APPENDIX G

Natural Sciences Report

LCA Environmental Consultants

Natural Sciences Report

Guelph Line (Regional Road 1) Transportation Corridor Improvements
Class Environmental Assessment Study
Regional Municipality of Halton

Prepared for:

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TABLE OF CONTENTS

List of Figures

List of Tables

1.0 INTRODUCTION

The Regional Municipality of Halton requires completion of a Class Environmental Assessment (Class EA) Study to consider possible road improvements to a portion of Guelph Line (Regional Road 1) from one kilometer north of Derry Road (Regional Road 7) to Conservation Road within the Town of Milton. R and R Associates Inc. is undertaking the Class EA study on behalf of the Regional Municipality of Halton. LCA Environmental Consultants, a sub-consultant to R and R Associates Inc., is completing all aspects of the natural environment component with the exception of air quality. The study area limits are identified in **Figure 1**.

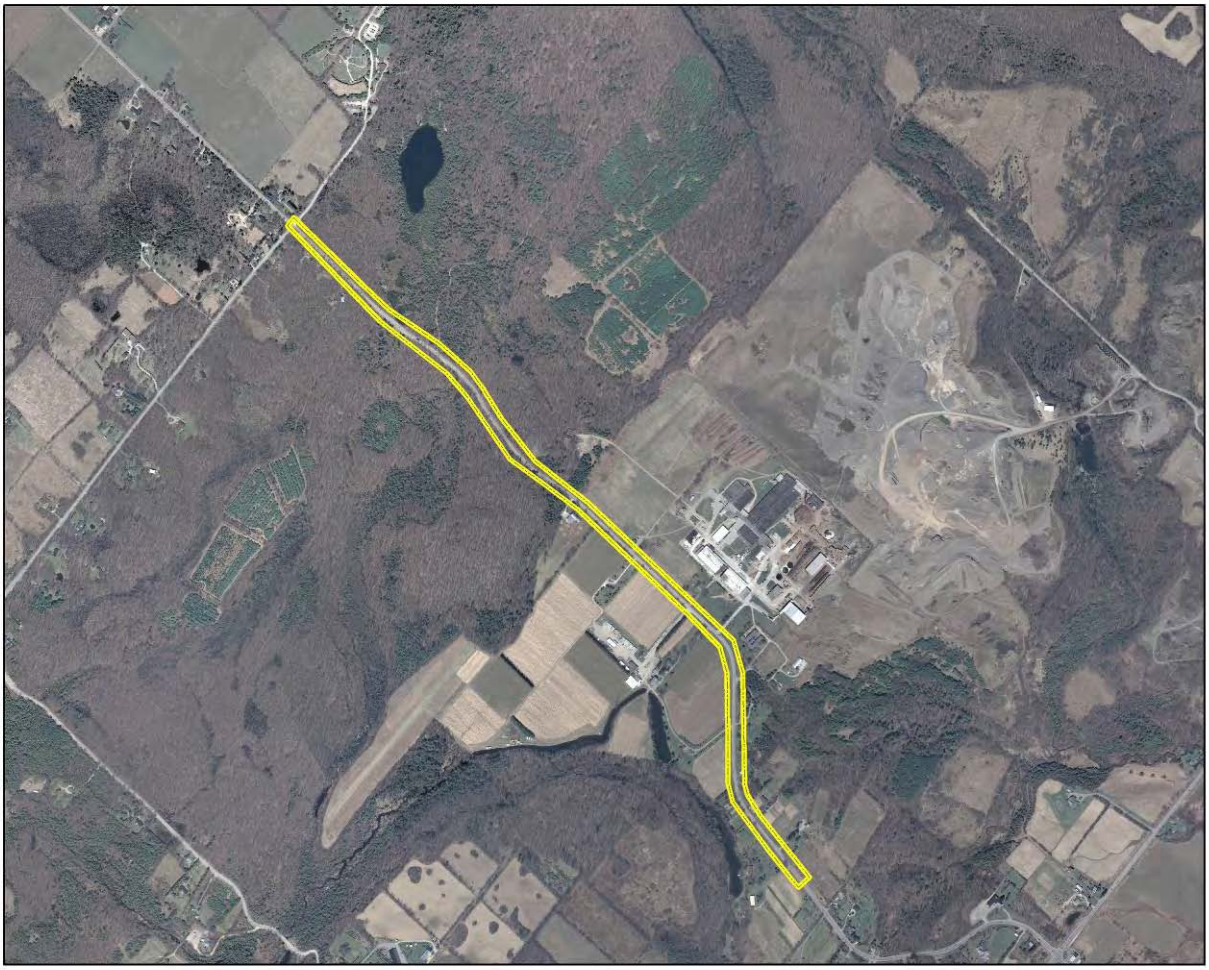

Figure 1: Guelph Line Study Area Limits

1.1 Background Information

The study area for the Guelph Line (Regional Road 1) transportation corridor improvements extends from one kilometer north of Derry Road (Regional Road 7) to Conservation Road within the Town of Milton, extending over a length of approximately 2.4 kilometers. The predominant land uses within the study area are a mix of agricultural, rural residential, commercial, and natural lands. The study area is located within the upper portion of the Limestone Creek subwatershed within the Bronte Creek Watershed. In the northern portion of the study area, Guelph Line is traversed by one tributary of the west branch of Limestone Creek (see Section 2.2 for more details). Further downstream, the west branch travels near the southwest limit of the study area.

Halton Region requires that a Class EA Study be completed for the proposed road improvements for Guelph Line within the study area limits. The Class EA Terms of Reference identified existing and future structural and capacity deficiencies of Guelph Line, as well as, approved and proposed land use changes in the area as factors leading to the initiation of the study. Further, the document indicates that the anticipated road improvements could include a combination of a 2-lane roadway reconstruction, improvements at the Guelph Line/Conservation Road intersection, and improvements to the roadway horizontal and vertical alignments. The Natural Sciences Report component of the EA is required in order to determine if the proposed improvements will have any impact on the natural environment. From this perspective, the study area was reviewed in general with specific criteria evaluated for the recommended alternative including the following:

- Aquatic Habitat and Fisheries (including significant species);
- Terrestrial Features (valleylands, wetlands, significant woodlots, ANSIs, ESAs & greenlands, and significant species);
- Wildlife (birds, herpetofauna, mammals); and
- Natural Heritage System (Greenbelt Plan Area, core areas, natural corridors, potential linkages, secondary linkages, other woodlots/wetlands and potential (unevaluated) wetlands.

Due to landowner restrictions, the majority of the lands adjacent to Guelph Line could not be accessed for comprehensive inventory beyond the road allowance. As such, the study area was evaluated through a combination of roadside surveys and a review of background studies. This approach was deemed sufficient as the proposed improvements are largely limited to the existing road footprint and any necessary site alterations will be limited to within a few metres of the road.

Supporting documents that have been consulted for relevant natural heritage data include:

- ✓ Bronte Creek Hydrology and Stream Morphology Study (BCHMS, PEIL, 2003);
- ✓ Bronte Creek Watershed Study (BCWS, Conservation Halton, 2002); and
- ✓ Halton Natural Areas Inventory (NAI) Volumes 1 and 2 (Dwyer, 2006).

The Ministry of Natural Resources and the Halton Region Conservation Authority were also contacted for existing natural heritage information which has been incorporated into this report.

1.2 Fieldwork

The natural environment in and adjacent to the study area was assessed and documented by LCA Environmental Consultants through the summer and fall of 2009 and summer of 2010. Table 1 summarizes all of the fieldwork completed for this report. Following, is a discussion outlining the existing environmental conditions within the study area including significant and/or sensitive natural areas and species.

Table 1: Summary of Fieldwork Completed for this Report

Date	Time	Weather	Purpose	Staff
July 15, 2009	9:45am – 12:00 noon	~ 20°C; mix of sun and clouds	• Reconnaissance • Study area characterization (natural areas, roadside vegetation, watercourses etc.)	• Lisa Campbell – Principal • Jason Elliott – Natural Heritage Biologist • Natalie Kiers – Field Technician
October 20, 2009	9:45am – 11:00am	~ 15°C; mix of sun and clouds	• ELC verification • Habitat and wildlife assessment • Watercourse assessment	• Scott Campbell – GIS • Jason Elliott – Natural Heritage Biologist • Nadine Litwin – Bird and Amphibian Naturalist
June 3, 2010	9:45 am – 12:00 pm	~ 23°C; mix of sun and clouds	• Vegetation inventory • Habitat and wildlife assessment • Watercourse assessment	• Lisa Campbell – Principal • Andrea Sinclair – Botanist • Natalie Kiers – Field Technician • Nadine Litwin – Bird and Amphibian Naturalist
June 8, 2010	8:00 pm – 9:00 pm	~ 17°C; overcast	• Marsh Monitoring Protocol • Breeding Birds	• Lisa Campbell – Principal • Nadine Litwin – Bird and Amphibian Naturalist

2.0 EXISTING STUDY AREA CONDITIONS

2.1 Physiography and Soils

An assessment of the physiography in the study area was conducted by reviewing the relevant background documents noted above. The documents reviewed for each section of the following discussion are referenced at the end of each paragraph.

The physiography of the Bronte Creek Watershed is dominated by the Niagara Escarpment which runs on a north–south axis through the Halton Region and divides many of the watercourses in the area into lower and upper reaches. In terms of bedrock geology, three formations make up the watershed. The Queenston Formation, comprised of red shale, underlies the lower portion of the watershed below the escarpment and forms the scarp's lower slopes. The Cataract Group, comprised of sandstone, dolostone, and shale, overlies the Queenston Formation and is exposed on the escarpment face. The Amabel Formation, comprised of erosion resistant dolostone, overlies the other formations, forms the upper scarp face, and underlies the upper portion of the watershed above the escarpment. (Conservation Halton, 2002; Dwyer, 2006; PEIL, 2003)

The northern portion of the study area is located within the Flamborough Limestone Plain physiographic region which occupies the majority of the Bronte Creek Watershed above the escarpment. Shallow Wentworth Till consisting of boulder till, sand, and gravel generally overlies the plain leading to the formation of stony, shallow soils. As these soils are unfavourable for agriculture, widespread forest cover exists across the plain associated with numerous wetlands and adjacent upland areas. Together, the shallow permeable soils and wetlands as well as bedrock fractures allow significant groundwater recharge and discharge across the plain. The southern portion of the study area is located within a Spillway physiographic region. This feature contains deep sand and gravel accumulations deposited along glacial spillways which allow groundwater discharge into Bronte Creek and the midstream reaches of Limestone Creek. (Conservation Halton, 2002)

An assessment of the soils and drainage in the study area was conducted by reviewing the relevant soils map for the area (Canada Department of Agriculture; 1971). According to the mapping, six different soil types are present in the subject lands. The northern portion of the study area near Steeles Avenue is comprised of very to exceedingly stony, well drained loam on complex topography with 5 - 9% slopes. Loams are also present further south in the area where the tributaries of Limestone Creek converge and traverse Guelph Line; however, these loams are variably to poorly drained, less stony, and are present on flatter topography (0 – 5% slopes). The southern portion of the study area is comprised of moderately stony, well drained sandy loam on complex topography with 5 – 9% slopes. Additionally, a very poorly drained organic mesisol is located at the southwest limit of the study area that corresponds to the downstream reach of the west branch of Limestone Creek.

2.2 Aquatic Habitat and Fisheries

As noted above, various unnamed tributaries of the west branch of Limestone Creek converge and traverse Guelph Line in the upper portion of the study area. Mapping contained in both the Bronte Creek Watershed Study (Conservation Halton, 2002) and the Halton NAI (Dwyer, 2006) displays various headwater tributaries on the east side of Guelph Line; however, their number and alignments are not consistent. Additionally, although both sources display widening of a channel into a small waterbody just upstream of the road, they differ in terms of the location of the waterbody relative to the tributaries. Both sources indicate that Crawford Lake is part of the system (either online or origin) and show confluences and/or interconnections of the tributaries into two that cross the road. Site visits confirmed the southern crossing via a small culvert, however, there is no indication based on historical records and current field searches that a northern culvert exists at the pond location (see Appendix D – Site Photographs). Further, the engineering drawings corresponding to the alternatives for the project do not indicate a northern culvert crossing. As such, it appears that only one crossing exists. Based on the mapping, the location of the putative additional crossing would link the wetland with an open water zone that is present on the east side of Guelph Line (upstream) to wetland (without open water) that is present on the road's west side (downstream). Given these observations, it is possible that a historical linkage has been severed by the road leading to the current local hydrology.

In addition to the northern tributaries, a downstream reach of the west branch of Limestone Creek is present near the southwestern limit of the study area. However, as it is located outside of the study area approximately 80 metres west of Guelph Line and was not evaluated for this report.

2.2.1 Historical Data

The Bronte Creek Watershed, which includes the Limestone Creek subwatershed, has been evaluated in several studies dating back to 1960. The Bronte Creek Watershed Study (BCWS) prepared by Conservation Halton in 2002 provided a comprehensive evaluation of the watershed and its aquatic habitat through the incorporation of historical findings, as well as, new data gathered from 1998 – 2001 in support of the study. In 2003, Planning & Engineering Initiatives Ltd. (PEIL) completed the Bronte Creek Hydrology and Stream Morphology Study (BCHMS) on behalf of Conservation Halton. The following, is a discussion of the aquatic conditions present in Limestone Creek based on a review of the 2002 and 2003 reports.

The west branch of Limestone Creek begins northwest of the study area in the Guelph Junction Woods Environmentally Sensitive Area (ESA). The watercourse flows southeast and enters a glacial outwash valley associated with the Calcium Pits ESA/ANSI located west of Guelph Line. The ESA also encompasses portions of the Crawford Lake/Calcium Pits Provincially Significant Wetland (PSW) Complex. Within the ESA, the creek bends northeast then back southeast circumventing a till moraine and then travels near the southwest limit of the study area. Just south of the study area, the watercourse bends northeast again and flows over the Niagara

Escarpment (a natural fish barrier) at Guelph Line before its confluence with the east branch of the creek upstream of Derry Road. The tributary of the west branch that traverses the study area originates east of Guelph Line in a portion of the Crawford Lake/Rattlesnake Point Escarpment Woods ESA/ANSI that encompasses a portion of the Crawford Lake/Calcium Pits PSW Complex. The tributary flows south under Guelph Line, merges with another tributary that extends south from the wetland present on the west side of the road and then joins the west branch of the creek just east of Twiss Road. In general, the west branch exhibits extensive forest cover with some adjacent agricultural land use. Although flows in the west branch are augmented by groundwater discharge, more significant groundwater contributions into the creek occur in the reach of the main branch located between the confluence of the east and west branches and Derry Road. Downstream of Derry Road, the main branch of the creek travels through predominantly agricultural lands with limited forest cover before discharging into Bronte Creek upstream of No. 4 Sideroad (Conservation Halton, 2002; PEIL, 2003).

Mapping contained in the BCWS and the Halton NAI (Dwyer, 2006) indicates that the tributaries flow through wetland present on the east and west side of Guelph Line. A review of the Halton NAI, BCWS and recent correspondence from Conservation Halton (January 4, 2010; Appendix A) identifies the wetland as part of the Crawford Lake/Calcium Pits PSW Complex. The NAI classified the wetland as Shallow Marsh (MAS) and Open Aquatic (OAO) under the Ecological Land Classification for Southern Ontario (ELC) protocols (Lee et. al., 1998). The roadside surveys conducted for this report confirmed this classification and noted white cedar (*Thuja occidentalis*) as the dominate tree species in the wetland area in association with cattails (*Typha latifolia*), Sugar Maple (*Acer saccharum var. saccharum*) and Green Ash (*Fraxinus pennsylvanica*).

As discussed above, mapping contained in various sources display multiple tributaries connected/disconnected at Guelph Line on different alignments. Although the lands could not be accessed, it appears on the 2009 aerial imagery recently received GIS data from Halton Conservation that the alignment contained in the NAI mapping is not accurate. The Halton Conservation GIS data indicates multiple channels that converge into one branch approximately 150m southeast of the PSW and cross Guelph Line as one channel via a (~500 mm) corrugated steel culvert at Guelph Line.

An instream temperature survey conducted for the BCWS at nine stations in Limestone Creek indicated that the west branch, due to groundwater inputs at its headwaters and in its downstream reaches below the escarpment, provides coolwater habitat along its length. A coolwater temperature regime was also found in the east branch due to groundwater inputs. Downstream of the confluence of the two branches, warmer temperatures that approach the coolwater/warmwater margin near the creek's outlet into Bronte Creek were recorded due to the limited forest cover along the main branch. It was noted in the study that "*the [measured] coolwater habitat conditions upstream of Derry Road do not correspond with the healthy Brook Trout populations (coldwater habitat indicator) [found] through these reaches*" (Conservation Halton, 2002).

Fish community sampling was conducted at three stations in Limestone Creek (two in the west branch and one in the main branch) for the BCWS in order to "*…qualitatively assess changes in fish community composition from the headwaters of [the creek] to [its] confluence with the main branch of Bronte Creek*" (Conservation Halton, 2002). Additionally, the data was used to evaluate changes in the fish community over time through comparison with historical studies. According to the report, the creek "*supports a diverse coldwater fish community highlighted by the presence of salmonids from its headwaters downstream to its confluence with Bronte Creek*". In the west branch Brook Trout were common and migrating Rainbow Trout and Chinook Salmon were found as far upstream as the escarpment. Similar communities were found in the east branch below the east branch dam. In the main branch, in addition to the migrating species noted above, Brook Trout were common upstream of Walkers Line and Brown Trout were found downstream of Derry Road. Numerous forage fish species such as Rainbow Darter, Fantail Darter, Stonecat, Common Shiner, Northern Hog Sucker, White Sucker, and Creek Chub were found throughout the watercourse. Notably, the study indicates that Limestone Creek is a significant spawning ground and nursery for the Rainbow Trout population in Lake Ontario. As well, the study points to historical Coho Salmon reproduction in the creek. The full fish community data presented in the BCWS has been included in Appendix B for reference purposes.

According to correspondence from Conservation Halton to R and R Associates dated December 22, 2009 (Appendix A), the Ontario Ministry of Natural Resources may have concerns regarding Redside Dace (*Clinostomus elongatus*; S2, END), Atlantic Salmon (*Salmo salar*; SX, EXP), and American Eel (*Anguilla rostrata*; S1?, END) populations in Limestone Creek. According to the BCWS, Redside Dace was relatively common in the upper portions of the Bronte Creek Watershed until the early 1970s; however, the resident population appears to have declined and contracted since then as only three records of the species have been recorded since 1990 despite sampling at former known sites. The report indicated that, presently, Redside Dace appears to be limited to a reach of Bronte Creek and one of its tributary systems south and west of Limestone Creek. Atlantic Salmon, which used to be abundant in the Bronte Creek Watershed, has been extirpated from Lake Ontario and its tributaries since the late 1800s (BCWS, 2002). According to the BCWS, Atlantic Salmon fry were stocked in Bronte Creek and Willoughby Creek from 1997 – 2000 in an effort to re-establish the species in the watershed. However, no indication was given as to the success of the program. The status of American Eel in the watershed is unclear as there is no discussion of the species in the BCWS. No records of Redside Dace or Atlantic Salmon are included in the BCWS fisheries data for Limestone Creek; however American Eel has been found in the creek below the escarpment (Appendix B). Correspondence from OMNR dated June 7, 2010 (Appendix A) indicated that there are no fish species of concern within the study area. Species and their respective habitat that receive protection under the *Endangered Species Act 2007* may require a permit should the proposed alternative cause harm to these species or their habitat.

Benthic invertebrate sampling conducted for the BCWS according to the BioMAP protocols (Griffiths, 1999) at three stations in Limestone Creek indicated that the water quality in the

watercourse was non-impaired to slightly impaired. However, it was noted that the benthic indices used in the evaluation may not be entirely appropriate for the upstream station (downstream of the study area) given the characteristics of that reach of the creek (low gradient, non-gravel bottom) and a reference condition approach was recommended for future monitoring. Nevertheless, the benthic study results in Limestone Creek appeared to correlate well with the instream temperature and fish community studies as healthy, diverse fish communities such as that found in Limestone Creek were generally found in reaches with non-impaired or slightly impaired water quality throughout the watershed (BCWS, 2002).

Overall aquatic ecosystem health in the Bronte Creek Watershed was evaluated in the BCWS (2002) using the factors outlined above as well as water chemistry, instream habitat, and riparian cover parameters. The vast majority of the reaches of Limestone Creek upstream of Derry Road (including the reaches in the study area) were rated as having high aquatic ecosystem health while downstream of Derry Road the main branch of the creek was rated as having moderate health and tributaries to the main branch were rated as having poor health. Limited riparian cover, livestock access, and channelization were given as reasons for the lower ratings downstream of Derry Road. Riparian plantings were recommended to improve the conditions downstream of Derry Road and to help maintain coolwater habitat to the confluence with Bronte Creek.

A fluvial geomorphological assessment of Limestone Creek conducted for the BCHMS indicated that, although there are relatively few concerns for the creek on the whole, significant bank slumping is present in the creek's lower reaches near Bronte Creek where livestock access occurs and farm crossings are located. Additionally, the limited riparian buffer further upstream on the main channel was noted as having the potential to cause channel alterations. Restrictions to cattle and machinery access to the creek as well as public education on these matters was recommended to prevent further bank and bed alterations in the lower reaches. Although site descriptions and Rosgen classifications were provided in the study for seven stations on the creek, none were located in or near the study area as they were all below the escarpment.

Flow, sediment transport, and erosion were also studied throughout the watershed in the BCHMS. In terms of flow and sediment transport, the study found that, in general, bankfull dimensions were as expected, bedloads in the watershed are made up of many different materials, suspended solids concentrations in the creeks are relatively low, and the watercourses were transporting sediment efficiently. Further, the report indicated that as suspended sediment is being transported through the watercourses, it is not collecting on the creek beds where it could degrade aquatic habitat. It was concluded that the watercourses are in equilibrium with the current flow regimes. Results of the erosion analysis from the study indicated little bank retreat in the watercourses over the study period. However, of the seven sites studied on Limestone Creek (as above, all were below the escarpment), three were assigned a Moderate Erosion Sensitivity-High Erosion Risk rating and one near the mouth of the creek was given a High Erosion Sensitivity rating.

2.2.2 Field Assessment

The Limestone Creek tributaries and the associated wetlands were examined during the field surveys completed for this study. The northern tributary which according to mapping would traverse Guelph Line at the wetland appears to be disconnected from the historic downstream by Guelph Line and no longer provides a surface connection from Crawford Lake. As a result, extensive ponding has occurred on the east side of Guelph Line, contributing to the PSW identified in the area (see Appendix C, Site Photographs). The tributary currently flows southwest parallel to Guelph Line, crossing beneath the Bruce Trail where it converges with a second unnamed tributary and crosses Guelph Line via a 500mm corrugated steel culvert. The tributaries are approximately 260 metres apart and meander through an undisturbed/minimally impacted environment. As discussed above, various tributaries of Limestone Creek converge near Guelph Line and join the main channel near Twiss Road. One relatively large culvert (~500 mm diameter) appears to carry the bulk of the flows from the east side of Guelph Line. Ample riparian cover is present between Crawford Lake and the main branch connecting to Limestone Creek.

Roadside drainage is variable along Guelph Line ranging from defined swales to leveled shoulders. Based to the topography of the road and variability in roadside drainage, it is difficult to determine the hydrologic surface linkage between the roadside runoff and the existing surface water hydrologic features. However, given the proximity of the wetland pond feature to the road, it should be presumed that there is direct runoff from the road into both the wetland and the tributary crossing beneath Guelph Line.

Wetland areas immediately adjacent to Guelph Line were present on both the east and west sides of the road approximately 400 metres south of Steeles Avenue. East of Guelph Line, the slope from the road's edge to the edge of the open water pond was approximately 2:1 with primarily herbaceous vegetation coverage. Loose gravelly soil was evident beneath the vegetation and gravel could be seen extending 30-50 centimetres into the water. Given the direct roadside drainage, it is likely that a portion of the gravel is coming from the road. Aquatic vegetation at the water's edge was limited to detritus, algae and cattails. Small fish and tadpoles were visible during the spring field surveys; however, no fish data was collected. Historical data from 2009 provided by Conservation Halton indicated an abundance of Pumpkinseed (*Leponis gibbosus*) within the wetland pond. No other species were recorded during that sampling event and there were no other data provided by CH for this location. Standing snags and wildlife trails were evident along the road and wetland edges. The wetland area west of Guelph Line did not contain any open water and consisted primarily of marsh vegetation types. As there is no direct linkage (i.e. culvert) between the two wetland areas, it is unclear as to the origins of the western wetland area. It is possible, given the karst topography that a subsurface flow exists beneath the road.

The tributary traversing beneath Guelph Line is located approximately 225 metres south of the open wetland. There was no historical fisheries data for the small tributary at the crossing beneath Guelph Line; however, the channel was noted to be flowing during both the fall and

spring field surveys and had the potential to support local fish populations. CH data indicated that fish sampling was completed in 2009 at a sampling site located approximately 200 metres downstream (west) of the Guelph Line, below the steep ravine. The data confirmed the presence of Blacknose dace (*Rhinichthys atratulus*) and Brook stickleback (*Culaea inconstans*) at this location.

The majority of the historical fisheries data provided by CH was recorded from the Crawford Lake area and within the downstream reaches of Limestone Creek, in locations well beyond the study area limits. The diversity of fish species was considerably higher within the downstream reaches of Limestone Creek below the escarpment. An assessment of the fisheries habitat characteristics and water quality was conducted at the point of convergence of the main channel where the channel crosses Guelph Line. In general, aquatic organisms require pH levels between 5 and 9, dissolved oxygen levels above 5 mg/L, conductivity levels below 1600 µS/cm, and total dissolved solids (TDS) levels below 1000 ppm although fish spawning can be affected by lower levels of conductivity and TDS.

Table 2: General Water Quality Data

Parameter	Eastern Pond/wetland 06/03/2010	Limestone Creek at Bruce Trail 06/03/200	Limestone Creek at Guelph Line (10/20/2009)*	Limestone Creek at Guelph Line (06 /03 /2010)
Temperature (^{o}C)	22.8	20.0	10.3	19.1
Conductivity (µS/cm)	1426	649.8	742.4	641.2
TDS (ppm)	1001	444.5	516.9	439.5
pH	8.24	7.60	7.05	7.82
Dissolved Oxygen (mg/L)	7.97	3.53	12.02	5.07

* measurements taken approximately 3 metres upstream of Guelph Line culvert

While most parameters were within the tolerable range, the dissolved oxygen was considerably lower within Limestone Creek during the spring field survey. This result could be due to the difference in temperature or the relative contribution of groundwater as the tributary meanders through the wooded area. Conductivity was considerably lower in Limestone Creek than in the Open water pond along Guelph Line.

The Limestone Creek tributary upstream of Guelph Line meanders through a heavily wooded portion of the Crawford Lake Conservation Area, traversing beneath the Bruce Trail through a small culvert before reaching Guelph Line. The watercourse wetted width ranged from 80 centimetres to 1.27 metres depending upon the season with a max depth of approximately 15 centimetres. The channel banks were low and heavily vegetated suggesting that the channel likely overtops the low-flow banks spreading into the adjacent floodplain during peak rainfall events. While the instream vegetation was limited to grasses and sedges, the canopy cover was robust shading approximately 90% of the channel with the only direct exposure near the Guelph

Line crossing. The channel substrate consisted of cobble and rock (70%) with gravel and a minor sand component. During rainy periods the water depth appears to be sufficient to allow fish passage between the rocks, however, during low flow periods, the rocks may form a barrier to movement. The channel was stable both upstream and downstream of Guelph Line. West of Guelph Line the channel drops into a steep ravine system and meanders west through a heavily vegetated ravine.

There are three vernal pools identified within the study area, two of which have confirmed presence of Jefferson Salamander (*Ambystoma jeffersonianum*), a threatened species. The vernal pool located south of Steeles Avenue is approximately 90 metres east of Guelph Line within the Crawford Lake Conservation Area. Impacts to this vernal pool are not anticipated given the distance between the proposed works on Guelph Line and the vernal pool. The second vernal pool with confirmed presence of Jefferson Salamander is located approximately 10 metres east of Guelph Line, 100 metres south of the eastern wetland pond. The vernal pool is large and well shaded. There is an earthern and rock berm between the road and the vernal pool, as well as, debris. The upland area surrounding the vernal pool provides excellent habitat for adult salamanders. Several species of frogs and dragonflies were observed during the spring site visits.

As the field inventories were initiated in the summer of 2009, the timing was late for amphibian surveys in 2009. However, amphibians were noted on the various field days and the historical data for this area was reviewed. The Marsh Monitoring Program was initiated in June of 2010 but the initial surveys confirmed that completion of the protocol would not provide additional data and the designs were such that the amphibian habitat was not being altered in terms of size or quality. As such, more extensive field data collection was not warranted. The presence and location of the Jefferson salamander was confirmed by CH.

2.2.3 Summary

Based on the historical data provided by Conservation Halton and the field assessments completed for this study, both the wetland system and the Limestone Creek tributary appear to be productive in terms of fish habitat, provide suitable aquatic habitat for a variety of species and are not limited by surrounding land uses or existing riparian buffer. The vernal pools support amphibian breeding and juvenile development and the surrounding upland area provides excellent adult habitat for a variety of amphibians and reptiles.

2.3 Terrestrial Ecosystems

The portion of Guelph Line within the Study Area extends from Conservation Road in the north to approximately one kilometer north of Derry Road, encompassing both natural conservation lands with heavily wooded riparian features and open, active agricultural areas with limited tree cover and rural residential development.

2.3.1 Historical Data

The Halton Natural Areas Inventory (2006) and the Bronte Creek Watershed Study (2002) have completed extensive evaluation and mapping of the vegetation communities throughout the Bronte Creek watershed which includes the vegetation communities within the Limestone Creek subwatershed. The Crawford Lake Rattlesnake Point Escarpment Woods (NAI-18) is located east of Guelph Line while Calcium Pits (NAI-19) is adjacent to the western side of Guelph Line. The NAI report (2006) documented ninety-seven plant communities in NAI-18 and twenty plant communities in NAI-19, including a number of significant plant communities in both natural areas. The vegetation community data is also summarized in the Halton Region Environmentally Sensitive Areas Consolidation Report (2005).

2.3.2 Field Assessment

Field investigations and air photo interpretation determined the geographical extent, composition, structure and function of vegetation communities on and adjacent to the study area. A review of vegetation communities presented in the Halton Natural Areas Inventory-Detailed ELC Mapping (2005) was undertaken for the study area. Air photos were also used to interpret and determine the limits and characteristics of vegetation communities found abutting Guelph Line.

Guelph Line traverses through several ELC polygons, specifically identified in map sheets; BM080, BN081, and BO081 (see Appendix B). The predominant polygons abutting Guelph Line within the study area are: Deciduous Mixed Forest, Mixed Forest, Treed Talus, Shallow Marsh, Deciduous Swamp, Cultural Plantation and Cultural Meadow, with the main branch of Crawford Lake traversing through a Mixed Forest polygon. The field evaluations completed for this study confirmed the ELC designations that had been assigned to the various areas along Guelph Line and documented the dominant and abundant species within these areas.

A roadside vegetation inventory was conducted for all lands within ten to twenty metres from the existing road in fall of 2009 and in June of 2010 where access was possible. Private land ownership prohibited the ability to completed comprehensive surveys beyond the road allowance in most areas. No additional ecological land classification (ELC) was completed for this report as the proposed road improvements are primarily limited to the existing road footprint such that the ELC polygons identified in the historical reports will remain intact.

An inventory of the vegetation identified during the field site visits has been included in Appendix B for reference purposes. There were no threatened or endangered vegetation species identified within the right of way.

2.4 Wildlife and Wildlife Habitat

2.4.1 Historical Data

The BCWS Natural Heritage Report (Appendix B) lists rare species occurrences for all NAI's within the Halton Region. Specifically Appendix 1 contained in Appendix 7 of the BCWS lists flora and fauna occurrences for the Crawford Lake/Rattlesnake Point Escarpment Woods which encompasses the areas identified as NAI 18 and 19. Appendix 1 of the BCWS lists 38 rare vascular plants species, 2 rare species of reptile and amphibians, and 1 rare mammal occurrence.

The study area is evenly divided by anthropegenic uses of rural farmland, rural residential areas and a commercial aggregate operation. The remaining portion of the study area is of ecologically sensitive origin with multiple significant natural heritage features. Wildlife habitat throughout the study area is typical of undisturbed forest and interior forest habitat. The most significant habitat consists of the cliffs and talus slopes of Rattlesnake Point, the Niagara Escarpment Milton Outlier, Lowville Re-entrant Valley, meromictic Crawford Lake and Calcium Pits (BCWS, 2002).

The natural areas surrounding the watercourses and the woodlot provide nesting and dwelling habitat for many wildlife species including birds, mammals and herpetofauna. Wildlife expected to be found within the study limits include wildlife species that exhibit a tolerance for human activity, and wildlife species which require large tracts of undisturbed habitat. The Fauna Inventory presented in Appendix B details the species of wildlife that were documented within the project limits based on the current study and historical records.

Correspondence from Conservation Halton (CH, dated May 20, 2010) confirmed the presence of the Jefferson Salamander (*Ambystoma jeffersonianum*) within 10 metres of the road widening. This species is currently identified as *threatened* according to OMNR and the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). While the Jefferson Salamander was not identified in the field inventories conducted for this study, there is suitable habitat within the study area as this species prefers undisturbed closed canopy deciduous forests, ephemeral wetlands, and vernal pools as breeding habitat.

Correspondence from the Ministry of Natural Resources dated June 7, 2010 (Appendix A) indicated that there were historical records of a number of Species at Risk recorded within the study area. Species at Risk identified included the Snapping Turtle (*Chelydra serpentina*), Milksnake (*Lampropeltis triangulum triangulum*), Butternut *(Juglans cinerea*), Eastern Ribbonsnake (*Thamnophis sauritus)* and Jefferson Salamander (*Ambystoma jeffersonianum*). The Natural heritage features recorded in the study area include the Lowville Re-entrant Valley ANSI, Crawford Lake – Milton Outlier Valley ANSI, Crawford Lake Conservation Area, the Provincially Significant Crawford Lake and Calcium Pits Wetland Complex, Calcium Pits ESA and Crawford Lake – Rattlesnake Point Escarpment Woods ESA.

As previously discussed, Redside Dace has also been recorded south of the study area. With the exception of these species, no bird, amphibian or mammal species located within the study area are considered to be of provincial or regional significance according to the Natural Heritage Information Centre (NHIC) Provincial Rankings (SRANK) and the OMNR status list. The valley systems associated with the Limestone Creek main branch and its tributaries provide connectivity to upstream and downstream habitat.

According to the Halton Natural Areas Inventory (2006), NAI-18, defined as the Crawford Lake-rattlesnake Point Escarpment Woods and Extensions, provides a rich habitat supporting diverse flora and fauna, many of which are native. In terms of species richness, NAI-18 supports twenty-six species of butterflies, twelve native species of dragonflies and damselflies, thirty native herptofaunal and a total of one hundred and six breeding birds, including twenty-three interior species. Twenty-four mammal species were also recorded in NAI-18, all of which are native species. The significant species within this area have been summarized in the NAI (2006) report (pages 124-127).

2.4.1 Field Assessment

Field surveys conducted in June 2010 confirmed the presence of American Toad (*Bufo americanus*), Western Chorus Frog (*Pseudacris triseriata*), Green Frog (*Rana clamitans*) and Northern Leopard Frog (*Rana pipiens*), as well as, Red-back Salamanders (*Plethodon cinereus*).
The Western Chorus Frog (Great Lakes-St. Lawrence Canadian Shield population) is identified as a Threatened species according to the COSEWIC status reports. The amphibian was heard within the woodland area well beyond the road allowance. Several mammals and/or tracks were also recorded during the site visits completed in fall of 2009 and spring of 2010. Numerous dreys were observed in the woodland canopy indicating the site offers suitable habitat for squirrels. Various standing snags, tree cavities and a number of stick nests were also observed in the woodland indicating current and potential habitat for nesting birds. Although no deer were observed directly, White-tailed Deer (*Odocoileus virginianus*) are also utilizing the property as evidenced by their tracks in various locations. Mast and berry producers in the woodlot and thicket areas provide a food source for various mammalian and avian species.

South of the Crawford Lake Conservation Area, the surrounding landscape transitions to agricultural uses, including active fields, mowed lawns and fallow fields. While these areas provide suitable habitat for a variety of small mammals and a variety of birds, there are no water features or wooded areas within the southern portion of the study area. As such, the wildlife habitat diversity is very limited on the southern portion of the study area.

Avifaunal surveys were completed in the fall of 2009 and the spring of 2010 and included an assessment of the potential habitat along Guelph Line. The surveys were limited the areas along the road in order to determine which species are actively utilizing the lands adjacent to the road and those that may be impacted by the proposed road works. The avifaunal species present in the

study area are a mixture of open country and woodland species. The observed woodland species were at the edge of their habitat in the large woodlot.

Thirty-four avian species, five herptofaunal species, and two mammalian species were observed or heard during the site visits completed for this study. The majority of species identified were ranked as common nationally, provincially, and regionally according to the Natural Heritage Information Centre (2008) and supporting documentation. The species lists include those fauna identified on the site and on adjacent lands and include species expected but not observed based on range and habitat availability. Additionally, historical data for the area from the Ontario Breeding Bird Atlas (OBBA), Ontario Partners in Flight (PIF), the SARO and NHIC databases, Bird Studies Canada and the Audobon Christmas Bird Count (CBC) databases is presented in the bird inventory. A search of the NHIC database confirmed historical records of rare, threatened or extirpated wildlife species within an approximately one kilometre radius of the subject lands. The NHIC database information is presented in Appendix B. None of these species were identified during the field assessments completed for this study; however, Conservation Halton has confirmed the presence of Jefferson salamander in recent years. The bird survey confirmed the presence of Barn Swallow, a high priority candidate due for assessment in April of 2011. Eastern Wood-Peewee and Wood Thrush are also identified as high priority candidates, while the Belted Kingfisher is classified as mid-priority.

Several avifaunal species identified within the study area are candidates for assessment by COSEWIC. This designation indicates that they are species of concern but require further evaluation. Of the candidate species, Eastern Wood-Pewee (*Contopus virens)* and Wood Thrush (*Hylocichla mustelina*), are High Priority Candidates. Eastern Wood-Pewee belongs to the aerial insectivore group of birds which have undergone dramatic declines in population numbers over the last twenty years. The reason for the decline is not clear. Several aerial insectivore species were observed in the study area due to the presence of habitat that supports diverse food sources. Other woodland area-sensitive birds included the Veery (*Catharus fuscescens*) and the Ovenbird (*Seiurus aurocapilla*). Species of interest utilizing the wetland area include Belted Kingfisher (*Ceryle alcyon*) which is considered Mid-Priority under COSEWIC and Barn Swallow (*Hirundo rustica*) which is a COSEWIC High Priority Candidate under review. Area-sensitive species either require a large area of suitable habitat for breeding or breed in higher densities in such areas. These species generally will not breed in what appears to be suitable habitat if it is not part of a much larger tract, irrespective of the size of their home ranges which can be quite small. The significance of area-sensitive species is that they act as indicators of the overall health of the landscape, and quality of the habitat (Environment Canada, 2007).

Four observed bird species have been identified by Ontario Partners in Flight (OPIF) or Bird Studies Canada (BSC) as species of conservation concern. These include Savannah Sparrow, wood thrush, eastern Wood Peewee and Belted Kingfisher. It is important to note however, that both the OPIF and BSC rankings, in and of themselves, confer no protection under the PPS or other applicable regulations and policies. Rather, they are meant to be used as guides in identifying habitat and features that may be subject to the policies and regulations. Partners in

Flight (PIF), established in 1990 as a response to declining neotropical bird species, now includes all landbirds and PIF partnerships now extend throughout North and Central America. The PIF mission is to keep common birds common, to help species at risk, and to work in partnership for birds, habitat, and people. Assessment scores and prioritization methods are provided by the PIF Science Committee (Canada, USA, Mexico). In Canada PIF activities are coordinated by a National Working Group. In Ontario this conservation initiative began in 1995. A partnership of government and nongovernmental agencies produced a bird conservation plan for Ontario that was published in 1997 as the Ontario "Flight Plan". Priority species lists for southern Ontario were subsequently produced by Bird Studies Canada (Couturier, 1999). The current plan, OPIF, builds on these earlier efforts with data provided by the Canadian Wildlife Service, the Breeding Bird Survey, the Ontario Breeding Bird Atlas, Christmas Bird Counts, and others. The plan is positioned within the North American Bird Conservation Initiative (NABCI) Bird Conservation Region (BCR) planning framework where southern Ontario is identified as BCR 13. OPIF identifies 42 species that regularly breed and/or winter in ON BCR13. For each species the OPIF plan identifies a category (forest, grassland/agricultural, shrub/successional, and/or aerial insectivore), lays out reasons for concern, sets overall conservation objectives, and recommends action. The intent is to both facilitate and evaluate implementation of landbird conservation efforts in ON BCR 13.

The purpose of the Bird Studies Canada rankings is to assist municipalities in identifying natural heritage features, in particular significant wildlife habitat and significant woodlands, by using bird species that have been deemed of conservation concern. A species level of conservation concern was arrived at by a screening process through 3 main criteria: its range distribution and importance of a particular region to the overall range; the biological characteristics that make it vulnerable; and its habitat area requirements. Species are separated into 3 broad categories: forest, marsh, and open country, and within each category are 4 levels of conservation priority with Level 1 being the highest level of concern. All species within each category are considered to be of equal conservation importance. These conservation priorities were incorporated into OPIF. All wildlife data and historical reports and information are presented in Appendix B for reference purposes.

2.5 Designated Natural Areas

The following discussion provides a summary of the various designations that apply to the existing natural heritage features and functions. While the Provincial Policy Statement (PPS) does not apply as this is not a planning application, consideration should be given to the wildlife habitat as part of the alternative review and scoring process.

2.5.1 Greenbelt and Niagara Escarpment Plans

According to mapping contained within the Greenbelt Plan (2005), the study area is located within the Niagara Escarpment Plan Area on both sides of Guelph Line and to the east and west at Derry Road and Steeles Avenue. The Niagara Escarpment Plan (2008) mapping depicts the

portion of the study area within the Niagara Escarpment Plan Area as Escarpment Natural Area, Escarpment Protection Area and Public Land within the Area of Development Control. Transportation facilities are permitted within the Escarpment Areas according to the policies contained within the Niagara Escarpment Plan.

2.5.2 Greenlands

The Halton Regional Official Plan (Office Consolidation, 2006) identifies Greenlands A and Greenlands B in the study area. The Greenlands A area appears to correspond with the main channel and portions of the tributaries of Limestone Creek and Crawford Lake and also correspond to a provincially significant wetland polygon identified in the Official Plan on the north and south side of Guelph Line. The Greenlands B designation appears to encompass the overall areas of NAI 18 and 19 and correspond with the Regional Woodlands Mapping. The goal of the Greenlands System is "*to maintain as a permanent landform and interconnected system of natural areas and open space that will preserve areas of significant ecological value while providing, where appropriate, some opportunities for recreation*". According to Table A1 in the Appendix to the Plan, transportation and utilities are permitted in Agricultural Rural Area and Greenlands B while essential transportation and utilities are permitted in Greenlands A.

2.5.3 Environmentally Sensitive Areas

The Region of Halton designates Environmentally Sensitive Areas (ESA) based on criteria contained in the Regional Official Plan (Office Consolidation, 2006). The study area lies between two Regionally designated ESA's. The Regional Municipality of Halton identifies the study area as ESA No. 18 (Crawford Lake-Rattlesnake Point Escarpment Woods and Extensions) and ESA No. 19 (Calcium Pits and Extension). Guelph Line which lies within the middle of the study area represents the border between ESA 18 and ESA 19.

2.5.4 Valleylands

There are no significant valleylands identified within the study area according to the agency mapping; however, the steep terrain adjacent to the tributary of Limestone Creek west of Guelph Line provides a valley corridor and connectivity from the woodland area to the lands west of Guelph Line.

2.5.5 Wetlands

Figure A1 from the Regional Official Plan (Office Consolidation, 2006) identifies a wetland polygon in the study area on the north and south side of Guelph Line labeled 'Provincially Significant'. Mapping in the BCWS identifies a similar polygon designated also as Provincially Significant Wetland. The identified PSW directly abutting the north and south sides of Guelph Line is identified as the Crawford Lake and Calcium Pits Provincially Significant Wetland Complex.

2.5.6 Significant Wildlife Habitat

Four general types of significant wildlife habitat may be designated according to the PPS: migration corridors, seasonal concentration areas, rare or specialized habitat, and habitat for species of conservation concern. The OMNR description of the four categories is presented in Table 3 below.

Table 3: OMNR Descriptions of Significant Wildlife Habitat

Category	Description
Habitats of Seasonal Concentrations of Animals	• areas where animals occur in relatively high densities for that species at specific periods in their life cycles and/or in particular seasons • seasonal concentration areas tend to be localized and relatively small in relation to the area of habitat used at other times of the year
Rare Vegetation Communities or Specialized Habitat for Wildlife	Rare Vegetation Communities include: • areas that contain a provincially rare vegetation community • areas that contain a vegetation community that is rare within the planning area Specialized Wildlife Habitats include: • areas that support wildlife species that have highly specific habitat requirements • areas with exceptionally high species diversity or community diversity • areas that provide habitat that greatly enhance species' survival
Habitat of Species of Conservation Concern	• includes the habitat of species that are rare, substantially declining, or have a high percentage of their global population in Ontario • includes special concern species identified under the Endangered Species Act, 2007 which were formally referred to as vulnerable in the Significant Wildlife Habitat Technical Guide • excludes habitats of endangered and threatened species covered under PPS policy 2.1.3 a)
Animal Movement Corridors	• habitats that link two or more wildlife habitats that are critical to the maintenance of a population of a particular species or group of species • habitats with a key ecological function to enable wildlife to move between areas of significant wildlife habitat or core natural areas with a minimum of mortality

Source: Natural Heritage Reference Manual 2nd Edition (OMNR, 2009)

Based on the OMNR defined criteria, the wetland areas, localized vernal pools and the surrounding woodland areas provide for seasonal concentration areas, habitat of species of conservation concern and animal movement corridors. However, as these features are outside of

the proposed work area, the relatively impacts are deemed negligible as none of the identified features or functions will be altered.

2.5.7 Significant Woodlands

The OMNR Natural Heritage Reference Manual (2010) details the criteria which define the relative significance of woodland features according to the Natural Heritage Policies of the Provincial Policy Statement (2005). The benefits include soil erosion protection, nutrient cycling, hydrological cycling, flood and erosion reduction, clean air and carbon storage, wildlife habitat, outdoor recreational opportunities and sustainable harvest of woodland products. According to the Manual, those woodlands that meet the size criteria or the criteria for ecological function or uncommon characteristics or provide for economic and social function are to be considered significant. The woodlands within the study area meet numerous of the criteria defined by the OMNR Natural Heritage Reference Manual (2010). As such, the woodlands within the study area should be considered Significant both provincially and locally.

Figure A2 from the Appendix to the Regional Official Plan (Office Consolidation, 2006) displays Guelph Line bisecting a woodland greater than 0.5 ha in size. Detailed information regarding the Crawford Lake Conservation Area and adjacent lands is presented in the Halton Natural Areas Inventory.

2.5.8 Areas of Natural and Scientific Interest (ANSIs)

There are two ANSI's located in or adjacent to the study area. The identified ANSI's within the vicinity of the study area are the Crawford Lake-Lowville Re-Entrant Valley (Earth Science) ANSI and Crawford Lake-Milton Outlier Valley (Life Science) ANSI.

3.0 PROPOSED ROAD IMPROVEMENTS

Guelph Line (Regional Road 1) is classified as a "Major Arterial Roadway" in the Region of Halton's Official Plan (1995) extending from Lakeshore Road in Burlington to McLaren Road in Campbellville, providing a northeast/southwest traffic route crossing Highway 403 and Highway 407. The portion of Guelph Line within the defined study area extends southeast from Conservation Road to one km north of Derry Road, and is currently a two-lane roadway with a rural cross-section and gravel shoulders on both sides. One tributary of Limestone Creek crosses Guelph Line in the north central portion of the study area through a north/south (~500 mm diametre) culvert. Guelph Line within the study area limits is a mixed rural/urban roadway with a 60km/hr speed limit. The predominant land uses consist of open space conservation lands, agricultural, single family residences, and commercial development.

As presently configured, Guelph Line has a number of existing structural, geometric and roadway cross-section deficiencies which can be improved to increase overall safety, capacity,

and roadside drainage. The recommended planning solution includes a combination of roadway shoulder widening and supporting measures to widen Guelph Line, provide local intersection improvements for safety and traffic operation, and implement storm water collection capabilities. Several design alternatives were considered based on a series of investigations as required by the EA process. To account for the unique character of this area of Guelph Line, the study area was divided into sections that incorporated the existing features and land uses. The road widening alternatives were then evaluated against the Evaluation Criteria for Guelph Line and the Preferred Design Alternative was established as detailed below. It is anticipated that the Preferred Design Alternative will have the least impact on the existing adjacent properties and the surrounding natural areas. A summary of the proposed road changes for each alternative is presented in Table 4 below.

TABLE 4: Guelph Line Improvement Alternatives

Proposed Alternative	Alternative Details
Alternative 1 (Preferred)	• Maintain current horizontal roadway alignment with a minimum horizontal curve radius of 250 metres and a rural road cross-section including 3.65 metre lanes, 2.5 metre partially paved shoulders (1.0 metre paved; 1.5 metres granular) and 3:1 ditch side slopes. • In the north section of Guelph Line from approximately the base of the escarpment to south of Conservation Road, provide an urban roadway cross-section including 3.65 metre lanes, 1.0 metre paved shoulders with curb and gutter, guiderail protection, and retaining walls (if required) through the northern section of the study area.
Alternative 2	• Centre roadway alignment within the existing right-of-way limits and provide a minimum curve radius of 250 metres while maintaining a rural road cross-section with 3.65 metre lanes, 2.5 metre partially paved shoulders (1.0 metre paved; 1.5 metres granular) and 3:1 ditch side slopes. • In the north section of Guelph Line from approximately the base of the escarpment to south of Conservation Road, provide a rural roadway cross-section including 3.65 metre lanes, 2.5 metre partially paved shoulders (1.0 metre paved) with guiderail protection where required through the northern section of the study area.
Alternative 3	• Centre roadway alignment within the existing right-of-way limits and provide a minimum curve radius of 400 metres while maintaining a rural road cross-section with 3.65 metre lanes, 2.5 metre partially paved shoulders (1.0 metre paved; 1.5 metres granular) and 3:1 ditch side slopes. • In the north section of Guelph Line from approximately the base of the escarpment to south of Conservation Road, provide a rural roadway cross-section including 3.65 metre lanes, 2.5 metre partially paved shoulders (1.0 metre paved) with guiderail protection where required through the northern section of the study area.

4.0 IMPACT ASSESSMENT AND RECOMMENDED MITIGATION

It is anticipated that the widening of Guelph Line will be accommodated within the existing right-of-way wherever possible which will minimize changes to the current road footprint and potentially reduce impacts on the adjacent lands and natural heritage features and functions. The preferred design alternative incorporates potential geometric restrictions based on the location of the existing residences, wetlands, natural areas, and watercourses.

The two culvert crossings are 400mm and 500mm CSP and do not meet the hydraulic requirements to convey the 25year design event. In addition, a third drainage area does not have a roadway cross culvert (or it could not be located). This drainage area is approximately 66.1ha in size. Although there would typically be significant runoff generated from an area of this size it is suspected that because of the sandy soils and the presence of fractured bedrock at the surface the drainage from this area does not travel on surface. Notwithstanding the foregoing, it is recommended that a properly sized culvert be provided at this location.

Given the proximity of the natural features within the study area, it is likely that a SAR permit will be required from OMNR, as well as, a permit from CH under the Generic Regulation. Ongoing consultation with the agencies through the detailed design phase is encouraged to ensure that the applicable permits can be issued based acceptable detailed designs.

4.1 Fisheries and Aquatic Ecosystems

The unnamed tributary of Limestone Creek provides indirect fish habitat. As discussed in Section 2.2.2, the tributary and culvert at Guelph Line is a convergence of multiple unnamed tributaries with potential coldwater, coolwater and warmwater fisheries habitat. The watercourse is considered to be Type 2 coolwater habitat according to the BCWS (2002). Conservation Halton has confirmed that the main tributaries are designated as coldwater fisheries according to the most recent data. The conclusions of the field evaluations completed for this report and the information provided in the BCWS (2002) also suggest that these tributaries currently support and/or contribute to coldwater fishery, and that watercourse conditions are non-impaired/minimally impaired and the overall conditions of the Limestone Creek watershed can be maintained through appropriate land use management.

Based on the proposed designs, there does not appear to be any requirement to alter the flow regime or channel orientation that allows water to move from north to south beneath Guelph Line. Culvert improvements on the unnamed tributary may improve overall water flow through this area. The extent to which the drainage currently flowing within the ditches along Guelph Line will be maintained post construction. However, installation of the storm sewer will change where runoff discharges into the watercourse. Details regarding the exact length of the required culvert are needed in order to assess the potential impacts on the watercourse systems post-construction. It is anticipated that the detailed designs will be forthcoming once the preferred alternative has been confirmed. A review of the preliminary design drawings confirms that the

proposed infrastructure and road widening will not alter the current channel regime or flow. In the event that the Conservation Halton deems the culvert replacement to be a HADD to fish habitat, authorization may be required from the Department of Fisheries and Oceans. As well a permit will be required from Conservation Halton for any alteration to the watercourses under the Conservation Authority Act.

TABLE 5: Summary of Alternative 1 Work Proposed and Potential Impacts

Natural Heritage Feature	Existing Culvert/Structure or Conditions	Habitat Type	Proposed Work Required	Potential Impact and/or Changes
Wetland adjacent to Guelph Line	-Wetland buffer limited to road should and 2:1 gravelly vegetated slope to water's edge; - Direct road runoff input in to wetland	Fish, amphibian, mammalian and avifaunal	- Earthen slope constructed at pond (east) and wetland (west) edge with a guardrail and curb and gutter - Urban cross-section	- Marginal loss of existing wetland edge vegetation and habitat (extent to be determined at detailed design) - Change in substrate - Potential sedimentation during construction -Temporary noise disturbance through construction period - Loss of direct road drainage input
Tributary of Limestone Creek	- Stable channel with rocky substrate - 500 mm corrugated culvert	Indirect fish, amphibian, benthic invertebrate	- Replace culvert with 1000 mm culvert - Add an additional 400 perched culvert for peak flows and dry crossing for salamanders - Curb and gutter to direct road runoff into channel - Urban cross-section	- No change to the upstream or downstream channel morphology - Potential sedimentation during construction - Potential increased flow capacity in culvert post-construction - Dry culvert for potential salamander crossing
Vernal Pools	- Breeding habitat for Jefferson salamander (SAR)	Amphibians, insects, mammals	- No proposed changes beyond existing road footprint	- Potential reduction in direct road runoff into vernal pool
Woodlands	- ESA and Conservation lands - mature canopy and diverse habitat for wildlife	Avifaunal, mammals, amphibians	- Minor tree clearing along the eastern edge of the Crawford Lake Conservation woodland (200 m south of Steeles on east; 200-400 m south of Steeles on west)	- No change in woodland function or wildlife habitat - Temporary disturbance during construction

A summary of the potential impacts to the watercourse, wetland and adjacent woodland habitat is presented in Table 4 above. The proposed changes are primarily focused on the Preferred Alternative (Alternative 1) as the culvert replacement, curb and gutter requirements and minor tree clearing is consistent among the proposed alternatives. The preferred alternative was selected in order to minimize the proposed road footprint beyond the existing road.

Installation of an earthen slope on the north and south sides of Guelph Line abutting the PSW in combination with the minor widening will incur a small unsubstantial loss of wetland as the newly constructed slope will be functionally equivalent and likely more stable than the existing granular slope. Once installed, the slope can be planted with native vegetation, as well as, planting s at the water's edge to increase the shade potential in this area. The curb and gutter will minimize erosion and runoff directly into the PSW, redirecting the runoff into the downstream watercourse crossing Guelph Line. Potential impacts and habitat loss in the PSW associated with the slope can be addressed through additional plantings and habitat edge creation along the base of the slope. If required, a retaining wall can be constructed instead of the slope, however, this approach will minimize the potential for plantings and shade at the water's edge.

Harmful alteration to fish habitat can be reduced through appropriate construction practices and through use of bioengineering strategies for bank stabilization. The following mitigation measures will further assist in reducing a potential HADD to fish habitat:

- ✓ All work areas should be delineated with construction fencing to restrict the equipment and construction from potentially sensitive areas;

- ✓ All in-water construction activities should be implemented in the permitted time period to ensure that spawning fish and spawning habitat, eggs and fry are protected through the critical period. No work should occur in the water between September 15 to June 30 in any calendar year or as determined by the review agencies;

- ✓ Heavy equipment should be limited to stable areas and away from potentially soft banks;

- ✓ All culvert extensions should be countersunk to the depth of the existing culvert and backfilled with native material;

- ✓ All work should be completed under low flow and dry conditions and work areas should be isolated from flows during the construction phase;

- ✓ Fish should be removed from any area that may be isolated the during construction phase and released in the watercourse beyond the work area;

- ✓ Best management practices related to materials storage, machinery operation and the movement of earth should be implemented during construction

Although, the mitigation strategies detailed above will assist in reducing the potential harm to fish habitat, replacement of the culvert will not likely result in a loss to fish habitat. As such, compensation should not be required.

4.2 Stormwater Management and Erosion and Sedimentation Control

Currently, the storm water from Guelph Line enters the unnamed watercourse and PSW via direct runoff where there is no roadside ditch and through indirect discharge flowing along portions of a highly vegetated roadside ditch. The proposed road improvements will increase the amount of impermeable surface throughout the study reach. The preferred alternative design incorporates the installation of a storm sewer and curb and gutter collection system, the captured run-off will be discharged directly into the unnamed tributary at the existing Guelph Line crossing. The preferred alternative calls for the replacement of the existing culvert and connection of the proposed storm sewer. Runoff will be prevented from entering the PSW and sensitive *species at risk* habitats. However, redirection of the runoff directly into the tributary may negatively impacting water quality. A combination of engineered works and natural drainage attenuation on the downstream outlet portion of the watercourse may be effective in treating the excess storm water.

Increased erosion due to the exposure of soil is common through the construction phase, resulting in increased suspended sediments, which can have detrimental effects on the watercourse(s) if conveyed by surface water runoff. Suspended and deposited sediment can have negative impacts on amphibian breeding pools, fish, fish habitat, and spawning areas. As well, increased sediments loads can result in changes in the channel equilibrium that may translate into downstream problems. For these reasons it is important that erosion and sediment control practices are clearly established and practiced throughout the construction phases to minimize the construction-related impacts on aquatic habitats and water quality.

Temporary erosion and sedimentation control measures may include, but are not limited to the following:

- ✓ Soils exposure time should be kept to a minimum;
- ✓ Silt fencing should be installed along the stream margins in areas of soil disturbance to minimize disturbance of these areas and restricted the dumping of waste/fill materials in a potential erosion zone;
- ✓ Use of an erosion control blanket in areas of soil disturbance should be used to provide slope protection and stabilization; seeding, sodding, and mulching material can also be effective if applied appropriately;

- ✓ In sensitive areas associated with the riparian buffers, the placement of the vegetation mats of native materials is effective at reducing erosion while quickly establishing stability to the bank;

Long-term strategies that control the overland flows, such as vegetated swales, rock checks and rip-rap linings in ditches can also be effective at controlling excessive sediments from reaching the watercourses and will provide continued maintenance of the fish habitat and water quality for the watercourses within the study limits.

All temporary measures should remain in place until the natural vegetation is established on any exposed soils. As well, measures aimed at establishing bank vegetation and improved riparian function should be incorporated into the design specifics for any portions of the watercourses that may require realignment. Provided that the erosion and sedimentation control strategies are established before construction begins, maintained throughout the construction phase and removed once the system is stable, there should only be minor effects on the surface water quality.

4.3 Terrestrial Ecosystems and Wildlife Habitat

There are no significant ecological changes anticipated as a result of the proposed road widening and improvements, and no rare, threatened or endangered plant species were identified directly within the proposed road improvements along Guelph Line. However, Jefferson Salamander (Ambystoma jeffersonianum) listed nationally and provincially as *threatened*, has been identified within the Crawford Lake PSW and ephemeral pool breeding habitat within 10m of Guelph Line has also been confirmed by Conservation Halton. Installation of the retaining wall at the wetland will incur minimal loss of habitat for local flora and fauna and no impact on the breeding pool. Construction of a double perched culvert at the existing Guelph Line crossing may provide a secure corridor crossing for fauna within NAI 18 and 19. Traffic is not likely to increase along this portion of Guelph Line and it is unlikely that the widening will increase fauna mortality rates.

Impacts to Jefferson Salamander and its habitat can be minimized through the following measures; installation of silt fencing along the road side to prevent erosion and sedimentation into breeding pools during rain events; storage of fill and spoil should be kept well away from Jefferson Salamander breeding habitats and secured using standard erosion control measures; installation of a double perched culvert at the existing crossing will provide a secure crossing for all amphibians once roadway improvements are complete; the second 'dry' culvert should be placed beside and downstream of the 'wet' culvert used to convey water and perched at an elevation that is 15cm higher than the upstream culvert; plantings at the inlet and outlet of both culverts should be done to provide cover and facilitate amphibian movement.

The presence of identified Species at Risk (SAR) within the study area may require a permit from OMNR under the Species at Risk Ontario (SARO) legislation. These species include

Western Chorus Frog (Great Lakes), the Snapping Turtle and the Bobolink. Consultation with OMNR regarding the habitat requirements for these species is recommended through the detailed design phase to ensure that the final design meets the requirements of the SARO legislation and OMNR is confident that the habitat for SAR will not be altered.

Based on field assessments, trees within NAI 18 and 19 are 3m to 8m from the existing roadway. The Preferred Design Alternative suggests that some trees may require trimming to accommodate the widening and hydro pole relocation, as proposed no trees are targeted for removal. Trees along the edges of NAI 18 and 19 consist primarily of sugar maple, white cedar, ash, birch and white spruce. Should tree removal be required, removal should be done in phases as to not pre-stress the interior trees. Tree removal from the woodlot edge should not involve any heavy equipment to minimize damage to the remaining trees.

The Migratory Bird Convention Act is federal legislation that is intended to protect and conserve migratory birds — as populations and individual birds — and their nests. Under the legislation, the protection of migratory birds and their nesting sites is regulated and may impact the construction windows for this project, specifically avoid the spring months when most birds are nests. Should the construction require the removal of a tree, it should be verified prior to removal that the tree does not provide for migratory bird nesting habitat.

5.0 MONITORING

Monitoring would occur in response by request of applicable agencies and stakeholders association with the in-water works to ensure compliance with Fisheries Act authorization and permits from Halton Conservation. It is recommended that the all interested parties discussed the detailed design as they pertain to the potential alteration of fish habitat prior to initiating the construction phase of this project.

We trust that this report thoroughly addresses the existing natural heritage features and functions within the study area. Should you require any additional information, please contact our office.

Sincerely,

Lisa Campbell, M.Sc., C.C.E.P.
Director

6.0 LITERATURE REVIEWED

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APPENDIX A

Project Correspondence

PROTECTING THE NATURAL ENVIRONMENT FROM LAKE TO ESCARPMENT

2596 Britannia Road West
RR2, Milton, Ontario L9T 2X6
905.336.1158 Fax 905.336.7014
www.conservationhalton.on.ca

BY MAIL AND EMAIL

December 22, 2009

Mr. Rick Hein
R and R Associates
600 Ontario Street
P.O. Box 28058
St. Catharines, ON
L2N 7P8

Dear Mr. Hein:

Re: Guelph Line Transportation Corridor Improvements
Municipal Class Environmental Assessment
Halton Region
CH File: MPR 523

Staff of Conservation Halton has reviewed the following documents in relation to the above-noted EA:

- Notice of Commencement,
- Technical Agencies Committee Meeting No. 1 materials, and
- *Summary of Natural Environmental Assessment Project Scope* (Technical Memorandum, dated November 30, 2009)

During our meeting on November 9, 2009, staff provided a brief overview of Conservation Halton's interests with respect to the above-referenced EA Study. Further, it was noted that additional information would be provided to assist in the study team's decision-making and study process. Outlined below is a brief overview of the items that Conservation Halton believes warrant consideration in the study process. (N.B. this is not an exhaustive list of items for consideration.)

General Comments:

Natural Heritage

1. Please note that the study area is within the Bronte Creek watershed. There are two crossings of Limestone Creek watercourse, a tributary Bronte Creek. Pursuant to Ontario Regulation 162/06, permits from Conservation Halton will be required for any works within the regulated areas associated with the watercourse.

2. The study area lies partially within the Crawford Lake Environmentally Sensitive Area, which is a Life and Earth Science Area of Natural and Scientific Interest

(ANSI). As such, field surveys should be undertaken to determine the presence of threatened species or endangered species.

3. The study area contains portions of the provincially-significant Crawford Lake and Calcium Pits wetland complex. Conservation Halton regulates the wetlands pursuant to Ontario Regulation 162/06.

4. Part of the study area also contains Significant Woodlands designated by Halton Region. Staff recommends that a detailed vegetation inventory be undertaken within 50 metres of any proposed works in the study area. The EA should recommend protection/mitigation measures for any vegetation impacts;

5. If available, road kill surveys should also be referenced to determine the impact of the roadway on wildlife habitat, and whether ecopassages along Guelph Line may be warranted (depending on the scope of proposed works).

6. The impacts of any utility relocation on natural heritage features and/or functions should be considered when evaluating alternatives.

Fish Habitat

7. The headwaters of Limestone Creek, which originate from the Crawford Lake/Calcium Pits wetland, support a diverse coldwater fish community highlighted by the presence of salmonids, including brown trout, brook trout, and rainbow trout.

8. Conservation Halton has a Level II Agreement with Fisheries and Oceans Canada (DFO) to administer the review of projects under section 35(1) of the *Fisheries Act*. Section 35 (1) of the Act states that no person shall carry on any work or undertaking that results in the harmful alteration, disruption or destruction of fish habitat (HADD). Under this agreement Conservation Halton will assess the alternatives within our watershed, regardless of other permitting requirements.

9. The Ontario Ministry of Natural Resources (OMNR) may have outstanding concerns with respect to Redside Dace (*Clinostomus elongatus*), Atlantic Salmon (*Salmo salar*) and American Eel (*Acipencer fulvescens*) populations in Limestone Creek. For example, the OMNR has recently upgraded the status of Redside Dace from Threatened to Endangered under the Endangered Species Act (ESA). Pursuant to the ESA, the OMNR has recently made changes to the way that projects potentially impacting Redside Dace populations or habitat are being reviewed and thus, the OMNR may need to screen this project. Once more information is available on the location and nature of the proposed works, staff of Conservation Halton may need to initiate the ESA screening process for Redside Dace. With regard to Atlantic Salmon and American Eel, we encourage the proponent to direct inquiries regarding their status to Melinda Thompson-Black, Species at Risk Biologist (melinda.thompson-black@ontario.ca).

10. Any improvements to transportation crossings over watercourses must be consistent with DFO guidelines. For example, extensions to or replacements of such structures are requested to span the bankfull channel width of the watercourse. In addition, expansions or replacements of such structures are also requested to consist of an open bottom design.

11. Riparian tree removal is requested to be kept to an absolute minimum within 30 meters of the bankfull channel width of watercourses. Where tree removal in this zone is necessary it is requested that the trees be replaced at a ratio of 3:1 within the road right of way.

Natural Hazards

12. The study area is traversed by a tributary of Bronte Creek and contains wetlands greater than 2 hectares in size, as well as the flooding and erosion hazard lands associated with those features. Conservation Halton regulates, pursuant to Ontario Regulation 162/06, all hazardous lands (i.e., Regional Storm flood plain, meander belt, valleylands, wetlands), as well as the lands that are adjacent to these hazard lands. Development within Conservation Halton's regulated area, requires permission pursuant to Ontario Regulation 162/06 and must meet the policies within Conservation Halton's *Policies, Procedures and Guidelines for the Administration of Ontario Regulation 162/06 and Land Use Planning Policy Document, April 27, 2006.* A copy of this document can be found on the CH website at http://www.hrca.on.ca/uploads//Final_Policy_Document_162-06.pdf.

13. Mapping of Conservation Halton's Approximate Regulation Limit is included with this letter. Please note that all areas regulated by Conservation Halton need to be plotted on drawings. Digital information requests can be made to Conservation Halton with the Data Request Form available on the CH website at http://www.conservationhalton.ca/ShowCategory.cfm?subCatID=1321.

14. The flood plain impacts of proposed works, including conveyance and storage, must be considered.

15. A geotechnical assessment will be required to assess slope stability.

16. A fluvial geomorphological assessment may be required depending on the nature of the proposed works.

17. Emergency Route Access: if the roadway is deemed an emergency route then there should be no overtopping of the road with flood waters.

Stormwater Management/Drainage

18. Drainage Patterns: both existing and proposed catchment areas will need to be identified.

19. Stormwater Quantity: post to pre quantity control will be required for all design storms.

20. Stormwater Quality Control: we anticipate that Enhanced Level quality control for all watersheds will be required.

21. Stormwater Management should be considered as it pertains to fish habitat, including treatment level and potential direct impacts from construction.

22. The Ministry of Transportation's B-100 Directive should be referenced.

23. Erosion Control: Erosion control measures listed below should be met if feasible; otherwise the consultant must demonstrate no net impacts on the watershed. The recommended erosion strategy for each watershed differs slightly. For Bronte Creek, the erosion control requirements should be determined on a site-specific basis, using both a tractive force analysis, and a flow frequency approach.

Groundwater

24. Field investigations should be undertaken to determine if there are any groundwater recharge/discharge areas within the study area that could be impacted as a result of any of the proposed options.

Other Information

25. The *Bronte Creek Watershed Study* (Conservation Halton, 2002) is a good source for background information. A hardcopy of this document is available and staff would be happy to provide you with a copy, should you require it. Please advise accordingly.

26. The *Bronte Creek Hydrology and Stream Morphology Study* (PEIL, 2003) may also be of interest.

27. Conservation Halton's landholdings in the study area consist of the Crawford Lake Conservation and Resource Management Areas. Staff requests that impacts to CH's landholdings, both direct and indirect, be considered as part of the EA process.

28. The Crawford Lake Conservation Area is one of the most accurately dated pre-contact archaeological sites in Canada. Adjacent lands may also contain significant First Nations artifacts.

29. The Ontario Ministry of Natural Resources may need to participate in the EA process if there are implications regarding the Lakes and Rivers Improvement Act. Please note that Conservation Halton does not screen for LRIA implications on behalf of OMNR.

Comments on the Summary of Natural Environmental Assessment Project Scope:

30. The Environmental Study Report should include a table in the methodology section showing staff, date, time, weather conditions and purpose of all fieldwork.

31. Conservation Halton's Environmental Impact Study Guidelines should be consulted. The guidelines are available on CH's website at http://www.conservationhalton.ca/ShowCategory.cfm?subCatID=1168.

32. Staff suggests that the study area encompass a minimum of 120 metres around the potential works area to reflect direction regarding adjacent lands in the updated draft Natural Heritage Reference Manual.

33. A botanical inventory and surveys for butterflies and odonates should also be included in the workplan.

34. Please use standard inventory methodology (i.e., OBBA, March Monitoring Program) where applicable. For other taxa, please thoroughly describe methodology and ensure that search efforts are well documented in the ESR.

Staff of Conservation Halton look forward to working with the study team through the Class EA process and welcome the opportunity to participate on the Technical Advisory Committee. We trust the above is of assistance. If you require additional information please contact the undersigned at extension 225.

Yours truly,

Kim Peters
Environmental Planner

cc: Alicia Jakatis, Halton Region, by email
David Lukezic, Halton Region, by email

Encl.

March 6, 2010 Our File: RR-09-024

2596 Britannia Road West
RR2, Milton, Ontario L9T 2X6

Attention: **Kim Peters, MES (Planning)**
Environmental Planner

Re: **Guelph Line Transportation Corridor Improvements**
Municipal Class Environmental Assessment (Class EA)
Halton Region, CH File: MPR 527
Comments to CH December 22, 2009 Letter

Dear Ms. Peters:

Thank you for your recent letter and input related to the Guelph Line Transportation Corridor Improvements Class EA study. We have reviewed Conservation Halton's (CH) letter dated December 22, 2009, Points 1 through 34 as they relate to the above noted Class EA study. Our response/ comments addressing each of the Conservation Halton points are provided in the attached table for your review.

As a follow up to this response letter, we would like to schedule a meeting with CH for the first week of April 2010 to discuss any further issues related to the above noted study. We will contact you separately to set an agreeable meeting date and time.

We look forward to moving ahead with the Class EA process and continue to encourage Conservation Halton staff's input throughout the EA process. In the meantime, if you have any questions or comments related to the aforementioned information provided, we would be pleased to hear from you either by phone at 289-241-2624 or via e-mail at RHein@RandR-Associates.com. As always, please feel free to contact either Ms. Alicia Jakaitis or myself at your convenience.

Sincerely,

R and R Associates Inc.

Rick Hein, P. Eng., PTOE, AVS
Principal

cc: Alicia Jakaitis, Halton Region
Jeff Reid, Halton Region

600 Ontario Street, PO Box 28058, St. Catharines, Ontario L2N 7P8 | Phone: 905-937-1708 | Fax: 905-937-4384 | E-mail: info@RandR-Associates.com

No.	Conservation Halton Comments	Response/Comment
Natural Heritage		
1.	Please note that the study area is within the Bronte Creek watershed. There are two crossings of Limestone Creek watercourse, a tributary Bronte Creek. Pursuant to Ontario Regulation 162/06, permits from Conservation Halton will be required for any works within the regulated areas associated with the watercourse	As part of the Environmental Study Report (ESR) documentation, a description of the applicable permits required (to be obtained as part of implementation) for any works within the regulated areas associated with the noted watercourse crossings, including a list of mitigation/protection measures associated with such works, will be provided
2.	The study area lies partially within the Crawford Lake Environmentally Sensitive Area, which is a Life and Earth Science Area of Natural and Scientific Interest (ANSI). As such, field surveys should be undertaken to determine the presence of threatened species or endangered species	The limits of species at risk surveys will be limited to the extent that would be directly impacted by any future road improvements
3.	The study area contains portions of the provincially-significant Crawford Lake and Calcium Pits wetland complex. Conservation Halton regulates the wetlands pursuant to Ontario Regulation 162/06	The information has been noted and will be included as part of the ESR documentation, where applicable
4.	Part of the study area also contains Significant Woodlands designated by Halton Region. Staff recommends that a detailed vegetation inventory be undertaken within 50 metres of any proposed works in the study area. The EA should recommend protection/mitigation measures for any vegetation impacts	A detailed vegetation inventory within 50 metres of any proposed work is beyond the area impacted by any future road improvements and would be greatly limited by access to private property. The inventories will be completed and inventoried as needed to assess alternatives in relation to the woodlot area
5.	If available, road kill surveys should also be referenced to determine the impact of the roadway on wildlife habitat, and whether ecopassages along Guelph Line may be warranted (depending on the scope of proposed works)	Road kill surveys were completed on the various field days assigned for the scheduled work. There are no additional days assigned for surveying road kills
6.	The impacts of any utility relocation on natural heritage features and/or functions should be considered when evaluating alternatives	The evaluation of alternative design concepts will consider and weigh the impacts of any utility relocations as part of the Class EA process for this study
Fish Habitat		
7.	The headwaters of Limestone Creek, which originate from the Crawford Lake/Calcium Pits wetland, support a diverse coldwater fish community highlighted by the presence of salmonids, including brown trout, brook trout, and rainbow trout	(CH Points 7 through 9) - The information has been noted and will be included as part of the ESR documentation, where applicable, including any required regulations and construction timing issues. We will contact MNR regarding the Redside Dace. In general, the majority of requirements have already been accounted for as part of the original natural sciences work program for the Guelph Line Class EA study
8.	Conservation Halton has a Level II Agreement with Fisheries and Oceans Canada (DFO) to administer the review of projects under section 35(1) of the Fisheries Act. Section 35 (1) of the Act states that no person shall carryon any work or undertaking that results in	

No.	Conservation Halton Comments	Response/Comment
	the harmful alteration, disruption or destruction of fish habitat (HADD). Under this agreement Conservation Halton will assess the alternatives within our watershed, regardless of other permitting requirements	
9.	The Ontario Ministry of Natural Resources (OMNR) may have outstanding concerns with respect to Redside Dace (Clinostornus elongatus), Atlantic Salmon (Salmo safar) and American Eel (Acipencer fulvescens) populations in Limestone Creek. For example, the OMNR has recently upgraded the status of Redside Dace from Threatened to Endangered under the Endangered Species Act (ESA). Pursuant to the ESA, the OMNR has recently made changes to the way that projects potentially impacting Redside Dace populations or habitat are being reviewed and thus, the OMNR may need to screen this project Once more information is available on the location and nature of the proposed works, staff of Conservation Halton may need to initiate the ESA screening process for Redside Dace. With regard to Atlantic Salmon and American Eel, we encourage the proponent to direct inquiries regarding their status to Melinda Thompson-Black, Species at Risk Biologist (melinda.thompson-black@ontario.ca)	
10.	Any improvements to transportation crossings over watercourses must be consistent with DFO guidelines. For example, extensions to or replacements of such structures are requested to span the bankfull channel width of the watercourse. In addition, expansions or replacements of such structures are also requested to consist of an open bottom design	As part of the Class EA process, DFO has been contacted as a technical agency associated with this study. Through Phase 3 of the Class EA process, a range of alternative design concepts will be developed and evaluated. Based on an assessment of the alternatives, should the recommended alternative include any modifications to existing watercourse crossings, any applicable DFO regulations will be documented as part of the ESR
11.	Riparian tree removal is requested to be kept to an absolute minimum within 30 meters of the bankfull channel width of watercourses. Where tree removal in this zone is necessary it is requested that the trees be replaced at a ratio of 3: 1 within the road right of way	Removal and replacement of riparian trees as they relate to the recommended design concept will follow applicable Regional requirements. Every effort will be made to minimize the potential impacts to existing trees within 30 metres of the bankfull width of watercourses where applicable within the study limits
Natural Hazards		
12.	The study area is traversed by a tributary of Bronte Creek and contains wetlands greater than 2 hectares in size, as well as the flooding and erosion hazard lands associated with those features. Conservation Halton regulates, pursuant to Ontario Regulation 162/06, all hazardous lands (i.e., Regional Storm flood plain,	At this time, it is anticipated that the area of future construction disturbance will be kept to a minimum and within current roadway right-of-way limits where possible, thereby minimizing any environmental impacts within the study limits. As part of the evaluation of the various alternative design concepts the potential

No.	Conservation Halton Comments	Response/Comment
	meander belt, valleylands, wetlands), as well as the lands that are adjacent to these hazard lands. Development within Conservation Halton's regulated area, requires permission pursuant to Ontario Regulation 162/06 and must meet the policies within Conservation Halton's Policies, Procedures and Guidelines for the Administration of Ontario Regulation 162106 and Land Use Planning Policy Document, April 27, 2006. A copy of this document can be found on the CH website at http://www.hrca.on.ca/uploads//Final_Policy_Document_162.06.pdf)	impacts of the various alternatives will be measured in terms of their potential environmental impacts. Where applicable to the recommended design, the policies of Ontario Regulation 162/06 will be noted in the ESR documentation as required
13.	Mapping of Conservation Halton's Approximate Regulation Limit is included with this letter. Please note that all areas regulated by Conservation Halton need to be plotted on drawings. Digital information requests can be made to Conservation Halton with the Data Request Form available on the CH website at http://www.conservationhalton.ca/ShowCategory.cfm?subCatID=1321	The Approximate Regulation Limit is based on available digital information from CH and Halton Region and will be shown on all relevant base plans associated with the development of alternative design concepts as required
14.	The flood plain impacts of proposed works, including conveyance and storage, must be considered	Stormwater drainage is being reviewed as part of the Class EA process for this study
15.	A geotechnical assessment will be required to assess slope stability	A previous geotechnical investigation conducted to assess roadway deficiencies along Guelph Line provided the necessary information for the 2008 road resurfacing. It is anticipated at this time that the current geotechnical information should be sufficient for the development of the alternative design concepts in Phase 3 of the Class EA process. Should additional geotechnical investigations be required to support the recommended design alternative, including that needed to assess slope stability, then additional investigations will be initiated during the detail design phase of the study
16.	A fluvial geomorphological assessment may be required depending on the nature of the proposed works	The requirement for a fluvial geomorphological assessment would depend upon the route and impacts of the recommended design alternative. Should such a study be required, the need will be assessed and determined during the detail design phase of the study
17.	Emergency Route Access: if the roadway is deemed an emergency route then there should be no overtopping of the road with flood waters	Noted for information purposes

No.	Conservation Halton Comments	Response/Comment
Stormwater Management/Drainage		
18.	Drainage Patterns: both existing and proposed catchment areas will need to be identified	As part of the stormwater review the existing storm drainage areas have been determined. The proposed drainage areas are anticipated to remain the same as the existing drainage areas except for where new cross culverts are recommended. No stormwater diversions are expected. Culverts will be replaced where the existing structure is deficient either hydraulically, structurally or does not meet current minimum size criteria
19.	Stormwater Quantity: post to pre quantity control will be required for all design storms	Controlling the post-flows to pre-flow levels should not be an issue since we are not widening the roadway beyond its current two-lane configuration. Quantity control will therefore not be required as there is no major increase in impervious area. Localized lane/shoulder widening would be considered insignificant in terms of generating additional stormwater flows. If only minor roadway geometric improvements are carried forward during the selection of the preferred alternative design concept then the need for formal stormwater management facilities are not anticipated
20.	Stormwater Quality Control: we anticipate that Enhanced Level quality control for all watersheds will be required	(CH Points 20 and 21) - Quality control will be incorporated where feasible through enhanced grassed swales. Major stormwater management facilities will not be required as part of this study as there is no increase in impervious coverage proposed; however, given the sensitivity of the area it is recommended that minor stormwater management will be provided as an enhancement where feasible
21.	Stormwater Management should be considered as it pertains to fish habitat, including treatment level and potential direct impacts from construction	
22.	The Ministry of Transportation's B-100 Directive should be referenced	The Ministry of Transportation's B-100 Directive is currently followed by Halton Region
23.	Erosion Control: Erosion control measures listed below should be met if feasible; otherwise the consultant must demonstrate no net impacts on the watershed. The recommended erosion strategy for each watershed differs slightly. For Bronte Creek, the erosion control requirements should be determined on a site-specific basis, using both a tractive force analysis, and a flow frequency approach	Required erosion control measures (i.e. mitigation measures) will be noted as part of the ESR documentation. Specific erosion control measures will be determined through the design phase of the study
Groundwater		
24.	Field investigations should be undertaken to determine if there are any groundwater recharge/discharge areas within the study area that could be impacted as a result of any of the proposed options	While we are aware that the tributaries are likely receiving some groundwater input, a groundwater recharge /discharge study has not been included as part of the project. It is understood that most cool water/cold water creeks are hydrologically linked to

No.	Conservation Halton Comments	Response/Comment
		groundwater and hence, impacts to these systems should incorporate consideration to maintain the hydrologic connection (i.e. open-bottom culverts)
Other Information		
25.	The Bronte Creek Watershed Study (Conservation Halton, 2002) is a good source for background information. A hardcopy of this document is available and staff would be happy to provide you with a copy, should you require it. Please advise accordingly	Noted for information purposes
26.	The Bronte Creek Hydrology and Stream Morphology Study (PEIL, 2003) may also be of interest	Noted for information purposes
27.	Conservation Halton's landholdings in the study area consist of the Crawford Lake Conservation and Resource Management Areas. Staff requests that impacts to CH's landholdings, both direct and indirect, be considered as part of the EA process	As part of the evaluation process of the alternative design concepts, impacts to all adjacent land areas, including CH's landholdings will be considered as part of the Class EA process
28.	The Crawford Lake Conservation Area is one of the most accurately dated pre¬-contact archaeological sites in Canada. Adjacent lands may also contain significant First Nations artifacts	(CH Points 28 and 29) – Both First Nations and the MNR were included as technical agency contacts and will continue to be solicited for input on this study throughout the Class EA process
29.	The Ontario Ministry of Natural Resources may need to participate in the EA process if there are implications regarding the Lakes and Rivers Improvement Act. Please note that Conservation Halton does not screen for LRIA implications on behalf of OMNR	
Comments on the Summary of Natural Environmental Assessment Project Scope		
30.	The Environmental Study Report should include a table in the methodology section showing staff, date, time, weather conditions and purpose of all fieldwork	Documentation will be provided in the ESR outlining all data collection methods and dates information was collected, etc.
31.	Conservation Halton's Environmental Impact Study Guidelines should be consulted. The guidelines are available on CH's website at http://www.conservationhalton.ca/ShowCategory.cfm?subCatID=1168	Noted for information purposes
32.	Staff suggests that the study area encompass a minimum of 120 metres around the potential works area to reflect direction regarding adjacent lands in the updated draft Natural Heritage Reference Manual	Conservation Halton has indicated that the study area should "encompass a minimum of 120 metres around the potential work areas". Similar to CH's comments for a 50 metre vegetation inventory for the entire length of proposed works, access beyond the road allowance for flora and fauna surveys is very difficult given the private land ownership along the road and is not considered appropriate in terms of measuring impacts related to

No.	Conservation Halton Comments	Response/Comment
		potential road improvements
33.	A botanical inventory and surveys for butterflies and odonates should also be included in the workplan	Butterflies and notable insects are typically noted during field assessment through incidental sightings. We have not included a survey of butterflies and odonates (dragonflies) as part of this study
34.	Please use standard inventory methodology (i.e., OBBA, March Monitoring Program) where applicable. For other taxa, please thoroughly describe methodology and ensure that search efforts are well documented in the ESR	In general, these requirements have already been accounted for as part of the original natural sciences work program for the Guelph Line Class EA study

Southern Region
Aurora District Office
50 Bloomington Road West
Aurora, ON L4G 0L8

Ontario

Ministry of Natural Resources | **Ministere des Richesses Naturelles**

June 7, 2010

Lisa Campbell, M.Sc., C.C.E.P.
LCA Environmental Consultants
104-155 Main Street East, Suite 234
Grimsby, ON
L3M 1P2
Phone: 905-945-4700
Fax: 905-945-3747

Re: Guelph Line – from 1 km north of Derry Road to Steeles Avenue, Town of Milton

Dear Ms. Campbell,

In your email dated May 20, 2010 you requested information on natural heritage features and element occurrences occurring on or adjacent to the above mentioned location.

There are a number of Species at Risk recorded from your study area. We have records of Snapping Turtle, Milksnake, Butternut, Eastern Ribbonsnake, and Jefferson Salamander. Some of these species receive protection under the *Endangered Species Act 2007* and thus, a permit may be required if the work you are proposing could cause harm to these species or their habitat.

Natural heritage features recorded for your area include the Lowville Re-entrant Valley ANSI, Crawford Lake – Milton Outlier Valley ANSI, Crawford Lake Conservation Area, the Provincially Significant Crawford Lake and Calcium Pits Wetland Complex, Calcium Pits ESA and Crawford Lake – Rattlesnake Point Escarpment Woods ESA.

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 the NHIC and to our office. This will assist with updating our database.

If you have any questions or comments, please do not hesitate to contact me at 905-713-7425.

Sincerely,

Melinda Thompson-Black

Melinda Thompson-Black
Species at Risk Biologist
Ontario Ministry of Natural Resources, Aurora District

APPENDIX B1

Historical Data and Information

Table 1. Fish Community Summary (various data sources). 1990-present.

Common Name	Scientific Name	Lower Bronte Creek	Middle Bronte Creek	Upper Bronte, East Branch	Upper Bronte, Main Branch	Upper Bronte, North-East Branch	Upper Bronte, West Branch	Bronte Harbour	Flamboro	Indian	Kilbride, downstream of escarpment	Kilbride, upstream of escarpment	Limestone, downstream of escarpment	Limestone, upstream of escarpment	Lowville	Mount Nemo	Mountsberg, upstream of Reservoir	Mountsberg, downstream of reservoir	Mountsberg Reservoir	Strabane	Willoughby
American Brook Lamprey	*Lampetra appendix*		X																		
Sea Lamprey	*Petromyzon marinus*	X																			
Alewife	*Alosa pseudoharengus*	X						X													
Coho Salmon	*Oncorhynchus kisutch*	X						X					X								
Chinook Salmon	*Oncorhynchus tshawytscha*	X						X													
Rainbow Trout	*Oncorhynchus mykiss*	X	X					X	X		X		X								X
Atlantic Salmon	*Salmo salar*	X	X																		X
Brown Trout	*Salmo trutta*	X	X					X	X			X	X					X			X
Brook Trout	*Salvelinus fontalis*		X		X				X		X	X	X	X			X			X	X
Rainbow Smelt	*Osmerus mordax*							X													
Central Mudminnow	*Umbra limi*			X	X	X	X		X		X	X	X	X			X	X		X	
Northern Pike	*Esox lucius*							X									X	X			
Northern Redbelly Dace	*Phoxinos eos*			X	X	X				X		X		X				X		X	
Finescale Dace	*Phoxinos neogaeus*																			X	
Redside Dace	*Clinostomus elongatus*			X	X																
Spotfin Shiner	*Cyprinella spiloptera*	X																			
Carp	*Cyprinus carpio*	X						X		X			X								
Brassy Minnow	*Hybognathus hankinsoni*			X		X						X					X	X			
Hornyhead Chub	*Nocomis biguttstus*	X																			
River Chub	*Nocomis micropogon*	X																			
Golden Shiner	*Notemigonus crysoleocas*							X		X											
unknown Chub	*Nocomis spp.*	X																			
Striped Shiner	*Luxilus chrysocephalus*	X																			
Common Shiner	*Luxilus cornutus*	X	X	X	X			X		X		X	X			X		X			
Gizzard Shad	*Notemigonus crysoleucas*	X																X			
Emerald Shiner	*Notropis atherinoides*	X						X													
Blacknose Shiner	*Notropis heterolepis*																	X		X	
Spottail Shiner	*Notropis hudsonius*	X						X													
Silver Shiner	*Notropis photogenis*	X																X			
Rosyface Shiner	*Notropis rubellus*	X			X																
Spotfin Shiner	*Notropis spilopterus*	X																			
Mimic Shiner	*Notropis volucellus*								X												
Bluntnose Minnow	*Pimephales notatus*	X	X	X	X				X	X		X	X					X			X
Fathead Minnow	*Pimephales promelas*	X			X		X		X	X		X	X		X	X	X	X			
Blacknose Dace	*Rhinichthys atratulus*	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X		X	X
Longnose Dace	*Rhinichthys cataractae*	X	X		X					X	X		X					X			X
Creek Chub	*Semotilus atromaculatus*	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X		X	X
Pearl Dace	*Margariscus margarita*			X	X	X	X					X					X	X		X	
White Sucker	*Catostomus commersoni*	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Table 1 continued. Fish Community Summary (various data sources). 1990-present.

Common Name	Scientific Name	Creek	Lower Bronte Creek	Middle Bronte Creek	Upper Bronte, East Branch	Upper Bronte, Main Branch	Upper Bronte, North-East Branch	Upper Bronte, West Branch	Bronte Harbour	Flamboro	Indian	Kilbride, downstream of escarpment	Kilbride, upstream of escarpment	Limestone, downstream of escarpment	Limestone, upstream of escarpment	Lowville	Mount Nemo	Mountsberg, upstream of Reservoir	Mountsberg, downstream of reservoir	Mountsberg Reservoir	Strabane	Willoughby
Northern Hog Sucker	*Hypentelium nigricans*		X	X		X						X	X	X				X	X		X	X
Shorthead Redhorse	*Moxostoma macrolepidotum*		X														X					
Brown Bullhead	*Amelurus nebulosus*		X		X	X			X					X			X		X	X		
Stone Cat	*Noturus flavus*		X											X								
Tadpole Madtom	*Noturus gyrinus*		X																			
Trout Perch	*Percopsis omiscomaycus*		X																			
American Eel	*Anguilla rostrata*								X					X			X					
Brook Stickleback	*Culea inconstans*		X	X	X	X	X	X			X		X		X		X	X			X	X
Threespine Stickleback	*Gasterosteus aculeatus*		X						X								X					
White Perch	*Morone americana*								X								X					
Rock Bass	*Ambloplites rupestris*		X		X	X			X		X						X		X	X	X	
Sunfish	*Lepomis*								X								X					
Green Sunfish	*Lepomis cyanellus*		X														X		X	X	X	
Pumpkinseed	*Lepomis gibbosus*		X	X	X	X			X	X	X		X				X	X	X	X	X	
Bluegill	*Lepomis macrochirus*		X														X		X	X		
Small Mouth Bass	*Micropterus dolomieu*		X			X			X		X						X			X		
Large Mouth Bass	*Micropterus salmoides*		X	X	X	X			X		X			X			X	X	X	X		X
Black Crappie	*Poxomis nigromaculatus*								X								X		X	X		
Yellow Perch	*Perca flavescens*		X						X	X							X					
Rainbow Darter	*Etheostoma caeruleum*		X	X		X					X	X		X								X
Iowa Darter	*Etheostoma exile*														X		X					
Fantail Darter	*Etheostoma flabellare*		X	X							X	X	X	X								X
Johnny Darter	*Etheostoma nigrum*		X	X	X	X			X		X	X		X					X		X	X
Log Perch	*Percina caprodes*		X						X								X					
Blackside Darter	*Percina maculata*					X								X			X					X
Freshwater Drum	*Aplodinotus grunniens*								X								X					
Molted Sculpin	*Cottus bairdi*																X					
Slimy Sculpin	*Cottus cognatus*								X								X					
unknown Cyprenid	*Unknown Cyprenid*						X										X				X	

APPENDIX 1

RARE SPECIES LIST

Table 1. Rare Species List for ESAs in Bronte Creek. Data derived from Heagy, 1993, Geomatics 1995, Riley *et al.* 1996, Eagles *et al.*, 1976.

				ESA																										
Common Name	**Scientific Name**	**Affinity**	**Status**	**SSD**	**SNW**	**PSW**	**PNS**	**MWA**	**MEW**	**MN**	**MS**	**MH**	**LMM**	**GJW**	**FEW**	**FCS**	**CLR**	**CNF**	**CP**	**BS**	**BDF**	**BCV**	**BCR**	**BS**	**HFC**	**AW**
Vascular Plants																										
Running Clubmoss	*Lycopodium clavatum*		r														X			X			X			
Arrow-grass	*Scheuchzeria palustris*		R																						X	
Meadow Horsetail	*Equisetum pratense*		r																				X			
Woodland Horsetail	*Equisetum sylvaticum*		r											X								X	X			
Variegated Scouring-rush	*Equisetum variegatum*		r																X				X			
Daisy-leaved Grape Fern	*Botrychium matricariifolium*		r														X									
Grape Fern	*Botrychium rugulosum*		NPR														X									
Interrupted Fern	*Osmunda claytoniana*		r											X						X						
Hay-scented Fern	*Dennstaedtia punctilobula*		r																				X			
Slender Cliff-brake	*Cryptogramma stelleri*		r														X									
Virginia Chain Fern	*Woodwardia virginica*		r																					X		
Ebony Spleenwort	*Asplenium platyneuron*		R															X					X	X		
Maidenhair Spleenwort	*Asplenium trichomanes*		R									X														
Green Spleenwort	*Asplenium viride*		R								X															
Hybrid Shield Fern	*Dryopteris carth X D. crista*		r														X									
Hybrid Shield Fern	*Dryopteris gold X D. marg*		r														X									
Hybrid Shield Fern	*Dryopteris inter X D. marg*		r														X									
Hart's-tongue Fern	*Phyllitis scolopendrium*		NRP							X														X		
NorthernBeech Fern	*Phegopteris connectilis*		r											X												
New York Fern	*Thelypteris noveboracensis*		r																	X			X			
Black Spruce	*Picea mariana*		r											X										X		
Red Cedar	*Juniperus virginiana*		r																			X				
Large-leaved Pondweed	*Potamogeton amplifolius*		r											X												
Pondweed	*Potamogeton berchtoldii*		r					X	X																	
Pondweed	*Potamogeton obtusifolius*		R					X																		
Pondweed	*Potamogeton perfoliatus*		R														X					X				
Small Pondweed	*Potamogeton pusillus*		r											X								X				
Slender Wheat Grass	*Agropyron trachycaulum*		r														X									
Big Bluestem	*Andropogon gerardii*	S	r																		X					
Little Bluestem	*Andropogon scoparius*	S	r																		X	X				
Bearded Shorthusk	*Brachyelytrum erectum*		r														X				X					
Tall Brome Grass	*Bromus latiglumis*		r														X				X					
River Bank Wild Rye	*Elymus riparius*		r																				X			
Wire-stemmed Muhly Grass	*Muhlenbergia frondosa*		R																			X				
Muhly Grass	*Muhlenbergia glomerata*		r																X							

Table 1 continued. Rare Species List for ESAs in Bronte Creek. Data derived from Heagy, 1993, Geomatics 1995, Riley *et al.* 1996, Eagles *et al.*, 1976.

				ESA																										
Common Name	**Scientific Name**	**Affinity**	**Status**	**SSD**	**SNW**	**PSW**	**PNS**	**MWA**	**MEW**	**MN**	**MS**	**MH**	**LMM**	**GJW**	**FEW**	**FCS**	**CLR**	**CNF**	**CP**	**BS**	**BDF**	**BCV**	**BCR**	**BS**	**HFC**	**AW**
Vascular Plants																										
Muhly Grass	*Muhlenbergia tenuiflora*		NRP																			X				
Panic Grass	*Panicum gattingeri*		NRP							X																
Sedge	*Carex capillaris*		R														X									
Sedge	*Carex careyana*		NRP																					X		
Sedge	*Carex castanea*		r																					X		
Sedge	*Carex formosa*		P											X											X	
Sedge	*Carex gracilescens*	C	NRP																			X		X	X	
Sedge	*Carex gravi*		R																			X				
Sedge	*Carex grisea*		R*														X					X				
Sedge	*Carex lucorum*		R																			X				
Sedge	*Carex muhlenbergii*	S	r																				X			
Sedge	*Carex prairea*		r																X							
Sedge	*Carex prasina*		NPR							X													X			
Sedge	*Carex scoparia*		r																			X				
Sedge	*Carex sychnocephala*		r					X	X																	
Sedge	*Carex trisperma*		r												X		X									
Sedge	*Carex umbellata*		R																X							
Sedge	*Carex vaginata*		r										X	X												
Nut Grass	*Cyperus erythrorhizos*		NPR																			X				
Nut Grass	*Cyperus rivularis*		N or P																			X				
Nut Grass	*Cyperus strigosus*		r																			X				
Spike-rush	*Eleocharis intermedia*		r																			X				
Bulrush	*Scirpus pendulus*		r			X														X						
Star Duckweed	*Lemna trisulca*		r																	X						
wollfia	*Wolffia punctata*		r																	X						
Yellow Mandarin	*Disporum lanuginosum*	C	NRP							X			X													
Wild Yam	*Dioscorea quaternata*		R*										X													
Wild Yam	*Dioscorea villosa*	C	R										X													
Grass-pink	*Calopogon tuberosus*		r																					X		
Spotted Coral-root	*Coralliorhiza maculata*		r																			X				
Pale Coral-root	*Coralliorhiza trifida*		r								X													X		
Stemless Lady-slipper	*Cypripedium acaule*		r																					X	X	
Showy Orchis	*Galearis spectabilis*		r						X																	
Dwarf Rattlesnake-plantain	*Goodyera repens*		r																				X	X		
Club-spur Orchid	*Platanthera clavellata*		r																							

Table 1 continued. Rare Species List for ESAs in Bronte Creek. Data derived from Heagy, 1993, Geomatics 1995, Riley *et al.* 1996, Eagles *et al.*, 1976.

Common Name	Scientific Name	Affinity	Status	ESA																									
				SSD	SNW	PSW	PNS	MWA	MEW	MN	MS	MH	LMM	GJW	FEW	FCS	CLR	CNF	CP	BS	BDF	BCV	BCR	BS	HFC	AW
Vascular Plants																										
Small Purple Fringed Orchid	*Platanthera psycodes*		r																X							
Nodding Ladies'-tresses	*Spiranthes cernua*		r																					X		
Shining Ladies'-tresses	*Spiranthes lucida*		R																X							
Hooded Ladies'-tresses	*Spiranthes romanzoffiana*		r																					X	X	
Sage-leaved Willow	*Salix candida*		r																					X	X	
Black Willow	*Salix nigra*		r											X								X				
Bog Willow	*Salix pedicellaris*		r																X							
Autumn Willow	*Salix serissima*		r														X		X							
Sweet Gale	*Myrica gale*		r										X											X		
Swamp Birch	*Betula pumila*		r																					X		
Wild Chestnut	*Castanea dentata*	C	NPR							X																
Chinquapin Oak	*Quercus muehlenbergii*		R																		X					
Hackberry	*Celtis occidentalis*		r							X						X		X								
Rock Elm	*Ulmus thomasii*		r													X										
Spring Clearweed	*Pilea fontana*		R							X																
Striate Knotweed	*Polygonum achoreum*		r															X								
Fringed Buckwheat	*Polygonum ciliinode*		r																					X		
Jumpseed	*Polygonum virginianum*	C	r																			X				
Great Water Dock	*Rumex orbiculatus*		r											X												
False Pennyroyal	*Trichostema brachiatum*	A	r																					X		
Pokeweed	*Phytolacca americana*		r																				X			
Rock Sandwort	*Arenaria stricta*		R							X																
Hybrid Baneberry	*Actaea pachypoda x rubra*		r*														X									
Clematis	*Clematis occidentalis*		R							X							X									
Yellow Water Buttercup	*Ranunculus flabellaris*		R														X									
Swamp Buttercup	*Ranunculus hispidus*		r											X					X							
Sassafras	*Sassafras albidum*	C	r																X			X				
Climbing Fumitory	*Adlumia fungosa*		r																			X		X		
Golden Corydalis	*Corydalis aurea*		R							X																
Pink Corydalis	*Corydalis sempervirens*		r					X																		
Dutchman's-breeches	*Dicentra cucullaria*		r																			X				
Rock-cress	*Arabis divaricarpa*	S	r									X					X									
Tower-mustard	*Arabis glabra*		r																					X		
Rock-cress	*Arabis hirsuta*		R							X							X									
Cuckoo Flower	*Cardamine pratensis*		R											X												

Table 1 continued. Rare Species List for ESAs in Bronte Creek. Data derived from Heagy, 1993, Geomatics 1995, Riley *et al.* 1996, Eagles *et al.*, 1976.

				ESA																										
Common Name	**Scientific Name**	**Affinity**	**Status**	**SSD**	**SNW**	**PSW**	**PNS**	**MWA**	**MEW**	**MN**	**MS**	**MH**	**LMM**	**GJW**	**FEW**	**FCS**	**CLR**	**CNF**	**CP**	**BS**	**BDF**	**BCV**	**BCR**	**BS**	**HFC**	**AW**
Vascular Plants																										
Skunk Currant	*Ribes glandulosum*		r								X													X		
Sycamore	*Platanus occidentalis*	C	r																			X				
Hairy Agrimony	*Agrimonia pubescens*		R																					X		
Saskatoon-berry	*Amelanchier alnifolia*	S	r																			X				
Hawthorn	*Crataegus aboriginum*		r																X							
Hawthorn	*Crataegus compta*		r									X														
Hawthorn	*Crataegus conspecta*	C	NPR												X											
Hawthorn	*Crataegus dodgei*	C	NPR						X																	
Purple Avens	*Geum rivale*		r									X		X			X		X			X				
Indian Psychic	*Gillenia trifoliata*		NPR									X														
Wild Rose	*Rosa acicularis*		r																			X				
Hardhack	*Spiraea tomentosa*		r									X														
Groundnut	*Apios americana*		r																			X	X			
Canada Milk-vetch	*Astragalus canadensis*		R							X												X				
Round headed Bush Clover	*Lespedeza capitata*	S	R				X						X					X					X			
Bush Clover	*Lespedeza hirta*	C,S	R																			X				
Bush Clover	*Lespedeza intermedia*	S	R																			X				
Virginia Yellow Fever	*Linum virginianum*	C,S	NPR																			X				
Milkwort	*Polygala verticillata*	S	r																			X				
Mountain Holly	*Nemopanthus mucronatus*		R											X										X		
Burning Bush	*Euonymus atropurpurea*	C	NPR														X									
Hybrid Maple	*Acer rubrum X A. saccharinum*		r																	X						
Large Canadian St. John's-wort	*Hypericum majus*		r				X																			
Pinweed	*Lechea intermedia*		r																			X				
Green Violet	*Hybanthus concolor*		NPR														X		X					X	X	
Marsh Violet	*Viola affinis*		r																			X				
Violet	*Viola fimbriatula*	S	r																							
Violet	*Viola macloskeyi*		r										X				X		X							
Violet	*Viola septentrionalis*		r																			X				
Water Willow	*Decodon verticillatus*		r																X							
Fireweed	*Epilobium angustifolium*		r											X												
Downy Willowherb	*Epilobium strictum*		R														X		X					X		
Northern Water-milfoil	*Myriophyllum sibiricum*		r					X																		
Ginseng	*Panax quinquefolius*		NPr														X		X			X			X	
Long-styled Canadian Sanicle	*Sanicula canadensis*	C	NPR																					X		

Table 1 continued. Rare Species List for ESAs in Bronte Creek. Data derived from Heagy, 1993, Geomatics 1995, Riley *et al.* 1996, Eagles *et al.*, 1976.

				ESA																								
Common Name	**Scientific Name**	**Affinity**	**Status**	**SSD**	**SNW**	**PSW**	**PNS**	**MWA**	**MEW**	**MN**	**MS**	**MH**	**LMM**	**GJW**	**FEW**	**FCS**	**CLR**	**CNF**	**CP**	**BS**	**BDF**	**BCV**	**BCR**	**BS**	**HFC**	**AW**
Vascular Plants																										
Pipsissewa	*Chimaphila umbellata*		r														X									
Wintergreen	*Orthilia secunda*		r																	X						
Pink Pyrola	*Pyrola asarifolia*		r																	X						
Shinleaf	*Pyrola virens*		r									X														
Bearberry	*Arctostaphylos uva-ursi*		r														X			X		X		X		
Leather-leaf	*Chamaedaphne calyculata*		r											X			X			X		X	X			
Creeping Snowberry	*Gaultheria hispidula*		r																	X				X		
Labrador-tea	*Ledum groenlandicum*		r																	X				X		
Bog Laurel	*Kalmia polifolia*		r									X														
Highbush Blueberry	*Vaccinium corymbosum*		r														X									
Velvet-leaved Blueberry	*Vaccinium myrtilloides*		r																	X				X		
Small Cranberry	*Vaccinium oxycoccos*		r																	X				X		
Swamp Candles	*Lysimachia terrestris*		r																	X				X		
Fringed Gentian	*Gentiana crinita*		R																X					X		
Stiff Gentian	*Gentianella quinquefolia*	S	NPR																	X				X		
Spurred Gentian	*Halenia deflexa deflexa*		r																	X				X		
Butterfly-weed	*Asclepias tuberosa*	S	r																			X				
Green Milkweed	*Asclepias viridiflora*	S	PR									X														
Low Bindweed	*Calystegia spithameus*		r																			X				
Yellow False Foxglove	*Aureolaria flava*	C	r														X									
False Pimpernel	*Lindernia dubia*		r																			X				
Speedwell	*Veronica catenata*		R											X												
Cancer-root	*Orobanche uniflora*		r																			X				
Flat-leaved Bladderwort	*Utricularia intermedia*		r																					X		
Small Bladderwort	*Utricularia minor*		R					X									X		X							
Bedstraw	*Galium pilosum*		NPR																							
Bedstraw	*Galium tinctorium*		r																			X				
Marsh-bellflower	*Campanula aparinoides*		r																X							
Marsh Bellflower	*Campanula uliginosa*		r																X							
Pale-spike Lobelia	*Lobelia spicata*		R				X		X					X												
Pearly Everlasting	*Anaphalis margaritacea*		r						X																	
Sky-blue Aster	*Aster azureus*	S	r																			X				
Bog Aster	*Aster borealis*		r																	X				X		
Heath Aster	*Aster ericoides*		r														X					X				
Arrow-leaved Aster	*Aster sagittifolius*	S	r																			X				

Table 1 continued. Rare Species List for ESAs in Bronte Creek. Data derived from Heagy, 1993, Geomatics 1995, Riley *et al.* 1996, Eagles *et al.*, 1976.

Common Name	Scientific Name	Affinity	Status	ESA																							
				SSD	SNW	PSW	PNS	MWA	MEW	MN	MS	MH	LMM	GJW	FEW	FCS	CLR	CNF	CP	BS	BDF	BCV	BCR	BS	HFC	AW
Vascular Plants																										
Rough Hawkweed	*Hieracium scabrum*		r																			X				
Lettuce	*Lactuca biennis*		r										X				X									
Late Goldenrod	*Solidago gigantea*		r									X										X				
Hairy Goldenrod	*Solidago hispida*		r																			X				
Bog Goldenrod	*Solidago uliginosa*		r											X					X							
Mosses																										
	Platydictya convervoides									X																
	Thamnobryum alleghaniense		R							X																
Fish																										
Silver Lamprey	*Ichthyomyzon unicuspis*		N or P																		X		X			
Silver Shiner	*Notropis photogenis*		NV																		X		X			
Redside Dace	*Clinostumus elongatus*		V					X																		
Reptiles & Amphibians																										
Wood Turtle	*Clemmys insculpta*		N or P																			X				
Jefferson Salamander	*Ambystoma jeffersonianum*		NPrT							X							X		X					X		
Pickerel Frog	*Rana palustris*		NPr			X			X										X	X				X		
Eastern Ribbon Snake	*Thamnophis sauritus*		N or P																	X						
Stinkpot	*Sternotherus odoratus*		N or P														X									
Blanding's Turtle	*Emydoidea blandingii*		r																					X		
Northern Ringneck Snake	*Diadophis punctatus*		P																			X				
Birds																										
American Bittern	*Botaurus lentiginosus*		r																					X		
American Coot	*Fulica americana*		r					X																		
American Wigeon	*Anas americana*		r																					X		
Broad-winged Hawk	*Buteo platypterus*		r																					X		
Caspian Tern	*Sterna caspia*		NPrS										X													
Cerulean warbler	*Dendroica cerulea*	C	rS																					X		
Cooper's hawk	*Accipiter cooperi*		NPrS										X						X			X		X		
Eastern Bluebird	*Sialia sialis*		NPr																			X				X
Gadwall	*Anas strepera*		r					X																		
Golden-crowned Kinglet	*Regulus satrapa*		r																					X		
Hooded Merganser	*Lophodytes cucullatus*		r					X																		
Least Bittern	*Ixobrachus exilis*		NPrS					X											X							
Long-eared Owl	*Asio otus*		rS																			X				
Louisiana Waterthrush	*Seiurus motacilla*	C	NPrS																				X			
Northern Harrier	*Circus cyaneus*		r			X																				

Table 1 continued. Rare Species List for ESAs in Bronte Creek. Data derived from Heagy, 1993, Geomatics 1995, Riley *et al.* 1996, Eagles *et al.*, 1976.

Common Name	Scientific Name	Affinity	Status	ESA																							
				SSD	SNW	PSW	PNS	MWA	MEW	MN	MS	MH	LMM	GJW	FEW	FCS	CLR	CNF	CP	BS	BDF	BCV	BCR	BS	HFC	AW
Birds																										
Solitary Vireo	*Vireo solitarius*		r																				X		
Yellow-bellied Sapsucker **	*Sphyrapicus varius*		r					X																	
Yellow-billed Cuckoo	*Coccyzus americanus*		r						X																
Mammals																										
bobcat	*Lynx rufus*		N or P																					X	
Eastern Pipistrelle	*Pipistrellus subflavus*		N or P							X							X								
Small-footed Bat	*Myotis liebii*		HS							X															
Water Shrew	*Sorex palustris*		r					X												X			X		
Northern Flying Squirrel	*Glaucomys sabrinus*		r					X												X			X		
Woodland Jumping Mouse	*Napaeozapus insignis*		r																	X			X		
Porcupine	*Erethizon dorsatum*		r																	X			X		
Arctic Skipper	*Carterocephalus palaemon*		r			X							X							X			X		
Leonardus Skipper	*Hesperia leonardus*		r																	X			X		
Mulberry Wing	*Poanes massasoit*		P																	X			X		
West Virginia White	*Pieris virginiensis*	C	P												X			X				X			
Harvester	*Feniseca tarquinius*		r	X																			X		
Hickory Hairstreak	*Satyrium caryaevorum*		P															X					X		
Aphrodite Fritillary	*Speyeria aphrodite*		r				X		X																

Status
N-Nationally Rare
P-Provincally Rare
r-Rare in Old Central Region
V-Nationally Vulnerable
R-Regionally Rare
T-Threatened

Affinities
C-Carolinian
S-Prarie/Savannah
A-Alvar

ESA Abbreviations	
AW	Aberfoyle Woods
BS	Beverly Swamp
BCR	Bronte Creek Ravine/Lowville-Bronte Creek Escarpment Valley
BCV	Bronte Creek Valley
BDF	Brookville Drumlin Field
BS	Brookville Swamp
CP	Calcium Pits
CNF	Carlisle North Forests
CLR	Crawford Lake/Rattlesnake Point Escarpment Woods
FCS	Flamboro Centre Swamp
FEW	Freelton Esker-Wetland Complex
GJW	Guelph Junction Woods
HFC	Hilton Falls Complex
LMM	Lake Medad & Medad Valley
MH	Milton Heights
MS	Moffat Swamp/Moffat Marsh/Fish Hatchery Swamp
MN	Mount Nemo Escarpment Woods
MEW	Mountsberg East Wetlands
MWA	Mountsberg Wildlife Area
PNS	Progreston North Swamp
PSW	Puslinch Southeast Wetland
SNW	Strabane North Wetlands
SSD	Strabane Southwest Drumlin Field

APPENDIX B2

Current Field Data and Information

NHIC Database Results - Inquiry July 2010

Scientific Name	English Name	G-rank	S-rank	COSEWIC	SARO	EO Rank	EO Rank Date	First Observed Date	Last Observed Date
Falco peregrinus	Peregrine Falcon	G4	S3B	SC	THR	H	1997-03-13; 1998-02-09	5/17/1936	5/27/1964
Wilsonia citrina	Hooded Warbler	G5	S3B	THR	SC	E	1/14/2000	7/5/1979	1994-05
Sternotherus odoratus	Eastern Musk Turtle	G5	S3	THR	THR	H	1/1/2009		1977-?
Crotalus horridus	Timber Rattlesnake	G4	SX	EXP	EXP	X	2/3/1998	1669-09	1950
Ambystoma hybrid pop. 1	Jefferson X Blue-spotted Salamander, Jefferson genome dominates	GNA	S2			E		6/28/1988	4/27/2006
Ambystoma hybrid pop. 1	Jefferson X Blue-spotted Salamander, Jefferson genome dominates	GNA	S2			H	1/16/2002	4/11/1978	4/5/1980
Ambystoma hybrid pop. 1	Jefferson X Blue-spotted Salamander, Jefferson genome dominates	GNA	S2			H	1/16/2002	3/30/1981	2002
Ambystoma jeffersonianum	Jefferson Salamander	G4	S2	THR	THR	C?	11/11/2008	1978	4/27/2006
Lestes eurinus	Amber-winged Spreadwing	G4	S3			E			
Enallagma aspersum	Azure Bluet	G5	S3			E	10/8/2004	8/4/1996	8/8/1996
Botrychium rugulosum	Rugulose Grapefern	G3	S2			H	1/1/2009	1975	4/13/1976
Carex careyana	Carey's Sedge	G4G5	S2			H	1/1/2009	5/14/1977	6/9/1978
Hybanthus concolor	Eastern Green-violet	G5	S2			H	1/1/2009	6/10/1946	6/14/1979
Platanthera macrophylla	Large Round-leaved Orchid	G4	S2			H	1/1/2009		7/8/1978

Guelph Line EA - BIRD INVENTORY (LCA 2009-2010)

SCIENTIFIC NAME	COMMON NAME	ONTARIO STATUS	GLOBAL STATUS	COSEWIC	OMNR			INTRODUCED	NAI	OPIF	BSC	Area-Sensitive	Observed	OBBA			CBC	HABITAT NOTES
					Status	Tracked	Ontario General Status							Confirmed	Probable	Possible		
									Significant Spe	BCR 13	Halton		October 20, 2009; June 3, 8, 2010				Hamilton	
ANATIDAE																		
Branta canadensis	Canada Goose	S5	G5				SECURE (01-Mar-00)							x			x	might nest in the fields if near water in early spring
Anas platyrhynchos	Mallard	S5	G5				SECURE (01-Mar-00)							x			x	urban-tolerant
PHASIANIDAE																		
Meleagris gallopavo	Wild Turkey	S5	G5				SECURE (01-Mar-00)										x	open country/agricultural fields/woodland edge
ARDEIDAE																		
Butorides virescens	Green Heron	S4B	G5				SECURE (01-Mar-00)				Marsh IV				x			ponds
CATHARTIDAE																		
Cathartes aura	Turkey Vulture	S5B	G5				SECURE (01-Mar-00)				Forest III		overhead		x			woodland
ACCIPITRIDAE																		
Accipiter striatus	Sharp-shinned Hawk	S5	G5		NAR		SECURE (01-Mar-00)				Forest II	√			x		x	woodland
Accipiter cooperii	Cooper's Hawk	S4	G5	NAR	NAR		SECURE (01-Mar-00)				Forest III	√				x	x	woodland
Buteo platypterus	Broad-winged Hawk	S5B	G5				SECURE (01-Mar-00)		x		Forest II	√			x			woodland
Buteo Jamaicensis	Red-tailed Hawk	S5	G5	NAR	NAR		SECURE (01-Mar-00)							x			x	nests/roosts along forest edges, hunts fields
FALCONIDAE																		
Falco sparverius	American Kestrel	S5B	G5	MID			SECURE (01-Mar-00)			x	Open Country II			x			x	could hunt the fields; open country; cavity nester
RALLIDAE																		
Rallus limicola	Virginia Rail	S5B	G5				SECURE (01-Mar-00)				Marsh I	√			x			wetlands
Porzana carolina	Sora	S4B	G5				SECURE (01-Mar-00)				Marsh I	√			x			wetlands
CHARADRIIDAE																		
Charadrius vociferus	Killdeer	S5B,S5N	G5	LOW			SECURE (01-Mar-00)							x				open fields
SCOLOPACIDAE																		
Actitis macularia	Spotted Sandpiper	S5	G5				SECURE (01-Mar-00)				Open Country III		x	x				open fields
Gallinago delicata	Wilson's Snipe	S5B	G5				SECURE (01-Mar-00)				Marsh II	(√)			x			early spring breeder; damp areas
Scolopax minor	American Woodcock	S4B	G5				SECURE (01-Mar-00)				Forest IV			x				early spring breeder; damp areas, woodland edges
COLUMBIDAE																		
Columba livia	Rock Pigeon	SNA	G5				EXOTIC (01-Mar-00)	√						x			x	urban-tolerant
Zenaida macroura	Mourning Dove	S5	G5				SECURE (01-Mar-00)						x		x		x	urban-tolerant
STRIGIDAE																		
Megascops (Otus) asio	Eastern Screech-Owl	S5	G5	NAR	NAR		SECURE (01-Mar-00)							x			x	cavity nester
Bubo virginianus	Great Horned Owl	S5	G5				SECURE (01-Mar-00)							x			x	often shares habitat with Red-tailed Hawk
ALCEDINIDAE																		
Ceryle alcyon	Belted Kingfisher	S4B	G5	MID			SECURE (01-Mar-00)			x			x	x			x	water quality; erosion, flood control measures reduce
PICIDAE																		
Melanerpes carolinus	Red-bellied Woodpecker	S4	G5				SECURE (01-Mar-00)				Forest III	√			x		x	woodland; cavity nester
Sphyrapicus varius	Yellow-bellied Sapsucker	S5B	G5				SECURE (01-Mar-00)				Forest II	√			x			woodland; cavity nester
Picoides pubescens	Downy Woodpecker	S5	G5				SECURE (01-Mar-00)						x	x			x	urban-tolerant; cavity nester
Picoides villosus	Hairy Woodpecker	S5	G5				SECURE (01-Mar-00)					√		x			x	woodland; cavity nester
Colaptes auratus	Northern Flicker	S4B	G5				SECURE (01-Mar-00)			x			x	x			x	requiring snags >30cm dbh; ant predator
Dryocopus pileatus	Pileated Woodpecker	S5	G5				SECURE (01-Mar-00)				Forest II	√	x (fresh holes)		x		x	woodland; cavity nester
TYRANNIDAE																		
Contopus virens	Eastern Wood-Pewee	S4B	G5	HIGH			SECURE (01-Mar-00)			x		(√)	x		x			aerial insectivore; intermediate, closed-canop; woodlands; does not nest near development
Myiarchus crinitus	Great Crested Flycatcher	S4B	G5				SECURE (01-Mar-00)					(√)	x	x				woodlands; of conservation concern; cavity nester
Sayornis phoebe	Eastern Phoebe	S5B	G5				SECURE (01-Mar-00)				Forest III			x				urban-tolerant
Tyrannus tyrannus	Eastern Kingbird	S4B	G5	LOW			SECURE (01-Mar-00)			x	Open Country III			x				land
VIREONIDAE																		
Vireo gilvus	Warbling Vireo	S5B	G5				SECURE (01-Mar-00)							x				urban-tolerant
Vireo olivaceus	Red-eyed Vireo	S5B	G5				SECURE (01-Mar-00)						x	x				woodlots; urban tolernt
LANIIDAE																		
Lanius excubitor	Northern Shrike	SNA	G5				SENSITIVE (01-Mar-00)										x	open country
CORVIDAE																		
Cyanocitta cristata	Blue Jay	S5	G5				SECURE (01-Mar-00)						x	x			x	urban-tolerant
Corvus brachyrhynchos	American Crow	S5B	G5				SECURE (01-Mar-00)						x	x			x	urban-tolerant; gather into winter roosts
ALAUDIDAE																		
Eremophila alpestris	Horned Lark	S5B	G5				SECURE (01-Mar-00)				Open Country III				x		x	fields
HIRUNDINIDAE																		
Progne subis	Purple Martin	S4B	G5				SECURE (01-Mar-00)				Marsh II			x				aerial insectivore; colonial nester
Tachycineta bicolor	Tree Swallow	S4B	G5				SECURE (01-Mar-00)						x	x				urban tolerant
Stelgidopteryx serripennis	Northern Rough-winged Swallow	S4B	G5				SECURE (01-Mar-00)				Open Country II			x				aerial insectivore; semi-colonial
Riparia riparia	Bank Swallow	S4B	G5	HIGH			SECURE (01-Mar-00)			x	Open Country II			x				aerial insectivore; colonial nester
Petrochelidon pyrrhonota	Cliff Swallow	S4B	G5				SECURE (01-Mar-00)				Open Country III				x			aerial insectivore; colonial nester; urban tolerant

Guelph Line EA - BIRD INVENTORY (LCA 2009-2010)

SCIENTIFIC NAME	COMMON NAME	ONTARIO STATUS	GLOBAL STATUS	COSEWIC	OMNR			INTRODUCED	NAI	OPIF	BSC	Area-Sensitive	OBBA				CBC	HABITAT NOTES
					Status	Tracked	Ontario General Status						Observed	Confirmed	Probable	Possible		
Hirundo rustica	Barn Swallow	S4B	G5	APR 2011			SECURE (01-Mar-00)				Open Country IV		x	x				aerial insectivore; colonial nester; urban tolerant
PARIDAE																		
Poecile atricapillus	Black-capped Chickadee	S5	G5				SECURE (01-Mar-00)				Forest IV		x	x			x	cavity nester; urban tolerant
SITTIDAE																		
Sitta canadensis	Red-breasted Nuthatch	S5	G5				SECURE (01-Mar-00)				Forest III	√			x		x	woodland; cavity nester
Sitta carolinensis	White-breasted Nuthatch	S5	G5				SECURE (01-Mar-00)					√	x	x			x	woodland; cavity nester
CERTHIIDAE																		
Certhia americana	Brown Creeper	S5B	G5				SECURE (01-Mar-00)				Forest II	√			x		x	woodland
TROGLODYTIDAE																		
Thryothorus ludovicianus	Carolina Wren	S4	G5				SECURE (01-Mar-00)				Forest III				x		x	undergoing range expansion
Troglodytes aedon	House Wren	S5B	G5				SECURE (01-Mar-00)						x	x				urban-tolerant
Troglodytes troglodytes	Winter Wren	S5B	G5				SECURE (01-Mar-00)				Forest III	√		x			x	woodland
REGULIDAE																		
Regulus satrapa	Golden-crowned Kinglet	S5B	G5				SECURE (01-Mar-00)					√				x	x	woodland
TURDIDAE																		
Sialia sialis	Eastern Bluebird	S5B	G5	NAR	NAR		SECURE (01-Mar-00)				Open Country I	√		x			x	open country, orchards
Catharus fuscescens	Veery	S4B	G5				SECURE (01-Mar-00)				Forest III	√	x	x				woodland
Hylocichla mustelina	Wood Thrush	S4B	G5	HIGH			SECURE (01-Mar-00)			x	Forest IV	√	x	x				woodland
Turdus migratorius	American Robin	S5B	G5				SECURE (01-Mar-00)						x	x			x	urban-tolerant
MIMIDAE																		
Dumetella carolinensis	Gray Catbird	S4B	G5				SECURE (01-Mar-00)				Forest IV			x				urban-tolerant; fields, shrubby thickets
Mimus polyglottos	Northern Mockingbird	S4	G5				SECURE (01-Mar-00)				Open Country I	(√)			x		x	open country, fields
STURNIDAE																		
Sturnus vulgaris	European Starling	SNA	G5				EXOTIC (01-Mar-00)	√					x	x			x	urban-tolerant; cavity nester
BOMBYCILLIDAE																		
Bombycilla cedrorum	Cedar Waxwing	S5B	G5				SECURE (01-Mar-00)						x		x		x	thickets
PARULIDAE																		
Dendroica petechia	Yellow Warbler	S5B	G5				SECURE (01-Mar-00)						x	x				urban-tolerant; damp areas
Seiurus aurocapilla	Ovenbird	S4B	G5				SECURE (01-Mar-00)				Forest IV	√	x	x				woodland
Geothlypis trichas	Common Yellowthroat	S5B	G5				SECURE (01-Mar-00)							x				damp areas
EMBERIZIDAE																		
Spizella arborea	American Tree Sparrow	S4B	G5				SECURE (01-Mar-00)										x	winter only
Spizella passerina	Chipping Sparrow	S5B	G5				SECURE (01-Mar-00)						x	x				urban-tolerant
Spizella pusilla	Field Sparrow	S4B	G5	MID			SECURE (01-Mar-00)			x	Open Country III	√		x				grassland, shrub/successional
Passerculus sandwichensis	Savannah Sparrow	S4B	G5				SECURE (01-Mar-00)			x	Open Country I	√	x	x				grassland, fields, may be area-sensitive
Melospiza melodia	Song Sparrow	S5B	G5				SECURE (01-Mar-00)						x	x			x	urban-tolerant
Melospiza georgiana	Swamp Sparrow	S5B	G5				SECURE (01-Mar-00)				Marsh II				x			wet areas
Zonotrichia albicollis	White-throated Sparrow	S5B	G5				SECURE (01-Mar-00)				Forest II	√			x		x	woodland
Junco hyemalis	Dark-eyed Junco	S5B	G5				SECURE (01-Mar-00)										x	woodland
Plectrophenax nivalis	Snow Bunting	SNA	G5				UNDETERMINED (01-Mar-00)										x	open country
CARDINALIDAE																		
Cardinalis cardinalis	Northern Cardinal	S5	G5				SECURE (01-Mar-00)						x	x			x	urban-tolerant
Pheucticus ludovicianus	Rose-breasted Grosbeak	S4B	G5				SECURE (01-Mar-00)			x				x				sensitive
Passerina cyanea	Indigo Bunting	S4B	G5				SECURE (01-Mar-00)						x	x				fields, hedgerows, woodlot edges
ICTERIDAE																		
Dolichonyx oryzivorus	Bobolink	S4B	G5	THR			SECURE (01-Mar-00)			x	Open Country II	√			x			grassland
Agelaius phoeniceus	Red-winged Blackbird	S5	G5				SECURE (01-Mar-00)						x	x				near water; urban-tolerant
Sturnella magna	Eastern Meadowlark	S4B	G5	APR 2011			SECURE (01-Mar-00)			x	Open Country III	√			x			grassland
Quiscalus quiscula	Common Grackle	S5B	G5				SECURE (01-Mar-00)						x	x				near water; urban-tolerant
Molothrus ater	Brown-headed Cowbird	S4B	G5				SECURE (01-Mar-00)						x	x			x	urban-tolerant
Icterus galbula	Baltimore Oriole	S4B	G5				SECURE (01-Mar-00)			x			x	x				susceptible to pesticides, vehicular collisions
FRINGILLIDAE																		
Carpodacus mexicanus	House Finch	SNA	G5				EXOTIC (01-Mar-00)	√							x		x	urban-tolerant
Carduelis flammea	Common Redpoll	S4B	G5				SECURE (01-Mar-00)										x	woodland
Carduelis pinus	Pine Siskin	S4B	G5				SECURE (01-Mar-00)										x	woodland; nomadic
Carduelis tristis	American Goldfinch	S5B	G5				SECURE (01-Mar-00)				Open Country III		x	x			x	urban-tolerant
PASSERIDAE																		
Passer domesticus	House Sparrow	SNA	G5				EXOTIC (01-Mar-00)	√						x			x	urban-tolerant

2010; LOW, MID, HIGH =

SARO & NHIC status current as of August 2009

OPIF: Ontario Partners in Flight, 2006

BSC: Conservation Priorities, Niagara, 1999

OBBA: Relevant Ontario Breeding Bird Atlas (2001-2005) 10km X 10km Square

CBC: Possible Wintering Birds Adapted from Audubon Christmas Bird Counts (1998-2008)

Guelph Line EA - BIRD INVENTORY (LCA 2009-2010)

					OMNR									OBBA				HABITAT NOTES
SCIENTIFIC NAME	COMMON NAME	ONTARIO STATUS	GLOBAL STATUS	COSEWIC	Status	Tracked	Ontario General Status	INTRODUCED	NAI	OPIF	BSC	Area-Sensitive	Observed	Confirmed	Probable	Possible	CBC	
List in accordance with the American Ornithologists Union (AOU) 7th edition, 42nd-49th supplements																		

WILDLIFE INVENTORY

COMMON NAME	*SCIENTIFIC NAME*	*ONTARIO STATUS*	*GLOBAL STATUS*	*COS*	*OMNR*	*Tracked*	*ONTARIO GENERAL STATUS*	*Introduced (Y/N)*	*Observed or Heard- LCA*	*Expected but Not Observed***
AMPHIBIANS										
Jefferson Salamander	*Ambystoma jeffersoniamnum*	S2	G4	THR	THR	Y	AT RISK	Y		x
Blue-spotted Salamander	*Ambystoma laterale*	S4	G5			N	SECURE (01-Nov-99)	N		x
Spotted Salamander	*Ambystoma maculatum*	S4	G5			N	SECURE (01-Nov-99)	N		x
American Toad	*Bufo americanus*	S5	G5			N	SECURE (01-Nov-99)	N	x	
Gray Treefrog	*Hyla versicolor*	S5	G5			N	SECURE (01-Nov-99)	N		x
Red-spotted Newt	*Notophthalmus viridescens virides*	S5	G5T5			N	N/A	N		x
Eastern Red-backed Salamander	*Plethodon cinereus*	S5	G5			N	SECURE (01-Nov-99)	N	x	
Spring Peeper	*Pseudacris crucifer*	S5	G5			N	SECURE (01-Nov-99)	N		x
Western Chorus Frog	*Pseudacris triseriata*	S4	G5TNR	THR	NAR	N	SECURE (01-Nov-99)	N	x	
American Bullfrog	*Rana catesbeiana*	S4	G5			N	SECURE (01-Nov-99)	N		x
Green Frog	*Rana clamitans*	S5	G5			N	SECURE (01-Nov-99)	N	x	
Northern Leopard Frog	*Rana pipiens*	S5	G5	NAR	NAR	N	SECURE (01-Nov-99)	N	x	
Wood Frog	*Rana sylvatica*	S5	G5			N	SECURE (01-Nov-99)	N		x
MAMMALS										
Coyote	*Canis latrans*	S5	G5			N	SECURE (no date)	N		x
Virginia Opposum	*Didelphis virginiana*	S4	G5			N	SECURE (no date)	N		x
Big Brown Bat	*Eptesicus fuscus*	S5	G5			N	SECURE (no date)	N		x
Striped Skunk	*Mephitis mephitis*	S5	G5			N	SECURE (no date)	N		x
Meadow Vole	*Microtus pennsylvanicus*	S5	G5			N	SECURE (no date)	N		x
Woodland Vole	*Microtus pinetorum*	S3?	G5	SC	SC	Y	SENSITIVE (no date)	N		x
House Mouse	*Mus musculus*	SNA	G5			N	EXOTIC (no date)	Y		x
Little Brown Bat	*Myotis lucifugus*	S5	G5			N	SECURE (no date)	N		x
White-tailed Deer	*Odocoileus virginianus*	S5	G5			N	SECURE (no date)	N		x
Muskrat	*Ondatra zibethicus*	S5	G5			N	SECURE (no date)	N		x
White-footed Mouse	*Peromyscus leucopus*	S5	G5			N	SECURE (no date)	N		x
Deer Mouse	*Peromyscus maniculatus*	S5	G5			N	SECURE (no date)	N		x
Raccoon	*Procyon lotor*	S5	G5			N	SECURE (no date)	N	x	
Grey Squirrel	*Sciurus carolinensis*	S5	G5			N	SECURE (no date)	N	x	
Eastern Cottontail	*Sylvilagus floridanus*	S5	G5			N	SECURE (no date)	N		x
Eastern Chipmunk	*Tamias striatus*	S5	G5			N	SECURE (no date)	N		x
Red Squirrel	*Tamiasciurus hudsonicus*	S5	G5			N	SECURE (no date)	N		x
REPTILES										
Snapping Turtle	*Chelydra serpentina*	S3	G5	SC	SC	Y	SECURE (01-Nov-99)	N		x
Midland Painted Turtle	*Chrysemys picta marginata*	S5	G5T5			N	N/A	N		x
Spotted Turtle	*Clemmys guttata*	S3	G5	END	END	Y	N/A	N		x
Blanding's Turtle	*Emydoidea blandingii*	S3	G4	THR	THR	Y	SECURE (01-Nov-99)	N		x
Northern (Common) Watersnake	*Nerodia sipedon sipedon*	S5	G5T5	NAR	NAR	N	N/A	N		x
Eastern Ribbonsnake	*Thamnophis sauritus*	S3	G5	SC	SC	Y	SECURE (01-Nov-99)	N		x
Eastern Gartersnake	*Thamnophis sirtalis sirtalis*	S5	G5T5			N	N/A	N		x
BUTTERFLIES										

WILDLIFE INVENTORY

COMMON NAME	*SCIENTIFIC NAME*	*ONTARIO STATUS*	*GLOBAL STATUS*	*COS*	*OMNR*	*Tracked*	*ONTARIO GENERAL STATUS*	*Introduced (Y/N)*	*Observed or Heard- LCA*	*Expected but Not Observed***
Common Wood-Nymph	*Cercyonis pegala*	S5	G5			N	SECURE (no date)	N		x
Spring Azure	*Celastrina ladon*	S5	G4			N	SECURE (no date)	N		x
Monarch	*Danaus plexippus*	S4B, S2N	G5	SC	SC	P	SECURE (no date)	N		x
Mourning Cloak	*Nymphalis antiopa*	S5	G5			N	SECURE (no date)	N		x
Cabbage White	*Pieris rapae*	SNA	G5			N	EXOTIC	Y		x

** Lewis, J. C., 1991. Guide to the Natural History of the Niagara Region & Dobbyn, J.S., 1994. Atlas of Mammals of Ontario - Used to identify species that can be expected in the study area based on their geographical range and habitat preferences.

VEGETATION INVENTORY - LCA 2009-2010

SCIENTIFIC NAME	*COMMON NAME*	*ONTARIO STATUS*	*GLOBAL STATUS*	*COS**	*OMNR*	*Tracked +*	*ONTARIO GENERAL STATUS*	*Coefficient of Wetness*	*Coefficient of Conservatism*	*Introduced (Y/N)*
TREES										
Acer saccharum var. saccharum	Sugar Maple	S5	G5T5			N	SECURE (01-Mar-00)	3	4	N
Fraxinus americana	White Ash	S5	G5			N	SECURE (01-Mar-00)	3	4	N
Picea glauca	White Spruce	S5	G5			N	SECURE (01-Mar-00)	3	6	N
Populus deltoides	Eastern Cottonwood	S5	G5			N	SECURE (01-Mar-00)	-1	4	N
Quercus rubra	Northern Red Oak	S5	G5			N	SECURE (01-Mar-00)	3	6	N
Rhus typhina	Staghorn Sumac	S5	G5			N	SECURE (01-Mar-00)	5	1	N
Robinia pseudoacacia	Black Locust	SNA	G5			N	EXOTIC (01-Mar-00)	N/A	N/A	Y
Thuja occidentalis	Eastern White Cedar	S5	G5			N	SECURE (01-Mar-00)	-3	4	N
Tilia americana	American Basswood	S5	G5			N	SECURE (01-Mar-00)	3	4	N
Ulmus americana	American Elm	S5	G5?			N	SECURE (01-Mar-00)	-2	3	N
SHRUBS										
Cornus alternifolia	Alternate-leaf Dogwood	S5	G5			N	SECURE (01-Mar-00)	5	6	N
Rhus typhina	Staghorn Sumac	S5	G5			N	SECURE (01-Mar-00)	5	1	N
Rubus odoratus	Purple Flowering Raspberry	S5	G5			N	SECURE (01-Mar-00)	5	3	N
Syringa vulgaris	Common Lilac	SNA	GNR			N	EXOTIC (01-Mar-00)	5	N/A	Y
Zanthoxylum americanum	Prickly ash									
HERBS										
Alliaria petiolata (officinalis)	Garlic Mustard	SNA	GNR			N	EXOTIC (01-Mar-00)	0	N/A	Y
Anemone canadensis	Canada Anemone	S5	G5			N	SECURE (01-Mar-00)	-3	3	N
Aquilegia canadensis	Wild Columbine	S5	G5			N	SECURE	1	N/A	N/A
Arctium minus	Lesser Burdock	SNA	GNR			N/A	EXOTIC (01-Mar-00)	5	N/A	Y
Asclepias incarnata	Swamp Milkweed	S5	G5			N	SECURE (01-Mar-00)	-5	6	N
Asclepias syriaca	Kansas Milkweed	S5	G5			N	SECURE (01-Mar-00)	5	0	N
Asparagus officinalis	Garden Asparagus-fern	SNA	G5?			N	EXOTIC (01-Mar-00)	3	N/A	Y
Bromus inermis	Awnless Brome	GNR	SNA			N	SECURE (01-Mar-00)	N/A	N/A	N
Cardamine pratensis var. palustris	Cuckoo Flower	S5	G5T5			N	N/A	N/A	N/A	N/A
Carex stipata	Stalk-grain Sedge	S5	G5			N	SECURE (01-Mar-00)	-5	3	N
Caulophyllum thalictroides	Blue Cohosh	S5	G4G5			N	SECURE (01-Mar-00)	N/A	N/A	N
Chenopodium album	White Goosefoot	SNA	G5T5			N	EXOTIC (01-Mar-00)	1	N/A	Y
Cichorium intybus	Chicory	SNA	GNR			N	EXOTIC (01-Mar-00)	5	N/A	Y
Cirsium sp.	Thistle species	N/A	N/A			N/A	N/A	N/A	N/A	N/A
Coronilla varia	Common Crown-vetch	SNA	GNR			N	N/A	5	N/A	N/A
Cynoglossum officinale	Common Hound's-tongue	SNA	GNR			N	N/A		N/A	N/A
Cyperus esculentus	Chufa Flat-sedge	S5	G5			N	SECURE (01-Mar-00)	-3	1	N
Dactylis glomerata	Orchard Grass	SNA	GNR			N	EXOTIC (01-Mar-00)	3	N/A	Y
Danthonia spicata	Poverty Oatgrass	S5	G5			N	SECURE (01-Mar-00)	5	5	N
Daucus carota	Wild Carrot	SNA	GNR			N	EXOTIC (01-Mar-00)	5	N/A	Y
Dipsacus fullonum	Fuller's Teasel	SNA	GNR			N	EXOTIC (01-Mar-00)	N/A	N/A	Y
Eleocharis sp.	Spike-rush species	N/A	N/A			N/A	N/A	N/A	N/A	N/A
Elymus (Agropyron) repens	Creeping Wild-rye (Quackgrass)	SNA	GNR			N	EXOTIC (01-Mar-00)	3	N/A	Y

VEGETATION INVENTORY - LCA 2009-2010

SCIENTIFIC NAME	*COMMON NAME*	*ONTARIO STATUS*	*GLOBAL STATUS*	*COS**	*OMNR*	*Tracked +*	*ONTARIO GENERAL STATUS*	*Coefficient of Wetness*	*Coefficient of Conservatism*	*Introduced (Y/N)*
Equisetum sp.	Horsetail species	N/A	N/A			N/A	N/A	N/A	N/A	N/A
Erigeron annuus	White-top Fleabane	S5	G5			N	SECURE (01-Mar-00)	1	0	N
Geranium robertianum	Herb-robert	SNA	G5			N	EXOTIC (01-Mar-00)	5	N/A	Y
Hemerocallis fulva	Orange Daylily	SNA	GNA			N	EXOTIC (01-Mar-00)	5	N/A	Y
Hesperis matronalis	Dame's Rocket	SNA	G4G5			N/A	EXOTIC (01-Mar-00)	5	N/A	Y
Hieracium lachenalii (vulgatum)	Common Hawkweed	SNA	GNR			N	EXOTIC (01-Mar-00)	5	N/A	Y
Impatiens capensis	Spotted Jewel-weed	S5	G5			N	SECURE (01-Mar-00)	-3	4	N
Lotus corniculatus	Birds-foot Trefoil	SNA	GNR			N	EXOTIC (01-Mar-00)	N/A	N/A	Y
Maianthemum racemosum	False Solomon's Seal	S5	G5			N	SECURE (01-Mar-00)	3	4	N
Matricaria discoidea (matricarioides)	Pineapple-weed Chamomile	SNA	G5			N	EXOTIC (01-Mar-00)	N/A	N/A	Y
Parthenocissus vitacea	Virginia Creeper	S5	G5			N	N/A	N/A	N/A	N
Poa pratensis	Kentucky Bluegrass	S5	G5			N/A	SECURE (01-Mar-00)	1	0	N
Podophyllum peltatum	May Apple	S5	G5			N	SECURE (01-Mar-00)	3	5	N
Ranunculus acris	Tall Butter-cup	SNA	G5			N	EXOTIC (01-Mar-00)	-2	N/A	Y
Rumex crispus	Curly Dock	SNA	GNR			N	EXOTIC (01-Mar-00)	-1	N/A	Y
Silene vulgaris	Maiden's Tears	SNA	GNR			N	EXOTIC (01-Mar-00)	5	N/A	Y
Solanum dulcamara	Climbing Nightshade	SNA	GNR			N	EXOTIC (01-Mar-00)	0	N/A	Y
Solidago altissima	Tall Goldenrod	S5	G5			N/A	SECURE (01-Mar-00)	N/A	N/A	N
Solidago canadensis	Canada Goldenrod	S5	G5			N	SECURE (01-Mar-00)	3	1	N
Solidago flexicaulis	Broad-leaved Goldenrod	S5	G5			N	SECURE (01-Mar-00)	3	6	N
Sonchus arvensis	Field Sowthistle	SNA	GNR			N/A	EXOTIC (01-Mar-00)	1	N/A	Y
Taraxacum officinale	Brown-seed Dandelion	SNA	G5			N	EXOTIC (01-Mar-00)	3	N/A	Y
Thalictrum pubescens	Tall Meadow-rue	S5	G5			N	SECURE (01-Mar-00)	-2	5	N
Toxicodendron (Rhus) radicans ssp. Ne	Poison Ivy	S5	G5T5			N	SECURE (01-Mar-00)	N/A	N/A	N
Trifolium pratense	Red Clover	SNA	GNR			N	EXOTIC (01-Mar-00)	2	N/A	Y
Tussilago farfara	Colt's Foot	SNA	GNR			N	EXOTIC (01-Mar-00)	3	N/A	Y
Typha angustifolia	Narrow-leaved Cattail	SNA	G5			N	SECURE (01-Mar-00)	-5	3	N
Typha latifolia	Broad-leaf Cattail	S5	G5			N	SECURE (01-Mar-00)	-5	3	N
Vicia cracca	Tufted Vetch	SNA	GNR			N	EXOTIC (01-Mar-00)	5	N/A	Y
Vinca minor	Periwinkle	SNA	GNR			Y	EXOTIC (01-Mar-00)	5	N/A	Y
Vitis riparia	Riverbank Grape	S5	G5			N	SECURE (01-Mar-00)	-2	0	N

APPENDIX C

Field Protocols

1.0 SITE RECONNAISSANCE AND PHOTOGRAPHIC RECORD

Site reconnaissance involves an initial site investigation where site features are referenced with existing aerial photographs and OMNR natural areas mapping. Site features are verified and photos are taken that outline key features of the site including vegetation community transition, signs of degradation or human disturbance, and proximity to significant natural heritage areas (locally or provincially significant wetlands, Environmental Sensitive Areas (ESA'S) and Areas of Natural and Scientific Interest (ANSI's).

2.0 VEGETATION IDENTIFICATION AND COMMUNITY CLASSIFICATION

2.1 Vegetation Surveys

Site boundaries and community overviews are initially identified on aerial images of the study area. Site visits are conducted seasonally and involve walking the site with the purpose of covering all habitat types and listing the species found within them. Vouchers are taken for species whose identity is in doubt. Taxa are identified to the species level where possible with the help of a range of field guides identified in the Literature Reviewed section of this Appendix. The use of technical flora guides, such as Britton and Brown (1993) are also useful. Species of unusual size or distribution are photo-documented. Tree diameters are measured at breast height (DBH) in order to ascertain the most common size class characterizing the study area. Dominant species in each vegetation layer, particular species of interest, and especially large-sized trees are also recorded. The plants are classified for global, provincial and regional significance according to the Natural Heritage Information Centre (NHIC, 2000) and local documentation.

2.2 Ecological Land Classification

The vegetation communities on the subject lands are identified and categorized based on the Ecological Land Classification (ELC) System according to the guidelines in the SCSS Field Guide FG-02 (Lee et al. 1998). The biologist conducting the ELC analysis has undertaken a training course under the direction of Harold Lee, Peter Uhlig, Ken Ursic and Dale Leadbeater at Turkey Point in June 2004. Ecological Land Classification is a protocol established for Southern Ontario that considers distribution and abundance of plants in combination with related topography and soil conditions in order to classify plant communities. It was developed for the purpose of creating a comprehensive and consistent province-wide approach for ecosystem description, inventory and interpretation.

Aerial images are consulted to delineate homogeneous polygons. During site visits to these polygons, vegetation communities are classified according to Community Units, which are identified based on the vegetation species present, the dominant species, soil characteristics and hydrology. Plant lists for each vegetation layer are compiled and vegetation is ranked according to its abundance. The plants are identified to the species level by an experienced botanist and are verified according to the plant identification field guides that are listed in the Literature Reviewed section. Representative soil cores are taken using a soil auger to evaluate texture, moisture regime and drainage values. Prism sweeps are conducted to calculate the basal area cover of trees, which allows for determination of the stand composition with a polygon. Trees are also categorized into size classes and estimates are made for prevalence of standing snags and deadfall. ELC polygons are then identified based on the data collected.

3.0 WILDLIFE AND HABITAT SURVEYS

3.1 Breeding Bird Survey Protocols

Breeding bird surveys are conducted using Point Counts in the early morning and late evening to coincide with the breeding activities of most birds in Ontario. The best time for coverage occurs within the first 5 hours after dawn from June through to the middle of July (traditionally July 20; however, the date changes with locale, weather, etc.). Dusk and night visits are necessary for twilight and nocturnal species. Surveys for some species, such as Great Horned Owls, are best conducted February-March.

Point Counts consider birds both heard and seen from a fixed point for a fixed period of time. The Ontario Breeding Bird Atlas (OBBA) point count is for 5 minutes; while 10 minutes is appropriate for general surveys conducted on the study areas. Area searches are also conducted, which occur in a series of three, twenty-minute point counts. The distance between points and the amount of time spent at each spot are defined by the habitat.

Conservatively, all species of birds found in suitable habitat, or singing, are assumed to be breeding if observed between June and July 10th. The breeding bird inventory includes species identified on the subject property and those identified in the adjacent natural areas. As well, all species identified in transit between the proposed site and adjoining field and forest areas are included in the survey, as their nesting sites can not be determined. The Audubon Christmas Bird Count and the Ontario Breeding Bird Atlas (OBBA) are also consulted to ensure that the species inventoried in the study area is comprehensive. Area searches are conducted according to the OBBA 2001-2005 list in accordance with the American Ornithologists Union (AOU) 7th Edition (42nd-47th supplements).

3.2 Reptile and Amphibian Surveys

Amphibian surveys are conducted according to the Marsh Monitoring Program protocols in the morning and at dusk, between the months of May and August, to coincide with the breeding activity of most amphibians in Ontario. Amphibian species presence is identified based on male breeding calls and visual observations. Incidental sightings during the day are also documented. Salamanders and snakes are surveyed by turning over rocks and logs. Amphibian habitat is also documented during field surveys and expected species that are not observed during surveys are documented based on geographic range and available suitable habitat.

3.3 Mammals

Mammal surveys are conducted in the morning and afternoon, in the spring, summer and fall. Mammal species presence is confirmed by sightings, track marks, scat, and evidence of habitat usage (e.g. holes leading to burrows and stick nests). Expected presence of some species is based on habitat quality and potential. Traps are not used for mammal surveying on any study areas. The Atlas of the Mammals of Ontario is consulted to determine the habitat ranges and habitat requirements for mammals. This information is considered in conjunction with the habitat suitability of the site to determine the potential presence of mammals that were not observed through field surveys.

3.4 Wildlife Habitat Determination

Habitat evaluations are conducted using a Wildlife Habitat Evaluation Field Data Form; the time required to complete an evaluation is dependent on the size and complexity of the study site. The field data form consists of five sections: general information, site description, important habitat features, landscape

context and habitat degradation. Vegetation is characterized by estimating the percent cover for trees, shrubs, woody vines, herbaceous plants, mosses and aquatic plants. Soil is characterized according to the data in recent soil survey reports for the general study area.

Important habitat features are determined through use of a checklist that focuses on references to specific wildlife whose habitats depend on each particular feature. For some habitat features, seasonal hydrology is estimated from indicators present during a site visit. Landscape context is divided into habitat continuity and connectivity with adjoining natural habitats. Aerial photographs are consulted for an assessment of the study area and surrounding lands. Habitat degradation includes any evidence of significant chemical contamination, dumping, erosion or sedimentation problems, invasive exotic plants or animals, road or highway disturbance and other human disturbance.

4.0 LITERATURE REVIEWED

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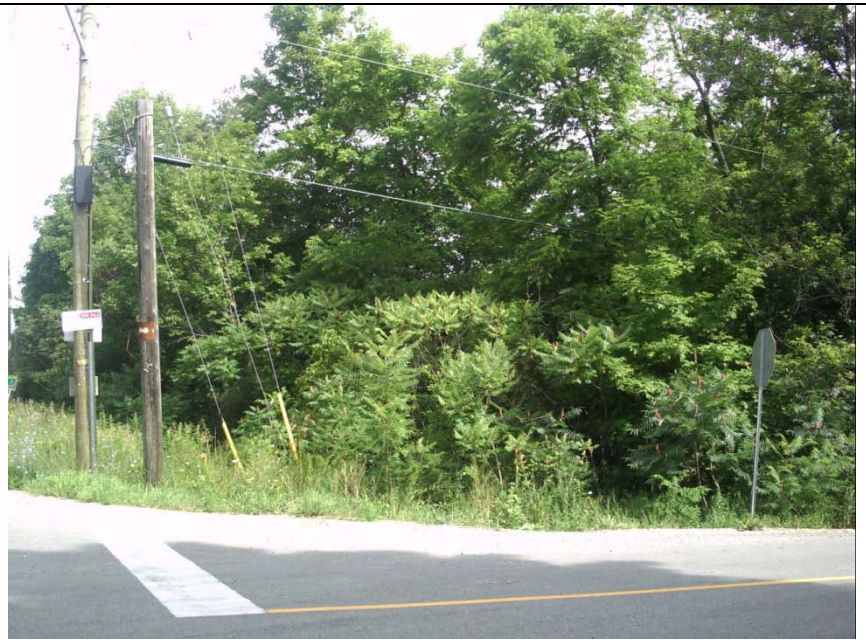
APPENDIX D

Photographic Records (2009-2010)

LCA Environmental Consultants Guelph Line EA Photographic Records

1. Corner of Guelph Line and Conservation Road view southeast corner



2. Corner of Guelph Line and Conservation Road view northeast corner

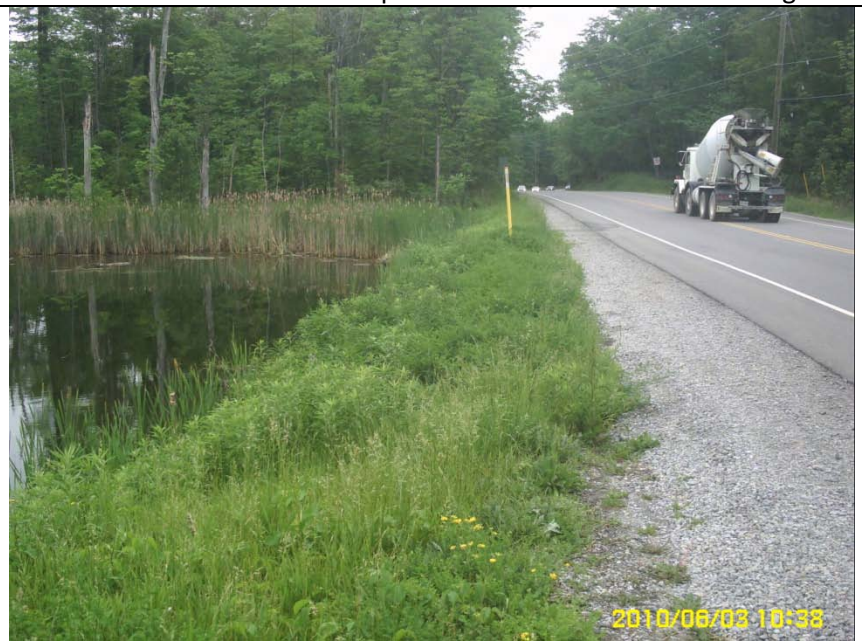
3. Southeast Corner of Guelph Line and Conservation Road view north

4. Northeast corner of Guelph Line and Conservation Road view south

LCA Environmental Consultants Guelph Line EA Photographic Records

5. View south on west side of Guelph Line–roadside shoulder and vegetation.

6. Wetland along east side of Guelph Line



7. On east side in location of proposed guard rail & slope, natural gas line present

8. Bank of road adjacent to wetland, no roadside ditch, 2:1 slope

9. Wetland on west side of Guelph Line

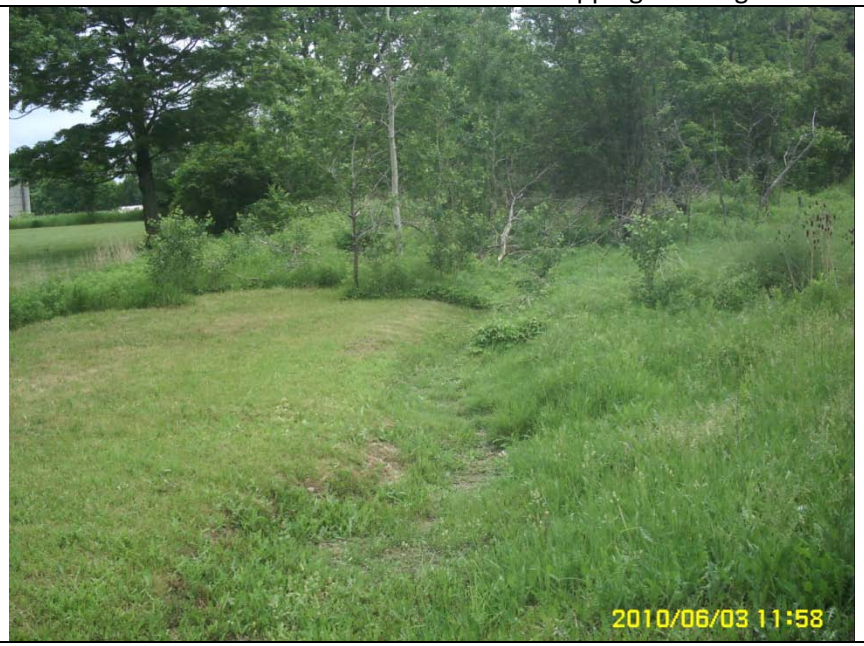
10. Jefferson Salamander vernal pool, 8-10 m from proposed road work

11. Limestone Creek view upstream at Bruce Trial crossing

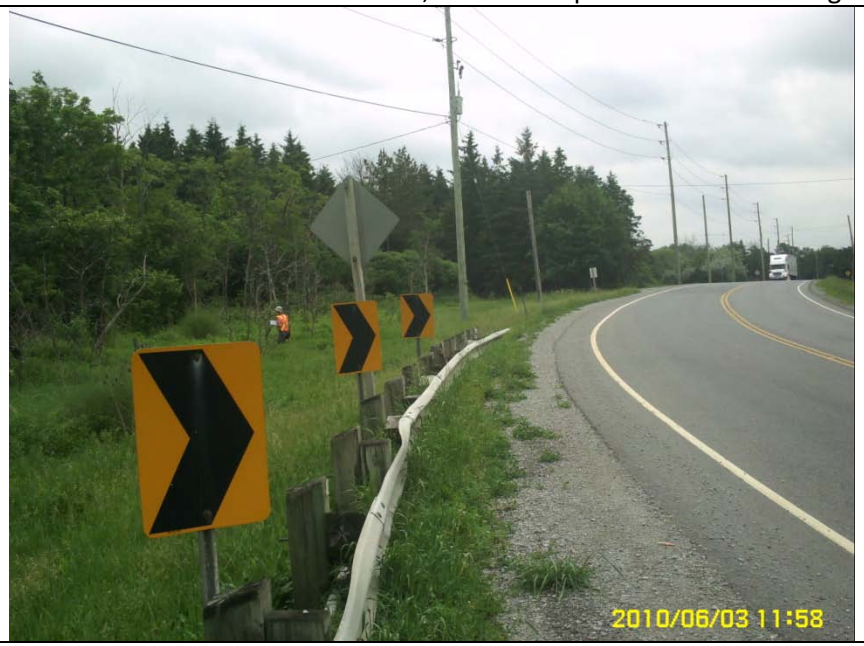
12. Limestone Creek view upstream – high flow

13. Limestone Creek view downstream and dropping into large ravine

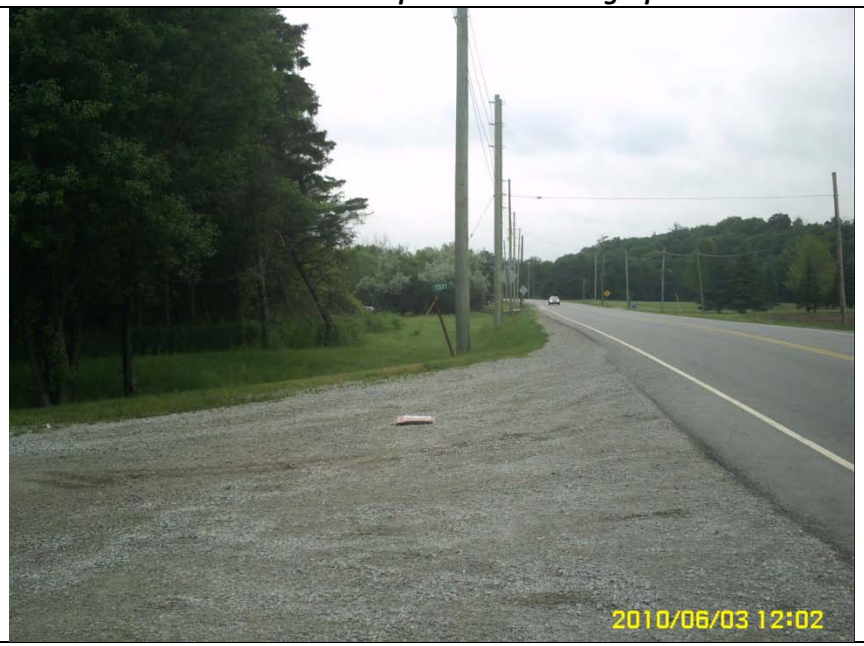
14. View south on east side of road, rock outcrop 3-4 m from road edge



15. Seasonal channel – dry behind bend at southern section of study area



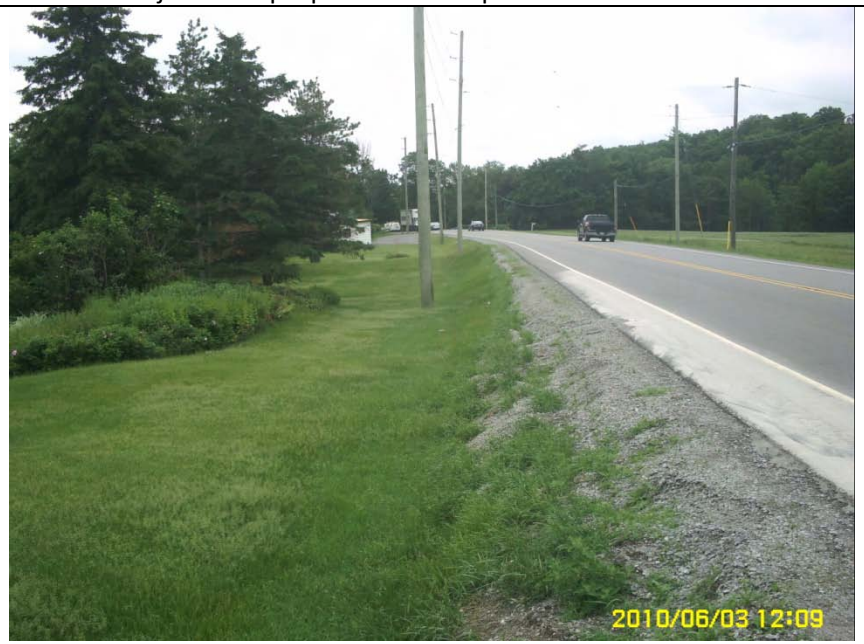
16. East side at bend in location of proposed road improvement



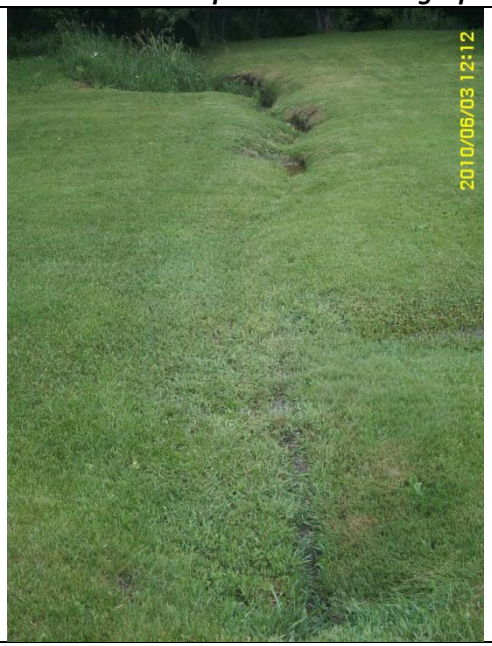
17. East side just past bend, in location of proposed road realignment

18. Adjacent to proposed road improvement – wind throw

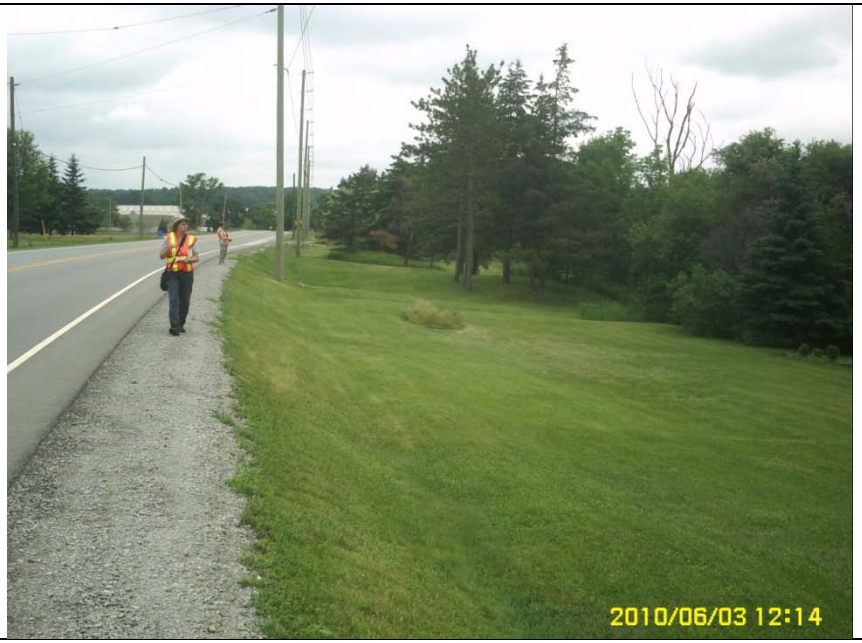
19. East side, further down the proposed road improvement



20. East side, further down the proposed road improvement, gravel slumping



21.Small channel in-between residential properties, mowed and not stable at bend



22. View north at east side at bottom end of proposed road improvement

23. Nesting cavities

24. Nesting cavities