

Appendix D: Natural Environment Documentation

- Fish Collection Record for McCraney Creek (MCR-13) collected by Conservation Halton in July 2022
- Aquatic and Bat Habitat Surveys for Proposed Channel Realignment of McCraney Creek North of Lakeshore Road to Rebecca Street (January 24, 2018)
- Class Environmental Assessment Study and Preliminary Design - Lakeshore West Improvements - Aquatic Habitat Existing Conditions Report (October 2017)
- Class Environmental Assessment Study and Preliminary Design - Lakeshore West Improvements - Terrestrial Habitat Existing Conditions Report (September 2017)
- Excerpted Fish Species Sampling Information from “Conservation Halton’s Urban Creeks and Supplemental Monitoring (2008)”

Fish Collection Record for McCraney Creek (MCR-13) collected by Conservation Halton in July 2022

**Licence to Collect Fish for Scientific Purposes
Field Collection Record**

CH SITE ID#: MCR-13					
Licence No: 1100320		Licencee Name: Andrea Dunn			
Business Name: Conservation Halton		Telephone: 905 336-1158 x 2309		Fax: 905 336-6684	
Mailing Address: 2596 Britannia Road West, Burlington, ON, L7P 0G3					
Waterbody Name: McCraney			Township/Municipality: Oakville		
General Description of Sampling Site Location/Access: U/S Lakeshore Rd.					
Site UTM Coordinates: 606088 E 4808918 N					
Stream Type: ☐ Intermittent ☒ Permanent			Watercress Present: ☐ Yes ☒ No		
Waterbody Type: ☒ Stream/River ☐ Pond ☐ Lake ☐ Reservoir ☐ Other _____					
Bottom Type by Percent: (Total = 100%)	Bedrock	10	Boulder	Cobble	50
	Silt		Clay	Muck	40
	Other (Description)				
Current: ☐ Still ☒ Slow ☐ Medium ☐ Fast ☐ Quantitative (m/s) _____					
Water Colour/Clarity: ☒ Colourless ☐ Yellow/Brown ☐ Blue/Green ☐ Turbid ☐ Other _____					
Secchi Depth: (m) _____					
Aquatic Vegetation: ☐ Submergent ☐ Floating ☐ Emergent ☒ None					
Cover (Shore): ☐ None ☒ Sparse ☐ Moderate ☐ Dense ☐ Other _____					
Cover (In Water): ☐ None ☒ Sparse ☐ Moderate ☐ Dense ☐ Other _____					
Gear: ☒ Electrofisher ☐ Seine ☐ Dip Net ☐ Angled ☐ Minnow Trap ☐ Other _____					
ELECTROFISHER SECONDS: 1034					
Size of Net (Gill or Seine Net) Length (m):				Mesh Size (cm):	
Selectivity of Sample: ☐ All Kept ☒ None Kept* ☐ Some Kept* ☐ No Catch * Record released fish on back					
Date: Day 11 Month 07 Year 2002					
Collectors: Shocker = C. Smith Netters = A. Shriner K. Funk Bucket =					
Additional Data: (Pollution, Condition of Fish, Habitat Conditions)					

Species Captured:

[illegible]

Aquatic and Bat Habitat Surveys for Proposed Channel Realignment of McCraney Creek North of Lakeshore Road to Rebecca Street (January 24, 2018)



Memo

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

From: Daryl Rideout (Amec Foster Wheeler)

CC: Steve Chips (Amec Foster Wheeler)
David Sinke (Amec Foster Wheeler)
Neal Smith (Amec Foster Wheeler)

Ref: Amec Foster Wheeler TPB166047

Date: January 24, 2018

Re: **Aquatic and Bat Habitat Surveys for Proposed Channel Realignment of McCraney Creek North of Lakeshore Road to Rebecca Street.**

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 (Attachment 1; Figure 1). Amec Foster Wheeler Environment & Infrastructure, a Division of Amec Foster Wheeler Americas Limited (Amec Foster Wheeler) was 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. The proposed work includes; intersection improvements, provision of pedestrian and cycle facilities, urban design streetscape improvements, and the provision of other transit-related infrastructure.

Within the study area, Lakeshore Road West crosses four (4) permanent watercourses including McCraney Creek, which is located approximately 1.37 km west of Dorval Drive at the easternmost end of the Lakeshore Road West study area. During the preliminary design process for Lakeshore Road West road improvements, alternatives for replacement of the McCraney Creek structure were assessed and included an alternative to skew the replacement structure and/or realign the stream to accommodate a more direct flow path into the structure and reduce erosion in the immediate vicinity of the structure.

Correspondence with the Ministry of Natural Resources and Forestry (MNRF) was conducted during the EA background review, in which the MNRF indicated several aquatic and terrestrial species at risk (SAR) which have the potential to exist on site. Two bat species, Little Brown Myotis (*Myotis lucifugus*) and Northern Myotis (*Myotis septentrionalis*), both provincially listed as 'Endangered' under the *Endangered Species Act, 2007* (ESA), were identified as having the potential to utilize treed habitat on site. The woodlot at McCraney Creek and Lakeshore Road has been identified as a Fresh-Moist Lowland Deciduous Forest, with common tree species including

Norway Maple, ashes and willows. Vegetation removals will be required to accommodate a potential structure skew and/or stream realignment upstream of the crossing. As such, an assessment of potential bat habitat (i.e. maternity roost areas) was conducted within the woodland north of the McCraney Creek crossing to determine the extent of impacts which may result from the proposed crossing skew and/or watercourse realignment.

This memorandum provides a summary of the aquatic and potential bat habitat existing conditions reported within the study area associated with the proposed creek realignment footprint, which may be up to 200 m in length upstream of Lakeshore Road towards Rebecca Street. The memo also identifies opportunities for aquatic habitat enhancement and vegetation improvement within the woodlot

2.0 METHODOLOGY

Amec Foster Wheeler biologists revisited the crossing of McCraney Creek at Lakeshore Road West on December 18th, 2017, to conduct surveys within the enlarged study area (Attachment 1, Figure 2 and 3) associated with the proposed creek realignment.

2.1 Aquatic Field Surveys

McCraney Creek was assessed for opportunities for fish habitat enhancement (i.e. fish passage barriers, areas exhibiting bank instability). The watercourse was assessed from approximately 50m upstream of Rebecca Street to Lakeshore Road West. Detailed mapping of areas requiring enhancement/rehabilitation was performed and key areas were geographically referenced using a handheld GPS. The GPS coordinates recorded marked the approximate areas of erosion as well as the approximate location of fish passage barriers found within the reach. The GPS coordinates were also used to map the approximate location of the watercourse within the woodlot. As the GPS coordinates are approximate, they should not be used for construction purposes. Photographic records are provided in a photographic log (Attachment 2).

2.2 Terrestrial Field Surveys

The woodlot was thoroughly surveyed by visual inspection for trees with cavities, cracks, knotholes and loose bark that may be suitable for a bat maternity roost. These trees may provide maternity roost habitat for Little Brown Myotis and Northern Myotis. All trees with a Diameter at Breast Height (DBH) of 10 centimetres (cm) or greater were identified, georeferenced, and any other pertinent information was noted.

Maple and Oak trees provide potential maternity roost sites for Tri-colored Bat (*Perimyotis subflavus*), which typically roost in clusters of dead leaves. Although not identified by MNRF for this site, this species occurs throughout Southern Ontario. As such, the presence of maple and oak trees with or without dead leaf clusters was also noted.

It should be noted that the late seasonality of the study reduced the ability to assess the presence of dead leaf clusters, as the dead leaf clusters are dynamic habitat feature which are temporary,

occurring seasonally. The identification of preferred tree species within the woodlot provides an indication of whether potential habitat is present on site.

3.0 RESULTS

3.1 Aquatic Habitat

A depiction of the key features and habitat mapping for the site are provided in (Attachment 1; Figure 2). Upstream of Lakeshore Road West, McCraney Creek maintains a relatively uniform wetted width of approximately 6 m as it meanders through the woodlot. Flows are slow and is mainly comprised of flats with a few small sets of riffles where rocky substrate is present in shallower areas.

Immediately downstream of Rebecca Street, there is a vertical drop where the poured concrete slab foundation of the crossing meets the natural stream substrate. Flows at the outlet of the crossing structure are concentrated on the easternmost side of the crossing where they flow over this structure, as a large accumulation of woody debris and leaves blocks the majority of the channel at the westernmost side of the crossing outlet. The vertical drop from the poured cement slab to the natural stream substrate is approximately 0.5 m high on the west and 0.8 m high on the east. This area of concentrated flow exhibits a higher velocity than the surrounding watercourse and laminar flow is present. As such, this feature is a barrier to the upstream movement of small-bodied fish. The effects of this barrier would be exacerbated during periods of high flow.

Immediately downstream of this area past the southwest headwall of the Rebecca Street crossing, erosion is evident along the east bank of the watercourse, spanning a length of approximately 10.3 m. Unstable soil and exposed roots are evident up to a height of approximately 1 m. The west bank was stable in this area. No further erosion was observed on the easternmost bank approaching the Lakeshore Road ROW.

Downstream of this area, erosion became evident on the west bank of the watercourse, with exposed soils and bare roots evident spanning along approximately 31.5 m of channel. The unstable banks were approximately 1m high. As the watercourse approaches the tight bend at Lakeshore Road, the erosion becomes more severe with the greatest amounts of erosion found at the crest of the turn where McCraney Creek transitions its flow from a southerly direction to an easterly direction as it reaches the Lakeshore Road ROW. The bank height, through this area reaches a maximum height of approximately 2.5 m.

At the inlet of the Lakeshore Road crossing, an area of exposed limestone is evident. At the downstream end of the limestone, a poured concrete pad is evident. This was potentially 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 surveys previously conducted in June, 2017. During a revisit of the site in September 2017 as well as the December 18th, 2017 surveys, flows were significantly reduced, exposing much of the limestone and resulting in shallow laminar flow. As such, it is believed that this area may pose

a barrier to fish movement. Removal of this feature represents a potential enhancement opportunity.

3.2 Terrestrial Habitat

Four trees with potentially suitable maternity roost sites for Little Brown and Northern Myotis were recorded within the study area, as well as one additional tree in a backyard immediately adjacent to the study area. Cavities noted included: two knotholes in willow species; two woodpecker cavities in a willow and a dead tree of unknown species; and a natural cavity in a rotting dead tree. The rotting dead tree also had loose bark which may provide roosting habitat. The data for potentially suitable roosting trees is summarised in Table 1 and mapped locations provided in Figure 3 (Attachment 1).

Table 1 – Potentially suitable roost trees for Little Brown and Northern Myotis

Tree Number	Tree Species	Diameter at Breast Height (cm)	Height	Habitat Attributes	Decay Status	Easting	Northing	Notes
22	Willow species	55	Canopy height	Knot Hole (5 m high)	Declining live tree	606091	4808924	Small knothole
23	Willow species	41	Just below canopy	Knot Hole (3 m high)	Very recently dead, no canopy, bark intact, branches intact	606081	4808926	Small knothole
24	Unknown dead tree	unknown	Just below canopy	Cavity (6 m high), Loose Bark	Recently dead, bark peeling, only large branches intact	606063	4808943	In backyard on private property, lots of loose bark
25	Willow species	61	Canopy height	Cavity (8 m high)	Healthy Live Tree	606024	4808902	Woodpecker nest hole. Several other large trunks without visible cavities
26	Unknown dead tree	22	Well below canopy	Cavity (3 m high)	Recently dead, bark peeling, only large branches intact	606040	4808894	Likely a woodpecker feeding cavity

Potentially suitable trees for Tri-colored Bat found included fourteen Norway Maple (*Acer platanoides*) and one Manitoba Maple (*Acer negundo*). No dead leaf clusters were observed on any of these trees. This data is summarised in Table 2 and mapped in Figure 3 (Attachment 1).

Table 2 – Potentially suitable roost trees for Tri-colored Bat

Tree Number	Tree Species	Tree Status	Diameter at Breast Height (cm)	Tree Location	Easting	Northing
1	Norway Maple	Live	22	Forest Edge	606063	4808896
2	Norway Maple	Live	24	Forest Edge	606059	4808907
3	Norway Maple	Live	35	Forest Edge	606059	4808907
4	Norway Maple	Live	33	Forest Edge	606054	4808900
5	Norway Maple	Live	26	Forest Edge	606054	4808900
6	Norway Maple	Live	21	Forest Edge	606054	4808900
7	Norway Maple	Live	22	Forest Edge	606054	4808900
8	Manitoba Maple	Live	31	Forest Edge	606075	4808895
9	Norway Maple	Live	20	Forest Edge	606030	4808888
10	Norway Maple	Live	40	Forest Edge	606048	4808912
11	Norway Maple	Live	49	Forest Edge	606049	4808924
12	Norway Maple	Live	35	Forest Edge	606058	4808919
13	Norway Maple	Live	23	Forest Edge	606058	4808919
14	Norway Maple	Live	21	Forest Edge	606066	4808934
15	Norway Maple	Live	15	Forest Edge	606065	4808935
16	Norway Maple	Live	18	Forest Edge	606064	4808925
17	Norway Maple	Live	20	Forest Edge	606068	4808924
18	Norway Maple	Live	36	Forest Edge	606077	4808920
19	Norway Maple	Live	22	Forest Edge	606080	4808926
20	Norway Maple	Live	23	Forest Edge	606081	4808926
21	Norway Maple	Live	39	Forest Edge	606081	4808926

4.0 ENHANCEMENT OPPORTUNITIES

4.1 Aquatic Habitat

Enhancement measures which could be utilized to improve aquatic habitat as a component of the crossing replacement/extension works and stream realignment include:

- Select a new replacement structure that will improve fish passage:
 - o Consider flow velocities and select the structure, grading, etc. that will ensure the crossing structure is passable by fish species known to inhabit the watercourse which include smaller-bodied species which may move through the watercourse seasonally based on stream temperatures and are capable of low/moderate swim speeds (i.e. Longnose Dace 0.65 meters per second (m/sec) and White Sucker 0.45-0.60 m/sec). Rainbow Trout, a sensitive cool/coldwater species has also been found within the watercourse and is likely migrating through the study area to reach upstream breeding grounds. This species can move up to 5.70 m/sec (Peake, S.J, 2008).
 - o Naturalize the substrate within the ROW. Consider modifying the limestone bedrock and poured concrete slab substrate at the upstream end of the ROW to improve fish passage within the ROW by creating a low flow channel.
- Incorporate natural channel design for the channel realignment to improve bank stability, and create flow morphology diversity;
- Following the completion of the construction activities, vegetate margins under the structure where light penetration is sufficient for growth;
- Enhance riparian vegetation in areas adjacent to and upstream of the crossing through restoration and revegetation following the completion of the construction activities to increase: shading to the watercourse; maintain cooler water temperatures and increase bank stability / provide scour protection;
- Enhance stormwater drains at Lakeshore Road which outlet to McCraney Creek to ensure the flows are thermally regulated and of good quality; and
- Protect natural channel areas and habitats which provide refuge and potential spawning habitat.

4.2 Terrestrial Habitat

Enhancement measures which could be utilized to improve bat habitat as a component of the stream realignment include:

- Selection of native species for vegetation restoration including selection of native trees able to outcompete invasive trees and shrubs present such as Norway Maple. Recommended trees may include Black Maple (*Acer nigrum*) and Red Maple (*Acer rubrum*);
- Provide forest management to monitor the site to encourage the growth of native tree species and maintain existing large trees, as well as potentially controlling invasive species such as Norway Maple and Multiflora Rose;
- Install bat roosting boxes to provide additional roosting habitat for SAR bats.

5.0 CLOSURE

This document is intended for the exclusive use of Amec Foster Wheeler and Town of Oakville representatives only for the purpose of Project compliance with contract specifications and regulatory requirements, and for the definition of any recommended SAR mitigation/management procedures. The findings, interpretations and recommendations as outlined herein are based on the expertise of Amec Foster Wheeler and their representative specialists based on the observations and information available at the time of document preparation and on the assumptions and interpretation of the Project contract and any other regulatory compliance requirements.

Sincerely,

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

DRAFT

Daryl Rideout, B.Sc.
Environmental Biologist and Species at Risk Specialist

6.0 REFERENCES

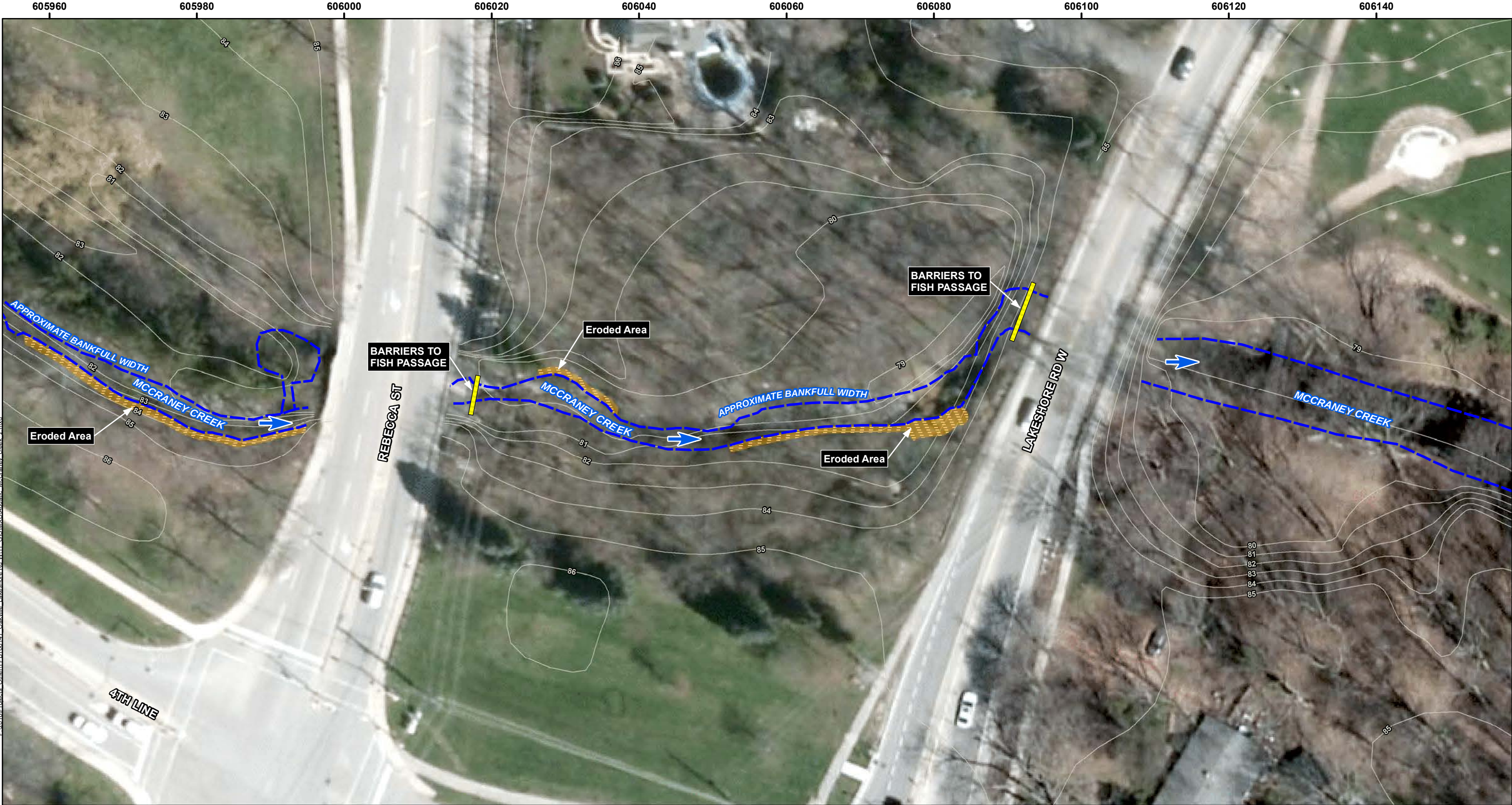
Peake, S.J. 2008. Swimming performance and behaviour of fish species endemic to Newfoundland and Labrador: A literature review for the purpose of establishing design and water velocity criteria for fishways and culverts. Can. Manuscr. Rep. Fish. Aquat. Sci. 2843: v + 52p.

ATTACHMENT 1

Figure 1 – Project Location

Figure 2 – Aquatic Study Area and Areas Requiring Restoration

Figure 3 – Potentially Suitable Bat Maternity Roost Trees



LEGEND

- McCraney Creek Bankfull (approximate)
- Fish Barrier
- Erosion Areas ¹
- Flow Direction
- Contours 1 m Interval

OVERVIEW

NOTES:
¹ Approximate location of Erosion areas (accuracy of ~ 3m)

Datum & Projection:
NAD 1983 UTM Zone 17N

OAKVILLE

**TOWN OF OAKVILLE
LAKESHORE ROAD WEST IMPROVEMENTS**

**Aquatic Areas and
Erosion Areas**

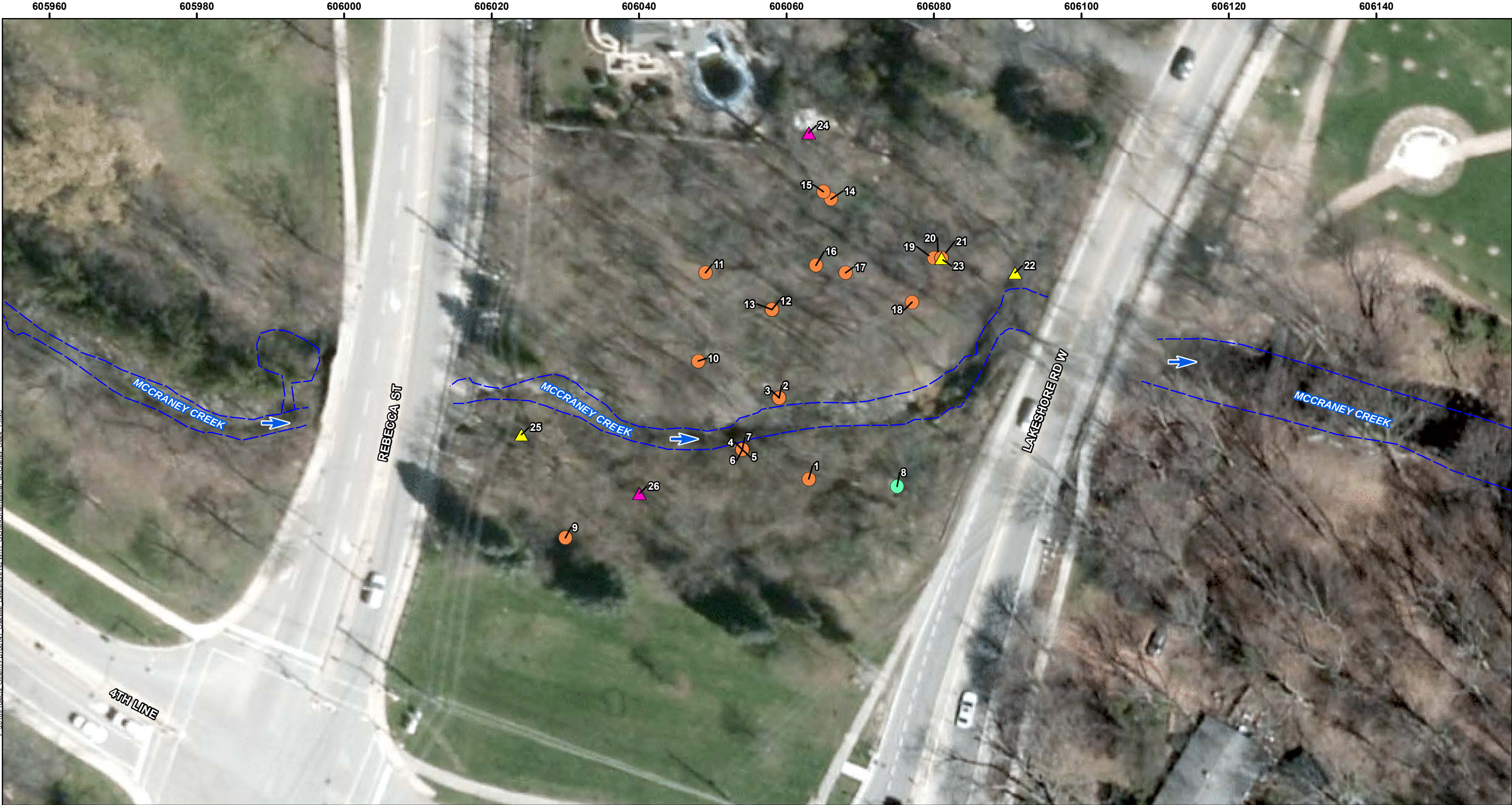
PROJECT N°: TPB166147

SCALE: 1:500

FIGURE 2

DATE: December 2017

P:\2016\Projects_Other\TPB166147_Oakville_Lakeshore Rd W\11_GIS\MXD\Aquatic_McCraney_creek_2.mxd



LEGEND

Trees - Potential Tri-coloured Bat Habitat
(labelled with ID)

Manitoba Maple

Norway Maple

Trees - Potential Maternity Roost Tree
for Little Brown Myotis and Northern Myotis
(labelled with ID)

Willow species

Unknown species (dead)

McCraney Creek

Flow Direction

OVERVIEW

500

Meters

NOTES:

TOWN OF OAKVILLE
LAKESHORE ROAD WEST IMPROVEMENTS

Bat Habitat Features

Datum & Projection:
NAD 1983 UTM Zone 17N

PROJECT N°: TPB166147

SCALE: 1:500

FIGURE 3

DATE: December 2017

P:\2016\Projects - Other\TPB166147 - Oakville - Lakeshore Rd W\11_GIS\MXD\Terrastra_Lakeshore_creek_1.mxd

ATTACHMENT 2

AQUATIC HABITAT PHOTOGRAPHIC LOG



Photo 1: Within Rebecca Street ROW facing downstream. Note large area of debris at west downstream end of crossing forcing flows to move over cement ledge on east.



Photo 2: Cement slab present at downstream end of Rebecca Street crossing is a barrier to small-bodied fish.



Photo 3: *Photo of stable west bank at Rebecca Street.*



Photo 4: *Photo of stable east bank at Rebecca Street.*



Photo 5: Erosion evident at east bank immediately downstream of Rebecca Street retaining wall. Area spans approximately 10.3 m in length. Height of erosion averages at 1 meter.



Photo 6: Erosion evident at east bank immediately downstream of Rebecca Street retaining wall.



Photo 7: *Downstream banks stabilize before erosion area present on west bank.*



Photo 8: *Erosion evident on west bank for approximately 31.5 meters prior to reaching retaining wall for Lakeshore Road.*



Photo 9: *Erosion evident at west bank on approach to Lakeshore Road ROW.*



Photo 10: *Close up of exposed roots present on west bank.*



Photo 11: Bank nearest the retaining wall structure experiencing significant erosion. Erosion of bank reaches approximately 2.5 meters in height at its highest point.



Photo 12: Emergency works were completed in the summer of 2017 to repair the severely eroded bank present directly west of the Lakeshore Road crossing.



Photo 13: Upstream end of Lakeshore Road crossing. Note some erosion is also evident at northeast bank, where exposed sandy soils are present.



Photo 14: Standing within Lakeshore Road ROW facing upstream. Note large area of limestone present to right (east) of structure inlet. Cement slab located at left may pose a potential barrier to smaller-bodied fish during periods of high flow.

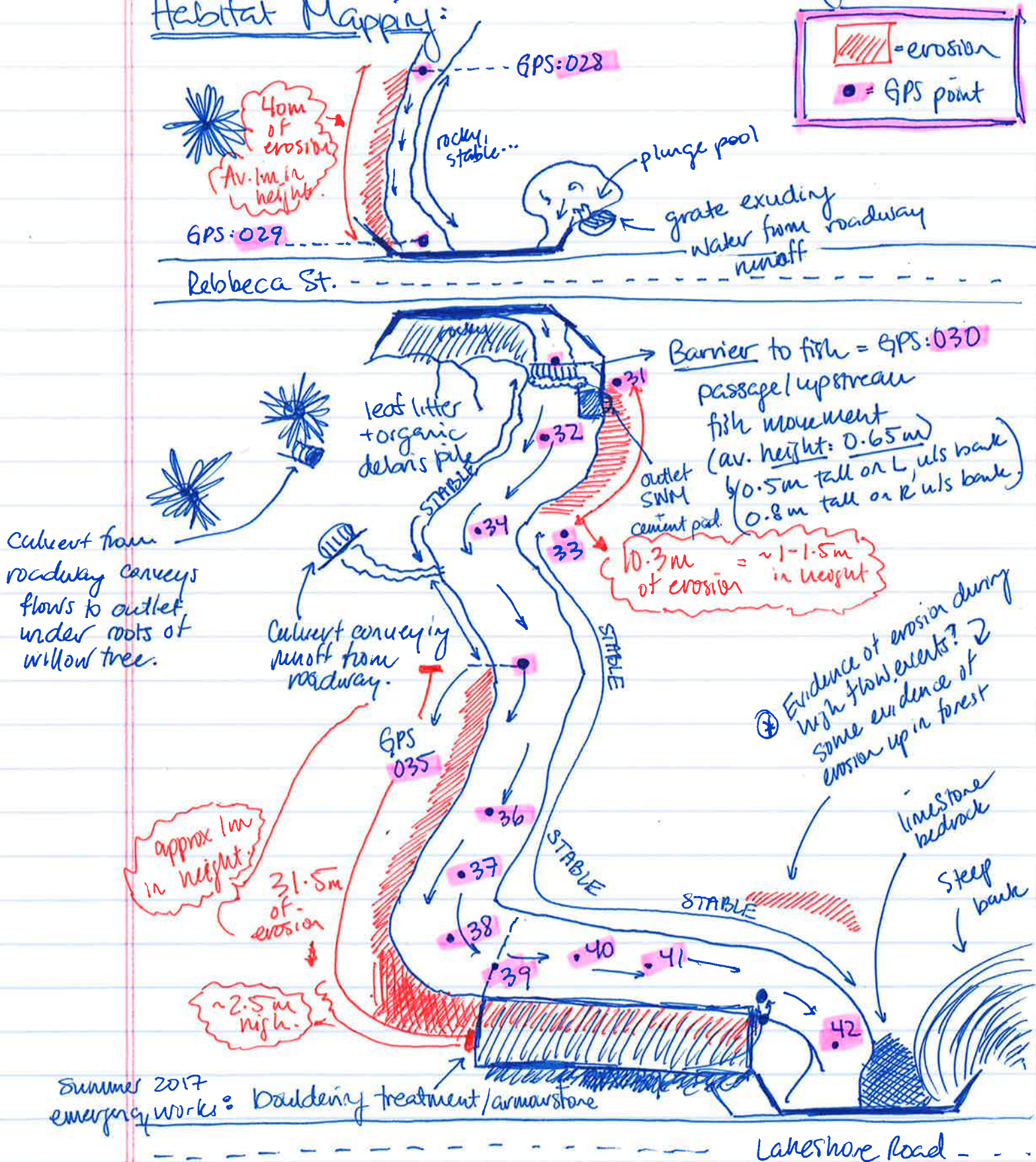
ATTACHMENT 3

FIELD NOTES

Lakeshore Road Project:

Dec 18, 2017

McCraney Creek - Aquatic Habitat Survey: Habitat Mapping:



Suitable Maternity Roost Trees for Little Brown Myotis/Northern Myotis

Include all live and dead standing trees $\geq 10\text{cm}$ dbh with loose or naturally exfoliating bark, cavities, hollows or cracks.

Project Name:

Survey Date(s): Dec 18, 2017

Site Name: Lakehurst Rd.

Observers(s): RDM

ELC Ecosite: Northern Oak Woodland Forest

Snag Density (snags/ha):

Tree #	Tree Species ID	dbh (cm)	Height Class ¹	Snag attributes (check all that apply)	Easting	Northing	Notes Cavity Height
22	288 Salix	55	2	☒ cavity ² ☐ loose bark ☐ crack ☒ knot hole ☐ other snag within 10m? ☒ Decay Class 1-3? ³ 2	0606091	4808924	5 m, knot hole, small
23	289 Salix	41	3	☒ cavity ☐ loose bark ☐ crack ☒ knot hole ☐ other snag within 10m? ☒ Decay Class 1-3? ³ 2	0606081	4808926	3 m, knot hole, small
24	290 Dead	?	3	☒ cavity ☒ loose bark ☐ crack ☐ knot hole ☐ other snag within 10m? ☐ Decay Class 1-3?	0606063	4808943	on private property, back yard lots of fl. bark
25	291 Salix	61	2	☐ cavity ☐ loose bark ☐ crack ☐ knot hole ☐ other snag within 10m? ☐ Decay Class 1-3?	0606024	4808902	w-p cavity, 8 m high several holes
26	292 Dead	22	4	☐ cavity ☐ loose bark ☐ crack ☐ knot hole ☐ other snag within 10m? ☐ Decay Class 1-3?	0606040	4808894	w-p cavity/feeding hole? 3 m high
				☐ cavity ☐ loose bark ☐ crack ☐ knot hole ☐ other snag within 10m? ☐ Decay Class 1-3?			
				☐ cavity ☐ loose bark ☐ crack ☐ knot hole ☐ other snag within 10m? ☐ Decay Class 1-3?			
				☐ cavity ☐ loose bark ☐ crack ☐ knot hole ☐ other snag within 10m? ☐ Decay Class 1-3?			
				☐ cavity ☐ loose bark ☐ crack ☐ knot hole ☐ other snag within 10m? ☐ Decay Class 1-3?			
				☐ cavity ☐ loose bark ☐ crack ☐ knot hole ☐ other snag within 10m? ☐ Decay Class 1-3?			
				☐ cavity ☐ loose bark ☐ crack ☐ knot hole ☐ other snag within 10m? ☐ Decay Class 1-3?			
				☐ cavity ☐ loose bark ☐ crack ☐ knot hole ☐ other snag within 10m? ☐ Decay Class 1-3?			
				☐ cavity ☐ loose bark ☐ crack ☐ knot hole ☐ other snag within 10m? ☐ Decay Class 1-3?			

¹ **Height Class:** 1 = Dominant (above canopy); 2 = Co-dominant (canopy height); 3 = Intermediate (just below canopy); 4 = suppressed (well below canopy)

² The approx. height of the cavity should be noted.

³ **Decay Class:** 1 = Healthy, live tree; 2 = Declining live tree, part of canopy lost; 3 = Very recently dead, bark intact, branches intact.

Suitable Maternity Roost Trees for Tri-colored Bat

Include all oak trees $\geq 10\text{cm}$ dbh (if present). If oaks are absent, include maples $\geq 10\text{cm}$ dbh IF dead/dying leaf clusters are present; and maples $>25\text{cm}$ dbh if no dead/dying leaf clusters are present.

Project Name: Lakeshore Rd.

Survey Date(s): Dec 18 2017

Site Name:

Observer(s): RDM

ELC Ecosite: Norway Maple Lowland Forest

Wintertime survey

Tree#	Tree Species ID	Tree Status (live/dead)	Dbh (cm)	Tree Structural & Locational Attributes (check all that apply)	Easting	Northing	Notes
1	293 ACERPLA	L	22	☐ dead/dying leaf cluster ☐ cavity ☐ open area/forest gap ☒ forest edge ☐ interior ☐ preferred tree species within 10m?	0606063	4808896	
2	294 ACERPLA	L	24	☐ dead/dying leaf cluster ☐ cavity ☐ open area/forest gap ☒ forest edge ☐ interior ☐ preferred tree species within 10m?	0606059	4808907	2 trees
3			35				
4	295 ACERPLA	L	33	☐ dead/dying leaf cluster ☐ cavity ☐ open area/forest gap ☒ forest edge ☐ interior ☐ preferred tree species within 10m?	0606054	4808900	4 trees
5			26				
6			21				
7			22				
8	296 ACERNEG	L	31	☐ dead/dying leaf cluster ☐ cavity ☐ open area/forest gap ☒ forest edge ☐ interior ☐ preferred tree species within 10m?	0606075	4808895	
9	297 ACERPLA	L	20	☐ dead/dying leaf cluster ☐ cavity ☐ open area/forest gap ☒ forest edge ☐ interior ☐ preferred tree species within 10m?	0606030	4808888	
10	298 ACERPLA	L	40	☐ dead/dying leaf cluster ☐ cavity ☐ open area/forest gap ☐ forest edge ☐ interior ☐ preferred tree species within 10m?	0606048	4808912	
11	299 ACERPLA	L	44	☐ dead/dying leaf cluster ☐ cavity ☐ open area/forest gap ☐ forest edge ☐ interior ☐ preferred tree species within 10m?	0606049	4808924	
12							
13	300 ACERPLA	L	35	☐ dead/dying leaf cluster ☐ cavity ☐ open area/forest gap ☐ forest edge ☐ interior ☐ preferred tree species within 10m?	0606058	4808919	2 trees
			23				

Suitable Maternity Roost Trees for Tri-colored Bat

Include all oak trees $\geq 10\text{cm}$ dbh (if present). If oaks are absent, include maples $\geq 10\text{cm}$ dbh IF dead/dying leaf clusters are present; and maples $> 25\text{cm}$ dbh if no dead/dying leaf clusters are present.

Project Name:

Survey Date(s): Dec 18/2017

Site Name: Lakeshore Rd.

Observer(s): RDM

ELC Ecosite: Norway Maple Lombard Forest

Wintertime Survey

Tree#	Tree Species ID	Tree Status (live/dead)	Dbh (cm)	Tree Structural & Locational Attributes (check all that apply)	Easting	Northing	Notes
14 302	ACERPLA	L	21 15	☐ dead/dying leaf cluster ☐ cavity ☐ open area/forest gap ☒ forest edge ☐ interior ☐ preferred tree species within 10m?	0606066	4808934	
15 301	ACERPLA	L	15	☐ dead/dying leaf cluster ☐ cavity ☐ open area/forest gap ☒ forest edge ☐ interior ☐ preferred tree species within 10m?	0606065	4808935	
16 303	ACERPLA	L	18	☐ dead/dying leaf cluster ☐ cavity ☐ open area/forest gap ☒ forest edge ☐ interior ☐ preferred tree species within 10m?	0606064	4808925	
17 304	ACERPLA	L	20	☐ dead/dying leaf cluster ☐ cavity ☐ open area/forest gap ☒ forest edge ☐ interior ☐ preferred tree species within 10m?	0606068	4808924	
18 305	ACERPLA	L	36	☐ dead/dying leaf cluster ☐ cavity ☐ open area/forest gap ☒ forest edge ☐ interior ☐ preferred tree species within 10m?	0606077	4808920	
19 20 306	ACERPLA	L	22 23	☐ dead/dying leaf cluster ☐ cavity ☐ open area/forest gap ☒ forest edge ☐ interior ☐ preferred tree species within 10m?	0606080	4808926	2 trees
21 307	ACERPLA	L	39	☐ dead/dying leaf cluster ☐ cavity ☐ open area/forest gap ☒ forest edge ☐ interior ☐ preferred tree species within 10m?	0606081	4808926	
				☐ dead/dying leaf cluster ☐ cavity ☐ open area/forest gap ☐ forest edge ☐ interior ☐ preferred tree species within 10m?			

Class Environmental Assessment Study and Preliminary Design - Lakeshore West Improvements - Aquatic Habitat Existing Conditions Report (October 2017)



**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:

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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.

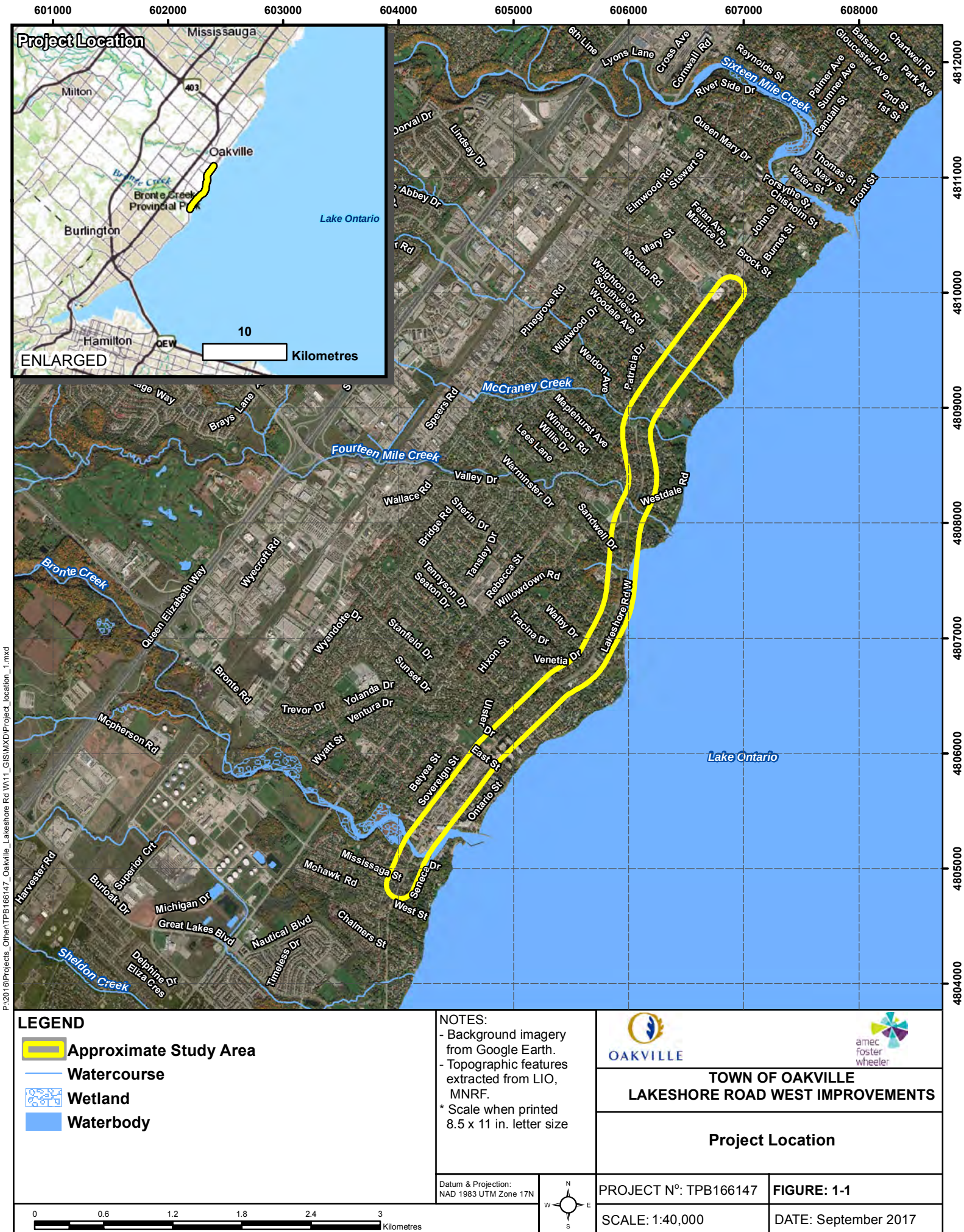
This Aquatic Habitat Existing Conditions Report will facilitate the preparation of an Environmental Study Report (ESR) for the project and inform the Municipal Class EA Process.

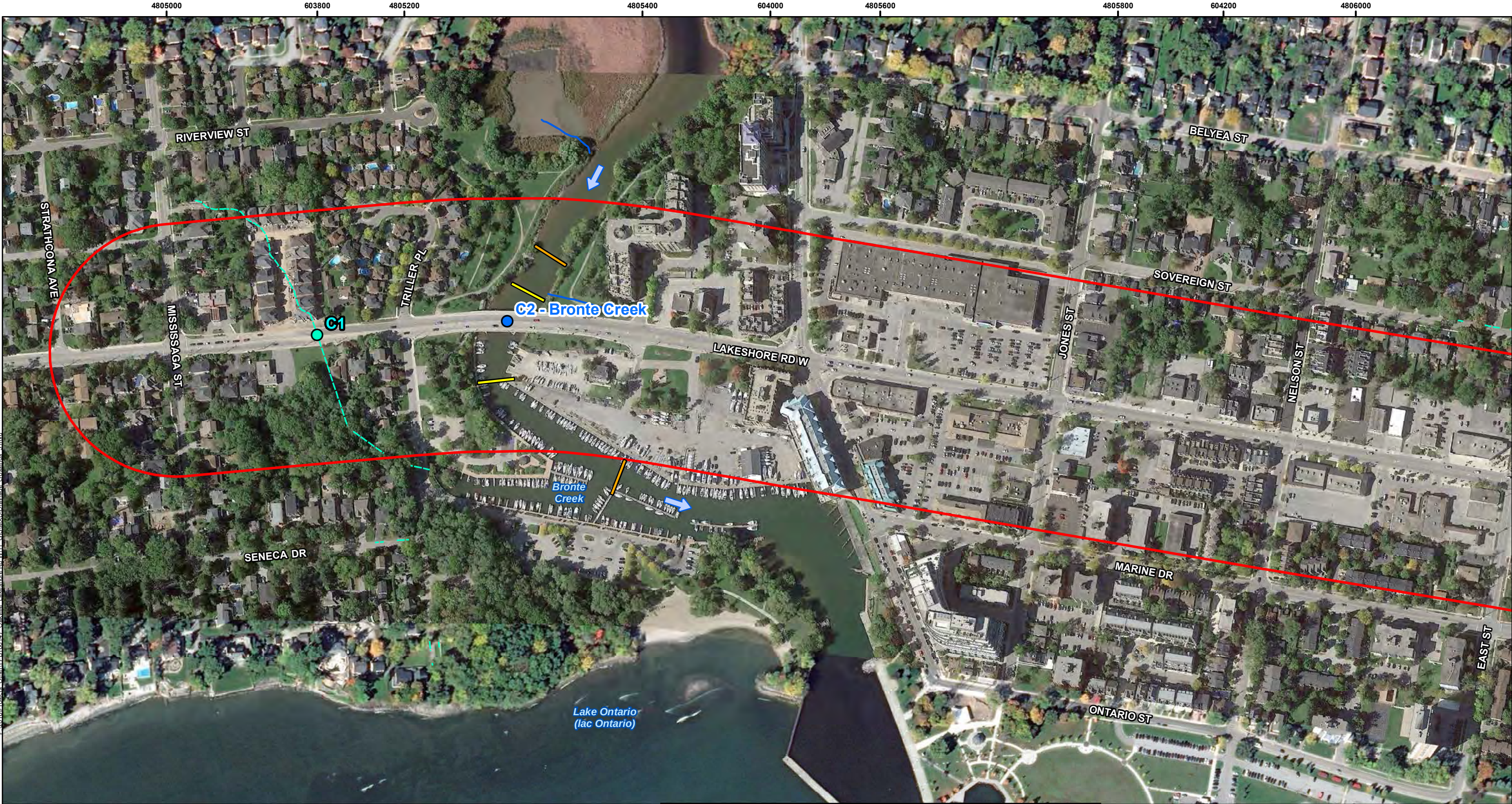
1.1 Study Area

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 (MNRF).

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.





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.

TOWN OF OAKVILLE

LAKESHORE ROAD WEST IMPROVEMENTS

Drainage Crossings

C1, C2

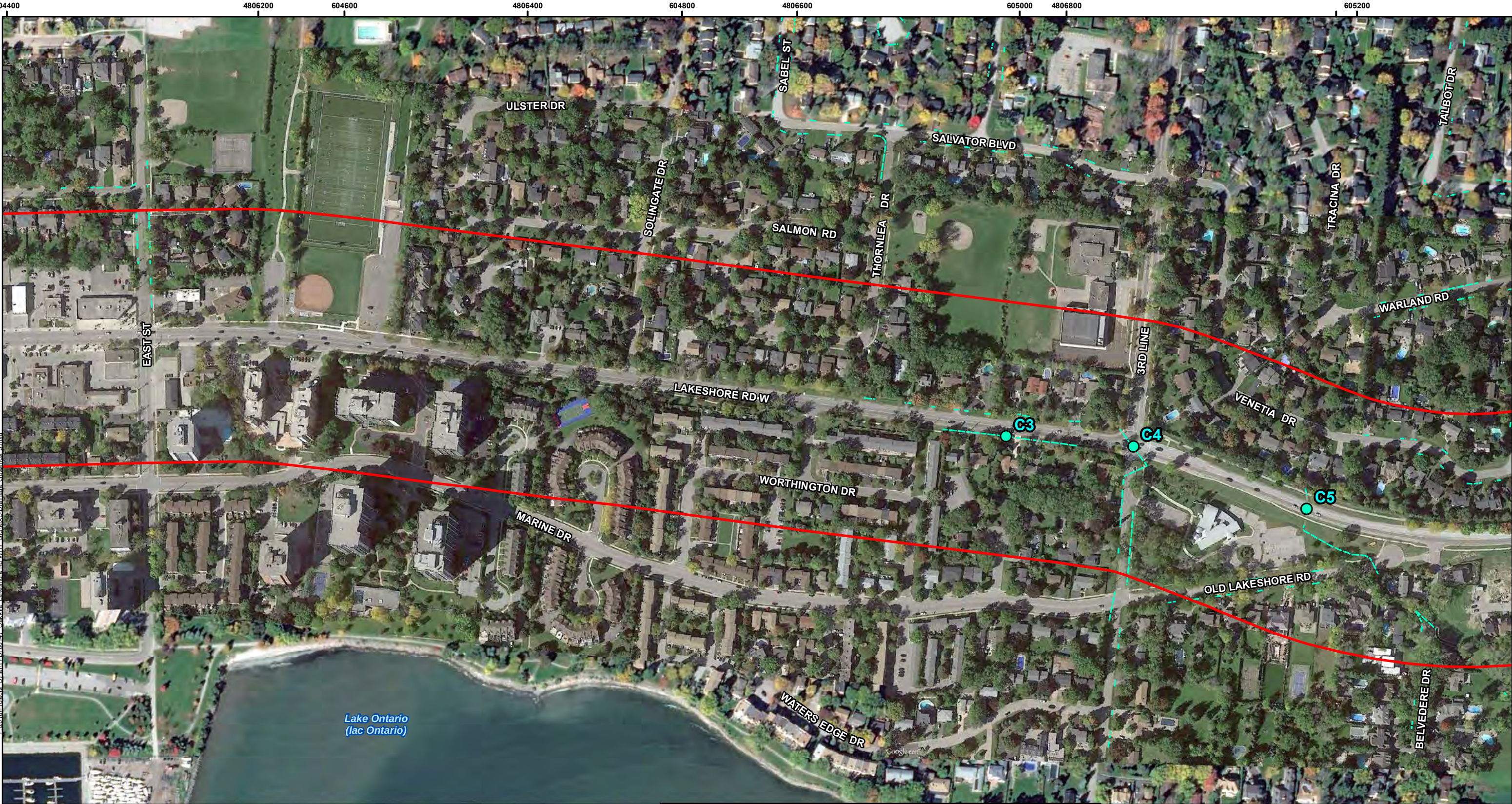
Datum & Projection:
NAD 1983 UTM Zone 17N

PROJECT N°: TPB166147

SCALE: 1:3,500

FIGURE: 1-2

DATE: October 2017



LEGEND

Approximate Study Area

--- Ephemeral Watercourse

● Ephemeral Drainage Crossing

0 100 200 300 400 500 Metres

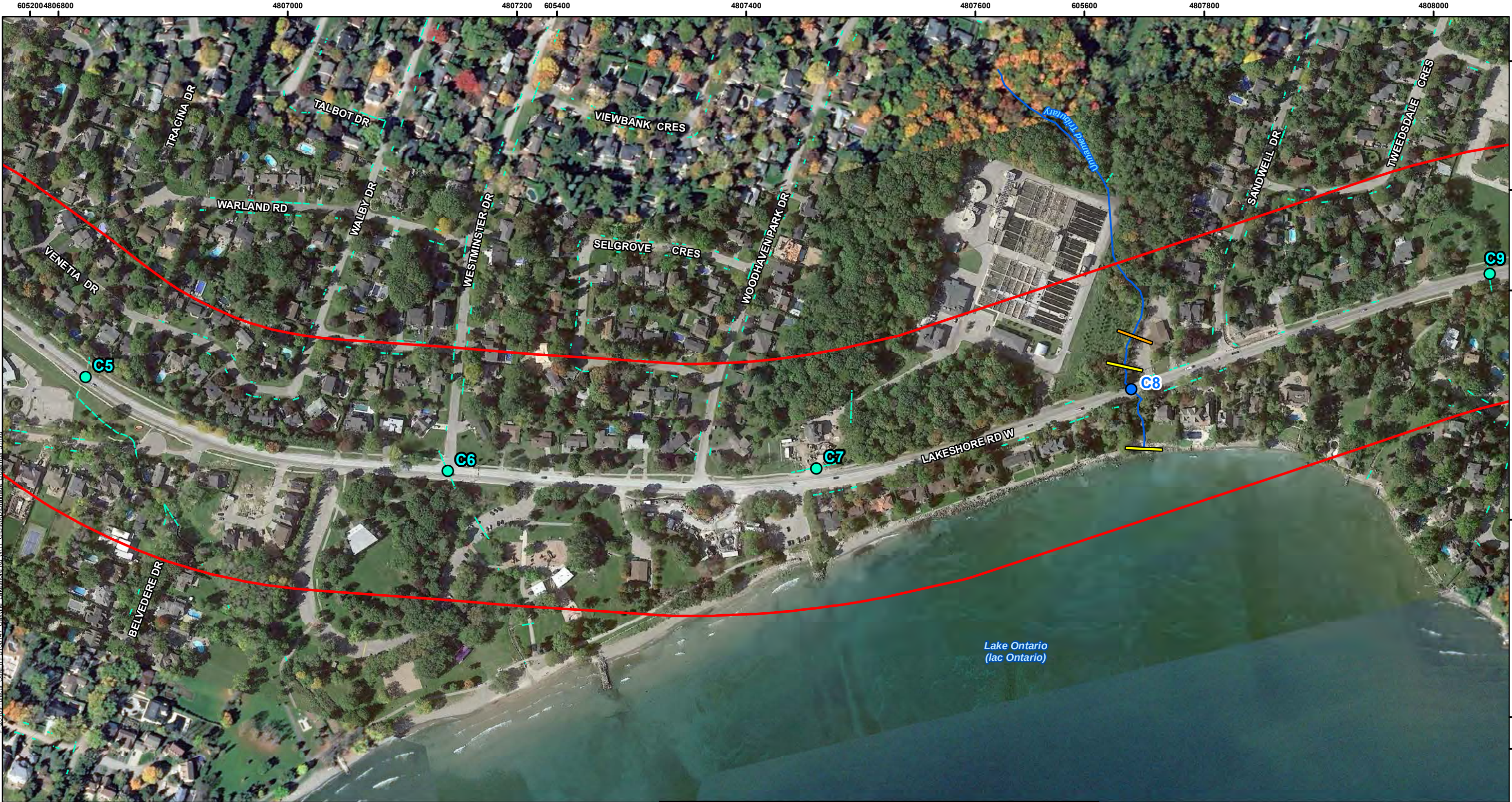


NOTES:

- 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 C3, C4, C5	
PROJECT N°: TPB166147	FIGURE: 1-3
SCALE: 1:3,500	DATE: October 2017



P:\2016\Projects - Client\TPB166147 - Oakville - Lakeshore Rd W\11 GIS\MXD\Drainage crossings_3.mxd

LEGEND

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



KEY MAP



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

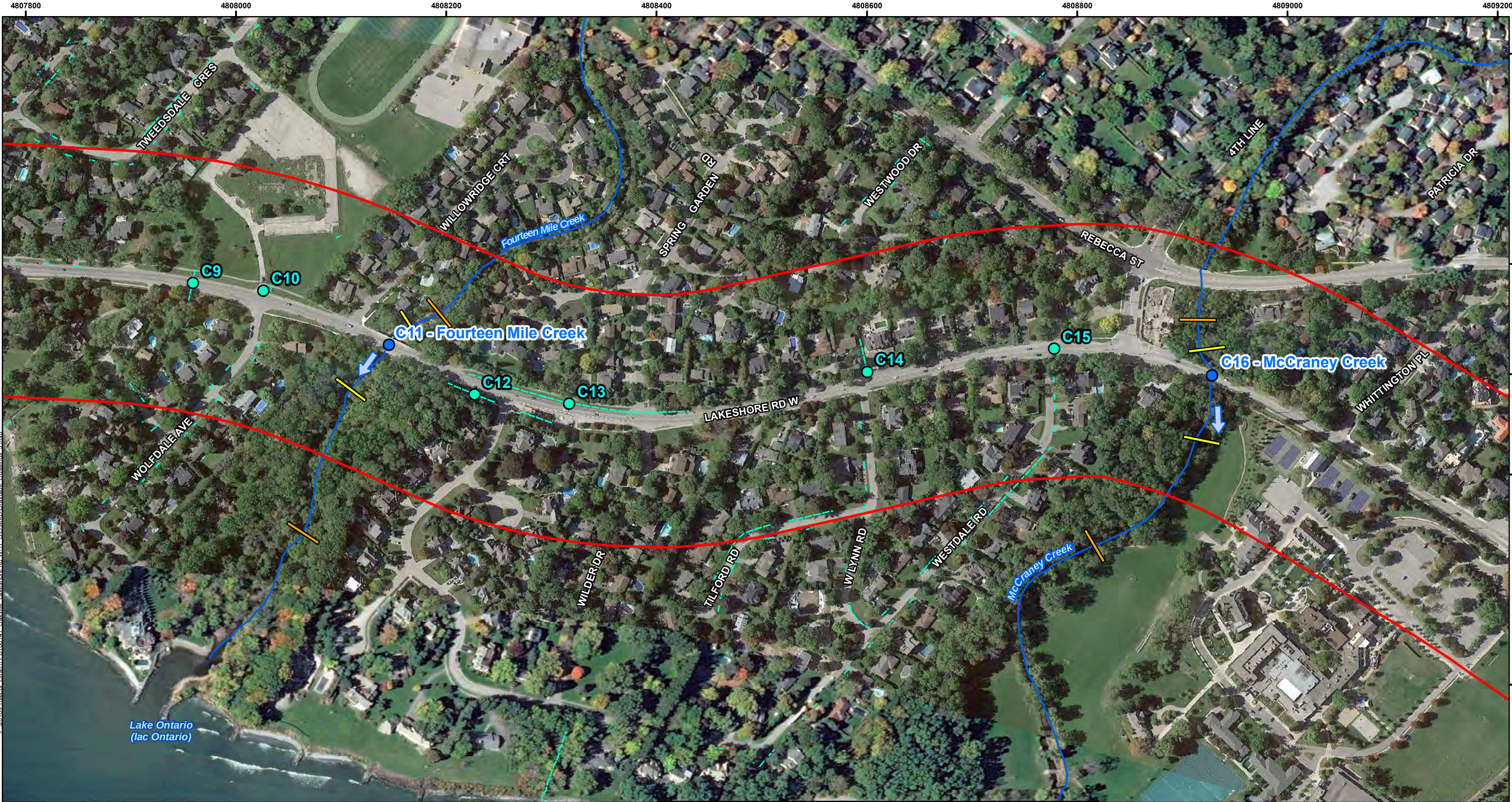
Drainage Crossings
C5, C6, C7, C8

PROJECT N°: 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

OAKVILLE

TOWN OF OAKVILLE
LAKE SHORE ROAD WEST IMPROVEMENTS

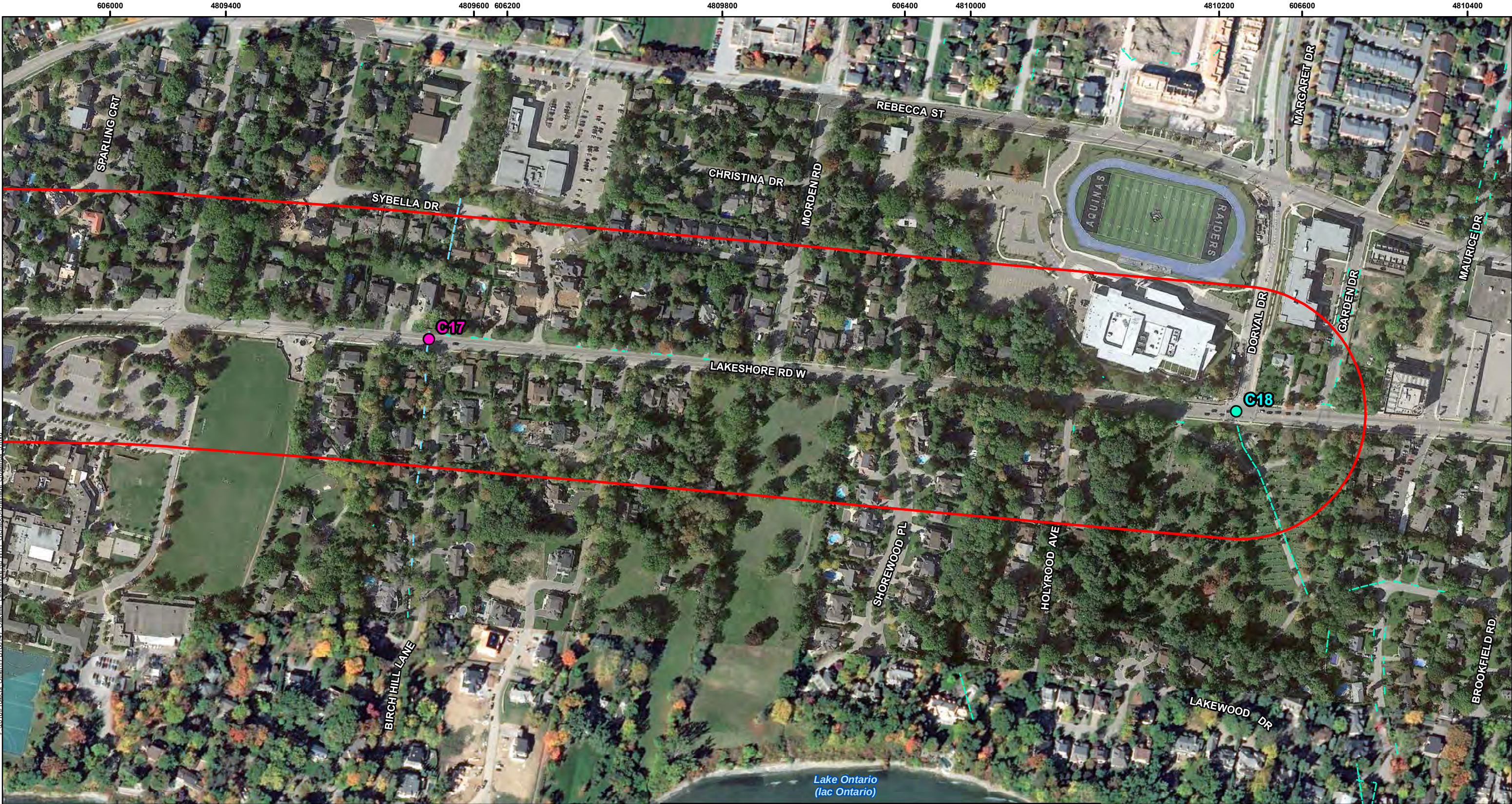
Drainage Crossings
C9, C10, C11, C12, C13, C14, C15, C16

PROJECT N°: 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

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.

OAKVILLE

amec foster wheeler

TOWN OF OAKVILLE

LAKESHORE ROAD WEST IMPROVEMENTS

Drainage Crossings

C17, C18

Datum & Projection:
NAD 1983 UTM Zone 17N

PROJECT N°: TPB166147

SCALE: 1:3,500

FIGURE: 1-6

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:
 - o Conservation Halton website (HRCA 2017);
 - o 2013 Conservation Halton Watershed Report Card (CH 2013);
 - o Urban Creeks and Supplemental Monitoring – Long Term Environmental Monitoring Program (CH 2009e); and
 - o 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.

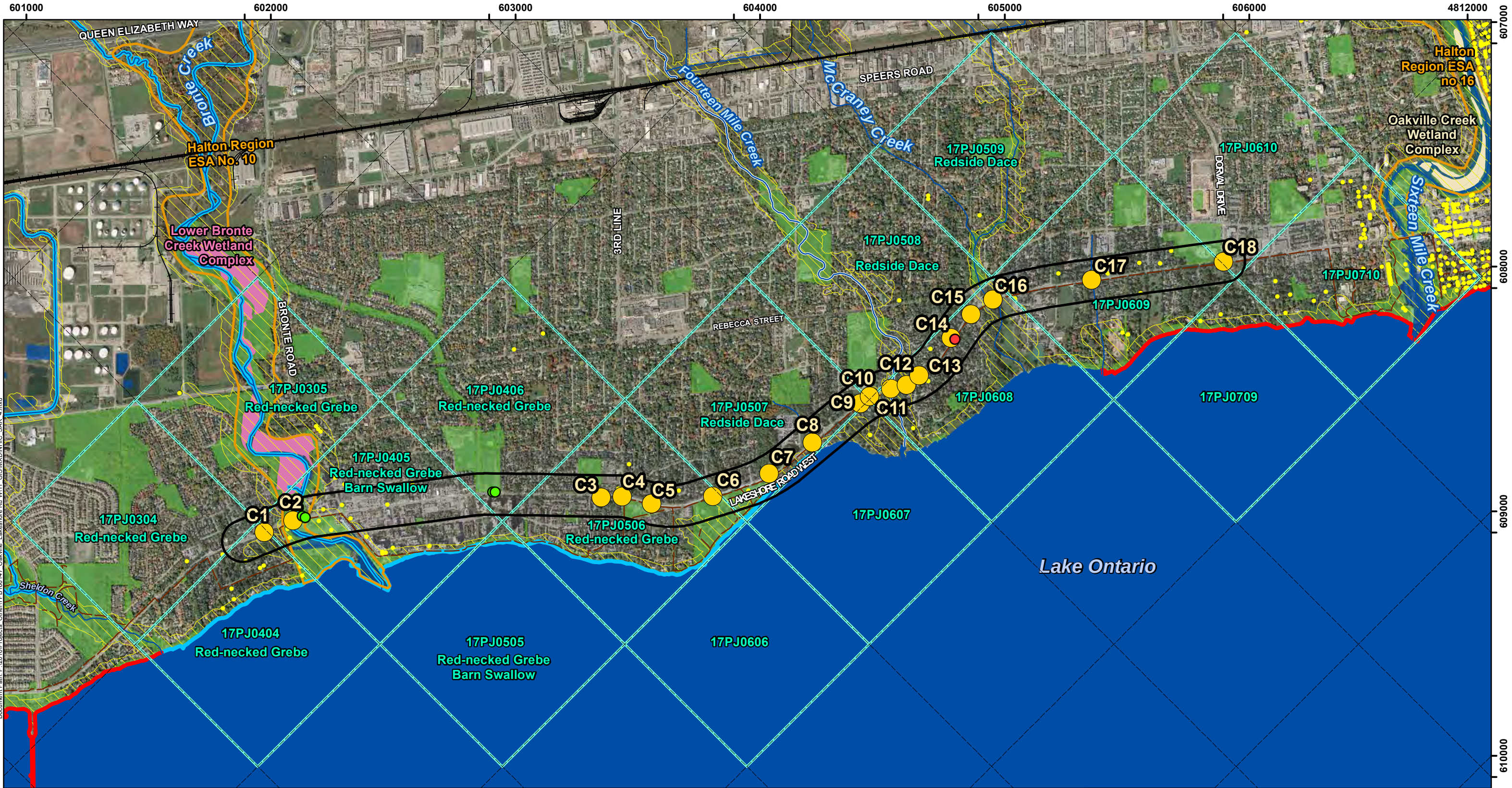
Table 3-1: Potential Occurrence of SAR within the Study Area

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



LEGEND

Approximate Study Area

Watercourse Crossings

NHIC Squares
(Labelled with square ID and
SAR occurrences within the
past 20 years)

Heritage Properties

Trails

Environmentally Sensitive Area

Conservation Halton Regulation Limits

2016 DFO Species at Risk
(Deepwater Sculpin, Eastern Pondmussel,
Grass Pickerel, Mapleleaf, Northern Brook Lamprey,
River Redhorse, Shortnose Cisco, Spotted Gar,
and Upper Great Laked Kiyi)

2015 DFO Species at Risk
(American Eel, Lake Sturgeon
Redside Dace, and Silver Shinner)

2015 DFO Occupied Redside

Locally Significant Wetland

Provincially Significant Wetland

Butternut¹

kentucky coffee tree²

Parks

Watercourse

Railway

Waterbody

NOTES:
- Background extracted
from Google Earth.
¹ Potential Butternut Hybrid.
² Planted Trees.
* Scale when printed
11 x 17 in. tabloid size.

Datum & Projection:
NAD 1983 UTM Zone 17N

**LAKESHORE ROAD WEST IMPROVEMENTS
CLASS ENVIRONMENTAL**

**Natural Heritage and
Species at Risk**

PROJECT N°: TPB166147

SCALE: 1:21,000

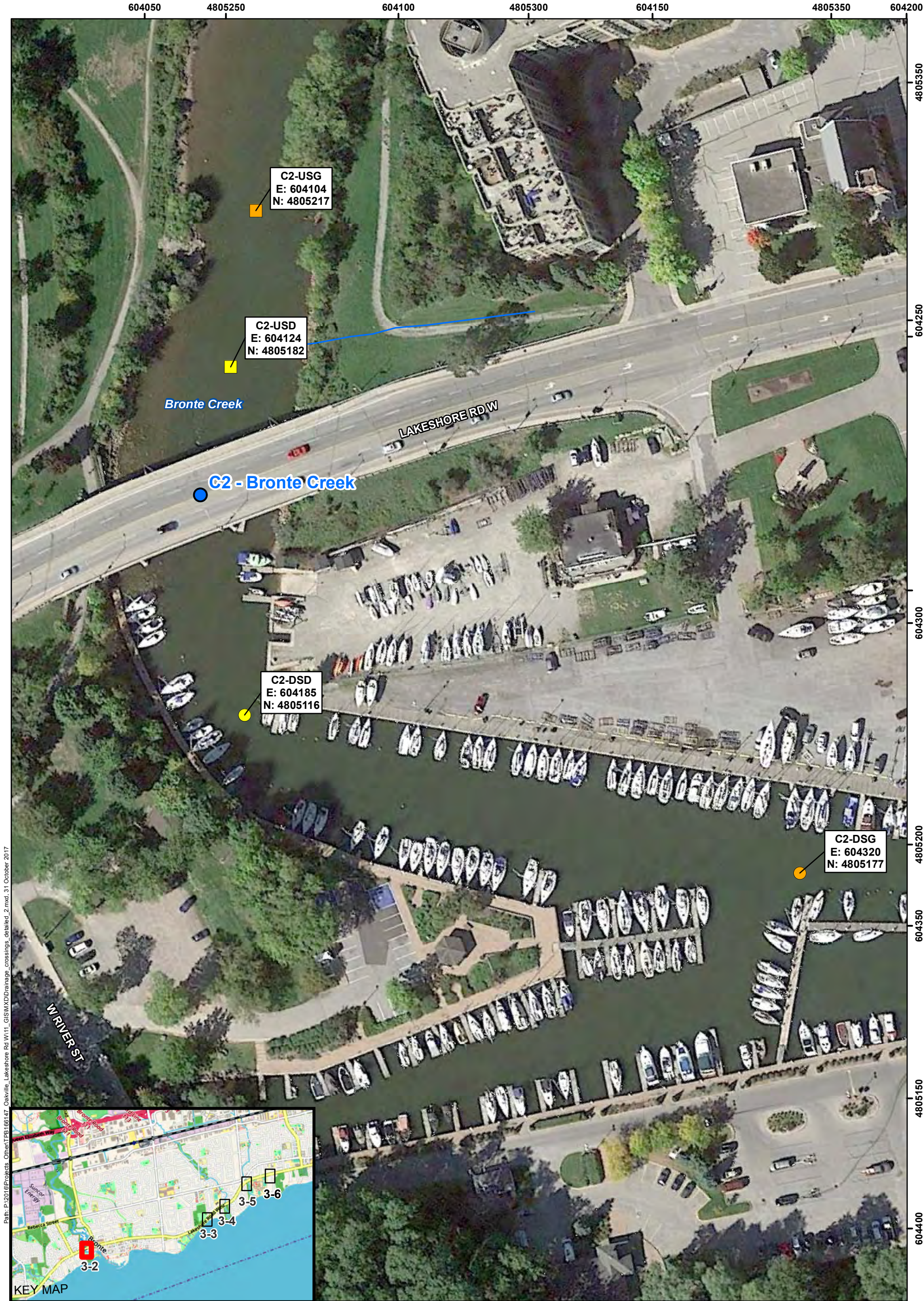
FIGURE: 3-1

DATE: September 2017

Document Path: P:\2016\Projects_Other\TPB166147_Oakville_Lakeshore Rd W11 GIS\MXDNHIC_SAR_4.mxd

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.



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.		 	
						TOWN OF OAKVILLE LAKESHORE ROAD WEST IMPROVEMENTS	
						Crossing C2 Bronte Creek Survey Area	
				Datum: NAD83 Projection: UTM Zone 17N			
				PROJECT N°: TC121522		FIGURE: 3 - 2	
				SCALE: 1:900		DATE: October 2017	



- LEGEND**
- Permanent Drainage Crossing
 - Permanent Watercourse
 - - - Ephemeral 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 C8
Unnamed Tributary Survey Area**

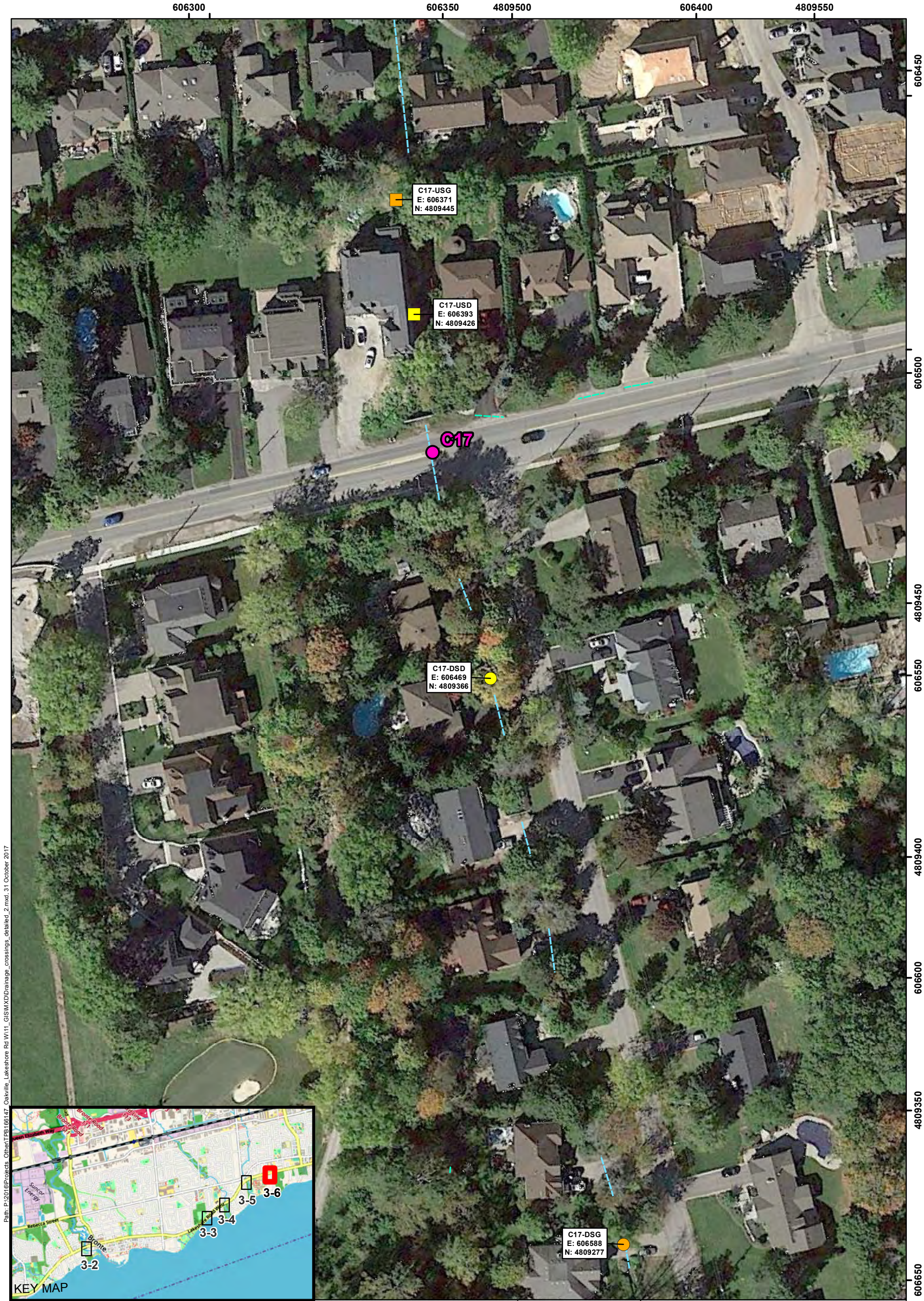
PROJECT N°: TC121522

FIGURE: 3 - 3

SCALE: 1:900

DATE: October 2017





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LEGEND

Intermittent Drainage Crossing

Ephemeral Watercourse

Intermittent 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 C17

Unnamed Tributary Survey Area

PROJECT N°: TC121522

SCALE: 1:900

FIGURE: 3 - 6

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:
 - o Specialized ESC measures specific to Redside Dace protection, will be utilized in the stabilization of the Fourteen Mile Creek site which the MNRF 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 MNRF. 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.
 - o 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.
 - o Stabilize stockpiles and embankments when not in use/as soon as possible following use, in order to prevent sedimentation to the watercourse.
 - o 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.
 - o Staging of the Project will limit vegetation disturbance and minimize the amount of time disturbed soil is exposed.
 - o 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.
 - o 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.

- o 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:

- o Gas-driven machinery and equipment will be turned off when not in use to reduce greenhouse gas emissions associated with the construction activities;
- o 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
- o 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:

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

- o 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:
 - o 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-especies/profiles-profils/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.

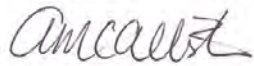
The species listed above may receive protection under the ESA and thus, an authorization from MNRF may be required if the work you are proposing could cause harm to these species or their habitats. If the Species at Risk in Ontario List is amended, additional species may be listed and protected under 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 alternation 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 dark 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
900 Maple Grove Road, Unit 10, Cambridge, ON, N3H 4R7, Canada
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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
900 Maple Grove Road, Unit 10, Cambridge, ON, N3H 4R7, Canada
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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.

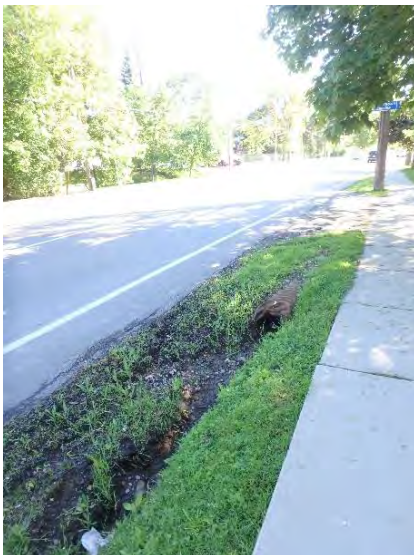


Photo 11: C3 facing east.

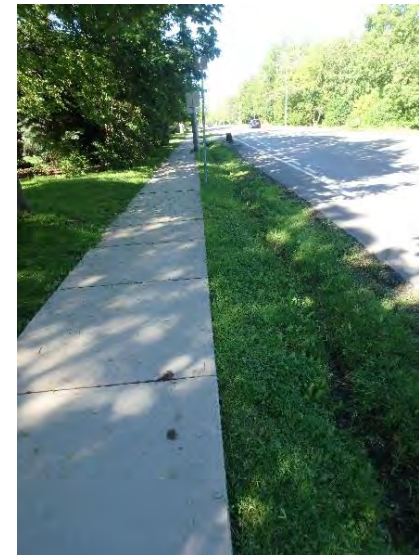


Photo 12: C3 facing west.



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

Ministry of Transportation
Environmental Guide for Fish and Fish Habitat

Section 4: Field Investigations
Appendix 4.A: Watercourse Field Record Form

GENERAL INFORMATION									
PROJECT #: TPB166147		PROJECT DESCRIPTION: Lakeshore Rd.		DAY: 5	MONTH: June	YEAR: 2017			
Is STREAM REALIGNMENT required for this section: ☐ Yes ☒ No ☐ Unknown									
COLLECTORS: BF + AL		WEATHER CONDITIONS: Overcast, chance of rain		TIME STARTED: 9:45 am		TIME FINISHED:			
AIR TEMP: 16°C		WATER TEMP: 17.1°C		CONDUCTIVITY (µS/cm): 727					
PHOTO NUMBERS AND DESCRIPTIONS: DO: 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 ☒		Box Culvert ☐		Open Foot Culvert ☐		CSP ☐		N/A ☐	
Other ☐ 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 ☐	Channelized ☐	Permanent ☒	Intermittent ☐	Ephemeral ☐	ASSOCIATED WETLAND: None			
TOTAL SECTION LENGTH (m): Approx 100 m				CURRENT VELOCITY (m/s): Very slow - flats.					
SUB-SECTION(S)	Run ☐	Pool ☐	Riffle ☐	Flats ☒	Inside culvert ☐	Other			
Percentage of area				100%					
Mean depth wetted (m)				2.38 m					
Mean width wetted (m)				NA					
Mean bankfull width (m)				55 m 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	☒	☐	☐	☐			
Right Upstream Bank	☒	☐	☐	☐			
HABITAT							
IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	☒	☒	☒	Instream 10% Overhanging <5%	5%	Instream N/A Overhanging ☒	-
SHORE COVER (% stream shaded):	100 - 90 %	90 - 60%	60-30%	30 - 1%	None		
	☐	☐	☐	☒	☐		
VEGETATION TYPE (%):	Submergent		Floating		Emergent		None
	☒		☒		☒		
Predominant Species							
MIGRATORY OBSTRUCTIONS:	None ☒		Seasonal ☒		Permanent ☒		
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning ☒ (?) see notes...		Evidence of Groundwater ☒		Other -		
POTENTIAL ENHANCEMENT OPPORTUNITIES:							
↳ vegetated banks could be used rather than rip-rap retaining walls + hardened shoreline near bridge.							
COMMENTS:							
• 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. From approx 100 m D/S of bridge - max depth measurements recorded = Mean wetted depth = 3.41 m							
Additional Notes Appended? ☐ No ☒ Yes number of pages <u>2</u>							

Ministry of Transportation
Environmental Guide for Fish and Fish Habitat

Section 4: Field Investigations
Appendix 4.A: Watercourse Field Record Form

GENERAL INFORMATION									
PROJECT #: TPB11147		PROJECT DESCRIPTION: Lakeshore Rd.		DAY: 5	MONTH: JUN	YEAR: 2017			
Is STREAM REALIGNMENT required for this section: ☐ Yes ☒ No ☐ 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: MNRF					
LAND USE AND POLLUTION									
SURROUNDING LAND USE: -				SOURCES OF POLLUTION: -					
EXISTING STRUCTURE TYPE									
Bridge ☒		Box Culvert ☐		Open Foot Culvert ☐		CSP ☐		N/A ☐	
Other ☐ Describe:						Size (w x h) m ²			
SECTION TYPE AND MORPHOLOGY									
SECTION IDENTIFIER: ROW 1/5			SECTION LOCATION: (Include on habitat map)						
TYPE:	Stream / river ☐	Channelized ☐	Permanent ☒	Intermittent ☐	Ephemeral ☐	ASSOCIATED WETLAND:			
TOTAL SECTION LENGTH (m):				CURRENT VELOCITY (m/s):					
SUB-SECTION(S)	Run ☐	Pool ☐	Riffle ☐	Flats ☒	Inside culvert ☐	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 Sl	Clay Cl	Muck Mu	Detritus D	

fires throughout reach

BANK STABILITY				
	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	☒	☐	☐	☐
Right Upstream Bank	☒	☐	☐	☐

HABITAT							
IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	☒	☒	☒	Instream < 5% Overhanging 25%	< 5%	Instream ☒ Overhanging ☒	

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

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

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	☒	☒	☒

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	☒	☒	-

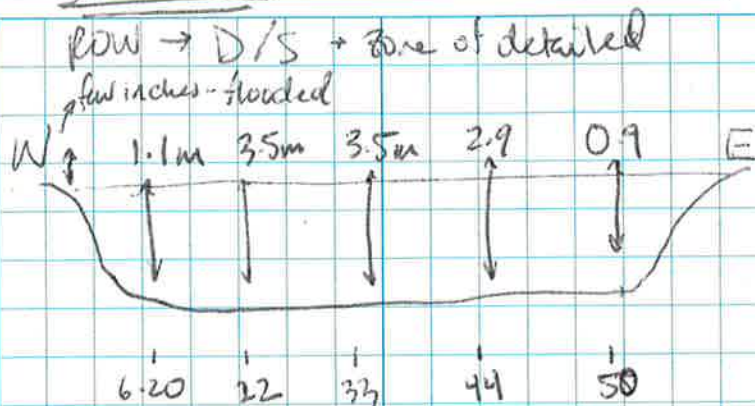
POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:
Dead bullhead floating immediately upstream of road rowl-

Additional Notes Appended? ☐ No ☒ Yes	number of pages <u>2</u>
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cannot see bottom through water - too murky

Bronte Creek



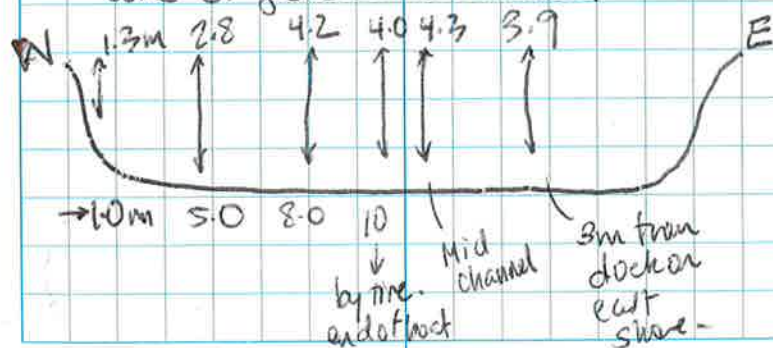
→ likely muddy bottom → fines →

DO = 72.9 PH = 8.51 WT = 17.1

US = 727 ppm = 364

ROW → D/S ~ 200m (GPS = 001) (*)

Zone of general assessment -



Gravel Creek

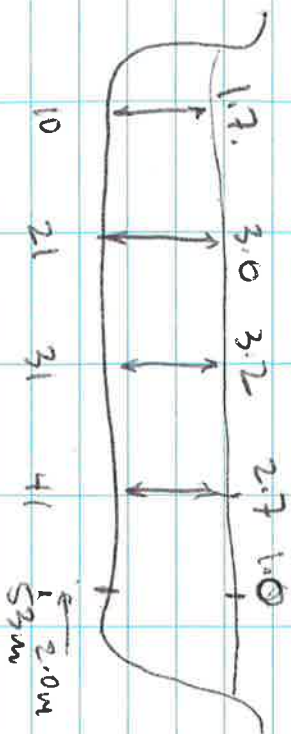
U/S + D/S of general assessment

(GPS = 002)



→ Watercourse narrows slightly upstream

W/S road @ bridge



→ 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

28

① Directly U/S of bridge

① → Wetted → 1.0 m wide R.O.

Bankfull → 2.85 m wide

Depth → 5.0 cm.

Bankfull D → 52.0 cm

② Wetted 1.8 m

BF W: 2.8 m

WD: 8.0 cm

BFD: 49.0 cm.

③ WNW: 1.1 m → less boulders

BFW: 2.1 m 20-30%

WD: 9.0 cm - algae & sand cover

BFD: 52.0 cm - shoe



GENERAL INFORMATION									
PROJECT #: TPB166147		PROJECT DESCRIPTION: Lakeshore		DAY: 5	MONTH: JUN	YEAR: 2017			
Is STREAM REALIGNMENT required for this section:									
☐ Yes ☐ No ☐ 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 ☐		Box Culvert ☒		Open Foot Culvert ☐		CSP ☐		N/A ☐	
Other ☐ Describe:						Size (w x h) m ²			
SECTION TYPE AND MORPHOLOGY									
SECTION IDENTIFIER: ROW + WS + BOM				SECTION LOCATION: (Include on habitat map)					
TYPE:	Stream / river ☐	Channelized ☐	Permanent ☒	Intermittent ☐	Ephemeral ☐	ASSOCIATED WETLAND:			
TOTAL SECTION LENGTH (m): ~30m				CURRENT VELOCITY (m/s):					
SUB-SECTION(S)	Run ☐	Pool ☒ (m)	Riffle ☒	Flats ☒	Inside culvert ☐	Other			
Percentage of area		10%	10%	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 8 Sa 10 Gr. 30 Co 2 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 ↑ e: 1.90 → open footed box culvert

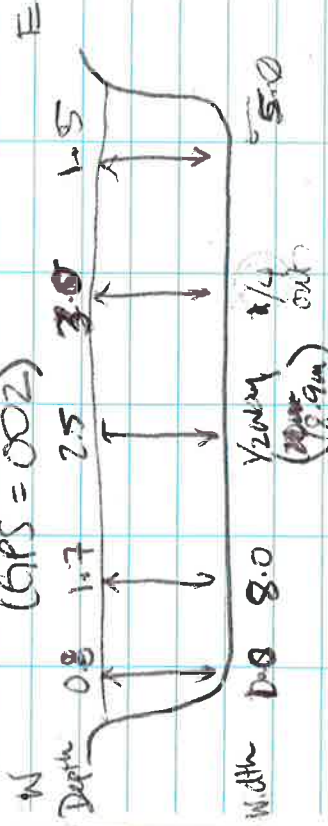
BANK STABILITY							
	Stable	Slightly Unstable	Moderately Unstable	Unstable			
Left Upstream Bank	☒	☐	☐	☐			
Right Upstream Bank	☒	☐	☐	☐			
HABITAT							
IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	☒	60%	10%	Instream 5-10% Overhanging	5%	Instream 20% algae Overhanging	
SHORE COVER (% stream shaded):	100 - 90 %	90 - 60 %	60 - 30 %	30 - 1 %	None		
	☐	☐	☐	☒	☐		
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:							
harder for larger fish passage. - remove debris in channel (loose wood @ upstream end of row).							
COMMENTS:							
- 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? ☐ No ☒ Yes number of pages <u>1</u>							

1 m + wetted width.
+ 2.85 Bankfull.

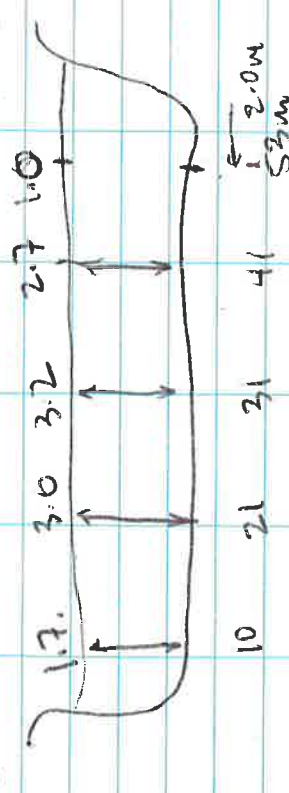
Bronze Creeper

W/S → zone of general assessment

(GPS = 0002)



→ Watercourse narrows slightly upstream

W/S ROW @ bridge

→ Swallow species observed carrying

nesting materials under bridge.

→ lighter patch near tail black wings, tail

→ white patch on head and ring around neck.

→ approx. 3 individuals

c8

Directly U/S of bridge

① → Wetted → 1.0m wide & ①

Bankfull → 2.85m wide

Depth → 5.0cm.

Bankfull D → 52.0cm

②

Wetted W: 1.8m

BF W: 2.8m

WD: 8.0cm

BFD: 49.0cm.

③

WNW: 1.1m → less boulder

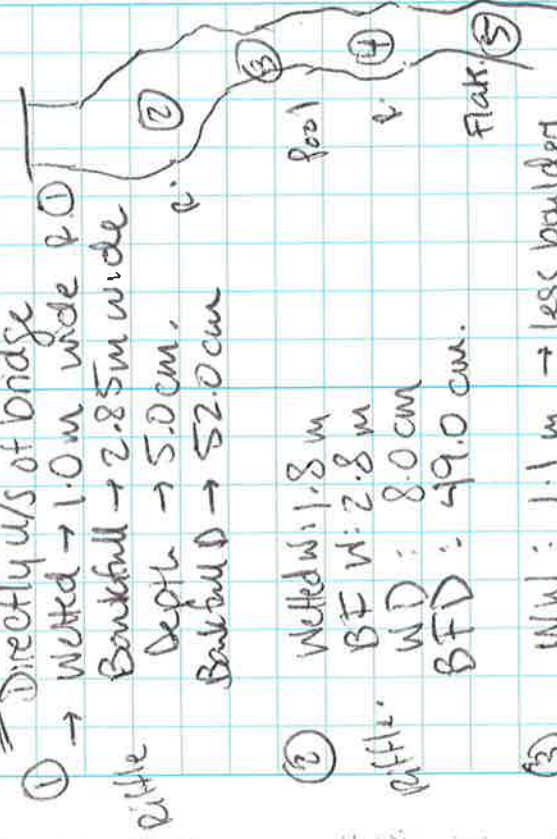
BFW: 2.1m 20-30%

WD: 9.0cm

BFD: 52.0cm - slope

pool

- algal cover



④

NW: 1:1

BFW: 3.1

WD: 7.0cm

BFD: 58.0cm

rifle.

⑤

NW: 1:2.7m

BFW: 2.23m

WD: 15.0cm

BFD: 62.0cm

Flats

↳ DS → No measurements taken

↳ private property

↳ Channelized with poured

Concrete bands - entire way to

Lake Ontario.

↳ approximately 40cm deep.

Fourteen Mile Creek.

Cell→ compact across upstream area - fenced.

13.7m wide - channelized

17.3°C

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

W

→ 0.50m

0.5 E

1.5m

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:									
☐ Yes ☐ No ☐ 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 ☒		Box Culvert ☐		Open Foot Culvert ☐		CSP ☐		N/A ☐	
Other ☐ 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 ☒	Channelized ☐	Permanent ☒	Intermittent ☐	Ephemeral ☐	ASSOCIATED WETLAND:			
TOTAL SECTION LENGTH (m):				CURRENT VELOCITY (m/s):					
SUB-SECTION(S)	Run ☐	Pool ☐	Riffle ☐	Flats ☐	Inside culvert ☐	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	☒	☐	☐	☐
Right Upstream Bank	☒	☐	☐	☐

HABITAT							
IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
84	☒	45	35	2 Instream Overhanging ☒	2	☒ Instream Overhanging ☒	

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

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

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	☒		

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other

POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:
0.33 0.40 0.28 0.24 0.11 WD: 27.2
0.31 0.82 0.67 0.97 0.51 WD: 65.6

Additional Notes Appended? ☐ No ☐ 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:									
☐ Yes ☐ No ☒ 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 TPS: 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 ☐		Box Culvert ☐		Open Foot Culvert ☐		CSP ☐		N/A ☐	
Other ☐ 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 ☒	Channelized ☐	Permanent ☒	Intermittent ☐	Ephemeral ☐	ASSOCIATED WETLAND:			
TOTAL SECTION LENGTH (m):				CURRENT VELOCITY (m/s):					
SUB-SECTION(S)	Run ☐	Pool ☐	Riffle ☐	Flats ☐	Inside culvert ☐	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 Bo Gr 40 40 Co Sand						
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	☒	☐	☐	☐			
Right Upstream Bank	☒	☐	☐	☐			
HABITAT							
IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
52	☒	10	40	Instream ☒ Overhanging 2	☒	Instream ☒ Overhanging ☒	68
SHORE COVER (% stream shaded):	100 - 90 %	90 - 60 %	60 - 30 %	30 - 1 %	None		
	☐	☐	☐	☐	☐		
VEGETATION TYPE (%):	Submergent		Floating		Emergent		None
	1%		☒		☒		
Predominant Species	algae sp-						100
MIGRATORY OBSTRUCTIONS:	None		Seasonal		Permanent		
	☒		☒		☒		
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning		Evidence of Groundwater		Other		
	☒		☒		☒		
POTENTIAL ENHANCEMENT OPPORTUNITIES:							
COMMENTS:							
At Bridge ROW $\Rightarrow$ 0.73 0.71 0.73 0.56 0.67 0.99m 0.15 0.16 0.7 0.6 0.22 0.44m $\leftarrow$ 11.5 m $\rightarrow$ 7.6 m 26 77 77 83 52 77 21 23 32 13 $\leftarrow$ 11.10 m $\rightarrow$ Bridge abut. (Riffle) $\rightarrow$ BFW = 73.2 $\rightarrow$ WW = 18.3 $\rightarrow$ BFW = 63 $\rightarrow$ WW = 21.2 Ph = 8.51 ppm = 477 DO = 94%							
DIS of ROW 6 Approx 30m D/S							
Additional Notes Appended? ☐ No ☐ Yes number of pages _____							

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: ☐ Yes ☐ No ☒ 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: 93.1%									
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 ☐		Box Culvert ☐		Open Foot Culvert ☒		CSP ☐		N/A ☐	
Other ☐ Describe:						Size (w x h) m ² W = 5.4m H = ?			
SECTION TYPE AND MORPHOLOGY									
SECTION IDENTIFIER: US of ROW.			SECTION LOCATION: (Include on habitat map)						
TYPE:	Stream / river ☒	Channelized ☐	Permanent ☒	Intermittent ☐	Ephemeral ☐	ASSOCIATED WETLAND:			
TOTAL SECTION LENGTH (m):				CURRENT VELOCITY (m/s):					
SUB-SECTION(S)	Run ☐	Pool ☐	Riffle ☐	Flats ☐	Inside culvert ☐	Other			
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 Gds=20		Bo=40 Co=40 Gr=25 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	☒	☐	☐	☐			
Right Upstream Bank	☒	☐	☐	☐			

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 ☒ Overhanging ☒	

SHORE COVER (% stream shaded):	100 - 90 %	90 - 60 %	60 - 30 %	30 - 1 %	None
	☐	☒	☐	☐	☐

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

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other

POTENTIAL ENHANCEMENT OPPORTUNITIES:

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

COMMENTS:

Run Ph = 8.50
 14cm 23 16 34 21 Wetted = 21.6cm Avg = 21.6cm ppm = 451

Rifle DO = 93.1
 11 21 16 9 8cm Wetted Avg = 13cm * Small fish observed (UNKNOWN) SP. Darter

Additional Notes Appended? ☐ No ☐ 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:									
☐ Yes ☐ No ☐ 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 ☐		Box Culvert ☐		Open Foot Culvert ☒		CSP ☐		N/A ☐	
Other ☐ 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 ☒	Channelized ☐	Permanent ☒	Intermittent ☐	Ephemeral ☐	ASSOCIATED WETLAND:			
TOTAL SECTION LENGTH (m):				CURRENT VELOCITY (m/s):					
SUB-SECTION(S)	Run ☒	Pool ☐	Riffle ☐	Flats ☐	Inside culvert ☐	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	Bo=10 CO=80 Gr 30 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	☒	☐	☐	☐
Right Upstream Bank	☒	☐	☐	☐

HABITAT							
IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
98	☒	10	80	Instream 5 Overhanging ☒	2	Instream 1 Overhanging ☒	

SHORE COVER (% stream shaded):	100 - 90 %	90 - 60%	60- 30%	30 - 1%	None
	☒	☐	☐	☐	☐

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

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other

POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:
67 55 50 44 50cm Run Bank full Depth Avg = 53.2 15 11 17 17 18cm Wetted Avg. = 15.6 Depth.

Additional Notes Appended? ☐ No ☐ Yes	number of pages _____
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④

NW: 1:1

BFM: 3.1

WD: 7.0cm

BFD: 58.0cm.

Killer

⑤

NW: 1:2.7m

BFM: 2.23m

WD: 15.0cm

BFD: 62.0cm

Flat

↳ DS → No measurements taken

↳ private property

↳ channelized with poured

concrete banks - entire way to

Lake Ontario.

↳ approximately 10cm deep.

Fourteen Mile Creek.

C11 → compact access upstream area - fenced.

13.7m wide - channelized

17.30°

to NP-1 trap

on both sides

of watercourse.

NW → 0.50cm

0.5 E



V. stability → 100% → 0.5m under water.

CS → At d/s end of box culvert

Wetted W: 0.5m

BFW: 2.0m

↳ D/S → WW: 0.8m

BFW: 1.55m

↳ minimum observed

↳ minor flow observed

↳ lots of algae in watercourse

↳ upstream (across road) water draining from ditches

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

↳ CS water course carries on

@ approx. < 30cm from next culvert.

Depth → 5-10cm (very shallow).

1591 μ S

794 ppm

13.1 $^{\circ}$ 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.

C17 D/S of bridge

↳ stream is a small trickle over

mucky / sandy substrate

Wetted W: dth → 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 $^{\circ}$ C

91.4% DO

8.2 pH

↳ W/S area inaccessible - private property very close to stream.

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

WW: 1.5m BFW: 3m.

**Class Environmental Assessment Study and
Preliminary Design - Lakeshore West
Improvements - Terrestrial Habitat Existing
Conditions Report (September 2017)**



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

**TERRESTRIAL 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**

September 2017

TPB166147

EXECUTIVE SUMMARY

The Town of Oakville has initiated a Municipal Class Environmental Assessment (Class EA) for improvements to Lakeshore Road West from Mississauga 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 active and 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 Terrestrial Habitat Existing Conditions Report will facilitate the preparation of an Environmental Study Report for the project and aid in the completion of the Municipal Class EA process.

This report provides a summary of terrestrial existing conditions from both secondary source information and field investigations conducted on May 24 and June 19, 2017. Through a secondary source review of Land Information Ontario (LIO) data, several natural heritage features are located in the vicinity of the project area. These areas, along with details of Ecological Land Classification survey findings, are discussed herein.

Correspondence with MNRF reports that 14 Species at Risk (SAR) have been recorded in the vicinity of the study area, 11 of which are terrestrial or semi-terrestrial. Several wildlife SAR and species of conservation concern were observed during field investigations, including: Barn Swallow, Chimney Swift, Eastern Wood-Pewee, Peregrine Falcon, Canada Warbler and Red-necked Grebe. These species are typically tolerant of disturbance and have learned to adapt in an urbanized environment. Generally habitat for SAR and species of conservation concern is limited and highly fragmented within the Project study area. As such, only minor impacts to wildlife and supporting habitat are anticipated to result from the proposed Project works.

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Appendix D:	Compiled Plant Species List
Appendix E:	Results from Breeding Bird Surveys

1.0 INTRODUCTION

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 EA for the proposed roadway and intersection improvements of Lakeshore Road West. This Terrestrial Habitat Existing Conditions Report will facilitate the preparation of an Environmental Study Report (ESR) for the project and aid in the completion of the Municipal Class EA Process.

1.1 Background

To meet existing and future needs, the Town of Oakville is proposing roadway and intersection improvements to Lakeshore Road West. Potential improvements to the section of Lakeshore Road West under study may include; intersection improvements, potential bridge structure improvements or full replacement, provision of pedestrian and cycle facilities, urban design streetscape improvements, including provision of transit-related infrastructure.

1.2 Study Area

The study area for the site includes the road right-of-way (ROW) along the entire length of the approximately 6.2 km section between Lakeshore Road West from Mississaga Street to Dorval Drive, as well as the surrounding environment within 120 m of the ROW. The 120 m study area was defined for the Project to ensure all natural heritage features (such as significant woodlands and significant wildlife habitat) as defined by Halton Regions Official Plan (ROPA 38, 2017) are effectively documented through this terrestrial existing conditions report.

The Bronte Creek and Oakville West Urban Creek watersheds are present within the Project study area. These watersheds are under the regulatory jurisdiction of Halton Region, Conservation Halton (CH), and the Aurora District Ministry of Natural Resources and Forestry (MNRF). The Project study areas is illustrated in Figure 1-1.

2.0 METHODOLOGY

As part of the overall work program, Amec Foster Wheeler undertook a biophysical inventory of the Project study area. The purpose of the inventory was to characterize and evaluate the existing biophysical environment to provide baseline data to support the design and approval process for the Project. Secondary source information and data from field investigations were used to map vegetation communities and determine existing conditions of terrestrial habitat, compile inventories of plant and wildlife species, and to document Species at Risk (SAR) presence, as well as the probability of SAR occurrence based on habitat suitability/availability.

2.1 Secondary Source Review and Agency Consultation

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

- Conservation Halton (CH) publications and online data (CH website; CH 2017);
- Correspondence with CH and MNRF (Aurora district) (Appendix A);
- Environment Canada's Species at Risk Public Registry database (ECCC 2017a);
- The MNRF Species at Risk in Ontario List (MNRF 2017a);
- MNRF's Natural Heritage Information Centre (NHIC) (MNRF 2017b);
- Ontario Reptiles and Amphibian Atlas (ORAA) (Ontario Nature 2017);
- Atlas of the Mammals of Ontario (AMO) (Dobbyn 1994);
- Bat species profiles and range maps provided by Bat Conservation International, Inc. (BCI 2013);
- The Ontario Butterfly Atlas (OBA) (Toronto Entomological Association 2017) 10 x 10 km survey squares 17PJ00 and 17PJ01;
- Second Atlas (2001-2005) of Breeding Birds of Ontario (ABBO) 10 x 10 km survey squares 17PJ00, 17PJ01 within Region 10 (Cadman et al. 2007); and
- Topographic data extracted from Land Information Ontario (LIO).

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

The ABBO, ORAA, and OBA utilize a 10 km x 10 km system whereby species documented within a specific square can be used to generate a list of species potentially present within a given area.

The lists of mammals that may be found in the study area were similarly generated, however, these resources are not available in a database and as such, the potential presence of these species within the 10 km x 10 km squares was extrapolated based on inventory mapping provided within each atlas.

2.1.1 Species at Risk and Provincially Rare Species

In Ontario, SAR are listed for both plant and animal species whose individuals or populations are considered Extirpated, Endangered, Threatened, or Special Concern, as determined by the provincial Committee on the Status of Species at Risk in Ontario (COSSARO) and the federal Committee on the Status of Endangered Wildlife in Canada (COSEWIC). SAR and their critical habitat are regulated by the provincial *Endangered Species Act, 2007* (ESA) and the federal *Species at Risk Act, 2003* (SARA).

In Ontario, if a species is listed under the ESA as Extirpated, Endangered or Threatened, Section 9 of the *Act* prohibits killing, harming, harassing, capturing, taking, possessing, collecting, buying, selling, leasing, trading or offering to buy, sell, lease or trade a member of the species. Some of these prohibitions also apply to body parts of a member of the species and to things derived from a member of the species. Similarly, if a species is listed under the ESA as Endangered or Threatened, Section 10 of the *Act* prohibits damaging or destroying the habitat of the species. Species listed as Special Concern are not afforded protection under Section 9 and 10 of the ESA.

Provincially rare species are those with a provincial rank of S1, S2 or S3 and considered provincially vulnerable to provincially imperiled. Provincially rare species are tracked by the NHIC and are not protected under ESA. These species are acknowledged in this report as they are considered rare within the province of Ontario and should be taken into consideration for planning purposes.

The potential for SAR and rare species to occur with the Project study area was determined based on a review of background information and agency consultation. The background information included a review of the NHIC online database of significant floral and faunal species near the Project study area. The background information noted above (i.e., wildlife atlases) were also used to develop a complete list of SAR and rare species occurrences that may overlap the Project study area.

2.2 Field Investigations

Field investigations were performed within the Project ROW limits, and in a corridor extending 120 m beyond the ROW. As access was not granted for properties outside of the ROW at the time of field investigations, natural heritage features and wildlife habitat within the 120 m area around the ROW were undertaken through the application of alternative methods of observation (i.e., visual assessment from within the ROW and aerial/satellite imagery interpretation). Natural heritage features examined included vegetation communities, plant species occurrence, breeding bird occurrences, and areas of candidate significant wildlife habitat. No formal surveys were

conducted for mammals, reptiles, or amphibians; however, additional wildlife searches were undertaken concurrently with other field investigations and included direct sightings and evidence of occurrence.

The field investigations were undertaken by a qualified Amec Foster Wheeler biologist on May 24 and June 19, 2017. A description of field survey methodologies are provided in the subsections below. Breeding bird survey locations are illustrated in maps 1 to 9, appended to the document in Appendix B.

2.2.1 Vegetation Communities and Plant Inventories

Detailed vegetation community determination and mapping within the Project study area were conducted according to the Ecological Land Classifications (ELC) system for southern Ontario. The First Approximation of ELC (Lee et al. 1998) was applied for the determination of ecosite type; however, the 2008 catalogue of ecosite types was applied where ecosites could not be determined through the application of the First Approximation. The occurrence of ELC communities were cross-referenced with provincially significant vegetation communities as identified in the Significant Wildlife Habitat Technical Guide (SWHTG; MNRF 2000) to determine whether these communities exist with the Project study area.

Botanical inventories were conducted from within the ROW and included documenting all visible species in ELC communities within the Project study area. Plant species occurrences were cross-referenced with NHIC database to determine existence of rare species within the Project study area. Common and scientific names of plant species are based on the current nomenclature as listed in the NHIC database. Only common names are provided within the body of the report; all scientific names are provided within Appendices C and D.

2.2.2 Breeding Bird Surveys

Sixteen (16) point count stations were surveyed on May 24 and June 19, 2017 by a qualified biologist skilled in the identification of birds by sight and sound. Surveys were conducted for ten minutes at each station (instead of the five minute listening period outlined in the ABBO) and all birds heard or observed were recorded at intervals of 0-50 m, 50-100 m, >100 m and flyovers (birds seen flying overhead). In addition, birds were recorded at intervals of 0-3 minutes, 3-5 minutes and 5-10 minutes. Surveys were initiated no earlier than 30 minutes prior to sunrise and extended to five hours after sunrise. Species were identified through their unique vocalisations and visual observations. Each bird was recorded once and mapped on the field data sheets to ensure no duplication of individual birds. All bird surveys were undertaken in good weather with warm temperatures, no precipitation, and little or no wind.

2.2.3 Wildlife Habitat

Based on the SWHTG, the MNRF defines significant wildlife habitat (SWH) as ecologically important in terms of features, functions, representation or amount and contributing to the quality

and diversity of an identifiable geographic area or Natural Heritage System (MNR 2000). SWH is divided into four main categories:

- Seasonal Concentration Areas of Animals;
- Rare Vegetation Communities and Specialized Habitat for Wildlife;
- Habitat for Species of Conservation Concern (excluding Endangered or Threatened species); and
- Animal Movement Corridors.

To determine the existence of SWH within the Natural Heritage System, the MNRF has developed SWH Criterion Schedules for identifying ecosites and/or natural features suitable for wildlife to carry out critical life processes (listed within the four main categories described above). The Project study area falls within ecoregion 7E (Lake Erie-Lake Ontario Ecoregion); accordingly, the SWH Criterion Schedules for Ecoregion 7E were applied to document the occurrence of candidate SWH within the Project study area.

3.0 RESULTS

3.1 Secondary Source Review and Agency Consultation

3.1.1 Physiography and Soils

The project is located within the Iroquois Plain physiographic region which extends across the southern portions of the Greater Toronto and Hamilton Area (GTHA). The soils within and adjacent to the study area are comprised of permeable sandy soils, which were deposited 12,500 years ago along the shores of glacial Lake Iroquois (TRCA, 2017).

3.1.2 Vegetation Communities

The Project study area is within Ecoregion 7E and is contained within the Deciduous Forest Region, Niagara Forest Section. Forest communities are typically dominated by broadleaved tree species common to both the Great Lakes-St. Lawrence Ecoregion (6E) and Deciduous Forest Region, such as Sugar Maple, American Beech, Basswood, Red Oak, Black Walnut, and White Ash, and contains remnants of Carolinian forests with species such as Black Gum, various oaks and hickories, Common Hackberry, Sassafras, and Tulip Tree (Rowe 1972).

Natural vegetation cover within Ecoregion 7E is primary agriculture; however, land use within the Project study area is predominantly anthropogenic, characterized by commercial, industrial, and residential land uses. The majority of natural/semi natural vegetated areas are generally associated with watercourses throughout the study areas and have experienced intense anthropogenic disturbances for many decades. Invasive species presence is often abundant and outcompeting the native flora.

Three woodlands are found within the project study area, including a 2.1 hectare (ha) deciduous forest located in the vicinity of Town of Oakville sewage and water treatment plant, a 2.1 ha deciduous forest in the valley lands of Fourteen Mile Creek, and a 1.5 ha deciduous forest (FOD7) located in the valley lands of McCraney Creek.

3.1.3 Wildlife

Inventories of wildlife (Appendix C) were compiled from available literature and resources (listed in Section 2.1). Based on a review of background information, 107 species of birds, 41 species of mammals, 14 species of amphibians, and 12 species of reptiles are reported to occur with the natural heritage squares encompassing the Project study area.

3.1.3.1 Birds

Within the vicinity of the Project study area, 107 species of birds were reported in the 2nd ABBO (BSC et al. 2006) (see Appendix C). It is important to note that the exact locations of species occurrences are not available from the atlas and are instead recorded from point count locations within the two 10 x 10 km squares encompassing the study area (17PJ00, 17PJ01). Consequently, it is not certain that these species or their habitats are present within the more

focused study area or surrounding area of Lakeshore Road. Ten bird species are SAR or rare species (see Section 3.1.4).

3.1.3.2 Mammals

In total, 41 species of mammals were found to potentially occur within the Project study area. This data was gathered from range maps in the AMO (Dobbyn 1994) and bat data has been supplemented by Bat Conservation International Inc. records (BCI 2013) (see Appendix C). Of the 41 species reported to be present in the vicinity of the project study area, four (4) are listed as SAR under the ESA (Section 3.1.4).

3.1.3.3 Reptiles and Amphibians

A review of the ORAA map indicated 12 species of reptiles and 14 species of amphibians have been observed within the natural heritage square which encompasses the Project study area (Ontario Nature 2017) (see Appendix C). Four reptile species are SAR or rare species (see Section 3.1.4). No amphibian SAR or rare species were documented in the Project study area. It is important to note that the exact locations of these species records are not available through the ORAA and are instead recorded from locations within the 10 x 10 km square encompassing the study area (17PJ00). Consequently, it is not certain that these species or their habitats are present within the more focused study area or surrounding the Lakeshore Road area.

3.1.4 Species at Risk and Provincially Rare Species

Secondary source review (Appendix C) and MNRF consultation (Appendix A) revealed the presence of two (2) plant species, twelve (12) bird species, four (4) mammal species, and four (4) herptile SAR / provincially rare species documented within the vicinity of the study area (MNRF Correspondence, MNRF 2017b, Cadman et al. 2007, BCI 2013, Dobbyn 1994, Ontario Nature 2017). It is important to note that the exact locations of these species are not available through the reviewed sources. As a result, it is unknown if these species are present within the study area with the exception of the species MNRF confirmed were recorded from the study area. These species documented through desktop resources include:

Endangered Species

Eastern Small-footed Myotis (*Myotis leibii*)

Little Brown Myotis (*Myotis lucifugus*)

Northern Long-eared Myotis (*Myotis septentrionalis*)

Tri-coloured Bat (*Perimyotis subflavus*)

Butternut (*Juglans cinerea*)

Jefferson/Blue-spotted Salamander (*Ambystoma jeffersonianum/ laterale*)

Threatened Species

Bank Swallow (*Riparia riparia*)

Barn Swallow (*Hirundo rustica*)

Bobolink (*Dolichonyx oryzivorus*)
Eastern Meadowlark (*Sturnella magna*)
Chimney Swift (*Chaetura pelagica*)
Eastern Whip-poor-will (*Caprimulgus vociferus*)
Kentucky Coffee-tree (*Gymnocladus dioica*)
Eastern Hog-nosed Snake (*Heterodon platirhinos*)

Special Concern Species

Eastern Wood-Pewee (*Contopus virens*)
Peregrine Falcon (*Falco peregrinus*)
Snapping Turtle (*Chelydra serpentina*)
Northern Map Turtle (*Graptemys geographica*)
Eastern Ribbonsnake (*Thamnophis sauritus*)
Canada Warbler (*Cardellina canadensis*)
Red-headed Woodpecker (*Melanerpes erythrocephalus*)
Common Nighthawk (*Chordeiles minor*)
Wood Thrush (*Hylocichla mustelina*)

The MNRF also reported the potential presence of Red-necked Grebe, a provincially rare species (S3B/S4N) in the vicinity of the Project study area. NHIC searches within the 16 natural heritage squares (1km x 1km) which encompass the study area do not indicate any additional SAR within the area beyond what was reported by the MNRF. In section 3.2.2 the likely, confirmed, or observed presence of the SAR listed above, is discussed.

3.1.5 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:
 - o 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.



LEGEND

Approximate Study Area

NHIC Squares
(Labelled with square ID and
SAR occurrences within the
past 20 years)

Heritage Properties

Trails

Environmentally Sensitive Area

Conservation Halton Regulation Limits

2016 DFO Species at Risk
(Deepwater Sculpin, Eastern Pondmussel,
Grass Pickerel, Mapleleaf, Northern Brook Lamprey,
River Redhorse, Shortnose Cisco, Spotted Gar,
and Upper Great Laked Kiyi)

2015 DFO Species at Risk
(American Eel, Lake Sturgeon
Redside Dace, and Silver Shinner)

2015 DFO Occupied Redside

Locally Significant Wetland

Provincially Significant Wetland

Butternut¹

kentucky coffee tree²

Parks

Watercourse

Railway

Waterbody

NOTES:

- Background extracted from Bing.
- Potential Butternut Hybrid.
- Planted Trees

Datum & Projection:
NAD 1983 UTM Zone 17N

OAKVILLE

**LAKESHORE ROAD WEST IMPROVEMENTS
CLASS ENVIRONMENTAL**

**Natural Heritage and
Species at Risk**

PROJECT N^o: TPB166147

FIGURE: 3-1

SCALE: 1:21,000

DATE: July 2017

0

1

2

3

4

5

Kilometres

3.2 Field Investigations

3.2.1 Vegetation Communities

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

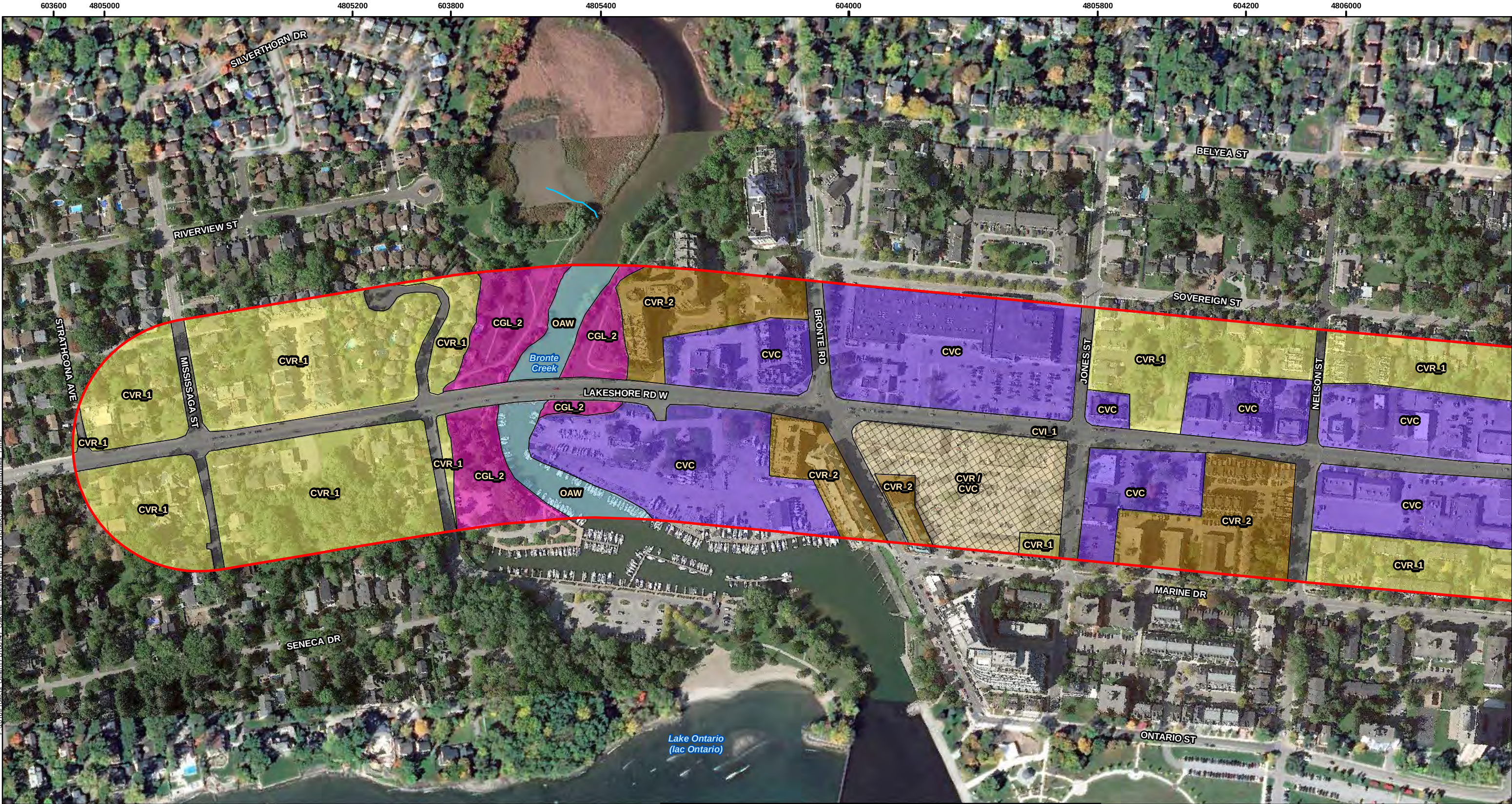
A summary table of the vegetation communities and land use within the study area is presented in Table 3-1, and distribution of land use and ELC units are illustrated in Figure 3-2 (Maps 1-6). Access was not granted for surveys outside of the ROW at the time of field investigations so communities could not be investigated thoroughly. ELC designations were undertaken at a high level based on observations from the ROW and aerial/satellite imagery interpretation. A compiled plant species list has been provided in Appendix D.

A total of 13 ELC community types / land uses were identified within the terrestrial study area. Of the 152 hectares (ha) that make-up the study area, 93.1% was made up of community types / land uses considered anthropogenic or cultural in origin (e.g., constructed). The natural / semi-natural habitats are known to contain numerous non-native species due to their proximity to cultural habitats.

Table 3-1: ELC Vegetation Communities and Land Uses

ELC Type	Community Description
Vegetated / Natural Communities	
FOD5-2 Dry - Fresh Sugar Maple - Beech Deciduous Forest Type Total Area: 2.1 ha (1.4%)	This mature deciduous forest is dominated by Sugar Maple and American Beech in the canopy with a lesser component of Red Oak and Black Cherry. The sparse sub-canopy is also Sugar Maple and American Beech, while there are some invasive Honeysuckles and Choke Cherry in the understory as well as the tree species. The ground layer is dominated by Garlic Mustard but with a significant component of native wildflowers such as Yellow-trout Lily and White Trillium as well as seedling Sugar Maples. The edges have numerous invasive and weedy species, but the small forest interior is relatively undisturbed.
FOD7 Fresh - Moist Lowland Deciduous Forest Ecosite Total Area: 1.5 ha (1.0%)	This lowland forest along the creek is dominated by Norway Maple with some Black Walnut and willow. Norway Maple are also abundant at the lower levels, along with Manitoba Maple in the sub-canopy, Multiflora Rose and invasive honeysuckles in the understory and Garlic Mustard in the ground layer. There are very few native species in this community, and it is highly disturbed with numerous trails and signs of flooding.
FOD7-4 Fresh - Moist Black Walnut Lowland Deciduous Forest Type Total Area: 2.1 ha (1.4%)	The canopy in this lowland forest along the creek is dominated by Black Walnut with some willow and Red Oak. The sub-canopy and understory have significant components of Manitoba Maple, European Buckthorn and invasive honeysuckles as well as young Black Walnut. Goldenrods and Poison Ivy are abundant in the ground layer, and Riverbank Grape and Virginia Creeper vines are abundant at all levels. At the time of survey, all the trees had been completely defoliated. Likely this was due to the infestation of Fall Cankerworm (<i>Alsophila pometaria</i>) at the time.

ELC Type	Community Description
CUW1 Mineral Cultural Woodland Ecosite Total Area: 0.9 ha (0.6%)	This cultural woodland is very diverse and disturbed. There are some large White Pine, Black Cherry and Black Walnut as well as planted young conifers. Some areas are densely covered in Manitoba Maple, Choke Cherry and Riverbank Grape while others are more open with many grasses and goldenrods.
OAW Open Water Total Area: 3.9 ha (2.5%)	The open water consists of several watercourses that cross Lakeshore Road.
Constructed Areas	
CGL_2 Parkland Total Area: 10.8 ha (7.1%)	Several city parks in the study area are dominated by lawn, but have small disturbed areas of cultural woodland, thicket and meadow.
CVC Commercial and Industrial Total Area: 10.7 ha (7.0%)	The area around downtown Bronte is particularly developed with numerous commercial buildings.
CVI_1 Transportation Total Area: 14.6 ha (9.6%)	The entire study area contains a dense network of city streets.
CVI_3 Sewage and Water Treatment Total Area: 0.9 ha (0.6%)	The Oakville Southwest Wastewater Treatment Plant is partially located within the study area.
CVR / CVC Residential / Commercial and Industrial Total Area: 1.7 ha (1.1%)	The area around downtown Bronte is particularly developed with numerous commercial and residential buildings.
CVR_1 Low Density Residential Total Area: 89.4 ha (58.8%)	Most of the study area is dominated by detached homes and the associated lawns, gardens and driveways.
CVR_2 High Density Residential Total Area: 6.4 ha (4.2%)	Around downtown Bronte there are several high-rise residential buildings.
CVS_1 Education Total Area: 7.0 ha (4.6%)	There are several schools within the study area.



LEGEND

Approximate Study Area

— Watercourse

Ecological Land Classification

- CGL_2, Parkland
- CVI_1, Transportation
- CVR / CVC, Residential / Commercial and Industrial
- CVC, Commercial and Industrial
- CVR_1, Low Density Residential
- CVR_2, High Density Residential
- OAW, Open Water

KEY MAP

NOTES:

- Aerial Imagery extracted from Google Earth, date is 2016.

Datum & Projection:
NAD 1983 UTM Zone 17N

TOWN OF OAKVILLE
LAKESHORE ROAD WEST IMPROVEMENTS

Ecological Land Classification

PROJECT N°: TPB166147	FIGURE: 3-2, Map1
SCALE: 1:3,500	DATE: June 2017

P:\2016\Projects - Other\TPB166147 - Oakville - Lakeshore Rd W\11 GIS\MXD\ELC - Communities_1.mxd



LEGEND

Approximate Study Area

Ecological Land Classification

- CGL_2, Parkland
- CVI_1, Transportation
- CVC, Commercial and Industrial
- CVR_1, Low Density Residential
- CVR_2, High Density Residential

KEY MAP

NOTES:
- Aerial Imagery extracted from Google Earth, date is 2016.

Datum & Projection:
NAD 1983 UTM Zone 17N


OAKVILLE

**TOWN OF OAKVILLE
LAKESHORE ROAD WEST IMPROVEMENTS**

Ecological Land Classification

PROJECT N°: TPB166147

SCALE: 1:3,500

FIGURE: 3-2, Map 2

DATE: June 2017

P:\2016\Projects - Client\TPB166147 - Oakville - Lakeshore Rd W11 - GIS\MXD\ELC - Communities 1.mxd



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LEGEND

- Approximate Study Area
- Watercourse

Ecological Land Classification

- CGL_2, Parkland
- CUW1, Mineral Cultural Woodland Ecosite
- CVI_1, Transportation
- CVI_3, Sewage and Water Treatment
- CVR_1, Low Density Residential
- FOD5-2, Dry - Fresh Sugar Maple - Beech Deciduous Forest Type
- OAW, Open Water

KEY MAP



NOTES:
- Aerial Imagery extracted from Google Earth, date is 2016.

Datum & Projection:
NAD 1983 UTM Zone 17N



TOWN OF OAKVILLE
LAKESHORE ROAD WEST IMPROVEMENTS

Ecological Land Classification

PROJECT N°: TPB166147

FIGURE: 3-2, Map 3

SCALE: 1:3,500

DATE: June 2017



LEGEND

Approximate Study Area

Watercourse

Ecological Land Classification

CVI_1, Transportation

CVR_1, Low Density Residential

CVS_1, Education

FOD7, Fresh - Moist Lowland Deciduous Forest Ecosite

FOD7-4, Fresh - Moist Black Walnut Lowland Deciduous Forest Type

KEY MAP

NOTES:
- Aerial Imagery extracted from Google Earth, date is 2016.

Datum & Projection:
NAD 1983 UTM Zone 17N

OAKVILLE

TOWN OF OAKVILLE
LAKESHORE ROAD WEST IMPROVEMENTS

Ecological Land Classification

PROJECT N°: TPB166147

FIGURE: 3-2, Map 4

SCALE: 1:3,500

DATE: June 2017

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LEGEND

Approximate Study Area

— Watercourse

Ecological Land Classification

CGL_2, Parkland

CVI_1, Transportation

CVR_1, Low Density Residential

CVS_1, Education

0 100 200 300 400 500 Metres



NOTES:

- Aerial Imagery extracted from Google Earth, date is 2016.

TOWN OF OAKVILLE

LAKESHORE ROAD WEST IMPROVEMENTS

Ecological Land Classification

PROJECT N°: TPB166147

SCALE: 1:3,500

FIGURE: 3-2, Map 5

DATE: June 2017

3.2.2 Wildlife

3.2.2.1 Birds

Fifty-seven (57) species were identified within the Project study area during the Amec Foster Wheeler breeding bird point count survey, of which 51 were not documented through the secondary source review (Appendix C). All species recorded during the Amec Foster Wheeler field investigations are considered common, except for six SAR/rare species, including Barn Swallow, Chimney Swift, Eastern Wood-Pewee, Peregrine Falcon, Canada Warbler, and Red-necked Grebe (see Section 3.2.4). The results of the breeding bird survey data are provided in Appendix E.

The most commonly recorded birds included Common Grackle, House Sparrow, European Starling, American Robin, and Chimney Swift, which represented 41% of all birds recorded. These species are typical of urban settings and anthropogenically influenced natural areas.

Watercourse culverts and bridges were inspected and no Barn Swallow nests were observed inside culverts which are common locations for nesting. Cliff Swallows were observed ingressing and egressing from the Bronte Creek Bridge during aquatic site investigations; however, no nests were observed on the structure. Correspondence with the Town of Oakville confirmed Cliff Swallow nests are present beneath the Bronte Creek Bridge (Town of Oakville pers. comm., 2017). While this species is not listed as 'at risk' provincially or federally, it is protected under the *Migratory Bird Convention Act, 1997* (MBCA). In order to minimize the potential for incidental take of nesting migratory birds, any proposed bridge rehabilitation works planned for the Bronte Creek Bridge should be undertaken outside of the active breeding season. Further details on construction timing windows are provided in Section 5.0.

Several of the species observed during the surveys are likely migrants that were commuting through the area, these species include Canada Warbler, Blackburnian Warbler, Blackpoll Warbler, Black-throated Green Warbler, Magnolia Warbler, Tennessee Warbler, and Northern Parula. Ring-billed Gull and Double-crested Cormorant were also observed during the field investigations, but are unlikely to nest within the area and are more likely commuting from breeding colonies in Hamilton Harbour and/or Leslie Street Spit in Toronto.

3.2.2.2 Mammals

In total, 41 species of mammals were documented as potentially occurring within the natural heritage blocks which encompass the Project study area (see Section 3.1.3.2). Of the 41 species, only one was observed during field surveys, an Eastern Gray Squirrel (*Sciurus carolinensis*) and urban tolerant species, was observed during site investigations. Field investigations were only conducted from the ROW and evidence of other species utilizing more natural areas beyond the ROW could not be observed. The majority of other potentially occurring species are small such as mice, voles and shrews, or nocturnal such as flying squirrels and bats. These species are difficult to detect using standard, non-invasive methods.

3.2.2.3 Reptiles and Amphibians

A review of the ORAA map indicated 12 species of reptiles and 14 species of amphibians which have been observed within the natural heritage block encompassing the study area (see Section 3.1.3.3). No reptile or amphibian species were observed during Amec Foster Wheeler field investigations. A scarcity of fallen woody debris, wetlands, and ponds within the Project study area indicate that there is limited potential habitat for feeding and nesting of reptiles and amphibians. As evidence of species utilizing more natural areas within the Project study area could not be observed from the ROW, the findings do not suggest that reptiles or amphibians are absent within the Project study area, but instead suggests these species are likely limited or isolated to marginal habitats in the area.

3.2.2.4 Invertebrates

An atlas for species in the *Insecta* class has not been published and therefore, it is difficult to reference how many species of butterflies, moths, and dragonflies inhabit the project study area. During field investigations, five invertebrates were observed within the Project study area including Cabbage White, Orange Sulphur, Clouded Sulphur, Hobomok Skipper, and Monarch Butterfly (see Section 3.2.4.5). These species may be utilizing the limited habitat in ditches or small plots of undeveloped land within the Project study area for feeding and/or egg laying.

3.2.3 Species at Risk (Endangered and Threatened)

Species identified through secondary source review and from field investigations were synthesized in Table 3-2 for the purpose of identifying potential/confirmed occurrence of endangered and threatened SAR within the Project study area. Special concern and provincially rare species are discussed in the context of significant wildlife habitat (Section 3.2.4.2). The probabilities provided in Table 3-2 are based on an assessment of each species' habitat preferences/needs in conjunction with existing conditions observed during 2017 field investigations and background information. Additional SAR may come into the area or species already occurring in the area may be up-listed at any time. For this reason, ongoing communication with the MNR is strongly recommended to ensure compliance with the ESA. The probabilities of occurrence are defined as 'High', 'Moderate', 'Low', and 'None' and are based on the following definitions:

- **High:** Those species recorded in the vicinity of the project (typically within 10 km and recorded in the past 20 years) and whose preferred habitat is abundant within the Project study area. Species with high probability of occurrence would be expected to breed within or frequently use the habitats available within the Project study area and would be known to have a high relative abundance within the region (i.e., compared to other regions in Ontario).
- **Moderate:** Those species in the vicinity of the project, but have limited suitable habitat within the Project study area. Species with moderate probabilities of occurrence may not occur within the Project study area frequently, but may intermittently use it for foraging, migration or movement to other parts of their home-range.

- **Low:** Those species recorded in the vicinity of the Project study area, but whose preferred habitat does not occur or is extremely limited within the study area. These species may intermittently move through the study area, but are unlikely to become permanent residents.
- **None:** Those species whose preferred habitat is completely absent from the Project study and may only migrate intermittently through the Project study area.

Table 3-2: Records of Endangered and Threatened Species at Risk within the Vicinity of the Study Area and Probability of Occurrence

Species Name, Status (SARA, ESA, S-Rank) ^{1,2,3} and Data Source ⁴	Preferred Habitat	Potential SAR Habitat/Occurrence on Project site
SAR Birds		
Bank Swallow (<i>Riparia riparia</i>) SARA: No Status ⁵ ESA: Threatened S-Rank: S4B Source: ABBO (2001-2005)	Bank swallows nest in burrows in natural and human-made settings where there are vertical faces in silt and sand deposits. Many nests are on banks of rivers and lakes, but they are also found in active sand and gravel pits or former ones where the banks remain suitable (COSEWIC 2013a).	Low – No vertical faces suitable for Bank Swallow nesting are present within the Project study area.
Barn Swallow (<i>Hirundo rustica</i>) SARA: No Status ⁵ ESA: Threatened S-Rank: S4B Source: ABBO (2001-2005)	Often found feeding in a range of open habitats including fields, marshes, meadows, and ponds. They primarily use man-made structures such as building, bridges, and culverts for nesting (COSEWIC, 2011a).	Moderate – Human-made structures suitable for nesting are present, but no evidence of nesting was observed during the site surveys.
Bobolink (<i>Dolichonyx oryzivorus</i>) SARA: No Status ⁵ ESA: Threatened S-Rank: S4B Source: ABBO (2001-2005), NHIC (2003)	Bobolink nest primarily in forage crops, hayfields and associated pastures. Bobolink also occur in wet prairie, graminoid peatlands and abandoned fields dominated by tall grasses, no-till cropland, small-grain fields, reed beds and irrigated fields in arid regions. The species does not generally occupy fields of row crops such as corn, soybean and wheat, pastures in valleys which high shrub density or intensively grazed pastures (COSEWIC 2010a).	Low – There are few areas of marginally suitable habitat available within the study area. Areas of potential habitat are limited to small plots of undeveloped land located adjacent to the road ROW and to residential/commercial areas. Bobolink tend to avoid edge habitat and it is unlikely that these areas would provide suitable nesting habitat for the species.
Chimney Swift (<i>Chaetura pelagica</i>) SARA: Threatened ESA: Threatened S-Rank: S4B, S4N Source: ABBO (2001-2005)	Mainly associated with areas where the birds can find chimneys to use as nesting and resting sites; however, it is likely that a small portion of the population continues to use hollow trees. (COSEWIC 2007a).	Moderate – Chimney Swift were observed on site during Amec Foster Wheeler surveys. Nesting areas are limited within the project area, but some suitable chimneys are evident which may provide habitat for nesting.

Species Name, Status (SARA, ESA, S-Rank) ^{1,2,3} , and Data Source ⁴	Preferred Habitat	Potential SAR Habitat/Occurrence on Project site
Eastern Meadowlark (<i>Sturnella magna</i>) SARA: No Status⁵ ESA: Threatened S-Rank: S4B Source: ABBO (2001-2005), NHIC (2003)	Prefers grassland habitats, including native prairies and savannahs, as well as non-native pastures, hayfields, weedy meadows, herbaceous fencerows and airfields. Moderately area-sensitive preferring larger tracts of grasslands over smaller fragments; the minimum area required is estimated at 5 ha (COSEWIC 2011b).	Low - There are few areas of marginally suitable habitat available within the study area. Areas of potential habitat are limited to small plots of undeveloped land located adjacent to the road ROW and to residential/commercial areas. Bobolink tend to avoid edge habitat and it is unlikely that these areas would provide suitable nesting habitat for the species.
Eastern Whip-poor-will (<i>Antrostomus vociferous</i>) SARA: Threatened ESA: Threatened S-Rank: S4B Source: ABBO (2001-2005)	An obligate forest breeding bird dependent on open, dry deciduous or mixed forests with little or no underbrush forest. Shade, proximity to open areas for foraging, and fairly sparse ground cover are key elements of habitat chosen. Open habitats such as open wetlands with perches, regenerating forest edges and shrubby pastures for used for foraging (COSEWIC 2009).	Low – Suitable breeding habitat is not present on Site. Potential migrant through the area.
SAR Herpetiles		
Eastern hog-nosed snake (<i>Heteron platirhinos</i>) SARA: Threatened ESA: Threatened S-Rank: S3? Source: ORA 2017	This species inhabits fields, forests, shrubland, beaches and old dune habitats. This species is generally found in habitats with sandy, well-drained soils, into which this snake burrows. It is commonly encountered on beaches due to its affinity for open, sandy areas (Ontario Nature, 2017).	Low –The beaches of Lake Ontario as well as small undeveloped plots between residential and commercial areas provide limited habitat for this species.
Jefferson/Blue-Spotted Salamander Complex (<i>Ambystoma jeffersonianum/laterale</i>) SARA: Endangered ESA: Endangered S-Rank: S3? Source: Ontario Nature (2013)	Given Jefferson/Blue-spotted Salamander expresses Jefferson Salamander dominant alleles, this species is protected under SARA and the ESA. Throughout their range, Jefferson Salamanders are found within deciduous or mixed upland forests containing, or adjacent to, suitable breeding ponds. Breeding ponds are normally ephemeral, or vernal woodland pools that dry in late summer. Terrestrial habitat is mature woodlands (COSEWIC 2010b).	Low – Jefferson/Blue-spotted Salamander have been recorded in Petro-Canada Park, located to the north of the project area in the vicinity of the Rebecca Street Bridge at Bronte Creek. There is some likelihood that Jefferson Salamander dominant individuals could be present. Suitable habitat may be present on site, as vernal pools may be evident outside of areas that were studied. Suitable upland habitat is present.
SAR Mammals		
Eastern Small-footed Myotis (<i>Myotis leibii</i>) SARA: Not at Risk ESA: Endangered S-Rank: S2S3 Source: AMO (1994)	While some are found in caves/mines of eastern North America, they generally roost on the ground under rocks and in crevices, as well as hollow trees, in buildings and under tree bark (MNR, 2017c). Caves and mines are wintering habitat. Similar habitat requirements as other Myotis species.	Moderate – Potential maternal roost habitat is present in limited areas of woodland habitat on site.

Species Name, Status (SARA, ESA, S-Rank) ^{1,2,3} , and Data Source ⁴	Preferred Habitat	Potential SAR Habitat/Occurrence on Project site
Little Brown Myotis (<i>Myotis lucifugus</i>) SARA: Endangered ESA: Endangered S-Rank: S4 Source: AMO (1994)	Roosts in tree cavity, including small spaces or crevices found in loose bark, hollow trees, rock faces and human structures such as attics, walls and bat boxes. Hibernates in caves and abandoned mines during the winter months. Typically forages over water (COSEWIC 2013b).	Moderate – Potential maternal roost habitat is present in limited areas of woodland habitat on site. Lake Ontario would provide an abundant foraging opportunity for this species.
Northern Myotis (<i>Myotis septentrionalis</i>) SARA: Endangered ESA: Endangered S-Rank: S3 Source: AMO (1994)	Roosts in tree cavity, including small spaces or crevices found in loose bark, hollow trees, rock faces and human structures such as attics, walls and bat boxes. Hibernates in caves and abandoned mines during the winter months. Typically forages over water (COSEWIC 2013b).	Moderate – Potential maternal roost habitat is present in limited areas of woodland habitat on site. Lake Ontario would provide an abundant foraging opportunity for this species.
Tri-colored Bat (<i>Perimyotis subflavus</i>) SARA: Endangered ESA: Endangered S-Rank: S3? Source: AMO (1994)	Within treed habitats, Tri-colored Bat primarily roosts in tree foliage (mainly within oak leaves). Leaf roosts are shaped like umbrellas with a "roof" and a hollow core where bats rest. Studies have shown that oak leaves are a preferred roost site. Maple leaves are also selected, although less commonly. It is thought that Tri-colored Bat may prefer roost trees in more open woodlands, as opposed to deep woods. Roosts in tree cavity are used less frequently than Myotis species (BCI 2017; COSEWIC 2013b).	Moderate – Potential maternal roost habitat is present in limited areas of woodland habitat on site. Lake Ontario would provide an abundant foraging opportunity for this species.
SAR Plants		
Butternut (<i>Juglans cinerea</i>) SARA: Endangered ESA: Endangered S-Rank: S3? Source: Stantec 2013; Amec Foster Wheeler 2017	Butternut usually grows alone or in small groups in deciduous forests. It prefers moist, well-drained soil and is often found along streams. It is also found on well-drained gravel sites and rarely on dry rocky soil. This species does not do well in the shade, and often grows in sunny openings and near forest edges (COSEWIC, 2003).	Moderate – Butternut Walnut or a Butternut/Walnut hybrid was found on site through field investigations. It is possible that additional individuals, which were not visible from the ROW, are present within the study area. Further investigations should be completed during the detail design phase of the Project to confirm the presence of the species.
Kentucky Coffee-tree (<i>Gymnocladus dioica</i>) SARA: Threatened ESA: Threatened S-Rank: S3? Source: Town of Oakville, 2017	A Carolinian species which inhabits open areas of floodplains and edges of wetlands. Grows in areas with warm climates and a long growing season (SARA 2000).	High – This is a Carolinian species which is not likely to be found naturally growing within this area. While individuals were found growing in the Project study area, these individuals have likely been planted.

¹ Species At Risk Act, 2002 (SARA).

² Endangered Species Act, 2007 (ESA).

³ S1 - Extremely rare throughout its range in the province; S2 - Rare throughout its range in the province; S3 - Uncommon or vulnerable species; S4 - Apparently Secure Species; S5 - Secure Species; SX - Extirpated; B - Breeding; N - Non-breeding; ? - Uncertainty

3.2.3.1 Birds

Of the avian SAR / provincially rare species potentially present within the vicinity of the study area (see Section 3.1.3.2), two species were reported during the Amec Foster Wheeler field investigations – Barn Swallow and Chimney Swift. All other SAR birds documented through the secondary source review have a low probability of occurrence due to a lack of suitable habitat in the Project study area. The critical habitat and rationale for Barn Swallow and Chimney Swift are discussed below.

Barn Swallow

Before European settlement in Ontario, Barn Swallows nested mostly in caves, holes, crevices and ledges in cliff faces (COSEWIC 2011a). Although Barn Swallows continue to nest in traditional natural habitats, they are now most closely associated with human structures in rural areas. Such nesting sites include a variety of artificial structures that provide either a horizontal nesting surface (e.g., a ledge) or a vertical face, often with some sort of overhang that provides shelter (COSEWIC 2011a). Nests are most commonly located in and around open barns, garages, sheds, boat houses, bridges and road culverts, and are situated on such surfaces as beams and posts, light fixtures, and ledges over windows and doors (COSEWIC 2011a). Because Barn Swallow nests are constructed of mud pellets, Barn Swallows require nest sites that have a source of nearby mud, which makes bridges and large culverts ideal sites for nesting (COSEWIC 2011a). Barn Swallows typically select foraging sites close to open habitats such as farmlands of various descriptions, wetlands, road rights-of-way and large forest clearings (COSEWIC 2011a). Barn Swallow are listed as Threatened provincially and are therefore protected under the ESA. Barn Swallows are listed federally as Threatened by COSEWIC but are not designated under SARA.

The Breeding Bird Atlas indicated records of Barn Swallow in the vicinity of the Study Area and Barn Swallow were observed on site through investigations. The Project study area provides suitable open foraging habitat for the Barn Swallow, with cleared ROW, as well as bridges and culverts suitable for nesting. As such, there is potential for Barn Swallows to be utilising the site to carry out life processes.

Chimney Swift

As the Chimney Swift spends most of the day foraging for insects on the wing, associating this species with a single type of habitat is difficult, but its presence in any given area is largely dependent upon the availability of suitable nesting sites and the abundance of insects (COSEWIC 2007a). Before the arrival of European settlers, the Chimney Swift was associated with old growth forests where they nested and roosted in large hollow trees (greater than 50 cm diameter at breast height; COSEWIC 2007a). As the availability of hollow trees declined with settlement and logging activities, the swifts adapted to nest in chimneys. As a result, the aptly named Chimney Swift is now primarily associated with urban and rural areas where chimney structures are available for nesting and roosting (COSEWIC 2007a). In addition to chimneys, Chimney Swifts have been documented to nest and roost in air shafts, silos, wells, barns and abandoned buildings

(COSEWIC 2007a). Nesting sites are difficult to locate due to the secretive behaviour of the swifts as they approach the nest, though roosts are easier to identify due to the larger number of birds involved (COSEWIC 2007a). Swifts are often commonly associated with bodies of water due to the higher abundance of insects, especially wetlands (COSEWIC 2007a). Studies indicate that most roosting sites are located within 1 km of a body of water (COSEWIC 2007a). Chimney Swift are listed provincially as Threatened and are therefore protected under the ESA. Chimney Swift are also designated federally as Threatened under SARA.

During biological inventories, a total of 27 Chimney Swifts were observed within the Study Area (station 2, 3, 4 and 14; Appendix B). Old growth forests were absent from the Study Area, as were large hollow trees and only a limited number of chimneys were evident that could provide nesting and/or roosting habitat for the species. The Town of Oakville stated that numerous Chimney Swift nesting areas are evident, including one nest at the Walton Memorial United Church, located slightly east of Bronte Creek (Town of Oakville pers. comm. 2017). These areas have been noted, however, the proposed activities will not impact this building or impact this species.

3.2.3.2 Mammals

Through a review of the mammal atlases available online, the Bat Conservation International (BCI, 2013) database and available range maps, it was determined that four bat SAR have a low to moderate potential to exist within the project area, including Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, and Tri-coloured Bat. Habitat suitable for bat maternity roosting may be present within the Project study area. Further details regarding the suitability of the habitat on site for bats is included below.

Little Brown Myotis

Little Brown Myotis are cavity roosting bat species that hibernate in Ontario. The Little Brown Myotis was listed as Endangered in February 2012 by Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and was subsequently listed as Endangered in October 2012 by Committee on the Status of Species at Risk in Ontario (COSSARO) thereby receiving protection as a SAR under the Endangered Species Act. Little Brown Myotis feed over open bodies of water, the margins of waterbodies and forests, in clearings and along open forest roads (COSEWIC, 2013b).

Northern Myotis

Northern Myotis are cavity roosting bat species that hibernate in Ontario. Similar to Little Brown Myotis, Northern Myotis was listed as Endangered in February 2012 by COSEWIC. This species was listed as Endangered in October 2012 by COSSARO thereby receiving protection as a SAR under the Endangered Species Act. Northern Myotis is a generalist in terms of foraging habitat and show no preference for over water versus over land sites, edge versus non-edge sides, areas with versus without canopy enclosures, or urban versus rural environments (COSEWIC, 2013b). Potential maternal roost habitat is present in limited areas of woodland habitat on site. Lake Ontario would provide an abundant foraging opportunity for this species.

Eastern Small-footed Myotis

While some are found in caves/mines of eastern North America, they generally roost on the ground under rocks and in crevices, as well as hollow trees, in buildings and under tree bark (MNR, 2011). Caves and mines are wintering habitat. Similar habitat requirements as other Myotis species. Potential maternal roost habitat is present in limited areas of woodland habitat on site.

Little Brown Myotis

Roosts in tree cavity, including small spaces or crevices found in loose bark, hollow trees, rock faces and human structures such as attics, walls and bat boxes. Hibernates in caves and abandoned mines during the winter months. Typically forages over water (COSEWIC, 2013b). Potential maternal roost habitat is present in limited areas of woodland habitat on site. Lake Ontario would provide an abundant foraging opportunity for this species.

Tri-coloured Bat

Within treed habitats, Tri-colored Bat primarily roosts in tree foliage (mainly within oak leaves). Leaf roosts are shaped like umbrellas with a "roof" and a hollow core where bats rest. Studies have shown that oak leaves are a preferred roost site. Maple leaves are also selected, although less commonly. It is thought that Tri-colored Bat may prefer roost trees in more open woodlands, as opposed to deep woods. Roosts in tree cavity are used less frequently than Myotis species (BCI 2017; COSEWIC, 2013b). Potential maternal roost habitat is present in limited areas of woodland habitat on site. Lake Ontario would provide an abundant foraging opportunity for this species.

3.2.3.3 Reptiles and Amphibians

Review of ORAA species list for the natural heritage square encompassing the study area indicated the potential presence of Jefferson Salamander/Blue-spotted Salamander hybrids in the vicinity of the project area. These species all have a low probability of occurrence due to a notable lack of suitable habitat in the Project study area.

3.2.3.4 Plants

MNRF correspondence indicated the potential for Butternut (*Juglans cinerea*) in the vicinity of the project site. The Town of Oakville online forestry database further indicated the potential presence of Butternut and Kentucky Coffee-tree (*Gymnocladus dioica*) within the study area near the Lakeshore Road ROW. Amec Foster Wheeler field investigations concluded that four Kentucky Coffee-tree and potentially one Butternut or Walnut/Hybrid species are located within the Project study area (see Figure 3-1 for location details). During the detail design phase, further studies will be completed to determine the potential impacts of works to these species within the ROW. MNRF and Conservation Halton will be contacted for further guidance on protection measures and permitting requirements.

Butternut

This species is typically found growing in riparian habitats, but is also found on rich, moist, well-drained loams, and well-drained gravels, especially those of limestone origin. Within its Canadian range, butternut is widespread, primarily found as a minor component of hardwood stands, but also occurring as extensive pure stands on flood plains (COSEWIC, 2003).

Through vegetation surveys conducted within the study area, one potentially Butternut or Butternut/Walnut hybrid species was observed in the vicinity of the ROW. Further studies and potential genetic testing may be required during the future detail design phase of the project, to determine the status of the tree and MNRF will be solicited for information related to permitting requirements should the tree be impacted or removed through the proposed works. No other Butternut trees were observed in the vicinity of the road ROW.

The majority of improvements proposed for the Lakeshore Road West corridor will take place within the existing ROW. Furthermore, there is limited potential for this species to be naturally growing within the woodland habitats found on site, as the soil composition and tree stand composition are not in keeping with the preferred habitat of this species. During detailed design, once property requirements are determined, the potential for harm or removal of Butternut trees will be further assessed.

Kentucky Coffee-tree

This is a Carolinian species which grows in parts of southern Ontario exhibiting warmer climates and a long growing season. The Kentucky Coffee-tree inhabits open areas of floodplains and the edges of wetlands and is shade-intolerant (SARA, 2000).

Several Kentucky Coffee-tree individuals were observed during vegetation field studies. These species were found within the Lakeshore Road ROW and have likely been planted by the Town of Oakville. Given that these trees are not cultivated from wild stock, they do not receive habitat or species protection, as underlined in subsection 12 (1) of the ESA. The MNRF should be solicited during the detail design phase to ascertain whether genetic testing of the individuals on site is required to determine cultivar status and permitting requirements that may be needed.

3.2.3.5 Invertebrates

Monarch Butterfly (provincially listed as a species of special concern) was observed in the project area during site surveys. This species may be utilizing the limited habitat in ditches or small plots of undeveloped land within the study area for feeding and or egg laying. It is likely that this species was passing through the area on route to other more suitable habitat (see Section 3.2.4.5).

3.2.3.6 Fishes

Through correspondence, MNRF indicated that Bronte Creek provides occupied habitat for American Eel and Silver Shiner and that Fourteen Mile Creek provides occupied habitat for

Redside Dace. Further communications with the Aurora District MNRF and Conservation Halton are underway to determine appropriate measures and permitting requirements required to protect these features. Further information pertaining to aquatic SAR can be found within Amec Foster Wheeler's (2017) *Aquatic Habitat Existing Conditions Report*.

3.2.4 Significant Natural Heritage Features

3.2.4.1 Significant Woodlands

The Halton Region official plan indicates that significant woodlands are those woodlands reach 2 ha in size or greater. Accordingly, two significant woodlands are found within the project area: a Dry-Fresh Sugar Maple – Beech Deciduous Forest (FOD5-2) is approximately 2.1 hectares (ha) in size and is located in the vicinity of Town of Oakville sewage and water treatment plant; and a 2.1 ha Fresh-Moist Black Walnut Lowland Deciduous Forest Type (FOD4-7) in the valley lands of Fourteen Mile Creek.

3.2.4.2 Significant Wildlife Habitat

3.2.4.3 Seasonal Concentration Areas

Seasonal concentration areas are those habitats where large numbers of a single species or many species congregate at one (or several) times a year. The SWH Criterion Schedules for Ecoregion 7E outlines 14 wildlife habitats meeting the criteria for seasonal concentration areas of Animals. Based on habitats and ecosites documented during field investigations, three candidate SWH are present within the Project study area, including bat maternity colonies, turtle wintering areas, and landbird migratory stopover areas.

The locations and site characteristics of bat maternal colony habitats are poorly known (OMNR, 2009). In Ontario, bats use two strategies for roosting during the day. Most species roost in small spaces or crevices found in loose bark, hollow trees, rock faces and human structures such as attics, walls and bat boxes and colony numbers may range from a few to hundreds of individuals (OMNR, 2011a). During the summer, females often roost in large maternity colonies while males tend to roost in small groups or individually (OMNR, 2011b). Other bat species roost in foliage in small groups or individually very high up in the tree canopy and as such are often difficult to detect. The presence of forest communities in the Project study area (FOD7, FOD5-2, and FOD7-4 ecosites) suggests these habitat may be present; however, given the woodland assessments were conducted from the ROW (no access was permitted), the present of potential bat maternal colonial habitat could not be ascertained.

Turtle over-wintering sites are permanent water bodies, large wetlands, and bogs or fens with adequate dissolved oxygen (OMNR, 2000). These areas may support congregations of turtles if over-wintering habitats are limited (OMNR, 2000). Two areas of open water (OAW ecosite) are present within the Project study area; one associated with Bronte Creek at the west end of the Project study area and the other a section of Lake Ontario overlapping the 120 m area surrounding the Project study area. The shorelines of Lake Ontario within the Project study area do not support

turtle overwintering habitat; however, several turtle species (Midland Painted Turtle, Snapping Turtle, and Northern Map Turtle) may overwinter in the slow moving waters of Bronte Creek.

Landbird migratory stopover areas can occur in any forest or treed swamp community (MNRF, 2000). The SWH Criterion Schedule for Ecoregion 7E defines significant landbird migratory stopover areas as forested habitats greater than 5 hectares (or 2 ha if woodlands are rare in the area) that occur within 5 km of Lake Ontario. Several woodland features meet the size criteria for landbird stopover areas within the Project study area. Although migratory bird surveys were not conducted as part of field investigations, the presence of multiple migrants birds that breed in the mixed hardwood and boreal forests in northern Ontario (i.e., Canada Warbler, Blackburnian Warbler, Blackpoll Warbler, Black-throated Green Warbler, Magnolia Warbler, Tennessee Warbler, and Northern Parula) suggests the areas may support landbird migratory bird habitat.

3.2.4.4 Rare Vegetation Communities and Specialized Habitat

Rare vegetation communities are those habitats rare in the province and/or the ecoregion. Based on the site investigations, none of the rare vegetation communities in Ecoregion 7E are present with the Project study area.

Specialized habitat for wildlife are those microhabitats that are critical to a species or several species. The SWH Criterion Schedules for Ecoregion 7E outlines eight wildlife habitats meeting the criteria for specialized habitat for wildlife. Based on habitats and ecosites documented during field investigations, two candidate SWH are present within the Project study area, including amphibian woodland breeding habitat and turtle nesting areas.

Amphibian woodland breeding habitat may occur in any forested ecosite supporting permanent and/or vernal woodland ponds. Woodlands with permanent ponds or those containing water in most years until mid-July are more likely to be used as breeding habitat. The presence of forest communities in the Project study area (FOD7, FOD5-2, and FOD7-4 ecosites) suggests this habitat may be present; however, given the woodland assessments were conducted from the ROW, the presence of potential amphibian woodland breeding habitat could not be ascertained. During detailed design, once Project details (i.e. footprint) have been determined, further field studies will be completed to confirm the presence/absence of amphibian woodland breeding habitat on site.

Turtle nesting areas must provide sand and/or gravel where turtles can dig their nests in, and are often south to south-west facing to maximize exposure to sunlight for egg incubation (OMNR, 2000). Sand and gravel beaches adjacent to shallow areas of marshes, lakes, and rivers are most frequently used (OMNR, 2000). If the turtle travels from the aquatic environment in search of a suitable nesting area, optimally, safe movement corridors will be present between the nesting and aquatic habitat (OMNR, 2000). Due to the presence of candidate turtle over-wintering sites in Bronte Creek, candidate turtle nesting areas may occur along the shorelines areas where suitable substrates for laying eggs are present. As stated above, during detailed design, further studies will be completed to assess the presence/absence of this habitat on site.

3.2.4.5 Habitat for Species of Conservation Concern

Habitat for species of conservation concern includes wildlife habitats that are fairly rare in southern Ontario and habitats for those species that are not afforded protection under the provincial ESA (e.g., special concern species, low S-ranking species). The SWH Criterion Schedules for Ecoregion 7E outlines five wildlife habitats meeting the criteria for habitat for species of conservation concern.

Twelve (12) species of conservation concern were recorded during the site investigations, identified through secondary sources, and/or were documented as potentially occurring through consultations with the MNRF, including:

- Canada Warbler
- Common Nighthawk
- Eastern Wood-Pewee
- Hooded Warbler
- Wood Thrush
- Red-Necked Grebe
- Red-headed Woodpecker
- Peregrine Falcon
- Snapping Turtle
- Northern Map Turtle
- Eastern Ribbonsnake
- Monarch Butterfly

Canada Warbler

The Canada Warbler is found in a variety of upland and wetland forest types, but it is most abundant in wet, mixed deciduous-coniferous forests with a well-developed shrub layer (COSEWIC 2008a). Nests are typically located on or near the ground on mossy logs or roots, along stream banks or on hummocks. Canada Warblers are also less commonly found in riparian shrub forests on slopes and ravines, old-growth forests with canopy openings and a high density of shrubs and in stands regenerating after disturbances (COSEWIC 2008a). The Canada Warbler is listed under the ESA as Special Concern.

Canada Warbler was not observed during the breeding bird surveys. Upland forest types are limited and fragmented. Wetland forest types are absent from the Project study area. As such, there is low potential for Canada Warbler to be utilizing elements of the study area to carry out its life history phases.

Common Nighthawk

The Common Nighthawk breeds in open habitats, such as sand dunes, beaches, recently logged areas, recently burned-over areas, forest clearings, short-grass prairies, pastures, open forests, peatbogs, marshes, lakeshores, gravel roads, river banks, rocky outcrops, rock barrens, quarries, and urban parks. The species is also present in mixed and coniferous forests, as well as in pine stands. Since the end of the 1870s, it has also used flat gravel-covered roofs in urban areas for nesting (COSEWIC 2007b).

While some areas of open-habitat exist on site in undeveloped areas, these areas are small, highly fragmented and are in close vicinity to edge habitat. As such, it is unlikely that this species is utilizing the site and impacts to this species are not anticipated.

Eastern Wood-Pewee

In Ontario, Eastern Wood-Pewee largely inhabits deciduous or mixed forests. This species is not area sensitive and will inhabit both small woodlots and large undisturbed forests. Nests are positioned near forest edges, clearings or water. This species is not known to be sensitive to fragmentation, though no studies have compared reproductive success to habitat size. This species is listed provincially under the ESA as Special Concern (COSEWIC 2012a).

Eastern Wood-Pewee were identified within the study area during field investigations. Findings from the vegetation surveys found some limited forested habitat area on site that may be suitable for breeding and nesting by this species (i.e., FOD5-2, FOD7, FOD7-4, and CUW1). As the Eastern Wood-Pewee is not area sensitive, the small fragmented forested areas may provide suitable habitat for this species.

Hooded Warbler

The Hooded Warbler typically nests in shrubs associated with small canopy-gaps within large tracts (>100 ha) of mature deciduous or mixed forests (COSEWIC 2012b). Given that large tracts of forested habitat are required to support this species, there is little/no likelihood that the study area would provide suitable habitat for this species. Forested habitat available on site is limited to small areas within residential/commercial lands and is highly fragmented. This species may migrate through the area on route to more suitable breeding grounds.

Red-headed Woodpecker

Preferred habitat of this woodpecker includes open woodlands, riparian habitat and in particular, oak savannah. Oak and American Beech are preferred foraging trees. The presence of this species largely depends on the presence of suitable foraging trees as well as an abundance of cavity trees which are used as nesting sites (SARA, 2007). The Red-headed Woodpecker is listed under the ESA as Special Concern.

During biological inventories, no Red-headed Woodpeckers were identified within the Study Area. Based on vegetation surveys, some open woodland areas are present (i.e., FOD5-2 and FOD7-4), which may provide foraging habitat for this species.

Peregrine Falcon

Peregrine Falcon nest on cliff ledges or crevices, but some will also use tall buildings and bridges near good foraging areas. Peregrine Falcons may use tall buildings for nesting and the rearing of young (COSEWIC, 2007c).

During the field surveys, one Peregrine Falcon was observed within the study area at breeding bird point count station #3 (Appendix B). Tall residential and commercial buildings are evident within the study area and may provide suitable nesting habitat for this species. This species is listed under the ESA as Special Concern.

Wood Thrush

Wood Thrush breed in mature or second growth deciduous and mixed wood forests (COSEWIC 2012d). They prefer forests with dense understory and large continuous areas of forest however they are not reliant on this. Habitat fragmentation due to human development and over grazing by White-tailed Deer are the main threats to this species (COSEWIC 2012d). Wood Thrush is listed under the ESA as Special Concern. During biological inventories, no Wood Thrush were identified within the Study Area. The forested areas on site have provide limited habitat for this species due to its sensitivity to human activity.

Red-necked Grebe

During the summer, Red-necked Grebes typically nest on large freshwater lakes, sloughs, and reservoirs. They prefer areas with stable water levels. Red-Necked Grebe typically nest in shallow waters and/or marsh habitat and require emergent vegetation to anchor their floating nests. During winter they are found predominantly on salt water, most commonly in protected bays, marshes, and coasts. However in winter they can also be found miles offshore (Bird Web, 2017).

Within the study area, this species is well documented as breeding annually in the outer Harbour near Bronte Creek. Nesting platforms have been installed to host the species, and 1-2 breeding pairs are observed with young are each year (Town of Oakville pers. comm., 2017). While this species is observed breeding in the greater vicinity of the study area, the proposed works are not anticipated to have impacts on this species.

Snapping Turtle

Snapping Turtles prefer slow-moving waters with a soft mud bottom and dense aquatic vegetation. Established populations are most often located in ponds, sloughs, shallow bays or river edges and slow streams and wetlands (COSEWIC, 2008). Individuals can persist in developed areas (e.g. golf course ponds, irrigation canals). Snapping Turtles can occur in highly polluted waterways, but environmental contamination is known to limit reproductive success (COSEWIC, 2008b). Snapping Turtle is listed under the ESA as special concern.

Bronte Marsh, located upstream of the Bronte Creek bridge and north of the study area, is known to contain juvenile and adult snapping turtles (Town of Oakville pers. comm., 2017). Given there is limited habitat present within the immediate area adjacent to the bridge, the potential for this

species to be utilizing the study to carry out life processes is low. Exclusionary fencing may be implemented to prevent entry of turtles into the active construction area if activity is noted. Further details pertaining to exclusionary fencing can be found in Section 5.0. No wetland areas are evident within the study area and the only area exhibiting a slow-moving flow and soft mud substrate is Bronte Creek, located on the westerly end of the site. The other watercourses on site (i.e. Fourteen Mile Creek, McCraney Creek and various small ephemeral drainage features) are not suitable in providing habitat to this species, as they exhibit shallow, more rapid flows and generally rockier bottom substrates.

Northern Map Turtle

Similar to the Snapping Turtle, the Northern Map Turtle prefers shallow, soft-bottomed aquatic habitats with exposed object for basking near shorelines. In the winter, this species typically hibernates on the bottom of deep, slow-moving sections of rivers or lakes (COSEWIC, 2012c). Northern Map Turtle is listed under the ESA as special concern.

No wetland areas are evident within the study area and the only area exhibiting a suitable flows and substrate for this species is Bronte Creek, located on the westerly end of the site. The other watercourses on site (i.e. Fourteen Mile Creek, McCraney Creek and various small ephemeral drainage features) are not suitable in providing habitat to this species, as they exhibit shallow, more rapid flows and generally rockier bottom substrates. As such, the potential for this species to be utilizing the site to carry out life processes is low.

Eastern Ribbonsnake

The Eastern Ribbonsnake is semi-aquatic. This species is most frequently found along wetland edges and prefers quiet areas with shallow water and low surrounding cover. Exposed areas for basking are also required. Female typically nest in upland areas (Ontario Nature 2017). This species is listed as special concern under the ESA.

There are no wetland areas evident within the Project study area and as such, the probability that this species is utilizing the site to carry out its life history phases is low. Impacts to this species resulting from the proposed project works are not anticipated.

Monarch Butterfly

Monarch is very widely distributed across North America and found in a wide variety of habitats. Populations fluctuate dramatically, but have been generally declining likely due to habitat destruction on the hibernation grounds in Mexico, as well as pesticide use and other factors on the vast breeding grounds. Monarchs require Milkweeds (*Asclepias*) to lay their eggs, and will use a variety of other flowers for adult food (COSEWIC, 2010b). This species is listed as special concern under the ESA.

This species may be utilizing the limited habitat in ditches or small plots of undeveloped land within the study area for feeding and or egg laying. It is likely that this species was passing through the area on route to other more suitable habitat.

3.2.4.6 Animal Movement Corridors

Animal movement corridors are habitats that link two or more wildlife habitats that are critical to the maintenance of a population of a particular species or group of species (particularly in highly fragmented landscapes; OMNR, 2000). These corridor habitats serve a key ecological function to enable wildlife to move between areas of significant wildlife habitat or core natural areas with a minimum of mortality (OMNR, 2000; OMNR, 2015). Animal movement corridors are elongated, naturally vegetated parts of the landscape used by animals to move from one habitat to another (OMNR, 2000). These corridors may include valleylands, dense vegetated riparian buffer areas, and hedgerows, and are potentially used by a variety of wildlife species including migratory and breeding birds, reptiles, and amphibians. The SWH Criterion Schedules for Ecoregion 7E outlines three wildlife habitats meeting the criteria for animal movement corridor habitat.

Based on a review of ecosites and wildlife present, only the amphibian movement corridor habitat is considered potentially present in the Project study area. These areas are associated with the woodland communities surrounding Fourteen Mile Creek and McCraney Creek due to the presence of candidate amphibian breeding habitats in these woodland features.

The Project study area is likely a part of a major migratory pathway and several other SAR, including Bald Eagle, Bank Swallow, Bobolink, Cerulean Warbler, Common Nighthawk, Eastern Meadowlark, Eastern Whip-poor-will, Golden-winged Warbler, Grasshopper Sparrow, Hooded Warbler, Louisiana Waterthrush, Olive-sided Flycatcher, Red-headed Woodpecker, Short-eared Owl, and Wood Thrush would be likely to move through this area on route to spring/summer habitat.

3.3 Summary of Existing Conditions

The study area is characterized by large amounts of cultural land use and fragmentation. Approximately 93.1% of the study area includes these anthropogenic and cultural habitats and land uses in the form of residential, industrial and commercial lands and cultural vegetation communities. The majority of existing naturalized areas are associated with the watercourses throughout the Project study area. Many non-native species were found within these naturalized areas. Wildlife found to occur in the vicinity of the Project area from the secondary source review, as well as those observed on site during field investigations were found to be those that are tolerant of urbanized environments (i.e. Raccoon, Skunk) and includes several SAR which were observed or have a high likelihood of occurring in the area.

Only those features immediately adjacent to Mississauga Road have potential to be directly impacted by project works. The Lower Bronte Creek Wetland Complex is located approximately 170 m north of the Bronte Creek Bridge on Lakeshore Road West (not shown in Figure 3-1) and is not anticipated to be impacted by the project works. Several urbanized parks (Riverview Park,

Bronte Athletic Park and Coronation Park), as well as fragmented areas of woodland/forest near the watercourses on site are also present within the Project study area. These parklands and fragments of forest/cultural woodland near the watercourses and are a relatively significant feature in context of the project area landscape, given that the area is characterized by a high degree of disturbance and development. Although the high disturbance and habitat fragmentation suggests limited functionality of these lands, several candidate SWH has been identified in the Project study area, including:

- Bat maternity colonies;
- Turtle wintering areas;
- Landbird migratory stopover areas;
- Amphibian woodland breeding habitat;
- Turtle nesting areas;
- Special concern and rare wildlife species habitats; and
- Amphibian movement corridor habitat.

Confirmation of habitat use within these SWH should be conducted at the detailed design stage of the Project to support the effects assessment and the development of environmental protection measures consistent with the municipal, regional, and provincial regulations.

4.0 PRELIMINARY IMPACT ASSESSMENT

The proposed improvements of the Project are expected to have minimal long term impact on the natural environment due to the current existing ROW and traffic in the area; however, there is potential for direct and indirect effects on the terrestrial environment during construction activities. These impacts may be associated with disturbance to significant natural features (i.e., woodlands, wetland, and wildlife habitat) and flora and fauna populations. The potential impacts specific to the candidate and known natural heritage features present within the Project study area may include:

- Loss of natural and cultural vegetation along exiting ROW and potential ROW expansion areas;
- Loss of pervious surfaces leading to increased runoff;
- Disturbance, damage, or harm to wildlife species protected under the MBCA, the FWCA, and/or the ESA;
- Potential Project encroachment on woodland features resulting in potential impacts to woodland dwelling species and land bird stopover areas;
- Loss and disturbance to bat maternity colonies through destruction and/or noise disturbance in forested habitats/treed areas within and adjacent to the ROW;
- Increased human presence near bat maternal roost sites may cause females to drop young for their protection or abandon young altogether if stressed;
- Potential encroachment of the road ROW into areas of the Project study area that may support turtle nesting;
- Potential increased noise and light disturbance to wildlife adjacent to the ROW;
- Potential increased dust generation and deposition on vegetation resulting in effects on photosynthesis, respiration, and transpiration;
- Potential increase in invasive species colonization within disturbed areas;
- Increased road mortality on birds, turtles, and amphibian associated with construction vehicles, increased road width, and increased traffic flows;
- Potential loss of amphibian breeding habitat adjacent to the ROW. Impacts may also include increased sedimentation; and
- Potential for direct loss of habitat for species of conservation concern. The footprint of the road along with associated shoulders, banks, and ditches will result in loss of habitat. Indirect loss of habitat may occur through changes in hydrology, introduction of non-native plant species, introduction of sediments and other contaminants, and salt spray and runoff.

The potential Project impacts discussed above should be further evaluated during the detailed design stage for the Project. The intent of this preliminary effects assessment is to only provide considerations for further effects evaluation based on significant natural features present within the Project study area, environmental consideration relative to road widening projects, and regulatory considerations for wildlife protected under various federal and provincial legislation.

5.0 PRELIMINARY ENVIRONMENTAL MITIGATION MEASURES

The following sections have been prepared to provide preliminary mitigation measures relative to potential direct and indirect effects identified in Section 4.0. Recommended design consideration and general mitigation measures are as follows:

- All materials and equipment shall be operated and stored in such a manner that prevents any deleterious substance from entering the water and drainage ditches.
- Apply sediment and erosion control measures (e.g., silt fence, silt curtain, sedimentation basins) consistent with Ontario Provincial Standards and Specifications (OPSS). In the vicinity of Bronte Creek and Fourteen Mile Creek, erosion and sediment control measures specific to the protection of Redside Dace/Silver Shiner shall be installed and maintained in order to protect these sensitive aquatic SAR species. The control measures shall be implemented prior to work and be maintained during construction and until disturbed areas have been effectively stabilized (further details pertaining to aquatic SAR protection and mitigation measures can be found within Amec Foster Wheeler's (2017) *Aquatic Habitat Existing Conditions Report*).
- Minimizing dust production to the extent practical by implementing dust suppression methods and thereby minimizing the zone of influence. Primary dust suppression methods can include road watering in cases where watering will not promote entry of chemicals in to nearby wetlands or waterways.
- Prevent introduction of new invasive species by washing down equipment prior to transporting to site and limiting travel of equipment and vehicles to and from the Project study area.
- All disturbed areas of the work site shall be stabilized and re-vegetated promptly, and/or treated with appropriate erosion protection materials.
- Disturbance and removal of existing trees and vegetation should be minimized where possible and confined to the footprint of the Project.
- In the event forest/woodland habitat requires removal for road widening, removal of habitat must occur outside critical periods for the bat species, which encompasses the summer active period of April 1 to September 30 or at least the maternity period of approximately June 1 to July 31.
- Comply with the *Migratory Bird Convention Act*, 1997 (MBCA) regulations and guidelines for vegetation clearing recommended by Environment Canada. In order to minimize the potential for incidental take of nesting migratory birds, vegetation clearing and any proposed work activities in migratory bird habitat should be undertaken outside of the active breeding season. Clearing is to be avoided from April 1 to August 30 for this project location, although these timing constraints should not be perceived as absolutes. This period represents the core breeding period, although some species may nest in March and September. Ultimately, the objective from a compliance perspective is to not circumvent the MBCA. As such, due diligence measures should be implemented and

documented for any nest searching efforts, including record control, to ensure compliance with the MBCA.

- Road widening should be designed so that they are not barriers to herpetiles moving between significant habitats. Suitable ecopassages may be required to allow movement.
- Sufficient culverts should be installed under the road to ensure that lateral drainage is not impeded. Where possible, roadside ditches should never be designed so that they remove water from the wetland and cause localized drying;
- Where bird nests may be found on crossing structures (i.e. Cliff Swallow at Bronte Creek Bridge); should works be required to proceed within the breeding bird timing window, appropriate exclusion measures may be required to prevent nesting within the structure during the construction activities. These exclusion measures may include netting to prevent ingress to the crossing. These barriers should be installed prior to April 1 and shall remain in place until August 30, or until the completion of rehabilitation works.
- Vertical facings suitable for nesting by bird species (i.e., soil piles, excavation areas) should be covered using tarps, or plastic sheets, or any other means of preventing nesting within the construction zone. Such barriers should be installed prior to April 1 and shall remain in place until August 30, or until the completion of rehabilitation works. Alternatively, vertical facings should be maintained daily at a 45° angle to deter nesting.
- Where feasible, works will be conducted during daylight hours, unless otherwise necessary, to avoid potential effects of artificial night lighting on crepuscular and nocturnal species.
- Minimize footprint of the Project within habitats on site to the extent possible to limit impacts to sensitive habitats utilized for nesting, roosting, migratory stopover etc.
- Exclusion fencing shall be utilized in areas where there is potential for turtles to enter the active construction area. This fencing should be installed prior to the onset of the nesting period, prior to May 15 and should remain in place until July 15, or until the completion of the rehabilitation works.
- Minimize sources of unnecessary noise or encroachment of worker activities into nearby habitats in order to limit the extent of the project zone of influence when possible.
- All heavy equipment and tools used on-site shall be maintained in good working condition.
- Construction personnel shall avoid idling of vehicles when not necessary for construction activities.
- Equipment and vehicles shall be turned off when not in use unless required for construction activities and/or effective operation.
- The MNRF should be consulted to gain further direction relative to any technical and process requirements under ESA, and to obtain guidance on any additional mitigation measures that may be required during construction and operation phases of the Project.

6.0 CONCLUSIONS AND RECCOMENDATIONS

The Lakeshore Road West study area is predominantly anthropogenic, characterized by commercial, industrial, and residential land uses. The majority of natural/semi natural vegetated areas are generally associated with watercourses throughout the study areas and have experienced intense anthropogenic disturbances for many decades. Invasive species presence is often abundant and outcompeting the native flora. One Butternut individual or Butternut/Walnut hybrid and several Kentucky Coffee-tree were observed through field investigations. No rare vegetation communities were recorded within the study area.

Several habitat features such a critical wildlife habitats, rare vegetation communities, or habitat for species of conservation concern were observed within the study area. Due to the presence of the Lakeshore Road West ROW, as well as other roads, commercial, industrial and residential areas on-site, habitat connectivity is relatively low surrounding the study area and Project works are unlikely to increase the current habitat fragmentation level more than its current state.

The secondary source review indicated the potential presence of 107 species of birds, 41 species of mammals, 14 species of amphibians, and 12 species of reptiles in the vicinity of the Project study area. Several wildlife SAR and species of conservation concern were indicated, several of which were observed during field investigations (i.e. Barn Swallow, Chimney Swift, Eastern Wood-Pewee, Peregrine Falcon and Canada Warbler). These species are typically tolerant of disturbance and have learned to adapt in an urbanized environment. Generally habitat for SAR and species of conservation concern is limited and highly fragmented within the Project study area. As such, only minor impacts to wildlife and supporting habitat are anticipated to result from the proposed Project works.

As there is some potential for critical wildlife habitat to exist on site or other significant natural areas, as well as SAR and species of conservation concern, roadway improvement efforts for the terrestrial environment should focus on maintaining a small footprint; containing emissions, dust, and other deleterious substances; and proactively reducing the risks of wildlife roadway mortality.

7.0 CLOSURE

This existing condition report has been prepared based on a review of secondary source information, agency consultations, and field investigations and is based on the proposed Project footprint at the time of the report. This existing condition report is intended to support detailed design and should be used for focusing future field investigations relative to significant natural heritage features within the footprint of the Project. This report does not exclude any process requirements relative to the ESA and/or further consultations with the MNRF to ensure compliance with the ESA. This report is intended to guide further consultations with the MNRF relative to SAR and to support further SAR surveys, if required.

Yours truly,

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APPENDIX A
CORRESPONDENCE

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
900 Maple Grove Road, Unit 10, Cambridge, ON, N3H 4R7, Canada
T +1 (519) 650-7132 C +1 (647) 919-7607
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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

900 Maple Grove Road, Unit 10, Cambridge, ON, N3H 4R7, Canada

T +1 (519) 650-7132 C +1 (647) 919-7607

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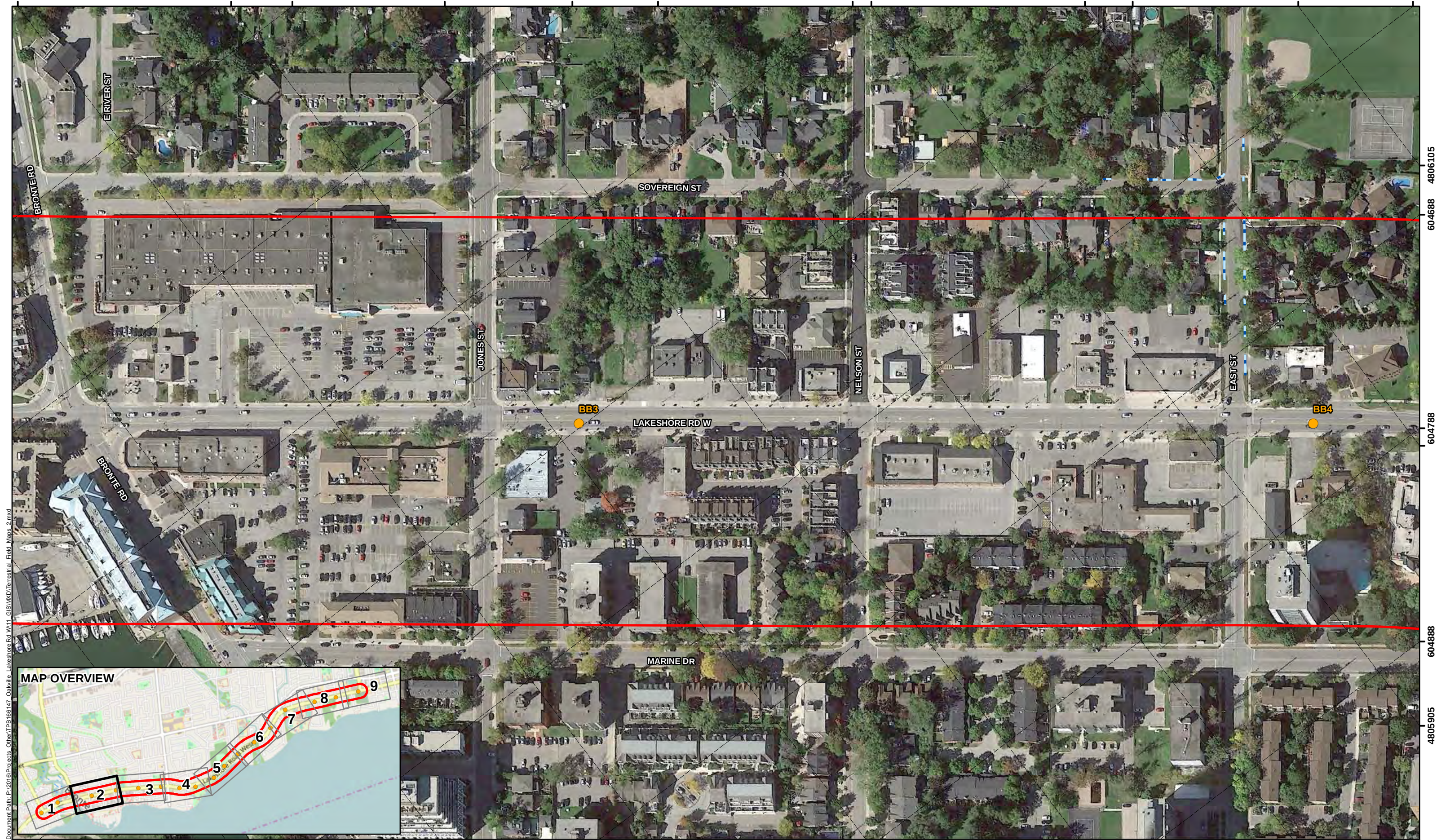
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APPENDIX B

BREEDING BIRD SURVEY POINT COUNT STATIONS



4805505 4805605 604188 4805705 604288 4805805 604388 4806005 604488 4806105 604588



Document Path: P:\2016\Projects_Other\TPB\66 47 Oakville Lakeshore Rd W\11 GIS\XDO\Terrestrial Field Maps 2.mxd

LEGEND

	Approximate Study Area		Watercourse
	Breeding Bird Survey Locations		Drainage Line (City of Oakville)
	Watercourse Crossings		

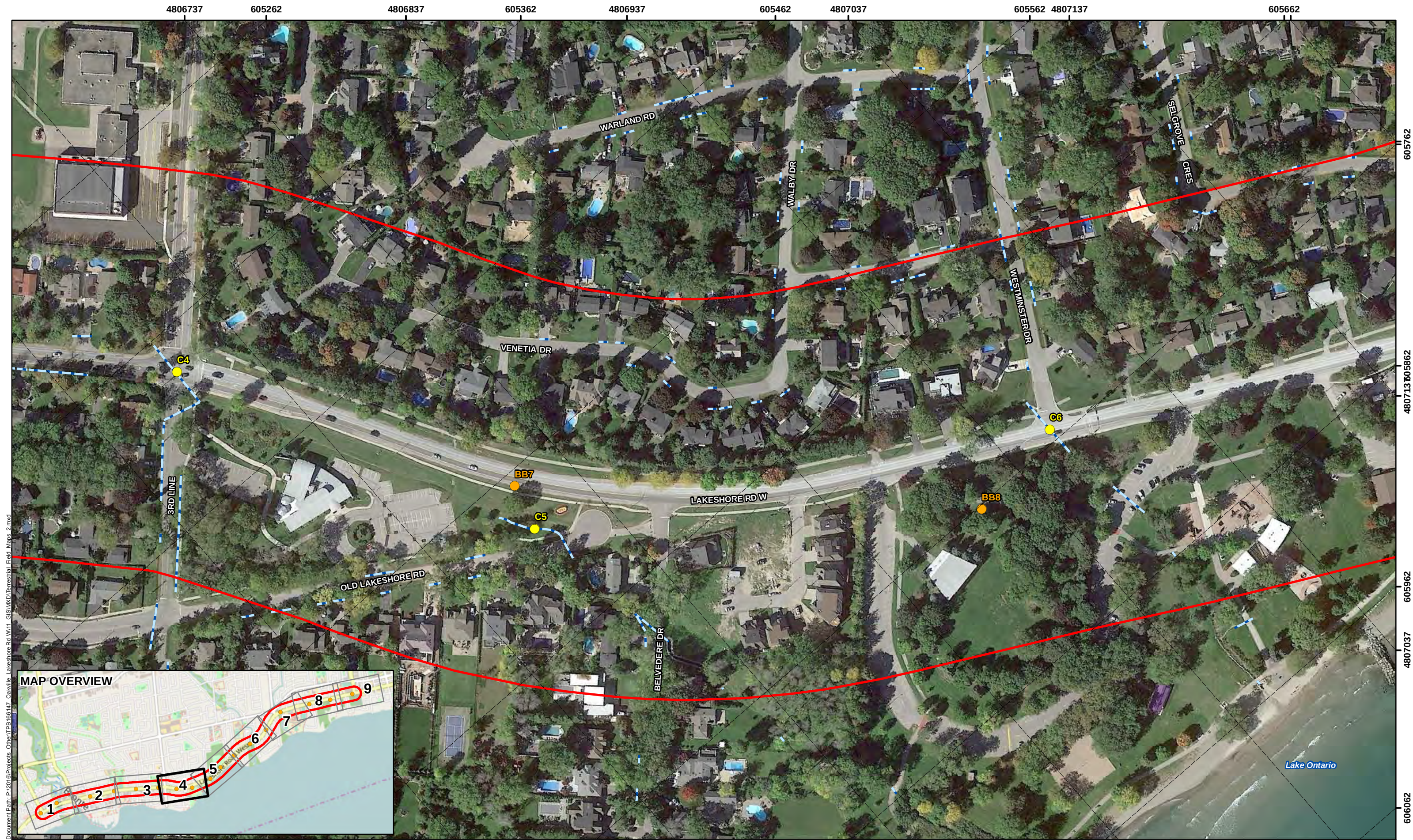
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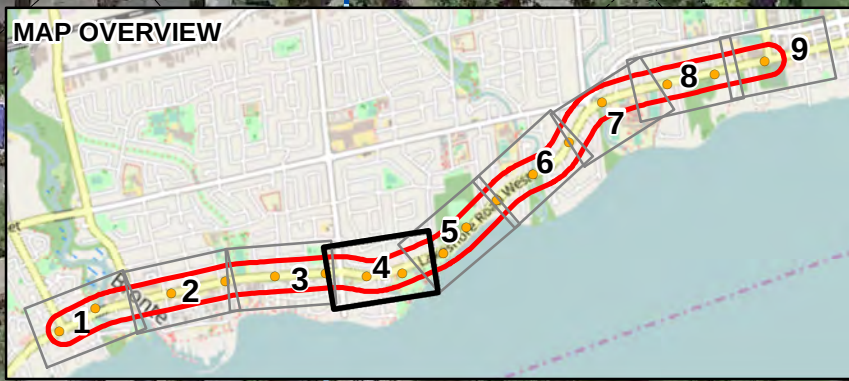
Datum & Projection:
NAD 1983 UTM Zone 17N

Appendix B
Terrestrial Field Maps
Map 2





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LEGEND

	Approximate Study Area		Watercourse
	Breeding Bird Survey Locations		Drainage Line (City of Oakville)
	Watercourse Crossings		

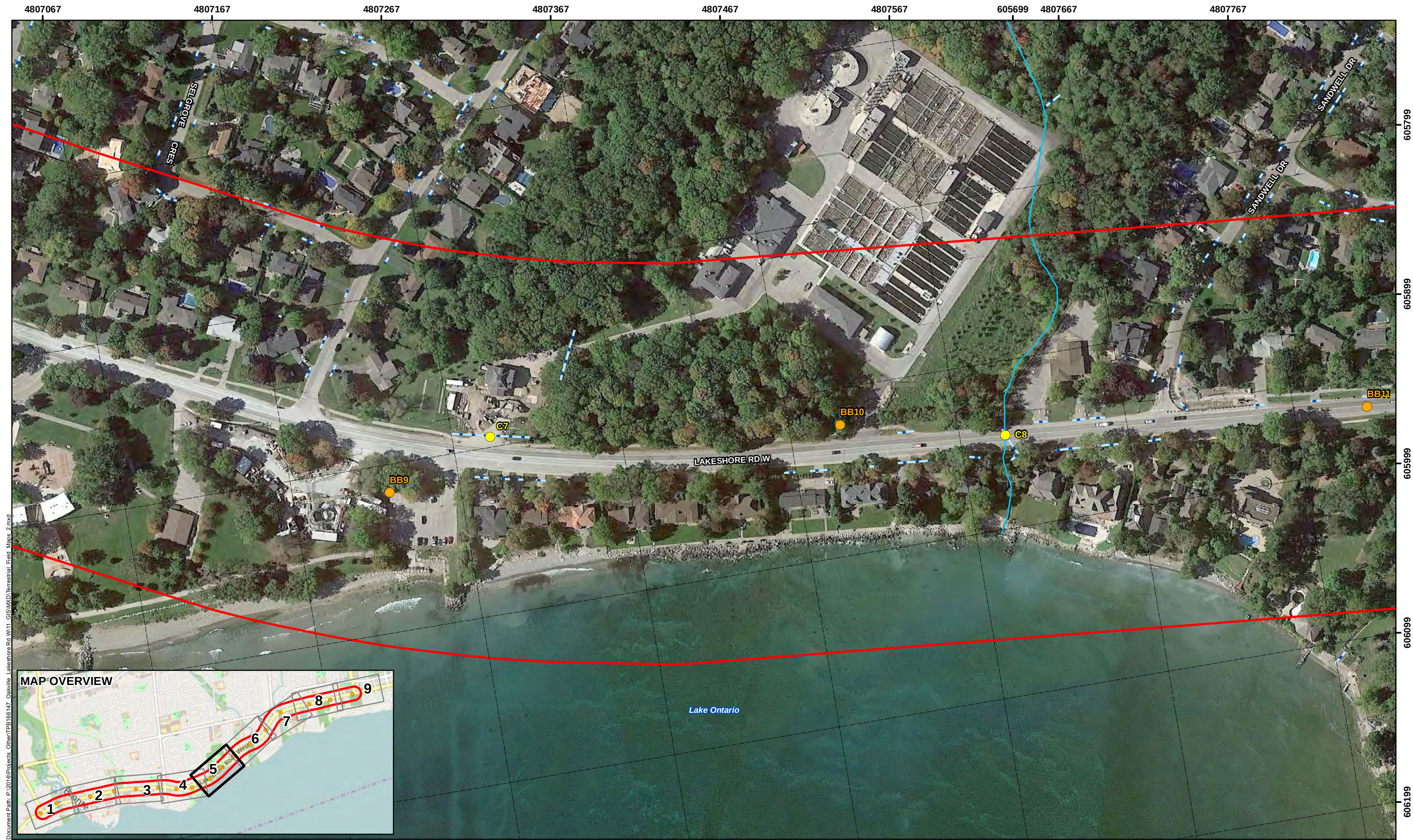
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Datum & Projection:
NAD 1983 UTM Zone 17N



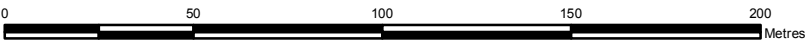
Appendix B
Terrestrial Field Maps
Map 4



Document Path: P:\2016\Projects_Other\TPB\66 47 Oakville Lakeshore Rd W\11 GIS\MXD\Terrestrial Field Maps 2.mxd



- LEGEND**
- Approximate Study Area
 - Breeding Bird Survey Locations
 - Watercourse
 - Drainage Line (City of Oakville)
 - Watercourse Crossings

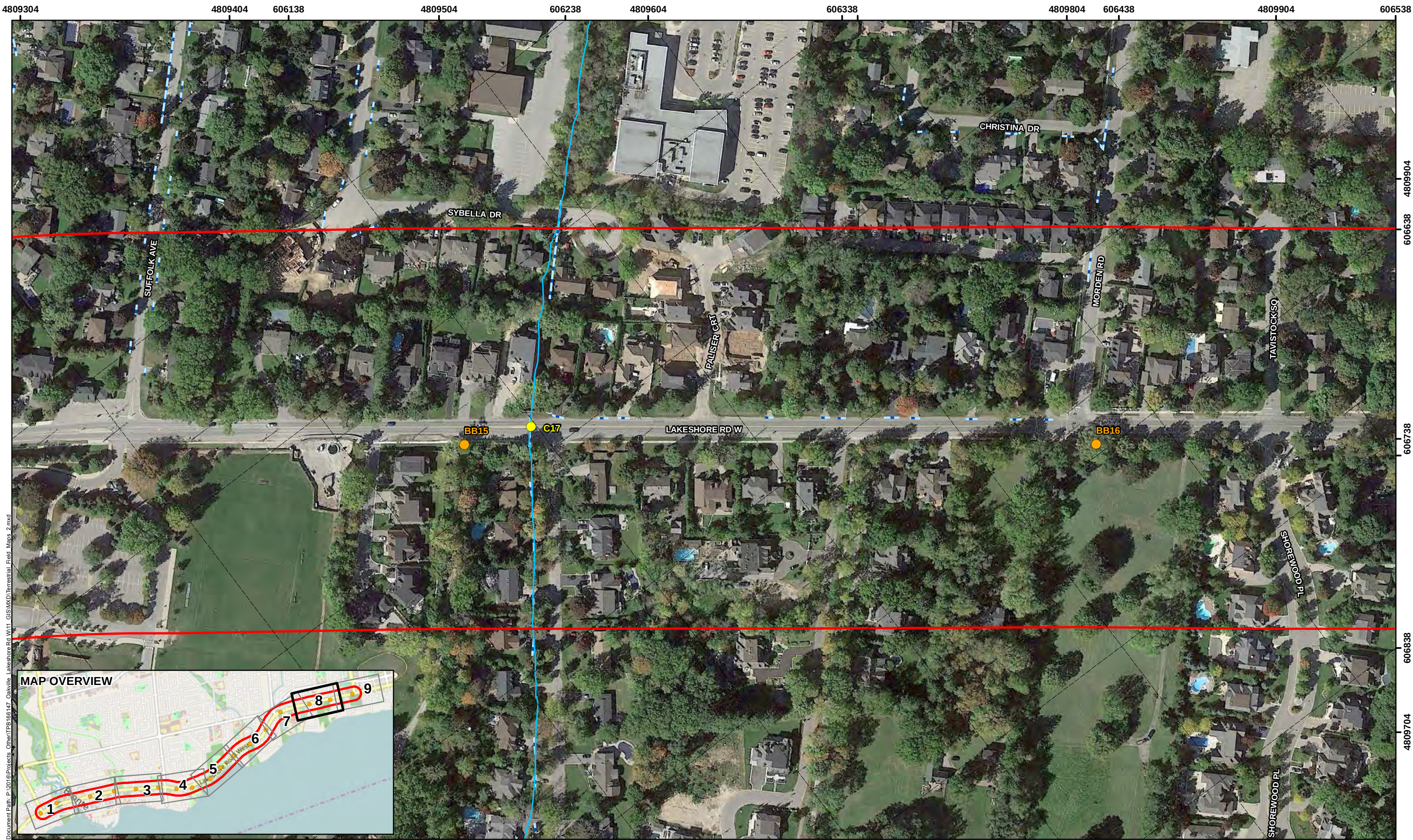


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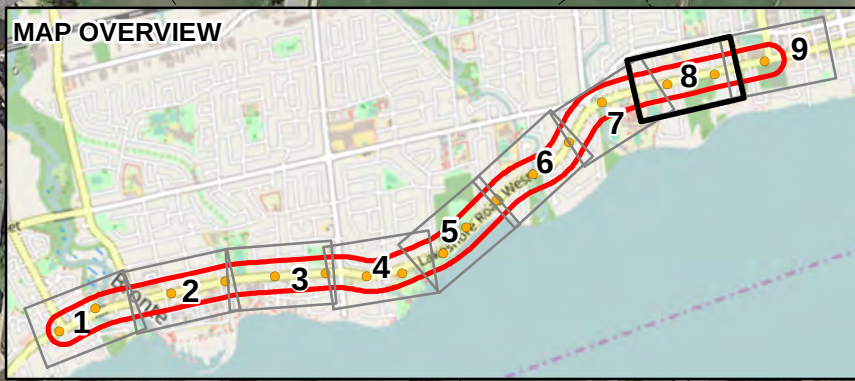








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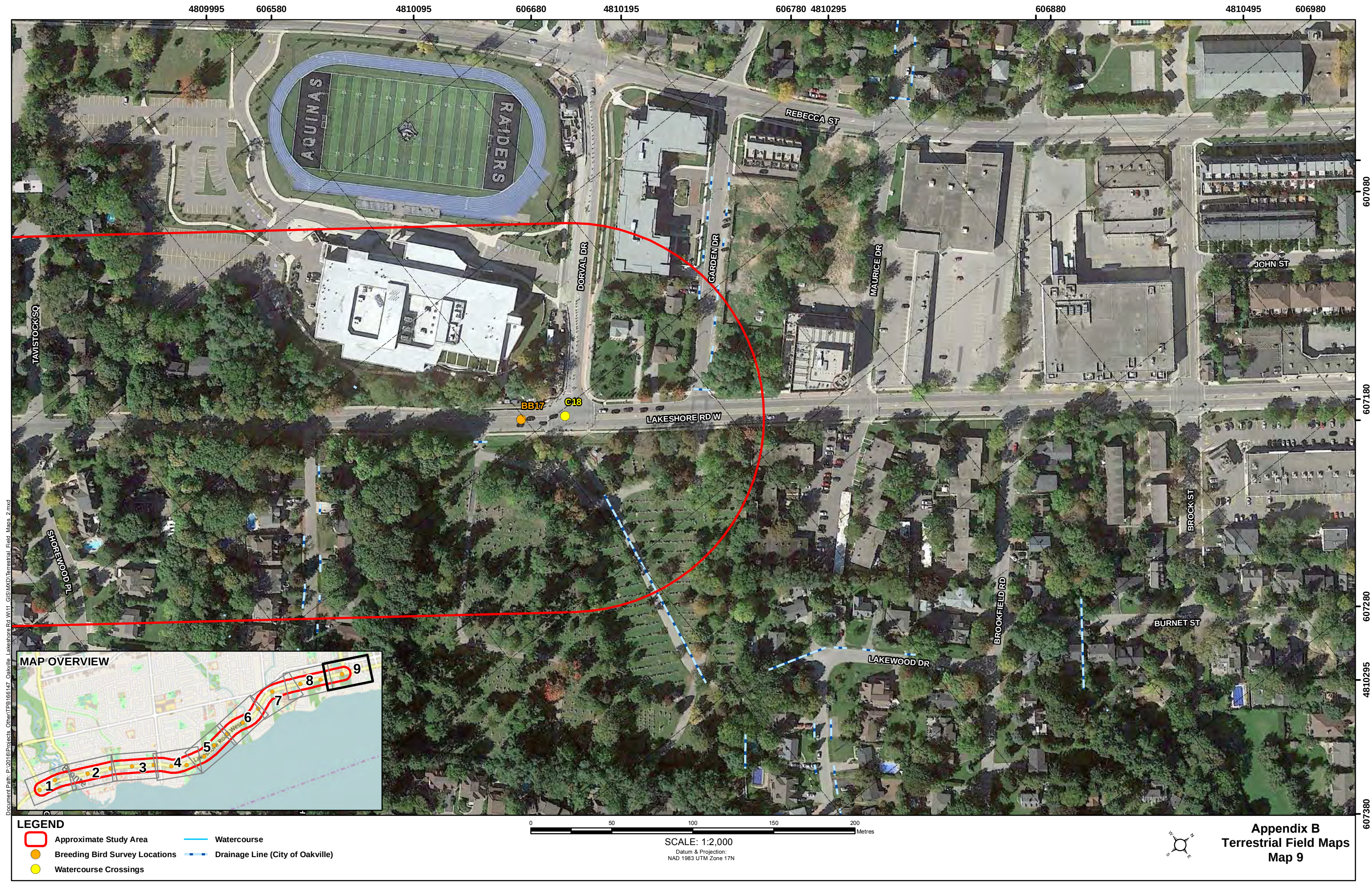


- LEGEND**
- Approximate Study Area
 - Breeding Bird Survey Locations
 - Watercourse Crossings
 - Watercourse
 - Drainage Line (City of Oakville)

0 50 100 150 200 Metres

SCALE: 1:2,000

Datum & Projection:
NAD 1983 UTM Zone 17N



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- LEGEND**
- Approximate Study Area
 - Breeding Bird Survey Locations
 - Watercourse
 - Drainage Line (City of Oakville)
 - Watercourse Crossings

SCALE: 1:2,000
Datum & Projection:
NAD 1983 UTM Zone 17N



APPENDIX C
COMPILED WILDLIFE SPECIES LIST

COMPILED WILDLIFE SPECIES LIST

Species	Scientific Name	SRank	(SARA)*	(ESA)**
<u>Avian²</u>				
Alder Flycatcher	<i>Empidonax alnorum</i>	S5		
American Black Duck	<i>Anas rubripes</i>	S5		
American Crow	<i>Corvus brachyrhynchos</i>	S5		
American Goldfinch	<i>Spinus tristis</i>	S5		
American Kestrel	<i>Falco sparverius</i>	S4		
American Redstart	<i>Setophaga ruticilla</i>	S5		
American Robin	<i>Turdus migratorius</i>	S5		
American Woodcock	<i>Scolopax minor</i>	S5		
Baltimore Oriole	<i>Icterus galbula</i>	S4		
Bank Swallow	<i>Riparia riparia</i>	S4		THR
Barn Swallow	<i>Hirundo rustica</i>	S4		THR
Belted Kingfisher	<i>Megaceryle alcyon</i>	S4		
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	S5		
Black-capped Chickadee	<i>Poecile atricapillus</i>	S5		
Black-throated Blue Warbler	<i>Setophaga caerulescens</i>	S5		
Black-throated Green Warbler***	<i>Dendroica virens</i>	S5		
Blackburnian Warbler***	<i>Dendroica fusca</i>	S5		
Blackpoll Warbler***	<i>Dendroica striata</i>	S4		
Blue Jay	<i>Cyanocitta cristata</i>	S5		
Blue-gray Gnatcatcher	<i>Polioptila caerulea</i>	S4		
Bobolink	<i>Dolichonyx oryzivorus</i>	S4		THR
Brown Creeper	<i>Certhia Americana</i>	S5		
Brown Thrasher	<i>Toxostoma rufum</i>	S4		
Brown-headed Cowbird	<i>Molothrus ater</i>	S4		
Canada Goose***	<i>Branta Canadensis</i>	S5		
Canada Warbler***	<i>Wilsonia canadensis</i>	S4	THR	SC
Carolina Wren	<i>Thryothorus ludovicianus</i>	S4		
Cedar Waxwing	<i>Bombycilla cedrorum</i>	S5		
Chestnut-sided Warbler	<i>Setophaga pensylvanica</i>	S5		
Chimney Swift	<i>Chaetura pelagica</i>	S4	THR	THR
Chipping Sparrow	<i>Spizella passerine</i>	S5		
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	S4		
Common Grackle	<i>Quiscalus quiscula</i>	S5		
Common Nighthawk	<i>Chordeiles minor</i>	S4	THR	SC
Common Yellowthroat	<i>Geothlypis trichas</i>	S5		
Cooper's Hawk	<i>Accipiter cooperii</i>	S4		
Double-crested Cormorant***	<i>Phalacrocorax auritus</i>	S4		
Downy Woodpecker	<i>Picoides pubescens</i>	S5		
Eastern Bluebird	<i>Sialia sialis</i>	S5		
Eastern Kingbird	<i>Tyrannus tyrannus</i>	S4		
Eastern Meadowlark	<i>Sturnella magna</i>	S4		THR
Eastern Phoebe	<i>Sayornis phoebe</i>	S5		
Eastern Screech-Owl	<i>Megascops asio</i>	S4		
Eastern Towhee	<i>Pipilo erythrophthalmus</i>	S4		
Eastern Wood-Pewee	<i>Contopus virens</i>	S4	SC	SC
European Starling	<i>Sturnus vulgaris</i>	SNA		
Field Sparrow	<i>Spizella pusilla</i>	S4		
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	S4		
Gray Catbird	<i>Dumetella carolinensis</i>	S4		
Great Blue Heron	<i>Ardea Herodias</i>	S4		
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	S4		
Great Horned Owl	<i>Bubo virginianus</i>	S4		

Species	Scientific Name	SRank	(SARA)*	(ESA)**
Green Heron	<i>Butorides virescens</i>	S4		
Hairy Woodpecker	<i>Picoides villosus</i>	S5		
Hooded Warbler	<i>Setophaga citrina</i>	S4	THR	
Horned Lark	<i>Eremophila alpestris</i>	S5		
House Finch	<i>Haemorhous mexicanus</i>	SNA		
House Sparrow	<i>Passer domesticus</i>	SNA		
House Wren	<i>Troglodytes aedon</i>	S5		
Indigo Bunting	<i>Passerina cyanea</i>	S4		
Killdeer	<i>Charadrius vociferus</i>	S5		
Least Flycatcher	<i>Empidonax minimus</i>	S4		
Magnolia Warbler***	<i>Dendroica magnolia</i>	S5		
Mallard	<i>Anas platyrhynchos</i>	S5		
Mourning Dove	<i>Zenaida macroura</i>	S5		
Mourning Warbler	<i>Geothlypis philadelphia</i>	S4		
Mute Swan	<i>Cygnus olor</i>	SE		
Northern Cardinal	<i>Cardinalis cardinalis</i>	S5		
Northern Flicker	<i>Colaptes auratus</i>	S4		
Northern Mockingbird	<i>Mimus polyglottos</i>	S4		
Northern Parula***	<i>Parula Americana</i>	S4		
Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	S4		
Orchard Oriole	<i>Icterus spurius</i>	S4		
Ovenbird	<i>Seiurus aurocapilla</i>	S4		
Peregrine Falcon***	<i>Falco peregrinus anatum</i>	S2S3B	SC	SC
Pileated Woodpecker	<i>Dryocopus pileatus</i>	S5		
Pine Warbler	<i>Setophaga pinus</i>	S5		
Purple Finch	<i>Haemorhous purpureus</i>	S4		
Purple Martin	<i>Progne subis</i>	S4		
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	S4		
Red-breasted Nuthatch	<i>Sitta Canadensis</i>	S5		
Red-eyed Vireo	<i>Vireo olivaceus</i>	S5		
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	S4	THR	SC
Red-necked Grebe	<i>Podiceps grisegena</i>	S3		
Red-tailed Hawk	<i>Buteo jamaicensis</i>	S5		
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	S4		
Ring-billed Gull***	<i>Larus delawarensis</i>	S5		
Rock Pigeon	<i>Columba livia</i>	SNA		
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	S4		
Ruby-throated Hummingbird	<i>Archilochus colubris</i>	S5		
Savannah Sparrow	<i>Passerculus sandwichensis</i>	S4		
Scarlet Tanager	<i>Piranga olivacea</i>	S4		
Sharp-shinned Hawk	<i>Accipiter striatus</i>	S5		
Song Sparrow	<i>Melospiza melodia</i>	S5		
Spotted Sandpiper	<i>Actitis macularius</i>	S5		
Tennessee Warbler***	<i>Vermivora peregrina</i>	S5		
Tree Swallow	<i>Tachycineta bicolor</i>	S4		
Tufted Titmouse	<i>Baeolophus bicolor</i>	S2S3		
Turkey Vulture	<i>Cathartes aura</i>	S4		
Veery	<i>Catharus fuscescens</i>	S4		
Vesper Sparrow	<i>Pooecetes gramineus</i>	S4		
Warbling Vireo	<i>Vireo gilvus</i>	S5		
Eastern Whip-poor-will	<i>Antrostomus vociferus</i>	S4	THR	THR
White-breasted Nuthatch	<i>Sitta carolinensis</i>	S5		
Willow Flycatcher	<i>Empidonax traillii</i>	S5		
Wood Duck	<i>Aix sponsa</i>	S5		
Wood Thrush	<i>Hylocichla mustelina</i>	S5		SC
Yellow Warbler	<i>Setophaga petechial</i>	S5		

Species	Scientific Name	SRank	(SARA)*	(ESA)**
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	S4		
<u>Mammals</u>³				
Big Brown Bat	<i>Eptesicus fuscus</i>	S4		
Silver-haired Bat	<i>Lasionycteris noctivagans</i>	S4		
Eastern Red Bat	<i>Lasiurus borealis</i>	S4		
Hoary Bat	<i>Lasiurus cinereus</i>	S4		
Eastern Small-footed Myotis ⁶	<i>Myotis leibii</i>	S2S3		END
Little Brown Myotis ⁶	<i>Myotis lucifugus</i>	S4	END	END
Northern Long-eared Myotis ⁶	<i>Myotis septentrionalis</i>	S3	END	END
Tri-colored Bat	<i>Perimyotis subflavus</i>	S3	END	END
Coyote	<i>Canis latrans</i>	S5		
Red Fox	<i>Vulpes vulpes</i>	S5		
Raccoon	<i>Procyon lotor</i>	S5		
Ermine	<i>Mustela ermine</i>	S5		
Long-tailed Weasel	<i>Mustela frenata</i>	S4		
Mink	<i>Mustela vison</i>	S4		
Striped Skunk	<i>Mephitis mephitis</i>	S5		
White-tailed Deer	<i>Odocoileus virginianus</i>	S5		
Virginia Opossum	<i>Didelphis virginiana</i>	S4		
Eastern Cottontail	<i>Sylvilagus floridanus</i>	S5		
Snowshoe Hare	<i>Lepus americanus</i>	S5		
European Hare	<i>Lepus europaeus</i>	SNA		
Eastern Chipmunk	<i>Tamias striatus</i>	S5		
Woodchuck	<i>Marmota monax</i>	S5		
Gray Squirrel	<i>Sciurus carolinensis</i>	S5		
Red Squirrel	<i>Tamiasciurus hudsonicus</i>	S5		
Northern Flying Squirrel	<i>Glaucomys sabrinus</i>	S5		
Southern Flying Squirrel	<i>Glaucomys Volans</i>	S4		
Beaver	<i>Castor Canadensis</i>	S5		
White-footed Mouse	<i>Peromyscus leucopus</i>	S5		
Deer Mouse	<i>Peromyscus maniculatus</i>	S5		
Meadow Vole	<i>Microtus pennsylvanicus</i>	S5		
Muskrat	<i>Ondatra zibethicus</i>	S5		
Southern Bog Lemming	<i>Synaptomys cooperi</i>	S4		
Norway Rat	<i>Rattus norvegicus</i>	SNA		
House Mouse	<i>Mus musculus</i>	SNA		
Meadow Jumping Mouse	<i>Zapus hudsonius</i>	S5		
Porcupine	<i>Erethizon dorsatum</i>	S5		
Common Shrew	<i>Sorex cinereus</i>	S5		
Smoky Shrew	<i>Sorex fumeus</i>	S5		
Northern Short-tailed Shrew	<i>Blarina brevicauda</i>	S5		
Hairy-tailed Mole	<i>Parascalops breweri</i>	S4		
Star-nosed Mole	<i>Condylura cristata</i>	S5		
<u>Reptiles</u>⁴				
Snapping Turtle ⁶	<i>Chelydra septentina</i>	S3	SC	SC
Midland Painted Turtle	<i>Chrysemys picta marginata</i>	S4		
Northern Map Turtle ⁶	<i>Graptemys geographica</i>	S3	SC	SC
Eastern Milksnake ⁶	<i>Lampropeltis triangulum</i>	S4	SC	
Dekay's Brown Snake	<i>Storeria dekayi</i>	S5		
Red-bellied Snake	<i>Storeria occipitomaculata</i>	S5		
Northern Water Snake	<i>Nerodia sipedon sipedon</i>	S5		
Northern Ring-necked Snake	<i>Diadophis punctatus</i>	S5		
Red-eared Slider	<i>Trachemys scripta</i>	SNA		
Eastern Hog-nosed Snake	<i>Heteron platirhinos</i>	S3	THR	THR
Eastern Ribbonsnake	<i>Thamnophis sauritus</i>	S3	SC	SC
Eastern Gartersnake	<i>Thamnophis sirtalis</i>	S5		

Species	Scientific Name	SRank	(SARA)*	(ESA)**
<u>Amphibians⁴</u>				
American Toad	<i>Anaxyrus americanus</i>	S5		
Eastern Red-backed Salamander	<i>Plethodon cinereus</i>	S5		
Gray Treefrog	<i>Hyla versicolor</i>	S5		
Green Frog	<i>Lithobates clamitans</i>	S5		
Northern Leopard Frog	<i>Lithobates pipiens</i>	S5		
Wood Frog	<i>Lithobates sylvaticus</i>	S5		
Spring Peeper	<i>Pseudacris crucifer</i>	S5		
American Bullfrog	<i>Lithobates catesbianus</i>	S4		
American Toad	<i>Bufo americanis americanis</i>	S5		
Pickerel Frog	<i>Rana palustris</i>	S5		
Eastern Newt	<i>Notophthalmus viridescens</i>	S5		
Mudpuppy	<i>Necturus maculosus maculosus</i>	S5		
Spotted Salamander	<i>Ambystoma maculatum</i>	S5		
Jefferson Salamander/Blue-Spotted Salamander Complex	<i>Ambystoma jeffersonianum</i>	S3	END	END
<u>Invertebrates</u>				
Cabbage White	<i>Pieris rapae</i>	S5		
Orange Sulphur	<i>Colias eurytheme</i>	S5		
Clouded Sulphur	<i>Colias philodice</i>	S5		
Hobomok Skipper	<i>Poanes hobomok</i>	S5		
Monarch Butterfly	<i>Danaus plexippus</i>	S3	SC	SC
¹ Shaded species are those observed/reported during Amec Foster Wheeler site investigations ² Second (2001-2005) Atlas of the Breeding Birds of Ontario (Cadman et al. 2007) ³ Atlas of the Mammals of Ontario (Dobbyn 1994; Species reported in the vicinity during 1970 – 1993); Bat data supplemented by Bat Conservation International (BCI 2013). ⁴ Ontario Reptile & Amphibian Atlas (Ontario Nature 2013) ⁵ NHIC Historical record. Last observed date was prior to 1980. (MNR 2013b) ⁶ MNRF Correspondence *SARA = Species at Risk Act **ESA = Endangered Species at Risk Act *** means species were observed but not found in the ABBO Provincial Rank: S2 Imperilled; S3 Vulnerable; S4 Apparently Secure; S5 Secure; SNA Not Applicable/Provincially non-native, not suitable target for conservation activities; S#B Breeding; S#N Non-breeding <u>SARA/ESA Designation:</u> END Endangered, THR Threatened, SC Special Concern				

APPENDIX D

COMPILED PLANT SPECIES LIST

COMPILED PLANT SPECIES LIST

Common Name	Scientific Name	Provincial S-Rank
Manitoba maple	<i>Acer negundo</i>	S5
Norway Maple	<i>Acer platanoides</i>	SNA
Silver Maple	<i>Acer saccharinum</i>	S5
Sugar Maple	<i>Acer saccharum</i>	S5
Freeman's Maple	<i>Acer x freemanii</i>	SHY4?
Baneberry species	<i>Actaea</i> sp.	
Horse Chestnut	<i>Aesculus hippocastanum</i>	SNA
Hooked Agrimony	<i>Agrimonia gryposepala</i>	
Garlic Mustard	<i>Alliaria petiolata</i>	SNA
Speckled Alder	<i>Alnus incana rugosa</i>	S5
Common Burdock	<i>Arctium minus</i>	SNA
Jack-in-the-pulpit	<i>Arisaema triphyllum</i>	S5
Sedge species	<i>Carex</i> sp.	
Northern Catalpa	<i>Catalpa speciosa</i>	SNA
Greater Celandine	<i>Chelidonium majus</i>	SNA
Broadleaf Enchanter's Nightshade	<i>Circaea canadensis</i>	S5
Thistle species	<i>Cirsium</i> sp.	
European Lily-of-the-valley	<i>Convallaria majalis</i>	SNA
Red Osier Dogwood	<i>Cornus stolonifera</i>	S5
Hawthorn species	<i>Crataegus</i> sp.	
Fuller's Teasel	<i>Dipsacus fullonum sylvestris</i>	SNA
Beechdrops	<i>Epifagus virginiana</i>	S5
Yellow Trout Lily	<i>Erythronium americanum</i>	S5
Leafy Spurge	<i>Euphorbia esula</i>	SNA
American Beech	<i>Fagus grandifolia</i>	S4
Green Ash	<i>Fraxinus pennsylvanica</i>	S5
Wild Geranium	<i>Geranium maculatum</i>	
Herb-robert	<i>Geranium robertianum</i>	S5
Kentucky Coffee-Tree	<i>Gymnocladus dioicus</i>	S3
Dame's-rocket	<i>Hesperis matronalis</i>	SNA
Spotted Jewelweed	<i>Impatiens capensis</i>	S5
Butternut	<i>Juglans cinerea</i>	S3?
Black Walnut	<i>Juglans nigra</i>	S4
Juniper species	<i>Juniperus</i> sp.	
Invasive Honeysuckle species	<i>Lonicera</i> sp. (invasive)	
Canada Mayflower	<i>Maianthemum canadensis</i>	S5
Starry False Solomon's Seal	<i>Maianthemum stellatum</i>	
Ostrich Fern	<i>Matteucia struthiopteris</i>	S5
Virginia Creeper species	<i>Parthenocissus</i> sp.	
Norway Spruce	<i>Picea abies</i>	SNA
White Pine	<i>Pinus strobus</i>	S5
Scots Pine	<i>Pinus sylvestris</i>	S5
Broadleaf Plantain	<i>Plantago major</i>	
Mayapple	<i>Podophyllum peltatum</i>	
Solomon's Seal species	<i>Polygonatum</i> sp.	
Black Cherry	<i>Prunus serotina</i>	S5
Choke Cherry	<i>Prunus virginiana</i>	S5
Red Oak	<i>Quercus rubra</i>	S5
Common Buckthorn	<i>Rhamnus cathartica</i>	SNA
Fragrant Sumac	<i>Rhus aromatica</i>	S5
Staghorn Sumac	<i>Rhus typhina</i>	S5
Black Locust	<i>Robinia pseudoacacia</i>	SNA
Multiflora Rose	<i>Rosa multiflora</i>	SNA
Purple Flowering Raspberry	<i>Rubus odoratum</i>	S5
Dock species	<i>Rumex</i> sp.	

Common Name	Scientific Name	Provincial S-Rank
Crack Willow	<i>Salix x fragilis</i>	SNA
Black Elderberry	<i>Sambucus canadensis</i>	SNA
Bloodroot	<i>Sanguinaria canadensis</i>	S5
Bittersweet Nightshade	<i>Solanum dulcamara</i>	
Late Goldenrod	<i>Solidago altissima</i>	S5
Zigzag Goldenrod	<i>Solidago flexicaulis</i>	S5
Common Lilac	<i>Syringa vulgaris</i>	SNA
Common Dandelion	<i>Taraxacum officinale</i>	SNA
European Yew	<i>Taxus baccata</i>	SNA
Eastern White Cedar	<i>Thuja occidentalis</i>	S5
American Basswood	<i>Tilia americana</i>	S5
Western Poison Ivy	<i>Toxicodendron rydbergii</i>	S5
White Trillium	<i>Trillium grandiflorum</i>	S5
American Elm	<i>Ulmus americana</i>	S5
European Highbush Cranberry	<i>Viburnum opulus opulus</i>	S5
Common Periwinkle	<i>Vinca minor</i>	SNA
Common Blue Violet	<i>Viola sororia</i>	S5
Riverbank Grape	<i>Vitis riparia</i>	S5

APPENDIX E

RESULTS OF BREEDING BIRD SURVEYS

Species Name	Number of Birds/Station	Breeding Bird Point Count Station Number																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Red-winged Blackbird	19	0	6	0	0	0	1	0	2	2	1	2	1	0	2	1	0	1
Ring-billed Gull	19	0	0	1	2	1	1	2	1	1	1	4	0	0	0	1	0	4
Rock Pigeon	3	0	0	0	1	0	0	0	0	2	0	0	0	0	0	0	0	0
Song Sparrow	8	0	2	0	0	0	0	0	0	1	3	0	1	0	1	0	0	0
Tennessee Warbler	4	0	0	0	0	0	0	1	0	0	2	0	1	0	0	0	0	0
Tree Swallow	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Tufted Titmouse	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Warbling Vireo	6	0	1	0	0	0	1	1	0	1	1	0	0	0	0	0	0	1
White-breasted Nuthatch	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Yellow Warbler	2	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Total Number of Birds Observed:	389																	

**Excerpted Fish Species Sampling
Information from “Conservation Halton’s
Urban Creeks and Supplemental
Monitoring (2008)”**



08 Urban Creeks and Supplemental Monitoring

LONG TERM ENVIRONMENTAL MONITORING PROGRAM

October 09

Figure 3: Fisheries Sampling Stations and Associated Biotic Integrity Classifications.



Table 8: Benthic Invertebrate Indices and Associated Classifications.

Water Quality Index	Unimpaired	Possibly Impaired	Impaired
EPT	>10	5-10	<5
Taxa Richness	>13		<13
% Oligochaeta	<10	10-30	>30
% Chironomidae	<10	10-40	>40
% Isopoda	<1	1-5	>5
% Gastropoda	1-10	0 or >10	>10
% Diptera	20-45	15-20 or 45-50	<15 or >50
% Insect	50-80	40-50 or 80-90	<40 or >90
% Dominant taxa	<40	40-45	>45
HFI	<6	6-7	>7
SDI	>4	3-4	<3

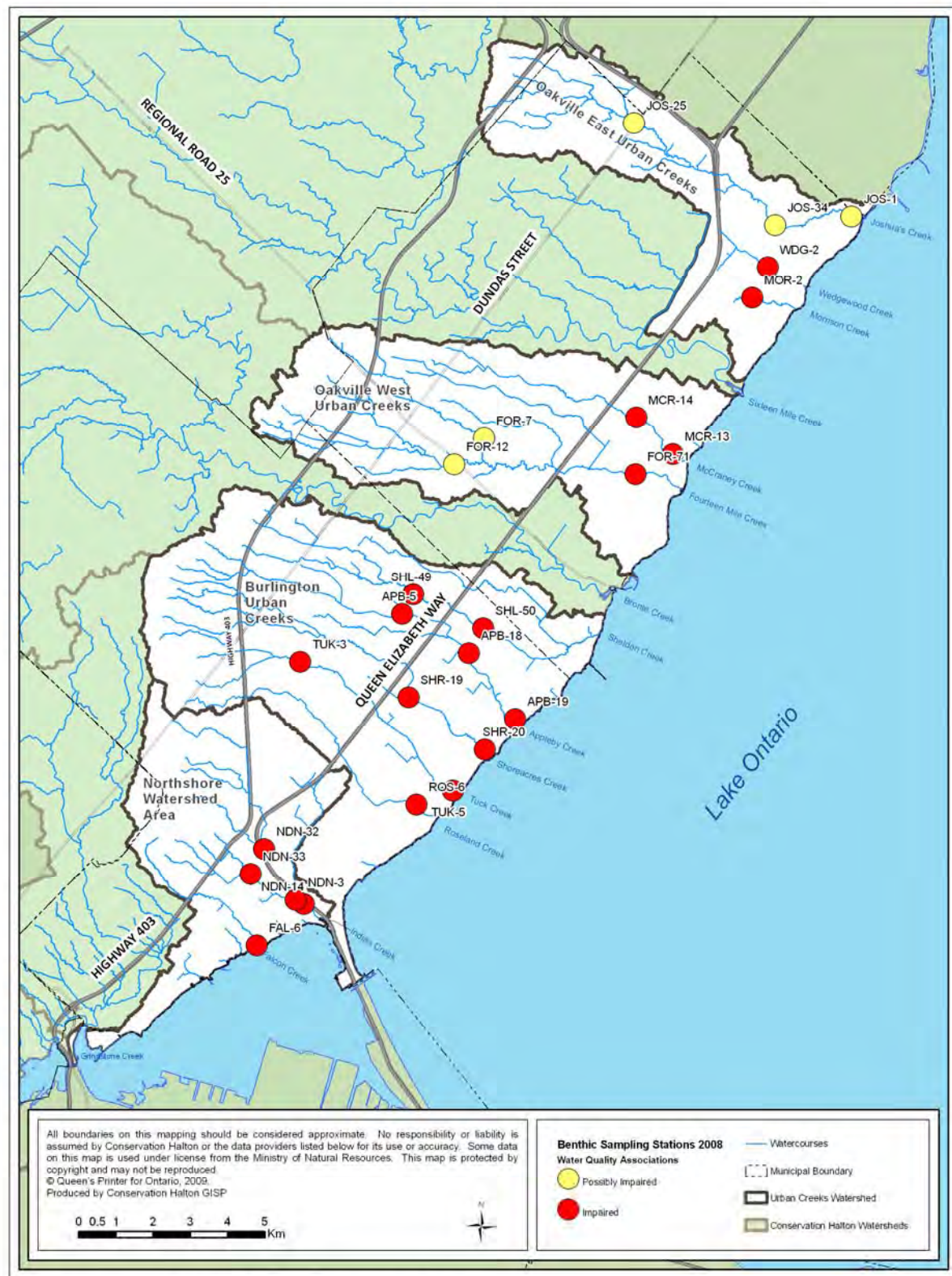
2.2.1 Results for Urban Creeks

Sampling of the 27 stations in 2008 resulted in the collection of 59 different taxa spread across the watershed. Almost 10,000 benthic invertebrates were captured and identified for the 2008 benthic study. Individual taxa groups including oligochaeta, chironomidae and isopoda were by far the most abundant taxa groups encountered and were collected at almost all of the stations sampled. Sensitive taxa groups and families were still present but at a limited number of stations. In total 21 stations were considered impaired, 5 potentially impaired and no stations were considered to be unimpaired. Figure 5 illustrates the distribution of stations and their associated water quality classifications across the watershed. A list of species captured at each station can be found in Appendix 3.

Analysis of the benthic data illustrated some interesting findings. The healthiest of the urban streams included both Joshua's Creek and Fourteen Mile Creek (Appendix 5). Both creeks had a high abundance of species richness and a variety of habitats suitable for benthic invertebrates. The Hilsenhoff scores were also better than most other sites in the urban watershed, indicating a lower level of nutrients within the streams. Some of the worst creeks were McCraney Creek and Falcon Creek. The majority of benthic invertebrates found in these creeks were aquatic worms, which are typically found in areas that contain organic pollution and anoxic conditions (Borisko 2002). The fish IBI scores were fair (Falcon) and good (McCraney), most likely due to the proximity to the lake.

Overall the benthic community for the Urban Creeks watershed would be considered poor. The majority of the streams flow through heavy development or intensive landuse, resulting in mostly realigned streams. Additionally, surface runoff from the urban development and associated flashiness in stream flow is detrimental to maintaining good habitat for benthic invertebrates to thrive.

Figure 5: Benthic Sampling Stations and Associated Water Quality Classifications



Appendix 1: Fish Species Caught in Urban Creeks

	JOS-1	JOS-25	JOS-34	WDG-2	APB-19	APB-5	FAL-6	FOR-71	FOR-12	FOR-7	MCR-13	MCR-14	NDN-14	NDN-3	NDN-32	NDN-33	SHL-49	SHL-50	SHR-20	SHR-19	TUK-3	TUK-5	ROS-6	MOR-2	Total
Blacknose Dace	21	38	34	66				10		33		30					68	7			61	1			369
Bluntnose Minnow	2		27					29	4				6					4							72
Brook Stickleback															1										1
Common Carp	1																								1
Common Shiner	4		6					47	1		1											3			62
Creek Chub	6	42	36	78	23	51	6	18	12	39	40	23		2		54	11	17	25	10	110	10			613
Fathead Minnow			6			9		4	4	15	2		1					2		10		1			54
Goldfish	1																								1
Johnny Darter	6		22																						28
Largemouth Bass									1																1
Longnose Dace	42		6		2						6			1								1			58
Pumpkinseed					11	7					33							2							53
Rainbow Darter								2			2														4
Rainbow Trout	2		1								1														4
River Chub			1																						1
Rock Bass	1		1																						2
White Sucker		1	7		3		1	25	4		5		1					4	3		5	13			72
yoy Cyprinid		17				1	1															1			20
No Fish																							*	*	
Total	86	98	147	144	39	68	8	135	26	87	90	53	8	3	1	54	79	36	28	20	176	30	0	0	1416