Environmental Study Report

Wyecroft Road Improvements from Bronte Road to Kerr Street

Appendix B: Natural Environment

Submitted to Town of Oakville
by IBI Group
January 2020

NATURAL ENVIRONMENT REPORT – IMPACT ASSESSMENT

WYECROFT ROAD IMPROVEMENTS
BRONTE ROAD TO KERR STREET
SCHEDULE "C" MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT
TOWN OF OAKVILLE, HALTON REGION

prepared for:

IBI GROUP

prepared by:

LGL LIMITED
environmental research associates

JUNE 2019 updated August 2019

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TOWN OF OAKVILLE, HALTON REGION

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LGL Project # TA8828

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1.0 INTRODUCTION

The Town of Oakville is undertaking a Schedule 'C' Municipal Class Environmental Assessment (Class EA) for improvements to Wyecroft Road from Bronte Road to Kerr Street in the Town of Oakville, Halton Region. The study limits are presented in **Figure 1**.

This Class EA is being conducted by IBI Group on behalf of the Town of Oakville. LGL Limited (LGL), as a sub-consultant to IBI Group, is providing natural environment services. This Natural Environment Report – Impact Assessment documents existing conditions based on secondary sources and data collection during the 2018 field season and summarizes potential effects of the proposed improvements to Wyecroft Road on the natural environment, and includes environmental protection measures.

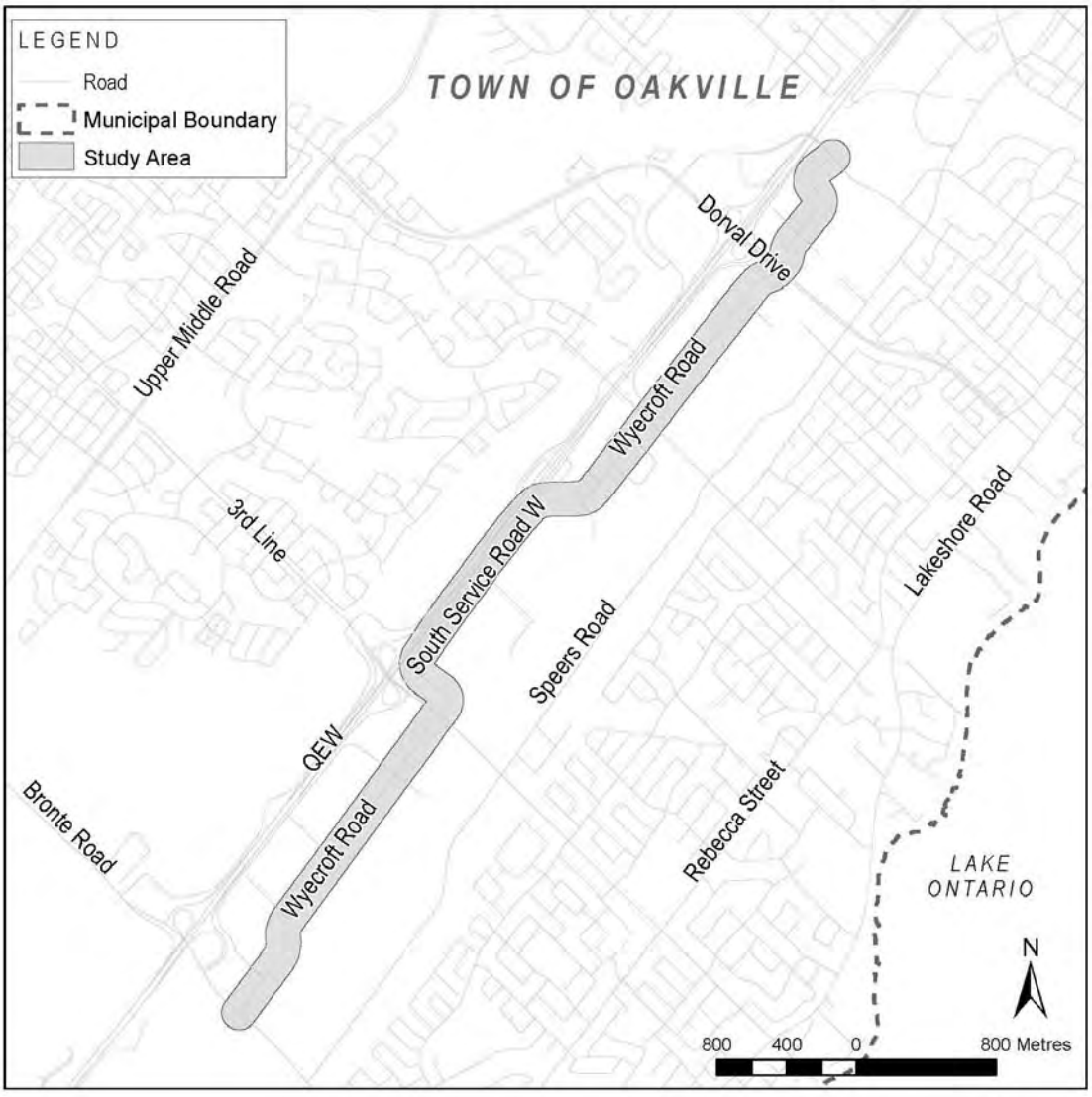


FIGURE 1. KEY PLAN

During the preparation of this report, background information was reviewed. A detailed list of background information reviewed is presented in **Section 5.0**. Relevant legislation/regulations were taken into consideration and applied as required. These include, but are not limited to the following:

- *Fisheries Act*;
- *Migratory Birds Convention Act*;
- *Species at Risk Act*; and,
- *Endangered Species Act*.

2.0 EXISTING CONDITIONS

The following discussion outlines the existing environmental conditions within the study area and identifies natural heritage areas and/or features of environmental sensitivity and/or significance. Information is based on secondary data sources and the field investigations undertaken during the 2018 field season.

2.1 Physiography and Soils

The study area is located within the Iroquois Plain physiographic region in southern Ontario, a lowland region bordering Lake Ontario. The area is relatively flat and formed by lacustrine deposits, a result of the inundation from Lake Iroquois during the late Pleistocene. This region extends around the western part of Lake Ontario, from the Niagara River to the Trent River (Chapman and Putnam 1984). The old shorelines of Lake Iroquois include cliffs, bars, beaches and boulder pavements.

2.1.1 Chinguacousy clay loam

Soils in the study area include: Chinguacousy clay loam (rocky phase); and, Jeddo clay loam. Chinguacousy clay loam (rocky phase) is an imperfectly drained soil that has developed in glacial drifts and shale outcrops are frequent. This soil has a typically gently sloping topography (Ontario Department of Agriculture, Report 43).

2.1.2 Jeddo clay loam

Jeddo clay loam is a poorly drained soil that is mainly found in narrow, shallow drainage basins or in the depressional areas associated with undulating or rolling topography, and occur as inclusions in the areas mapped as Chinguacousy (Ontario Department of Agriculture, Report 43). The soil is developed from slightly stony calcareous clay till.

2.2 Aquatic Habitats and Communities

The study area is located within the Bronte Creek, Fourteen Mile Creek and McCraney Creek Watersheds, located within the jurisdiction of Conservation Halton (CH) and the Ministry of Natural Resources and Forestry (MNRF), Aurora District. There are three watercourses within the study area that encompass the McCraney Creek system; Upper McCraney Creek, Taplow Creek and Glen Oaks Creek. Upper McCraney Creek has been diverted to flow west towards Fourteen Mile Creek, flowing along the Canadian National (CN) Railway further downstream of South Service Road West (**Figure 2a**). Taplow Creek and McCraney Creek join at the CN Railway to form the Lower McCraney Creek. The main branch of Fourteen Mile Creek is located west of these systems, crossing South Service Road West within the vicinity of Third Line. Bronte Creek and Sixteen Mile Creek watersheds are located just west and east of the study area, respectively, and are not crossed by Wyecroft Road.

LGL conducted a secondary source review to identify the fish community within the watersheds. The secondary source review included a species at risk screening through aquatic species at risk mapping (DFO 2018), the Natural Heritage Information Centre (NHIC) database (MNRF 2018), the Land

Information Ontario (LIO) database and review of the most recent study conducted, the Fourteen and McCraney Creek Flood Mitigation Opportunities Study (AMEC 2011). Background review also included correspondence with the MNRF Aurora District (May 14, 2018) and CH for natural heritage (fisheries) records. Most of the fish species information available for these creeks was provided by CH, which houses data collected from multiple sources over multiple years. This information, as well as general Aquatic Resource Area (ARA) watercourse species information and incidental observations during field investigations is presented in **Table 1**.

2.2.1 Species at Risk

Background information reviewed indicates that two species at risk, Redside Dace (*Clinostomus elongatus*) and American Eel (*Anguilla rostrata*), have occurrence records within the vicinity of the study area. Both of these species are listed as Endangered by the Status of Species at Risk in Ontario (COSSARO), and were included in the ARA database available through Land Information Ontario (LIO). The ARA database includes Redside Dace within the list of fish species present within Fourteen Mile Creek. In addition, Department of Fisheries and Oceans (DFO) species at risk (SAR) mapping, Environmentally Sensitive Area (ESA) Report for ESA No. 12 (Halton Region and North-South Environmental 2005) and MNRF confirmed the presence of Redside Dace (occupied habitat) in Fourteen Mile Creek. In addition, the lower reaches of Upper McCraney Creek, paralleling the railway corridor, are also considered occupied habitat for this species (see MNRF correspondence dated July 13, 2018 presented in **Appendix D**).

Redside Dace has species and habitat regulation, as defined in *Ontario Regulation 242/08*. American Eel currently has species and general habitat protection and the ARA database indicates that this species occurs within Bronte Creek, which is located immediately west of the study area. Note: Bronte Creek records are not included in Table 1 as this watercourse lies over 200 m away from Wyecroft Road.

2.2.2 Aquatic Field Investigations

An LGL spring field investigation was conducted on May 17, 2018. Weather conditions at the time of the investigation were sunny, clear, wind at 6 km/hr out of the north and an air temperature of 20°C. An aquatic assessment was conducted within approximately 50 m upstream and 150 m downstream of Wyecroft Road/ South Service Road West, using the Ontario Ministry of Transportation (MTO) protocol Fish Guide (MTO 2009). Physical habitat features were surveyed in sufficient detail to enable mapping and identification of key habitat types. The physical habitat attributes assessed included: (a) instream cover, (b) bank stability, (c) substrate characteristics, (d) stream dimensions, (e) barriers, (f) stream morphology, (g) terrain characteristics, (h) stream canopy cover, (i) aquatic vegetation, (j) ground water seepage areas, and (k) visual fish observations. These attributes are similar to what is referenced in CH's Gudelines for Ecological Studies (CH 2017).

TABLE 1. FISH COLLECTION RECORDS WITHIN THE STUDY AREA

Scientific Name	Common Name	14 Mile Creek (FOR-39)	Upper McCraney Creek (MCR-3) (FOR-59)*	Taplow Creek (MCR-4)	Glen Oaks Creek (MCR-5)	COSEWIC	SARA	SARO
Conservation Halton Fish Station Record Dates		**Sept 2000/ May 2001**	**Sept 1995/ Oct 2000/ Aug 2001/ April 2015***	**Sept 1995/ Aug 2001**	**Sept 1995/ Aug 2001**			
Carassius auratus	Goldfish	*x, y*				-	-	-
Chrosomus eos	Northern Redbelly Dace	*y*			*x*	-	-	-
Clinostomus elongatus	Redside Dace	*y*				END	END	END
Luxilus cornutus	Common Shiner	*x, y*				-	-	-
Hybognathus hankinsoni	Brassy Minnow	*y*						
Pimephales notatus	Bluntnose Minnow	*x,y*	*x**			-	-	-
Pimephales promelas	Fathead Minnow	*x, y*	*x*,y*	*x, y*	*x, y*	-	-	-
Rhinichthys atratulus	Blacknose Dace	*x, y*	*x*,y*	*x, y*	*x, y*	-	-	-
Rhinichthys cataractae	Longnose Dace	*y*						
Semotilus atromaculatus	Creek Chub	*x, y*	*x**	*x, y*	*x, y*	-	-	-
Catostomus commersonii	White Sucker	*x, y*	*x**		*x*	-	-	-
Ameiurus sp.	Bullhead sp.				*z*	-	-	-
Oncorhynchus tshawytscha	Chinook Salmon	*y*				-	-	-
Culaea inconstans	Brook Stickleback	*y*	*x**			-	-	-
Ambloplites rupestris	Rock Bass	*x*				-	-	-
Micropterus salmoides	Largemouth Bass	*y*				-	-	-
Lepomis gibbosus	Pumpkinseed	*y*				-	-	-
Etheostoma flabellare	Fantail Darter	*y*						
Etheostoma caeruleum	Rainbow Darter	*x, y*				-	-	-

Note: x = Conservation Halton Collection Data (obtained May 2018)
y = ARA Watercourse general fish list
z = LGL incidental observations

Figures 2a and **2b** present the location of the watercourse crossings identified within the study area. An aquatic habitat summary is presented below which describes existing conditions at each of the watercourse crossings. Representative photographs of the crossings were also taken during investigations and are provided in **Appendix A**; the location of these photographs are displayed on Insets 1 to 4 in **Figure 2b**. For the purposes of this report, all watercourses flow in a north to south direction under Wyecroft Road/ South Service Road West. At the Fourteen Mile Creek crossing, where South Service Road West turns 'north', east of Third Line, this watercourse is described as flowing west to east. There are a number of smaller drainage features that cross Wyecroft Road/South Service Road West or are present on the downstream side of Wyecroft Road/South Service Road West. These features were investigated within the summer field season of 2018, to assess connectivity and aquatic habitat condition.

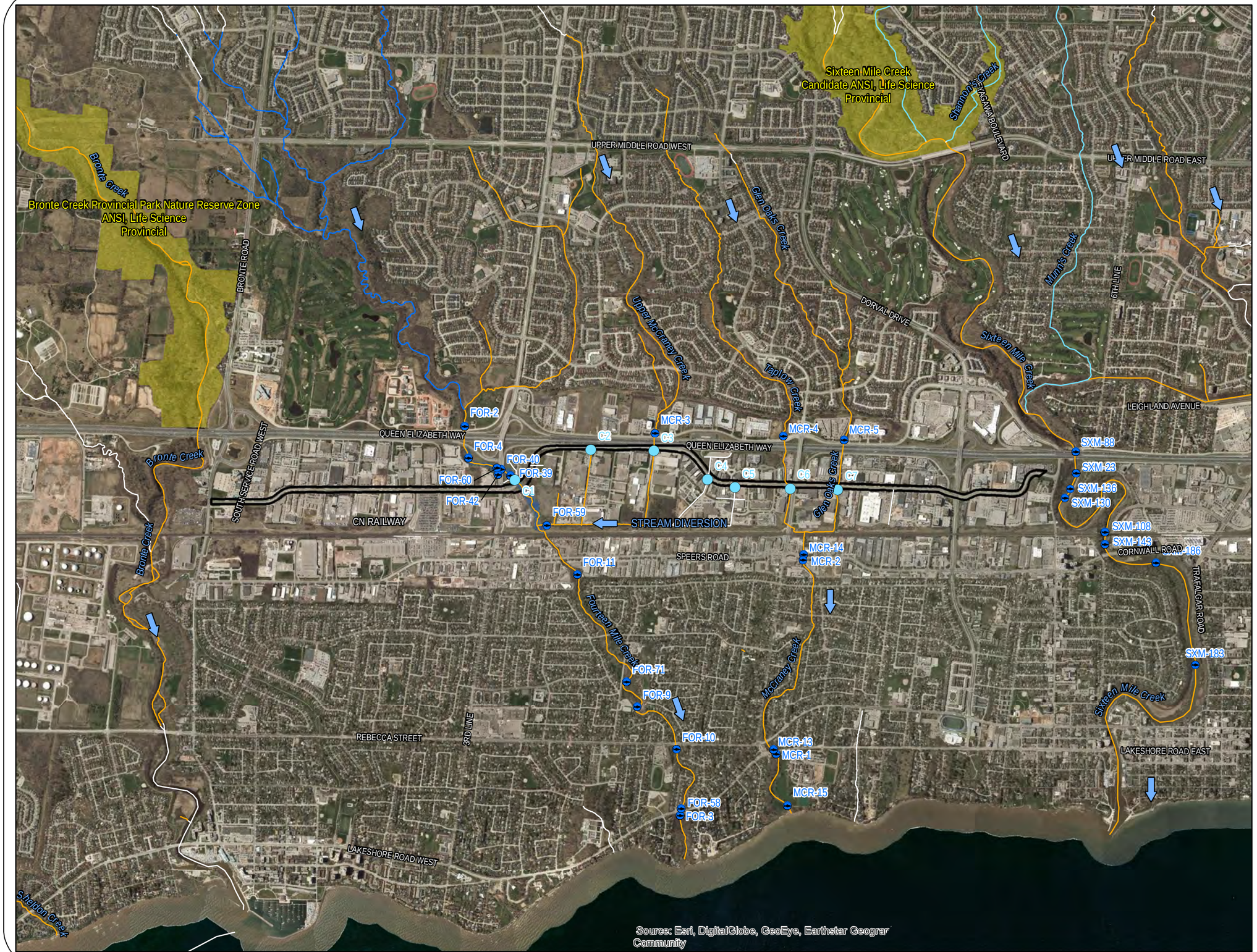
2.2.2.1 Fourteen Mile Creek (Culvert #C1)

The main branch of Fourteen Mile Creek crosses under South Service Road West just east of Third Line and the QEW (**Figure 2a**, **Figure 2b**-Inset 1). This watercourse crosses under all three of these roads within the vicinity. Valleylands have been identified within the study limits and the creek valley and tablelands upstream of the QEW have been designated as ESA 12 (Halton Region & North-South 2005). The study reach represents the lower reach of the creek, outletting to Lake Ontario within 3.4 km downstream of South Service Road West.

Fourteen Mile Creek crosses under South Service Road West via a 6 m wide twin cell open bottomed structure (approximate dimensions) (Photo 1). The south cell conveys the main flow while the north cell appears to be designed as a dry crossing, likely supporting some flow during high flow events. Upstream (west) of South Service Road West, morphology is comprised of mostly riffle and run habitat (Photo 2), as well as a large (20-25 m long) pooling zone located approximately 50 m upstream of South Service Road West (Photo 3). Wetted dimensions measured between 2.5 m to 7 m wide within this reach and appears over-widened at the large pool, which measured approximately 10 m wide (wetted) at the time of the spring survey. Bankfull dimensions average 7.5 m wide in the upstream reach. Substrates are dominated by cobble and some gravel as well as scattered boulders within riffles and runs. There are portions of the channel that have exposed shale pavement, particularly within the pool. Riparian vegetation is comprised of deciduous lowland trees including willow species and balsam poplar (*Populus balsamifera*). Other species include young willow species, red-osier dogwood (*Cornus sericea*), blackberry (*Rubus* sp.) cattail (*Typha* sp.), reed canary grass (*Phalaris arundinacea*) and field horsetail (*Equisetum arvense*).

There is a low concrete lip that extends between the culvert inlet wingwall and crosses the channel within 1 m of the culvert inlet (Photo 4). This lip appears to represent a partial barrier to fish movement during low flow conditions (approximately 1/3 of lip is exposed). Where water travels over the lip, depth was only 5 cm (Photo 11). A small scour pool (24 cm deep in spring) is present immediately downstream of this lip and the water travels along the west wall of the culvert. A large gravel and cobble point bar extends into the north cell and a portion of the south cell, immediately upstream of the culvert inlet.

Downstream of South Service Road West, a large log is located instream within 65 cm of the structure outlet (Photo 5) causing some flow to be directed into the north cell, in turn causing a backwater area (Photo 6, 12). This log was not present (appeared to have been removed by maintenance) at the time of the summer survey. Inside the south cell, exposed substrates are present near the upstream end, again on the north side of the structure. Spring water depth is 25 cm deep at the upstream end and an average of 13 cm deep at the downstream end over gravel and cobble substrates. Water depth upstream of the log measures 40 cm deep, as some scour is occurring here as water travels underneath the log. The stream bends slightly north downstream of the double cell structure, with point bar material (cobble, gravel) extending along the south side, supporting some terrestrial vegetation growth here (cultural meadow species, young tree saplings) (Photo 7).



LEGEND

- Wyecroft Road Within the Study Area
- Cold Water Watercourse
- Cool Water Watercourse
- Warm Water Watercourse
- Unknown Temperature Watercourse
- Watercourse Flow Direction
- Conservation Halton Fish Station
- Culvert Number
- Locally Significant Wetland
- Area of Natural and Scientific Interest

Data Sources: LGL Limited field surveys, Ministry of Natural Resources and Forestry, Town of Oakville, Conservation Halton.

400 200 0 400 Metres

AQUATIC RESOURCES

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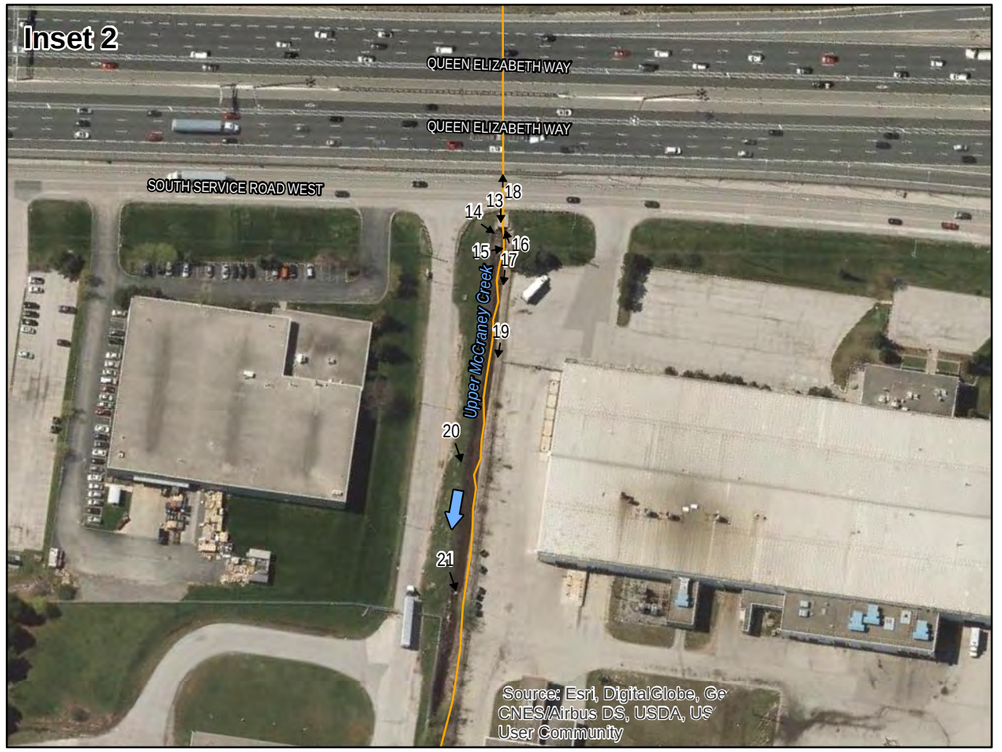
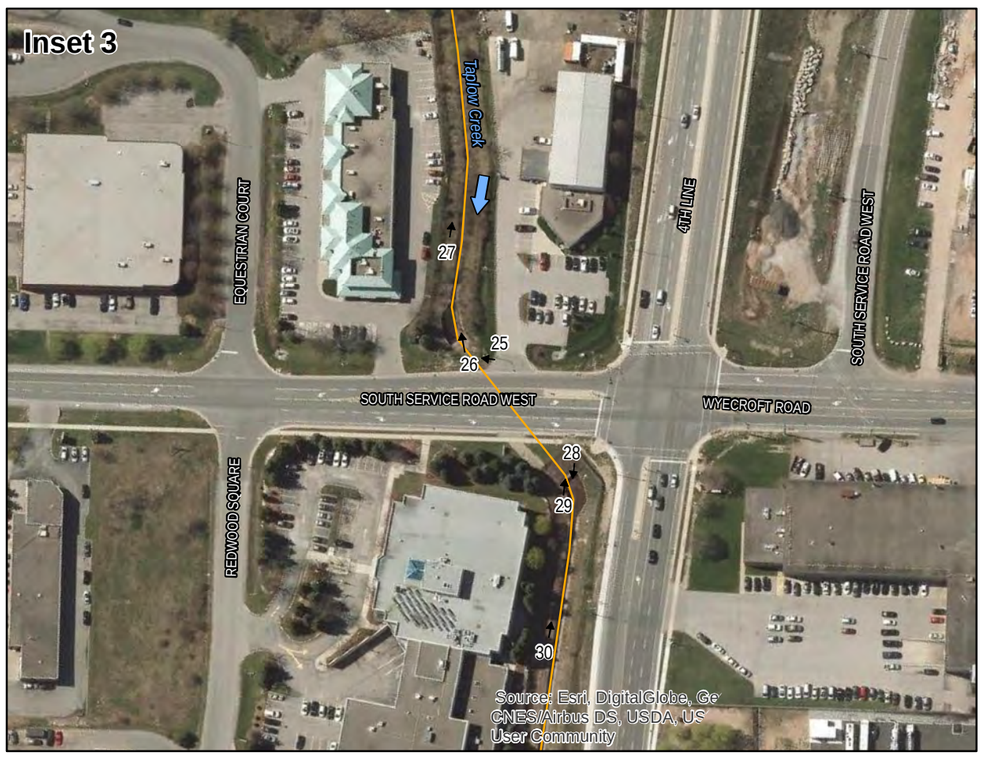
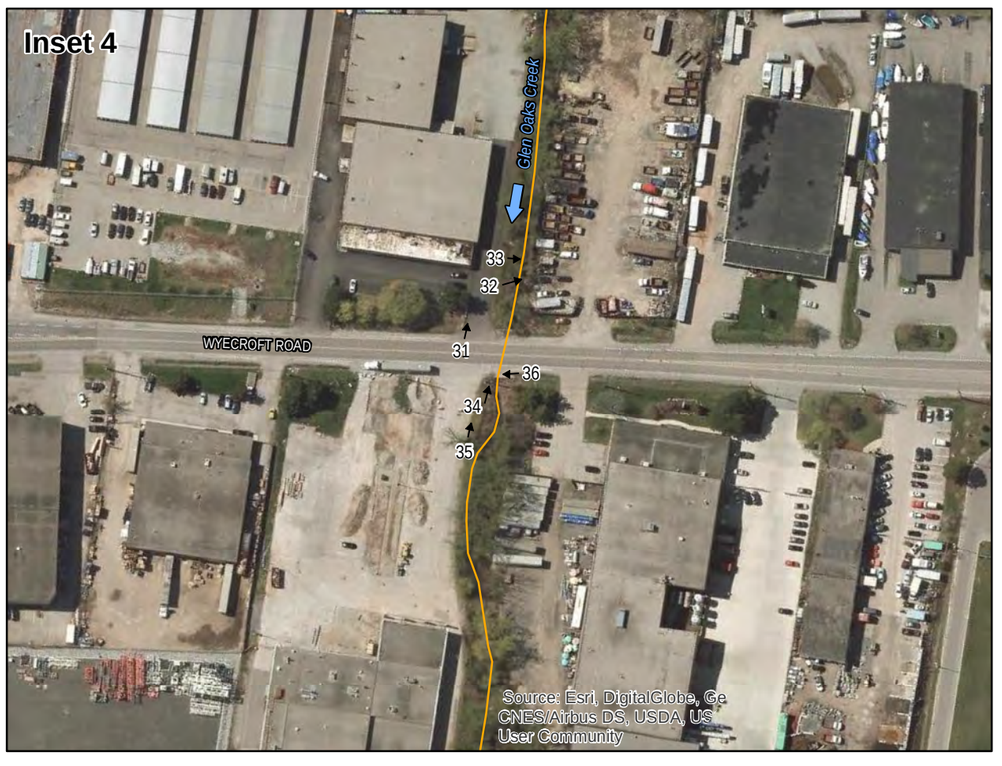
Project: TA8828	**Figure:** 2a
Date: June, 2019	**Prepared By:** JJP
Scale: 1 : 25,000	**Checked By:** EEB







LEGEND

- 1-35 Photo ID (see Appendix A)
- Warm Water Watercourse
- Unknown Temperature Watercourse
- Watercourse Flow Direction
- Locally Significant Wetland

Data Sources: LGL Limited field surveys, Ministry of Natural Resources and Forestry, Town of Oakville, Conservation Halton.

40 20 0 40 Metres

N

AQUATIC INVESTIGATIONS

LGL LIMITED
environmental research associates

Project: TA8828	**Figure:** 2b
Date: June, 2018	**Prepared By:** MWF
Scale: 1 : 2000	**Checked By:** EEB

Morphology downstream of the structure is comprised of a riffle, transitioning into run habitat (Photo 8), with a shallow flat present approximately 45 m downstream of the structure (Photo 9). Channel dimensions (in spring) measured 2.4 m wide and 27 cm deep at the upstream riffle, widening to 5.5 m wide and 15 cm deep (6 m wide, 38 cm deep bankfull) within the flat habitat. A large pool is present at a bend located 115 m downstream, measuring approximately 75 cm deep and 10 m long, with an eroding outside bank (Photo 10). Substrates are dominated by gravel with some shale boulders, particularly at upstream riffle. Shale pavement is exposed in some areas. A 2.5 m high exposed shale valley slope is present along the north side of the watercourse within approximately 80 m downstream of South Service Road West. Some slope erosion is notable above the shale and this continues along both banks within the downstream reach. The riparian habitat supports deciduous swamp vegetation downstream of South Service Road West. Riparian vegetation is comprised of fairly open habitat (<30% overhead cover) along the margins of the watercourse with large willows (*Salix* sp.), Manitoba maple (*Acer negundo*), black walnut (*Juglans nigra*), dogwoods (*Cornus* sp.) and hawthorn (*Crataegus* sp.) providing some cover. Other riparian species include basswood (*Tilia americana*), young ash (*Fraxinus* sp.), grasses, and herbaceous species including field horsetail (*Equisetum arvense*), goldenrods (*Solidago* sp.), aster (*Symphyotrichum* sp.), Virginia creeper (*Parthenocissus quinquefolia)*, and bittersweet nightshade (*Solanum dulcamara*). Instream cover is provided mostly by large and small instream woody debris and shale substrates.

Fourteen Mile Creek supports a warmwater thermal regime, as well as some coolwater (i.e., Redside Dace) and migratory coldwater ((Chinook Salmon (*Oncorhynchus tshawytscha*)) species. Forage fish appeared abundant in both the upstream and downstream reaches of this watercourse. Species noted (visually) include White Sucker (*Catostomus commersonii*), Blacknose Dace (*Rhinichthys atratulus*), Fathead Minnow (*Pimephales promelas*) and shiner species. A total of nine species are confirmed from fish stations within the vicinity of South Service Road West. The ARA fish species list includes a total of 18 species.

2.2.2.2 Upper McCraney Creek (AU-0004-MCC) (Culvert #C3)

McCraney Creek crosses South Service Road West, approximately 270 m east of Progress Court (**Figure 2a**, **Figure 2b**-Inset 2). This watercourse has been diverted to Fourteen Mile Creek via a ditch located on the north side of the railway (AMEC 2011). Therefore, this watercourse now lies within the Fourteen Mile Creek catchment area. The reach upstream of South Service Road West was not investigated, as this watercourse is enclosed under a road corridor (South Service Road West, QEW, North Service Road) for approximately 95 m. An open channel is located upstream of this corridor, flowing in between residential neighbourhoods (Photo 23). This creek supports permanent flow.

Downstream of South Service Road West, a hardened trapezoidal channel exists, comprised of concrete bottom and steep concrete banks (Photo 13). The banks are experiencing erosion and are caving in along the top of the concrete bank near the culvert outlet (Photo 14). In addition, the lower banks have been scoured out, measuring up to 90 cm undercut within 6 m downstream of the culvert outlet (Photo 15). The closed bottom culvert measures approximately 3 m wide by 2 m high and the culvert is perched approximately 53 cm above the channel bottom or 46 cm from the water surface (Photo 16). These dimensions measured 65 cm / 55 cm, respectively, in low flow. Angular rock (rap-rap) has been placed at the outlet, presumably for erosion control (Photo 17). No substrates are present in the culvert and numerous perches were visible; the downstream one measuring 42 cm high (Photo 18).

Morphology in the downstream reach is dominated by riffles and runs within 50 m, transitioning into flats downstream of this point. Wetted dimensions in May 2018 measured 1.5 m wide and 20 cm deep (at culvert outlet) and ranged between 2.8 m to 3.4 m wide further downstream with depths ranging between 5 cm to 18 cm. Although the bed is concrete, some cobble sized angular substrates are present within the channel between the culvert and approximately 50 m downstream (Photo 19). Gravel, sand and clay

deposition is notable downstream of this point, on top of the concrete layer (Photo 20). There are a few patches of watercress (*Nasturtium officinale*) present within 30 m downstream although minimal instream cover is generally present as well as other instream structures. Riparian vegetation is limited to a few Austrian pines (*Pinus nigra*) and some tree growth along the fence paralleling the east bank. Minimal vegetation is present on the bank slopes although small shrubs and saplings, including Tartarian honeysuckle (*Lonicera tatarica*), staghorn sumac (*Rhus typhina*), common buckthorn (*Rhamnus cathartica*) and white elm (*Ulmus americana*) have managed to grow through the hardened banks. The riparian buffer is narrow and comprised of an 8 m wide swath of manicured grass, adjacent to a driveway on the west side and a parking lot extending within 1 m of the bank of the east side.

The channel appeared to support deeper water depths approximately 130 m downstream, where access was not possible (area fenced off) (Photo 21). Stagnant or slower flowing water was noted here, with estimated water depth measuring between 20 cm to 30 cm deep. Forage fish were observed and instream and overhead vegetative cover (overhanging willows) increases within this reach.

McCraney Creek supports a warmwater thermal regime, and supports forage fish species. A total of six species are confirmed from fish stations within this system.

2.2.2.3 Taplow Creek (AU-0001-MCC) (Culvert #C6)

This watercourse is located just west of 4th Line and is channelized within the assessment reach as well as downstream of the study area (**Figure 2a**, **Figure 2b-**Inset 3). It appears to support natural channel characteristics upstream of the QEW, based on air photo interpretation. Within the assessment reach, this watercourse is fenced off both upstream and downstream of Wyecroft Road. The structure under Wyecroft Road is a two cell open bottomed structure (wet and dry cells) that each measure approximately 3 m wide by 1.7 m high (invert), located just west of 4th Line. This structure is skewed on an angle to the road and the inlet and outlet ends measure approximately 7 m and 12 m, respectively, from the end of the road (Photo 24). Upstream of Wyecroft Road, an approximately 8 m long and 4.5 m wide (maximum) concrete inlet area is present (Photo 25). This reach supports flat morphology and 12 cm to 15 cm deep water at the time of the survey. Upstream of this inlet, the channel is comprised of concrete block bottom and mainly riffle and run morphology. Wetted channel dimensions measured 1.6 m to 1.7 m wide and 10 cm deep (on average). Instream vegetation is minimal with the exception of cattail, reed canary grass and purple loosestrife (*Lythrum salicaria*) growing along the bank edges within the inlet area. The banks are densely vegetated by mostly shrubs, comprised of dogwood, shrub willow, dogwood, apple (*Malus* sp.), rose (*Rosa* sp.), eastern red cedar (*Juniperus virginiana*) and balsam poplar (*Populus balsamifera*), within a 15 m wide riparian zone, providing approximately 30% to 60% overhead cover (Photo 26).

Rifle/run morphology is present inside the culvert and the wetted channel measured approximately 1.45 m wide and 11 cm deep at the time of survey. The east cell was comprised of soft and moist substrates.

Downstream of Wyecroft Road, a concrete lined over widened outlet area exists measuring approximately 6.5 m wide (3 m wetted width), with gravel deposition along the west side of the channel (Photos 27, 28). Channel morphology is dominated by riffles and runs, measuring approximately 1.8 m wide and 8 cm to 10 cm deep at the time of survey. The bank to bank measurements were 3.5 m and 50 cm deep, supporting low gradient banks. Channel substrates and banks are comprised of the concrete block material (Photo 29), which is eroding within one area along the west bank. Some deposition of sand and gravel is occurring in between the block material. Instream vegetation is comprised of common reed (*Phragmites australis*), watercress and cattail, which is more prevalent within 40 m downstream of the structure (Photo 29). Riparian cover is minimal and mostly vegetated with cultural meadow vegetation including grasses, wild carrot (*Daucus carota*), clover (*Trifolium* sp.) and garlic mustard (*Alliaria petiolata*). Scattered trees grow next to the fence lines but do not provide overhanging cover as the fences are set back from the banks.

Taplow Creek supports a warmwater thermal regime, and supports forage fish species. A total of three species are confirmed from fish stations within this system. This creek supports permanent flow.

2.2.2.4 Glen Oaks Creek (AU-0002-MCC) (Culvert #C7)

This creek crosses Wyecroft Road approximately 300m east of Fourth Line (**Figure 2a**, **Figure 2b**-Inset 4). Within 530 m downstream of Wyecroft Road, this creek joins Taplow Creek (AU-0001-MCC), at the CN railway. Within the assessment reach, this watercourse supports natural banks and bottom, unlike the other two McCraney Creek systems present within the study area. Upstream of Wyecroft Road, the creek flows through a very narrow riparian corridor between industrial properties. There is approximately 7 m distance between the parking lot on the west side and the creek; and a minimal buffer along the east bank. Upstream of Wyecroft Road, wetted channel dimensions measured between 1.4 m and 3.2 m wide and 8 cm to 15 cm deep at the time of survey. Bankfull dimensions measure approximately 5 m wide and 35 cm deep. Morphology is comprised mostly of riffles and substrates are composed of cobble and gravel (shale) (Photo 30). Instream vegetation is minimal although the banks support overhanging dogwood, reed canary grass and spotted touch-me-not (*Impatiens capensis*) within the vicinity of the culvert inlet. Several mature willow, common buckthorn, Norway maple (*Acer platanoides*), chokecherry (*Prunus virginiana*) and riverbank grape (*Vitis riparia*) grow along the channel, providing approximately 30% overhead cover. Top of bank vegetation has been removed along portions of the channel and dumping of debris including concrete, wood skids and soil is prevalent within this reach, particularly along the east bank (Photos 31, 32).

The culvert under Wyecroft Road is single cell open bottomed culvert measuring 6 m wide by 1.2 m high (invert). The invert is a bit lower on the east side, measuring only 72 cm above the channel substrate. The wetted channel travels along the west side of the culvert here (Photo 33). Within 50 m downstream, wetted channel dimensions appear to range between 1.4 m to 2 m wide and 5 cm to 25 cm deep. Channel morphology is comprised of a mix of riffles, runs and flat morphology and substrates are composed of mostly sand and gravel (shale) (Photo 34). The riparian cover is more open near the culvert (< 30%) as a hydro line crosses the channel here (Photo 35). Downstream of this area, riparian cover increases to up to 70% cover; however, similar to the upstream reach some areas of bank do not support vegetation or a minimal riparian width (average of 4 m to 7 m wide from stream bank). Bank vegetation includes Tartarian honeysuckle, common buckthorn, willow, Manitoba maple, white elm, dying ash trees and Norway maple. Near the culvert, cattail and purple loosestrife grow along the channel margins, with goldenrod, spotted jewelweed and raspberry also present. Dumping (garbage, soil) and woody debris build-up, indicative of flashy flows, is prevalent throughout the downstream reach. Further downstream, pool habitat is common and forage fish were also abundant using these pools.

Glen Oaks Creek supports a warmwater thermal regime, and supports forage fish species. A total of five species are confirmed from fish stations within this system. An additional genus, bullhead (*Ameiurus* sp.), was observed by LGL in addition to Creek Chub (*Semotilus atromaculatus*) using the pool habitats at the time of survey. This creek supports permanent flow.

2.2.2.5 Drainage Features

There were three drainage features investigated within the study area, conveyed by Culverts 2, 4 and 5. Drainage conveyed by Culvert 2 travels mostly underground (in sewer) south of South Service Road West. Culverts 4 and 5 are both drainage ditches supporting very dense vegetation. The drainage features eventually drain to Fourteen Mile Creek and McCraney Creek systems, although would not support direct fish habitat at South Service Road West.

2.3 Vegetation and Vegetation Communities

The geographical extent, composition, structure and function of the vegetation communities were identified through air photo interpretation and a field investigation. Air photos were interpreted to determine the limits and characteristics of the vegetation communities in the study area. Field investigations of the vegetation communities along Wyecroft Road from Bronte Road to Kerr Street was conducted on May 24, June 7, July 16 and September 14, 2018. The investigation was conducted within the road right-of-way (ROW) and adjacent habitat, to the extent possible. These investigations were carried out to ground truth the boundaries of the vegetation communities and to conduct botanical surveys.

The vegetation communities were classified according to the *Ecological Land Classification for Southern Ontario: First Approximation and Its Application* (Lee *et al*. 1998). A plant list and a description of the general structure of vegetation communities were obtained during the field investigation. Plant species status was reviewed for Ontario (Oldham 2009), and Halton Region (Varga 2000 and Riley 1989). Vascular plant nomenclature follows Newmaster *et al*. (1998) with a few exceptions that have been updated to Newmaster *et al.* (2005).

2.3.1 Vegetation Communities

Vegetation communities identified within the study area consist primarily of manicured areas with amenity trees planted. The manicured areas consist of strips of grass dominated habitat that are regularly mown, with planted amenity trees including numerous planted Kentucky coffee-trees (*Gymnocladus dioicus*). A deciduous forest (FOD) was identified northeast and adjacent to Kerr Street. This community, associated with the Sixteen Mile Creek, is partially situated on a steep slope that extends down from Kerr Street to the floodplain below. This portion of the FOD contained several Siberian elm (*Ulmus pumila*) trees that were observed to be in very poor condition. The understorey contained abundant common buckthorn, and ground flora within the right-of-way was dominated by non-native species including common dandelion (*Taraxacum officinale*), garlic mustard (*Alliaria petiolata*), and the toxic plant poison-ivy (*Toxicodendron radicans*), all observed as occasional to abundant. A Fresh-Moist Lowland Deciduous Forest (FOD7) was identified through air photo interpretation because property access was not available.

One Willow Mineral Swamp Thicket (SWD4-1) was identified along Fourteen Mile Creek, and this community is bisected by South Service Road West where the watercourse is conveyed through a 6 m wide twin cell open bottomed structure (approximate dimensions). The portion of the swamp community, within the ROW, is more open with few large trees but occasional to abundant shrub cover. Species identified include red ash (*Fraxinus pennsylvanica*), Manitoba maple, black walnut, white willow (*Salix alba*) and sandbar willow (*Salix exigua*).

Cultural vegetation communities identified during LGL's botanical investigation include Mineral Cultural Meadows (CUM1-1a to CUM1-1e), Cultural Thicket (CUT1a and CUT1b), and Mineral Cultural Woodlands (CUW1a and CUW1b). Cultural vegetation communities typically persist in areas that are regularly disturbed, and as a result, generally contain a high proportion of invasive and/or non-native plant species that are disturbance tolerant. Such species included smooth brome (*Bromus inermis*), Canada goldenrod (*Solidago canadensis*), bird's-foot trefoil (*Lotus corniculata*), tufted vetch (*Vicia cracca*), and common plantain (*Plantago major*). Two additional cultural communities were identified through air photo interpretation on lands where property access was not granted. The two communities include Dry-Moist Old Field Meadow/Mineral Cultural Thicket (CUM1-1/CUT1) and Mineral Cultural Thicket/Mineral Cultural Woodland (CUT1/CUW1).

Overall, the vegetation communities identified within the study area are considered widespread and common in Ontario and are secure globally. The vegetation communities identified during LGL's botanical investigations are delineated in **Figures 3a** to **3c** and are described in **Table 2.**

There are many Manicured (M) areas identified within the study area that are not defined by the ELC, these areas include mown lawns, gardens and planted trees.

2.3.2 Flora

A total of 132 plant species were recorded within the study area. Four of these plants could only be identified to genus and are not included in the following calculations. Of the 128 plants identified to species, 65 (51%) plant species identified are native to Ontario and 63 (49%) plant species are considered introduced and non-native to Ontario. Many of the native species identified were observed within forest, cultural woodland, and wetland communities surveyed within the vicinity of the study area. A list of vascular plants is presented in **Appendix B.**

2.3.3 Species at Risk

A review of the Natural Heritage Information Centre's online mapping revealed element occurrence records for eastern flowering dogwood (*Cornus florida*), a species listed as Endangered in Ontario. A search for individuals of this species was undertaken during the botanical and tree investigations, however, this species was not observed within the study limits, or within proximity to the study limits where surveys along watercourses went beyond the study limits. A request for information was submitted to the MNRF and a response received July 13, 2018 (see **Appendix D**). The letter received provided a summary of potential species at risk and rare species occurring on or adjacent to the study area. The list was reviewed and the necessary field surveys undertaken to screen for potential species at risk including consideration of potential environmental impacts that may result from the activity.

Table 3 outlines plant species identified as Rare in Halton Region by Riley (1989) and Varga (2000), and where these species were observed within the study area. One species, Kentucky coffee-tree is of provincial concern (S2), the other four species all have populations that are considered apparently secure or secure provincially (see **Appendix C** for rarity definitions). All of the rare tree species identified in **Table 3** are planted within manicured areas, throughout the study area. Common hackberry (*Celtis occidentalis*) was also found within a cultural woodland, and could be a result of seed from planted trees within the vicinity. It has been previously confirmed with MNRF biologists that streetscape and planted Kentucky coffee trees are not protected under the Endangered Species Act, 2007 (see **Section 2.4.3** below).

TABLE 2. SIGNIFICANT PLANT SPECIES IDENTIFIED WITHIN THE STUDY AREA

Scientific Name	Common Name	Vegetation Community	Status	
			SRank	Halton (Riley/Varga)*
Celtis occidentalis	common hackberry	M, CUW1a	S4	R3
Quercus bicolor	swamp white oak	M	S4	R1
Gymnocladus dioicus	Kentucky coffee-tree	M	S2	RINT**
Oenothera biennis	common evening-primrose	SWD4-1	S5	R1
Acer X fremannii	freeman's maple	M	S4?	R3

*Number of stations species were observed / **INT=Introduced

LEGEND

- Watercourse
- Watercourse Flow Direction
- Locally Significant Wetland
- Breeding Bird Point Count Station
- Anuran Monitoring Station
- Grading Limit
- Urban River Valley Greenbelt Designation

Vegetation Communities

- Vegetation Community Boundary

CUM1-1(1-f)	Dry-Moist Old Field Meadow Type
CUT1	Cultural Thicket
CUT1/CUW1	Cultural Thicket/Cultural Woodland
CUW1b	Cultural Woodland
D	Disturbed
FOD7	Fresh-Moist Lowland Deciduous Forest Ecosite
M	Manicured
SWD4-1	Willow Mineral Deciduous Swamp Type

Data Sources: LGL Limited field surveys, Ministry of Natural Resources and Forestry, Town of Oakville.

80 40 0 80 Metres

N

NATURAL HERITAGE

LGL LIMITED
environmental research associates

Project:	TA8828	**Figure:**	3a
Date:	June, 2019	**Prepared By:**	JJP
Scale:	1 : 4000	**Checked By:**	NMF

LEGEND

- Watercourse
- Watercourse Flow Direction
- Locally Significant Wetland
- Breeding Bird Point Count Station
- Anuran Monitoring Station
- Grading Limit

Vegetation Communities

- Vegetation Community Boundary

CUM1-1(d-d)	Dry-Moist Old Field Meadow Type
CUT1	Cultural Thicket
CUT1/CUW1	Cultural Thicket/Cultural Woodland
CUW1b	Cultural Woodland
D	Disturbed
FOD7	Fresh-Moist Lowland Deciduous Forest Ecosite
M	Manicured
SWD4-1	Willow Mineral Deciduous Swamp Type

Data Sources: LGL Limited field surveys, Ministry of Natural Resources and Forestry.

80 40 0 80 Metres

N

NATURAL HERITAGE

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environmental research associates

Project:	TA8828	**Figure:**	3b
Date:	June, 2019	**Prepared By:**	JJP
Scale:	1 : 4000	**Checked By:**	NMF

LEGEND

- Watercourse
- Watercourse Flow Direction
- Locally Significant Wetland
- Breeding Bird Point Count Station
- Anuran Monitoring Station
- Grading Limit
- Urban River Valley Greenbelt Designation

Vegetation Communities

- Vegetation Community Boundary

CUM1-1(dc)	Dry-Moist Old Field Meadow Type
CUT1	Cultural Thicket
CUT1/CUW1	Cultural Thicket/Cultural Woodland
CUW1b	Cultural Woodland
D	Disturbed
FOD7	Fresh-Moist Lowland Deciduous Forest Ecosite
M	Manicured
SWD4-1	Willow Mineral Deciduous Swamp Type

Data Sources: LGL Limited field surveys, Ministry of Natural Resources and Forestry.

0 25 50 75 100 Meters

N

NATURAL HERITAGE

LGL LIMITED
environmental research associates

Project: TA8828	**Figure:** 3c
Date: June, 2019	**Prepared By:** JJP
Scale: 1 : 3000	**Checked By:** NMF

TABLE 3.
SUMMARY OF ECOLOGICAL LAND CLASSIFICATION VEGETATION COMMUNITIES

ELC Code	Vegetation Type	Species Association	Community Characteristics
TERRESTRIAL – NATURAL/SEMI-NATURAL			
FOD	Deciduous Forest		
FOD	Deciduous Forest	**Canopy:** includes Siberian elm (*Ulmus pumila*) observed as occasional to abundant along the northern edge of the community, Manitoba maple (*Acer negundo*), white oak (*Quercus alba*) and Norway maple (*Acer platanoides*) were observed as rare to occasional, and sweet cherry was observed as rare. **Understory:** includes common buckthorn (*Rhamnus cathartica*) observed as abundant to dominant, and American ash (*Fraxinus americana*), Siberian elm, tartarian honeysuckle (*Lonicera tatarica*), Manitoba maple and staghorn sumac (*Rhus typhina*) as rare to occasional. **Ground Cover:** includes poison-ivy (*Toxicodendron radicans*), as abundant, and Kentucky bluegrass (*Poa pratensis*), garlic mustard (*Alliaria petiolata*), and yellow avens (*Geum aleppicum*) variably observed as rare to occasional.	• Tree cover > 60% (FO). • Deciduous trees > 75% of canopy cover (D).
FOD7*	Fresh-Moist Lowland Deciduous Forest*	**Canopy:** includes species like Manitoba maple (*Acer negundo*), willows (*Salix* spp.), red ash (*Fraxinus pennsylvanica*) and black walnut (*Juglans nigra*). **Understory:** includes species like willows, common buckthorn, tartarian honeysuckle, Manitoba maple, and red ash. **Ground Cover:** includes species like Kentucky bluegrass and, reed canary grass (*Phalaris arundinacea*).	• Tree cover > 60% (FO). • Deciduous trees > 75% of canopy cover (D).

TABLE 3.
SUMMARY OF ECOLOGICAL LAND CLASSIFICATION VEGETATION COMMUNITIES

ELC Code	Vegetation Type	Species Association	Community Characteristics
TERRESTRIAL – CULTURAL			
CUM	Cultural Meadow		
CUM1-1 (a-f)	Dry-Moist Old Field Meadow	**Emergent Trees/Shrubs**: includes American elm (*U. americana*), Manitoba maple, red cedar (*Juniperus virginiana*), black walnut, common buckthorn, staghorn sumac, Russian olive (*Elaeagnus angustifolia*), and tartarian honeysuckle all observed as rare to occasional. **Ground cover:** includes Kentucky bluegrass, Canada bluegrass (*Poa compressa*), bird's-foot trefoil (*Lotus corniculatus*), Canada goldenrod (*Solidago canadensis*), wild teasel (*Dipsacus fullonum* ssp. *sylvestris*), common plantain and ribgrass (*Plantago major* and *P. lanceolata*), garlic mustard, common dandelion (*Taraxacum officinale*), and Canada thistle (*Cirsium arvense*) variably observed as rare to abundant.	• Cultural communities (CU). • Tree cover and shrub cover < 25% (M). • Mineral soil (1). • This community can occur on a wide range of soil moisture regimes (Dry-Moist) (-1).
CUM1-1/ CUT1*	Dry-Moist Old Field Meadow/ Mineral Cultural Thicket	**Canopy:** could include species like trembling aspen (*Populus tremuloides*), Manitoba maple, and black walnut. **Understory:** could include species like riverbank grape, common buckthorn and tree seedlings like trembling aspen, Manitoba maple and black walnut. **Ground cover:** includes species like Kentucky bluegrass, smooth brome and wild teasel.	• Cultural communities (CU). • Tree cover and shrub cover < 25% (M). • Mineral soil (1). • Can occur on a wide range of soil moisture regimes (Dry-Moist) (-1). • Tree cover ≤ 25%; shrub cover ≤ 25% (T). • Mineral soil (1). • Community resulting from, or maintained by, cultural or anthropogenic-based disturbances.

TABLE 3.
SUMMARY OF ECOLOGICAL LAND CLASSIFICATION VEGETATION COMMUNITIES

ELC Code	Vegetation Type	Species Association	Community Characteristics
CUT	Cultural Thicket		
CUT1 (a-b)	Mineral Cultural Thicket	**Canopy:** includes Siberian elm. **Understory (shrubs):** includes staghorn sumac, common buckthorn, tartarian honeysuckle, riverbank grape and Japanese Knotweed (*Polygonum cuspidatum*). **Ground cover:** includes Kentucky bluegrass, smooth brome (*Bromus inermis*), poison-ivy, wild teasel, garlic mustard, Canada goldenrod, reed canary grass and Canada thistle variably observed as rare to abundant.	• Cultural communities (CU). • Tree cover ≤ 25%; shrub cover ≤ 25% (T). • Mineral soil (1). • Community resulting from, or maintained by, cultural or anthropogenic-based disturbances.
CUT1/CUW1*	Mineral Cultural Thicket/Mineral Cultural Woodland	**Canopy:** includes species like trembling aspen, black walnut, Manitoba maple and red ash. **Understory:** includes species like common buckthorn, tartarian honeysuckle, and riverbank grape. **Ground cover:** includes species like Kentucky bluegrass, reed canary grass, garlic mustard, wild carrot (*Daucus carota*), thistles (*Cirsium* spp.), and Canada goldenrod	• Cultural communities (CU). • Tree cover ≤ 25%; shrub cover ≤ 25% (T). • Mineral soil (1). • Community resulting from, or maintained by, cultural or anthropogenic-based disturbances. • 25% < tree cover < 35% (W). • Mineral soil (1). • Pioneer community resulting from, or maintained by, anthropogenic-based influences.
CUW	Cultural Woodland		
CUW1 (a-b)	Mineral Cultural Woodland	**Canopy:** includes black walnut, willows (*Salix* sp.), Eastern white cedar (*Thuja occidentalis*), and Norway and white spruce (*Picea abies* and *P. glauca*) variably observed as occasional to dominant. **Understory:** includes Manitoba maple, American elm, red maple (*Acer rubrum*), common buckthorn, tartarian honeysuckle, and riverbank grape observed variably as rare to abundant. **Ground cover:** includes reed canary grass, Kentucky bluegrass, garlic mustard, Canada goldenrod, leafy spurge (*Euphorbia esula*), common buckthorn, wild carrot, and Canada thistle variably observed as rare to abundant.	• Cultural communities (CU). • 25% < tree cover < 35% (W). • Mineral soil (1). • Pioneer community resulting from, or maintained by, anthropogenic-based influences.

TABLE 3.
SUMMARY OF ECOLOGICAL LAND CLASSIFICATION VEGETATION COMMUNITIES

ELC Code	Vegetation Type	Species Association	Community Characteristics
WETLAND			
SWD	Deciduous Swamp		
SWD4-1	Willow Mineral Deciduous Swamp	**Canopy:** includes white and crack willows (*Salix alba* and *S. fragilis*), black walnut, and red ash observed as rare to occasional. **Understory:** includes Manitoba maple, red ash, sandbar willow (*Salix exigua*), and tartarian honeysuckle observed as occasional to abundant. **Ground cover:** includes reed canary grass, fowl meadow grass (*Poa palustris*), blue vervain (*Verbena hastata*), common evening-primrose (*Oenothera biennis*), spotted touch-me-not (*Impatiens capensis*), and wild parsnip (*Pastinaca sativa*).	• Tree or shrub cover >25% and dominated by hydrophytic shrub and tree species (SW). • Deciduous tree cover >75% of canopy cover (D). • Less common associations of willow and associated hardwoods. Areas where flooding duration is short. Common in floodplains (4). • Willow dominant swamp (-1).
OTHER**			
Planted	Manicured lawns, planted boulevard trees, etc.		
M	Manicured grasses and planted shrubs and/or trees	Areas where large expanses of grass/shrubs/trees are maintained and/or planted. **Trees/shrubs:** includes Norway maple, honey locust (*Gleditsia triacanthos*), Colorado spruce (*Picea pungens*), Norway spruce, Austrian pine (*Pinus nigra*), small leaf linden (*Tilia cordata*), Kentucky coffee-tree (*Gymnocladus dioicus*), basswood (*Tilia americana*), and various oaks (*Quercus sp.*). **Ground cover:** includes Kentucky bluegrass, common dandelion, bird's-foot trefoil, and common plantain.	

**Based on air photo interpretation and observations from within the right-of-way where no access was available / **Codes not defined by ELC.*

2.4 Tree Resources

2.4.1 Methodology

An ISA Certified Arborist conducted an inventory of tree resources on June 4, 2018. The tree survey was undertaken along Wyecroft Road between Bronte Road and Kerr Street. All trees located within the existing Wyecroft Road ROW were surveyed. The following was completed for each tree:

- Species identification, including screening for species regulated by the Ontario *Endangered Species Act*, 2007 (ESA);
- Measurements: diameter at breast height (DBH) and estimation of canopy dripline;
- Location: trees were assigned a numerical identifier using metal tags and their locations recorded using a TopCon GRS1 GPS unit. GPS accuracy is within 1-2 metres horizontal distance. If greater accuracy is required, the locations will need to be captured by an Ontario Land Surveyor for sub-metre accuracy; and,
- Health Assessment: trees were assessed as poor, fair or good based on qualities such as trunk integrity, crown structure, vigour, and dieback. Physical irregularities and defects were also noted for each tree.

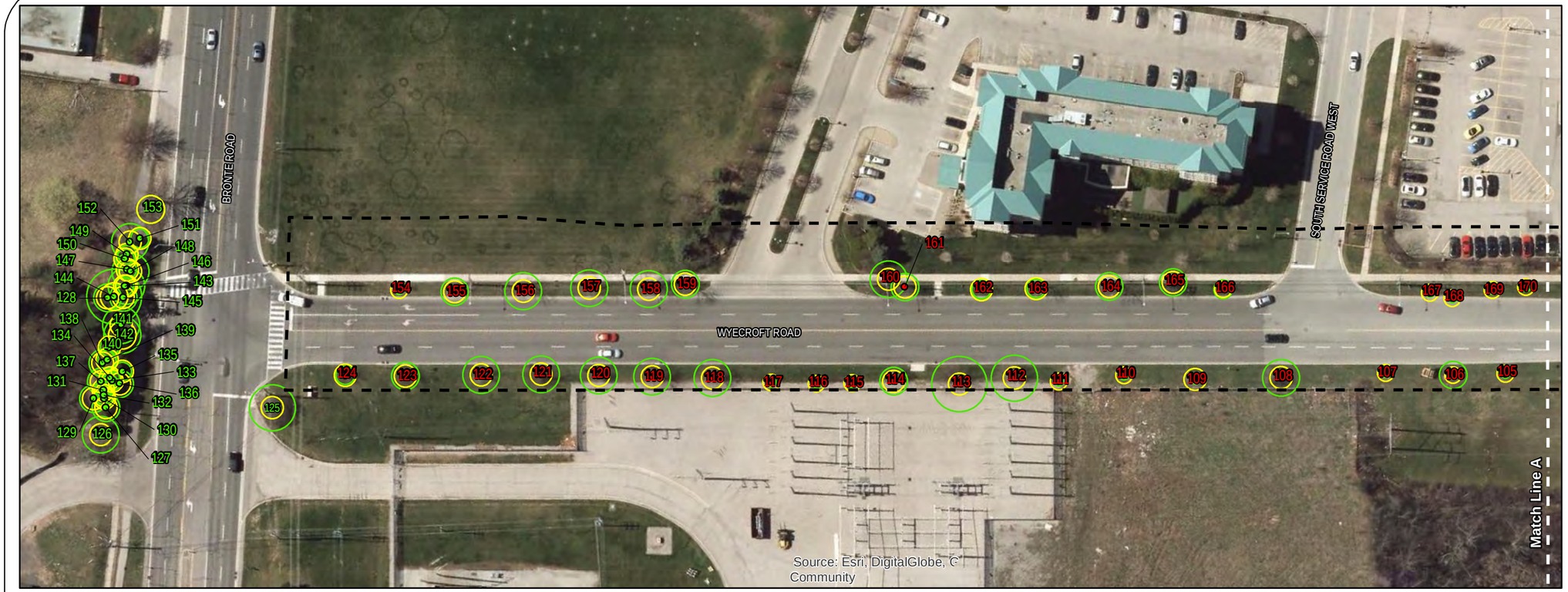
Surveyed trees have been screened for rare species as referenced by the MNRF Natural Heritage Information Centre (NHIC), which includes classification of Endangered, Threatened, and Special Concern species both at a provincial and federal scale.

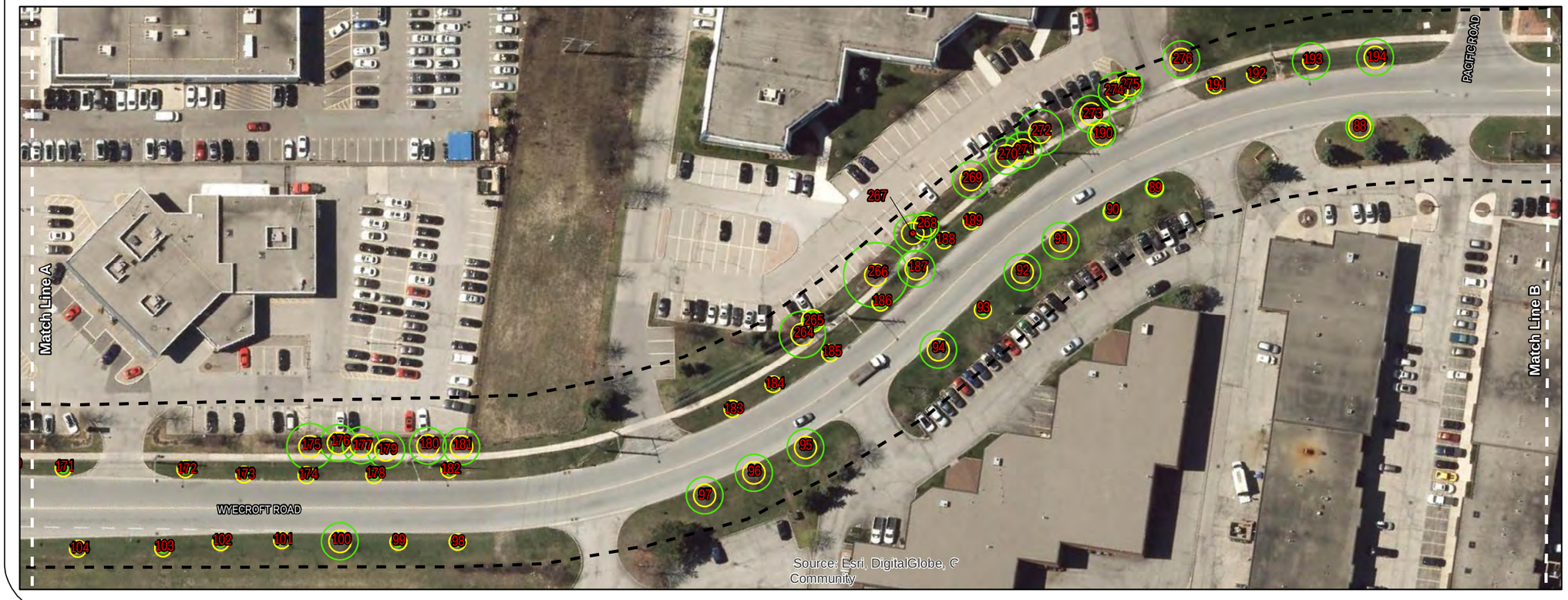
2.4.2 Results

A total of 314 trees were identified and assessed within the study area. Tree resources are summarized in **Appendix E** and the locations of each tree (by tree number) are presented in **Figures 4a** to **4h**. Overall, trees within the study limits range in size from 3 to 57 cm DBH and are generally considered to be in good to fair condition.

2.4.3 Species at Risk

Kentucky coffee-tree is regulated as Threatened by the Ontario *Endangered Species Act*, 2007, which is the only plant species at risk identified within the study area. The locations of the Kentucky coffee trees are presented in **Figures 4a to 4h**. Previous consultation with the MNRF Area Biologist (Mr. Bohdan Kowalyk, January 2016) through other projects confirmed that streetscape and planted Kentucky coffee trees are not protected under the Endangered Species Act, 2007, due to their non-native origin. As such, no further consultation with the MNRF or Ministry of the Environment, Conservation and Parks (MECP) is required for the Kentucky coffee trees.





LEGEND

- Tree to be Retained
- Tree to be Removed
- Dripline
- Tree Protection Zone
- Grading Limit

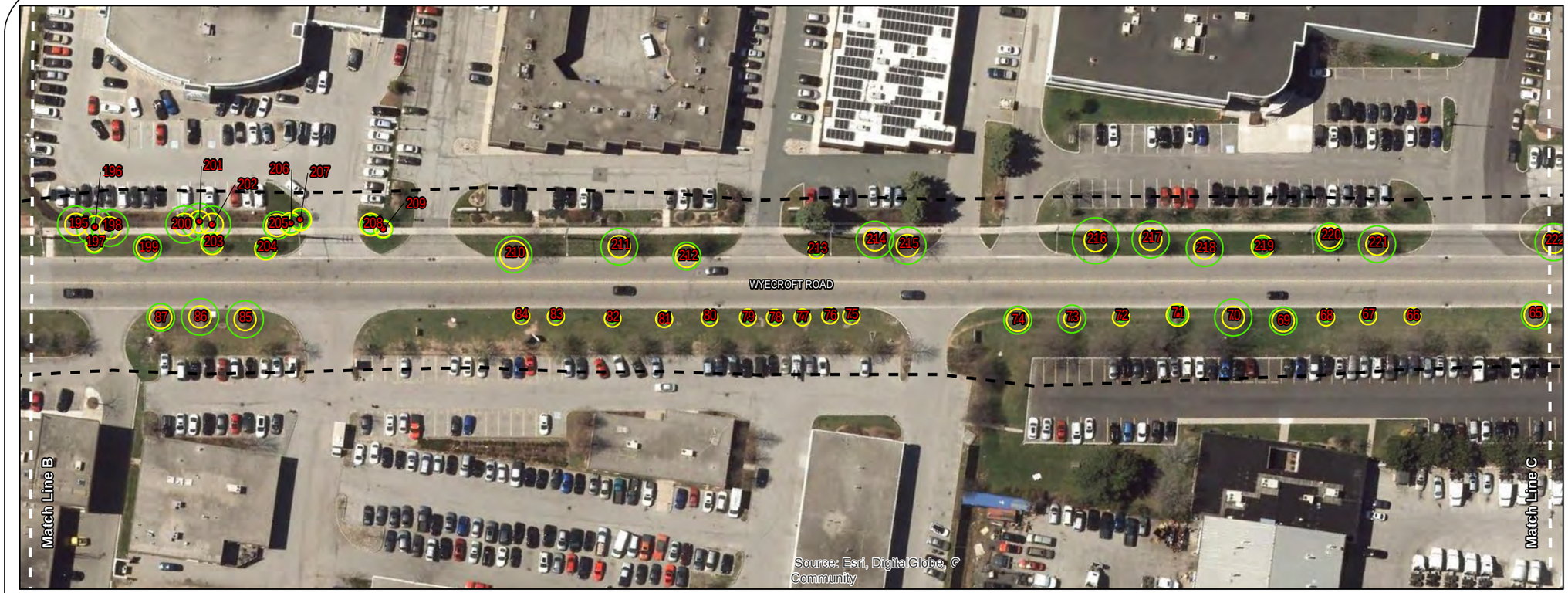
Data Source: LGL Limited field surveys.

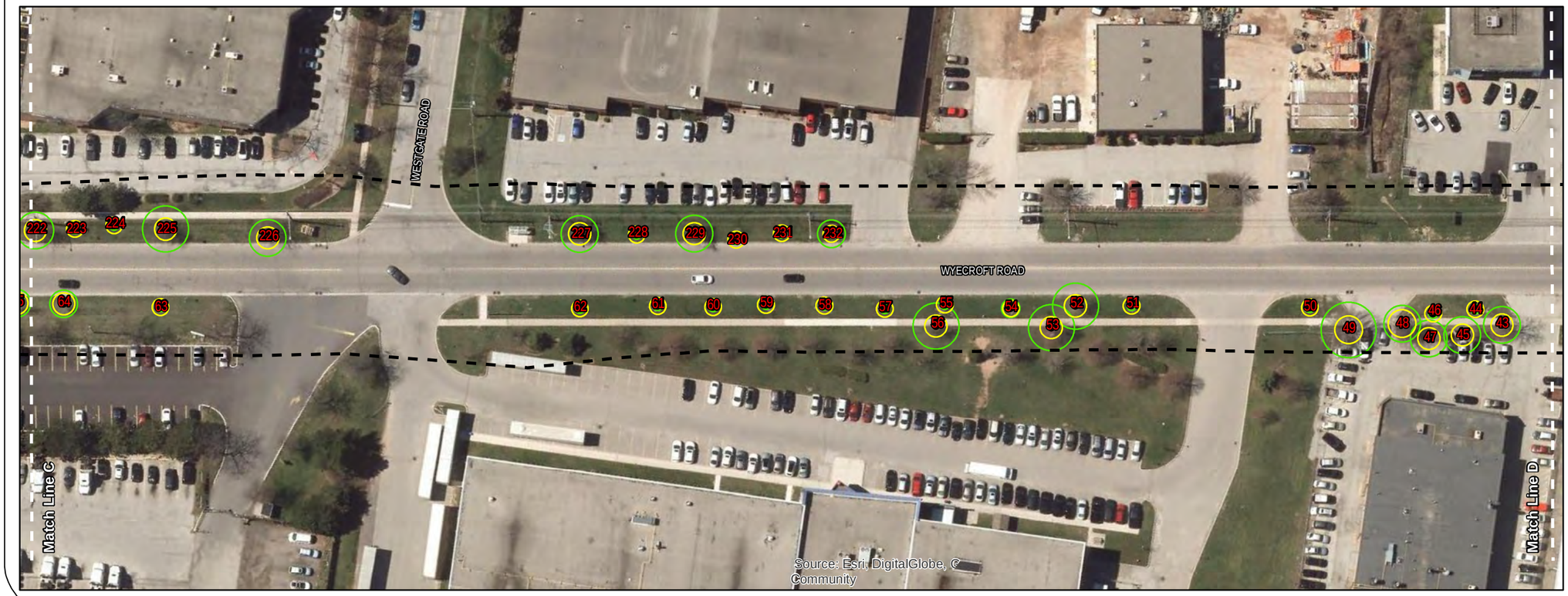
0 10 20 30 40 m

TREE PROTECTIONS AND REMOVALS

LGL LIMITED
environmental research associates

Project:	TA8828	**Figure:**	4a
Date:	May, 2019	**Prepared By:**	JJP
Scale:	1 : 1000	**Checked By:**	LMC





LEGEND

- 116 Tree to be Retained
- 117 Tree to be Removed
- Dripline
- Tree Protection Zone
- Grading Limit

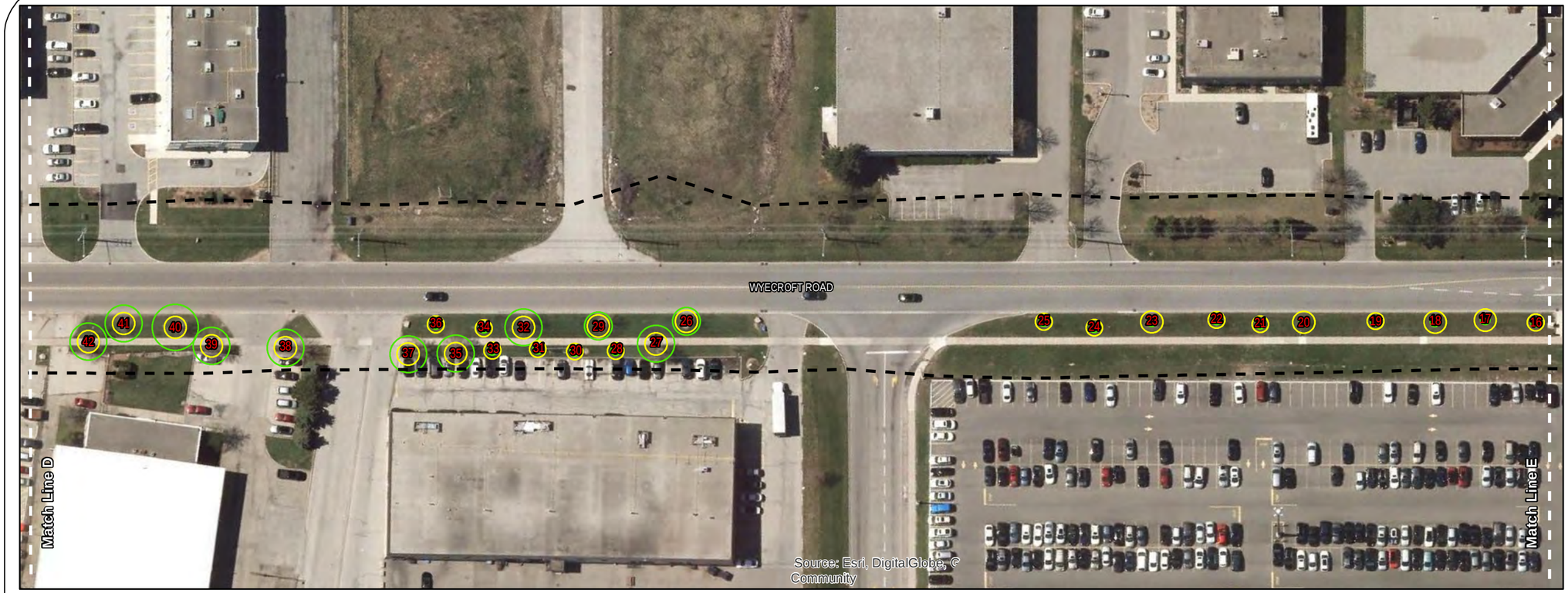
Data Source: LGL Limited field surveys.

0 10 20 30 40 m

TREE PROTECTIONS AND REMOVALS

LGL LIMITED
environmental research associates

Project:	TA8828	**Figure:**	4b
Date:	May, 2019	**Prepared By:**	JJP
Scale:	1 : 1000	**Checked By:**	LMC



LEGEND

- 116 Tree to be Retained
- 117 Tree to be Removed
- Dripline
- Tree Protection Zone
- Grading Limit

Data Source: LGL Limited field surveys.

0 10 20 30 40
m

TREE PROTECTIONS AND REMOVALS

LGL LIMITED
environmental research associates

Project:	TA8828	**Figure:**	4c
Date:	May, 2019	**Prepared By:**	JJP
Scale:	1 : 1000	**Checked By:**	LMC

LEGEND

- 116 Tree to be Retained
- 117 Tree to be Removed
- Dripline
- Tree Protection Zone
- Grading Limit

Data Source: LGL Limited field surveys.

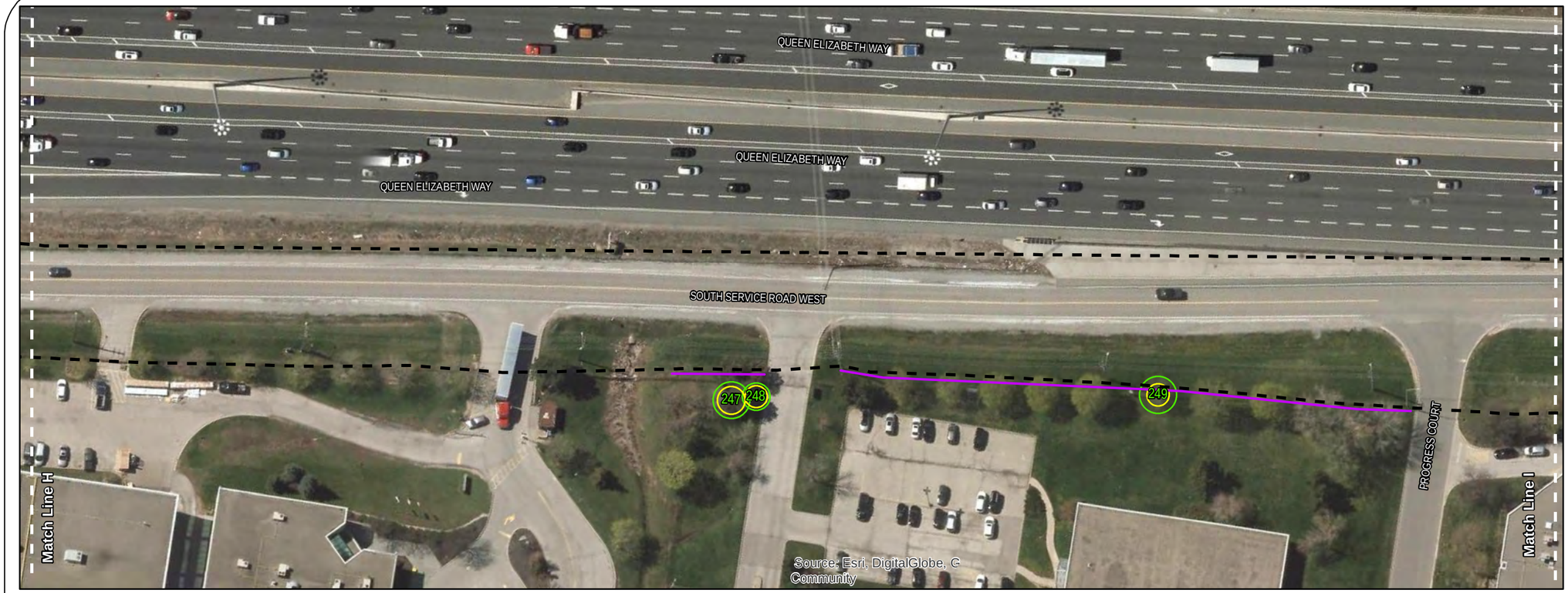
0 10 20 30 40

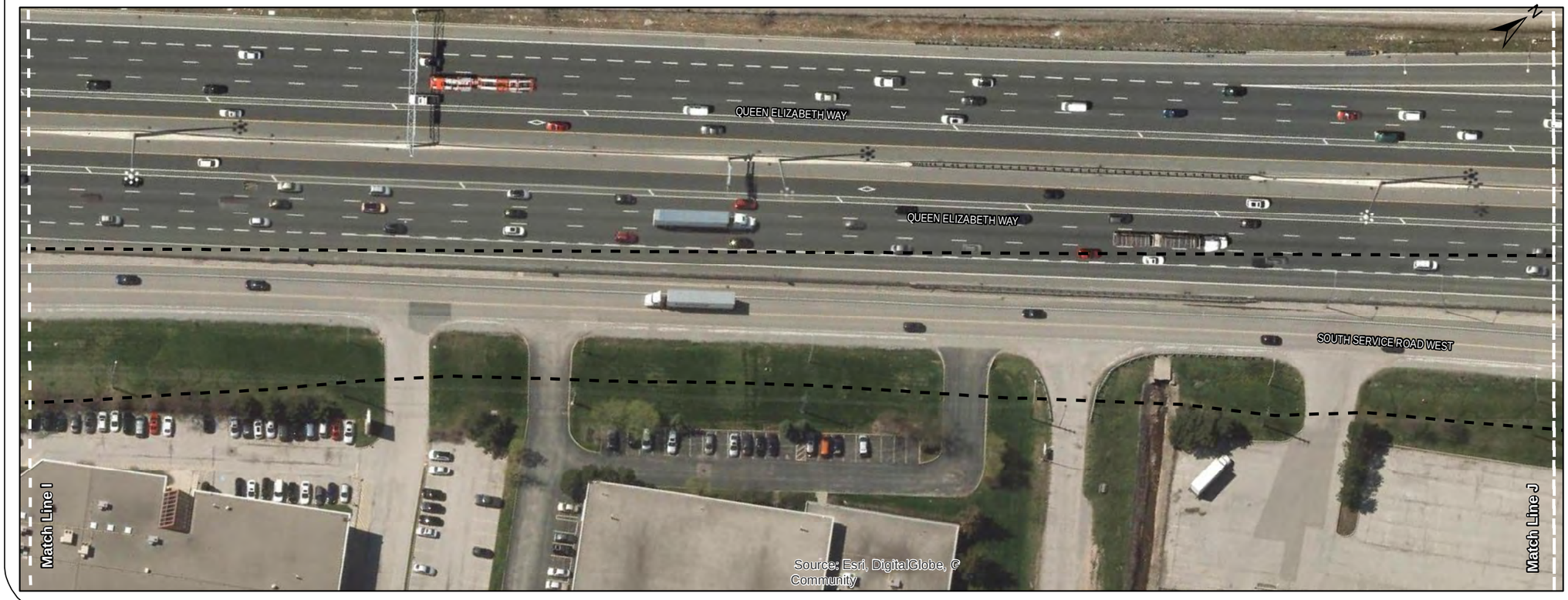
m

TREE PROTECTIONS AND REMOVALS

LGL LIMITED
environmental research associates

Project:	TA8828	**Figure:**	4d
Date:	May, 2019	**Prepared By:**	JJP
Scale:	1 : 1300	**Checked By:**	LMC





LEGEND

- 116 Tree to be Retained
- 117 Tree to be Removed
- Dripline
- Tree Protection Zone
- Tree Protection Fencing
- Grading Limit

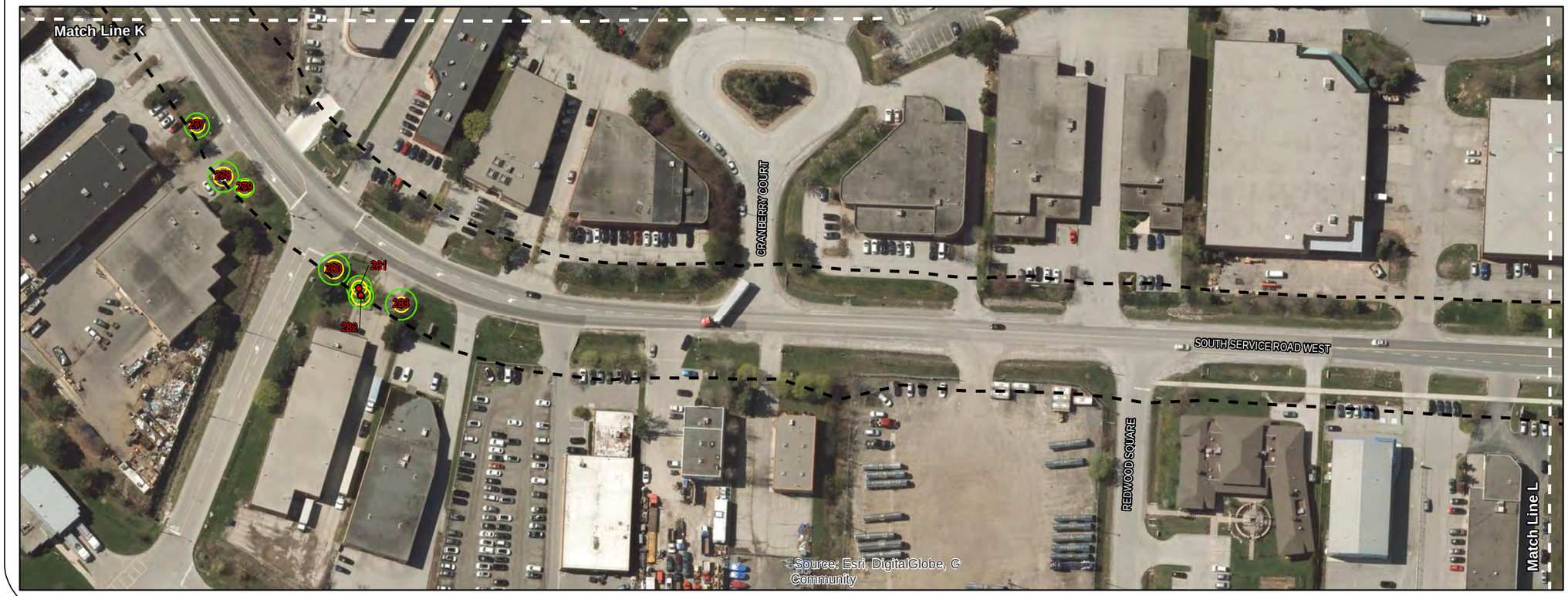
Data Source: LGL Limited field surveys.

0 10 20 30 40 m

TREE PROTECTIONS AND REMOVALS

LGL LIMITED
environmental research associates

Project: TA8828	**Figure:** 4e
Date: May, 2019	**Prepared By:** JJP
Scale: 1 : 1000	**Checked By:** LMC



LEGEND

- 116 Tree to be Retained
- 117 Tree to be Removed
- Dripline
- Tree Protection Zone
- Grading Limit

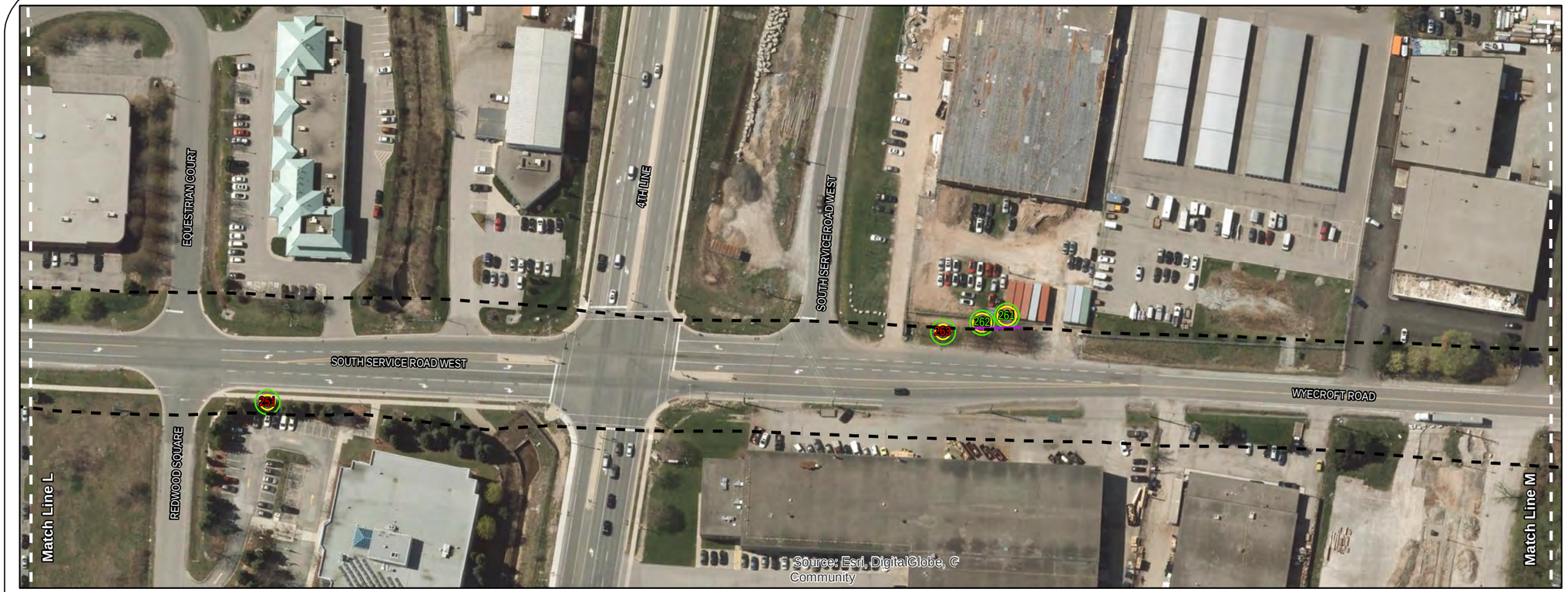
Data Source: LGL Limited field surveys.

0 10 20 30 40
m

TREE PROTECTIONS AND REMOVALS

LGL LIMITED
environmental research associates

Project:	TA8828	**Figure:**	4f
Date:	May, 2019	**Prepared By:**	JJP
Scale:	1 : 1500	**Checked By:**	LMC



LEGEND

- 116 Tree to be Retained
- 117 Tree to be Removed
- Dripline
- Tree Protection Zone
- Tree Protection Fencing
- Grading Limit

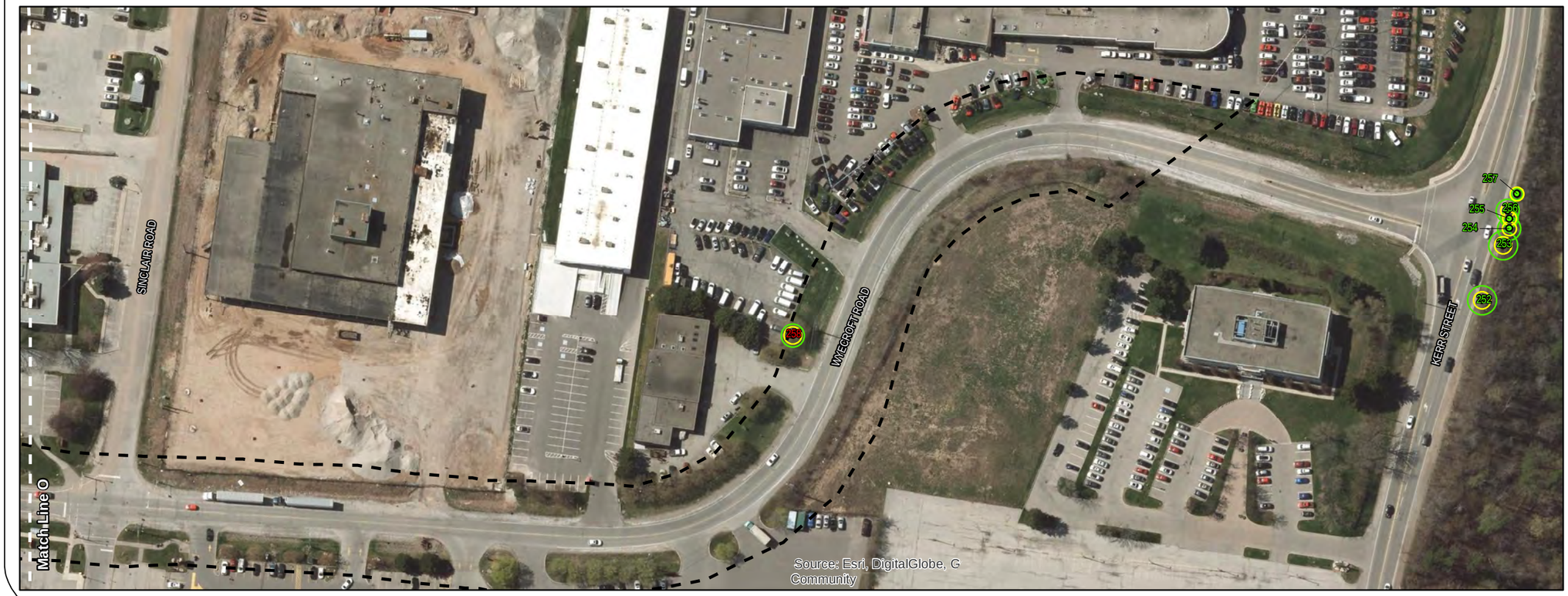
Data Source: LGL Limited field surveys.

0 10 20 30 40
m

TREE PROTECTIONS AND REMOVALS

LGL LIMITED
environmental research associates

Project:	TA8828	**Figure:**	4g
Date:	May, 2019	**Prepared By:**	JJP
Scale:	1 : 1500	**Checked By:**	LMC



LEGEND

- 116 Tree to be Retained
- 117 Tree to be Removed
- Dripline
- Tree Protection Zone
- Grading Limit

Data Source: LGL Limited field surveys.

0 10 20 30 40
m

N

TREE PROTECTIONS AND REMOVALS

LGL LIMITED
environmental research associates

Project: TA8828	**Figure:** 4h
Date: May, 2019	**Prepared By:** JJP
Scale: 1 : 1500	**Checked By:** LMC

2.5 Wildlife and Wildlife Habitat

Field investigations were conducted to document wildlife and wildlife habitat and to characterize the nature, extent and significance of wildlife usage within the study area between May and June of 2018. Wildlife investigations were focused within and adjacent to the Wyecroft Road ROW, from Bronte Road to Kerr Street, Town of Oakville. Direct observations, calls and tracks were used to record wildlife present within the study area. Breeding bird surveys and an anuran call survey were also completed. A summary of survey date(s), tasks, weather and personnel for each visit is presented in **Table 4**. The methodology and results of these surveys are described in the following sections.

TABLE 4.
SUMMARY OF DATE OF INVENTORY, TASK, WEATHER AND PERSONNEL

Date of Inventory	Task	Weather	LGL Personnel
May 25, 2018	Breeding Bird survey and incidental wildlife survey	No clouds, 18°C, 10km/hr	David Smith
May 30, 2018	Anuran survey	Partial cloud cover, 24°C, calm	David Smith
June 5, 2018	Breeding Bird survey and incidental wildlife survey	Partial cloud cover, 13°C, 15km/hr wind	David Smith

2.5.1 Wildlife Habitat

The study area is comprised of a mix of anthropogenic, semi-natural and natural features and is in an area that is dominated by commercial and industrial development. Natural areas are largely associated with Bronte Creek, Fourteen Mile Creek and Sixteen Mile Creek valleylands.

Natural areas associated with Bronte Creek are found at the western limit of the study area, with treed cover found immediately west of Bronte Road. Cultural meadow and cultural woodland communities were noted to provide habitat for forest/forest edge and open-country bird species. North-south wildlife movement opportunity is facilitated by the natural heritage communities associated with the valleylands. Communities found immediately west of Bronte Road were noted to largely host species considered tolerant of anthropogenic influences.

Natural areas associated with Fourteen Mile Creek cross South Service Road West in the vicinity of Third Line. Cultural meadow and deciduous swamp communities were noted to provide habitat for forest/forest edge, aquatic and open-country bird species. A number of mammal tracks (including white-tailed deer (*Odocoileus virginianus*) were identified along the banks of the watercourse. North-south wildlife movement opportunity is facilitated by the natural heritage communities associated with the valleylands.

Natural areas associated with Sixteen Mile Creek are found at the eastern terminus of Wyecroft Road in the vicinity of Kerr Street. Deciduous forest habitat types dominate the valleylands and were noted to provide habitat for forest/forest edge bird species. Overall, wildlife species were noted to be largely absent from natural areas immediately adjacent to Wyecroft Road/Kerr Street and most species were identified at a distance (e.g. > 50 m) from the forest edge. North-south wildlife movement opportunity is facilitated by the natural heritage communities associated with the valleylands.

Cultural meadow and manicured habitat types were found across much of the study area and were generally associated with commercial lands. Cultural meadows were found to contain a moderately diverse wildlife assemblage. These communities provide nesting habitat for some bird species.

In summary, wildlife and wildlife habitat was found to be largely distributed across the entire study area; however, core wildlife habitat areas were associated with Bronte Creek, Fourteen Mile Creek and Sixteen Mile Creek valleylands. On the local landscape scale, these natural areas are likely to provide significant wildlife movement opportunity and function. Several small watercourse features cross through the study area; however, these watercourses provide only seasonal flows, contain little vegetation and are found within highly anthropogenic settings, limiting their capacity to support wildlife species. Wildlife species identified within the study area are generally considered urban or tolerant of anthropogenic features and disturbance.

2.5.1.2 Significant Wildlife Habitat, Ecoregion 7E

Significant Wildlife Habitat (SWH) has been identified as a natural heritage area for the purposes of Section 2.1 of the Provincial Policy Statement (PPS; 2014).

The PPS defines wildlife habitat as:

> *"areas where plants, animals, and other organisms live, and find adequate amounts of food, water, shelter, and space needed to sustain their populations. Specific wildlife habitats of concern may include areas where species concentrate at a vulnerable point in their annual or life cycle; and areas which are important to migratory or non-migratory species."*

Wildlife habitat is considered significant by the Province where it is:

> *"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. Criteria for determining significance may be recommended by the Province, but municipal approaches that achieve the same objective may also be used."*

SWH Criteria Schedules for Ecoregion 7E (MNRF 2015) was referenced to identify SWH. The following types of significant wildlife habitat were examined for the potential to occur on the study area:

- Seasonal concentration areas;
- Rare vegetation communities or specialized habitats for wildlife;
- Habitats of species of conservation concern, excluding the habitats of endangered and threatened species; and,
- Animal movement corridors.

Data for ELC and wildlife as presented in Sections 2.0 was compiled and assessed according to the criteria outlined in MNRF's Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E (2015).

The crossing of South Service Road West over the Fourteen Mile Creek provided some potential for SWH within the study area due to the presence of a watercourse and locally significant wetland. Seasonal Concentration Areas may include waterfowl stopover and staging areas (terrestrial and aquatic), colonial-nesting bird breeding habitat (trees/shrubs), bat maternity colonies, migratory butterfly stopover areas, landbird migratory stopover areas, deer winter congregation areas, and raptor wintering areas.

Based on the botanical survey results there are no rare vegetation communities associated with the study area, as the vegetation communities identified within the study area are considered widespread and common in Ontario and are secure globally.

Specialized Habitats for Wildlife in the study area could include waterfowl nesting area, Bald Eagle and Osprey nesting, foraging and perching habitat, and amphibian breeding habitat. Habitat for Species of

Conservation Concern could include marsh bird breeding habitat, open country bird breeding habitat, shrub/early successional bird breeding habitat and terrestrial crayfish habitat within the study area.

The wildlife surveys conducted did not find sufficient indicator species required to meet the criteria of these SWH within the subject lands. The study area contained a modest number of breeding bird species representing several habitat types. No nests of migratory bird species were identified on any bridge or culvert structure located within the study area. No anuran breeding evidence or suitable amphibian breeding habitat was identified during the 2018 survey. Additional amphibian breeding and butterfly surveys can be completed to assess potential for amphibian breeding habitat and migratory butterfly stopover areas. Data from the Ontario Reptile and Amphibian Atlas showed 533 observations from 1926 to 2019 in square 17PJ00 and 869 observations from 1936 to 2019 in square 17PJ01; this includes observations of indicator species for SWH, such as Spotted Salamander and Western Chorus Frog (a summary species list is provided in section 2.5.2.2). Ontario Butterfly Atlas shows 167 records of Monarch observations from 1989 to 2018 (this data is provided in **Appendix F**). This secondary data may not be representative of the study area as the size of the squares analyzed on the Ontario Herp & Butterfly Atlas is much larger than the study area. The habitats found within the study area may also not be representative of that which supports many of the secondary source species identified.

Overall, no suitable habitat which meets the candidate SWH criteria was identified on subject lands due to its highly disturbed nature, habitat simplicity, function and lack of cover habitat.

2.5.2 Fauna

Based on field observations and secondary source data from Conservation Halton, 42 species of wildlife could be verified in the study area and the majority of these records came from identification (through calls and sightings) of bird species with more modest numbers of herpetofauna and mammal species identified. The wildlife assemblage is for the most part typical of urban settings and includes wildlife species that are tolerant of human activity and habitat disturbance. A summary of wildlife species documented in the study area during field investigations is presented in **Table 5**.

2.5.2.1 Anuran Species

Modified methodologies outlined in the Marsh Monitoring Program Protocol (2000) were applied to confirm presence/absence of anuran species, document potential breeding habitat/areas, and confirm the nature, extent and significance of amphibian usage. As a result of project award timing, only a single anuran survey was completed. Stations were strategically placed where amphibian breeding habitat was suspected, based on air-photo interpretation and a review of the study area (see **Figures 3a** to **3c**). Field investigations within the study area were conducted on May 30, 2018 and ran from one half hour after sunset and ended prior to midnight (see **Table 4**). The survey was undertaken during periods of peak anuran breeding activity and vocalization for mid to late breeding species (e.g., Gray Treefrog (*Hyla versicolor*) and Green Frog (*Lithobates clamitans*)).

No anuran breeding evidence was documented during the 2018 survey. Overall, anuran use of the area is expected to be limited, but most prevalent within aquatic and valleyland habitats. No suitable amphibian breeding habitat was identified immediately adjacent to Wyecroft Road.

2.5.2.2 Herpetofauna Species

Secondary source data from Conservation Halton indicates that several records exist for three herpetofauna species including Eastern Gartersnake (*Thamnophis sirtalis*), Dekay's Brownsnake (*Storeria dekayi*) and Northern Watersnake (*Nerodia sipedon sipedon*) which were previously recorded in the

vicinity of Sixteen Mile Creek, at the eastern limit of the study area. Eastern Gartersnake and Dekay's Brownsnake are ranked abundant and common, respectively, by Conservation Halton. Northern Watersnake is ranked uncommon; however, this species is considered common across the province.

The Ontario Herpetofauna Atlas was consulted for additional records of herpetofauna species within squares 17PJ00 and 17PJ01 (present – 2010). Given the square area is much larger than study area, it may not be representative of the study area. Records were found for the following species:

- Snapping Turtle (*Chelydra serpentine*, SC)
- Eastern Red-backed Salamander (*Plethodon cinereus*)
- Dekay's Brownsnake (*Storeria dekayi*)
- American Toad (*Anaxyrus americanus*)
- Eastern Gartersnake (*Thamnophis sirtalis*)
- Midland Painted Turtle (*Chrysemys picta marginata*)
- Milksnake (*Lampropeltis Triangulum*, SC)
- Gray Treefrog (*Hyla versicolor*)
- Northern Watersnake (*Nerodia sipedon sipedon*)
- Wood Frog (*Lithobates sylvaticus*)
- Red-bellied Snake (*Storeria occipitomaculata*)
- Spring Peeper (*Pseudacris crucifer*)
- Northern Leopard Frog (*Lithobates pipiens*)
- Northern Map Turtle (*Graptemys geographica*, SC)
- Red-spotted Newt (*Notophthalmus viridescens viridescens*)
- Green Frog (*Lithobates clamitans*)
- Western Chorus Frog (*Pseudacris triseriata*, THR)
- Ring-necked Snake (*Diadophis punctatus*)
- Red-eared Slider (*Trachemys scripta elegans*)
- Spotted Salamander (*Ambystoma maculatum*)

TABLE 5. WILDLIFE SPECIES DOCUMENTED IN THE STUDY AREA BY LGL AND OTHERS

Wildlife	Scientific Name	Common Name	Species Status under Legislation/ Local Sensitivity				Source of Species Identification	
			Canada SARA	Ontario ESA	Legal Status	Local	LGL[1]	Secondary Source[2]
Herpetofauna	*Thamnophis sirtalis*	Eastern Gartersnake			-	A		*
	Storeria dekayi	Dekay's Brownsnake			-	C		*
	Nerodia sipedon sipedon	Northern Watersnake			FWCA(P)	U		*
Birds	*Anas platyrhynchos*	Mallard			MBCA	-	*	
	Charadrius vociferus	Killdeer			MBCA	-	*	
	Larus delawarensis	Ring-billed Gull			MBCA	-	*	
	Columba livia	Rock Pigeon			-	I	*	
	Zenaida macroura	Mourning Dove			MBCA	-	*	
	Picoides pubescens	Downy Woodpecker			MBCA	-	*	
	Colaptes auratus	Northern Flicker			MBCA	-	*	
	Myiarchus crinitus	Great-crested Flycatcher			MBCA	-	*	
	Empidonax traillii	Willow Flycatcher			MBCA	U	*	
	Vireo gilvus	Warbling Vireo			MBCA	-	*	
	Vireo olivaceus	Red-eyed Vireo			MBCA	INT	*	
	Cyanocitta cristata	Blue Jay			FWCA(P)	-	*	
	Corvus brachyrhynchos	American Crow			MBCA	-	*	
	Tachycineta bicolor	Tree Swallow			MBCA	-	*	
	Poecile atricapillus	Black-capped Chickadee			MBCA	-	*	
	Sitta carolinensis	White-breasted Nuthatch			MBCA	-	*	
	Turdus migratorius	American Robin			MBCA	-	*	
	Dumetella carolinensis	Gray Catbird			MBCA	-	*	
	Sturnus vulgaris	European Starling			-	I	*	
	Bombycilla garrulus	Cedar Waxwing			MBCA	-	*	
	Dendroica petechia	Yellow Warbler			MBCA	-	*	
	Geothlypis trichas	Common Yellowthroat			MBCA	-	*	
	Spizella passerina	Chipping Sparrow			MBCA	-	*	
	Passerculus sanwichensis	Savannah Sparrow			MBCA	SWH	*	
	Melospica melodia	Song Sparrow			MBCA	-	*	
	Cardinalis cardinalis	Northern Cardinal			MBCA	-	*	
	Passerina cyanea	Indigo Bunting			MBCA	-	*	
	Agelaius phoeniceus	Red-winged Blackbird			-	-	*	
	Quiscalus quiscula	Common Grackle			-	-	*	
	Molothrus ater	Brown-headed Cowbird			-	-	*	

TABLE 5. WILDLIFE SPECIES DOCUMENTED IN THE STUDY AREA BY LGL AND OTHERS

Wildlife	Scientific Name	Common Name	Species Status under Legislation/ Local Sensitivity				Source of Species Identification	
			Canada SARA	Ontario ESA	Legal Status	Local	LGL[1]	Secondary Source[2]
	Carduelis tristis	American Goldfinch			MBCA	-	*	
	Passer domesticus	House Sparrow			-	I	*	
Mammals	*Tamiasciurus hudsonicus*	Red Squirrel			FWCA(F)	-	*	
	Sciurus carolinensis	Eastern Gray Squirrel			FWCA(G)	-	*	
	Sylvilagus floridanus	Eastern Cottontail			FWCA(G)	C	*	
	Marmota monax	Groundhog			-	C	*	
	Ondatra zibethica	Muskrat			FWCA(F)	C	*	
	Procyon lotor	Northern Raccoon			FWCA(F)	C	*	
	Mustela vison	American Mink			FWCA(F)	C	*	

SARA – federal *Species at Risk Act*:
END - Endangered
THR – Threatened
SC - Special Concern

ESA - *Ontario Endangered Species Act*, 2007
END – Endangered
THR – Threatened
SC - Special Concern

Source of Species Identification:
[1]Species recorded within the study area during field investigations (LGL 2018).
[2]Species recorded within the study area (Conservation Halton 2018).

Other:
Significant Wildlife Habitat Technical Guide:
SWH – Area Sensitive Species
INT - Interior Species
Local – Conservation Halton – R-rare, C-common, A-abundant, U-uncommon, EXT-extirpated, INT-introduced
For definitions of species ranks, refer to **Appendix C**.

Legal Status:
MBCA - *Migratory Birds Convention Act*
ESA - E*ndangered Species Act, 2007*
SARA - *Species at Risk Act*
FWCA - *Fish and Wildlife Conservation Act*
(P) Protected Species (G) Game species (F) Furbearing mammals

2.5.2.3 Breeding Bird Species

Breeding bird surveys were conducted on two separate mornings during the 2018 breeding bird season to document breeding bird evidence (BBE) and to characterize the nature, extent and significance of breeding bird usage of the habitats within the study area (see **Table 4**). In all habitat types, survey methodology and breeding bird behaviours used as evidence of breeding success were categorized according to the Breeding Bird Atlas five-year surveys organized by Bird Studies Canada (Cadman et al., 2007). Locations of the seven breeding bird point count stations are shown on **Figures 3a** to **3c**. Point count stations were strategically placed where natural habitats were present.

The study area contained a modest to moderate number of breeding bird species representing several habitat types. A summary of the bird species, species ranks, breeding evidence, and station locations are presented in **Table 6**. Data provided by Conservation Halton did not contain any records for bird species in the vicinity of the study area. The Ontario Breeding Bird Atlas (OBBA; 2005) was consulted for observations within squares 17PJ00 and 17PJ01. Eighty-one (81) bird species were recorded in square 17PJ00 and 91 bird species were found in square 17PJ01; this data is provided in **Appendix F**. Given both squares analysed in the OBBA are much larger than study area, the information provided may not be representative of the study area.

Breeding evidence was obtained for 31 species of birds. Of these 31 species, breeding evidence was confirmed in two species, suspected in 16 species, and 13 species were identified as having the potential to breed within the study area (see **Table 6**). Confirmed breeding by bird species was documented based on adults carrying food (to a nest), including species such as Red-winged Blackbird (*Agelaius phoeniceus*) and European Starling (*Sturnus vulgaris*). Species which were most commonly encountered across the study area were generally species associated with open-country, anthropogenic, forest, forest edge and aquatic habitat types.

Two species including Red-eyed Vireo (*Vireo olivaceus*) and Savannah Sparrow (*Passerculus sanwichensis*) are considered area-sensitive and/or interior species according to the Significant Wildlife Habitat Technical Guide (MNRF 2000), as indicated in **Table 5**. No nests of migratory bird species were identified on any bridge or culvert structure located within the study area.

TABLE 6. BREEDING BIRD SPECIES DOCUMENTED IN THE STUDY AREA BY LGL LIMITED

Scientific Name	Common Name	SARA[1]	ESA[1]	Legal Status[1]	Other[1]	BBE[2]	Station #[3]
Anas platyrhynchos	Mallard			MBCA	-	H	4
Charadrius vociferus	Killdeer			MBCA	-	A, T	1, 2, 6
Columba livia	Rock Pigeon			-	I	H	1, 3
Zenaida macroura	Mourning Dove			MBCA	-	T	2, 3, 5, 7
Picoides pubescens	Downy Woodpecker			MBCA	-	T	4, 7
Colaptes auratus	Northern Flicker			MBCA	-	S	4, 5, 7
Myiarchus crinitus	Great-crested Flycatcher			MBCA	-	T	4, 7
Empidonax traillii	Willow Flycatcher			MBCA	U	S	4
Vireo gilvus	Warbling Vireo			MBCA	-	S	4
Vireo olivaceus	Red-eyed Vireo			MBCA	INT	S	7
Cyanocitta cristata	Blue Jay			FWCA(P)	-	T	2, 4, 7
Corvus brachyrhynchos	American Crow			MBCA	-	T	1, 3, 7

TABLE 6. BREEDING BIRD SPECIES DOCUMENTED IN THE STUDY AREA BY LGL LIMITED

Scientific Name	Common Name	SARA[1]	ESA[1]	Legal Status[1]	Other[1]	BBE[2]	Station #[3]
Tachycineta bicolor	Tree Swallow			MBCA	-	H	4
Poecile atricapillus	Black-capped Chickadee			MBCA	-	T	2, 3, 5, 7
Sitta carolinensis	White-breasted Nuthatch			MBCA	-	T	2, 4, 7
Turdus migratorius	American Robin			MBCA	-	T, A	1, 3, 4, 5, 6
Dumetella carolinensis	Gray Catbird			MBCA	-	T	4, 5
Sturnus vulgaris	European Starling			-	I	CF	1, 2, 3, 5, 7
Bombycilla garrulus	Cedar Waxwing			MBCA	-	T	4, 6, 7
Dendroica petechia	Yellow Warbler			MBCA	-	S	4
Geothlypis trichas	Common Yellowthroat			MBCA	-	S	4
Spizella passerina	Chipping Sparrow			MBCA	-	T	3, 6
Passerculus sanwichensis	Savannah Sparrow			MBCA	SWH	S	2
Melospica melodia	Song Sparrow			MBCA	-	T, A	1, 2, 5
Cardinalis cardinalis	Northern Cardinal			MBCA	-	S	3, 6
Passerina cyanea	Indigo Bunting			MBCA	-	T	4, 7
Agelaius phoeniceus	Red-winged Blackbird			-	-	CF	1, 2, 4, 5
Quiscalus quiscula	Common Grackle			-	-	H	4
Molothrus ater	Brown-headed Cowbird			-	-	H	2, 6, 7
Carduelis tristis	American Goldfinch			MBCA	-	T	1, 3, 4, 5, 7
Passer domesticus	House Sparrow			-	I	T	1, 3, 5, 6

[1]For definitions of species ranks, refer to **Appendix C**.

[2]BBE - Breeding Bird Evidence (according to Bird Studies Canada):
Possible Breeding:
H - Species observed in its breeding season in suitable nesting habitat.
S - Singing male present in its breeding season in suitable nesting habitat.
Probable Breeding:
T - Permanent territory presumed through registration of territorial song on at least two days, a week or so apart, at the same place.
A - Agitated behaviour or anxiety calls of an adult.
Confirmed Breeding:
NU - Used nest or egg shell found (occupied or laid within the period of study).
FY - Recently fledged young or downy young, including young incapable of sustained flight.
CF - Adult carrying food for young.
NE - Nest containing eggs.
NY - Nest with young seen or heard.

[3]Breeding Bird Point Count Station.

2.5.2.4 Mammal Species

Seven mammal species were identified during field investigations in the study area. Eastern gray squirrel (*Sciurus carolinensis*) and red squirrel (*Tamiasciurus hudsonicus*) were commonly encountered in treed habitats within the study area. Eastern cottontail (*Sylvilagus floridanus*), northern raccoon (*Procyon lotor*) and groundhog (*Marmota monax*) (or evidence of the species) were noted infrequently across the industrial portion of the study area. White-tailed deer, American mink (*Neovison vison*) and muskrat

(*Ondatra zibethicus*) tracks were noted along the banks of Fourteen Mile Creek. The mammal species documented represent an assemblage that readily utilizes human influenced landscapes.

Data provided by Conservation Halton did not contain any records for mammal species in the vicinity of the study area.

2.5.3 Species at Risk

Twenty-five recorded bird species are protected under the *Migratory Birds Convention Act* (MBCA) and a single bird species is protected under the *Fish and Wildlife Conservation Act* (FWCA). Six bird species are not afforded any legislative protection. Six of seven recorded mammal species are afforded protection under the FWCA. Two bird species identified, including Red-eyed Vireo and Savannah Sparrow are considered area-sensitive or interior species according to the Significant Wildlife Habitat Technical Guide (MNRF 2000) (see **Table 5**).

Of the 42 wildlife species recorded within the study area, none are regulated under the Ontario *Endangered Species Act, 2007* (ESA). An information request was sent to the MNRF, Aurora District on May 14, 2018 requesting information on species at risk previously identified within proximity to the study area, and a response was received July 13, 2018 (see **Appendix D**). The letter received provided a summary of potential species at risk and rare species occurring on or adjacent to the study area. The list was reviewed and a preliminary screening undertaken to screen for potential species at risk including consideration of potential environmental impacts that may result from the activity. A review of the NHIC database (MNRF 2018) for rare species records indicated element occurrences for four species at risk within the vicinity of the study area, including Northern Bobwhite (*Colinus virginianus*), Eastern Meadowlark (*Sturnella magna*), Northern Map Turtle (*Graptemys geographica*) and Milksnake (*Lampropeltis triangulum*) (see **Table 7**).

Each of the four species identified above, their respective legal status, biological requirements, habitat suitability of the study area, likelihood of presence within the study area and survey results (if completed) are discussed below and summarized in **Table 7**.

Northern Bobwhite

The Northern Bobwhite is regulated as 'Endangered' under the ESA and SARA. NHIC element occurrence records were identified from across the study area for Northern Bobwhite (all dated from 1904). Northern Bobwhite is typically found in agricultural fields, grasslands and open country communities. The occurrence records for this species are dated from 1904 and are consequently considered historic in nature. Formerly widespread across the southern portion of the province, the Northern Bobwhite is now only known from a few scattered sites in extreme southwestern Ontario, namely Walpole Island. Northern Bobwhite is not expected to live in or near the study area. Field investigations conducted in May and June 2018 screened for presence of this species across aquatic habitats; however, no individuals were encountered.

Eastern Meadowlark

Review of the NHIC database contained several records (most recent 2009) of Eastern Meadowlark. The Eastern Meadowlark, a species with a broad distribution across southern Ontario, is regulated as 'Threatened' under the ESA and is listed as 'Special Concern' by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), but has no status under the SARA. The Eastern Meadowlark, formerly a prairie species, has adapted to agricultural practices of the European settlers (hayfields, pastures, etc.) (Cadman et al. 2007). Open-country and meadow habitat types found across the study area were noted to be small, heavily disturbed and contained poor quality grasslands habitat,

consequently, habitat suitable to support this species was not identified. Field investigations conducted in May and June 2018 screened for presence of this species and no individuals were recorded.

Bobolink

The MNRF has identified that Bobolink has the potential to be found within the vicinity of the study area. Bobolink is regulated as 'Threatened' under the Ontario ESA. Bobolinks are typically described as residents of grassland communities with an abundance of grass species that are typical of hayfields and fallow fields. Bobolinks are also commonly associated with agricultural lands. No grassland dominated habitat was identified within the study area. As a consequence, habitat suitable to support this species was not identified. No Bobolinks were identified during breeding bird surveys conducted in 2018.

Barn Swallow

Barn Swallow is regulated as 'Threatened' under the ESA. Barn Swallow generally builds mud nests on bridges, walls, ledges and barns (Cadman et al. 2007). Barn Swallow typically forages in open areas such as agricultural lands, meadows or water. MNRF data provided indicated that Barn Swallow have the potential to be found within the vicinity of the study area. Breeding bird surveys conducted by LGL in 2018, did not identify Barn Swallow (or their nests) within the study area. Suitable habitat to support this species was identified within the study area.

Bank Swallow

MNRF has identified that Bank Swallow has the potential to be found within the vicinity of the study area. Bank Swallow is regulated as 'Threatened' under the ESA. The Bank Swallow is listed as 'Special Concern' by COSEWIC, but has no status under the SARA. This species generally nests along rivers, streams, lake shorelines or reservoirs. Nests are excavated along vertical surfaces such as eroded stream banks, sand/gravel piles and road cuts. No Bank Swallow were identified within the study area during breeding bird surveys conducted in 2018. Suitable habitat to support this species has the potential to be found along watercourse banks within the study area.

Northern Map Turtle

Review of the NHIC database contained two records of Northern Map Turtle (most recent 1990) which were located at the western and eastern limits of the study area. The Northern Map Turtle is listed as 'Special Concern' under the ESA and SARA; however, this species is not a regulated species (Endangered or Threatened) under the ESA. This species is known to inhabit large rivers and lakes with slow-moving water and a soft bottom. Habitats which have the potential to support Northern Map Turtle were identified at Bronte Creek and Sixteen Mile Creek in the vicinity of the study area. Field investigations conducted in May and June 2018 screened for presence of this species across aquatic habitats; however, no individuals were encountered.

Milksnake

Review of the NHIC database contained two records of Milksnake (most recent 1996) in the vicinity of the study area. Milksnake was formerly listed as 'Special Concern' under the ESA and SARA; however, this species has recently been removed from the SARO list and is not a regulated species (Endangered or Threatened) under the ESA. Milksnake is found in a wide variety of habitats. This species is known to inhabit areas heavily disturbed by humans (e.g., farmland, urban parks and residential areas). Habitats that could be suitable to support Milksnake were found across much of the study area; however, valleyland habitats associated with Bronte Creek and Sixteen Mile Creek contain the habitat which was noted to be most suitable to support this species. Field investigations conducted in May and June 2018 screened for presence of this species across aquatic habitats; however, no individuals were encountered.

TABLE 7. WILDLIFE SPECIES AT RISK SUMMARY

Scientific Name	Common Name	Location (s)	ESA	SARA	Last Observed Date	Preferred Habitat*	Potential Habitat in Study Area
Colinus virginianus	Northern Bobwhite	NHIC records across much of the study area	END	END	1904	Agricultural fields, grasslands and open country communities. Species only known from a few scattered locations in extreme south-western Ontario.	No suitable habitat for this species was identified.
Sturnella magna	Eastern Meadowlark	NHIC records across much of the study area	THR	-	2009	Open country, meadows and agricultural habitat associated with pasture and hayfields.	No suitable habitat for this species identified.
Dolichonyx oryzivorus	Bobolink	Vicinity of study area	THR	-	Unknown	Open country, meadows and agricultural habitat associated with pasture and hayfields.	No suitable habitat for this species identified.
Hirundo rustica	Barn Swallow	Vicinity of study area	THR	-	Unknown	Open areas such as agricultural lands, meadows and/or water.	Has the potential to be found across the study area; in particular, open areas.
Riparia riparia	Bank Swallow	Vicinity of study area	THR	-	Unknown	Forages over open areas and nests along exposed watercourse banks.	Has the potential to be found across the study area; in particular, valleyland and other natural areas.
Graptemys geographica	Northern Map Turtle	NHIC records at the east and west limits of the study area	SC	SC	1990	Inhabits large rivers and lakes with slow-moving water and a soft bottom.	Habitats which have the potential to support Northern Map Turtle were identified at Bronte Creek and Sixteen Mile Creek in the vicinity of the study area.

TABLE 7. WILDLIFE SPECIES AT RISK SUMMARY

Scientific Name	Common Name	Location (s)	ESA	SARA	Last Observed Date	Preferred Habitat*	Potential Habitat in Study Area
Lampropeltis triangulum	Milksnake	Two NHIC records	-	SC	1996	Habitat generalist; will occupy most natural areas and will live in anthropogenic areas which are bordered by natural area.	Has the potential to be found across the study area; in particular, valleyland and other natural areas.

*Preferred habitat is based on a review of secondary sources; however, these species may be found in other habitats.
For definitions of the acronyms used in this table, refer to **Appendix C**.

2.6 Designated Natural Areas

Based on a review of the Natural Heritage Information Centre (NHIC) database, one Provincially Significant Area of Natural and Scientific Interest (ANSI), the Bronte Creek Provincial Park Nature Reserve Zone Wetlands, is located approximately 0.5 km southwest of the study area. This ANSI is west of Bronte Road and north of the Queen Elizabeth Way highway (QEW), and is outside of the study area. The Bronte Creek Valley Environmentally Sensitive Area (ESA) No. 10 appears to be part of this ANSI associated with the valley feature which consists of a deeply incised valley cut into the Queenston shale. Fourteen Mile Creek Valley ESA No. 12 is comprised of a floodplain with wet meadows and slopes comprised of mature mixed forests; this ESA is located north of the QEW and is outside of the study area. The Sixteen Mile Creek Candidate ANSI is a Provincially Significant Life Science ANSI, which is located over 2 km northwest and outside of the study area. Sixteen Mile Creek Valley ESA No. 16 is an incised valley cut into both the Queenston Formation and Georgian Bay Formation shales. This ESA is located east of Kerr Street and is outside of the study area (Halton Region *et al.* 2005). One Provincially Significant Wetland (PSW), the Lower Bronte Creek Wetland Complex, is located approximately 1 km southwest of the study area, west of Bronte Road.

A local wetland identified on Land Information Ontario (LIO) along Fourteen Mile Creek was identified by Halton Conservation as a Deciduous Swamp (SWD). This wetland is located approximately mid-way through the study area just east of Third Line. The riparian habitat classified as Willow Mineral Deciduous Swamp (SWD4-1) is diagonally bisected by South Service Road West. Within the vicinity of the ROW several species were observed as occasional to abundant including willows, red ash and Manitoba maple (see the community description presented in **Table 2** and plant list presented in **Appendix B**).

Greenbelt Plan Area
The Bronte Creek natural habitat west of Bronte Road and north of the QEW and the Sixteen Mile Creek natural habitat east of Kerr Street, are both located outside of the study area. These areas are identified as within the Urban River Valleys within the Greenbelt Plan Boundary.

Halton Region
Based on a review of Map 1 (Regional Structure) of the Region of Halton Official Plan (2016), the natural habitat associated with Bronte Creek, Fourteen Mile Creek and Sixteen Mile Creek are identified as components of the Regional Natural Heritage System. The Bronte Creek natural area, west of Bronte Road, is also identified as part of the Parkway West Belt Plan Boundary. Both the natural areas associated with Bronte Creek and Sixteen Mile Creek are outside of the study area.

Livable Oakville Plan
Based on a review of Schedules F and G (South West and South East Land Use) of the Livable Oakville Plan (2017), the natural habitat associated with Bronte Creek, west of Bronte Road, is identified as part of the Parkway Belt. The natural habitat associated with Fourteen Mile Creek, Upper McCraney Creek and Sixteen Mile Creek are identified as Natural Area.

3.0 TECHNICALLY PREFERRED PRELIMINARY DESIGN ALTERNATIVE

The Wyecroft Road study area was divided into three segments: west, middle, and east, due to the corridor's varied land use and natural environment conditions. A context sensitive design was developed for each of the corridor segments, as described below.

West Segment
The preferred design in the west segment includes two through lanes in each direction plus a two-way left-turn lane. Active transportation facilities include a sidewalk on the north side, a multi-use trail on the south side and buffered bike lanes on both sides. The existing signalized intersection at South Service Road West #2 and the Bronte GO Station entrance is maintained.

Middle Segment
The preferred design in the middle segment includes one through lane in each direction plus a west-bound left-turn lane at Progress Court, a sidewalk on the south side and buffered bike lanes on both sides. The preferred design also realigns South Service Road West, east of Third Line, with a new structure at Fourteen Mile Creek.

East Segment
The preferred design in the east segment includes one through lane in each direction, plus a two-way left-turn lane. Active transportation facilities include sidewalks and buffered bike lanes on both sides.

4.0 IMPACT ASSESSMENT AND MITIGATION

This section focuses on the potential effects on significant environmental features and outlines the environmental protection/mitigation measures proposed to manage adverse effects related to terrestrial ecosystems. Environmental effects are identified based on issues/concerns raised by property owners/members of the public, external agencies/stakeholders and the study team. The proposed environmental protection/mitigation measures will need to be reviewed and updated as necessary during detail design.

4.1 Soils, Erosion and Sediment Control, and Surface Water

The improvements to Wyecroft Road have the potential to suspend soil particles, which could result in eroded materials inadvertently affecting vegetation, wildlife habitat and could impair surface water quality. Furthermore, an increase in runoff may promote erosion downstream thus impairing water quality with sediments. There is also the potential for the contamination of surface water from sources other than sediments (i.e. spills). Water quality treatment must be provided to maintain the existing quality of surface water within the study limits.

4.1.1 Soil Disturbance/Erosion

Located within the Iroquois Plain physiographic region in southern Ontario, which borders Lake Ontario, this area is relatively flat and formed by lacustrine deposits. Soils in the study area include Chinguacousy clay loam which is imperfectly drained soil developed from slightly stony calcareous clay till (Ontario Department of Agriculture, Report 43). Such soils may be susceptible to erosion. Consequently, soil disturbance associated with construction activities (i.e. to improve the corridor for all transportation modes, refine the roadway alignment to reduce negative impacts, culvert improvements, etc.) may result in the erosion of, and sedimentation to receiving watercourses (i.e. Fourteen Mile Creek). For this reason, an erosion and sedimentation control plan must be implemented during construction, using best practice erosion and sedimentation control measures to cover the installation, maintenance, and removal of the temporary erosion and sediment control measures (i.e. straw bale flow checks) and the removal of

sediment accumulated by the control measures. This will minimize construction-related impacts on water quality and fish habitat. Site-specific erosion and sedimentation control measures will be identified during detail design following the *Erosion and Sediment Control Guidelines for Urban Construction* (GGHA 2006). Erosion and sedimentation control measures may include:

- Placing straw bale flow checks at regular intervals in roadside ditches down-gradient from areas of soil disturbance to trap suspended sediments and reduce the erosive force of runoff;
- Placing silt fence along watercourses, ditches, wetlands and forest/woodland edges in areas of soil disturbance;
- Limiting the extent and duration that soils are exposed to the elements to the minimum area and time necessary to perform the work;
- Managing stormwater during construction to prevent contact with exposed soils;
- Applying seed and mulch, tackifier and/or erosion control blanket in areas of soil disturbance to provide adequate slope protection and long-term slope stabilization;
- Monitoring and maintenance of erosion and sedimentation control measures during construction to ensure their effectiveness; and,
- Any dewatering will have discharge directed to a sediment containment system (sediment basin, sediment bag, etc.) prior to release to the watercourse.

These environmental protection measures will be implemented prior to construction commencement and will remain in place until construction is complete and soils have been re-stabilized. This will greatly reduce the potential for soil erosion and impairment of surface water quality and fish habitat.

4.1.2 Contamination of Surface Water from Other Sources

There is also the potential for contamination of surface water from sources other than sediment (i.e. spills or other materials/equipment). Best management/construction practices and control of all construction operations will be implemented during construction to reduce the potential for spills or other materials/equipment from entering the watercourses/pond within the study area. The following measures will be employed:

- Storage, stockpiling and staging areas will be delineated prior to construction and inspected in accordance with the *Erosion and Sediment Control Guideline for Urban Construction* (GGHA 2006);
- Construction material, excess material, construction debris, and empty containers will be stored at least 30 m distance from watercourses and watercourse banks to prevent their entry into watercourses;
- Equipment refueling, maintenance and washing activities will be conducted at a pre-determined site located at an adequate distance (minimum 30 m) from the watercourses and their banks located within the study area to prevent the entry of petroleum, oil or lubricants (POL) or other deleterious substances (including any debris, waste, rubble or concrete material) into watercourses within the study area, or their release to the environment. Any material which inadvertently enters the watercourses will be removed by the Contractor in a manner satisfactory to the Contract Administrator; and,
- All spills that could potentially cause damage to the environment should be reported to the Spills Action Centre of the MECP. In the event of a spill, containment and clean-up will be completed quickly and effectively. In addition, an NSSP (Spill Prevention and Response Contingency Plan) must be included in the contract package to ensure a Spill Prevention and Response Contingency Plan and the appropriate contingency materials to absorb or contain any petroleum products/spills that may be accidentally discharged will be on site at all times.

These environmental protection measures will greatly reduce the potential for surface water contamination from spills of POL and from other materials/equipment from entering the watercourses/pond within the study area, and will provide a contingency in the event of an unforeseen event.

4.2 Aquatic Habitats and Communities

Improvements to Wyecroft Road have the potential to result in impacts to aquatic habitats and communities. Effects on these features related to these modifications could include:

- Temporary disruption or permanent loss of site-specific habitat;
- Temporary changes to water quality;
- Changes in water temperature; and,
- barriers to fish passage.

DFO has introduced a self-assessment process for proponents to determine if Serious Harm to fish or fish habitat is expected as a result of project activities. Previously, all screenings under the *Fisheries Act* in the CH jurisdiction were undertaken by the Conservation Authority in accordance with an agreement with DFO. Within the last 6 years, proponents use DFO screening criteria to determine if a review of the project by DFO is required.

There are proposed works that will cause direct habitat impacts at the four watercourse crossings (culvert removal, replacement and rehabilitation) that support direct fish use, within the project limits. It is anticipated that a DFO review will be required under the *Fisheries Act* for these works, as there will be permanent impacts to habitat below the high water mark. This review process typically occurs at the detail design stage, once the crossing designs are refined.

Conservation Halton's Ontario Regulation 162/06 may trigger the need for further fish community surveys; dependent upon the level of impact at each watercourse crossing. Should fish community surveys be conducted, these surveys will reference methods outlined in *Conservation Halton's Guidelines for Ecological Studies* (2017). It is anticipated that fish surveys on Fourteen Mile Creek will not be recommended by MECP given the presence of the sensitive fish community there. The CH Guidelines reference Benthic Invertebrate and water quality surveys; however these types of surveys are more applicable in long term monitoring studies.

Further details regarding works, net environmental effects and site-specific mitigation proposed at each crossing can be found in the sections below.

4.2.1 Summary of Bridge/Culvert Replacement Works

The following table summarizes proposed improvements at each watercourse crossing that supports direct fish use, to accommodate the Wyecroft Road improvements.

TABLE 8. SUMMARY OF PRELIMINARY CROSSING DESIGNS ON WATERCOURSES SUPPORTING DIRECT FISH USE

Culvert #	Watercourse	Existing Structure/Culvert	Proposed Structure/Culvert	Comments
C1	Fourteen Mile Creek	6.0m (W) x 3.0m (H) x 23.5m (L) twin cell concrete box	20.0 (W) x 5.07m x (H) x (L) 24.78m clear span bridge	Replacement

TABLE 8. SUMMARY OF PRELIMINARY CROSSING DESIGNS ON WATERCOURSES SUPPORTING DIRECT FISH USE

Culvert #	Watercourse	Existing Structure/Culvert	Proposed Structure/Culvert	Comments
C3	Upper McCraney Creek	3.06 (W) x 1.7m (H) x 97.3m (L) concrete box - with baffles	3.06 (W) x 1.7m (H) x 109.75m (L) concrete box culvert	Extension
C6	Taplow Creek	3.0m (W) x 1.8m (H) x 59.0m (L) twin cell, concrete box	Culvert to be maintained	
C7	Glen Oaks Creek	6.1m (W) x 1.47m (H) x 16.9m (L) open footing	6.1 (W) x 1.5m (H) x 29.5m (L) open footing	Replacement

4.2.2 Effects of Bridge/Culvert Works on Site-Specific Habitat

Fourteen Mile Creek (Culvert #C1)
The existing twin cell wide culvert, does not span the bankfull width of the creek and also supports a partial seasonal fish barrier (concrete lip) at the upstream end of the structure. The proposed crossing for this creek is a bridge design that would span 20m high (larger than bankfull) and 5m high, and aim to re-connect the floodplain. The current (preliminary) bridge design is approximately 1.3m longer than the existing culvert. There will be some impacts (removal) of riparian habitat associated with the South Service Road West realignment at this location.

Upper McCraney Creek (Culvert #C3)
This watercourse is highly modified within the vicinity of South Service Road West. The channel is a constructed trapezoidal channel, and the perched culvert outlet and baffles are considered permanent barriers to fish movement to upstream reaches (upstream of QEW). This culvert would be extended approximately 12.45m and further culvert and stream channel rehabilitation may be required here given the presence of existing channel erosion and the perched conditions. This creek has been diverted to flow to Fourteen Mile Creek and the lower portion of this creek is mapped as supporting Redside Dace habitat.

Taplow Creek (Culvert #C6)
The existing twin cell culvert is a concrete box, with additional concrete floor at the inlet and outlet ends. This culvert is skewed on an angle to the road. As a culvert extension is not required, no additional instream habitat will be enclosed. There are no anticipated works required at this culvert.

Glen Oaks Creek (Culvert #C7)
The current culvert design is an open bottomed culvert, however, the culvert invert is very low and the channel does not travel through the middle of the culvert. A culvert replacement is required, enclosing an additional 12.6m length of riffle/run habitat. However, this open bottomed culvert will be slightly higher and placed to better convey flow at this location. Potential localized channel realignment may be required.

Drainage Features
There will be some upgrades to existing drainage feature crossings to accommodate for improvements to Wyecroft Road, and these changes are presented in **Table 9** below. As noted in **Section 2.2.6** these drainage features do not support fish habitat, thus no direct impacts to fisheries habitat will occur. Changes to these culverts would likely only impact wildlife movement, see **Section 4.5.2** and **Table 11**, below.

TABLE 9. SUMMARY OF PRELIMINARY CROSSING DESIGNS ON DRAINAGE FEATURES

Culvert #	Drainage	Existing Structure/Culvert	Proposed Structure/Culvert	Comments
C2	Fourteen Mile Creek	1.00m diameter CSP x 80.20m (L)	1.00m diameter CSP x 87.70m (L)	Extension
C4	Upper McCraney Creek	2.44m (W) x 1.83m (H) x 42.7m (L) Concrete Box	2.44m (W) x 1.83m (H) x 48.0 (L) Concrete Box	Extension
C5	Upper McCraney Creek	1.03m (W) x 0.74m (H) x 26.0m (L) CSPA	3.66m (W) x 1.22m (H) x 35.7m (L) Concrete Box	Replacement

4.2.3 Changes to Water Quality and Quantity

The construction associated with the proposed structure and culvert works has the potential to alter water quality through on-site erosion of exposed materials and the subsequent impairment of downstream water quality with sediments and other contaminants.

Changes to water quality will be mitigated through the isolation of the work areas, the treatment of effluent from dewatering (if applicable) prior to its release back into the receiving watercourse, and the deployment and maintenance of erosion and sediment controls (silt fencing, flow checks, etc.) which will prevent sediments from reaching the watercourse from exposed soils upslope. To improve storm water quality, roadway runoff should be directed to storm water management (SWM) systems where technically feasible or additional options for on-site treatment considered (enhanced swales, infiltration). In addition, all exposed areas should be vegetated as quickly as possible once the work is completed.

Water quality monitoring may be required during construction at more sensitive crossings (i.e., Fourteen Mile Creek). Monitoring should follow the *Conservation Halton's Guidelines for Ecological Studies* (2017) for water quality sampling, if deemed required. The surface water monitoring program details would be determined at detail design.

The implementation of these mitigation measures should eliminate potential changes to water quality to the receiving watercourses.

4.2.4 Barriers to Fish Passage

No barriers to fish passage will result from this project. There are existing barriers present at the Upper McCraney Creek culvert that require additional consultation with agencies (MTO, DFO) to determine if removal of the perched culvert outlet is possible. As the culvert itself also presents additional barriers (baffles), considerable enhancements would be required to reconnect upstream and downstream fish habitats at this location. Barrier mitigation to be employed at the detail design stage are included further below.

4.2.5 Species at Risk

The Fourteen Mile Creek crossing supports Redside Dace (occupied habitat), as confirmed by the MNRF on July 13, 2018 (see **Appendix D**). The proposed bridge design would be considered a benefit to fish habitat. Removing the partial seasonal fish barrier and spanning bankfull will benefit fish habitat in general, at this crossing. Further, increasing the structure height at this crossing would also benefit the system as Redside Dace is a species highly dependent upon the presence of overhanging streamside

vegetation. The final bridge design would incorporate input from various disciplines including: fisheries, fluvial geomorphology, botany and engineering (hydraulics). The reinstated channel under the structure could also be enhanced through fluvial geomorphological design. It is anticipated that works (removal of the existing structure) may require a permit under the provincial ESA 2007. The bridge structure could be considered an overall benefit to the system, however additional restoration measures may be required to offset impacts.

4.2.6 Mitigation

To reduce the potential for serious harm to fish habitat, the following environmental protection measures will be implemented:

- For in-water works, construction is to be done between July 1 to September 15, to avoid the period when spawning is occurring and low flow conditions are present in Fourteen Mile Creek. For all other watercourses supporting fish habitat, an in-water construction window of July 1- March 31 would apply, to protect warmwater fish spawning.
- Work areas will be delineated with construction fencing to minimize the area of disturbance;
- Limiting riparian vegetation removals along watercourses to the extent possible and delaying removals until immediately prior to construction;
- Appropriate sediment control structures will be installed prior to and maintained during construction to prevent entry of sediments into watercourses and drainage features;
- All in-water work will be carried out "in the dry" using an appropriate stream by-pass system;
- Where cofferdams (if applicable) are to be employed, dewatering effluent will be treated prior to discharge to receiving watercourse;
- Fish isolated by construction activities (if applicable) will be captured and safely released to the watercourse under a Fish Collection Permit and conducted by qualified, experienced biologists;
- Good housekeeping practices related to materials storage/stockpiling, equipment fuelling/ maintenance, etc. will be implemented during construction; and,
- Disturbed riparian areas will be vegetated and/or covered with an erosion control blanket as quickly as possible to stabilize the banks and minimize the potential for erosion and sedimentation.

These environmental protection measures will greatly reduce the potential adverse effects to fish and fish habitat resulting from construction activities.

4.2.6.1 Crossing Design Considerations

Culvert design parameters will be analyzed at the detail design stage, to ensure successful fish passage within new culverts or culvert extensions (where applicable).

The following fish passage design parameters should be considered:

- Maximum velocity shall not exceed natural channel velocity (MTO 2008);
- The water depth inside the culvert shall be consistent with the average depth immediately upstream and downstream of the culvert (MTO 2008);
- The minimum width of the culvert is recommended to be 1.25 times the bankfull width (DFO 2015, MTO 2008);
- No sudden drops in the water surface should exceed 0.15 m (MTO 2008);

- Desirable culvert slope should be ≥ 0.5%, with minimum slope of 0.0%. (MTO 2008); and,
- Channel velocity does not exceed fish swimming speed (MTO/DFO/MNR Fish Guide (2009, adapted from Katopodis & Gervais 1991).

Where a watercourse requires realignment or readjustment at the culvert inlet/outlet, the use of natural channel design measures will be incorporated into the design. The channel should blend in within the existing channel width and consider further measures outlined in the *Adaptive Management of Stream Corridors in Ontario* (MNRF & Watershed Science Centre 2002). A fluvial geomorphologist will be consulted for all watercourse crossings that require channel adjustments.

Requirements for replacement structures over occupied Redside Dace habitat typically involve spanning the meander belt to ensure that floodplain connectivity within the defined habitat (meander belt and meander belt plus 30 m) is re-established and/or maintained. During detail design, a fluvial geomorphologist should be employed to conduct a meander belt width analysis to aid in the determination of the proper span of the structure. This will likely be a requirement for any permitting that may be obligatory for works within Redside Dace habitat. Spanning the meander belt width and the re-establishment of a continuous floodplain under the structure will also contribute to the "overall benefit to the species" requirement of the ESA permit, should one be necessary. In addition, structures that span the meander belt enhance wildlife crossing.

It is anticipated that the removal of the existing structure at Fourteen Mile Creek may require a permit under the provincial Endangered Species Act (ESA). The recommended bridge structure could be considered an overall benefit to the system, however, additional restoration measures may be required to offset impacts.

A DFO review will be carried out during detail design to determine if works at all watercourse crossings, constitute serious harm to fish after the implementation of mitigation measures, and if project authorization is required.

4.3 Vegetation and Vegetation Communities

The improvements to the Wyecroft Road study area will result in the displacement of and disturbance to vegetation and vegetation communities. Effects on vegetation and vegetation communities may include:

- Displacement of/disturbance to vegetation and vegetation communities;
- Displacement of/disturbance to designated natural areas/areas of environmental significance; and,
- Displacement of/disturbance to rare, threatened or endangered vegetation and vegetation communities.

The following is an evaluation of potential impacts to vegetation and vegetation communities that will result from the improvements to Wyecroft Road. Detailed vegetation surveys should be undertaken where any data gaps exist with subsequent design changes and within the proposed realignment at Third Line as permission to enter was not granted during this EA study.

4.3.1 Displacement of/Disturbance to Vegetation and Vegetation Communities

Within the study area, the majority of the improvements to Wyecroft Road will take place within the existing ROW and immediately adjacent to it, which includes accommodations for grading. The one exception is the realignment of South Service Road West east of the current alignment where Fourteen Mile Creek crosses the study area. Overall, Wyecroft Road improvements will result in the total loss of 9.88 ha of vegetation communities. The largest area of impact will be to lands that have been

anthropogenically influenced including manicured or planted areas and cultural meadow. Of these lands a total of 7.29 ha and 1.35 ha, respectively, would be removed. This includes 0.45 ha of a cultural meadow/cultural thicket (CUM1-1/CUT1) a community where meadow habitat is transitioning to thicket. In addition, a total of 0.30 ha of cultural thicket, 0.81 ha of cultural woodland, and 0.13 ha of deciduous forest will be removed due to road improvements. Impacts to woodland includes a cultural thicket/cultural woodland (CUT1/CUW1), a community where thicket habitat is transitioning to woodland. All of the vegetation communities identified within the study area are considered widespread and common in Ontario and secure globally. **Table 10** provides a summary of the vegetation removals required for the improvements to Wyecroft Road, and the extent of impacts within the grading limits are illustrated in **Figures 3A** to **3C.**

TABLE 10. IMPACTS TO VEGETATION COMMUNITIES

Vegetation Community	Total Area (ha) to be Impacted
Fresh-Moist Lowland Deciduous Forest (FOD7)	0.13
Sub-total for Forest Communities	**0.13**
Dry-Moist Old Field Meadow (CUM1-1a to CUM1-1f and CUM1-1/CUT1)	1.35
Mineral Cultural Thicket (CUT1 and CUT1a)	0.30
Mineral Cultural Woodland (CUT1/CUW1 and CUW1a)	0.81
Sub-total for Cultural Communities	**2.46**
Manicured and/or Disturbed (M and M/D)	7.29
Sub-total for Human Influenced Lands	**7.29**
Total Area (ha) of Impacted Vegetation Communities	**9.88**

Vegetation communities within the study area are primarily manicured/cultural communities, which have resulted from anthropogenic influences. Such communities are considered tolerant of disturbances, with remnants typically able to recover quickly post disturbance. Within the vicinity of the proposed realignment of South Service Road West northeast of Third Line, permission to enter was not granted and no surveys were completed at this time. Detailed vegetation investigations should be undertaken during the detail design phase for this project to more concisely understand vegetation impacts within this area. Communities identified in this location through air photo interpretation and from within the right-of-way were a cultural meadow/thicket and a cultural thicket/woodland (CUM1-1/CUT1, CUT1/CUW1) natural areas in transition, as well as a Fresh-Moist Lowland Deciduous Forest (FOD7) primarily within the floodplain. Some of these areas appear to have been disturbed in the past. There is a greater diversity of plants within vegetation communities associated with Fourteen Mile Creek as compared to other areas associated with the study area. However, overall species diversity within the right-of-way at this location was still limited, likely a result of impacts due to the existing land uses resulting in disturbances associated with industrial and commercial development, and infrastructure.

No provincially significant, designated natural areas were identified within the study area. A local wetland associated with the riparian habitat along Fourteen Mile Creek was identified and is classified as Willow Mineral Deciduous Swamp (SWD4-1). No impacts to this wetland would result due to the proposed realignment of South Service Road West east of Third Line. Thus, impacts to wetland communities have been avoided.

Overall, impacts resulting in the loss of vegetation within the study area are considered to be moderate where removals are associated with Fourteen Mile Creek, and considered to be minor where removals are associated with the remaining study area. Cultural vegetation communities typically persist in areas that are regularly disturbed, and as a result, generally contain a high proportion of invasive and non-native

plant species that are disturbance tolerant. It is expected that plant species displaced and/or disturbed within the cultural communities due to the proposed construction will re-colonize available lands adjacent to the grading limits/ROW post-construction. Disturbance activities often serve to promote the establishment and/or spread of certain plant species such as those disturbance tolerant species.

4.3.2 Displacement of/Disturbance to Designated Natural Areas/Areas of Environmental Significance

There are no ANSIs, PSWs or ESAs located within the study area. The Bronte Creek Provincial Park Nature Reserve Zone Wetlands is located approximately 0.5 km southwest of the study area, but no impacts to this feature will occur. Also, no impacts to the Willow Mineral Deciduous Swamp (SWD4-1) associated with Fourteen Mile Creek are expected due to South Service Road West improvements. As a precaution, provisions should be included in the contract package (such as SP 199F12 (Environmentally Sensitive Areas)) to ensure that this sensitive area is avoided and to prohibit entry.

4.3.3 Displacement of/Disturbance to Rare, Threatened or Endangered Vegetation and Vegetation Communities

The study area has been screened for potential plant species at risk. Kentucky coffee tree, a species which is regulated as Threatened by the Ontario *Endangered Species Act*, 2007, was identified within the study area. However, due to its non-native origin the Kentucky coffee tree within the study area is not protected under the Endangered Species Act, 2007. No other plant species that are regulated under the Ontario ESA or the Canada SARA were encountered during LGL's field investigation in the study area.

Common hackberry (*Celtis occidentalis*), swamp white oak (*Quercus bicolor*), freeman's maple (*Acer X fremannii*) and common evening-primrose (*Oenothera biennis*) were also identified within the study area. These species are identified as rare in Halton Region (Riley/Varga). All three tree species were identified as planted within manicured areas, but common hackberry was also identified within the cultural woodland (CUW1a). This cultural woodland is riparian habitat associated with Glen Oaks Creek and this common hackberry would be removed due to impacts. Common evening-primrose was identified within the Willow Mineral Deciduous Swamp (SWD4-1) and this habitat is not expected to be impacted due to Wyecroft Road improvements.

Mitigation measures listed below should be revised accordingly during detail design and with each refinement to the design.

4.3.4 Mitigation

At a minimum, the following protection/mitigation measures should be implemented during construction to ensure the protection of vegetation and vegetation communities to the extent possible:

- Wherever possible during detail design, efforts will be made to minimize the removal of vegetation/vegetation communities, to the extent possible;
- The contractor shall ensure that soil migration from the construction area is prevented, and that exposed soils are stabilized as soon as is possible;
- Special care will be taken when construction vehicles are operating in the vicinity of the more sensitive wetland feature and riparian habitat including the Fresh-Moist Lowland Deciduous Forest associated with various watercourses within the study area. Provisions should be included in the contract package to ensure that these more sensitive features are avoided and to prohibit/limit impacts onto these sensitive areas;
- Native and non-invasive vegetation cover will be used to protect any exposed surfaces;

- Old field seed mix and mulching or erosion control blanket will be placed in areas of soil disturbance to provide adequate slope protection and long-term slope stabilization in areas where sensitive features and watercourses are to be protected;
- Appropriate tree protection will be installed to protect trees to be retained, including safeguarding trees from construction operations, equipment and vehicles where such trees are not designated for removal under the contract, and should also cover the installation of protective barriers. Prior to construction, trees to be protected will be clearly identified in the field by the Contract Administrator and a protective barrier will be installed. Repairing or replacing trees/shrubs identified to remain, which become damaged by construction activities, will be undertaken; and, restoration of disturbed natural areas shall use a native species seed mix and woody species plantings similar to the character of the surrounding area, or similar native woody species;
- Restoration and edge management planning should be undertaken and implemented to mitigate impacts related to vegetation removals and/or impacts near to existing edges of natural areas. Restoration and edge management planning shall be undertaken by experienced, qualified professionals. Maintenance and warranty should be in place for restoration works undertaken; and,
- Landscape planning and planting should be undertaken and implemented to mitigate removals within landscaped/manicured areas, to beautify areas within the new right-of-way, provide shading, provide wildlife habitat for local, urban species, and to promote carbon capture. Landscaping planning and implementation shall be undertaken by experienced, qualified professionals. Maintenance and warranty for Landscaping should be in place for landscaping works undertaken.

4.4 Tree Resources

A preliminary impact assessment was undertaken to determine impacts to tree resources as a result of the proposed improvements to Wyecroft Road from Bronte Street to Kerr Street. This assessment was conducted using the grading limits for the preliminary design alternative. Trees recommended for removal include trees within the grading limits or trees that would not be able to withstand construction related impacts. Trees identified as impacted likely will required root and/or canopy pruning. In addition, trees identified as retained are considered to be minimally affected and will be protected through mitigation measures.

As noted above, this assessment is preliminary and a detailed Tree Preservation Plan should be prepared during the detail design phase. A follow-up tree survey should be undertaken where any data gaps exist with subsequent design changes and within the proposed realignment at Third Line as permission to enter was not granted during this EA study. The recommendations for tree preservation, removal and mitigation measures included in this report should be updated at each phase of the detail design. The Tree Preservation Plan should be prepared in accordance with the Town of Oakville requirements.

4.4.1 Tree Removals

As noted in **Section 4.4**, trees identified for removal includes trees within the proposed grading limits and those trees outside of the grading limits where the amount of critical root zone that will be removed will likely cause significant and irreversible decline of the health of the tree. As such, a total of 266 trees have been identified for removal as a result of the proposed improvements to Wyecroft Road from Bronte Street to Kerr Street. Trees identified for removal are listed in **Appendix E** and presented in **Figures 4a to 4h.**

4.4.2 Impacted Trees

No trees were identified as impacted as a result of the proposed improvements to Wyecroft Road. As noted above, impacted trees are those trees that would likely require root and/or canopy pruning.

4.4.3 Trees Retention

Trees identified for retention will not be adversely affected by the proposed improvements to Wyecroft Road. A total of 48 trees have been identified for retention and listed in **Appendix E** and presented in **Figures 4a to 4h**.

4.4.4 Species at Risk

As noted in **Section 2.4.3** above, Kentucky coffee-tree, which is regulated as Threatened by the Ontario *Endangered Species Act*, 2007, was the only plant species at risk identified within the study area. However, streetscape and planted Kentucky coffee trees are not protected under the Endangered Species Act, 2007, due to their non-native origin. As such, no further consultation with the MNRF or MECP, is required for the Kentucky coffee trees.

4.4.5 Mitigation

As noted in **Section 4.4**, a detailed Tree Preservation Plan will be prepared during the detail design phase. The Tree Preservation Plan should include the designation of a TPZ and recommendation for mitigation measures to ensure impacts to all retained trees are minimized. Preliminary recommendations of mitigation measures are provided below. These mitigations should be revised accordingly during detail design and with each refinement to the design.

4.4.5.1 General Recommendations

The following general recommendations conform to good arboricultural practices and are designed to help ensure impacts to trees surrounding the work zone, and those identified to be retained are minimized. General recommendations include:

- Tree protection fencing must be installed as per the approved Tree Preservation Plan. Tree protection fencing shall be installed in accordance with the Town of Oakville Specifications. The contract administrator must review and approve the fencing prior to the commencement of any grading work and the fencing will be maintained until all construction is complete;
- Heavy machinery should not be operated within the TPZ (including overhead swinging of machine arms);
- Construction materials, equipment, soil, construction waste or debris are not to be stored within the TPZ or dripline of the trees identified for protection;
- There should be no movement or parking of vehicles, placement of equipment or pedestrian traffic within the TPZ;
- No grade changes shall occur within the TPZ unless approved by the Tree Protection Plan;
- Trees shall not have any rigging cables or hardware of any sort attached or wrapped around them, nor shall any contaminants be dumped within protected areas;
- All removals must be felled into the work zone to ensure that damage does not occur to trees within the TPZ;
- Should any additional, incidental or accidental tree injuries occur during construction, a qualified Arborist should be consulted to determine whether additional mitigation measures should be employed;
- Soil Compaction Mitigation - Wood chips shall be applied to the ground to a depth of 100 mm in areas where minimum tree protection zones will be encroached by construction traffic. Steel plates or ¾” plywood should be laid on top of the chips to dissipate compressive force of vehicles on the soil. Steel plates/plywood shall be removed once the access route is decommissioned, and the wood chips spread around the tree using hand tools; and,

- Tree clearing shall not be conducted during the *Migratory Bird Convention Act* (MBCA) breeding season commonly considered May- August, unless under appropriate permitting.

4.4.5.2 Pruning

Root Pruning

All approved root pruning should be undertaken by an ISA Certified Arborist or an Ontario College of Trades 444A Arborist or Arborist Apprentice. The following practices should be implemented for any root pruning:

- Prior to root pruning low pressure hydro-vac excavation should be undertaken in a 0.5 m wide section within and along the length of the TPZ to a depth of 500 mm to expose the roots;
- Exposed roots should not be allowed to dry out, where roots are exposed they should be covered by dampened mulch or topsoil to prevent desiccation;
- All pruning should maintain the integrity of the root bark ridge;
- A slow release deep root low nitrogen fertilizer should be applied to any trees requiring root pruning to increase vigour; and,
- Backfilling should occur as soon as possible and should occur with clean native uncontaminated topsoil.

Canopy Pruning

All canopy and clearance pruning should be undertaken by an ISA Certified Arborist or an Ontario College of Trades 444A Arborist or Arborist Apprentice. Any branches that overhang the work site and require pruning are to be pruned using good arboricultural practices in accordance with American National Standard (ANSI) A300 (Part 1) – 2008 Pruning.

Replacement Plantings

Compensation for the removal of trees within the study area should be in accordance with the requirements of the Conservation Halton *Landscaping and Tree Protection Guidelines* (2010). At a minimum, there should be a no net loss of trees within the study area.

4.5 Wildlife and Wildlife Habitat

The widening and updated alignment of Wyecroft Road has the potential to result in impacts to wildlife and wildlife habitat including:

- displacement of/disturbance to wildlife and wildlife habitat;
- barrier effects and interruptions to wildlife passage corridors;
- disturbance to wildlife from noise, light and visual intrusion;
- potential impacts to migratory birds; and,
- displacement of rare, threatened or endangered wildlife or significant wildlife habitat.

Detailed wildlife surveys should be undertaken where any data gaps exist with subsequent design changes and within the proposed realignment at Third Line as permission to enter was not granted during this EA study.

4.5.1 Displacement of/Disturbance to Wildlife and Wildlife Habitat

The widening of Wyecroft Road will impact primarily manicured grass areas, which typically only support non-sensitive wildlife or wildlife habitat with low habitat capabilities. If there are amenity trees planted within the area, these may provide some opportunity for urban nesting bird species, which could be displaced if tree removals are required. The majority of species residing in habitats within or directly adjacent to the ROW are tolerant of human disturbances/anthropogenic influences.

Several small cultural meadow/thicket communities along the ROW may support limited wildlife and provide habitat for other urban tolerant species but the natural heritage function is considered to be minimal due to the small, fragmented nature of the communities documented. Any vegetation removal taking place in cultural communities will be limited to areas along the edges of the communities, and displacement or disturbance to wildlife is considered minimal due to the extent of disturbance proposed and the limited presence of wildlife or habitat documented to be using these areas during field studies.

The replacement of crossing C1 with a single span bridge crossing of Fourteen Mile Creek is anticipated to disturb wildlife passage temporarily during construction, but will ultimately improve wildlife mobility and habitat linkage with a much wider passage through the creek valley upon completion of the bridge.

The realignment of South Service Road West Road near Third Line will lead to significant intrusion into the meadow/thicket/woodland/forest (CUM1-1/CUT1, CUT1/CUW1 and FOD7) communities to the northeast of Third Line. These areas are natural or semi-natural communities that provide opportunity to wildlife for movement, shelter, breeding habitat, foraging, or habitat linkage in an otherwise heavily urban area. The proposed realignment of South Service Road West and associated grading through this habitat will remove a significant amount of vegetated area. This will also fragment the community and disrupt the use of this semi-natural area permanently for wildlife. As noted above, permission to enter this area was not granted, and wildlife investigations should be undertaken during the detail design phase for this project.

4.5.2 Barrier Effects and Interruptions to Wildlife Passage

4.5.2.1 *Wildlife Openness Ratio Comparison*

Openness ratio (OR) is a calculation that is used to determine the tunnel effect created by a structure such as a bridge or culvert, and the relative likelihood that wildlife species would utilize that structure to move across the landscape. This evaluation is completed by analysing the measurements of a structure (i.e., height x width / structure length). Generally, a greater openness ratio value is expected to increase the likelihood of wildlife utilization of a given structure. To maximize the openness ratio, structures should be designed to have a larger opening and the shortest length possible, since wildlife species are more likely to pass through a structure if they can see light at the other end.

Minimum OR was determined by a review of secondary source data regarding wildlife passage at road crossings. The minimum OR for medium sized animals (e.g. red fox) should be 0.4, and the minimum OR for large sized animals (e.g. deer) should be 0.75 (Cavallaro et al. 2005). Research indicates that small mammals prefer small diameter openings (e.g. concealment may decrease exposure to predation), and subsequently, smaller OR structures (Ministry of Transportation, 2006). The following minimum clearance heights are recommended for structures that will provide passage for large, medium and small sized animals, respectively: 2 m, 1 m, and 0.3 m (Cavallaro et al. 2005).

An assessment of the openness ratio at the seven crossings that are part of improvements to Wyecroft Road, was undertaken and the results are presented in **Table 11**. Work being completed at each crossing varies from complete replacement to rehabilitation, or lengthening of existing structures. The Openness Ratio for the span bridge replacement of the concrete bottom culvert at C1 will significantly increase.

TABLE 11. EXISTING AND PROPOSED OPENNESS RATIOS FOR STRUCTURES WITHIN THE STUDY AREA

Crossing*	Existing								Proposed								Net Change for Wildlife Passage
	OR	W (m)	H (m)	L (m)	*Large Mammals*	*Mid-sized Mammals*	*Small Mammals*	*Herps*	OR	W (m)	H (m)	L (m)	*Large Mammals*	*Mid-sized Mammals*	*Small Mammals*	*Herps*	
C1	**0.766**	6.0	3.0	23.5	Y	Y	Y	Y	**4.09**	20.00	5.07	24.78	Y	Y	Y	Y	Significant increase to wildlife movement for all groups
C2	**0.012**	1.0	1.0	80.20	N	N	N	N	**0.011**	1.0	1.0	87.70	N	N	N	N	Slight decrease in OR. Structure size (existing and proposed) offers little opportunity for wildlife passage.
C3	**0.053**	3.06	1.7	97.3	N	N	Y	N	**0.047**	3.06	1.7	109.75	N	N	Y	N	Slight decrease in OR. Structure size (existing and proposed) offers little opportunity for wildlife passage.
C4	**0.105**	2.44	1.83	42.70	N	Y	Y	Y	**0.093**	2.44	1.83	48.0	N	N	Y	N	Small decrease in the capacity for Mid-Size and Herp wildlife to pass through structure.
C5	**0.029**	1.03	0.74	26.0	N	N	N	N	**0.125**	3.66	1.22	35.70	N	Y	Y	Y	Significant increase to wildlife movement for all except large mammals.
C6	**0.092**	3	1.8	59	N	N	Y	N	**0.092**	3	1.8	59	N	N	Y	N	No change
C7	**0.551**	6.1	1.47	16.9	N	Y	Y	Y	**0.310**	6.1	1.5	29.5	N	Y	Y	Y	Small decrease to wildlife movement for all except large mammals.

*See Tables 8 and 9 for associated watercourse crossing, which are presented on Figure 2a.

Animal Group	*Min. OR**	*Notes:*
Large mammals (e.g. deer)	≥ 0.6-1.0	Recommend width and height both ≥3 m, but no less than 2 m tall
Mid-sized mammals (e.g. fox, raccoon, skunk)	≥0.4, but no less than 0.1	Width and height each ≥1 m
Small mammals (e.g. mouse, vole, squirrel)	≥0.05	Width and height each 0.3-1.0 m
Herps (e.g. frog, salamander, turtle, snake)	≥0.25, but no less than 0.1	Recommend width and height both ≥1 m, but no less than 0.5 m - Length ideally less than 25 m

Although the previous culvert was within the OR to accept all wildlife types, the newly proposed OR will increase by approximately 6 times the existing ratio, which is anticipated to allow and encourage significantly greater wildlife mobility through the Fourteen Mile Creek Valley for species small and large.

Rehabilitation or replacement of culvert crossings C2, C3, C6, and C7 will have little to no impact on wildlife movement as the openness ratio will change only a minor degree and does not change the types of wildlife expected to use those crossings.

The proposed C4 crossing will have a slightly lower OR than the existing structure and may limit or exclude mid-size mammal (i.e. fox, raccoon) and herpetofauna crossing. It should be noted that the existing OR for C4 is already at the bottom acceptable range for both herpetofauna and mid-size mammals to cross, therefore; the slight reduction in OR for the proposed crossing is not expected to have a significant impact on wildlife movement. The C4 crossing is also located in a highly manicured area that likely already has very limited wildlife assemblage present.

Rehabilitation of the C5 crossing will significantly increase the OR and allow greater wildlife mobility for small to medium size wildlife. The existing OR indicates that there is a very low likelihood of any wildlife using the crossing. The OR for the proposed structure will accept mid-size mammals or smaller.

4.5.3 Disturbance to Wildlife from Noise, Light and Visual Intrusion

Noise, light and visual intrusion have the potential to alter wildlife activities and patterns. In the majority of the Wyecroft Road study area wildlife have become acclimatized to the noise, light and visual conditions associated with the presence of the highway and urban settings, and only those fauna that are tolerant of human activities tend to persist. Given that wildlife found within the study area are acclimatized to the presence of road infrastructure, disturbance to wildlife from any increase in noise light and visual intrusion potentially caused by the operation of the intersection are not expected to have significant adverse effects.

Wildlife using cultural meadow/thicket, cultural thicket/woodland and forest (CUM1-1/CUT1, CUT1/CUW1, and FOD7) communities to the northeast of Third Line will be impacted due to the fragmentation of the community proposed by the realignment of South Service Road West. The removal of a significant portion of these communities will alter the visual intrusion, roadway noise, and light that is present in these areas. The removal of vegetation will also create more low-quality edge habitat and may reduce wooded habitat for more sensitive species.

Disturbance to wildlife through construction activities are considered to be temporary in nature and can be mitigated to some degree. Long-term negative effects on wildlife from construction noise, light, dust, etc., are not anticipated.

4.5.4 Potential Impacts to Migratory Birds

Of the 31 bird species recorded (based on field observations, secondary sources and/or habitats present), 24 are protected under the MBCA. However, no nests of migratory birds were documented on/under any of the watercourse crossing structures/culverts located within the study area. The MBCA prohibits the killing, capturing, injuring, taking or disturbing of migratory birds (including eggs) or damaging, destroying, removing or disturbing of nests. Although no nests of migratory birds were documented within the study area, evidence of bird nesting behaviour was identified within the vicinity of the proposed construction activities. All construction activities associated with the road improvements must be in compliance with the MBCA.

The removal of vegetation within cultural meadow/thicket, cultural thicket/woodland and forest (CUM1-1/CUT1, CUT1/CUW1, and FOD7) communities to the northeast of Third Line will very likely impact migratory breeding birds that have previously used the area for nesting. As this area was not formally surveyed in 2018/2019 due to access restrictions, it is assumed that breeding birds protected under the MBCA are using the area for breeding purposes. As previously noted, detailed wildlife surveys should be undertaken where any data gaps exist with subsequent design changes, including within the proposed realignment at Third Line as permission to enter was not granted during this EA study.

The study area falls within Environment Canada's Nesting Zone C1 (Nesting Period: late March – late August). Consequently, to comply with the requirements of the MBCA, disturbance, clearing or disruption of vegetation, trees, or structures where birds may be nesting should be completed outside the nesting period. If any disruptive activities must be undertaken within the nesting period, a nest screening survey must be conducted by a qualified avian biologist to identify and locate active nests of species covered under the MBCA. If an active nest is located, a mitigation plan shall be developed.

4.5.5 Displacement of Rare, Threatened or Endangered Wildlife or Significant Wildlife Habitat

No rare species or significant wildlife habitat were documented within the study area, therefore; no impacts are anticipated to any SAR wildlife or SAR habitat. During the detail design stage presence of species at risk should be re-examined and additional consultation with the MECP should occur.

4.5.6 Mitigation

To comply with the requirements of the MBCA, disturbance, clearing or disruption of vegetation where birds may be nesting should be completed outside the window of April 1 to August 31 to avoid the breeding bird season for the majority of the bird species protected under the act. In the event that these activities must be undertaken from April 1 to August 31, a nest screening survey must be conducted by a qualified avian biologist to identify and locate active nests of species covered under the MBCA. If an active nest is located, a mitigation plan shall be developed.

Provisions shall be included to ensure that the Contractor does not block or prohibit wildlife access to culverts and to the wildlife corridor during construction. In addition, any replacement culverts shall be of similar size to allow for continued use of these corridors for all species of wildlife (as described above).

Further consultation with MECP will take place during detail design regarding any general habitat protection measures that will be required for the wildlife species at risk that are or have the potential to be located in the vicinity of the study area and are regulated as 'Endangered' or 'Threatened' under the ESA.

4.5.6.1 Road Ecology Best Management Practice Guidelines (Conservation Halton, 2018)

During detail design, implementation of road ecology principles outlined in Conservation Halton's Road Ecology Best Management Practice Quick Reference Guide (2018) will be taken into consideration. This includes proactive project planning to identify the key concerns and the requirements for mitigation of impacts. Conservation Halton mitigation measures will be referenced during the design of any wildlife crossing and fencing design, new crossing structures, retrofitting existing structures, or wildlife exclusion fencing.

Wildlife crossing and fencing design should ensure that all wildlife mitigation needs and engineering and hazard mitigation requirements are integrated through a collaborative approach. Conservation Halton suggests that wildlife crossing structures provide passage for a wide variety of species and maintain or improve connectivity to the broader landscape. The fencing should exclude wildlife from the road and/or

funnel wildlife to the crossing structure. If fencing is extended beyond creek banks, further wildlife-vehicle collisions may be reduced. Special consideration for wildlife passage should only be included where more functional wildlife corridor habitat is present, specifically, habitats associated with Fourteen Mile Creek.

Conservation Halton recommends that new crossing structures and passage elements are installed at watercourse crossings for roads that bisect the Natural Heritage System of high-quality habitat. The specifics of the crossing structure implementation will be dependent on the project details and consultation from relevant agencies. The structure's Openness Ratio (OR; amount of light visible at the end of a structure which is used as a measure of permeability or attractiveness of the crossing structure to wildlife in Road Ecology) and dimensions should be appropriate for the expected species groups and associated habitat, with a minimum required structure length. Additional design elements should be incorporated into a single design which is suitable for a variety of species.

When unable to replace existing crossing structures, retrofitting of existing structures can be implemented to improve wildlife passage. Modifying designs of existing structures that may be used to pass flow can interfere with the function and capacity of structure, so mitigation measures can be used. These include installing wildlife benches, aerial catwalk/shelves along sides, planting native vegetation, removing barriers at structure entrances, clearing debris/obstructions within the structure that impede passage. Improving natural substrate or cover elements, installing permanent exclusion fencing, and installing baffles in structure to provide/enhance fish passage.

Wildlife exclusion fencing may be used to exclude wildlife from the road when a crossing structure is not required. Fencing can be temporary (i.e. heavy-duty silt fencing) or permanent. Other types of culvert/bridge design elements such as retaining walls function as barriers that funnel wildlife to the structure. The fence type/materials used should be chosen based on the target species/species group. Conservation Halton recommends fencing is continuous on both sides of the road, tied into the structure entrance, and contain escape entrances at regular intervals. Also, fencing should be located beyond the natural heritage feature and far enough from the road to minimize damage from road maintenance and vehicular encroachment. As noted above, special consideration for wildlife fencing should only be included where more functional wildlife corridor habitat is present, specifically, habitats associated with Fourteen Mile Creek.

4.6 Summary of Identified Concerns and Mitigation Measures

The proposed improvements to Wyecroft Road should not result in any significant adverse environmental effects provided the environmental protection/mitigation measures identified in **Section 4.0** are implemented. The environmental protection/mitigation measures identified in this Report must be incorporated into the contract package during detail design to address potential environmental effects resulting from this project.

Table 12 summarizes the related concerns/potential effects and associated protection and mitigation requirements that have been identified during preliminary design. During detail design, new information or changes to environmental concerns, potential effects and associated mitigation and/or monitoring requirements should be updated/revised, as required.

TABLE 12.
SUMMARY OF ENVIRONMENTAL CONCERNS/POTENTIAL EFFECTS, ASSOCIATED MITIGATION AND MONITORING REQUIREMENTS IDENTIFIED DURING PRELIMINARY DESIGN

ID #	Issues/Concerns/Potential Effects	Protection/Mitigation/Monitoring Requirements
1	Disturbance to soils and erosion and sedimentation control.	Standard erosion and sedimentation control measures must be followed during construction to cover the installation, maintenance, monitoring and removal of the temporary erosion and sediment control measures (i.e. straw bale flow checks) and the removal of sediment accumulated by the control measures. Site-specific erosion and sedimentation control measures will be identified during detail design following the *Erosion and Sediment Control Guideline for Urban Construction* (GGHA 2006). Erosion and sedimentation control measures may include the following and shall be implemented prior to construction commencement and remain in place until construction is complete and soils have re-stabilized: • placing straw bale flow checks at regular intervals in roadside ditches down-gradient from areas of soil disturbance to trap suspended sediments and reduce the erosive force of runoff; • placing silt fence along watercourses, ditches, wetlands and forest/woodland edges in areas of soil disturbance; • limiting the extent and duration that soils are exposed to the elements to the minimum area and time necessary to perform the work; • applying seed and mulch, tackifier and/or erosion control blanket in areas of soil disturbance to provide adequate slope protection and long-term slope stabilization; • monitoring and maintenance of erosion and sedimentation control measures during construction to ensure their effectiveness; and, • any dewatering will have discharge directed to a sediment containment system (sediment basin, sediment bag, etc.) prior to release to the watercourse.
2	Contamination of surface water from sources other than sediment.	Best management/construction practices and control of all construction operations will be implemented during construction to reduce the potential for spills or other materials/equipment from entering the watercourses/pond within the study area. The following measures will be employed: • storage, stockpiling and staging areas will be delineated prior to construction and inspected in accordance with the *Erosion and Sediment Control Guideline for Urban Construction* (GGHA 2006); • construction material, excess material, construction debris, and empty containers will be stored at least 30 m distance from watercourses and watercourse banks to prevent their entry into watercourses; • equipment refueling, maintenance and washing activities will be conducted at a pre-determined site located at an adequate distance (minimum 30 m) from the watercourses and their banks located within the study area to prevent the entry of petroleum, oil or lubricants (POL) or other deleterious substances (including any debris, waste, rubble or concrete material) into watercourses within the study area, or their release to the environment. Any material which inadvertently enters the watercourses will be removed by the Contractor in a

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		manner satisfactory to the Contract Administrator; and, • all spills that could potentially cause damage to the environment should be reported to the Spills Action Centre of the MECP. In the event of a spill, containment and clean-up will be completed quickly and effectively. In addition, an NSSP (Spill Prevention and Response Contingency Plan) must be included in the contract package to ensure a Spill Prevention and Response Contingency Plan and the appropriate contingency materials to absorb or contain any petroleum products/spills that may be accidentally discharged will be on site at all times.
3	Disruption/ disturbance to/displacement of aquatic habitat and communities.	The proposed Wyecroft Road improvements will cause direct habitat impacts at three watercourse crossings (culvert removal, replacement and rehabilitation) that support direct fish use, within the project limits. It is anticipated that a DFO review will be required under the *Fisheries Act* for these works, as there will be permanent impacts to habitat below the high water mark. This review process will be undertaken during the detail design stage, once the crossing designs are refined. Overall impacts, net environmental effects and site-specific mitigation proposed at each watercourse crossing that supports direct fish use are summarized below. Works at #C1 (Fourteen Mile Creek) are associated with the replacement of a twin cell concrete box with a clear span bridge. The Fourteen Mile Creek crossing supports Redside Dace (occupied habitat). Overall, the proposed bridge would be considered a benefit to fish habitat with a replacement structure that typically spans the meander belt to ensure that floodplain connectivity within the defined habitat (meander belt plus 30 m) is re-established and/or maintained. Works at this location may constitute an overall benefit to Redside Dace; however, works at this crossing (structure removal/replacement) may require a permit under the provincial ESA 2007. Any requirements under the ESA 2007 will be investigated/undertaken during detail design. Works at #C3 (Upper McCraney Creek) are associated with an extension of the culvert. This watercourse is highly modified within the study area and the perched culvert outlet and baffles are considered permanent barriers to fish movement to upstream reaches. The lower portion of this creek is mapped as supporting Redside Dace habitat. Additional work/discussion during detail design should be undertaken to determine if the removal of the perched culvert outlet is possible. Works at #C7 (Glen Oaks Creek) are associated with a culvert replacement of the open footing culvert with an open footing culvert that will enclose an additional 12.6m length of riffle/run habitat. However, this open bottomed culvert will be slightly higher and placed to better convey flow. Potential localized channel realignment may be required. Drainage features (#C2, #C4 and #C5) will also be upgraded as part of Wyecroft Road improvements, however, these features do not support fish habitat, and thus, no direct impacts to fisheries habitat will occur.

TABLE 12.
SUMMARY OF ENVIRONMENTAL CONCERNS/POTENTIAL EFFECTS, ASSOCIATED MITIGATION AND MONITORING REQUIREMENTS IDENTIFIED DURING PRELIMINARY DESIGN

ID #	Issues/Concerns/Potential Effects	Protection/Mitigation/Monitoring Requirements
		To reduce the potential for serious harm to fish habitat, the following environmental protection measures will be implemented: • for in-water works, construction is to be done between July 1 to September 15, to avoid the period when spawning is occurring and low flow conditions are present in Fourteen Mile Creek. For all other watercourses supporting fish habitat, an in-water construction window of July 1- March 31 would apply, to protect warmwater fish spawning; • work areas will be delineated with construction fencing to minimize the area of disturbance; • limiting riparian vegetation removals along watercourses to the extent possible and delaying removals until immediately prior to construction; • appropriate sediment control structures will be installed prior to and maintained during construction to prevent entry of sediments into watercourses and drainage features; • all in-water work will be carried out "in the dry" using an appropriate stream by-pass system; • where cofferdams (if applicable) are to be employed, dewatering effluent will be treated prior to discharge to receiving watercourse; • fish isolated by construction activities (if applicable) will be captured and safely released to the watercourse under a Fish Collection Permit and conducted by qualified, experienced biologists; • good housekeeping practices related to materials storage/stockpiling, equipment fuelling/ maintenance, etc. will be implemented during construction; and, • disturbed riparian areas will be vegetated and/or covered with an erosion control blanket as quickly as possible to stabilize the banks and minimize the potential for erosion and sedimentation.
4	Water Quality and Quantity Protection.	The construction associated with the proposed structure and culvert works has the potential to alter water quality through on-site erosion of exposed materials and the subsequent impairment of downstream water quality with sediments and other contaminants. To reduce the potential for impacts to water quality and quantity, the following environmental protection measures will be implemented: • isolate work areas; • effluent from dewatering (if applicable) will be treated prior to its release back into the receiving watercourse; • installation and maintenance of erosion and sediment controls (silt fencing, flow checks, etc.) will be installed prior to construction, regularly monitored, corrected and/or improved through to the completion of construction to

TABLE 12.
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		prevent sediments from reaching the watercourse from exposed soils upslope; • roadway runoff should be directed to storm water management (SWM) systems where technically feasible or additional options for on-site treatment considered (enhanced swales, infiltration); • during detail design, any during construction water quality monitoring that may be deemed required at the more sensitive crossings, should follow the *Conservation Halton's Guidelines for Ecological Studies* (2017); and, • all exposed areas should be vegetated as quickly as possible once the work is completed.
5	Displacement of/disturbance to vegetation and vegetation communities.	The Wyecroft Road improvements will result in the total loss of 9.88 ha of vegetation communities, which consists primarily of two vegetation types including, 7.29 ha of manicured areas and 1.35 ha of cultural meadow. Notable vegetation removals will occur within the vicinity of the proposed realignment northeast of Third Line, where through air photo interpretation a cultural meadow/thicket and a cultural thicket/woodland (CUM1-1/CUT1, CUT1/CUW1) and a Fresh-Moist Lowland Deciduous Forest (FOD7), were identified. Detailed vegetation surveys were not permitted within this area. Detailed vegetation delineation and plant inventories will be undertaken during detail design, once permission to access the property has been granted. No ANSIs, PSWs or ESAs located within the study area. A local wetland associated with the riparian habitat along Fourteen Mile Creek was identified and is classified as Willow Mineral Deciduous Swamp (SWD4-1). No impacts to this wetland are anticipated. Kentucky coffee-tree, which is regulated as Threatened under the ESA 2007, was identified as planted within manicured areas and as such requires no further work under the ESA 2007. Common hackberry, swamp white oak, freeman's maple and common evening-primrose were observed in the study area, species that are rare in Halton Region. These tree species were identified as planted within manicured areas and not naturally occurring. Common hackberry was also identified within a cultural woodland that would be impacted, this species should be replanted along the new edge of this community as part of edge management. Common evening-primrose was identified within the Willow Mineral Deciduous Swamp (SWD4-1) and as such is not expected to be impacted. At a minimum, the following protection/mitigation measures should be implemented during construction to ensure the protection of vegetation and vegetation communities to the extent possible: • wherever possible during detail design, efforts will be made to minimize the removal of vegetation/vegetation communities, to the extent possible; • the contractor shall ensure that soil migration from the construction area is prevented, and that exposed soils are stabilized as soon as is possible;

TABLE 12.
SUMMARY OF ENVIRONMENTAL CONCERNS/POTENTIAL EFFECTS, ASSOCIATED MITIGATION AND MONITORING REQUIREMENTS IDENTIFIED DURING PRELIMINARY DESIGN

ID #	Issues/Concerns/Potential Effects	Protection/Mitigation/Monitoring Requirements
		• special care will be taken when construction vehicles are operating in the vicinity of the more sensitive wetland feature and riparian habitat including the Fresh-Moist Lowland Deciduous Forest associated with various watercourses within the study area. Provisions should be included in the contract package to ensure that these more sensitive features are avoided and to prohibit/limit impacts onto these sensitive areas; • native and non-invasive vegetation cover will be used to protect any exposed surfaces; • old field seed mix and mulching or erosion control blanket will be placed in areas of soil disturbance to provide adequate slope protection and long-term slope stabilization in areas where sensitive features and watercourses are to be protected; • appropriate tree protection will be installed to protect trees to be retained, including safeguarding trees from construction operations, equipment and vehicles where such trees are not designated for removal under the contract, and should also cover the installation of protective barriers. Prior to construction, trees to be protected will be clearly identified in the field by the Contract Administrator and a protective barrier will be installed. Repairing or replacing trees/shrubs identified to remain, which become damaged by construction activities, will be undertaken; and, restoration of disturbed natural areas shall use a native species seed mix and woody species plantings similar to the character of the surrounding area, or similar native woody species; • restoration and edge management planning should be undertaken and implemented to mitigate impacts related to vegetation removals and/or impacts near to existing edges of natural areas. Restoration and edge management planning shall be undertaken by experienced, qualified professionals. Maintenance and warranty should be in place for restoration works undertaken; and, • landscape planning and planting should be undertaken and implemented to mitigate removals within landscaped/manicured areas, to beautify areas within the new right-of-way, provide shading, provide wildlife habitat for local, urban species, and to promote carbon capture. Landscaping planning and implementation shall be undertaken by experienced, qualified professionals. Maintenance and warranty for Landscaping should be in place for landscaping works undertaken.
6	Displacement/ disturbance to/ removal of tree resources.	Trees identified for removal includes trees within the proposed grading limits and those trees outside of the grading limits where the amount of critical root zone that will be removed will likely cause significant and irreversible decline of the health of tree. A total of 266 trees have been recommended for removal as a result of the proposed improvements to Wyecroft Road from Bronte Street to Kerr Street, with the remaining 48 trees to be retained/protected. Within the vicinity of the proposed South Service Road West Road realignment northeast of Third Line

TABLE 12.
SUMMARY OF ENVIRONMENTAL CONCERNS/POTENTIAL EFFECTS, ASSOCIATED MITIGATION AND MONITORING REQUIREMENTS IDENTIFIED DURING PRELIMINARY DESIGN

ID #	Issues/Concerns/Potential Effects	Protection/Mitigation/Monitoring Requirements
		property access was not provided. Follow-up tree surveys will be undertaken where any data gaps exist, once permission to enter is granted during detail design. No trees were identified as impacted as a result of the proposed improvements to Wyecroft Road. Kentucky coffee-tree, which is regulated as Threatened by the Ontario ESA 2007, was the only plant species at risk identified within the study area. Streetscape and planted Kentucky coffee trees are not protected under the ESA 2007, due to their non-native origin. No further consultation with the MECP is expected for this species. A detailed Tree Preservation Plan will be prepared during the detail design phase, which should include the designation of a TPZ and recommendation for mitigation measures to ensure impacts to all retained trees are minimized. Preliminary recommendations of mitigation measures are provided below. These mitigations should be revised accordingly during detail design and with each refinement to the design: • tree protection fencing must be installed as per the approved Tree Preservation Plan. Tree protection fencing shall be installed in accordance with the Town of Oakville Specifications. The contract administrator must review and approve the fencing prior to the commencement of any grading work and the fencing will be maintained until all construction is complete; • heavy machinery should not to be operated within the TPZ (including overhead swinging of machine arms); • construction materials, equipment, soil, construction waste or debris are not to be stored within the TPZ or dripline of the trees identified for protection; • there should be no movement or parking of vehicles, placement of equipment or pedestrian traffic within the TPZ; • no grade changes shall occur within the TPZ unless approved by the Tree Protection Plan; • trees shall not have any rigging cables or hardware of any sort attached or wrapped around them, nor shall any contaminants be dumped within protected areas; • all removals must be felled into the work zone to ensure that damage does not occur to trees within the TPZ; • should any additional, incidental or accidental tree injuries occur during construction, a qualified Arborist should be consulted to determine whether additional mitigation measures should be employed; • soil Compaction Mitigation - Wood chips shall be applied to the ground to a depth of 100 mm in areas where minimum tree protection zones will be encroached by construction traffic. Steel plates or ¾" plywood should be laid on top of the chips to dissipate compressive force of vehicles on the soil. Steel

TABLE 12.
SUMMARY OF ENVIRONMENTAL CONCERNS/POTENTIAL EFFECTS, ASSOCIATED MITIGATION AND MONITORING REQUIREMENTS IDENTIFIED DURING PRELIMINARY DESIGN

ID #	Issues/Concerns/Potential Effects	Protection/Mitigation/Monitoring Requirements
		plates/plywood shall be removed once the access route is decommissioned, and the wood chips spread around the tree using hand tools; and, • tree clearing shall not be conducted during the Migratory Bird Convention Act (MBCA) breeding season commonly considered May- August, unless under appropriate permitting. All approved root pruning should be undertaken by an ISA Certified Arborist or an Ontario College of Trades 444A Arborist or Arborist Apprentice. The following practices should be implemented for any root pruning: • prior to root pruning low pressure hydro-vac excavation should be undertaken in a 0.5 m wide section within and along the length of the TPZ to a depth of 500 mm to expose the roots; • exposed roots should not be allowed to dry out, where roots are exposed they should be covered by dampened mulch or topsoil to prevent desiccation; • all pruning should maintain the integrity of the root bark ridge; • a slow release deep root low nitrogen fertilizer should be applied to any trees requiring root pruning to increase vigour; • backfilling should occur as soon as possible and should occur with clean native uncontaminated topsoil; and, • all canopy and clearance pruning should be undertaken by an ISA Certified Arborist or an Ontario College of Trades 444A Arborist or Arborist Apprentice. Any branches that overhang the work site and require pruning are to be pruned using good arboricultural practices in accordance with American National Standard (ANSI) A300 (Part 1) – 2008 Pruning. Compensation for the removal of trees within the study area should be in accordance with the requirements of the Conservation Halton *Landscaping and Tree Protection Guidelines* (2010). At a minimum, there should be a no net loss of trees within the study area
5	Displacement of/disturbance to wildlife and wildlife habitat.	The widening of Wyecroft Road will primarily impact manicured grass areas. These areas typically support non-sensitive wildlife or wildlife habitat. Other cultural meadow/thicket habitat along margins of the study area may support limited wildlife and provide habitat for other urban tolerant species. The realignment of South Service Road West near Third Line will lead to significant intrusion into the meadow/thicket/woodland/forest (CUM1-1/CUT1, CUT1/CUW1 and FOD7) where there is increased opportunity for wildlife movement, shelter, breeding, and foraging. Permission to enter this area was not granted, thus, wildlife investigations will be undertaken during the detail design. The replacement of crossing C1 with a single span bridge at Fourteen Mile Creek is anticipated to disturb wildlife passage temporarily during construction, but will ultimately improve wildlife mobility and habitat linkage. The Wildlife Openness Ratio (OR) at this crossing will significantly increase to accept all wildlife types.

TABLE 12.
SUMMARY OF ENVIRONMENTAL CONCERNS/POTENTIAL EFFECTS, ASSOCIATED MITIGATION AND MONITORING REQUIREMENTS IDENTIFIED DURING PRELIMINARY DESIGN

ID #	Issues/Concerns/Potential Effects	Protection/Mitigation/Monitoring Requirements
		Works at crossing C4 will reduce the OR and limit or exclude mid-size mammals. Works at crossing C5 will significantly increase the OR allowing for greater wildlife mobility for small to medium size wildlife. At culvert crossings C2, C3, C6, and C7, there will be little to no impact on wildlife movement. To comply with the requirements of the MBCA, disturbance, clearing or disruption of vegetation where birds may be nesting should be completed outside the window of April 1 to August 31 to avoid the breeding bird season for the majority of the bird species protected under the act. In the event that these activities must be undertaken from April 1 to August 31, a nest screening survey must be conducted by a qualified avian biologist to identify and locate active nests of species covered under the MBCA. If an active nest is located, a mitigation plan shall be developed. Provisions shall be included to ensure that the Contractor does not block or prohibit wildlife access to culverts and to the wildlife corridor during construction. No rare species or significant wildlife habitat were documented within the study area, therefore; no impacts are anticipated to any SAR wildlife or SAR habitat. During the detail design stage presence of species at risk will be re-examined and additional consultation with the MECP will occur, as necessary. If it is determined that the habitat of these species will be impacted, it is recommended that further discussion take place with MECP during detail design to confirm any potential impacts and to develop appropriate environmental protection/mitigation measures in order to meet MECP regulations under the ESA 2007. If any species at risk are identified within the vicinity of the study area that are regulated as 'Endangered' or 'Threatened', MECP must be contacted immediately and operations must be modified to avoid any negative impacts to species at risk or their habitat until further discussions with MECP can occur regarding opportunities for mitigation. During detail design, implementation of road ecology principles outlined in Conservation Halton's Road Ecology Best Management Practice Quick Reference Guide (2018) should be taken into consideration, including proactive project planning to identify key concerns and requirements for mitigation of impacts. Conservation Halton mitigation measures will be referenced during the design of any wildlife crossing and fencing design, new crossing structures, retrofitting existing structures, or wildlife exclusion fencing. Wildlife crossing and fencing (temporary or permanent) design should ensure that all wildlife mitigation needs and engineering and hazard mitigation requirements are integrated through a collaborative approach during detail design.

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APPENDIX A.
FISH AND FISH HABITAT
PHOTOGRAPHIC RECORD

Project #TA8828
Fourteen Mile Creek

Photo Appendix A

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Photo 1: Structure inlet, view from southwest bank (May 17/2018).

Photo 2: Upstream view of riffle/run habitat, upstream of structure inlet.

Photo 3: Large pool located approximately 50m upstream of Wyecroft Road.

Photo 4: Concrete lip located at structure inlet; partially exposed above the water at the time of survey (May 17, 2018).

Photo 5: View from on top of the structure outlet, showing large log across channel.

Photo 6: View of backwater within the north structure cell.

Project #TA8828
Fourteen Mile Creek

Photo Appendix A

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Photo 7: Upstream view of the structure outlet, showing large log and dry vegetated point bar.

Photo 8: Downstream view of Fourteen Mile Creek (May 17, 2018).

Photo 9: Upstream view of flat morphology present in the downstream reach.

Photo 10: Downstream view of large pool at bend and presence of eroding banks (within 115m downstream of Wyecroft Road).

Photo 11: Upstream view of concrete lip at the inlet of the culvert (September 7, 2018).

Photo 12: Upstream view of north structure cell (September 7, 2018).

Project #TA8828
McCraney Creek
(AU-0004-MCC)

Photo Appendix A

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Photo 13: Downstream view of McCraney Creek (May 17, 2018).

Photo 14: Eroding concrete channel banks near the culvert outlet.

Photo 15: Eroding channel banks (up to 90 cm undercut), located within 6m downstream of the Wyecroft Rd. culvert.

Photo 16: Upstream view of the culvert outlet, highlighting perch (May 17, 2018).

Photo 17: Another downstream view from culvert, showing rip rap and concrete sections instream.

Photo 18: Inside culvert, upstream view of perch.

Project #TA8828
McCraney Creek
(AU-0004-MCC)

Photo Appendix A

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Photo 19: Downstream view showing course substrates (within approximately 50m downstream of Wyecroft Road).

Photo 20: Flat morphology and soft substrate deposition area, near the downstream edge of the assessment area.

Photo 21: Deeper water and increase instream and overhanging cover approximately 130m downstream of Wyecroft Road.

Photo 22: Downstream view of channel from Wyecroft Road on September 7, 2018.

Photo 23: Channel reach upstream of the QEW showing instream barrier (September 7, 2018).

Project #TA8828
Taplow Creek
(AU-0001-MCC)

Photo Appendix A

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Photo 24: Westerly view of culvert inlet and distance from Wyecroft Road.

Photo 25: Upstream view of creek showing widened inlet area.

Photo 26: Upstream view of typical habitat, further upstream.

Photo 27: Downstream view of channel showing widened outlet area and depositional area.

Photo 28: Upstream view of culvert outlet.

Photo 29: Upstream view of downstream channel reach (concrete blocks on bank and in channel visible); some instream vegetation present.

Project #TA8828
Glen Oaks Creek
(AU-0002-MCC)

Photo Appendix A

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Photo 30: Upstream view of channel from the top of the culvert.

Photo 31: Example of dumping occurring along the bank edges, notable upstream of Wyecroft Road.

Photo 32: Upstream view of channel showing narrow riparian and soil dumping along the west bank.

Photo 33: Upstream view of the culvert outlet and more open reach near Wyecroft Road.

Photo 34: View of flat morphology and greater riparian cover in downstream reach.

Photo 35: Westerly view of culvert outlet and vicinity.

APPENDIX B
VASCULAR PLANT LIST

Appendix B. Vascular Plant List

	Scientific Name	Common Name	GRank	SRank	Halton	M	CUM1-1a	CUM1-1b	CUM1-1c	CUM1-1d	CUM1-1e	CUM1-1f	CUT1a	CUT1b	CUW1a	CUW1b	FOD	SWD4-1
	EQUISETACEAE	**HORSETAIL FAMILY**																
	Equisetum arvense	field horsetail	G5	S5	X													X
	PINACEAE	**PINE FAMILY**																
*	*Picea pungens*	Colorado spruce	G5	SE1		X												
	Picea glauca	white spruce	G5	S5	X	X										X		
*	*Pinus mugo*	mugo pine	G?	SE1		X												
	Pinus strobus	eastern white pine	G5	S5	X	X												
*	*Pinus sylvestris*	Scotch pine	G?	SE5	X	X												
*	*Pinus nigra*	Austrian pine	G?	SE2		X												
*	*Picea abies*	Norway spruce	G?	SE3	X	X										X		
	CUPRESSACEAE	**CEDAR FAMILY**																
	Thuja occidentalis	eastern white cedar	G5	S5	X	X										X		
	Juniperus virginiana	eastern red cedar	G5	S5					X	X	X			X	X		X	
	Juniperus horizontalis	creeping juniper	G5	S5		X												
	TAXACEAE	**YEW FAMILY**																
	Taxus canadensis	American yew	G5	S5	X	X												
	MAGNOLIACEAE	**MAGNOLIA FAMILY**																
	Liriodendron tulipifera	tulip tree	G5	S4		X												
	ULMACEAE	**ELM FAMILY**																
*	*Ulmus pumila*	Siberian elm	G?	SE3	X	X					X		X	X			X	
	Ulmus americana	white elm	G5?	S5	X			X							X			X
	Celtis occidentalis	common hackberry	G5	S4	R3	X									X			
	MORACEAE	**MULBERRY FAMILY**																
*	*Morus alba*	white mulberry	G?	SE5	X						X							
	JUGLANDACEAE	**WALNUT FAMILY**																

Appendix B. Vascular Plant List

	Scientific Name	Common Name	GRank	SRank	Halton	M	CUM1-1a	CUM1-1b	CUM1-1c	CUM1-1d	CUM1-1e	CUM1-1f	CUT1a	CUT1b	CUW1a	CUW1b	FOD	SWD4-1
	Juglans nigra	black walnut	G5	S4	X	X				X	X							X
	FAGACEAE	**BEECH FAMILY**																
	Quercus macrocarpa	bur oak	G5	S5	X	X												
	Quercus bicolor	swamp white oak	G5	S4	R1	X												
*	*Quercus robur*	English oak	G?	SE1		X												
	Quercus rubra	red oak	G5	S5	X	X												
	Quercus alba	white oak	G5	S5	X												X	
	BETULACEAE	**BIRCH FAMILY**																
	Betula papyrifera	white birch	G5	S5	X									X				
*	*Betula pendula*	European weeping birch	G?	SE4	X	X												
	CARYOPHYLLACEAE	**PINK FAMILY**																
*	*Cerastium arvense* ssp. *arvense*	field chickweed	G5T?	SE4		X												
	POLYGONACEAE	**SMARTWEED FAMILY**																
*	*Rumex crispus*	curly-leaf dock	G?	SE5	X	X				X								
*	*Polygonum cuspidatum*	Japanese knotweed	G?	SE4	X	X							X					
	TILIACEAE	**LINDEN FAMILY**																
*	*Tilia cordata*	small leaf linden	G?	SE1		X												
	Tilia americana	basswood	G5	S5	X	X												
	SALICACEAE	**WILLOW FAMILY**																
	Salix sp.	willow		?														X
	Salix lucida	shining willow	G5	S5	U									X				
*	*Salix fragilis*	crack willow	G?	SE5	X										X			X
	Salix exigua	sandbar willow	G5	S5	U			X										X
	Salix discolor	pussy willow	G5	S5	X												X	
	Salix bebbiana	long-beaked willow	G5	S5	X									X				

Appendix B. Vascular Plant List

	Scientific Name	Common Name	GRank	SRank	Halton	M	CUM1-1a	CUM1-1b	CUM1-1c	CUM1-1d	CUM1-1e	CUM1-1f	CUT1a	CUT1b	CUW1a	CUW1b	FOD	SWD4-1
*	*Salix alba*	white willow	G5	SE4	X						X				X			X
	Populus deltoides ssp. *deltoides*	eastern cottonwood	G5T?	SU	U	X					X							X
*	*Populus alba*	silver poplar	G5	SE5	X					X								
	BRASSICACEAE	**MUSTARD FAMILY**																
*	*Capsella bursa-pastoris*	shepherd's purse	G?	SE5	X			X										
*	*Alliaria petiolata*	garlic mustard	G5	SE5	X	X	X					X			X	X	X	
*	*Barbarea vulgaris*	yellow rocket	G?	SE5	X	X	X	X	X	X		X			X		X	
	PRIMULACEAE	**PRIMROSE FAMILY**																
*	*Lysimachia vulgaris*	garden loosestrife	G?	SE3	X										X			
	ROSACEAE	**ROSE FAMILY**																
	Geum aleppicum	yellow avens	G5	S5	X	X											X	
	Fragaria virginiana ssp. *virginiana*	scarlet strawberry	G5T?	SU	X					X				X			X	
	Amelanchier arborea	downy juneberry	G5	S5	X	X												
*	*Crataegus monogyna*	English hawthorn	G5	SE5	X									X				
	Crataegus sp.	hawthorn							X									
	Crataegus punctata	large-fruited thorn	G5	S5	X			X										
	Malus sp.	apple				X												
	Prunus pensylvanica	pin cherry	G5	S5	U									X				
	Prunus virginiana ssp. *virginiana*	choke cherry	G5T?	S5	X	X							X					X
*	*Pyrus communis*	common pear	G5	SE4	X		X											
	Potentilla simplex	old-field cinquefoil	G5	S5	X	X	X			X			X					
*	*Rosa multiflora*	multiflora rose	G?	SE4	X									X				X
	Rubus occidentalis	thimble-berry	G5	S5	X										X			
*	*Prunus avium*	sweet cherry	G?	SE4	X	X											X	
	FABACEAE	**PEA FAMILY**																

Appendix B. Vascular Plant List

	Scientific Name	Common Name	GRank	SRank	Halton	M	CUM1-1a	CUM1-1b	CUM1-1c	CUM1-1d	CUM1-1e	CUM1-1f	CUT1a	CUT1b	CUW1a	CUW1b	FOD	SWD4-1
*	*Medicago sativa ssp. sativa*	alfalfa	G?T?	SE5	X												X	
*	*Lotus corniculatus*	bird's-foot trefoil	G?	SE5	X	X	X	X		X	X	X				X	X	X
*	*Vicia cracca*	tufted vetch	G?	SE5	X					X								
*	*Coronilla varia*	variable crown-vetch	G?	SE5	X		X										X	
*	*Robinia pseudo-acacia*	black locust	G5	SE5	X	X												
*	*Trifolium pratense*	red clover	G?	SE5	X			X		X	X							
	Gleditsia triacanthos	honey locust	G5	S2	RINT	X												
	Gymnocladus dioicus	Kentucky coffee-tree	G5	S2		X												
	ELAEAGNACEAE	**OLEASTER FAMILY**																
*	*Elaeagnus angustifolia*	Russian olive	G?	SE3	X				X		X	X	X					
	ONAGRACEAE	**EVENING-PRIMROSE FAMILY**																
	Circaea lutetiana ssp. *canadensis*	yellowish enchanter's nightshade	G5T5	S5	X										X			
	Oenothera biennis	common evening-primrose	G5	S5	R1													X
	CORNACEAE	**DOGWOOD FAMILY**																
	Cornus alternifolia	alternate-leaved dogwood	G5	S5	X	X												
	Cornus stolonifera	red-osier dogwood	G5	S5	X									X				X
	Cornus foemina ssp. *racemosa*	red panicled dogwood	G5?	S5	X		X								X			
	EUPHORBIACEAE	**SPURGE FAMILY**																
*	*Euphorbia esula*	leafy spurge	G5	SE5	X			X	X	X	X	X		X	X		X	
	RHAMNACEAE	**BUCKTHORN FAMILY**																
*	*Rhamnus cathartica*	common buckthorn	G?	SE5	X	X	X	X	X	X	X		X	X	X	X	X	X
	VITACEAE	**GRAPE FAMILY**																
	Parthenocissus quinquefolia	Virginia creeper	G5	S5	X					X		X		X	X		X	
	Vitis riparia	riverbank grape	G5	S5	X	X				X	X		X	X			X	X

Appendix B. Vascular Plant List

	Scientific Name	Common Name	GRank	SRank	Halton	M	CUM1-1a	CUM1-1b	CUM1-1c	CUM1-1d	CUM1-1e	CUM1-1f	CUT1a	CUT1b	CUW1a	CUW1b	FOD	SWD4-1
	ACERACEAE	**MAPLE FAMILY**																
*	*Acer platanoides*	Norway maple	G?	SE5	X	X									X		X	
*	*Acer ginnala*	amur maple	G?	SE1		X												
	Acer saccharinum	silver maple	G5	S5	X	X												
	Acer X freemanii	freeman's maple		S4?	R3	X												
	Acer saccharum ssp. *saccharum*	sugar maple	G5T?	S5	X	X											X	
	Acer rubrum	red maple	G5	S5	X										X			
	Acer negundo	manitoba maple	G5	S5	X					X	X				X		X	X
	ANACARDIACEAE	**SUMAC FAMILY**																
	Rhus typhina	staghorn sumac	G5	S5	X	X	X				X		X	X			X	
	Toxicodendron radicans	poison-ivy	G5T	S5	X				X	X		X	X		X		X	
	BALSAMINACEAE	**TOUCH-ME-NOT FAMILY**																
	Impatiens capensis	spotted touch-me-not	G5	S5	X										X			X
*	*Impatiens glandulifera*	glandular touch-me-not	G?	SE4	X													X
	APIACEAE	**PARSLEY FAMILY**																
*	*Daucus carota*	wild carrot	G?	SE5	X		X	X	X	X	X		X		X	X	X	
*	*Pastinaca sativa*	wild parsnip	G?	SE5	X													X
	ASCLEPIADACEAE	**MILKWEED FAMILY**																
	Asclepias syriaca	common milkweed	G5	S5	X		X								X			
*	*Cynanchum rossicum*	swallow-wort	G?	SE5	X											X		
	SOLANACEAE	**POTATO FAMILY**																
*	*Solanum dulcamara*	bitter nightshade	G?	SE5	X					X	X							
	CONVOLVULACEAE	**MORNING-GLORY FAMILY**																
*	*Convolvulus arvensis*	field bindweed	G?	SE5	X			X		X								
	BORAGINACEAE	**BORAGE FAMILY**																

Appendix B. Vascular Plant List

	Scientific Name	Common Name	GRank	SRank	Halton	M	CUM1-1a	CUM1-1b	CUM1-1c	CUM1-1d	CUM1-1e	CUM1-1f	CUT1a	CUT1b	CUW1a	CUW1b	FOD	SWD4-1
*	*Echium vulgare*	blueweed	G?	SE5	X					X								
	VERBENACEAE	**VERVAIN FAMILY**																
	Verbena hastata	blue vervain	G5	S5	X					X				X				X
	LAMIACEAE	**MINT FAMILY**																
*	*Glechoma hederacea*	creeping Charlie	G?	SE5	X	X												
	PLANTAGINACEAE	**PLANTAIN FAMILY**																
*	*Plantago lanceolata*	ribgrass	G5	SE5	X	X						X					X	
*	*Plantago major*	common plantain	G5	SE5	X	X												
	OLEACEAE	**OLIVE FAMILY**																
	Fraxinus americana	white ash	G5	S5	X									X			X	
	Fraxinus pennsylvanica	red ash	G5	S5	X	X								X		X		X
*	*Syringa reticulata*	ivory silk tree				X												
	SCROPHULARIACEAE	**FIGWORT FAMILY**																
*	*Linaria vulgaris*	butter-and-eggs	G?	SE5	X					X		X			X		X	
*	*Verbascum thapsus*	common mullein	G?	SE5	X					X				X				
	CAPRIFOLIACEAE	**HONEYSUCKLE FAMILY**																
*	*Lonicera tatarica*	tartarian honeysuckle	G?	SE5	X				X	X	X	X	X	X	X	X	X	X
*	*Viburnum opulus*	guelder rose	G5	SE4	X										X			
	DIPSACACEAE	**TEASEL FAMILY**																
*	*Dipsacus fullonum* ssp. *sylvestris*	wild teasel	G?T?	SE5	X	X	X	X	X	X	X	X		X				
	ASTERACEAE	**ASTER FAMILY**																
*	*Arctium minus* ssp. *minus*	common burdock	G?T?	SE5	X	X	X	X		X								X
*	*Chrysanthemum leucanthemum*	ox-eye daisy	G?	SE5	X		X			X	X							X
*	*Tussilago farfara*	coltsfoot	G?	SE5	X													X
	Aster lateriflorus var. *lateriflorus*	calico aster	G5T5	S5			X											

Appendix B. Vascular Plant List

	Scientific Name	Common Name	GRank	SRank	Halton	M	CUM1-1a	CUM1-1b	CUM1-1c	CUM1-1d	CUM1-1e	CUM1-1f	CUT1a	CUT1b	CUW1a	CUW1b	FOD	SWD4-1
	Aster lanceolatus ssp. *lanceolatus*	tall white aster	G5T?	S5	X									X	X			
	Aster novae-angliae	New England aster	G5	S5	X		X		X	X								X
	Aster puniceus var. *puniceus*	purple-stemmed aster	G5T?	S5	X													X
*	*Achillea millefolium* ssp. *millefolium*	common yarrow	G5T?	SE?	X							X						
*	*Cichorium intybus*	chicory	G?	SE5	X	X	X		X	X	X							
*	*Cirsium arvense*	Canada thistle	G?	SE5	X	X	X	X							X	X		
*	*Sonchus arvensis* ssp. *arvensis*	field sow-thistle	G?T?	SE5	X	X				X								
	Solidago canadensis	canada goldenrod	G5	S5	X		X	X	X	X	X	X	X	X	X		X	
*	*Taraxacum officinale*	common dandelion	G5	SE5	X	X	X	X			X	X	X		X		X	X
	POACEAE	**GRASS FAMILY**																
	Poa pratensis ssp. *pratensis*	Kentucky bluegrass	G5T	S5	X	X	X	X	X		X	X	X	X		X	X	
*	*Bromus tectorum*	downy chess	G?	SE5	X	X												
*	*Dactylis glomerata*	orchard grass	G?	SE5	X		X								X			
*	*Digitaria ischaemum*	small crabgrass	G?	SE5	X	X												
*	*Festuca arundinacea*	tall fescue	G?	SE5	X	X		X										
	Phalaris arundinacea	reed canary grass	G5	S5	X									X	X		X	X
	Phragmites australis	common reed	G5	S5	X	X				X	X				X			X
	Poa palustris	fowl meadow grass	G5	S5	X													X
*	*Bromus inermis* ssp. *inermis*	awnless brome	G4G5T?	SE5	X	X	X		X	X			X					
	Poa compressa	Canada blue grass	G?	S5	X	X		X		X	X							
	TYPHACEAE	**CATTAIL FAMILY**																
	Typha latifolia	broad-leaved cattail	G5	S5	X									X	X			
	Typha angustifolia	narrow-leaved cattail	G5	S5	X					X								X
	IRIDACEAE	**IRIS FAMILY**																
*	*Iris pseudacorus*	yellow iris	G?	SE3	X		X											

APPENDIX C
ACRONYMS AND DEFINITIONS USED IN SPECIES LISTS

Appendix C. Species Rank

SRANK	**Provincial Rank**
Provincial (or Sub-national) ranks are used by the Ontario Ministry of Natural Resources Natural Heritage Information Centre (NHIC) to set protection priorities for rare species and natural communities. These ranks are not legal designations. Provincial ranks are assigned in a manner similar to that described for global ranks, but consider only those factors within the political boundaries of Ontario. By comparing the global and provincial ranks, the status, rarity, and the urgency of conservation needs can be ascertained. The NHIC evaluates provincial ranks on a continual basis and produces updated lists at least annually.	
Short Form	**Definition**
S1	**Critically Imperiled** in Ontario because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation.
S2	**Imperiled** in Ontario because of rarity due to very restricted range, very few populations (often 20 or fewer occurrences) steep declines or other factors making it very vulnerable to extirpation.
S3	**Vulnerable** in Ontario due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
S4	**Apparently Secure**—Uncommon but not rare; some cause for long-term concern due to declines or other factors.
S5	**Secure**—Common, widespread, and abundant in Ontario.
SX	**Presumed Extirpated** – Species or community is believed to be extirpated from Ontario.
SH	**Possibly Extirpated** – Species or community occurred historically in Ontario and there is some possibility that it may be rediscovered.
SNR	**Unranked**—Conservation status in Ontario not yet assessed
SU	**Unrankable**—Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
SNA	**Not Applicable** —A conservation status rank is not applicable because the species is not a suitable target for conservation activities.
S#S#	**Range Rank** —A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species or community. Ranges cannot skip more than one rank (e.g., SU is used rather than S1S4).

COSEWIC	**Committee on the Status of Endangered Wildlife in Canada**
The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assesses the national status of wild species that are considered to be at risk in Canada.	
Status	**Definition**
Extinct (X)	A wildlife species that no longer exists.
Extirpated (XT)	A wildlife species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A wildlife species facing imminent extirpation or extinction.
Threatened (T)	A wildlife species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)	A wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.
Not at Risk (NAR)	A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.
Data Deficient (DD)	A category that applies when the available information is insufficient (a) to resolve a wildlife species' eligibility for assessment or (b) to permit an assessment of the wildlife species' risk of extinction.

COSSARO/OMNR	Committee on the Status of Species at Risk in Ontario/Ontario Ministry of Natural Resources
The Committee on the Status of Species at Risk in Ontario (COSSARO)/Ontario Ministry of Natural Resources (OMNR) assesses the provincial status of wild species that are considered to be at risk in Ontario.	
Status	**Definition**
Extinct (EXT)	A species that no longer exists anywhere.
Extirpated (EXP)	A species that no longer exists in the wild in Ontario but still occurs elsewhere.
Endangered (Regulated) (END–R)	A species facing imminent extinction or extirpation in Ontario which has be regulated under Ontario's *Endangered Species Act*.
Endangered (END)	A species facing imminent extinction or extirpation in Ontario which is a candidate for regulation under Ontario's *Endangered Species Act*.
Threatened (THR)	A species that is at risk of becoming endangered in Ontario if limiting factors are not reversed.
Special Concern (SC)	A species with characteristics that make it sensitive to human activities or natural events.
Not at Risk (NAR)	A species that has been evaluated and found to be not at risk.
Data Deficient (DD)	A species for which there is insufficient information for a provincial status recommendation.

Species Status under Federal Legislation

MBCA	Migratory Birds Convention Act
The Canada *Migratory Birds Convention Act* provides for the protection of migratory birds in Canada and the United States. The provisions of this Act are implemented through the Migratory Bird Regulations. Bird species that are regulated under the *Migratory Birds Convention Act* are noted in the applicable species lists.	

SARA	Species at Risk Act
The Canada *Species at Risk Act* provides a framework for actions across Canada to ensure the survival of wildlife species and the protection of our natural heritage. It sets out how to decide which species are a priority for action and what to do to protect a species. It identifies ways governments, organizations and individuals can work together, and it establishes penalties for a failure to obey the law. Regulated species are listed in Schedules 1, 2 and 3 of the Act.	
Schedule 1 SARA (1)	Species that are currently covered under the Act.
Schedule 2 SARA (2)	Species that are endangered or threatened that have not been re-assessed by COSEWIC for inclusion on Schedule 1.
Schedule 3 SARA (3)	Species that are of special concern that have not yet been re-assessed by COSEWIC for inclusion on Schedule 1.

Species Status under Provincial Legislation

ESA	Endangered Species Act	
The Ontario *Endangered Species Act* provides for the conservation, protection, restoration and propagation of species of fauna and flora of the Province of Ontario that are threatened with extinction. Regulated species are listed in Ontario Regulation 338.		
Schedule No.	**Short Form**	**Status**
Schedule 1 ESA (1)	EXT	The species of flora and fauna listed in Schedule 1 are declared to be threatened with extinction.
Schedule 2 ESA (2)	EXP	The species of flora and fauna listed in Schedule 2 are declared to be extirpated.
Schedule 3 ESA (3)	END	The species of flora and fauna listed in Schedule 3 are declared to be endangered.
Schedule 4 ESA (4)	THR	The species of flora and fauna listed in Schedule 4 are declared to be threatened.
Schedule 5 ESA (5)	SC	The species of flora and fauna listed in Schedule 5 are declared to be special concern.

FWCA	Fish and Wildlife Conservation Act	
The Ontario *Fish and Wildlife Conservation Act* outlines the restrictions for hunting, trapping and fishing; handling of live wildlife; sale, purchase and transport of wildlife; and, licences that can be secured under the Act. Under Schedules 1 to 11 of the Act, wildlife are grouped for the purpose of regulating these species. These schedules are further defined below. Note: where there is a conflict between this Act and the Ontario *Endangered Species Act*, the provision with the most protection will prevail (s. 2 of the *Fish and Wildlife Conservation Act*).		
Schedule No.	**Short Form**	**Status**
Schedule 1	Furbearing – M	The species of fauna listed in Schedule 1 are declared to be furbearing mammals.
Schedule 2	Game – M	The species of fauna listed in Schedule 2 are declared to be game mammals.
Schedule 3	Game – B	The species of fauna listed in Schedule 3 are declared to be game birds.
Schedule 4	Game – R	The species of fauna listed in Schedule 4 are declared to be game reptiles.
Schedule 5	Game – A	The species of fauna listed in Schedule 5 are declared to be game amphibians.
Schedule 6	Specially Protected – M	The species of fauna listed in Schedule 6 are declared to be specially protected mammals.
Schedule 7	Specially Protected – R	The species of fauna listed in Schedule 7 are declared to be specially protected birds (raptors).
Schedule 8	Specially Protected – B	The species of fauna listed in Schedule 8 are declared to be specially protected birds (other than raptors).
Schedule 9	Specially Protected – R	The species of fauna listed in Schedule 9 are declared to be specially protected reptiles.
Schedule 10	Specially Protected – A	The species of fauna listed in Schedule 10 are declared to be specially protected amphibians.

FWCA	Fish and Wildlife Conservation Act	
The Ontario *Fish and Wildlife Conservation Act* outlines the restrictions for hunting, trapping and fishing; handling of live wildlife; sale, purchase and transport of wildlife; and, licences that can be secured under the Act. Under Schedules 1 to 11 of the Act, wildlife are grouped for the purpose of regulating these species. These schedules are further defined below. Note: where there is a conflict between this Act and the Ontario *Endangered Species Act*, the provision with the most protection will prevail (s. 2 of the *Fish and Wildlife Conservation Act*).		
Schedule No.	**Short Form**	**Status**
Schedule 11	Specially Protected – I	The species of fauna listed in Schedule 11 are declared to be specially protected invertebrates.

Halton Region (Riley 1989 and Varga 2000)	
Rank	**Definition**
U	Uncommon
R1-R10	Rarity Status (1-10 - number of stations at which a locally rare species is found); INT = Introduced

BSC	Bird Studies Canada
The Bird Studies Canada *Conservation Priorities for the Birds of Southern Ontario* (1999), based on work completed by Bird Studies Canada, the Canadian Wildlife Service and the MNR identifies bird species of high conservation priority. This list was prepared to assist municipalities in identifying significant natural heritage features, through using the information regarding the presence of birds of conservation priority in their municipality. Birds of conservation priority have been noted (BSC) in the appropriate species lists.	

APPENDIX D
MNRF RESPONSE

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

Ministère des
Richesses naturelles
et des Forets

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

Ontario

July 13, 2018

Erin Blenkhorn
LGL Limited
EBlenkhorn@lglcambridge.com

Re: Request for Information for Town of Oakville Wyecroft Road from Bronte Road to Kerr Street Class Environmental Assessment

Dear Erin,

Further to your follow-up email dated July 10, 2018 your firm has requested information on Species at Risk and rare species occurring on or adjacent to the above mentioned location. There are Species at Risk recorded for your study area. As of the date of this letter, MNRF has records of:

- REDSIDE DACE – occupied habitat (Endangered)

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

- BOBOLINK (Threatened)
- EASTERN MEADOWLARK (Threatened)
- BARN SWALLOW (Threatened)
- BANK SWALLOW (Threatened)
- NORTHERN BOBWHITE (Endangered)
- WOOD THRUSH (Special Concern)

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

The project proposal is within Oakville West Urban Creek watershed which contains the regulated habitat of Redside Dace. MNRF is responsible for protecting this habitat under Ontario's Endangered Species Act, 2007. As defined under Ontario Regulation 242/08 (Section 29.1), the regulated habitat of Redside Dace includes contributing features which are streams, permanent or intermittent headwater drainage features, groundwater discharge areas or wetlands that augment or maintain the baseflow, coarse sediment supply or surface water quality of areas currently known to be occupied by Redside Dace or areas which provide an opportunity for Redside Dace recovery / recolonization.

The project proposal is adjacent to an occupied reach of stream for Redside Dace. Which include 14 Mile Creek and the reach highlighted in yellow in Figure 1 (see attached). MNRF is responsible for protecting this habitat under Ontario's Endangered Species Act, 2007. As defined under Ontario Regulation 242/08 (Section 29.1), the regulated habitat of Redside Dace includes contributing features which are streams, permanent or intermittent headwater drainage features, groundwater discharge areas or wetlands that augment or maintain the baseflow, coarse sediment supply or surface water quality of areas currently known to be occupied by Redside Dace or areas which provide an opportunity for Redside Dace recovery / recolonization.

As part of the consultation with MNRF regarding your study / proposal, potential contributing habitat features may need to be assessed in order to determine the extent of the habitat regulation applying to your subject area / property.

The project study area includes Redside Dace habitat. Through the EA and Block Planning processes the proponent should work closely with MNRF and the municipality to further assess and map the extent of regulated habitat.

There are limited fish collection records available for this study area. Both Taplow and McCraney Creeks are considered warmwater. However, more fisheries assessments are recommended to better understand the local fish community.

Additional natural heritage information including information on wetlands and Areas of Natural and Scientific Interest (ANSIs) can be accessed through Land Information Ontario or through NHIC's Make-a-Map.

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

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

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

Sincerely,

April Currie
Management Biologist
Ontario Ministry of Natural Resources and Forestry | Aurora District

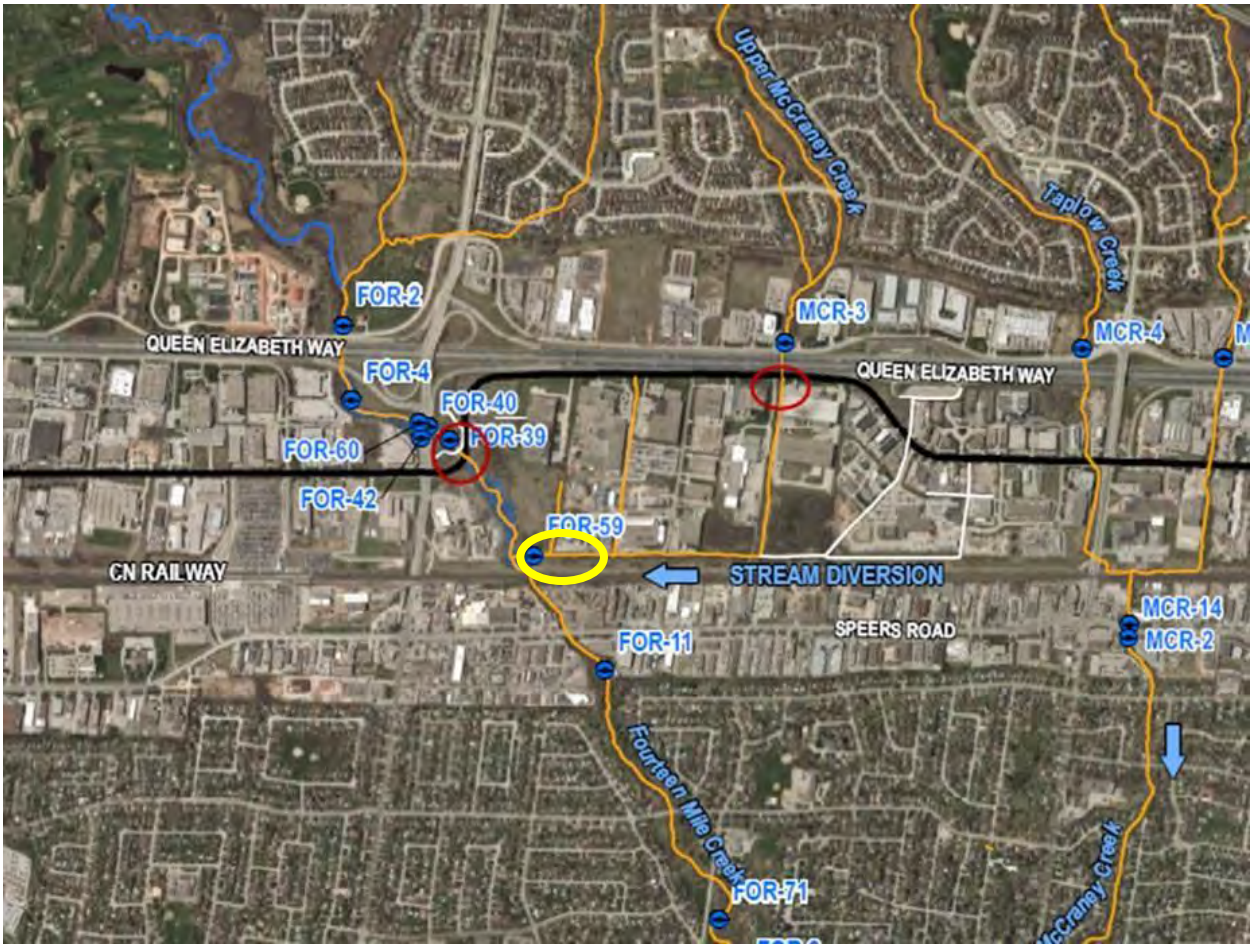

Figure 1. Reach associated with 14 Mile Creek - Redside Dace occupied habitat.

APPENDIX E
TREE RESOURCES

Project: TA8828

Client: IBI Date: June 4, 2018

Collectors: LMC, TRH Area: Wyecroft Road from Bronte Road to Kerr Street

TAG#	Scientific Name	Common Name	DBH (cm)	Additional Stems	CONDITION																Tree Protection Measures					COMMENTS
					TI	CS	CV	Radial Dripline (m)	Canopy Die Back (%)	Co-dominant stem	Included Bark	Lean, Dir.	Fungus	Insects	Cavity	Rot	Wound	Frost Crack	Epicormic	EAB	Canker	Tree Protection Zone (m)	Protect	Remove	Injury	ESA/SARA	
1	*Acer platanoides*	Norway maple	28.0		g	g	g	4											x			2.40		x			exposed roots
2	*Acer platanoides*	Norway maple	24.0		g	g	f	4	30										x			2.40		x			
3	*Acer platanoides*	Norway maple	24.0		g	g	f	4	30										x			2.40		x			exposed roots
4	*Acer platanoides*	Norway maple	32.0		g	g	f	4	30										x			3.00		x			exposed roots
5	*Acer platanoides*	Norway maple	32.0		g	g	f	4	30								x		x			3.00		x			girdling roots
6	*Acer platanoides*	Norway maple	24.0		f	f	f	3											x			2.40		x			
7	*Ulmus sp.*	elm	6.0		g	g	g	2														1.80		x			
8	*Picea pungens*	blue spruce	34.0		g	g	f	4	30										x			3.00		x			
9	*Acer platanoides*	Norway maple	32.0		g	g	g	5														3.00		x			
10	*Amelanchier sp.*	serviceberry	8.0	6,6,7	g	g	g	2											x			1.80		x			
11	*Acer platanoides*	Norway maple	35.0		g	g	g	5	30										x			3.00		x			
12	*Acer platanoides*	Norway maple	46.0		g	g	g	5	10													3.00		x			
13	*Picea pungens*	blue spruce	36.0		g	g	f	4	10													3.00		x			
14	*Picea pungens*	blue spruce	16.0		g	g	g	2														2.40		x			
15	*Picea pungens*	blue spruce	17.0		g	g	g	2														2.40		x			
16	*Gymnocladus dioicus*	Kentucky coffee tree	3.0		g	g	g	1														1.80		x		x	
17	*Gymnocladus dioicus*	Kentucky coffee tree	10.0		g	g	g	1														2.40		x		x	
18	*Gymnocladus dioicus*	Kentucky coffee tree	11.0		g	g	g	1														2.40		x		x	
19	*Gymnocladus dioicus*	Kentucky coffee tree	8.0		g	g	g	1														1.80		x		x	
20	*Gymnocladus dioicus*	Kentucky coffee tree	10.0		g	g	g	1														2.40		x		x	
21	*Gymnocladus dioicus*	Kentucky coffee tree	9.0		g	g	g	1														1.80		x		x	
22	*Gymnocladus dioicus*	Kentucky coffee tree	9.0		g	g	g	1														1.80		x		x	
23	*Gymnocladus dioicus*	Kentucky coffee tree	10.0		g	g	g	1														2.40		x		x	
24	*Gymnocladus dioicus*	Kentucky coffee tree	9.0		g	g	g	1														1.80		x		x	
25	*Gymnocladus dioicus*	Kentucky coffee tree	9.0		g	g	g	1														1.80		x		x	
26	*Acer platanoides*	Norway maple	10.0		g	g	g	3	10													2.40		x			
27	*Acer platanoides*	Norway maple	22.0		g	g	g	4	10			l,s										2.40		x			
28	*Acer platanoides*	Norway maple	5.0		g	g	g	1														1.80		x			
29	*Acer platanoides*	Norway maple	15.0		g	g	g	3	30													2.40		x			
30	*Acer platanoides*	Norway maple	4.0		g	g	g	1														1.80		x			
31	*Acer platanoides*	Norway maple	4.0		g	g	g	1														1.80		x			
32	*Acer platanoides*	Norway maple	13.0		g	g	g	4														2.40		x			
33	*Acer platanoides*	Norway maple	5.0		g	g	g	1											x			1.80		x			
34	*Gleditsia triacanthos*	honey locust	4.0		g	g	g	1											x			1.80		x			
35	*Acer platanoides*	Norway maple	26.0		g	g	g	4														2.40		x			
36	*Gymnocladus dioicus*	Kentucky coffee tree	7.0		g	g	g	1														1.80		x		x	
37	*Acer platanoides*	Norway maple	22.0		g	g	g	4														2.40		x			
38	*Acer platanoides*	Norway maple	28.0		g	g	g	4	10													2.40		x			
39	*Acer platanoides*	Norway maple	23.0		g	g	g	4				l,s										2.40		x			
40	*Celtis occidentalis*	common hackberry	16.0		g	g	g	5											x			2.40		x			
41	*Celtis occidentalis*	common hackberry	12.0		g	g	g	4	10			l,e						x	x			2.40		x			galls
42	*Acer platanoides*	Norway maple	22.0		f	g	f	4				l,s				x	x					2.40		x			
43	*Gleditsia triacanthos*	honey locust	26.0		g	g	g	4	10										x			2.40		x			
44	*Gymnocladus dioicus*	Kentucky coffee tree	3.0		g	g	g	1														1.80		x		x	
45	*Acer platanoides*	Norway maple	21.0		g	g	g	4											x			2.40		x			

Project: TA8828

Client: IBI Date: June 4, 2018

Collectors: LMC, TRH Area: Wyecroft Road from Bronte Road to Kerr Street

TAG#	Scientific Name	Common Name	DBH (cm)	Additional Stems	CONDITION																Tree Protection Measures					COMMENTS
					TI	CS	CV	Radial Dripline (m)	Canopy Die Back (%)	Co-dominant stem	Included Bark	Lean, Dir.	Fungus	Insects	Cavity	Rot	Wound	Frost Crack	Epicormic	EAB	Canker	Tree Protection Zone (m)	Protect	Remove	Injury	ESA/SARA	
46	*Gymnocladus dioicus*	Kentucky coffee tree	3.0		g	g	g	1														1.80		x		x	
47	*Acer platanoides*	Norway maple	18.0		g	g	g	4											x			2.40		x			
48	*Gleditsia triacanthos*	honey locust	32.0		g	g	g	4	10													3.00		x			
49	*Fraxinus sp.*	ash	42.0		g	g	g	6	10													3.00		x			treated for Emerald Ash Borer
50	*Gleditsia triacanthos*	honey locust	5.0		g	g	g	1	10													1.80		x			
51	*Gleditsia triacanthos*	honey locust	6.0		f	p	f	1	30										x			1.80		x			
52	*Acer platanoides*	Norway maple	19.0		f	f	f	5	30													2.40		x			
53	*Tilia cordata*	little leaf linden	26.0		f	f	f	5	30										x			2.40		x			girdling roots
54	*Acer x freemanii*	Freeman's maple	4.0		f	f	f	2	30													1.80		x			
55	*Acer x freemanii*	Freeman's maple	4.0		f	f	f	1	10													1.80		x			
56	*Quercus rubra*	red oak	20.0		g	f	f	5	30										x			2.40		x			
57	*Gleditsia triacanthos*	honey locust	5.0		f	f	f	1	30										x			1.80		x			
58	*Gleditsia triacanthos*	honey locust	5.0		f	f	f	1	30										x			1.80		x			
59	*Gymnocladus dioicus*	Kentucky coffee tree	4.0		g	g	g	1														1.80		x		x	
60	*Gymnocladus dioicus*	Kentucky coffee tree	3.0		g	g	g	1														1.80		x		x	
61	*Gleditsia triacanthos*	honey locust	5.0		f	f	f	1	30													1.80		x			
62	*Gleditsia triacanthos*	honey locust	5.0		f	p	p	1	50													1.80		x			
63	*Ulmus sp.*	elm	5.0		g	g	g	1														1.80		x			
64	*Acer platanoides*	Norway maple	11.0		g	g	g	3	10								x					2.40		x			
65	*Acer platanoides*	Norway maple	12.0		f	p	p	3	30								x		x			2.40		x			
66	*Quercus bicolor*	swamp white oak	3.0		f	f	f	1	30													1.80		x			girdled
67	*Ulmus sp.*	elm	4.0		g	g	g	1														1.80		x			
68	*Gymnocladus dioicus*	Kentucky coffee tree	3.0		g	g	g	1														1.80		x		x	
69	*Acer platanoides*	Norway maple	10.0		p	p	p	3	30										x			2.40		x			split leader
70	*Acer platanoides*	Norway maple	13.0		g	g	g	4														2.40		x			
71	*Quercus robur*	English oak	10.0		g	g	g	2											x			2.40		x			
72	*Gymnocladus dioicus*	Kentucky coffee tree	3.0		g	g	g	1														1.80		x		x	
73	*Acer platanoides*	Norway maple	7.0		g	g	g	3	10										x			1.80		x			
74	*Acer platanoides*	Norway maple	12.0		g	g	g	3														2.40		x			
75	*Gymnocladus dioicus*	Kentucky coffee tree	4.0		g	g	g	1														1.80		x		x	
76	*Gymnocladus dioicus*	Kentucky coffee tree	4.0		g	g	g	1														1.80		x		x	
77	*Quercus bicolor*	swamp white oak	4.0		f	f	f	1	30										x			1.80		x			
78	*Syringa reticulata*	ivory silk tree	4.0		f	f	f	1											x			1.80		x			
79	*Quercus bicolor*	swamp white oak	3.0		p	p	p	1	98										x			1.80		x			only epicormic growth
80	*Gleditsia triacanthos*	honey locust	5.0		f	f	f	1											x			1.80		x			
81	*Gleditsia triacanthos*	honey locust	6.0		f	f	f	1											x			1.80		x			
82	*Gleditsia triacanthos*	honey locust	6.0		p	p	p	1	98													1.80		x			only epicormic growth
83	*Gymnocladus dioicus*	Kentucky coffee tree	4.0		g	g	g	1											x			1.80		x		x	
84	*Gymnocladus dioicus*	Kentucky coffee tree	4.0		g	g	g	1														1.80		x		x	
85	*Gleditsia triacanthos*	honey locust	13.0		g	g	g	4											x			2.40		x			
86	*Gleditsia triacanthos*	honey locust	13.0		g	g	g	4											x			2.40		x			
87	*Gleditsia triacanthos*	honey locust	15.0		g	g	g	3											x			2.40		x			
88	*Gleditsia triacanthos*	honey locust	20.0		g	g	g	3											x			2.40		x			
89	*Acer platanoides*	Norway maple	9.0		p	p	p	2									x		x			1.80		x			bark sloughing
90	*Acer platanoides*	Norway maple	9.0		g	g	g	2														1.80		x			

Project: TA8828

Client: IBI Date: June 4, 2018

Collectors: LMC, TRH Area: Wyecroft Road from Bronte Road to Kerr Street

TAG#	Scientific Name	Common Name	DBH (cm)	Additional Stems	CONDITION																Tree Protection Measures					COMMENTS
					TI	CS	CV	Radial Dripline (m)	Canopy Die Back (%)	Co-dominant stem	Included Bark	Lean, Dir.	Fungus	Insects	Cavity	Rot	Wound	Frost Crack	Epicormic	EAB	Canker	Tree Protection Zone (m)	Protect	Remove	Injury	ESA/SARA	
91	*Acer platanoides*	Norway maple	12.0		g	g	g	4														2.40		x			
92	*Acer platanoides*	Norway maple	11.0		f	f	f	4	30								x		x			2.40		x			
93	*Quercus bicolor*	swamp white oak	4.0		g	g	g	1											x			1.80		x			
94	*Acer platanoides*	Norway maple	18.0		g	g	f	4	30													2.40		x			
95	*Gleditsia triacanthos*	honey locust	16.0		g	g	f	4	30										x			2.40		x			
96	*Gleditsia triacanthos*	honey locust	17.0		g	g	f	4	20													2.40		x			
97	*Gleditsia triacanthos*	honey locust	15.0		f	f	f	4	30										x			2.40		x			
98	*Gymnocladus dioicus*	Kentucky coffee tree	5.0		g	g	g	1														1.80		x		x	
99	*Gymnocladus dioicus*	Kentucky coffee tree	4.0		g	g	g	1														1.80		x		x	
100	*Quercus rubra*	red oak	14.0		g	g	g	4	10													2.40		x			
101	*Celtis occidentalis*	common hackberry	5.0		g	g	g	1														1.80		x			
102	*Celtis occidentalis*	common hackberry	4.0		g	g	g	1														1.80		x			
103	*Gleditsia triacanthos*	honey locust	5.0		f	f	f	1	30													1.80		x			
104	*Gleditsia triacanthos*	honey locust	6.0		p	p	p	1											x			1.80		x			
105	*Gymnocladus dioicus*	Kentucky coffee tree	6.0		g	g	g	1											x			1.80		x		x	
106	*Acer platanoides*	Norway maple	4.0		g	g	g	3	10													1.80		x			
107	*Acer platanoides*	Norway maple	4.0		g	g	g	1	10													1.80		x			
108	*Acer saccharinum*	silver maple	19.0		g	g	g	4														2.40		x			
109	*Gymnocladus dioicus*	Kentucky coffee tree	11.0		g	g	g	1														2.40		x		x	
110	*Gymnocladus dioicus*	Kentucky coffee tree	4.0		g	g	g	1														1.80		x		x	
111	*Gleditsia triacanthos*	honey locust	4.0		g	g	g	1														1.80		x			
112	*Acer saccharinum*	silver maple	20.0		g	g	g	5														2.40		x			
113	*Quercus robur*	English oak	27.0		g	g	g	6											x			2.40		x			
114	*Celtis occidentalis*	common hackberry	17.0		g	g	g	3														2.40		x			
115	*Gleditsia triacanthos*	honey locust	4.0		g	g	g	1											x			1.80		x			
116	*Gleditsia triacanthos*	honey locust	4.0		g	g	g	1											x			1.80		x			
117	*Gymnocladus dioicus*	Kentucky coffee tree	4.0		g	g	g	1														1.80		x		x	
118	*Quercus robur*	English oak	24.0		g	g	g	4											x			2.40		x			
119	*Quercus robur*	English oak	24.0		g	g	g	4											x			2.40		x			
120	*Tilia cordata*	little leaf linden	12.0		g	g	g	4											x			2.40		x			
121	*Quercus rubra*	red oak	22.0		g	g	g	4											x			2.40		x			
122	*Acer saccharinum*	silver maple	15.0		g	g	g	4											x			2.40		x			
123	*Quercus robur*	English oak	13.0		g	g	g	3	10										x			2.40		x			
124	*Quercus robur*	English oak	12.0		f	f	f	2	30										x			2.40		x			
125	*Malus sp.*	apple	28.0		g	g	g	5				l,s							x			2.40	x				
126	*Thuja occidentalis*	eastern white cedar	21.0		g	g	g	4	10	x	x	l,s										2.40	x				
127	*Thuja occidentalis*	eastern white cedar	22.0		g	g	g	3														2.40	x				
128	*Thuja occidentalis*	eastern white cedar	23.0	16.0	f	f	f	3		x	x											2.40	x				
129	*Thuja occidentalis*	eastern white cedar	15.0	14.0	f	f	f	3		x	x											2.40	x				
130	*Thuja occidentalis*	eastern white cedar	18.0		f	f	f	2														2.40	x				
131	*Thuja occidentalis*	eastern white cedar	18.0	10.0	f	f	f	2														2.40	x				
132	*Thuja occidentalis*	eastern white cedar	11.0	9.0	f	f	f	2														2.40	x				
133	*Thuja occidentalis*	eastern white cedar	17.0		f	f	f	2														2.40	x				
134	*Thuja occidentalis*	eastern white cedar	20.0	14.0	f	f	f	2														2.40	x				
135	*Thuja occidentalis*	eastern white cedar	22.0		f	f	f	2														2.40	x				

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Client: IBI Date: June 4, 2018

Collectors: LMC, TRH Area: Wyecroft Road from Bronte Road to Kerr Street

TAG#	Scientific Name	Common Name	DBH (cm)	Additional Stems	CONDITION																Tree Protection Measures					COMMENTS
					TI	CS	CV	Radial Dripline (m)	Canopy Die Back (%)	Co-dominant stem	Included Bark	Lean, Dir.	Fungus	Insects	Cavity	Rot	Wound	Frost Crack	Epicormic	EAB	Canker	Tree Protection Zone (m)	Protect	Remove	Injury	ESA/SARA	
136	*Thuja occidentalis*	eastern white cedar	19.0	17,10	p	p	p	3		x	x											2.40	x				
137	*Thuja occidentalis*	eastern white cedar	22.0		p	p	p	3														2.40	x				
138	*Thuja occidentalis*	eastern white cedar	22.0	16,16	p	p	p	3														2.40	x				
139	*Thuja occidentalis*	eastern white cedar	13.0		f	f	f	2														2.40	x				
140	*Thuja occidentalis*	eastern white cedar	12.0	11,10	f	f	f	2														2.40	x				
141	*Thuja occidentalis*	eastern white cedar	15.0	14,12,10	f	f	f	4														2.40	x				
142	*Pinus sylvestris*	Scots pine	36.0		f	f	f	4	30													3.00	x				
143	*Picea abies*	Norway spruce	27.0		f	f	f	4														2.40	x				
144	*Picea abies*	Norway spruce	34.0		f	f	f	6														3.00	x				
145	*Thuja occidentalis*	eastern white cedar	19.0		f	f	f	3														2.40	x				
146	*Thuja occidentalis*	eastern white cedar	13.0		f	f	f	2														2.40	x				
147	*Thuja occidentalis*	eastern white cedar	12.0	10.0	f	f	f	2														2.40	x				
148	*Thuja occidentalis*	eastern white cedar	22.0		g	g	g	4	10			l,w										2.40	x				
149	*Thuja occidentalis*	eastern white cedar	15.0		f	f	f	2														2.40	x				
150	*Fraxinus pennsylvanica*	red ash	10.0		f	f	f	2														2.40	x				
151	*Thuja occidentalis*	eastern white cedar	11.0	11.0	f	f	f	2		x	x											2.40	x				
152	*Picea glauca*	white spruce	25.0		f	f	f	4														2.40	x				
153	*Quercus macrocarpa*	bur oak	47.0		g	g	g	3	10	x	x								x			3.00	x				
154	*Syringa reticulata*	ivory silk tree	6.0		g	g	g	1														1.80		x			
155	*Gleditsia triacanthos*	honey locust	16.0		g	g	g	3														2.40		x			
156	*Gleditsia triacanthos*	honey locust	19.0		g	g	g	4											x			2.40		x			
157	*Gleditsia triacanthos*	honey locust	19.0		g	g	g	4	10										x			2.40		x			
158	*Gleditsia triacanthos*	honey locust	20.0		g	g	g	4											x			2.40		x			
159	*Gleditsia triacanthos*	honey locust	24.0		g	g	g	3											x			2.40		x			
160	*Gleditsia triacanthos*	honey locust	22.0		g	g	g	4											x			2.40		x			
161	*Gleditsia triacanthos*	honey locust	21.0		g	g	g	3											x			2.40		x			
162	*Gleditsia triacanthos*	honey locust	13.0		g	g	g	2									x		x			2.40		x			
163	*Gleditsia triacanthos*	honey locust	21.0		g	g	g	2											x			2.40		x			
164	*Gleditsia triacanthos*	honey locust	24.0		g	g	g	3														2.40		x			
165	*Gleditsia triacanthos*	honey locust	21.0		g	g	g	3										x	x			2.40		x			
166	*Syringa reticulata*	ivory silk tree	5.0		f	f	f	2														1.80		x			
167	*Gleditsia triacanthos*	honey locust	4.0		g	g	g	1	10													1.80		x			
168	*Gleditsia triacanthos*	honey locust	4.0		g	g	g	1														1.80		x			
169	*Gleditsia triacanthos*	honey locust	4.0		g	g	g	1														1.80		x			
170	*Syringa reticulata*	ivory silk tree	4.0		g	g	g	1														1.80		x			
171	*Syringa reticulata*	ivory silk tree	5.0		g	g	g	1														1.80		x			
172	*Tilia cordata*	little leaf linden	6.0		f	p	p	1	60													1.80		x			
173	*Tilia cordata*	little leaf linden	6.0		f	p	p	1	60													1.80		x			
174	*Acer ginnala*	Amur maple	5.0		f	f	f	1	20													1.80		x			
175	*Tilia cordata*	little leaf linden	21.0		g	g	g	5											x			2.40		x			exposed roots
176	*Tilia cordata*	little leaf linden	18.0		f	g	g	4														2.40		x			girdling roots
177	*Tilia cordata*	little leaf linden	20.0		f	g	g	4														2.40		x			girdling roots
178	*Acer ginnala*	Amur maple	5.0		f	f	f	1	10													1.80		x			
179	*Tilia cordata*	little leaf linden	15.0		g	g	g	4											x			2.40		x			
180	*Gleditsia triacanthos*	honey locust	16.0		g	g	g	4											x			2.40		x			

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TAG#	Scientific Name	Common Name	DBH (cm)	Additional Stems	CONDITION																Tree Protection Measures					COMMENTS
					TI	CS	CV	Radial Dripline (m)	Canopy Die Back (%)	Co-dominant stem	Included Bark	Lean, Dir.	Fungus	Insects	Cavity	Rot	Wound	Frost Crack	Epicormic	EAB	Canker	Tree Protection Zone (m)	Protect	Remove	Injury	ESA/SARA	
181	*Gleditsia triacanthos*	honey locust	14.0		g	g	g	4										x				2.40		x			
182	*Syringa reticulata*	ivory silk tree	5.0		g	g	g	1														1.80		x			
183	*Ulmus sp.*	elm	6.0		g	g	g	1														1.80		x			
184	*Syringa reticulata*	ivory silk tree	6.0		g	g	g	1									x					1.80		x			
185	*Quercus robur*	English oak	5.0		g	g	g	1									x					1.80		x			
186	*Syringa reticulata*	ivory silk tree	6.0		g	g	g	1														1.80		x			
187	*Gleditsia triacanthos*	honey locust	19.0		f	p	f	4									x					2.40		x			topped
188	*Syringa reticulata*	ivory silk tree	6.0		f	f	f	1	30													1.80		x			
189	*Syringa reticulata*	ivory silk tree	5.0		f	f	f	1	30										x			1.80		x			
190	*Gleditsia triacanthos*	honey locust	16.0		g	g	g	3														2.40		x			
191	*Gleditsia triacanthos*	honey locust	4.0		g	g	g	1	10													1.80		x			
192	*Gleditsia triacanthos*	honey locust	4.0		g	g	g	1	10										x			1.80		x			
193	*Malus sp.*	apple	8.0		g	g	g	4														1.80		x			
194	*Prunus sp.*	cherry	15.0		g	g	g	4														2.40		x			
195	*Gleditsia triacanthos*	honey locust	20.0		g	g	g	4											x			2.40		x			
196	*Gleditsia triacanthos*	honey locust	16.0		g	g	g	4											x			2.40		x			
197	*Syringa reticulata*	ivory silk tree	6.0		f	f	f	2	30													1.80		x			
198	*Gleditsia triacanthos*	honey locust	18.0		g	g	g	4											x			2.40		x			
199	*Amelanchier sp.*	serviceberry	11.0		g	g	g	3														2.40		x			
200	*Gleditsia triacanthos*	honey locust	17.0		g	g	g	4														2.40		x			
201	*Gleditsia triacanthos*	honey locust	17.0		g	g	g	4														2.40		x			
202	*Gleditsia triacanthos*	honey locust	18.0		g	g	g	4														2.40		x			
203	*Syringa reticulata*	ivory silk tree	10.0		g	g	g	2														2.40		x			
204	*Syringa reticulata*	ivory silk tree	12.0		g	g	g	2														2.40		x			
205	*Syringa reticulata*	ivory silk tree	11.0		g	g	g	3														2.40		x			
206	*Syringa reticulata*	ivory silk tree	11.0		g	g	g	2														2.40		x			
207	*Syringa reticulata*	ivory silk tree	18.0		g	g	g	2														2.40		x			
208	*Syringa reticulata*	ivory silk tree	11.0		g	g	g	2														2.40		x			
209	*Syringa reticulata*	ivory silk tree	9.0		g	g	g	2														1.80		x			
210	*Gleditsia triacanthos*	honey locust	32.0		g	g	g	4	30									x	x			3.00		x			
211	*Gleditsia triacanthos*	honey locust	25.0		g	g	g	4											x			2.40		x			
212	*Prunus sp.*	cherry	19.0		f	f	f	3	30				x									2.40		x			black knot
213	*Syringa reticulata*	ivory silk tree	5.0		g	g	g	1	10													1.80		x			
214	*Gleditsia triacanthos*	honey locust	21.0		g	g	g	4	10										x			2.40		x			
215	*Gleditsia triacanthos*	honey locust	19.0		g	g	g	4	10													2.40		x			
216	*Prunus sp.*	cherry	18.0		g	g	g	5	10				x						x			2.40		x			black knot
217	*Prunus sp.*	cherry	16.0		g	g	g	4					x									2.40		x			black knot
218	*Prunus sp.*	cherry	17.0		g	g	g	4					x									2.40		x			girdling roots, black knot
219	*Syringa reticulata*	ivory silk tree	13.0		f	f	f	2	20													2.40		x			
220	*Syringa reticulata*	ivory silk tree	13.0		g	g	g	3														2.40		x			
221	*Gleditsia triacanthos*	honey locust	20.0		f	f	f	4	30													2.40		x			
222	*Gleditsia triacanthos*	honey locust	20.0		g	g	g	4														2.40		x			
223	*Syringa reticulata*	ivory silk tree	3.0		g	g	g	1														1.80		x			
224	*Syringa reticulata*	ivory silk tree	3.0		g	g	g	1														1.80		x			
225	*Gleditsia triacanthos*	honey locust	20.0		g	g	g	5	10													2.40		x			

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Collectors: LMC, TRH Area: Wyecroft Road from Bronte Road to Kerr Street

TAG#	Scientific Name	Common Name	DBH (cm)	Additional Stems	CONDITION																Tree Protection Measures					COMMENTS
					TI	CS	CV	Radial Dripline (m)	Canopy Die Back (%)	Co-dominant stem	Included Bark	Lean, Dir.	Fungus	Insects	Cavity	Rot	Wound	Frost Crack	Epicormic	EAB	Canker	Tree Protection Zone (m)	Protect	Remove	Injury	ESA/SARA	
226	*Gleditsia triacanthos*	honey locust	27.0		g	g	g	4														2.40		x			
227	*Prunus sp.*	cherry	25.0		f	p	p	4	40				x									2.40		x			black knot
228	*Syringa reticulata*	ivory silk tree	5.0		g	g	g	1														1.80		x			
229	*Prunus sp.*	cherry	25.0		p	p	p	4	90				x						x			2.40		x			black knot
230	*Syringa reticulata*	ivory silk tree	6.0		p	p	p	1	40								x		x			1.80		x			
231	*Syringa reticulata*	ivory silk tree	6.0		p	p	p	1	40													1.80		x			
232	*Malus sp.*	apple	9.0		g	g	g	3											x			1.80		x			
233	*Acer platanoides*	Norway maple	29.0		g	g	g	4	10													2.40		x			
234	*Acer platanoides*	Norway maple	57.0		g	g	g	5											x			3.60		x			
235	*Acer platanoides*	Norway maple	22.0		f	f	f	4	30								x					2.40		x			girdling roots
236	*Acer platanoides*	Norway maple	26.0		g	g	g	4														2.40		x			
237	*Pinus nigra*	Austrian pine	23.0		g	g	g	3														2.40		x			
238	*Pinus nigra*	Austrian pine	27.0		g	g	g	4														2.40		x			
239	*Populus deltoides*	cottonwood	20.0		g	g	g	3														2.40	x				
240	*Populus deltoides*	cottonwood	17.0		g	g	g	3														2.40	x				
241	*Elaeagnus angustifolia*	Russian olive	30.0	23.0	g	g	g	5														2.40	x				
242	*Ulmus pumila*	Siberian elm	15.0		g	g	g	2											x			2.40	x				
243	*Prunus sp.*	cherry	15.0	4.0	f	f	f	3	40													2.40	x				
244	*Juglans nigra*	black walnut	16.0		g	g	f	4	30													2.40	x				
245	*Juglans nigra*	black walnut	12.0		g	g	g	2	10													2.40	x				
246	*Robinia pseudoacacia*	black locust	15.0	12,10	g	g	g	4	10	x	x											2.40	x				
247	*Pinus nigra*	Austrian pine	31.0		g	g	g	4														3.00	x				
248	*Pinus nigra*	Austrian pine	26.0		p	p	p	3	90													2.40	x				
249	*Picea abies*	Norway spruce	16.0		f	f	f	4		x	x						x					2.40	x				
250	*Pinus nigra*	Austrian pine	33.0		f	f	f	5														3.00		x			
251	*Picea pungens*	blue spruce	25.0		f	f	f	4														2.40		x			
252	*Ulmus pumila*	Siberian elm	49.0		f	f	f	5	30													3.00	x				
253	*Ulmus pumila*	Siberian elm	47.0		f	f	f	5														3.00	x				
254	*Ulmus pumila*	Siberian elm	29.0		f	f	f	4														2.40	x				
255	*Ulmus pumila*	Siberian elm	15.0		f	f	f	3														2.40	x				
256	*Ulmus pumila*	Siberian elm	23.0		f	f	f	4														2.40	x				
257	*Ulmus pumila*	Siberian elm	14.0		f	f	f	2														2.40	x				
258	*Acer platanoides*	Norway maple	45.0		g	g	g	4														3.00		x			
259	*Ulmus pumila*	Siberian elm	13.0	12,10	g	g	g	4														2.40		x			
260	*Quercus rubra*	red oak	27.0		g	g	g	4														2.40		x			
261	*Quercus robur*	English oak	39.0		g	g	g	4														3.00	x				
262	*Quercus robur*	English oak	39.0		g	g	g	4														3.00	x				
263	*Quercus robur*	English oak	30.0		g	g	g	4														2.40		x			
264	*Tilia cordata*	little leaf linden	26.0		g	g	g	5														2.40		x			
265	*Pinus strobus*	white pine	14.0		f	f	f	2	10													2.40		x			
266	*Tilia cordata*	little leaf linden	24.0		g	g	g	7											x			2.40		x			
267	*Pinus strobus*	white pine	21.0		g	g	g	4														2.40		x			
268	*Pinus strobus*	white pine	13.0		g	g	g	3														2.40		x			
269	*Tilia cordata*	little leaf linden	24.0		g	g	g	4											x			2.40		x			
270	*Picea pungens*	blue spruce	28.0		g	g	g	4														2.40		x			

Project: TA8828

Client: IBI Date: June 4, 2018

Collectors: LMC, TRH Area: Wyecroft Road from Bronte Road to Kerr Street

TAG#	Scientific Name	Common Name	DBH (cm)	Additional Stems	CONDITION																Tree Protection Measures					COMMENTS
					TI	CS	CV	Radial Dripline (m)	Canopy Die Back (%)	Co-dominant stem	Included Bark	Lean, Dir.	Fungus	Insects	Cavity	Rot	Wound	Frost Crack	Epicormic	EAB	Canker	Tree Protection Zone (m)	Protect	Remove	Injury	ESA/SARA	
271	*Picea pungens*	blue spruce	24.0		g	g	g	4														2.40		x			
272	*Tilia cordata*	little leaf linden	26.0		g	g	g	5														2.40		x			
273	*Picea pungens*	blue spruce	24.0		g	g	g	4														2.40		x			
274	*Picea pungens*	blue spruce	26.0		g	g	g	4														2.40		x			
275	*Tilia cordata*	little leaf linden	26.0		g	g	g	3														2.40		x			
276	*Tilia cordata*	little leaf linden	26.0		g	g	g	4														2.40		x			
277	*Acer platanoides*	Norway maple	26.0		g	g	g	4														2.40		x			
278	*Acer platanoides*	Norway maple	34.0		g	g	g	5														3.00		x			shallow surface roots
279	*Acer platanoides*	Norway maple	27.0		g	g	g	3														2.40		x			shallow surface roots
280	*Pinus nigra*	Austrian pine	34.0		f	f	f	5	30													3.00		x			
281	*Acer platanoides*	Norway maple	25.0		p	f	f	4	30										x			2.40		x			girdling roots
282	*Acer platanoides*	Norway maple	31.0		f	p	f	4														3.00		x			lost leader
283	*Acer platanoides*	Norway maple	28.0		g	g	g	5														2.40		x			
284	*Acer platanoides*	Norway maple	33.0		g	g	g	5	60													3.00		x			
285	*Acer platanoides*	Norway maple	35.0		g	g	g	4	10													3.00		x			
286	*Acer platanoides*	Norway maple	34.0		g	g	g	4														3.00		x			
287	*Acer platanoides*	Norway maple	40.0		g	g	g	4	10													3.00		x			
288	*Acer platanoides*	Norway maple	42.0		g	g	g	7														3.00		x			
289	*Acer platanoides*	Norway maple	34.0		g	g	g	6														3.00		x			
290	*Gymnocladus dioicus*	Kentucky coffee tree	5.0		g	g	g	1														1.80		x			
291	*Pinus nigra*	Austrian pine	38.0		g	g	g	5														3.00		x			
292	*Pinus nigra*	Austrian pine	35.0		g	g	g	4	10													3.00		x			
293	*Pinus nigra*	Austrian pine	40.0		g	f	p	4	40													3.00		x			
294	*Pinus nigra*	Austrian pine	45.0		g	g	f	6	30													3.00		x			
295	*Pinus nigra*	Austrian pine	41.0	32,31	g	f	f	5	10	x	x											3.00		x			
296	*Acer platanoides*	Norway maple	39.0		g	g	g	7														3.00		x			
297	*Pinus nigra*	Austrian pine	45.0		g	g	g	6														3.00		x			
298	*Pinus nigra*	Austrian pine	34.0		g	g	g	4														3.00		x			
299	*Pinus nigra*	Austrian pine	38.0		g	g	g	4														3.00		x			
300	*Pinus nigra*	Austrian pine	37.0		g	g	g	4														3.00		x			
301	*Pinus nigra*	Austrian pine	27.0		g	f	f	4	30													2.40		x			
302	*Pinus nigra*	Austrian pine	35.0		g	f	f	4	30													3.00		x			
303	*Pinus nigra*	Austrian pine	34.0		f	f	p	5	40													3.00		x			
304	*Pinus nigra*	Austrian pine	46.0		f	f	f	6	30													3.00		x			
305	*Betula pendula*	European birch	20.0	18.0	g	g	g	4		x	x											2.40		x			
306	*Acer platanoides*	Norway maple	30.0		g	g	f	4	30	x	x											2.40		x			
307	*Picea pungens*	blue spruce	31.0		g	g	g	4														3.00		x			
308	*Acer x freemanii*	Freeman's maple	42.0		g	g	g	4														3.00		x			
309	*Acer x freemanii*	Freeman's maple	34.0		p	p	f	5	60									x				3.00		x			
310	*Acer x freemanii*	Freeman's maple	35.0		g	g	g	6														3.00		x			
311	*Acer x freemanii*	Freeman's maple	33.0		g	g	g	6	10										x			3.00		x			girdling roots
312	*Acer x freemanii*	Freeman's maple	38.0		f	f	f	5	10													3.00		x			
313	*Acer x freemanii*	Freeman's maple	53.0		g	g	g	6	10	x	x								x			3.60		x			
314	*Acer platanoides*	Norway maple	27.0		f	f	f	5	15													2.40		x			

APPENDIX F
ADDITIONAL WILDLIFE RESOURCES

Appendix F. Species List from Ontario Butterfly Atlas

Square	Species#	Common Name	Scientific Name	# of Records	Earliest in Yr (adults)	Latest in Yr (adults)	Earliest Yr	Latest Yr
17PJ00	1	Silver-spotted Skipper	*Epargyreus clarus*	2	Jun-21	Jul-28	2016	2017
17PJ00	5	Northern Cloudywing	*Thorybes pylades*	1	Jul-17	Jul-17	1990	1990
17PJ00	9	Juvenal's Duskywing	*Erynnis juvenalis*	1	May-22	May-22	1990	1990
17PJ00	15	Wild Indigo Duskywing	*Erynnis baptisiae*	3	Jul-28	Sep-20	2013	2015
17PJ00	23	Least Skipper	*Ancyloxypha numitor*	6	Jun-05	Sep-01	1989	2014
17PJ00	25	European Skipper	*Thymelicus lineola*	2	Jun-15	Jul-01	2006	2014
17PJ00	26	Fiery Skipper	*Hylephila phyleus*	12	Aug-08	Oct-19	2000	2017
17PJ00	30	Peck's Skipper	*Polites peckius*	18	Jun-08	Oct-04	1989	2017
17PJ00	31	Tawny-edged Skipper	*Polites themistocles*	3	Aug-21	Sep-04	2000	2016
17PJ00	32	Crossline Skipper	*Polites origenes*	1	Jul-31	Jul-31	1993	1993
17PJ00	37	Sachem	*Atalopedes campestris*	3	Aug-12	Aug-18	2012	2012
17PJ00	55	Black Swallowtail	*Papilio polyxenes*	4	May-18	Sep-05	1989	2018
17PJ00	58	Eastern Tiger Swallowtail	*Papilio glaucus*	5	Jun-02	Jul-20	2001	2017
17PJ00	60	Spicebush Swallowtail	*Papilio troilus*	1	Aug-01	Aug-01	2018	2018
17PJ00	63	Mustard White	*Pieris oleracea*	1	Aug-06	Aug-06	2005	2005
17PJ00	65	Cabbage White	*Pieris rapae*	25	Apr-23	Oct-29	2005	2018
17PJ00	69	Clouded Sulphur	*Colias philodice*	8	Aug-06	Oct-29	2005	2018
17PJ00	70	Orange Sulphur	*Colias eurytheme*	5	Sep-01	Nov-03	2000	2017
17PJ00	76	Cloudless Sulphur	*Phoebis sennae*	1	Aug-06	Aug-06	2005	2005
17PJ00	91	Banded Hairstreak	*Satyrium calanus*	2	Jul-05	Jul-17	1993	2014
17PJ00	92	Hickory Hairstreak	*Satyrium caryaevorus*	2	Jun-27	Aug-06	2004	2005
17PJ00	93	Striped Hairstreak	*Satyrium liparops*	1	Jul-17	Jul-17	1982	1982
17PJ00	107	Eastern Tailed Blue	*Cupido comyntas*	4	May-20	Oct-05	2005	2017
17PJ00	109	Northern Azure	*Celastrina lucia*	1	May-14	May-14	2005	2005
17PJ00	111	Azure sp.	*Celastrina sp.*	2	Jul-01	Sep-16	2006	2017

Square	Species#	Common Name	Scientific Name	# of Records	Earliest in Yr (adults)	Latest in Yr (adults)	Earliest Yr	Latest Yr
17PJ00	118	Variegated Fritillary	*Euptoieta claudia*	1	Oct-27	Oct-27	2000	2000
17PJ00	119	Great Spangled Fritillary	*Speyeria cybele*	1	Jul-02	Jul-02	1989	1989
17PJ00	130	Silvery Checkerspot	*Chlosyne nycteis*	1	Jun-27	Jun-27	2004	2004
17PJ00	136	Question Mark	*Polygonia interrogationis*	2	Jul-31	Aug-01	1993	2015
17PJ00	137	Eastern Comma	*Polygonia comma*	5	Apr-21	Sep-28	2015	2018
17PJ00	142	Compton Tortoiseshell	*Nymphalis l-album*	1	Jul-01	Jul-01	2006	2006
17PJ00	143	Mourning Cloak	*Nymphalis antiopa*	20	Mar-27	Oct-01	1988	2018
17PJ00	144	Milbert's Tortoiseshell	*Aglais milberti*	2	Apr-23	Oct-15	2017	2017
17PJ00	145	American Lady	*Vanessa virginiensis*	7	Apr-23	Oct-19	2012	2017
17PJ00	146	Painted Lady	*Vanessa cardui*	10	Sep-16	Nov-03	2012	2017
17PJ00	147	Red Admiral	*Vanessa atalanta*	7	Apr-23	Oct-01	1989	2017
17PJ00	148	Common Buckeye	*Junonia coenia*	3	Oct-01	Oct-29	2012	2017
17PJ00	149	White Admiral	*Limenitis arthemis arthemis*	1	Jul-01	Jul-01	2006	2006
17PJ00	150	Red-spotted Purple	*Limenitis arthemis astyanax*	5	Jun-22	Aug-28	2005	2018
17PJ00	151	Viceroy	*Limenitis archippus*	1	Aug-28	Aug-28	2018	2018
17PJ00	154	Northern Pearly-Eye	*Lethe anthedon*	2	Jul-11	Jul-17	1993	2018
17PJ00	157	Little Wood-Satyr	*Megisto cymela*	2	Jun-20	Jun-21	2017	2018
17PJ00	159	Common Wood-Nymph	*Cercyonis pegala*	3	Jul-03	Aug-06	1993	2018
17PJ00	167	Monarch	*Danaus plexippus*	39	Jun-21	Oct-31	1989	2018
17PJ01	1	Silver-spotted Skipper	*Epargyreus clarus*	11	Jun-25	Jul-30	1951	2018
17PJ01	5	Northern Cloudywing	*Thorybes pylades*	10	Jun-05	Jul-23	1990	2017
17PJ01	7	Dreamy Duskywing	*Erynnis icelus*	1	Jun-20	Jun-20	1974	1974
17PJ01	9	Juvenal's Duskywing	*Erynnis juvenalis*	9	May-13	Jul-23	1975	2018
17PJ01	11	Mottled Duskywing	*Erynnis martialis*	1	Jun-05	Jun-05	2012	2012
17PJ01	14	Columbine Duskywing	*Erynnis lucilius*	2	May-20	May-20	2015	2015
17PJ01	15	Wild Indigo Duskywing	*Erynnis baptisiae*	11	May-24	Aug-02	2011	2018

Square	Species#	Common Name	Scientific Name	# of Records	Earliest in Yr (adults)	Latest in Yr (adults)	Earliest Yr	Latest Yr
17PJ01	20	Common Sootywing	*Pholisora catullus*	1	Aug-21	Aug-21	2016	2016
17PJ01	23	Least Skipper	*Ancyloxypha numitor*	1	Aug-03	Aug-03	1977	1977
17PJ01	25	European Skipper	*Thymelicus lineola*	12	Jun-14	Jul-17	1975	2017
17PJ01	26	Fiery Skipper	*Hylephila phyleus*	3	Aug-17	Oct-20	1971	2017
17PJ01	30	Peck's Skipper	*Polites peckius*	21	May-30	Oct-23	1964	2018
17PJ01	31	Tawny-edged Skipper	*Polites themistocles*	3	Jun-15	Jul-21	1974	2016
17PJ01	32	Crossline Skipper	*Polites origenes*	1	Jun-26	Jun-26	2016	2016
17PJ01	33	Long Dash Skipper	*Polites mystic*	2	Jun-22	Jun-24	1963	1965
17PJ01	35	Northern Broken-Dash	*Wallengrenia egeremet*	5	Jun-26	Jul-21	1976	2016
17PJ01	36	Little Glassywing	*Pompeius verna*	2	Jul-02	Jul-23	2000	2015
17PJ01	40	Hobomok Skipper	*Poanes hobomok*	13	Jun-04	Jun-24	1935	2017
17PJ01	43	Dion Skipper	*Euphyes dion*	1	Jul-23	Jul-23	1990	1990
17PJ01	47	Dun Skipper	*Euphyes vestris*	3	Jul-10	Jul-23	2015	2017
17PJ01	53	Pipevine Swallowtail	*Battus philenor*	3	Jun-22	Aug-12	1979	2012
17PJ01	55	Black Swallowtail	*Papilio polyxenes*	27	May-21	Aug-25	1967	2018
17PJ01	57	Eastern Giant Swallowtail	*Papilio cresphontes*	11	Jun-12	Sep-07	2002	2017
17PJ01	58	Eastern Tiger Swallowtail	*Papilio glaucus*	16	May-20	Aug-25	1973	2018
17PJ01	63	Mustard White	*Pieris oleracea*	1	Oct-14	Oct-14	1996	1996
17PJ01	64	West Virginia White	*Pieris virginiensis*	1	May-02	May-02	1990	1990
17PJ01	65	Cabbage White	*Pieris rapae*	60	Apr-03	Nov-12	1972	2018
17PJ01	69	Clouded Sulphur	*Colias philodice*	24	May-26	Dec-04	1969	2018
17PJ01	70	Orange Sulphur	*Colias eurytheme*	13	Jun-01	Sep-25	1968	2016
17PJ01	84	Bronze Copper	*Lycaena hyllus*	4	Jul-04	Aug-15	1959	1977
17PJ01	88	Acadian Hairstreak	*Satyrium acadica*	2	Jul-17	Jul-27	1972	1990
17PJ01	91	Banded Hairstreak	*Satyrium calanus*	25	Jun-22	Aug-03	1972	2018
17PJ01	92	Hickory Hairstreak	*Satyrium caryaevorus*	5	Jul-07	Jul-23	1990	2016
17PJ01	93	Striped Hairstreak	*Satyrium liparops*	11	Jun-25	Aug-06	1975	2016

Square	Species#	Common Name	Scientific Name	# of Records	Earliest in Yr (adults)	Latest in Yr (adults)	Earliest Yr	Latest Yr
17PJ01	107	Eastern Tailed Blue	*Cupido comyntas*	10	May-24	Sep-09	1964	2018
17PJ01	111	Azure sp.	*Celastrina sp.*	13	May-02	Sep-24	1990	2017
17PJ01	112	Silvery Blue	*Glaucopsyche lygdamus*	4	May-20	Jun-19	2015	2017
17PJ01	117	American Snout	*Libytheana carinenta*	1	Jun-09	Jun-09	1985	1985
17PJ01	118	Variegated Fritillary	*Euptoieta claudia*	4	Jun-06	Jul-21	1971	1981
17PJ01	119	Great Spangled Fritillary	*Speyeria cybele*	5	Jul-07	Aug-14	1979	2016
17PJ01	120	Aphrodite Fritillary	*Speyeria aphrodite*	2	Jul-15	Aug-20	1976	1977
17PJ01	125	Meadow Fritillary	*Boloria bellona*	2	Jul-25	Aug-03	1973	1977
17PJ01	132	Pearl Crescent	*Phyciodes tharos*	2	May-24	Jun-06	1976	2017
17PJ01	133	Northern Crescent	*Phyciodes cocyta*	6	May-24	Jul-19	1974	2018
17PJ01	135	Baltimore Checkerspot	*Euphydryas phaeton*	2	Jul-10	Jul-12	1973	1973
17PJ01	136	Question Mark	*Polygonia interrogationis*	16	Jun-03	Aug-17	1957	2017
17PJ01	137	Eastern Comma	*Polygonia comma*	6	Apr-03	Jul-30	2012	2018
17PJ01	138	Satyr Comma	*Polygonia satyrus*	1	Jun-08	Jun-08	1967	1967
17PJ01	141	Gray Comma	*Polygonia progne*	3	Jul-15	Jul-25	2015	2018
17PJ01	142	Compton Tortoiseshell	*Nymphalis l-album*	6	Mar-23	Oct-20	1971	1996
17PJ01	143	Mourning Cloak	*Nymphalis antiopa*	26	Mar-03	Oct-12	1974	2018
17PJ01	144	Milbert's Tortoiseshell	*Aglais milberti*	2	Aug-03	Sep-28	1977	2014
17PJ01	145	American Lady	*Vanessa virginiensis*	11	Apr-18	Oct-20	1971	2018
17PJ01	146	Painted Lady	*Vanessa cardui*	12	Jul-11	Oct-24	1968	2017
17PJ01	147	Red Admiral	*Vanessa atalanta*	31	Apr-14	Aug-25	1973	2018
17PJ01	148	Common Buckeye	*Junonia coenia*	2	Aug-25	Oct-20	2011	2017
17PJ01	149	White Admiral	*Limenitis arthemis arthemis*	10	Jun-17	Aug-24	1973	2004
17PJ01	150	Red-spotted Purple	*Limenitis arthemis astyanax*	10	Jun-05	Sep-16	1973	2016
17PJ01	151	Viceroy	*Limenitis archippus*	7	Jun-06	Aug-15	1973	2016
17PJ01	154	Northern Pearly-Eye	*Lethe anthedon*	2	Jul-07	Jul-31	2015	2016

Square	Species#	Common Name	Scientific Name	# of Records	Earliest in Yr (adults)	Latest in Yr (adults)	Earliest Yr	Latest Yr
17PJ01	155	Eyed Brown	*Lethe eurydice*	3	Jun-20	Jul-17	1974	1996
17PJ01	156	Appalachian Brown	*Lethe appalachia*	1	Jul-11	Jul-11	1990	1990
17PJ01	157	Little Wood-Satyr	*Megisto cymela*	22	May-25	Aug-20	1959	2018
17PJ01	158	Common Ringlet	*Coenonympha tullia*	17	Jun-03	Aug-24	1974	2018
17PJ01	159	Common Wood-Nymph	*Cercyonis pegala*	27	Jun-28	Aug-31	1961	2018
17PJ01	167	Monarch	*Danaus plexippus*	72	May-24	Oct-24	1964	2018

Appendix F. Observation List from Ontario Breeding Bird Atlas (2005)

Region	Square	Species	Max BE	Categ	Atlasser Name	#PC	%PC	Abun	#Sq
10	17PJ00	Canada Goose	NY	CONF	Mark Peck	2	8	5.24	1
10	17PJ00	Mute Swan	FY	CONF					
10	17PJ00	Mallard	FY	CONF	2 atlassers				
10	17PJ00	Red-necked Grebe	NY	CONF	3 atlassers				
10	17PJ00	Green Heron	H	POSS	2 atlassers				
10	17PJ00	Turkey Vulture	H	POSS	Roy Smith				
10	17PJ00	Cooper's Hawk	CF	CONF	Bob Curry				
10	17PJ00	Red-tailed Hawk	NY	CONF	Donna Sheppard				
10	17PJ00	American Kestrel	H	POSS	Roy Smith				
10	17PJ00	Killdeer	FY	CONF	Roy Smith	3	12	0.12	1
10	17PJ00	Rock Pigeon	AE	CONF	Bob Curry	1	4	0.08	1
10	17PJ00	Spotted Sandpiper	P	PROB	Bob Curry	1	4	0.04	1
10	17PJ00	American Woodcock	NY	CONF	Bob Curry				
10	17PJ00	Mourning Dove	NY	CONF	Mark Peck	10	40	1	1
10	17PJ00	Black-billed Cuckoo	S	POSS	Bob Curry				
10	17PJ00	Eastern Screech-Owl	FY	CONF	Donna Sheppard				
10	17PJ00	Great Horned Owl	NY	CONF	3 atlassers				
10	17PJ00	Chimney Swift	P	PROB		1	4	0.08	1
10	17PJ00	Ruby-throated Hummingbird	T	PROB	Rod Murray				
10	17PJ00	Belted Kingfisher	AE	CONF	Alan Wormington	1	4	0.04	1
10	17PJ00	Red-headed Woodpecker	AE	CONF	Rod Murray				
10	17PJ00	Red-bellied Woodpecker	NY	CONF	Donna Sheppard				
10	17PJ00	Downy Woodpecker	NY	CONF	Donna Sheppard	6	24	0.36	1
10	17PJ00	Hairy Woodpecker	NY	CONF	2 atlassers				
10	17PJ00	Northern Flicker	NY	CONF	Donna Sheppard	1	4	0.04	1
10	17PJ00	Pileated Woodpecker	FY	CONF	Donna Sheppard	1	4	0.08	1
10	17PJ00	Eastern Wood-Pewee	T	PROB	Bob Curry	2	8	0.08	1

Region	Square	Species	Max BE	Categ	Atlasser Name	#PC	%PC	Abun	#Sq
10	17PJ00	Willow Flycatcher	T	PROB	Rod Murray				
10	17PJ00	Eastern Phoebe	FY	CONF	Bob Curry				
10	17PJ00	Great Crested Flycatcher	AE	CONF	William J Crins	2	8	0.08	1
10	17PJ00	Eastern Kingbird	FY	CONF					
10	17PJ00	Warbling Vireo	AE	CONF	Rod Murray	1	4	0.04	1
10	17PJ00	Red-eyed Vireo	NY	CONF	Donna Sheppard	4	16	0.24	1
10	17PJ00	Blue Jay	FY	CONF	Bob Curry	3	12	0.24	1
10	17PJ00	American Crow	CF	CONF	William J Crins	3	12	0.28	1
10	17PJ00	Purple Martin	H	POSS	Alan Wormington				
10	17PJ00	Tree Swallow	AE	CONF	2 atlassers	4	16	0.2	1
10	17PJ00	Northern Rough-winged Swallow	FY	CONF	Bob Curry				
10	17PJ00	Bank Swallow	AE	CONF	2 atlassers				
10	17PJ00	Cliff Swallow	AE	CONF	Bob Curry				
10	17PJ00	Barn Swallow	NY	CONF	Bob Curry	3	12	0.2	1
10	17PJ00	Black-capped Chickadee	FY	CONF	2 atlassers	4	16	0.4	1
10	17PJ00	White-breasted Nuthatch	S	POSS	William J Crins				
10	17PJ00	Brown Creeper	S	POSS	Rod Murray				
10	17PJ00	Carolina Wren	FY	CONF	2 atlassers	2	8	0.12	1
10	17PJ00	House Wren	FY	CONF	Bob Curry	3	12	0.16	1
10	17PJ00	Eastern Bluebird	NY	CONF	Rod Murray				
10	17PJ00	Wood Thrush	FY	CONF	Rod Murray	1	4	0.04	1
10	17PJ00	American Robin	NY	CONF	Mark Peck	15	60	1.16	1
10	17PJ00	Gray Catbird	FY	CONF	William Morden	1	4	0.12	1
10	17PJ00	Northern Mockingbird	NY	CONF	3 atlassers				
10	17PJ00	Brown Thrasher	V	PROB	Donna Sheppard				
10	17PJ00	European Starling	NY	CONF	Bob Curry	18	72	2.68	1
10	17PJ00	Cedar Waxwing	FY	CONF					
10	17PJ00	Yellow Warbler	CF	CONF	Bob Curry	1	4	0.04	1

Region	Square	Species	Max BE	Categ	Atlasser Name	#PC	%PC	Abun	#Sq
10	17PJ00	Chestnut-sided Warbler	S	POSS	Bob Curry				
10	17PJ00	Black-throated Blue Warbler	T	PROB	Rod Murray				
10	17PJ00	Pine Warbler	CF	CONF	Rod Murray	2	8	0.08	1
10	17PJ00	Mourning Warbler	FY	CONF	Rod Murray				
10	17PJ00	Common Yellowthroat	DD	CONF	Bob Curry	1	4	0.08	1
10	17PJ00	Hooded Warbler	CF	CONF	Rod Murray				
10	17PJ00	Eastern Towhee	S	POSS	Rod Murray				
10	17PJ00	Chipping Sparrow	FY	CONF	Donna Sheppard	2	8	0.08	1
10	17PJ00	Field Sparrow	FY	CONF	Donna Sheppard				
10	17PJ00	Savannah Sparrow	FY	CONF	Donna Sheppard	3	12	0.36	1
10	17PJ00	Song Sparrow	CF	CONF	2 atlassers	14	56	0.88	1
10	17PJ00	Scarlet Tanager	T	PROB	Donna Sheppard				
10	17PJ00	Northern Cardinal	NY	CONF	Mark Peck	11	44	0.84	1
10	17PJ00	Rose-breasted Grosbeak	CF	CONF	William J Crins				
10	17PJ00	Indigo Bunting	CF	CONF	Donna Sheppard	3	12	0.16	1
10	17PJ00	Bobolink	CF	CONF	Rod Murray				
10	17PJ00	Red-winged Blackbird	NE	CONF	Mark Peck	14	56	1.2	1
10	17PJ00	Eastern Meadowlark	CF	CONF	Donna Sheppard				
10	17PJ00	Common Grackle	CF	CONF	Roy Smith	17	68	2.84	1
10	17PJ00	Brown-headed Cowbird	FY	CONF	Donna Sheppard	1	4	0.04	1
10	17PJ00	Orchard Oriole	NY	CONF	Rod Murray				
10	17PJ00	Baltimore Oriole	NY	CONF	Rod Murray	3	12	0.12	1
10	17PJ00	Purple Finch	S	POSS					
10	17PJ00	House Finch	NY	CONF	Mark Peck	3	12	0.16	1
10	17PJ00	American Goldfinch	NE	CONF	Mark Peck	12	48	0.92	1
10	17PJ00	House Sparrow	NY	CONF	William J Crins	16	64	2.2	1
10	17PJ01	Canada Goose	NE	CONF	2 atlassers				
10	17PJ01	Mute Swan	AE	CONF	Mike D. Boyd				
10	17PJ01	Wood Duck	FY	CONF	Alan Wormington				

Region	Square	Species	Max BE	Categ	Atlasser Name	#PC	%PC	Abun	#Sq
10	17PJ01	American Black Duck	P	PROB	Mike D. Boyd				
10	17PJ01	Mallard	NE	CONF	Ross D James				
10	17PJ01	Great Blue Heron	NY	CONF	Alan Wormington	2	7.14	0.0714	1
10	17PJ01	Green Heron	H	POSS	Mike D. Boyd				
10	17PJ01	Turkey Vulture	T	PROB	Mike D. Boyd	1	3.57	0.0357	1
10	17PJ01	Sharp-shinned Hawk	NE	CONF	Mark Peck				
10	17PJ01	Cooper's Hawk	FY	CONF	Mike D. Boyd				
10	17PJ01	Red-tailed Hawk	NY	CONF	Mark Peck	1	3.57	0.0357	1
10	17PJ01	American Kestrel	FY	CONF	Donna Sheppard	1	3.57	0.0357	1
10	17PJ01	Killdeer	NE	CONF	2 atlassers	6	21.43	0.3571	1
10	17PJ01	Rock Pigeon	NY	CONF	Alan Wormington	11	39.29	1.25	1
10	17PJ01	Spotted Sandpiper	FY	CONF	Alan Wormington				
10	17PJ01	American Woodcock	D	PROB	Donna Sheppard				
10	17PJ01	Mourning Dove	NY	CONF	Mark Peck	17	60.71	1.4643	1
10	17PJ01	Yellow-billed Cuckoo	S	POSS	Mike D. Boyd				
10	17PJ01	Black-billed Cuckoo	CF	CONF	Mike D. Boyd				
10	17PJ01	Eastern Screech-Owl	P	PROB	Mike D. Boyd				
10	17PJ01	Great Horned Owl	NY	CONF	Mark Peck				
10	17PJ01	Common Nighthawk	S	POSS	Mike D. Boyd				
10	17PJ01	Whip-poor-will	T	PROB	Mike D. Boyd				
10	17PJ01	Chimney Swift	AE	CONF	Roy Smith				
10	17PJ01	Ruby-throated Hummingbird	H	POSS	2 atlassers				
10	17PJ01	Belted Kingfisher	AE	CONF	Mike D. Boyd				
10	17PJ01	Downy Woodpecker	NY	CONF	2 atlassers	2	7.14	0.0714	1
10	17PJ01	Hairy Woodpecker	NY	CONF	2 atlassers	1	3.57	0.1071	1
10	17PJ01	Northern Flicker	NY	CONF	Mike D. Boyd	8	28.57	0.3571	1
10	17PJ01	Pileated Woodpecker	AE	CONF	Glenn Coady	1	3.57	0.0714	1
10	17PJ01	Eastern Wood-Pewee	T	PROB	Mike D. Boyd	2	7.14	0.0714	1
10	17PJ01	Alder Flycatcher	S	POSS	Mike D. Boyd				

Region	Square	Species	Max BE	Categ	Atlasser Name	#PC	%PC	Abun	#Sq
10	17PJ01	Willow Flycatcher	A	PROB	Mike D. Boyd				
10	17PJ01	Least Flycatcher	S	POSS	William J Crins				
10	17PJ01	Eastern Phoebe	S	POSS	Alan Wormington	1	3.57	0.0357	1
10	17PJ01	Great Crested Flycatcher	CF	CONF	Alan Wormington				
10	17PJ01	Eastern Kingbird	NY	CONF	Roy Smith	1	3.57	0.0357	1
10	17PJ01	Warbling Vireo	T	PROB	Mike D. Boyd				
10	17PJ01	Red-eyed Vireo	FY	CONF		4	14.29	0.1786	1
10	17PJ01	Blue Jay	NE	CONF	Ross D James	4	14.29	0.1786	1
10	17PJ01	American Crow	AE	CONF	2 atlassers	4	14.29	0.1786	1
10	17PJ01	Horned Lark	P	PROB	Mike D. Boyd				
10	17PJ01	Purple Martin	T	PROB	Mike D. Boyd				
10	17PJ01	Tree Swallow	V	PROB	Glenn Coady	1	3.57	0.0714	1
10	17PJ01	Northern Rough-winged Swallow	AE	CONF	Mike D. Boyd				
10	17PJ01	Bank Swallow	D	PROB	Mike D. Boyd				
10	17PJ01	Cliff Swallow	AE	CONF	Mike D. Boyd				
10	17PJ01	Barn Swallow	NY	CONF	Winnie Poon	8	28.57	0.4643	1
10	17PJ01	Black-capped Chickadee	NY	CONF	Mark Peck	4	14.29	0.2857	1
10	17PJ01	Tufted Titmouse	T	PROB	Mike D. Boyd				
10	17PJ01	Red-breasted Nuthatch	NB	CONF	Mike D. Boyd				
10	17PJ01	White-breasted Nuthatch	FY	CONF	2 atlassers	1	3.57	0.0357	1
10	17PJ01	Brown Creeper	H	POSS	Mike D. Boyd	1	3.57	0.0357	1
10	17PJ01	Carolina Wren	NY	CONF	Donna Sheppard				
10	17PJ01	House Wren	FY	CONF	Alan Wormington				
10	17PJ01	Blue-gray Gnatcatcher	B	PROB	Mike D. Boyd				
10	17PJ01	Veery	S	POSS	Mike D. Boyd				
10	17PJ01	Wood Thrush	T	PROB	Mike D. Boyd	1	3.57	0.0357	1
10	17PJ01	American Robin	NY	CONF	2 atlassers	22	78.57	2.0357	1
10	17PJ01	Gray Catbird	NE	CONF	Ross D James	2	7.14	0.0714	1

Region	Square	Species	Max BE	Categ	Atlasser Name	#PC	%PC	Abun	#Sq
10	17PJ01	Northern Mockingbird	NY	CONF	3 atlassers				
10	17PJ01	Brown Thrasher	NE	CONF	Ross D James				
10	17PJ01	European Starling	NY	CONF	Alan Wormington	20	71.43	3.2143	1
10	17PJ01	Cedar Waxwing	NB	CONF	Roy Smith	2	7.14	0.1071	1
10	17PJ01	Yellow Warbler	CF	CONF	2 atlassers	2	7.14	0.0714	1
10	17PJ01	Chestnut-sided Warbler	S	POSS	Mike D. Boyd				
10	17PJ01	Pine Warbler	T	PROB	Mike D. Boyd				
10	17PJ01	American Redstart	T	PROB	Mike D. Boyd				
10	17PJ01	Ovenbird	S	POSS	Alan Wormington				
10	17PJ01	Mourning Warbler	H	POSS	Alan Wormington				
10	17PJ01	Common Yellowthroat	T	PROB	Mike D. Boyd	1	3.57	0.0357	1
10	17PJ01	Eastern Towhee	T	PROB					
10	17PJ01	Chipping Sparrow	FY	CONF	Alan Wormington	2	7.14	0.1071	1
10	17PJ01	Field Sparrow	S	POSS	3 atlassers				
10	17PJ01	Vesper Sparrow	S	POSS	2 atlassers				
10	17PJ01	Savannah Sparrow	CF	CONF	Ross D James	3	10.71	0.1429	1
10	17PJ01	Grasshopper Sparrow	S	POSS	Mike D. Boyd				
10	17PJ01	Song Sparrow	FY	CONF	2 atlassers	9	32.14	0.5357	1
10	17PJ01	Scarlet Tanager	S	POSS	2 atlassers				
10	17PJ01	Northern Cardinal	NY	CONF	Mark Peck	3	10.71	0.1071	1
10	17PJ01	Rose-breasted Grosbeak	NE	CONF	Ross D James				
10	17PJ01	Indigo Bunting	FY	CONF		2	7.14	0.1071	1
10	17PJ01	Bobolink	S	POSS	2 atlassers	2	7.14	0.0714	1
10	17PJ01	Red-winged Blackbird	NE	CONF	Mark Peck	17	60.71	5.5	1
10	17PJ01	Eastern Meadowlark	T	PROB	Mike D. Boyd	3	10.71	0.2857	1
10	17PJ01	Common Grackle	NY	CONF	2 atlassers	10	35.71	0.8214	1
10	17PJ01	Brown-headed Cowbird	NE	CONF	Ross D James	2	7.14	0.0714	1
10	17PJ01	Baltimore Oriole	AE	CONF	Mike D. Boyd	1	3.57	0.0357	1
10	17PJ01	House Finch	FY	CONF	Donna Sheppard	4	14.29	1.0714	1

Region	Square	Species	Max BE	Categ	Atlasser Name	#PC	%PC	Abun	#Sq
10	17PJ01	American Goldfinch	NY	CONF	Mark Peck	20	71.43	1.6786	1
10	17PJ01	House Sparrow	FY	CONF	Mike D. Boyd	12	42.86	2.7143	1