C12	N/A
C13	N/A
C14	N/A
C15	N/A
C16 (McCraney Creek)	None
C17	N/A
C18	N/A

N/A: No water present, ephemeral drainage feature

1: SAR screening information provided by MNRF Aurora District office.

2: SAR screening information provided by DFO



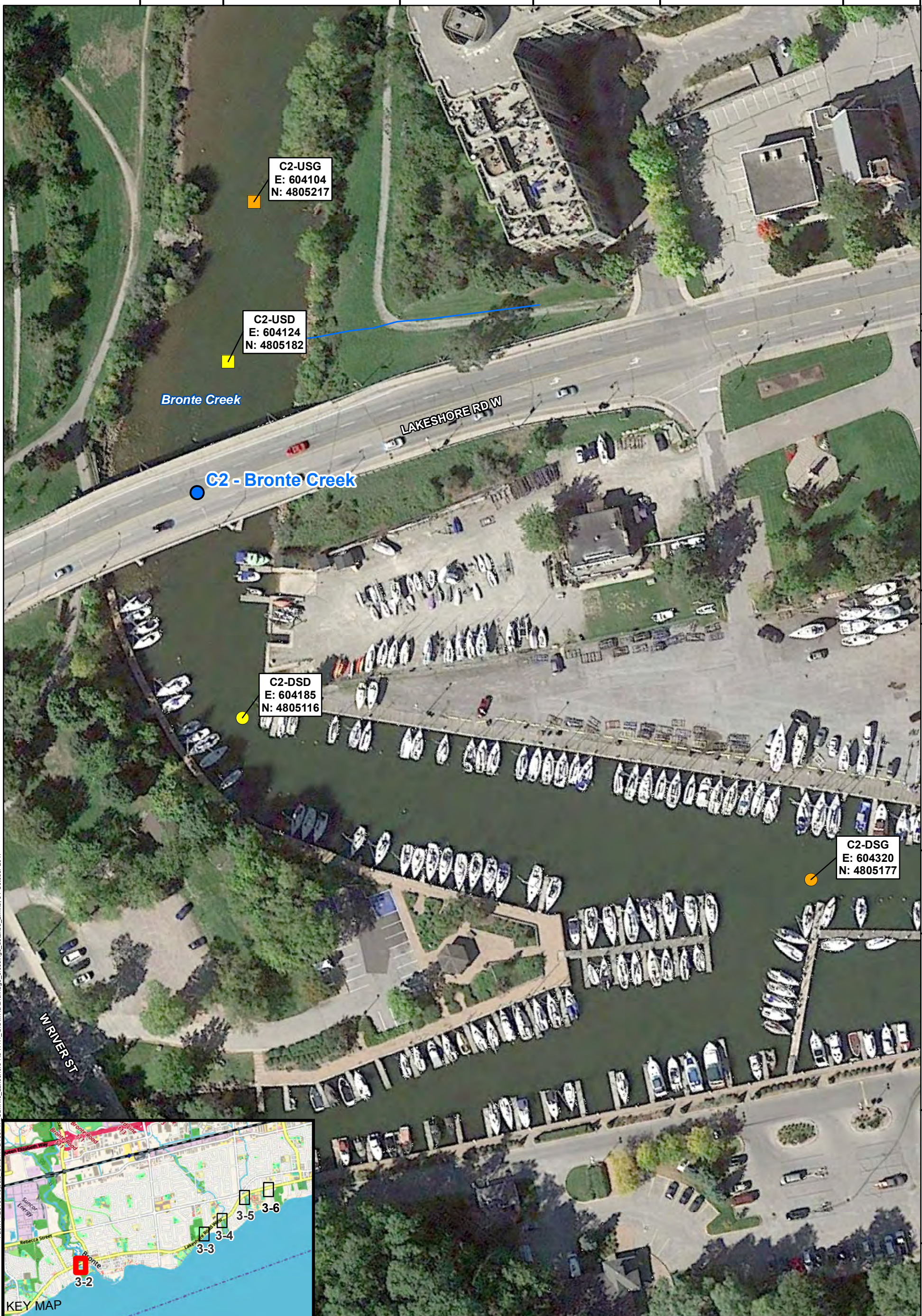
Document Path: P:\2016\Projects\Other\TPB166147_Oakville_Lakeshore Rd W111_GIS\MXD\NHIC_SAR_4.mxd

LEGEND 		NOTES: - Background extracted from Google Earth. ¹ Potential Butternut Hybrid. ² Planted Trees. * Scale when printed 11 x 17 in. tabloid size.	 LAKESHORE ROAD WEST IMPROVEMENTS CLASS ENVIRONMENTAL Natural Heritage and Species at Risk
2015 DFO Species at Risk (American Eel, Lake Sturgeon, Redside Dace, and Silver Shiner) 2015 DFO Occupied Redside Locally Significant Wetland Provincially Significant Wetland		Datum & Projection: NAD 1983 UTM Zone 17N 	

3.2 Existing Fish and Fish Habitat

The project area contains four (4) permanent watercourse crossings, including (from west to east): Bronte Creek (Crossing C2); an unnamed tributary to Lake Ontario flowing to the east of the water treatment plant through the Sedgewick Forest (C8); Fourteen Mile Creek (Crossing C11); and McCraney Creek (Crossing C16). One (1) intermittent watercourse crossing was identified at Crossing C17, where an unnamed tributary to Lake Ontario crosses the ROW. The aquatic habitat conditions for these permanent and intermittent watercourses as classified by secondary sources and observed during the 2017 field investigations are summarized below. The locations of the aquatic habitat field investigations are illustrated in Figure 3-2 to Figure 3-6.

604050 4805250 604100 4805300 604150 4805350 604200



604550
604250
604300
604200
604350
604150
604400

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LEGEND

- Permanent Drainage Crossing
- Permanent Watercourse
- - - Buried Watercourse

General Assessment Limits



- Upstream
- Downstream

Detailed Assessment Limits

- Upstream
- Downstream

NOTES:
 - Aerial Imagery extracted from Google Earth, date is 2016.
 * Scale when printed 11 x 17 in. tabloid size.

Datum: NAD83
 Projection: UTM Zone 17N

**TOWN OF OAKVILLE
 LAKESHORE ROAD WEST IMPROVEMENTS**

**Crossing C2
 Bronte Creek Survey Area**

PROJECT N°: TC121522 **FIGURE: 3 - 2**

SCALE: 1:900 DATE: October 2017

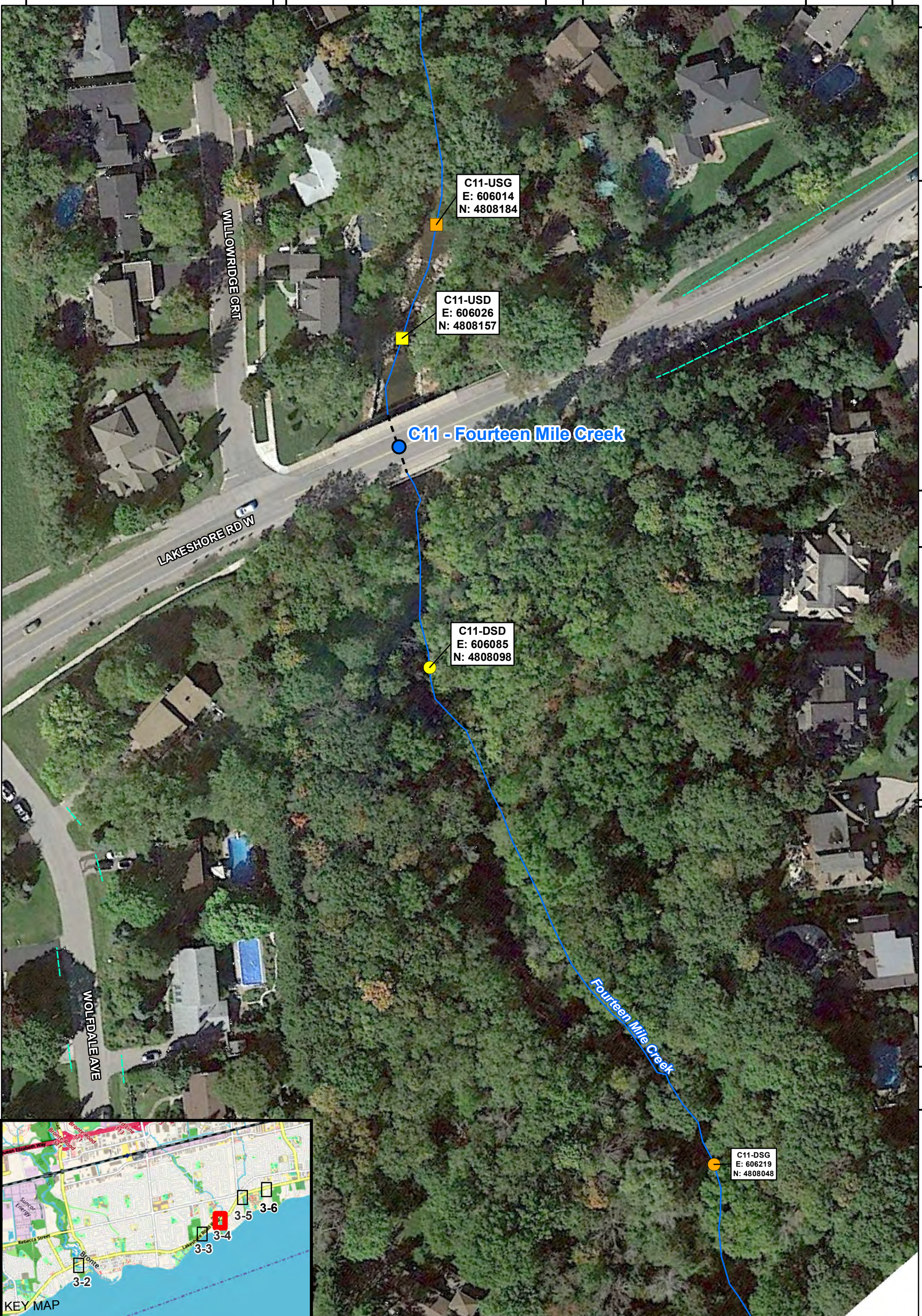


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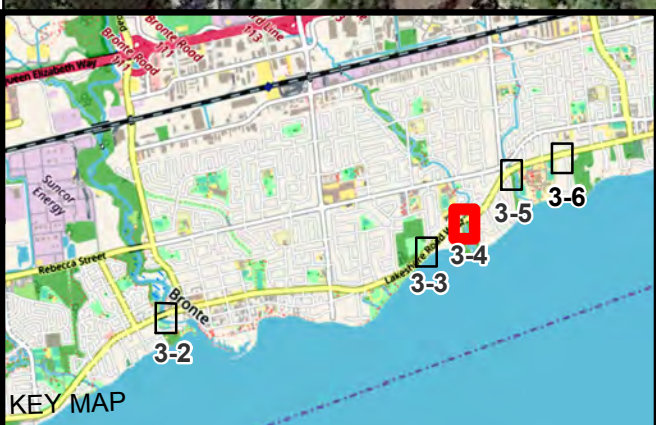
4807750
606000
4807700
606050
4807650
606100
4807600
606150

LEGEND Permanent Drainage Crossing Permanent Watercourse Ephemeral Watercourse		General Assessment Limits Upstream Downstream		NOTES: - Aerial Imagery extracted from Google Earth, date is 2016. * Scale when printed 11 x 17 in. tabloid size. Datum: NAD83 Projection: UTM Zone 17N	 TOWN OF OAKVILLE LAKESHORE ROAD WEST IMPROVEMENTS		
		Detailed Assessment Limits Upstream Downstream			Crossing C8 Unnamed Tributary Survey Area		
						PROJECT N°: TC121522	FIGURE: 3 - 3
				SCALE: 1:900		DATE: October 2017	

605900 605950 606000 4808250 606050 4808300



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LEGEND

- Permanent Drainage Crossing
- Permanent Watercourse
- - - Ephemeral Watercourse
- - - Buried Watercourse

General Assessment Limits

- Upstream
- Downstream

Detailed Assessment Limits

- Upstream
- Downstream

0 10 20 40 60 80 100 Metres

NOTES:
- Aerial Imagery extracted from Google Earth, date is 2016.
* Scale when printed 11 x 17 in. tabloid size.

Datum: NAD83
Projection: UTM Zone 17N

**TOWN OF OAKVILLE
LAKESHORE ROAD WEST IMPROVEMENTS**

**Crossing C11
Fourteen Mile Creek Survey Area**

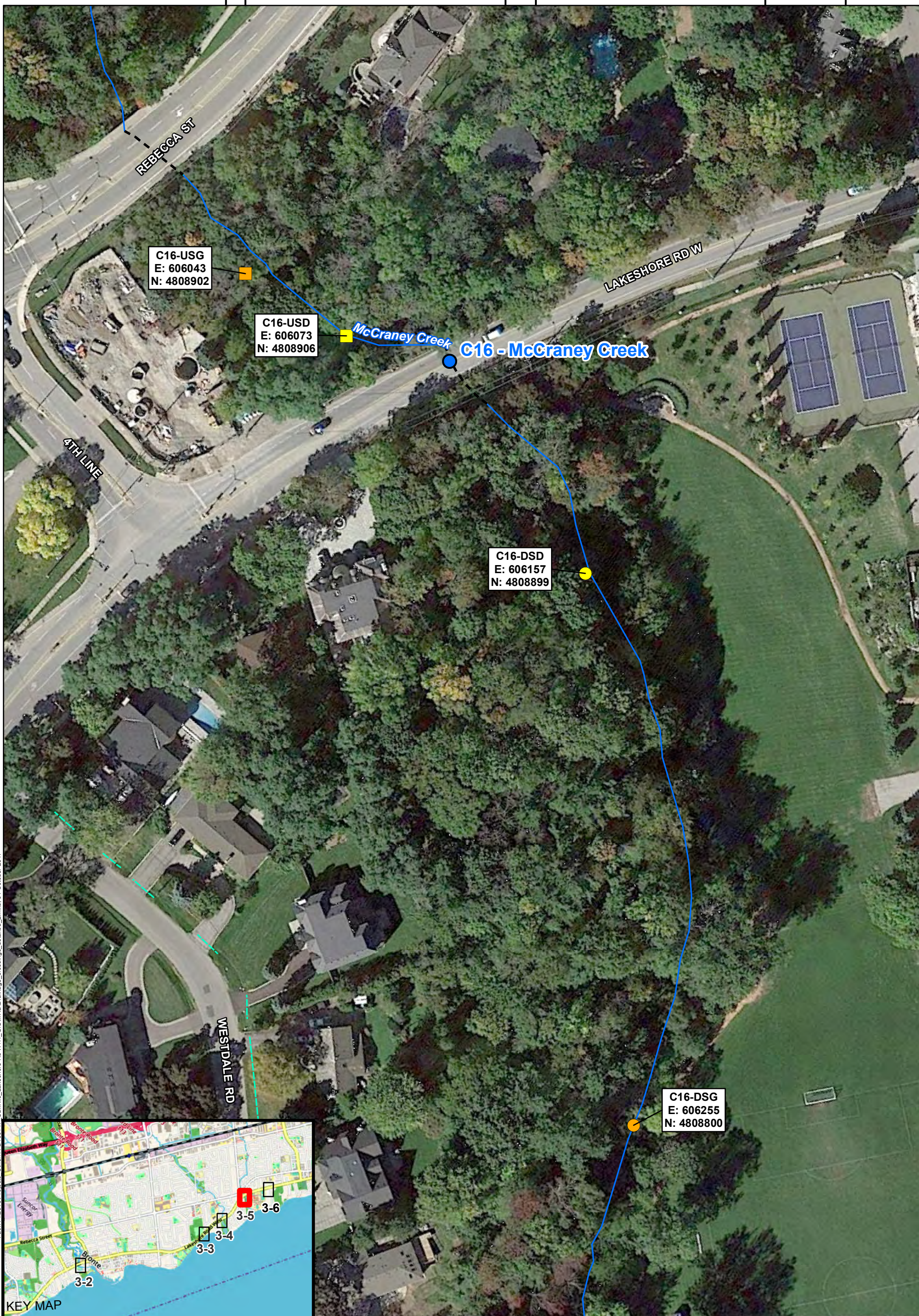
PROJECT N ^o : TC121522	FIGURE: 3 - 4
SCALE: 1:900	DATE: October 2017

606000

606050

606100

4809050



4809050
606150
4809000
606200
4808950
606250
4808900
606300
4808850
606350

Path: P:\2016\Projects\Other\TPB166147_Oakville_Lakeshore Rd W11_GISMXD\Drainage_crossings_detailed_2.mxd, 31 October 2017



LEGEND

- Permanent Drainage Crossing
- Permanent Watercourse
- Ephemeral Watercourse
- - - Buried Watercourse

General Assessment Limits

- Upstream
- Downstream

Detailed Assessment Limits

- Upstream
- Downstream

NOTES:

- Aerial Imagery extracted from Google Earth, date is 2016.
- * Scale when printed 11 x 17 in. tabloid size.

Datum: NAD83
Projection: UTM Zone 17N

OAKVILLE

**TOWN OF OAKVILLE
LAKESHORE ROAD WEST IMPROVEMENTS**

**Crossing C16
McCraney Creek Survey Area**

PROJECT N°: TC121522 FIGURE: 3 - 5

SCALE: 1:900 DATE: October 2017



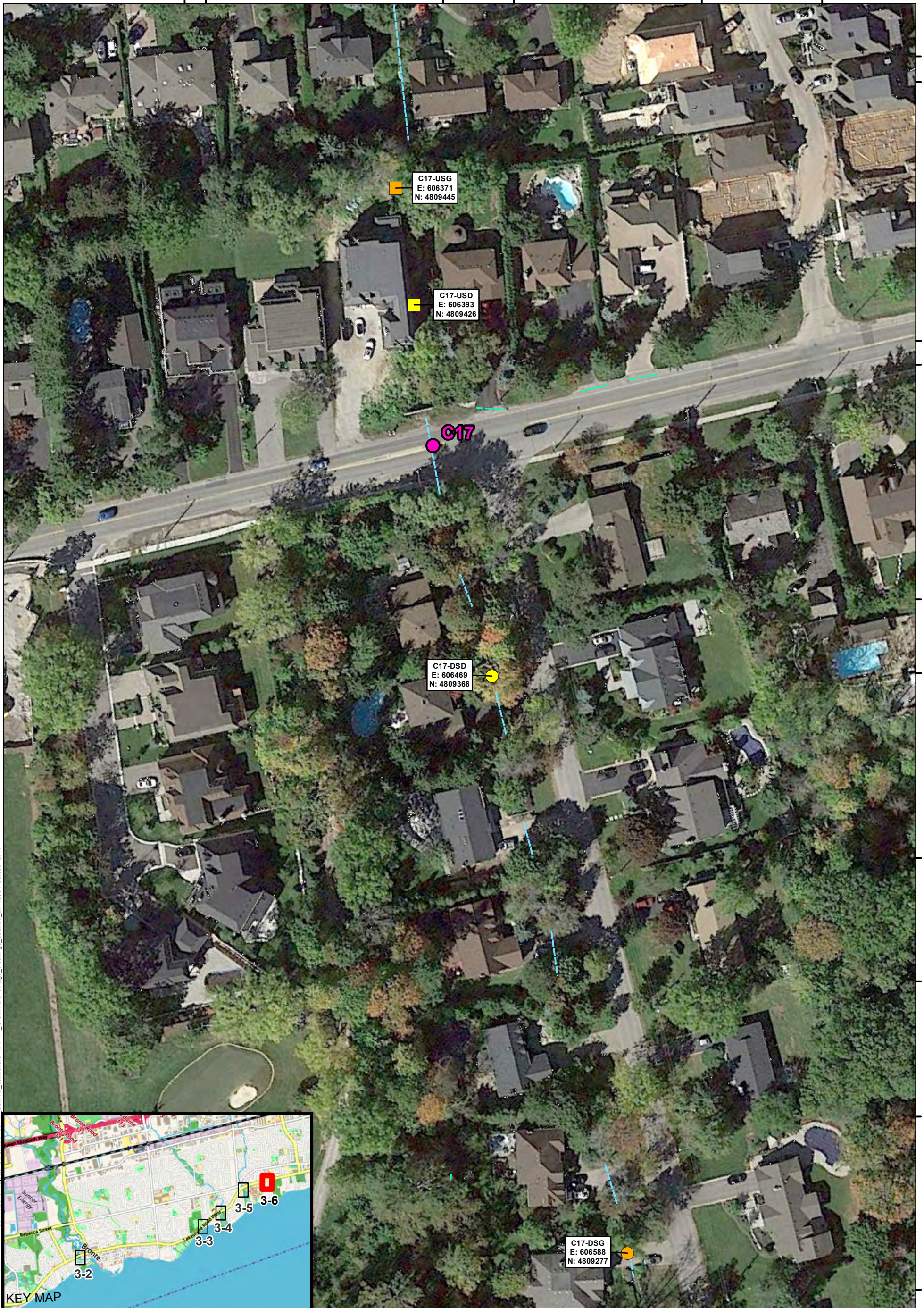
606300

606350

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4809350
606650

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LEGEND

- Intermittent Drainage Crossing
- Ephemeral Watercourse
- Intermittent Watercourse

General Assessment Limits



- Upstream
- Downstream

Detailed Assessment Limits

- Upstream
- Downstream

Datum: NAD83
Projection: UTM Zone 17N

NOTES:
- Aerial Imagery extracted from Google Earth, date is 2016.
* Scale when printed 11 x 17 in. tabloid size.

**TOWN OF OAKVILLE
LAKESHORE ROAD WEST IMPROVEMENTS**

**Crossing C17
Unnamed Tributary Survey Area**

PROJECT N ^o : TC121522	FIGURE: 3 - 6
SCALE: 1:900	DATE: October 2017



3.2.1 Bronte Creek Crossing (Crossing C2)

3.2.1.1 Origin and Flow

Within the study area, Lakeshore Road West crosses the main branch of Bronte Creek. The Bronte Creek watershed is the second largest watershed within the Conservation Halton jurisdiction and drains an area over 300 km². The headwaters are located approximately 30 km upstream of Lakeshore Road West, north of Highway 401, near Mountsberg. The watershed encompasses a variety of significant natural areas including provincially significant wetlands, the Niagara Escarpment, headwater wetlands and forests, significant valley systems and coldwater fish habitat (CH, 2009a). Lakeshore Road West is located at the southern end of the watershed, approximately 680 m upstream from the terminus of Bronte Creek in Lake Ontario and as such, this area of the watershed is largely influenced by Lake Ontario water levels. In the lower reaches of the watershed, greater amounts of urbanized areas are present, eliciting increased anthropogenic effects to the watercourse. Land use in the vicinity of this crossing is characterized by marina facilities, urban parkland and residential areas.

The structure at this crossing is a three-span bridge that has two piers located within the watercourse. During the surveys, Lake Ontario water levels were at historic highs, with significant nearshore flooding evident. Backwatering from Lake Ontario was observed at mouths of watercourses draining to the Lake. Subsequently, high water levels were observed in Bronte Harbour and Bronte Creek at the Lakeshore Road West crossing. Therefore, the aquatic habitat parameters provided herein reflect the high-water levels experienced in the area at the time of the site visit and are likely atypical of average summer conditions.

This site was revisited on September 21, 2017 to confirm the summer conditions for the watercourse. It was noted that water levels in the vicinity of the bridge had decreased significantly (>0.5 m) from those observed during the June 2017 site investigations.

3.2.1.2 General Morphology and Habitat Conditions

Due to high water levels at the time of the survey, all measurements were taken from the shoreline where reasonable to do so. A castable depth sounder was utilized to confirm depths and substrate type located in the area.

The habitat flow characteristics of Bronte Creek are uniform throughout the study area, exhibiting 100% flats with a thalweg increasing in depth as the creek extended into the Lake Ontario harbour. The channel narrows slightly upstream of the bridge. Substrate is consistent throughout the study area and is comprised of mainly fines (i.e. silt, sand, clay and muck). Some cobble and gravel was also evident in shoreline areas.

Directly downstream of the ROW, the mean depth was 2.38 metres (m) and the mean wetted width was approximately 55 m. Some instream (10%) and overhanging (<5%) woody debris was evident as well as organic debris (5%). Carp were observed jumping in the area downstream of the ROW, a potential sign that they may be breeding in the area. Beyond the immediate ROW

area, additional depth measurements were taken approximately 100 m downstream. The mean depth in this area was 3.41 m.

Directly upstream of the ROW, the mean depth was 1.9 m and the mean wetted width was approximately 51 m. Some instream and overhanging woody debris was observed as well as organic debris (approximately 5% ea.). The banks within this area are stable, with a rip-rap bank treatment present at the northwest bank, and armour stone present at the northeast bank. Within the ROW, the watercourse continues as a deep flats moving into downstream areas. The rip-rap bank treatment continues on the western bank and into downstream areas.

3.2.1.3 Community and Fisheries Classifications

A total of forty (40) different species of fish have been reported through sampling studies conducted within the watershed in riverine, nearshore area of Lake Ontario, and marsh habitats within the watershed (CH, 2009a, 2009b and MNRF). Species range from warmwater forage fish to coldwater sportfish indicating the wide variety of species and habitat diversity within the watershed (CH, 2009a).

In the immediate vicinity of the study area, at a CH fish sampling station located upstream of the site near Petro Canada Park, nine (9) species of fish were captured during fish sampling studies in 2008 (CH, 2009a). Additionally, Sea Lamprey (*Petromyzon marinus*) were observed from the lower reaches of Bronte Creek all the way upstream to the Lowville Dam (CH 2009a). Additional details of the fish species found within this watercourse are provided in Table 3-2 below. The reach of Bronte Creek within the study area is considered to have a warm water thermal regime. This is reflected by the fish community found during previous CH sampling efforts.

Bronte Creek was identified by the Atlantic Salmon Recovery Team as a candidate stream for Atlantic Salmon (*Salmo salar*) stocking and in 2010, the Ontario Federation of Anglers and Hunters spearheaded efforts to begin stocking Atlantic Salmon into the stream (CH, 2009a). As recovery efforts for this species are underway and several other salmonid species are present within the watercourse, Bronte Creek represents an important fall migratory route for spawning salmonids. While salmonids are known to occur within the watershed, the areas in the immediate vicinity of the crossing are likely only used as a migratory route. Spawning is more likely to occur in cool headwaters of the watershed.

The MNRF indicated that the reach of Bronte Creek located within the study area provides habitat for Silver Shiner and American Eel. Records of Lake Sturgeon were also indicated in the vicinity of the Study area. DFO further indicated records of Deepwater Sculpin and Lake Sturgeon in the vicinity of the site. No works have been proposed in the vicinity of the Bronte Creek Bridge; however, should plans change and any in-water or near water works be required, works should be conducted within the open construction timing window for these species (July 1st to September 15th) and appropriate mitigation measures should be implemented to ensure the protection of these species.

Table 3-2: Fish Species of Bronte Creek

Common Name	Scientific Name	G-Rank	S-Rank
Sea Lamprey	<i>Petromyzon marinus</i>	G5	SNA
Coho Salmon ²	<i>Oncorhynchus kisutch</i>	G4	SE
Chinook Salmon ²	<i>Oncorhynchus tshawytscha</i>	G5	SE
Rainbow Trout ^{1,2}	<i>Oncorhynchus mykiss</i>	G5	SE
Brown Trout ^{1,2}	<i>Salmo trutta</i>	G5	SE
Brook Trout ²	<i>Salvelinus fontinalis</i>	G5	S5
Rainbow Smelt ^{1,2}	<i>Osmerus mordax</i>	G5	S5
Northern Pike ¹	<i>Esox lucius</i>	G5	S5
Central Mudminnow ²	<i>Umbra limi</i>	G5	S5
White Sucker ^{1,2}	<i>Catostomus commersonii</i>	G5	S5
Northern Hog Sucker ^{1,2}	<i>Hypentelium nigricans</i>	G5	S4
Northern Redbelly Dace ²	<i>Phoxinus eos</i>	G5	S5
*Redside Dace ²	<i>Clinostomus elongates</i>	G4	S3
Common Carp ²	<i>Cyprinus carpio</i>	G5	SE
Brassy Minnow ²	<i>Hybognathus hankinsoni</i>	G5	S5
Hornyhead Chub ²	<i>Nocomis biguttatus</i>	G5	S4
River Chub ²	<i>Nocomis micropogon</i>	G5	S4
Common Shiner ¹	<i>Luxilus cornutus</i>	G5	S5
Rosyface Shiner ²	<i>Notropis rubellus</i>	G5	S4
Bluntnose Minnow ^{1,2}	<i>Pimephales notatus</i>	G5	S5
Fathead Minnow ²	<i>Pimephales promelas</i>	G5	S5
Blacknose Dace ^{1,2}	<i>Rhinichthys atratulus</i>	G5	S5
Longnose Dace ^{1,2}	<i>Rhinichthys cataractae</i>	G5	S5
Creek Chub ^{1,2}	<i>Semotilus atromaculatus</i>	G5	S5
Pearl Dace ²	<i>Semotilus margarita</i>	G5	S5
Stonecat ²	<i>Noturus flavus</i>	G5	S4
Brook Stickleback ²	<i>Culaea inconstans</i>	G5	S5
Rock Bass ^{1,2}	<i>Ambloplites rupestris</i>	G5	S5
Pumpkinseed ^{1,2}	<i>Lepomis gibbosus</i>	G5	S5
Smallmouth Bass ^{1,2}	<i>Micropterus dolomieu</i>	G5	S5
Largemouth Bass ^{1,2}	<i>Micropterus salmoides</i>	G5	S5
Rainbow Darter ^{1,2}	<i>Etheostoma caeruleum</i>	G5	S4
Fantail Darter ²	<i>Etheostoma flabellare</i>	G5	S4
Johnny Darter ^{1,2}	<i>Etheostoma nigrum</i>	G5	S5
Blackside darter ^{1,2}	<i>Percina maculata</i>	G5	S4
*American eel ¹	<i>Anguilla rostrata</i>	G4	S1
*Silver shiner ¹	<i>Notropis photogenis</i>	G5	S2S3

Common Name	Scientific Name	G-Rank	S-Rank
Alewife ^{1,2}	<i>Alosa pseudoharengus</i>	G5	SNA
Emerald Shiner ^{1,2}	<i>Notropis atherinoides</i>	G5	S5
White Perch ¹	<i>Morone americana</i>	G5	SNA
Northern Madtom ²	<i>Noturus stigmosus</i>	G3	S1
Round Goby ¹	<i>Neogobius melanostomus</i>	G5	SNA
Spotfin Shiner ¹	<i>Cyprinella spiloptera</i>	G5	S4

Source: CH 2009a, 2009b and MNRF field collection record data (1 CH records and 2 indicates MNRF records).

Species highlighted in grey are those species which were captured at a fish sampling station (BRO-119) located in close vicinity to the study area (CH 2009a).

*Indicates provincially endangered species (protected under ESA, 2007)

¹ S1 = Extremely Rare S2 = Very Rare S3 = Rare to Uncommon
 S4 = Common S5 = Very Common SE = Exotic
 SNA = Not Applicable

3.2.1.4 Fisheries Limitations

In the vicinity of the bridge, there are no limitations which would prevent fish passage through the area; however, the lack of riparian vegetation, low instream cover and hard engineering of the channel upstream and downstream of the crossing and within the ROW limit the productivity of the watercourse, decrease opportunities for cover and prevent the natural meandering and geomorphic processes of the channel.

There are no plans to modify or rehabilitate this structure as a component of the proposed works. As such, mitigation measures should ensure that sediments or other deleterious materials from nearby construction activities do not enter Bronte Creek at any time during the works. Impacts to SAR or the fish community within Bronte Creek are not anticipated. Should the current work plan be amended, MNRF and DFO will be notified as necessary to ensure obtainment of the appropriate approvals prior to the commencement of works.

3.2.1.5 Water Chemistry

Water quality (physicochemical parameter) values are provided in Table 3-5. At the time of the site June site visit, the watercourse was turbid due to high concentrations of suspended sediment, which is most likely due to the erosion occurring in upstream areas as a result of significant rainfall events taking place prior to the site investigations. Water quality results recorded at the site are typical for a southern Ontario urbanized stream and did not indicate any significant fisheries limitations.

3.2.2 Unnamed Tributary - Crossing C8

3.2.2.1 Origin and Flow

The unnamed tributary located at crossing C8 is an urban creek located in Oakville. Water within the tributary originates from residential areas to the north of the site and is permanently flowing albeit with typically low flows. The watercourse is likely supplied by significant rainfall events and

water from drainage ditches upstream; however, watercress was observed within the watercourse, indicating that this watercourse may also be supplied by groundwater discharge.

3.2.2.2 General Morphology and Habitat Conditions

This watercourse is narrow within the study area, ranging from 1 – 1.8 m in width upstream of the crossing. The watercourse is a series of riffles and flats with some pools evident. Downstream of the crossing, the watercourse is channelized with concrete banks and maintains a width of approximately 1 m. The watercourse maintained an approximate depth of 0.4 m before outflowing into Lake Ontario approximately 40 m downstream of the crossing. Backwatering from the Lake was evident in the area downstream of the crossing, with higher water levels and a decreased rate of flow evident.

The area upstream of the crossing consists primarily of riffles (60%) and flats (30%) with some pools also evident (10%). Riffles had a mean depth of 0.09 m and a mean wetted width of 1.1 m. Bankfull width was 2.1 m with a 0.52 m depth. Flats had a mean depth of 0.09 m and width of 1.1 m. Mean bankfull width was 2.1 m and depth was 0.52 m. Pools had a mean depth of 0.15 m and a mean wetted width of 1.27 m, with a bankfull width of 2.23 m and a depth of 0.62 m. Substrate within the channel consisted of a small amount of fines (8% sand and 2% silt) and gravel (10%), but mainly consisting of boulder (50%) and cobble (30%). The banks of the watercourse were stable within this area. Boulders and cobble provided the majority of in-stream cover (70%) total, with some instream woody debris (5%) organic debris (5%) and instream vascular macrophytes (20%) evident. Vegetation within the reach consisted of submergent species (algae sp.) as well as watercress, an emergent species which is indicative of potential groundwater discharge within the watercourse. Rip-rap stabilizes the channel banks and has created a hardened shoreline within the project area.

Within the ROW, the channel flows through closed bottom box culvert. While the watercourse was flowing upstream of the crossing, flows were noticeably slowed at the downstream end of the culvert, likely the result of backwatering from Lake Ontario. Rocky substrate could be observed within the culvert. A large jam of used lumber was observed at the upstream end of the ROW, but it is unlikely to be causing any fish passage issues.

Downstream of the crossing, the watercourse becomes channelized within poured concrete banks as it moves through residential backyards for 40 m before out-letting into Lake Ontario. The channel within this reach is narrow – 1 m wide and a water depth of 0.4 m. Larger, more concentrated rocks (i.e. cobble, gravel and boulders) were observed from the ROW. Specific measurements of this reach were not taken as specific landowner access had not been granted.

This site was revisited on September 21 2017 to assess the characteristics of the watercourse during summer conditions. Flows were decreased from those exhibited during the June 2017 field investigations and water levels within the downstream reach were approximately 0.2-0.3 m.

3.2.2.3 Community and Fisheries Classifications

Fish sampling records specific to this watercourse are not available. CH did not recognize this watercourse within their supplemental monitoring program in 2008 (CH 2009a, 2009b).

3.2.2.4 Fisheries Limitations

The existing culvert is embedded in the substrate and moderate flows are evident within the culvert. As such, the existing culvert does not constitute a barrier to fish passage. The concrete banks and channelization evident downstream of the crossing, as well as the rip-rap hardened channel banks upstream of the crossing inhibit the natural geomorphic processes within the reach, which eliminates the ability for natural meandering of the watercourse over time. Riparian vegetation is also lacking within the area. This limits cover afforded to the watercourse, decreases productivity within the riparian areas and may impact thermal buffering of the watercourse by decreasing shading.

The crossing at this structure may be improved to accommodate the widening of the roadway in this area. As such, a structure of appropriate dimensions which maintains fish passage (i.e. appropriate flows and flow velocity, natural channel substrate) through the ROW should be utilized. Additional mitigation measures are included in Section 5.0.

3.2.2.5 Water Chemistry

Water quality results recorded at the site are typical for a southern Ontario urbanized stream and did not indicate any significant fisheries limitations. Water quality values are provided in Table 3-5.

3.2.3 Fourteen Mile Creek Crossing (Crossing C11)

3.2.3.1 Origin and Flow

Fourteen Mile Creek is a cool/cold water watercourse which originates in the agricultural areas south of Old Base Line Road in the Trafalgar Moraine and drains an area approximately 34.8 km² in size (OS, 2009; HHSPC, 2012). The headwaters are located approximately 20 km north of the Lakeshore Road West crossing, within the Town of Milton. The headwaters are located predominantly within agricultural land use and rural residential areas, whereas downstream areas are urbanized, and include residential, commercial and industrial development areas where the stream has been mostly realigned (HHSPC, 2012). In the lower reaches, the main channel has a permanent flow in a well-defined valley, where stormwater sewers discharge to the tributaries and increase stream flow (OS, 2009; HHSPC, 2012). Land use in the vicinity of this crossing is characterized by residential areas.

3.2.3.2 General Morphology and Habitat Conditions

Within the study area, Fourteen Mile Creek has an average wetted width of approximately 9.52 m throughout the upstream and downstream areas. The channel has some deeper pools

which are not wadable at its centre. Upstream of the crossing, there is a series of fast flowing riffles which transition into an area of pools and flats near the Lakeshore Road ROW. Downstream of the crossing, the channel narrows and flows through another series of riffles before transitioning into flats.

Upstream of the ROW, the watercourse is characterized by pools (70%) and riffles (30%). The pools have a mean depth of 0.66 m and wetted width of 10.5 m. Bankfull width was found to be 11.6 m. Substrate within the pools consisted of boulders (30%), cobble (40%), gravel (15%) and fines (i.e. silt and sand; 15%). The riffles within this reach had a higher concentration of boulders (60%), with cobble (30%), gravel (5%) and a reduced amount of fines (5%). The mean depth of the riffles was 0.27 m and the mean wetted width was 6.57 m. The mean bankfull width was 9.81 m. The banks on either shoreline have been hardened with armour stone. The boulders and cobble present provide the majority of cover within the stream. Instream woody and organic debris are also evident.

Beneath the bridge and within the road ROW area, the watercourse is comprised mainly of flats and by small areas of riffle where gravel deposits are found. The channel remains very deep at the upstream end of the ROW, but becomes shallower towards the downstream end of the ROW.

Downstream of the ROW, there is another large riffle followed by flats that extend beyond the study area. The mean depth of the riffle was 0.18 m and the mean wetted width was 11.5 m. Bankfull width was 14.43 m and bankfull depth was 0.73 m. Substrate within this area consisted of boulder (10%), cobble (40%), gravel (40%) and sand (10%). The banks in this area showed slight signs of instability, with areas of exposed sand/gravel shoreline showing evidence of erosion. Similar to upstream areas, boulders and gravel provided the greatest amount of cover for fish. Some overhanging woody debris was also evident. Red/brown algae was observed on many of the rock surfaces found within this area.

This site was revisited on September 21, 2017 to assess the characteristics of the watercourse during summer conditions. Flows and water depths within the watercourse were largely reduced from those observed previously in June. Greater areas of rock were exposed at the channel banks as well as beneath the ROW and within the area immediately downstream of the ROW. Beneath the structure, the watercourse was confined to a narrow section of the channel, an area approximately 2-3 m in width near the western bank. Furthermore, greater water clarity was observed during the September 2017 site visit.

3.2.3.3 Community and Fisheries Classifications

A total of ten (10) species of fish have been reported through sampling studies conducted in riverine, nearshore areas of Lake Ontario, and marsh habitats within the watershed (CH, 2009a, 2009b and MNRF). In the immediate vicinity of the study area, at a CH fish sampling station located upstream of the site (FOR-71), seven (7) species of fish were captured during fish sampling studies conducted in 2008 (CH, 2009b). The species present in the vicinity of the site indicate that this area has a warm/cool thermal regime. Correspondence with MNRF indicated

that this watercourse is considered to be ‘occupied’ habitat for Redside Dace. Fish species found within this watercourse are provided in Table 3-3 below.

Fourteen Mile Creek is one of the few remaining watersheds to support relatively healthy populations of Redside Dace; however, increasing development over the last couple of decades is cited as threatening available habitat conditions (OS, 2009). Ontario Streams has partnered with the MNRF, Conservation Halton and several other local stakeholder groups to restore areas of the stream experiencing degradation and maintain suitability for Redside Dace. Furthermore, the MNRF Lake Ontario Management Unit, stocks Brown Trout in Lake Ontario for recreational purposes in the vicinity of Bronte Harbour. Through a Conservation Halton watershed monitoring program, two young of the year (YOY) Brown Trout individuals were captured in Fourteen Mile Creek during fish sampling surveys which were likely the offspring of stocked fish. This is the first evidence of natural reproduction of Brown Trout in Fourteen Mile Creek (OS, 2009).

Due to the presence of Redside Dace, the sensitivity of this watercourse is high. As such, mitigation measures specific to Redside Dace protection should be utilized to protect this species (e.g. specific Erosion and Sediment Control measures specific to Redside Dace protection). Additionally, any in-water or near-water works should be completed within the appropriate construction timing window for this species (July 1st to September 15th) to minimize disturbance during sensitive timing periods. Further mitigation recommendations are provided in Section 5.0.

Table 3-3: Fish Species of Fourteen Mile Creek

Common Name	Scientific Name	G-Rank	S-Rank
Eastern Blacknose Dace ^{1,2}	<i>Rhinichthys atratulus</i>	G5	S5
Bluntnose Minnow ^{1,2}	<i>Pimephales notatus</i>	G5	S5
Common Shiner ^{1,2}	<i>Luxilus cornutus</i>	G5	S5
Creek Chub ^{1,2}	<i>Semotilus atromaculatus</i>	G5	S5
Fathead Minnow ^{1,2}	<i>Pimephales promelas</i>	G5	S5
Largemouth Bass ¹	<i>Micropterus salmoides</i>	G5	S5
Rainbow Darter ¹	<i>Etheostoma caeruleum</i>	G5	S4
White Sucker ^{1,2}	<i>Catostomus commersonii</i>	G5	S5
*Redside Dace ^{1,2}	<i>Clinostomus elongates</i>	G4	S3
Brook Stickleback ²	<i>Culaea inconstans</i>	G5	S5

Source: CH 2009b and MNRF field collection record data (1 CH records and 2 indicates MNRF).

*Indicates provincially endangered species (protected under ESA, 2007)

S1 = Extremely Rare S2 = Very Rare S3 = Rare to Uncommon

S4 = Common S5 = Very Common SE = Exotic

SNA = Not Applicable

Species highlighted in grey are those species which were captured at a fish sampling station (BRO-119) located in close vicinity to the study area (CH 2009a).

3.2.3.4 Fisheries Limitations

No fish passage limitations were observed in the immediate location of the bridge; however, the bank armouring and lack of riparian vegetation present within the area limit the ability of the

channel to naturally meander and decrease the overall productivity of this area of the watercourse, respectively.

As the road will be widened within this area, alternatives to widen or replace the existing structure present at this crossing are under consideration. Any future plans to modify or replace the existing structure should consider efforts to naturalize the hardened shorelines in the vicinity of the crossing. Furthermore, the span of future crossings should be maximized to the extent practicable to allow for greater light penetration and natural meandering of the watercourse beneath the structure. Potential impacts of the proposed works and recommended mitigation measures are included in Sections 4.0 and 5.0 below.

3.2.3.5 Water Chemistry

Water quality results recorded at the site are typical for a southern Ontario urbanized stream and did not indicate any significant fisheries limitations. Water quality values are provided in Table 3-5.

3.2.4 McCraney Creek Crossing (Crossing C16)

3.2.4.1 Origin and Flow

McCraney Creek originates in the Trafalgar Moraine and drains an area approximately 12.2 km² in size. The only undeveloped part of the watershed lies within its headwaters. The upstream branches of the watershed are primarily intermittent, natural channels and swales, but become frequently enclosed and altered in urban areas. Storm sewers found in urban areas empty into the tributaries of McCraney Creek, thereby supporting perennial flow in the downstream reach (HHSPC, 2012).

3.2.4.2 General Morphology and Habitat Conditions

Within the study area, the watercourse remains highly homogenous, with a similar wetted width and depth throughout. The watercourse is provided extensive overhead cover by the surrounding deciduous trees (60-90%).

Upstream of the ROW, riffle and run sequences are evident, each covering approximately half the area. Directly upstream of the ROW, the watercourse veers to the west. The northwest bank is highly unstable, with bare eroding soils present. The wing wall of the bridge has become destabilized and can be seen leaning towards the watercourse. The mean depth of the runs were 0.22 m and the mean wetted width was 6.3 m. Bankfull depth and width was 0.58 m and 6.6 m respectively. The mean depth and width of the riffles was 0.13 m and 6.0 m respectively, with a bankfull depth of 0.31 m and a bankfull width of 7.7 m. Substrate within this reach consisted of mainly boulders (35-40%), cobble (30-40%), gravel (10-15%) and small amounts of sand and silt (5-10%). Instream cover was provided primarily by boulders (35%) and cobble (30%) with woody and organic debris as well as some small undercuts providing additional cover to the watercourse.

Downstream of the ROW, the watercourse becomes a consistent series of runs. The mean depth is 0.16 m and the mean wetted width was 7.0 m. The mean bankfull depth was 0.53 m and the mean bankfull width was 8.1 m. The substrate consisted of boulder (10%), cobble (80%), gravel, sand and silt (approximately 10%). The channel banks were stable within this reach and the bank has been stabilized and hardened with a boulder treatment on the west bank.

During the return site visit conducted on September 21, 2017, the summer conditions of the watercourse were recorded. Water levels were slightly lower than those observed during the June, 2017 field surveys, with greater areas of rock exposed upstream and downstream. Within the ROW, laminar flow is evident at the upstream end of the bridge where an area of exposed limestone is evident. At the downstream end of the limestone, a poured concrete pad is evident. This was likely installed for the protection of a conduit or other underground infrastructure. A step/face of concrete is present at the edge of the concrete pad, where the pad stops and meets with the natural channel bed downstream. Laminar flow was evident flowing over the limestone bedrock and concrete pad during the June, 2017 surveys. During the September 2017 surveys, flows were significantly reduced, exposing much of the limestone. As such, it is believed that this area may pose a barrier to fish movement. This represents a potential enhancement opportunity at this site may involve a level tie-in at the upstream end of the structure.

3.2.4.3 Community and Fisheries Classifications

A total of 9 species of fish have been observed through sampling studies conducted throughout the watershed in riverine, nearshore and marsh habitats within the watershed (CH, 2009a, 2009b and MNRF). CH captured eight (8) species of fish at a sampling station (MCR-13) sampled in 2008. These species are indicative that this reach of McCraney Creek can be considered to have a warm/cool thermal regime; with the exception of Rainbow Trout, which prefer cold water watercourses. While Rainbow Trout have been captured in the vicinity of this site, this area likely only represents a migratory route to upstream spawning grounds. Further details of the fish species found within this watercourse are provided in Table 3-4 below.

Table 3-4: Fish Species of McCraney Creek

Common Name	Scientific Name	G-Rank	S-Rank
Blacknose Dace ¹	<i>Rhinichthys atratulus</i>	G5	S5
Longnose Dace ¹	<i>Rhinichthys cataractae</i>	G5	S5
Common Shiner ¹	<i>Luxilus cornutus</i>	G5	S5
Creek Chub ¹	<i>Semotilus atromaculatus</i>	G5	S5
Fathead Minnow ¹	<i>Pimephales promelas</i>	G5	S5
Pumpkinseed ¹	<i>Lepomis gibbosus</i>	G5	S5
Rainbow Darter ¹	<i>Etheostoma caeruleum</i>	G5	S4
White Sucker ¹	<i>Catostomus commersonii</i>	G5	S5
Rainbow Trout ¹	<i>Oncorhynchus mykiss</i>	G5	SE

Source: CH 2009a, 2009b and MNRF field collection record data (1 CH records and 2 indicates MNRF).

Species highlighted in grey are those species which were captured at a fish sampling station (BRO-119) located in close vicinity to the study area (CH 2009a).

*Indicates provincially endangered species (protected under ESA, 2007)

S1 = Extremely Rare S2 = Very Rare S3 = Rare to Uncommon
S4 = Common S5 = Very Common SE = Exotic
SNA = Not Applicable

3.2.4.4 Fisheries Limitations

Within the ROW, laminar flow is evident at the upstream end of the bridge where an area of exposed limestone is evident. This presents a potential enhancement opportunity to increase fish passage beneath the structure.

McCraney Creek was found to be one of the least healthy watercourses within CH's jurisdiction based on invertebrate communities, with the majority of benthic invertebrates observed being aquatic worms, typically found in areas that contain organic pollution and anoxic conditions (CH, 2009b). The poor water quality present within the watercourse likely limits the fish species present; as species less tolerant of contaminants would not be able to inhabit this watercourse.

The proposed works at this site will include the replacement of the existing crossing structure with a larger spanning structure. Additionally, the channel upstream of the crossing may be realigned to better accommodate flows directly through the ROW and crossing structure. This would reduce bank erosion and bank instability caused by the current watercourse alignment, which enters the crossing at a sharp angle approaching from the west. Instream works would be required to complete the bridge replacement and potential realignment of the watercourse. Alternatively, the option to skew the replacement spanning structure to better align with the flows of the existing watercourse is also being considered. This alternative would avoid the need for channel realignments. As areas below the high water mark will be impacted through these proposed activities, a DFO 'Request for Review' should be completed and sent to DFO for consideration of the project detail and to determine approval requirements for the proposed works. Potential impacts of the proposed works and recommended mitigation measures are included in Sections 4.0 and 5.0 below.

Emergency works were recently performed at the southwest bank of the crossing to repair the wing-wall and bank slope which were exhibiting signs of failure. Active erosion had caused the wing-wall to lean significantly and become a safety concern.

3.2.4.5 Water Chemistry

Water quality results recorded at the site are typical for a southern Ontario urbanized stream and did not indicate any significant fisheries limitations. Water quality values are provided in Table 3-5.

3.2.5 Unnamed Tributary – Crossing C17

3.2.5.1 Origin and Flow

The unnamed tributary located at crossing C17 is an urban creek located in Oakville. Water within the tributary originates from residential areas to the north of the site and exhibits an intermittent flow. The watercourse is likely supplied by significant rainfall events and water from drainage ditches upstream.

3.2.5.2 General Morphology and Habitat Conditions

The structure present at this crossing is a concrete open-bottom box culvert. The watercourse at this site exhibits extremely low flows and was very shallow in depth during the June site visit. During the September site visit, there was no flow, and only small pools were observed in the vicinity of the ROW. The watercourse is narrow and is channelized by rock upstream of the ROW, but widens downstream of the ROW.

Upstream of the crossing, the watercourse is narrow. The watercourse has been channelized within a small valley located between two residential properties and the banks of the watercourse have been hardened with stone. Cobble is present within the channel, overlying a substrate of fines (i.e. silt, sand and clay). This cobble has likely fallen into the watercourse as a result of the channelization and bank hardening in the area. A small pool has formed at the culvert inlet, with an approximate depth of 0.20 - 0.30 m. The wetted width of the channel is approximately 1.5 m in this reach, and bankfull width is approximately 3 m.

Downstream of the crossing, several culverts are present out-letting stormwater from the roadway. The watercourse was extremely shallow, with laminar flow observed moving over a substrate of fines (i.e. silt, sand and clay) with a small amount of gravel evident. The average wetted width of the watercourse was 3 m and the average bankfull width was 3.20 m. The greatest depth recorded within this area was 0.04 m. This shallow, laminar flow continues on for approximately 30 m until the drainage feature crosses under the first of several residential driveways through an armoured, channelized channel prior to out-letting to Lake Ontario.

3.2.5.3 Community and Fisheries Classifications

Similarly to Crossing C8, fish sampling records specific to this watercourse are not available. CH did not recognize this watercourse within their supplemental monitoring program in 2008 (CH 2009a, 2009b).

3.2.5.4 Fisheries Limitations

No limitations or fish passage barriers were observed in the direct vicinity of the crossing; however, the intermittent nature of this stream means that it is impassable to fish species during dry periods of the year.

The concrete banks, armouring and channelization evident downstream of the crossing, as well as the hardened channel banks upstream of the crossing inhibit the natural geomorphic processes within the reach, including the natural meandering of the watercourse over time. Riparian vegetation is also lacking within the area. This limits cover afforded to the watercourse, decreases productivity within the riparian areas and may impact thermal buffering of the watercourse by decreasing shading.

The crossing at this structure may be improved to accommodate the widening of the roadway in this area. As such, a structure of appropriate dimensions which maintains fish passage (i.e. appropriate flows and flow velocity, natural channel substrate) through the ROW should be utilized. Additional mitigation measures are included in Section 5.0.

3.2.5.5 Water Chemistry

Water quality results recorded at the site are typical for a southern Ontario urbanized stream and did not indicate any significant fisheries limitations. Water quality values are provided in Table 3-5.

Table 3-5: Water Quality Results June 5 and 6, 2017

Water Body	Sample Date	Parameter	Result
Bronte Creek	June 5, 2017	Water temperature (°C)	17.1
		Air temperature (°C)	16
		Conductivity (µs/cm)	727
		Dissolved oxygen (%)	72.9
		Salinity (ppm)	364
		pH	8.51
Fourteen Mile Creek	June 5, 2017	Water temperature (°C)	15.1
		Air temperature (°C)	16
		Conductivity (µs/cm)	955
		Dissolved oxygen (%)	94.0
		Salinity (ppm)	477
		pH	8.51
McCraney Creek	June 5, 2017	Water temperature (°C)	14.7
		Air temperature (°C)	16
		Conductivity (µs/cm)	451
		Dissolved oxygen (%)	93.1
		Salinity (ppm)	451
		pH	8.50
Crossing C8	June 5, 2017	Water temperature (°C)	15.3
		Air temperature (°C)	16
		Conductivity (µs/cm)	1161
		Dissolved oxygen (%)	80.9
		Salinity (ppm)	580
		pH	8.10
Crossing C17	June 6, 2017	Water temperature (°C)	13.1
		Air temperature (°C)	16
		Conductivity (µs/cm)	1584
		Dissolved oxygen (%)	71.4
		Salinity (ppm)	798
		pH	8.26

4.0 POTENTIAL IMPACTS TO FISH

The improvements, extension or replacement of the crossing structures will likely require ‘in-water’ works that are both temporary and permanent in nature, depending on the extensiveness of the structure modifications. In-water works should occur within appropriate timing windows for construction suitable to the thermal regime and fish species evident. Furthermore, some sections of the creek may need to be dewatered to permit works ‘in-the-dry’. In these instances, cofferdams and bypass pumping and/or flumes can be utilized to isolate the work areas. Isolating and dewatering work areas may require fish salvage programs to avoid the stranding of fish within work areas.

During the works, runoff from construction activities may lead to a temporary increase in erosion risk due to increased area of exposed soil and stockpiled materials. This poses an increased risk of siltation to the watercourse leading to increased surface water turbidity which would be harmful for fish. Spills and leaks such as the introduction of sediment, concrete outwash, and other deleterious substances (e.g., salt, paint, solvents, oil and grease) during construction could allow contaminated water to enter the river. The potential for such effects is low if appropriate mitigation and environmental protection planning measures are applied consistent with Ontario Provincial Standards.

Additionally, the limited temporary and/or permanent removal of shrubs/trees and/or riparian vegetation may be required. Vegetation removals can result in a temporary increase in erosion and sedimentation risk, and instability in channel banks. Furthermore, vegetation removal may cause a temporary loss of overhead cover for fish and could result in increased water temperatures and instability in channel banks.

5.0 MITIGATION

5.1 Mitigation Measures

Specific mitigation measures have been provided that would minimize and/or avoid significant short-term and long-term adverse environmental effects resulting from the proposed construction activities on fish and fish habitat. Principal mitigation measures for construction activities in or near to a watercourse include:

- Prior to commencement of works, design and implement standard Erosion and Sediment Control (ESC) measures, consistent with Ontario Provincial Standards and Specifications (OPSS) and maintain ESC measures through all phases of the Project until vegetation is re-established and all disturbed ground is permanently stabilized. The ESC measures should be installed to meet the following requirements:
 - Specialized ESC measures specific to Redside Dace protection, will be utilized in the stabilization of the Fourteen Mile Creek site which the MNR has indicated provides habitat for Redside Dace. Similarly, ESC measures specific to Silver Shiner will be applied at the Bronte Creek site, where Silver Shiner and American Eel have been recorded by the MNR. These measures include the use of double-row non-woven, wire-backed silt fencing and the installation of staked straw bales between the silt fences.
 - All materials and equipment used for the purpose of site preparation and Project construction will be operated and stored in a manner that prevents any deleterious substance (e.g., petroleum products, silt, etc.) from entering a watercourse.
 - Stabilize stockpiles and embankments when not in use/as soon as possible following use, in order to prevent sedimentation to the watercourse.
 - A protocol to minimize spills/leaks and their impact to the environment should be provided in an Emergency Spill Response Plan. Routine inspections of the Project construction site should be conducted to ensure continued use and function of best management practices, mitigation measures and spill control and prevention measures. As appropriate, spills will be reported to the Ministry of Environment and Climate Change (MOECC) Spills Action Centre.
 - Staging of the Project will limit vegetation disturbance and minimize the amount of time disturbed soil is exposed.
 - Land drainage systems, whether naturally occurring or man-made are not to be used as receptors for any substance or material other than clean water complying with local municipal bylaws or storm water as intended.
 - All disturbed areas of the work site should be stabilized and revegetated promptly, and/or treated with appropriate erosion protection materials. In riparian and aquatic

habitats, all temporarily disturbed areas will be reinstated to original condition, or better, upon completion of works.

- Should the watercourse bed and/or bank be temporarily impacted as a result of construction activities, these areas should be rehabilitated to pre-construction condition.

Additional mitigation measures should be considered to account for the increased probability of extreme weather events as a result of climate change. High water levels were reported in Lake Ontario and potentially within the drainage features surveyed in 2017. These high water levels can be attributed to significant rainfalls experienced in the late spring/early summer of 2017. Significant rainfall caused additional rainwater loading to regional watersheds, which in turn cumulated in a water elevation rise in Lake Ontario. There is some potential that these heavy rainfalls are the result of climate change, which can change the frequency, intensity and duration of precipitation events (MOECC, 2016). As such, Amec Foster Wheeler recommends that the following mitigation measures be considered to counter impacts associated with climate change, as well as take into consideration the effects of climate change on the project and on the resiliency of the proposed roadway infrastructure following construction completion:

- Gas-driven machinery and equipment will be turned off when not in use to reduce greenhouse gas emissions associated with the construction activities;
- Staff will carpool to the site/between work areas as practicable to reduce greenhouse emissions resulting from vehicular transport. Machinery will be turned off when not in use. Furthermore, trips between sites will be minimized to the greatest extent possible; and
- Crossing sizing/dimensions shall take into consideration high water levels and peak rainfall intensity to ensure the long-term resiliency of the surrounding environment and the structure itself to altered weather patterns.

5.2 Timing Restrictions

The works should be implemented during appropriate (not restricted) timing windows that protect occupied habitat for SAR and other fish communities as follows:

- Work within the permitted construction timing window for Silver Shiner and American Eel in/near Bronte Creek (July 1st to September 15th).
- Work within the warm water timing window in the unnamed tributary located at Crossing C8 and Crossing C17 (July 1st to March 31st).
- Work within the permitted construction timing window for Redside Dace in/near Fourteen Mile Creek (July 1st to September 15th).

- Work within the permitted warm water timing window and construction timing window for Rainbow Trout (June 15th – March 31st) in/near McCraney Creek.
- Additional timing considerations include:
 - Scheduling work to avoid wet, windy and rainy periods that may increase erosion and sedimentation.



6.0 CLOSURE

Field investigations were completed in accordance with the MTO Fish Guide. Background data collection identified the characteristics of the watercourse associated with the various crossings on site. Four (4) permanent watercourses, one (1) intermittent watercourse, and (13) ephemeral drainage features are found within the study area.

A secondary source review, including correspondence from MNRF revealed records of Redside Dace at Fourteen Mile Creek and Silver Shiner and American Eel at Bronte Creek. No modifications to the existing crossing structure located at Bronte Creek have been proposed. As such, no impacts to SAR or the fish community are anticipated at this site. There is some potential for a bridge modification/replacement at Fourteen Mile Creek. As such, in-water/near water works taking place at this site should proceed within the appropriate timing window as indicated by the MNRF (July 1st to September 15th). The remaining watercourses (Crossing C8 - McCraney Creek, and Crossing C17 – unnamed tributary) are considered to have warm and warm/cool water thermal regimes, respectively. Any in-water/near-water works proposed in these areas should respect the timing windows provided in the report herein unless otherwise dictated by the MNRF or DFO. Appropriate mitigation measures should be applied during the construction activities to avoid harm to SAR and fish communities present at each site during sensitive time periods.

Proper planning, design, and implementation of the mitigation measures detailed above will ensure maximum protection to fish and fish habitat and restoration of each project site to pre-construction or better conditions.

Yours truly,

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

Written by: Brittany Ferguson
Environmental Biologist

Signature: _____ Date: _____

Reviewed by: Daryl Rideout
Environmental Biologist

Signature: _____ Date: _____

7.0 REFERENCES

AECOM. 2010. Town of Oakville – Creek Erosion Inventory and Assessment Study.

Conservation Halton (CH). 2009a. Bronte Creek and Supplemental Monitoring – Long Term Environmental Monitoring Program.

Conservation Halton (CH). 2009b. Urban Creeks and Supplemental Monitoring – Long Term Environmental Monitoring Program.

Fisheries and Oceans Canada (DFO). 2017. Upper Great Lakes Kiyi. <http://www.dfo-mpo.gc.ca/species-especes/profiles-profil/kiyi-eng.html>. Accessed online October 2017.

Oakvillegreen Conservation Association (OCA). 2017. Fourteen Mile Creek: Small Creek Big Heart. <http://oakvillegreen.org/discover-your-creek/fourteen-mile-creek-small-creek-big-heart/>. Accessed March, 2017.

Ministry of Environment and Climate Change Change (MOECC). 2016. Guide: Consideration of Climate Change in Environmental Assessment in Ontario.

MTO Environmental Guide to Fish and Fish Habitat. June, 2009.

Ontario Streams (OS). 2009. Fourteen Mile Creek Redside Dace Monitoring & Rehabilitation. <http://www.ontariostreams.on.ca/fourteenmile.htm>. Accessed March, 2017.

Hamilton-Halton Source Protection Committee (HHSPC). 2012. Assessment Report for the Halton Region Source Protection Area, Version 2.1.

APPENDIX A
CORRESPONDANCE

February 13, 2017

Erin M. Hellinga, B.Sc.
Environmental Biologist
Amec Foster Wheeler Environment & Infrastructure
900 Maple Grove Road, Unit 10
Cambridge, ON, N3H 4R7
Email: erin.hellinga@amecfw.com

Dear Ms. Hellinga,

**Re: Lakeshore West Class EA
Mississauga Street to Dorval Drive, Town of Oakville**

You have requested species at risk information for the above noted project within the Town of Oakville. As of the date of this letter, the Ministry of Natural Resources and Forestry (MNRF) has records of the following species within and adjacent to your study area:

- **Red-Necked Grebe (S3B, S4N)**
- **Snapping Turtle (Special Concern)**
- **Eastern Wood-Pewee (Special Concern)**
- **Northern Map Turtle (Special Concern)**
- **Chimney Swift (Threatened)**, with general habitat protection
- **Silver Shiner (Threatened)**, with general habitat protection
- **Bank Swallow (Threatened)**, with general habitat protection
- **Barn Swallow (Threatened)**, with general habitat protection
- **Lake Sturgeon (Threatened)**, with general habitat protection
- **American Eel (Endangered)**, with general habitat protection
- **Redside Dace (Endangered)**, with regulated habitat protection

Additionally, the species listed below have the potential to occur in your study and may require further assessment or field studies to determine presence:

- **Butternut (Endangered)**, with general habitat protection
- **Little Brown Myotis (Endangered)**, with general habitat protection
- **Northern Myotis (Endangered)**, with general habitat protection

Additional natural heritage information including information on wetlands and Areas of Natural and Scientific Interest (ANSIs) can be obtained through Land Information Ontario (LIO).

As there are species at risk within the study area and possible requirements under the *Endangered Species Act, 2007* (ESA), MNRF would appreciate the opportunity to provide comments on the draft Environmental Study Report.

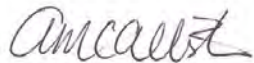
The species listed above may receive protection under the ESA and thus, an authorization from MNRF may be required if the work you are proposing could cause harm to these species or their habitats. If the Species at Risk in Ontario List is amended, additional species may be listed and protected under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

Please note that absence of information for a given geographic area, or lack of current information for a given area or element, does not categorically mean the absence of sensitive species or features. Many areas in Ontario have never been surveyed and new plant and animal species records are still being discovered for many localities. If development or site alteration is proposed, surveys by a qualified professional may need to be undertaken in the future to confirm presence or absence of sensitive species or features.

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

If you have any questions or comments, please do not hesitate to contact me at 905-713-7732 or at aurora.mcallister@ontario.ca.

Sincerely,

A handwritten signature in black ink, appearing to read "Amcallister".

Aurora McAllister, Management Biologist
Ontario Ministry of Natural Resources and Forestry, Aurora District

Ferguson, Brittany

Sent: February-13-17 12:11 PM
To: Hellinga, Erin
Cc: Rideout, Daryl T
Subject: RE: MNRF Information Request - Lakeshore Road West
Attachments: 14MileCreekFishDots.pdf; Bronte_Creek_unknown_DFO.pdf; BronteCreekFishDots.pdf; AMS11661_LakeshoreRdW.pdf

Hello Erin,

Please accept the attached response to your screening request.

Bronte Creek is an occupied reach of stream for American Eel and Silver Shiner. The construction timing window would be July 1 to September 15.

14 Mile Creek is an occupied reach of stream for Redside Dace. The construction timing window would be July 1 to September 15.

I have also included fish dot maps for your study area. Unfortunately we only have 1 of the files in digital format (which I have attached to this email), all the others (the red dots) are in hard copy. You can make an appointment with Karen Golby to come in and photocopy and/or scan these records.

Regards,

AURORA McALLISTER | MANAGEMENT BIOLOGIST | ONTARIO MINISTRY of NATURAL RESOURCES and FORESTRY |
AURORA DISTRICT OFFICE
50 Bloomington Road, Aurora, Ontario, L4G 0L8 | Email: aurora.mcallister@ontario.ca

From: ESA Aurora (MNRF)
Sent: 31-Jan-17 10:47 AM
To: 'Hellinga, Erin'
Cc: Rideout, Daryl T
Subject: RE: MNRF Information Request - Lakeshore Road West

Hi Erin,

Yes. Normally screenings take 4-6 weeks, sometimes longer during the busiest times of year. I will be in touch soon.

Aurora

AURORA McALLISTER | MANAGEMENT BIOLOGIST | ONTARIO MINISTRY of NATURAL RESOURCES and FORESTRY |
AURORA DISTRICT OFFICE
50 Bloomington Road, Aurora, Ontario, L4G 0L8 | Email: aurora.mcallister@ontario.ca

From: Hellinga, Erin [<mailto:Erin.Hellinga@amecfw.com>]
Sent: 31-Jan-17 10:45 AM
To: ESA Aurora (MNRF)

Cc: Rideout, Daryl T

Subject: FW: MNRF Information Request - Lakeshore Road West

To Whom It May Concern,

Amec Foster Wheeler would like to request if the MNRF is able to provide information with respect to the request below for the section of Lakeshore Road West extending from Mississauga Street to Dorval Drive (indicated in the attached map).

Thank you for your time and assistance.

Kind Regards,

Erin M. Hellinga, B.Sc.

Environmental Biologist, Environment & Infrastructure, Amec Foster Wheeler
900 Maple Grove Road, Unit 10, Cambridge, ON N3H 4R7, Canada
T +1 (519) 650-7132 M +1 (647) 919-7607
erin.hellinga@amecfw.com amecfw.com



From: Hellinga, Erin

Sent: January-07-17 3:26 PM

To: 'ESA Aurora (MNRF)' <ESA.Aurora@ontario.ca>

Cc: Rideout, Daryl T <Daryl.Rideout@amecfw.com>

Subject: MNRF Information Request - Lakeshore Road West

To Whom It May Concern,

This information request has been submitted to assist the Town of Oakville with the completion of Class EA requirements for the anticipated roadway improvements in the section of Lakeshore Road West extending from Mississauga Street (604019.7, 4804859.6) to Dorval Drive (606885.5, 4810013.6), Oakville (see attached map). Proposed project works include, but are not limited to, potential bridge structure improvements as well as provision of pedestrian and cycle facilities and future transit services.

At this time Amec Foster Wheeler would like to request the following information:

- Locations of Natural Heritage Features in the vicinity of the project;
- Species at Risk records in the vicinity of the project; and
- Fisheries data focusing of fish dot information, stream sensitivities, thermal regimes, and timing windows for watercourses along the length of the project.

Background data collection using the Ministry of Natural Resources and Forestry Natural Heritage Information Centre suggests that in the vicinity of the Lakeshore Road West crossing of Fourteen Mile Creek (ID 17PJ0508; Lakeshore Road West crossing at 606045.4, 4808137.4) there are recent records (from 2000) of Redside Dace and currently the Fourteen Mile Creek may contain Occupied or Recovery reaches for Redside Dace. Additionally, the area buffering Bronte Creek (ID 17PJ0405; Lakeshore Road West crossing at 604142.5, 4805149.2) is identified as an Environmentally Sensitive Area with Provincially Significant Wetlands (part of the Lower Bronte Creek Wetland Complex) north of Lakeshore Road West and historic records of Lake Sturgeon, Snapping Turtle and Northern Map Turtle (from 1962, 1993 and 1989, respectively).

To supplement these findings and information directly from the Ministry of Natural Resources and Forestry, information request have been sent to Conservation Halton and Fisheries and Oceans Canada.

Please find attached the completed Aurora District MNRF Information Request Form and project-specific figures for your reference. Should you require further information related to this project or if you have any questions please do not hesitate to contact me.

Kind Regards,

Erin M. Hellinga, B.Sc.

Environmental Biologist, Amec Foster Wheeler Environment & Infrastructure
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Brittany Ferguson, B.Sc.

Environmental Biologist
Amec Foster Wheeler
Environment & Infrastructure

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

D +1 (905) 568 2929 x 4122
E brittany.ferguson@amecfw.com
amecfw.com

Ferguson, Brittany

From: FPP.CA / PPP.CA (DFO/MPO) <fisheriesprotection@dfo-mpo.gc.ca>
Sent: January-11-17 5:06 PM
To: Hellinga, Erin
Subject: DFO Information Request - Lakeshore Road West

Hi Erin,

According to our maps, the following Species at Risk are in the vicinity of your project area, from Bronte Rd to Dorval Dr:

American Eel (Under Consideration)
Deepwater Sculpin (Special Concern)
Upper Great Lakes Kiyi (Special Concern)
Silver Shiner (Under Consideration)

If you require additional information, we ask that you complete the following request for review form (<http://www.dfo-mpo.gc.ca/pnw-ppe/reviews-revues/index-eng.html>).

Thank you,

Ashley Bedford

Fisheries Protection Program Biologist | Biologiste, Programme de Protection des Pêches

Fisheries and Oceans Canada | Pêches et Océans Canada

867 Lakeshore Road | 867 Chemin Lakeshore

Burlington, ON, L7S 1A1

Tel | Tél: 905-336-4588; Fax | Téléc: 905-336-6285

Ashley.Bedford@dfo-mpo.gc.ca

Web site | site Web: www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html Government of Canada | Gouvernement du Canada

Fisheries and Oceans Canada has changed the way new project proposals (referrals), reports of potential Fisheries Act violations (occurrences) and information requests are managed in Central and Arctic Region (Alberta, Saskatchewan, Manitoba, Ontario, Nunavut and the Northwest Territories). Please be advised that general information regarding the management of impacts to fish and fish habitat and self-assessment tools (e.g. Measures to Avoid Harm) that enable you to determine Fisheries Act requirements are available at DFO's "Projects Near Water" website at www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html. For all occurrence reports, or project proposals where you have determined, following self-assessment, that you cannot avoid impacts to fish and fish habitat, please submit to fisheriesprotection@dfo-mpo.gc.ca. For general inquiries call 1 855 852-8320.

From: Hellinga, Erin [<mailto:Erin.Hellinga@amecfw.com>]
Sent: January-07-17 3:26 PM
To: Info / Info (DFO/MPO)
Cc: Rideout, Daryl T
Subject: DFO Information Request - Lakeshore Road West

To Whom It May Concern,

This information request has been submitted to assist the Town of Oakville with the completion of Class EA requirements for the anticipated roadway improvements in the section of Lakeshore Road West extending from Mississauga Street (604019.7, 4804859.6) to Dorval Drive (606885.5, 4810013.6), Oakville (see attached NHIC map). Proposed project works include, but are not limited to, potential bridge structure improvements as well as provision of pedestrian and cycle facilities and future transit services.

Background data collection using the Fisheries and Oceans Canada mapping (map 16 of 33, DFO map attached) suggests that watercourses along the length of the project outlet into a portion of Lake Ontario in which Special Concern Species at Risk may be found.

At this time Amec Foster Wheeler would like to request further information relating to fisheries data and Species at Risk records in the vicinity of the project. Please note that a similar information request has also been submitted to the Ministry of Natural Resources and Forestry and Conservation Halton.

Kind Regards,

Erin M. Hellinga, B.Sc.

Environmental Biologist, Amec Foster Wheeler Environment & Infrastructure
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APPENDIX B
PHOTO RECORD



Photo 1: Crossing C1 - north of ROW.



Photo 2: C1 south of ROW.



Photo 3: Crossing C2 - at Bronte Creek facing upstream (north).



Photo 4: C2 northwest bank.



Photo 5: C2 northeast bank.



Photo 6: C2 facing downstream (south).



Photo 7: C2 facing southeast bank.



Photo 8: C2 facing southwest bank.



Photo 9: C2 under bridge ROW facing north.



Photo 10: C2 under bridge ROW facing south.

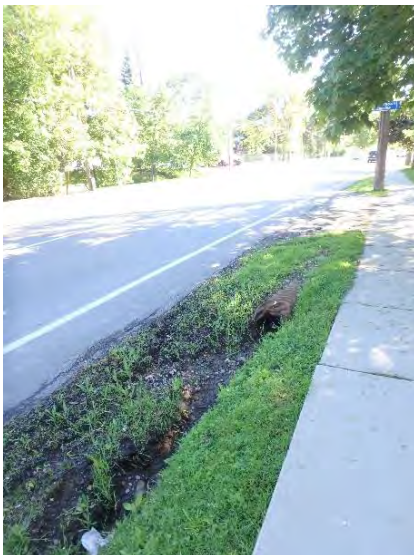


Photo 11: C3 facing east.

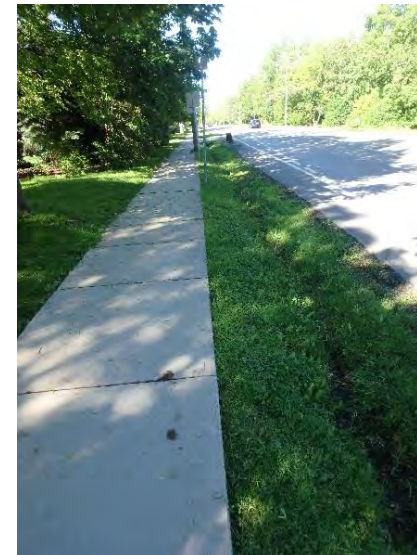


Photo 12: C3 facing west.



Photo 13: C4 northeast of intersection.



Photo 14: C4 southwest of intersection.



Photo 15: C4 southwest of Lakeshore Road flowing towards man-made wetland area.



Photo 16: C4 downstream (west) of wetland area.



Photo 17: Downstream end of crossing C5.



Photo 18: Downstream end of crossing C5 facing downstream culvert.



Photo 19: Upstream of C5.



Photo 20: Downstream of C5.



Photo 21: C6 upstream (north of Lakeshore).



Photo 22: C6 upstream south of Lakeshore).



Photo 23: Crossing C7 facing west.



Photo 24: Crossing C7 facing east.



Photo 25: Crossing C8 downstream of ROW.



Photo 26: Crossing C8 upstream of ROW.



Photo 27: Bridge at C8.



Photo 28: Crossing C9 upstream.



Photo 29: Crossing C10 east side.



Photo 30: Crossing C10 west side.



Photo 31: Crossing C11 facing south.



Photo 32: Crossing C11 northeast bank.



Photo 33: Crossing C11 northwest bank.



Photo 34: C11 east side of bridge.



Photo 35: C11 west side of bridge.



Photo 36: C11 southeast bank of bridge.



Photo 37: C11 southwest bank of bridge.



Photo 38: C11 downstream of ROW.



Photo 39: C12 facing east.



Photo 40: C12 facing west.



Photo 41: C13 facing east.



Photo 42: C13 facing west.



Photo 43: C14 facing north.



Photo 44: C14 facing south.



Photo 45: C15 facing south.



Photo 216: C16 facing upstream towards ROW.



Photo 47: C16 at ROW facing downstream.



Photo 48: C16 upstream of ROW facing downstream.



Photo 49: C16 northwest bank.



Photo 50: C17 downstream of ROW facing upstream.



Photo 51: C17 upstream of Lakeshore Road ROW.



Photo 52: C18 downstream of Lakeshore Road ROW.

APPENDIX C
FIELD RECORDS

GENERAL INFORMATION									
PROJECT #: TPB166147		PROJECT DESCRIPTION: Lakeshore Rd.			DAY: 5	MONTH: June	YEAR: 2017		
Is STREAM REALIGNMENT required for this section: <input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> Unknown									
COLLECTORS: BF + AL		WEATHER CONDITIONS: Overcast, chance of rain			TIME STARTED: 9:45 am		TIME FINISHED:		
AIR TEMP: 16°C		WATER TEMP: 17.9°C			CONDUCTIVITY (µS/cm): 727				
PHOTO NUMBERS AND DESCRIPTIONS: D0: 72.9% pH: 8.51 TDS: 364 ppm									
LOCATION									
NAME OF WATERBODY: Bronte Creek		DRAINAGE SYSTEM: -		CROSSING #: -		STATION #: -			
LOCATION OF CROSSING: @ Bronte Rd. and Lakeshore Rd. → West of intersection									
GPS COORDINATES: -				MTO CHAINAGE: -					
TOWNSHIP: Oakville				MNR DISTRICT: Aurora					
LAND USE AND POLLUTION									
SURROUNDING LAND USE: Residential, some parkland, manna					SOURCES OF POLLUTION: Road runoff, manna spills				
EXISTING STRUCTURE TYPE									
Bridge <input checked="" type="radio"/>		Box Culvert <input type="radio"/>		Open Foot Culvert <input type="radio"/>		CSP <input type="radio"/>		N/A <input type="radio"/>	
Other <input type="radio"/> Describe:						Size (w x h) m ² -			
SECTION TYPE AND MORPHOLOGY									
SECTION IDENTIFIER: ROW → D/S				SECTION LOCATION: (Include on habitat map) ROW + D/S					
TYPE:	Stream / river <input type="radio"/>	Channelized <input type="radio"/>	Permanent <input checked="" type="radio"/>	Intermittent <input type="radio"/>	Ephemeral <input type="radio"/>	ASSOCIATED WETLAND: None			
TOTAL SECTION LENGTH (m): Approx 100m				CURRENT VELOCITY (m/s): Very slow - flats.					
SUB-SECTION(S)	Run <input type="radio"/>	Pool <input type="radio"/>	Riffle <input type="radio"/>	Flats <input checked="" type="radio"/>	Inside culvert <input type="radio"/>	Other			
Percentage of area				100%					
Mean depth wetted (m)				2.38m					
Mean width wetted (m)				NA					
Mean bankfull width (m)				55m NA					
Mean bankfull depth (m)									
Substrate				Much bottom					
Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D	

Minor amounts evident.

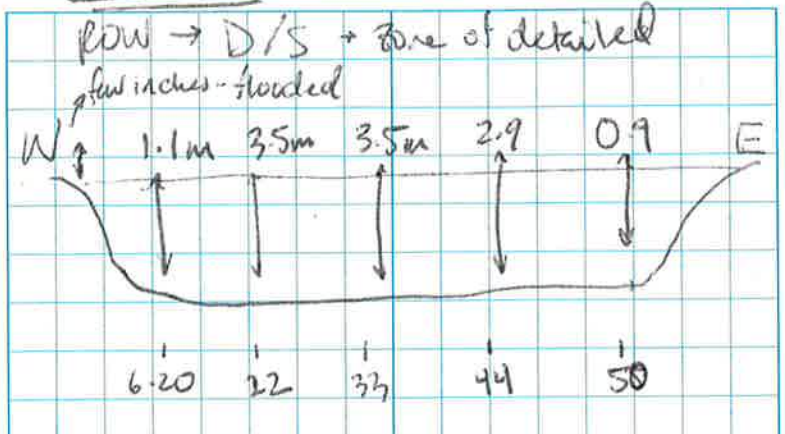
BANK STABILITY							
	Stable	Slightly Unstable	Moderately Unstable	Unstable			
Left Upstream Bank	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
Right Upstream Bank	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
HABITAT							
IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Instream 10% Overhanging <5%	5%	Instream N/A Overhanging <input type="checkbox"/>	-
SHORE COVER (% stream shaded):	100 - 90 %	90 - 60%	60-30%	30 - 1%	None		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
VEGETATION TYPE (%):	Submergent		Floating		Emergent		None
Predominant Species	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		
MIGRATORY OBSTRUCTIONS:	None <input checked="" type="checkbox"/>		Seasonal <input type="checkbox"/>		Permanent <input type="checkbox"/>		
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning <input type="checkbox"/> \emptyset (?) see notes...		Evidence of Groundwater <input type="checkbox"/>		Other <input type="checkbox"/>		
POTENTIAL ENHANCEMENT OPPORTUNITIES:							
<p>↳ vegetated banks could be used rather than rip-rap retaining walls + hardened shoreline near bridge.</p>							
COMMENTS:							
<ul style="list-style-type: none"> • Carp jumping d/s of bridge - may be spawning in area. • Severely flooded channel - marina nearby is flooded and closed. Terrestrial plant species are flooded at banks. • Bank → top - 6m in height. <p>From approx 100m D/S of bridge - max depth measurements recorded = Mean wetbed depth = 3.41m</p>							
Additional Notes Appended? <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes number of pages <u>2</u>							

GENERAL INFORMATION								
PROJECT #: TPB11147	PROJECT DESCRIPTION: Lakeshore Rd.	DAY: 5	MONTH: JUN	YEAR: 2017				
Is STREAM REALIGNMENT required for this section: <input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> Unknown								
COLLECTORS: BF + AL	WEATHER CONDITIONS: See previous	TIME STARTED: -	TIME FINISHED: -					
AIR TEMP:	WATER TEMP: -	CONDUCTIVITY (µS/cm): -						
PHOTO NUMBERS AND DESCRIPTIONS: -								
LOCATION								
NAME OF WATERBODY: Bronte Creek	DRAINAGE SYSTEM: -	CROSSING #: -	STATION #: -					
LOCATION OF CROSSING:								
GPS COORDINATES:				MTO CHAINAGE:				
TOWNSHIP: Oakville				MNR DISTRICT: MNR				
LAND USE AND POLLUTION								
SURROUNDING LAND USE:				SOURCES OF POLLUTION:				
EXISTING STRUCTURE TYPE								
Bridge <input checked="" type="radio"/>	Box Culvert <input type="radio"/>	Open Foot Culvert <input type="radio"/>	CSP <input type="radio"/>	N/A <input type="radio"/>				
Other <input type="radio"/> Describe:			Size (w x h) m ²					
SECTION TYPE AND MORPHOLOGY								
SECTION IDENTIFIER: ROW 4/5			SECTION LOCATION: (Include on habitat map)					
TYPE:	Stream / river <input type="radio"/>	Channelized <input type="radio"/>	Permanent <input checked="" type="radio"/>	Intermittent <input type="radio"/>	Ephemeral <input type="radio"/>	ASSOCIATED WETLAND:		
TOTAL SECTION LENGTH (m):				CURRENT VELOCITY (m/s):				
SUB-SECTION(S)	Run <input type="radio"/>	Pool <input type="radio"/>	Riffle <input type="radio"/>	Flats <input checked="" type="radio"/>	Inside culvert <input type="radio"/>	Other		
Percentage of area				100%				
Mean depth wetted (m)				1.9m				
Mean width wetted (m)				57m				
Mean bankfull width (m)				NA.				
Mean bankfull depth (m)				NA.				
Substrate				↓				
Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt SI	Clay Cl	Muck Mu	Detritus D

fine throughout reach

BANK STABILITY							
	Stable	Slightly Unstable	Moderately Unstable	Unstable			
Left Upstream Bank	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
Right Upstream Bank	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
HABITAT							
IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	Instream < 5% Overhanging 25%	< 5%	Instream <input checked="" type="radio"/> Overhanging <input checked="" type="radio"/>	
SHORE COVER (% stream shaded):	100 - 90 %	90 - 60%	60- 30%	30 - 1%	None		
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
VEGETATION TYPE (%):	Submergent		Floating		Emergent		None
	<input checked="" type="radio"/>		<input checked="" type="radio"/>		<input checked="" type="radio"/>		
Predominant Species	-		-		-		
MIGRATORY OBSTRUCTIONS:	None <input checked="" type="radio"/>		Seasonal <input checked="" type="radio"/>		Permanent <input checked="" type="radio"/>		
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning <input checked="" type="radio"/>		Evidence of Groundwater <input checked="" type="radio"/>		Other <input type="radio"/>		
POTENTIAL ENHANCEMENT OPPORTUNITIES:							
COMMENTS:							
7 Dead bullhead floating immediately upstream of road rowl-							
Additional Notes Appended? <input type="radio"/> No <input checked="" type="radio"/> Yes number of pages <u>2</u>							

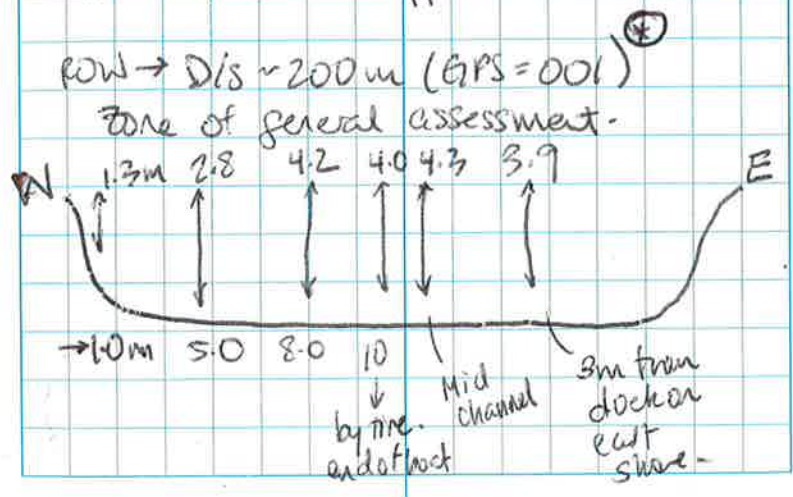
cannot see bottom through water - too murky



→ likely muddy bottom → fines →

DO = 72.9 PH = 8.51 WT = 17.1

US = 727 ppm = 364



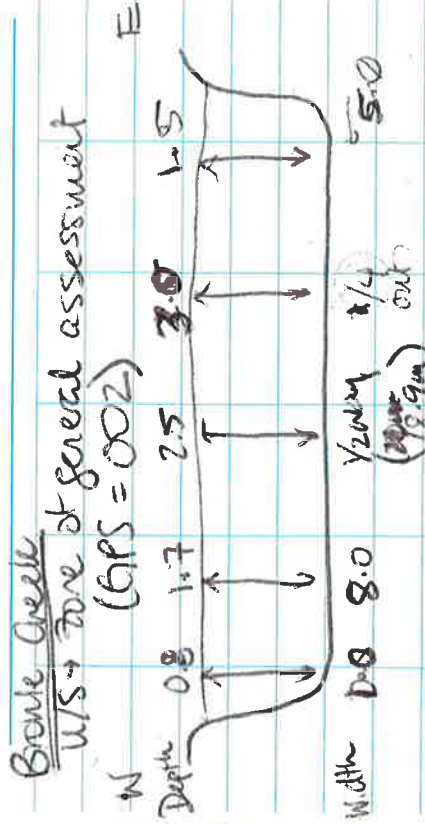
GENERAL INFORMATION									
PROJECT #: TPB166147		PROJECT DESCRIPTION: Lakeshore			DAY: 5	MONTH: JUN	YEAR: 2017		
Is STREAM REALIGNMENT required for this section: <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unknown									
COLLECTORS: BF + AL		WEATHER CONDITIONS: Overcast			TIME STARTED:		TIME FINISHED:		
AIR TEMP: 16°C		WATER TEMP: 15.3°C			CONDUCTIVITY (µS/cm): 1161				
PHOTO NUMBERS AND DESCRIPTIONS: PH: 8-10 TDS: 580 ppm 80.7% DO									
LOCATION									
NAME OF WATERBODY: CB		DRAINAGE SYSTEM: -			CROSSING #: -		STATION #: -		
LOCATION OF CROSSING:									
GPS COORDINATES: -					MTO CHAINAGE: -				
TOWNSHIP: Oakville					MNR DISTRICT: Aurora				
LAND USE AND POLLUTION									
SURROUNDING LAND USE:					SOURCES OF POLLUTION:				
EXISTING STRUCTURE TYPE									
Bridge <input type="radio"/>		Box Culvert <input checked="" type="radio"/>		Open Foot Culvert <input type="radio"/>		CSP <input type="radio"/>		N/A <input type="radio"/>	
Other <input type="radio"/> Describe:						Size (w x h) m ²			
SECTION TYPE AND MORPHOLOGY									
SECTION IDENTIFIER: ROW + WS → 130m				SECTION LOCATION: (Include on habitat map)					
TYPE:	Stream / river <input type="radio"/>	Channelized <input type="radio"/>	Permanent <input checked="" type="radio"/>	Intermittent <input type="radio"/>	Ephemeral <input type="radio"/>	ASSOCIATED WETLAND:			
TOTAL SECTION LENGTH (m): ~ 30m				CURRENT VELOCITY (m/s):					
SUB-SECTION(S)	Run <input type="radio"/>	Pool <input checked="" type="radio"/> (m)	Riffle <input checked="" type="radio"/>	Flats <input checked="" type="radio"/>	Inside culvert <input type="radio"/>	Other			
Percentage of area		10%	50%	30%					
Mean depth wetted (m)		0.09m	0.07m	0.15m					
Mean width wetted (m)		1.1m	1.3m	1.27m					
Mean bankfull width (m)		2.1m	2.92m	2.23m					
Mean bankfull depth (m)		0.52m	0.53m	0.62m					
Substrate		Bo Co	50 Bo 85a 10 Gr. 30 Co 25 Si						
Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D	

less boulders + cobble in pool + flat areas.

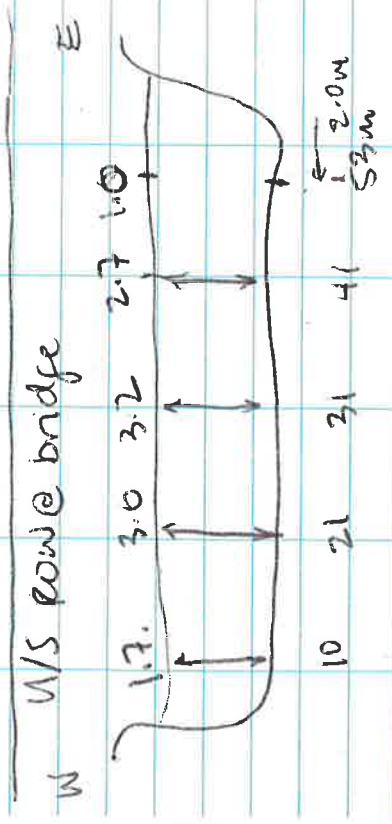
1.1m ↓ → open footed box culvert

BANK STABILITY							
	Stable	Slightly Unstable	Moderately Unstable	Unstable			
Left Upstream Bank	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
Right Upstream Bank	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
HABITAT							
IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	∅	60%	10%	Instream 5-10% Overhanging	5%	Instream 20% algae Overhanging	
SHORE COVER (% stream shaded):	100 - 90 %	90 - 60 %	60 - 30 %	30 - 1 %	None		
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>		
VEGETATION TYPE (%):	Submergent		Floating		Emergent		None
	20%		∅		< 5%		
Predominant Species	algae sp.				Watercress sp.		
MIGRATORY OBSTRUCTIONS:	None		Seasonal		Permanent		
	∅		∅		∅		
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning		Evidence of Groundwater		Other		
	∅						
POTENTIAL ENHANCEMENT OPPORTUNITIES:							
<p>harder for larger fish passage. - remove debris in channel (lose wood @ upstream end of row).</p>							
COMMENTS:							
<ul style="list-style-type: none"> - Potentially some watercress present - see photos - Dead Goby found at upstream end of culvert. - rip rap present on banks. - D/S area not sampled → private property → deep channelized area → approx 1-1.5 m wide + 40 cm deep - larger + more concentrated rocks (cobble, gravel, boulders) in riffles. 							
Additional Notes Appended? <input type="radio"/> No <input checked="" type="radio"/> Yes number of pages <u>1</u>							

1 m → wetted width.
 + 2.85 Bankfull.



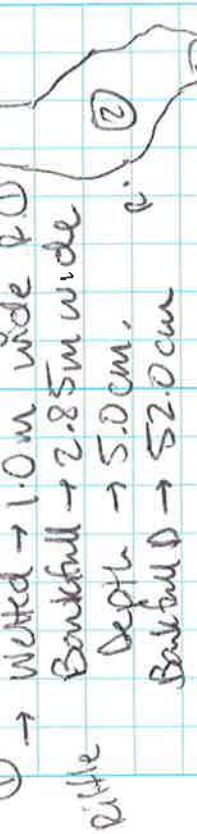
→ Watercourse narrows slightly upstream



→ Swallow species observed carrying nesting materials under bridge.
 → light patch near tail black wings, tail
 → white patch on head and ring around neck.
 → approx. 3 individuals

EB

Directly U/S of bridge



②
 Wetted W: 1.8m
 BF W: 2.8m
 WD: 8.0cm
 BFD: 49.0cm

③
 WW: 1.1m → less boulder
 BW: 2.1m 20-30%
 WD: 9.0cm - algal cover
 BFD: 52.0cm - shoe

④ NW: 1:1

BFW: 3.1

WD: 7.0cm

BFD: 58.0cm

valle

⑤ WW: 1.27m

BFW: 2.23m

WD: 15.0cm

BFD: 62.0cm

Flats

↳ DS → No measurements taken

↳ private property

↳ channelized with paved

concrete banks - entire way to

Lake Ontario.

↳ approximately 10cm deep.

Fourteen Mile Creek.

⑥ → channel across upstream area - fenced.

13.7m wide - channelized

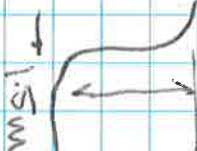
17.5°C

in n.p. trap
on both sides
of watercourse.

0.5

W

→ 0.50m



Unknown

1.5m

Visibility → 100 → 0.5m underwater.

GENERAL INFORMATION									
PROJECT #: TPB166147		PROJECT DESCRIPTION: Lakeshore Rd.		DAY: 05	MONTH: June	YEAR: 2017			
Is STREAM REALIGNMENT required for this section: <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unknown									
COLLECTORS: BF + AL			WEATHER CONDITIONS:		TIME STARTED:		TIME FINISHED:		
AIR TEMP:			WATER TEMP:			CONDUCTIVITY (µS/cm):			
PHOTO NUMBERS AND DESCRIPTIONS:									
LOCATION									
NAME OF WATERBODY: Fourteen Mile Creek			DRAINAGE SYSTEM:		CROSSING #:		STATION #: 1-US		
LOCATION OF CROSSING: Lakeshore Rd. & Fourteen Mile Cr.									
GPS COORDINATES:					MTO CHAINAGE:				
TOWNSHIP:					MNR DISTRICT: Aurora				
LAND USE AND POLLUTION									
SURROUNDING LAND USE:					SOURCES OF POLLUTION:				
EXISTING STRUCTURE TYPE									
Bridge <input checked="" type="radio"/>		Box Culvert <input type="radio"/>		Open Foot Culvert <input type="radio"/>		CSP <input type="radio"/>		N/A <input type="radio"/>	
Other <input type="radio"/> Describe:						Size (w x h) m ²			
SECTION TYPE AND MORPHOLOGY									
SECTION IDENTIFIER: ROW → U/S				SECTION LOCATION: (Include on habitat map)					
TYPE:	Stream / river <input checked="" type="radio"/>	Channelized <input type="radio"/>	Permanent <input checked="" type="radio"/>	Intermittent <input type="radio"/>	Ephemeral <input type="radio"/>	ASSOCIATED WETLAND:			
TOTAL SECTION LENGTH (m):					CURRENT VELOCITY (m/s):				
SUB-SECTION(S)	Run <input type="radio"/>	Pool <input type="radio"/>	Riffle <input type="radio"/>	Flats <input type="radio"/>	Inside culvert <input type="radio"/>	Other			
Percentage of area		70	30						
Mean depth wetted (m)		0.66	0.27						
Mean width wetted (m)		10.5m	6.57						
Mean bankfull width (m)		15.6m	9.810m						
Mean bankfull depth (m)		NA -	NA -						
Substrate		Bo=30 Co=40 Gr=15 Si=15		Bo=60 Co=30 Gr=5 Fine=5					
Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D	

Fines
 Bk full depth not taken

BANK STABILITY				
	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Right Upstream Bank	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

HABITAT							
IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
84	<input checked="" type="checkbox"/>	45	35	2 Instream Overhanging <input checked="" type="checkbox"/>	2	<input checked="" type="checkbox"/> Instream Overhanging <input type="checkbox"/>	
SHORE COVER (% stream shaded):	100 - 90 %	90 - 60 %	60 - 30 %	30 - 1 %	None		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
VEGETATION TYPE (%):	Submergent		Floating		Emergent		None
Predominant Species	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
MIGRATORY OBSTRUCTIONS:	None <input checked="" type="checkbox"/>		Seasonal		Permanent		
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning		Evidence of Groundwater		Other		
POTENTIAL ENHANCEMENT OPPORTUNITIES:							
COMMENTS:							
<p>Riffle 0.33 0.40 0.28 0.24 0.11 WD: 27.2</p> <p>Pool 0.31 0.82 0.67 0.97 0.51 WD: 65.6</p>							
Additional Notes Appended? <input type="checkbox"/> No <input type="checkbox"/> Yes number of pages _____							

GENERAL INFORMATION									
PROJECT #: TPB166147		PROJECT DESCRIPTION: Lakeshore Rd.			DAY: 05	MONTH: June	YEAR: 2017		
Is STREAM REALIGNMENT required for this section: <input type="radio"/> Yes <input type="radio"/> No <input checked="" type="radio"/> Unknown									
COLLECTORS: BF, AL		WEATHER CONDITIONS: Overcast			TIME STARTED: 14:10		TIME FINISHED:		
AIR TEMP:			WATER TEMP: 15.1°C			CONDUCTIVITY (µS/cm): 955			
PHOTO NUMBERS AND DESCRIPTIONS: PH: 8.51 TDS: 477 DO: 94%									
LOCATION									
NAME OF WATERBODY: Fourteen Mile Creek		DRAINAGE SYSTEM:			CROSSING #:		STATION #: DS		
LOCATION OF CROSSING: @ Lake Shore Blvd, Oakville									
GPS COORDINATES:					MTO CHAINAGE:				
TOWNSHIP: Oakville					MNR DISTRICT: Aurora				
LAND USE AND POLLUTION									
SURROUNDING LAND USE:					SOURCES OF POLLUTION:				
EXISTING STRUCTURE TYPE									
Bridge <input type="radio"/>		Box Culvert <input type="radio"/>		Open Foot Culvert <input type="radio"/>		CSP <input type="radio"/>		N/A <input type="radio"/>	
Other <input type="radio"/> Describe:						Size (w x h) m ²			
SECTION TYPE AND MORPHOLOGY									
SECTION IDENTIFIER: BOW → D/S				SECTION LOCATION: (Include on habitat map)					
TYPE:	Stream / river <input checked="" type="radio"/>	Channelized <input type="radio"/>	Permanent <input checked="" type="radio"/>	Intermittent <input type="radio"/>	Ephemeral <input type="radio"/>	ASSOCIATED WETLAND:			
TOTAL SECTION LENGTH (m):					CURRENT VELOCITY (m/s):				
SUB-SECTION(S)	Run <input type="radio"/>	Pool <input type="radio"/>	Riffle <input type="radio"/>	Flats <input type="radio"/>	Inside culvert <input type="radio"/>	Other			
Percentage of area			100						
Mean depth wetted (m)			0.18m						
Mean width wetted (m)			11.5m						
Mean bankfull width (m)			14.43m						
Mean bankfull depth (m)			0.73m						
Substrate			10 Bb Gr 40 40 Co Sa 10						
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	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Right Upstream Bank	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

HABITAT							
IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
52	<input checked="" type="checkbox"/>	10	40	Instream <input checked="" type="checkbox"/> Overhanging 2	<input checked="" type="checkbox"/>	Instream <input checked="" type="checkbox"/> Overhanging <input checked="" type="checkbox"/>	68
SHORE COVER (% stream shaded):	100 - 90 %	90 - 60 %	60 - 30 %	30 - 1 %	None		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
VEGETATION TYPE (%):	Submergent		Floating		Emergent		None
<input checked="" type="checkbox"/>	1%		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		100
Predominant Species	algae sp-						
MIGRATORY OBSTRUCTIONS:	None		Seasonal		Permanent		
	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning		Evidence of Groundwater		Other		
	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		
POTENTIAL ENHANCEMENT OPPORTUNITIES:							

COMMENTS:							
At Bridge ROW							
DIS of ROW							
Additional Notes Appended? <input type="checkbox"/> No <input type="checkbox"/> Yes number of pages _____							

At Bridge ROW
 DIS of ROW
 Approx 30m DIS

BFW = 73.2

Ph = 8.51
 ppm = 477
 DO = 94%

8.4
 -1.8

 7.6

GENERAL INFORMATION									
PROJECT #: TPB166147		PROJECT DESCRIPTION: Lakeshore Rd.		DAY: 05	MONTH: JUNE	YEAR: 2017			
Is STREAM REALIGNMENT required for this section: <input type="radio"/> Yes <input type="radio"/> No <input checked="" type="radio"/> Unknown									
COLLECTORS: BF. AL		WEATHER CONDITIONS: Overcast		TIME STARTED: 15:45		TIME FINISHED:			
AIR TEMP:			WATER TEMP: 14.7		CONDUCTIVITY (µS/cm): 902				
PHOTO NUMBERS AND DESCRIPTIONS: pt: 8-50 TDS: 451 ppm DO = 93%									
LOCATION									
NAME OF WATERBODY: McCraney Creek		DRAINAGE SYSTEM:		CROSSING #: C16		STATION #: US			
LOCATION OF CROSSING: Lakeshore Rd @ Appleby College									
GPS COORDINATES:					MTO CHAINAGE:				
TOWNSHIP: Oakville					MNR DISTRICT: Aurora				
LAND USE AND POLLUTION									
SURROUNDING LAND USE: Residential/commercial					SOURCES OF POLLUTION: Road				
EXISTING STRUCTURE TYPE									
Bridge <input type="radio"/>		Box Culvert <input type="radio"/>		Open Foot Culvert <input checked="" type="radio"/>		CSP <input type="radio"/>		N/A <input type="radio"/>	
Other <input type="radio"/> Describe:						Size (w x h) m ² W = 5.4m H = ?			
SECTION TYPE AND MORPHOLOGY									
SECTION IDENTIFIER: W/S of ROW.				SECTION LOCATION: (Include on habitat map)					
TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:			
	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>				
TOTAL SECTION LENGTH (m):					CURRENT VELOCITY (m/s):				
SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other			
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
Percentage of area	50		50						
Mean depth wetted (m)	0.22		0.13						
Mean width wetted (m)	6.3		6.0						
Mean bankfull width (m)	6.6		7.7						
Mean bankfull depth (m)	0.58		0.31						
Substrate	Bo=35 Co=30 Sa=15 Gr=20		Bo=40 Co=40 Gr=15 Sa=5						
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	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Right Upstream Bank	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

HABITAT							
IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
90	5	35	30	Instream 10 Overhanging 5	5	Instream <input checked="" type="checkbox"/> Overhanging <input checked="" type="checkbox"/>	

SHORE COVER (% stream shaded):	100 - 90 %	90 - 60 %	60 - 30 %	30 - 1 %	None
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Predominant Species				

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other

POTENTIAL ENHANCEMENT OPPORTUNITIES:

- Potential to reduce laminar flow speed in upstream portion of channel under bridge. → where flow moves over an area of limestone or bridge (footing).

COMMENTS:

Run Bank full = 78cm
 Avg = 78cm
 Wetted = 21.6cm
 Avg = 21.6cm
 Ph = 8.50

Riffle Bank full = 30.6cm
 Avg = 30.6cm
 Wetted = 13cm
 Avg = 13cm
 DO = 93.1
 *Small fish observed (UNKNOWN) SP. Darter

GENERAL INFORMATION								
PROJECT #: TPB166147	PROJECT DESCRIPTION: Lakeshore Rd.	DAY: 05	MONTH: JUNE	YEAR: 2017				
Is STREAM REALIGNMENT required for this section: <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unknown								
COLLECTORS: BF, AL	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:					
AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):						
PHOTO NUMBERS AND DESCRIPTIONS: See previous.								
LOCATION								
NAME OF WATERBODY: McCraney Creek	DRAINAGE SYSTEM:	CROSSING #: C16	STATION #: DS					
LOCATION OF CROSSING: Lake Shore Rd W & McCraney Creek @ Appleby College								
GPS COORDINATES:				MTO CHAINAGE:				
TOWNSHIP:				MNR DISTRICT: Aurora				
LAND USE AND POLLUTION								
SURROUNDING LAND USE:				SOURCES OF POLLUTION:				
EXISTING STRUCTURE TYPE								
Bridge <input type="radio"/>	Box Culvert <input type="radio"/>	Open Foot Culvert <input checked="" type="radio"/>	CSP <input type="radio"/>	N/A <input type="radio"/>				
Other <input type="radio"/> Describe:			Size (w x h) m ² W=5.4 H=UNK					
SECTION TYPE AND MORPHOLOGY								
SECTION IDENTIFIER: D/S of ROW.			SECTION LOCATION: (Include on habitat map)					
TYPE:	Stream / river <input checked="" type="radio"/>	Channelized <input type="radio"/>	Permanent <input checked="" type="radio"/>	Intermittent <input type="radio"/>	Ephemeral <input type="radio"/>	ASSOCIATED WETLAND:		
TOTAL SECTION LENGTH (m):				CURRENT VELOCITY (m/s):				
SUB-SECTION(S)	Run <input checked="" type="checkbox"/>	Pool <input type="checkbox"/>	Riffle <input type="checkbox"/>	Flats <input type="checkbox"/>	Inside culvert <input type="checkbox"/>	Other		
Percentage of area	100							
Mean depth wetted (m)	0.16m							
Mean width wetted (m)	7.0m							
Mean bankfull width (m)	8.1m							
Mean bankfull depth (m)	0.53m							
Substrate	60=10 CO=80 Gr Si = 10							
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	<input checked="" type="checkbox"/>	0	0	0
Right Upstream Bank	<input checked="" type="checkbox"/>	0	0	0

HABITAT							
IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
98	<input checked="" type="checkbox"/>	10	80	Instream 5 Overhanging <input checked="" type="checkbox"/>	2	Instream 1 Overhanging <input checked="" type="checkbox"/>	
SHORE COVER (% stream shaded):	100 - 90 %	90 - 60 %	60 - 30 %	30 - 1 %	None		
	<input checked="" type="checkbox"/>	0	0	0	0		
VEGETATION TYPE (%):	Submergent		Floating		Emergent		None
	<input checked="" type="checkbox"/>						<input checked="" type="checkbox"/>
Predominant Species							
MIGRATORY OBSTRUCTIONS:	None		Seasonal		Permanent		
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning		Evidence of Groundwater		Other		
POTENTIAL ENHANCEMENT OPPORTUNITIES:							
COMMENTS:							
<p>67 55 50 44 50cm Run Bank fall Depth Avg = 53.2</p> <p>15 11 17 17 18cm Wetted Avg. = 15.6 Depth.</p>							
Additional Notes Appended? <input type="checkbox"/> No <input type="checkbox"/> Yes number of pages _____							

④

NW: 1.1

BFW: 3.1

WD: 7.0cm

BFD: 58.0cm

W/Flt

⑤

NW: 1.27m

BFW: 2.23m

WD: 15.0cm

BFD: 62.0cm

Flat

↳ DS → No measurements taken

↳ private property

↳ Channelized with paved

Concrete banks - entire way to

Lake Ontario

↳ approximately 10cm deep

Fourteen Mile Creek.

CLL → cannot access upstream area - fenced.

13.7m wide - channelized

17.302

to NP-trap

on both sides

of watercourse.

0.5

W

→ 0.50cm



↳ stability → 100 → 0.5m under water.

④ CS → At d/s end of box culvert

Wetted W: 0.5m

BFW: 2.0m

↳ D/S → WW: 0.8m

BFW: 1.55m

↳ minor observed

↳ minor flow observed

↳ plots of algae in watercourse

↳ upstream (across road) water draining from ditches

↳ upstream (towards C3) minor amount of water present - mostly from road. - collected in narrow area outside of community centre.

↳ CS water course carries on f @ approx. < 30cm from next culvert.

Depth → 5-10cm (very shallow).

1591 μ S

794 ppm

13.1 °C

8.42 pH

64.5% DO

↳ downstream of CS → stream crosses road and becomes channelized → rock wall ~ 2m wide.

↳ water is slow - stagnant - flowing backwards (towards) into culvert.

17 D/S of bridge

↳ stream is a small trickle over muddy/sandy substrate

Wetted width → 3m

BFW 3.20m

↳ 100-95% cover provided by trees

↳ Substrate = 95% (sand/silt/clay) 5% (gravel)

↳ little/no in-stream cover evident.

↳ continues as flats to shallow flood ~ 30m D/S of bridge.

↳ 4cm max depth in centre of channel.

798 ppm

1584 μ S

13.1 °C

91.4% DO

8.2 pH

↳ WS area inaccessible - private property very close to stream.

↳ low/no flood → flats → culvert is ~ 30cm deep

WV: 1.5m BFW: 3m.