

APPENDIX B

NATURAL SCIENCES REPORT



Natural Sciences Report

**Ninth Line
Class Environmental Assessment Study
Region of Halton**

Prepared for:

Urban & Environmental Management Inc

Prepared by:

***LCA Environmental Consultants*
104-155 Main Street East, Suite 136
Grimsby, Ontario L3M 1P2**

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1.0 INTRODUCTION

The Regional Municipality of Halton requires completion of a Class Environmental Assessment (Class EA) Study to consider road improvements to a portion of Ninth Line from 10 Side Road (Regional Road 10) to Steeles Avenue within the Town of Halton Hills. Urban and Environmental Management Inc. (UEM Inc.) has been retained to complete the Class EA study on behalf of the Regional Municipality of Halton. LCA Environmental Consultants, a sub-consultant to UEM 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**.

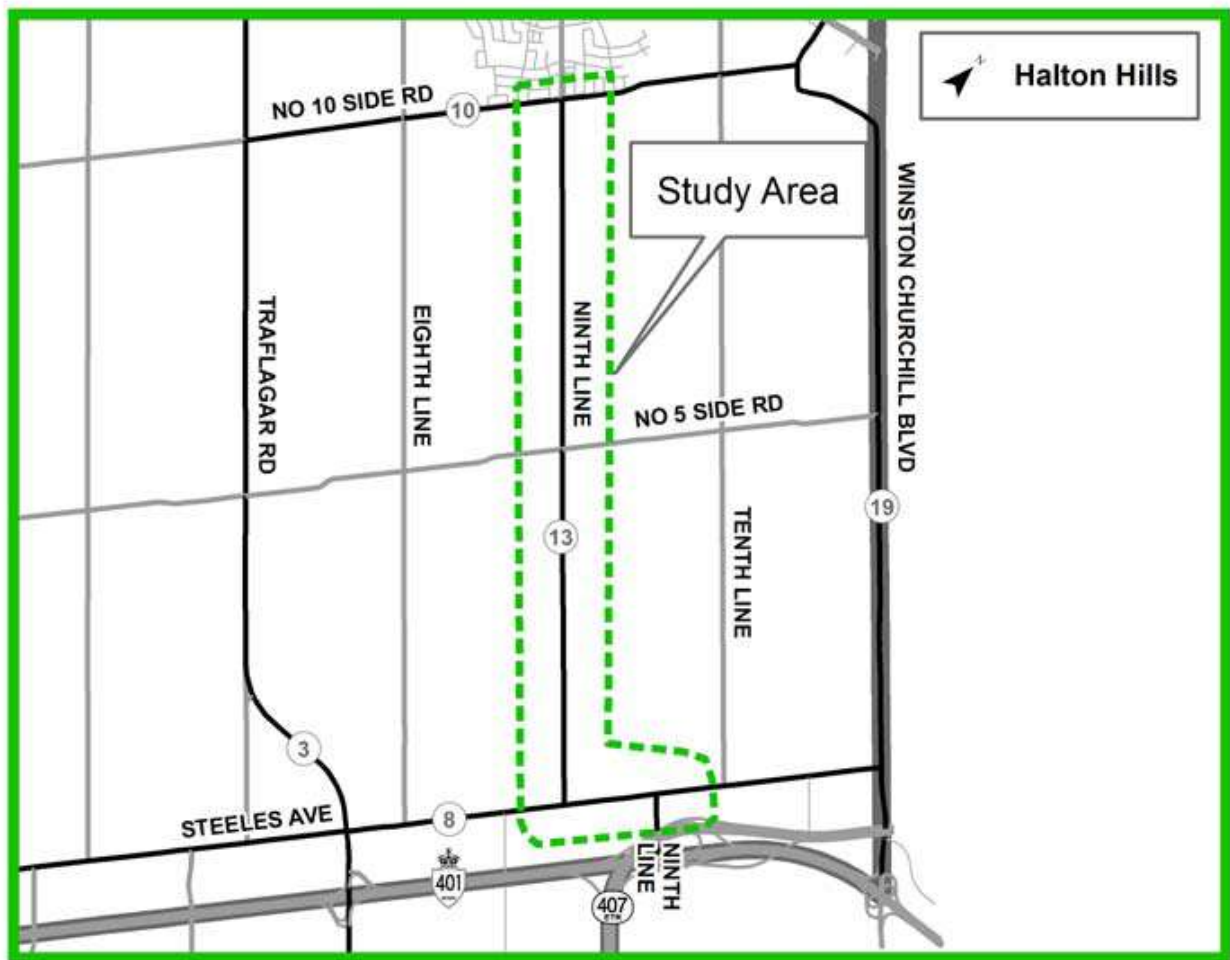


Figure 1: Ninth Line Class EA Study Area
(Source: Regional Municipality of Halton)

1.1 Background

The study area for the Ninth Line Transportation Corridor Improvements extends from 10 Side Road (Regional Road 10) to Highway 407 within the Town of Halton Hills, extending over a length of approximately 7.5 kilometers. The predominant land uses within the study area are a mix of agricultural, rural residential and natural lands. The study area is located within the northeastern portion of the Sixteen Mile Creek Watershed. A small headwater tributary traverses Ninth Line in the lower portion of the study area.

Halton Region requires a Class EA Study be completed for anticipated road improvements to the portion of Ninth Line located within the study area limits to address future capacity deficiencies on Ninth Line. Further, the EA terms of reference indicate that the anticipated road improvements could include a combination of four through lanes, intersection improvements, and improvements to the 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 existing 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 Ninth Line could not be accessed for a 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 majority of the existing land uses are active agriculture or manicured rural residential. Permission to access was granted for the only significant wooded area which was evaluated more comprehensively.

Supporting documents that have been consulted for relevant natural heritage data include, but are not limited to:

- GTA West Corridor Environmental Assessment (MRC et al., 2010);
- 401 Corridor Integrated Planning Project, Scoped Subwatershed Plan (Dillon, 2000);
- 2011 Grindstone Creek, Sixteen Mile Creek and Supplemental Monitoring (Conservation Halton, 2011); and
- Sixteen Mile Creek Monitoring Project (Dunn, 2007 (draft report)).

Consultation with Conservation Halton, regarding the key habitat features and potential species within the area, has been incorporated into this report, as well as, the information garnered from

the Ministry of Natural Resources and Forestry (MNR) Natural Heritage Information Centre website.

1.2 Fieldwork

The natural environment in and adjacent to the study area was assessed and documented by LCA Environmental Consultants through the spring and summer of 2014 and spring of 2015. **Table 1** summarizes all of the fieldwork completed for this report.

Table 1: Summary of Fieldwork Completed for this Report

Date	Time	Purpose	Staff
May 14, 2014	6:00 - 7:30 am	• Reconnaissance/safety assessment • Study area characterization (natural areas, roadside vegetation, watercourses, surrounding land uses)	• Pat Grynas – Natural Heritage Biologist • Taylor Boucock – Field Technician
June 4, 2014	6:00 – 8:30 am	• Bird inventory and habitat assessment • Habitat and wildlife assessment • Watercourse assessment	• Lisa Campbell – Principal • Pat Grynas – Natural Heritage Biologist • Nadine Litwin – Bird and Amphibian Naturalist
June 13, 2014	6:00 – 7:00 am	• Bird verification assessment (SAR)	• Lisa Campbell – Principal • Pat Grynas – Natural Heritage Biologist
July 16, 2014	7:00 – 9:00 am	• Habitat and wildlife assessment • Watercourse assessment	• Lisa Campbell – Principal • Pat Grynas – Natural Heritage Biologist
August 27, 2014	7:00 – 10:00 am	• Woodlot/wetland assessment of vernal pools and drainage	• Lisa Campbell – Principal • Pat Grynas – Natural Heritage Biologist
Sept. 8, 2014	6:00 – 9:00 am	• Street tree assessment and enumeration	• Pat Grynas – Natural Heritage Biologist • Taylor Boucock – Field Technician
April 14, 2015 May 6, 2015	8:00 – 9:00 pm	• Amphibian Inventories	• Pat Grynas – Natural Heritage Biologist

2.0 EXISTING STUDY AREA CONDITIONS

The study area (as defined above) encompasses a portion of the Sixteen Mile Creek Watershed (eastern branch) and includes two small woodlot features, one of which is identified as a regionally significant wetland (East Oakville Swamp). The majority of the surrounding land use is active agriculture, which essentially limits the natural wildlife habitat to sporadic street trees, a single defined channel crossing and the small isolated woodlots, though some wildlife will actively use the agricultural open space for breeding and nesting.

2.1 Physiography and Soils

An assessment of the physiography in the study area was conducted through a comprehensive review of relevant background documents and reports noted above.

The Sixteen Mile Creek watershed consists of approximately 42,000 ha with headwaters originating above the Niagara Escarpment, flowing through the Peel Plain into Lake Ontario. The Main and Middle branches of Sixteen Mile Creek originate in the Bedrock Plain west of the Escarpment. Groundwater seepage from the steep escarpment slopes provides baseflow to the lower reaches of the Creek. The East and Middle branches of the Creek merge just south of Hornby. Below the Escarpment, Sixteen Mile Creek flows onto the Peel Plain where the clay soils have much lower infiltration rates resulting in higher surface runoff and limited groundwater recharge of the Creek (GTA West Corridor, 2010).

The physiography of the eastern branch of the Sixteen Mile Creek Watershed is dominated by the Peel Plain, an expansive area characterized by level to undulating topography with a gradual slope towards Lake Ontario. The unique Halton till soils of the area provide for agricultural significance (GTA West Corridor, 2010). The soils are primarily part of the Trafalgar moraine, characterized by “reddish, clayey till with significant amounts of red shale incorporated into the till matrix” (Dunn, 2007). It has also been noted that the eastern portion of the watershed is characterized by an area of clay and clay-loam soils with low topographic relief and imperfect drainage (Dunn, 2007).

2.2 Aquatic Habitat and Fisheries

As noted previously, a headwater tributary of the East Sixteen Mile Creek traverses Ninth Line in the lower portion of the study area via an existing box culvert. The upstream portion is relatively small and is surrounded by active agriculture with minimal riparian buffer. The downstream portion of the channel traverses manicured rural residential land before merging with a larger tributary southwest of the study area limits. The small tributary and downstream tributary are both identified as cool water or transitional water tributaries according to the GTA West Corridor Study (MRC et al., 2010). However, earlier studies suggest that there is limited data on small headwater tributary and the downstream tributary supported warmwater sportfish (Dunn 2007). There does not appear to have been any fish sampling completed in this tributary based on the reports reviewed for this study and according to the Fisheries and Oceans Species at Risk (SAR) mapping (May 2014), there are no fish or mussel species at risk in this tributary or the East Sixteen Mile Creek tributary downstream.

Mapping from the various historic reports also indicate a number small headwater channels originating just north of Steeles Avenue flowing south under Highways 407 and 401. With the existing construction on Steeles Avenue, the channels were not visible from the roadside and it was presumed that the potential impacts associated with this portion of the study area were addressed in the report regarding the Steeles Avenue road improvements.

2.2.1 Field Assessment

The only identified tributary crossing beneath Ninth Line within the study area consists of a small headwater channel with origins within an active agricultural area with limited catchment at the very eastern limit of the Sixteen Mile Creek watershed. Downstream of Ninth Line, the channel traverses through manicured rural residential land, merging with a larger tributary of Sixteen Mile Creek about 120 metres downstream of Ninth Line. A large pond is located adjacent to the downstream reach at the merger point; however, it is unknown if there is a hydrologic connection to the channel.

The fisheries habitat and channel morphology of the small tributary was assessed during field visits conducted for this report. As the channel is located on private property on both sides of the road, the assessment was limited to approximately 30 metres upstream and 30 metres downstream in the channel and included an assessment of the substrate, banks and adjacent riparian vegetation. No fish sampling of the tributary was completed for this report. Photographic records were taken to document the existing conditions within the channel.

The small tributary of interest flows perpendicular to Ninth Line with a bend north approximately 200 metres upstream of the road. The channel is relatively small and shallow, exhibiting a wetted width ranging from 0.5 – 1.25 metres in the spring. While the bankfull width was relatively defined, there was no indication of high flows through this reach of the channel. The bank appears to be relatively stable with no signs of active erosion. The existing box culvert provides 3.0 metres inside dimension for conveyance of water and does not appear to be creating a hydrologic pinch point for the channel. Substantial sediment buildup at the upstream end of the culvert has altered the watercourse path slightly so the channel enters the culvert on an angle. The location of the sediment buildup suggests sediment origins from the roadside ditch to the north. The fluvial geomorphic assessment completed by UEM (December 2015) and included in the Stormwater Management Report (UEM May 2016) provides a complete assessment of the channel and culvert dimensions and current function.

OSAP protocols were applied to characterize the site features at the screening level for all suitable field measurements. The qualitative assessment included the rapid assessment for channel structure, however, benthic and fish sampling was not deemed required at the preliminary assessment stage based on the existing site features and limited fish habitat characteristics.

Substrate in the channel was comprised mainly of silt and clay (70-80%) with approximately 20% cobble providing relatively good benthic habitat. The instream vegetation was dense, consisting of both emergent vegetation and terrestrial species where the channel bottom was dry. There were notable sediment deposits on the downstream end of the channel by the culvert inlet giving rise to increased instream vegetation and braiding of the channel. Water was present during the June 2014 site visit with depths of 19 cm upstream at the culvert and 5 cm downstream; however the channel was dry by mid-July 2014 with only small residual pools of water. There were only a few small minnows observed in the channel at the culvert inlet during the earlier site visit in June.

The water chemistry within the channel was relatively good during the June site visit with a temperature of 13.9 degrees Celsius and relatively low conductivity despite the lack of flow. Water quality was taken in a small isolated instream pool of water upstream of the culvert in July due to the dry channel conditions. The water temperature was still relatively low (16.6 °C), however conductivity was very high (2972 uS/cm) and dissolved oxygen was very low (2.13 mg/L). The dry channel conditions likely affected the water quality and there were definite impediments to fish migration during the summer months. No minnows were observed during the July site visit.

General water quality parameters were measured during the site visits completed for this study as presented in **Table 2**.

Table 2: General Water Quality Data (upstream of culvert)

Parameter	LCA (06/04/2014)*	LCA (07/16/2014)
Ambient Temperature (°C)	14.3	15
Water Temperature (°C)	13.9	16.6
Conductivity (µS/cm)	737.9	2972
TDS (ppm)	513.3	2166
pH	6.82	7.03
Dissolved Oxygen (mg/L)	N/A	2.13

* Measurements taken approximately 15 m upstream of Ninth 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 TDS levels below 1000 ppm although fish spawning can be affected by lower levels of conductivity and TDS. The general water quality parameters fall within the preferred range for aquatic organisms during the spring months. The lack of water during the summer likely contributed to the higher concentrations of conductivity observed in the summer. Proximity to the road within roadside input and active agricultural land uses in the upstream reach may also contribute to variability in the water quality. Sampling following or during a major rain event may provide some additional information regarding the impact of the roadside drainage on the watercourse, as well as, the length of time water resides in the channel.

A more comprehensive aquatic habitat assessment at the detailed design stage of the project, once the culvert and road details have been determined, may provide more complete baseline data for the post-construction monitoring, as well as, provide an indication of the channel features that need to be re-instated and/or enhanced. As well, fish habitat mapping as per the MTO Environmental Guide for Fish and Fish Habitat (2009) should be completed at the detailed design stage in order to determine the suitable natural channel design features that should be incorporated into the culvert and channel areas impacted by the chosen design. This information will assist in completing the risk assessment framework in terms of potential impacts which will be required for the Fisheries Authorization. Implementing an open bottom culvert design will eliminate the need to assess groundwater through the culvert area or the need for a benthic assessment provided that similar substrate is re-instated in the bottom of the channel.

The riparian buffer along the channel is relatively narrow both upstream and downstream of the culvert, consisting primarily of a narrow swath of cultivated grasses and meadow species. Upstream of the culvert, the southern channel bank is adjacent to a narrow treed area, consisting of hawthorn, cedars, ash and willow species providing some shade and allochthonous matter to the watercourse. Further upstream, the surrounding lands are actively cultivated. The downstream riparian buffer is very narrow, consisting primarily of herbaceous vegetation and a few sporadic trees (See Appendix A for photographic records).

2.2.2 Summary

Based on the historical data provided in the existing reports and the field assessments completed for this study, the tributary of Sixteen Mile Creek is well defined and exhibits stable bank morphology and substrate characteristics. There is no current or historical information regarding the potential to support a fish community in this channel, and if so, the residence time would be limited to the spring months when there is water and connectivity. The water chemistry during the spring months falls within the range conducive to support an aquatic community. The narrow riparian buffers and proximity to road and roadside drainage inputs do expose the channel to both sediment and potential nutrient input.

2.3 Terrestrial Ecosystems

The portion of Ninth Line within the Study Area extends from 10 Side Road (Regional Road 10) to Steeles Avenue within the Town of Halton Hills, encompassing primarily rural residential and active agricultural lands. The terrestrial natural heritage features within the study area are limited to two small woodlot/wetland features, including portions of the East Oakville Swamp, at the intersection with 5 Side Road. There is also a small residual treed area south of the primary channel that provide some shade to the channel and a woodlot at the northeast corner of Ninth Line and Steeles Avenue. All other small woodlot features within the length of the study area are located beyond 150 metres from Ninth Line and were not assessed as part of this study.

Due to limited access to the woodlot features, formal ELC assessments were not completed based on roadside assessments. Field notes regarding the vegetation and soils in the wooded areas north of 5 Side Road were completed during the permitted field site visit to the small rectangular woodlot at the northwest corner and these notes provide the basis for the ELC applied to the forested areas at 5 Side Road, assuming similar conditions in the wooded areas further north and south of 5 Side Road. An ELC assessment was not completed at the edge of the channel, though the predominant trees were noted. As well, there were no site visits or assessments completed on the wooded area at Steeles Road due to the active construction at the time of the field assessments.

2.3.1 Historical Data

The Halton Natural Areas Inventory (NAI) (2006) has completed extensive evaluation and mapping of the vegetation communities throughout the Sixteen Mile Creek watershed. Although

the small woodlot features identified within the study area are not described in the Halton NAI report, the field site visits confirmed that the vegetation communities were similar to those described in the local area. As per the information provided in the 2006 Halton NAI report, the vegetation communities for this area were determined based on aerial photograph interpretation.

Both woodlots north and south of 5 Side Road were identified as woodlots greater than 0.5 hectares and are mapped as *Key Features* in the NHS on regional Official Plan Amendment 38 (ROPA 38, 2016).

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 NAI-Detailed Ecological Land Classification (ELC) Mapping (2005) was undertaken for the general area as there were no identified NAI communities identified within the defined study area. Air photos were also used to interpret and determine the limits and characteristics of vegetation communities found adjacent to Ninth Line.

The field evaluations completed for this report confirmed that the wooded natural area adjacent to Ninth Line at the intersection with 5 Side Road (northwest quadrant) can be described as *Mixed Forest Ecosite* (FOM7 – Fresh-Moist White Cedar-Hardwood Mixed Forest Ecosite) and *Mineral Deciduous Swamp* (SWD4) due to the predominance of Willow associated with the vernal pool areas. The woodlot edge along Ninth Line primarily of white cedar, birch, elm, basswood and young ash trees. The interior vegetation was sparse with little understory, consisting primarily of buckthorn and red dogwood in the shrub layer and wild grape and ground ivy on the ground. Although the canopy cover was approximately 60%, there was substantial deadfall throughout the woodlot feature and the open canopy areas were re-vegetating with buckthorn and young ash. Soils in the upland area (with frontage on Ninth Line) were predominantly silt loam with little organic accumulation and clay with mottles at approximately 30 cm.

Further west of Ninth Line, the woodlot transitions to wetland characteristics in terms of the vegetation community and soils. In this area, the canopy trees are all dead with exception of a few young ash and there is an increased abundance of willow species, dogwood and herbaceous vegetation such as purple loosestrife, jewelweed and a variety of sedges. The soils were saturated with organic depths of 30 to 40 cm and gley beneath.



Figure 2: ELC Ecosite Classification for Woodlots within the Study Area.

Although the surface drainage patterns could not be clearly determined through the dense vegetation, it appeared that the wetland areas were sustained even through the dryer periods which may indicate a high groundwater table and potential surface water groundwater interaction. The field assessment confirmed the presence of vernal pools that would be of sufficient depth to provide amphibian breeding through the spring months. Though it is unlikely that the vernal pool depth would support a salamander population and there was no detection of salamanders in the forested area on the northwest corner of the intersection based on a habitat sweep of logs and rocks.

The wetland area is located west of the right of way and it is not expected that there would be any direct impacts; however, the surface drainage patterns should be verified to ensure that any drainage contribution from Ninth Line is addressed. Although the wetland mapping for this woodlot was not verified and delineated as part of the field assessments, the vegetation in the at the corner is more indicative of upland features consisting of elm, birch and white cedar trees with sporadic black cherry and basswood. As such, it is recommended that the wetland polygon within the northwest woodlot be properly delineated to reflect the field conditions as the preliminary

survey suggests that the wetland does not extend to the edge of the woodlot as depicted in the wetland mapping for this area.

There was a small polygon of trees associated with the southern bank of the primary channel that consisted of large cedars, ash and willow with an understory of hawthorn, dogwood and wild cucumber. This area was assessed only from the edge of the channel due to limited access and private property. It can be assumed conservatively that the characteristics of the residual wooded area are similar to those identified in woodlots further north, which would classify the polygon as a Mixed Forest Ecosite (FOM7) based solely on the trees present. Soil assessments and polygons sweeps through the wooded feature are required to verify this ELC coding. A summary of the various vegetation communities identified within the study area is presented in Table 3 below. It should be noted that due to access constraints, the ELC codes are based on the data available and do not represent a comprehensive ELC survey of each woodlot feature.

Table 3: Summary of Ecological Land Classifications for Woodlots within Study Area

Vegetation Community Location	ELC Code	Summary of Features
Woodlot at NE corner of 5 Side Road	FOM7 (Fresh-Moist White Cedar – Hardwood Mixed Forest Ecosite)	20 cm of silt-loam over clay with 5-8 cm organics; canopy of white and red cedar, elm and white birch; understorey of buckthorn with red osier dogwood at edges; groundcover of may apple, poison ivy, sensitive fern and jack-in-the-pulpit
	SWD4 (Mineral Deciduous Swamp Ecosite)	35 cm of organics over clay (gley); predominance of willow species and young ash, mature canopy trees dead; understory consisting of willow shrubs, dogwood, cattails, rice cut grass; sedges present in small pooled areas
Wooded Area south of Channel	FOM7 (Fresh-Moist White Cedar – Hardwood Mixed Forest Ecosite)	Mature cedars with young ash and willow species; understory of hawthorn and dogwood with wild cucumber and garlic mustard. No soil cores taken.

A list of the vegetation observed during the field investigations of the natural areas is presented in Appendix B. It should be noted that the list is not comprehensive as the primary purpose of the woodlot assessment was to evaluate the potential for amphibian breeding habitat in the woodlot.

Along the remaining portions of the study area, the vegetation consisted primarily of roadside trees amidst agricultural and rural residential lands. The mature roadside trees were individually

identified as the road works will require selective removal of trees within the road allowance. The list of trees and vegetation along identified along the roadside is presented in Appendix B of this report.

A roadside vegetation inventory was conducted for all lands within twenty metres of the existing road in September of 2014 where access was possible. Private land ownership prohibited the ability to complete comprehensive surveys beyond the road allowance in most areas. It was noted that within the wetland area northwest of the intersection that there were a significant number of dead and dying trees and substantial deadfall and wind throw trees in the small woodlot. An inventory of the vegetation identified during the field site visits has been included in Appendix B for reference purposes. A table detailing the tree species and relative sizes for those trees located within the road allowance on the southern portion of the study area has also been included in Appendix B. It is estimated that there are approximately 191 trees along the western road allowance and 152 trees along the eastern road allowance. Only dead or dying trees were excluded from the survey. There were no federally or provincially threatened or endangered vegetation species identified within the right of way.

2.4 Wildlife and Wildlife Habitat

2.4.1 Historical Data

The study area is divided by anthropogenic uses of rural farmland and rural residential which extend throughout the study area. The northern portion of the study area has no ecologically sensitive natural features. The small woodlots in the middle of the study area at 5 Side Road offer some wildlife habitat though the size of the woodlots do not provide for interior habitat (GTA West Corridor, 2010). The small wetland area within the woodlot feature northwest of 5 Side Road is identified as the East Oakville Wetland and considered to be Regionally Significant based on MNRF evaluations in 2003. Conservation Halton completed field assessments in June 2015 to confirm the limits of the wetland features. The reports reviewed for this study confirmed that there are no Niagara Escarpment Commission (NEC) lands and no Areas of Natural and Scientific Interest (ANSI) in the study area. The GTA West Corridor report also indicated that there was no raptor nesting area or deer wintering areas identified within the study area limits (AECOM et al, 2010).

The natural riparian area adjacent to the watercourse and the small woodlots 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, especially the noise and traffic associated with a busy road.

A review of the Natural Heritage Information Centre (NHIC) database indicated that there were historical records of a few Species at Risk recorded within the study area. Species at Risk identified included the Milksnake (*Lampropeltis triangulum triangulum*) which is listed as Special Concern and Bobolink (*Dolichonyx oryzivorus*) which is listed as a Threatened species under

COSSARO and COSEWIC databases. With the exception of these species, no bird, amphibian or mammal species historically documented within the study area are considered to be of provincial significance according to the Natural Heritage Information Centre (NHIC) Provincial Rankings (COSSARO) and the COSEWIC status list.

2.4.2 Field Assessment

An assessment of the potential wildlife habitat was completed over several field days through spring and summer of 2014 and spring of 2015 as noted in Table 1, specifically for amphibian surveys. Incidental wildlife observations and any road kill information have also been included in the summarized data. Although the woodlot features are relatively small and isolated from larger contiguous tracks of forest, mast and berry producers in the woodlot areas provide a food source for various mammalian and avian species. Incidental wildlife observations included Northern Leopard Frog (*Rana pipiens*) which was observed at the channel culvert, Eastern Chipmunk (*Tamias striatus*), Grey Squirrel (*Sciurus carolinensis*), Northern Red-Bellied snake (*Storeria occipitomaculata*), Raccoon (*Procyon lotor*), Striped Skunk (*Mephitis mephitis*), and Eastern Wild Turkey (*Meleagris gallopavo silvestris*).

Field assessments for the amphibians were completed at dusk in the spring of 2015 at two locations, adjacent to the watercourse and adjacent to the woodlots at 5 Side Road (see Table 1 for dates and Figure 3 for location). The field assessments indicated no amphibians calling within the woodlot features or along the watercourse based on the Marsh Monitoring Protocol; however, there is habitat available to support common amphibian species for portions of their life cycle. As well, as noted earlier in the report, there was no indication of salamanders present in the northwestern woodlot based on a preliminary survey of rocks and logs.

The agricultural land uses, including active fields, mowed lawns and fallow fields provide suitable habitat for a variety of small mammals and a variety of birds; however, the small channel and limited associated riparian buffer provide little connectivity or cover for movement through the study area. Despite the constant traffic observed along Ninth Line, there was no evidence of road kill observed on the five field sampling dates in 2014.

An avifaunal survey was completed in the June of 2014 to assess the potential habitat along Ninth Line and record any species of concern based on the existing database information and field confirmation. The surveys were limited to 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 improvements. The avifaunal species present in the study area are primarily open country species and with some woodland species that prefer edge habitat. Species at Risk (including Candidate Species) were identified on the COSEWIC and SARO current website databases. These species were then cross-referenced with the Ontario Breeding Bird Atlas (OBBA) 2001-2005 database for Halton Squares 92 and 93 through which Ninth Line extends.

Only those SARs and Candidate Species that appear in the relevant OBBA squares are included in the following list.

Table 4: Potential Species at Risk (SAR) and Candidate Species

Potential SARS	Potential Candidates
Common Nighthawk Whip-poor-will Chimney Swift Red-headed Woodpecker Eastern Wood-Pewee Bank Swallow Barn Swallow Wood Thrush Hooded Warbler Bobolink Eastern Meadowlark	American Kestrel Killdeer Black-billed Cuckoo Belted Kingfisher Least Flycatcher Field Sparrow

The Bird Species Summary Table below (Table 4) was originally based on all species recorded in squares 92 and 93 during the 2001-2005 OBBA and all possible Species at Risk in Halton. The Ontario Landbird Conservation Plan (2008) by Ontario Partners in Flight (OPIF) was consulted for priority species relevant to this site. Information on area-sensitivity was gleaned from a number of documents including some from the MNRF, OPIF, and Environment Canada (see Additional Information for examples). And, finally, Christmas Bird Count data for years 2011-2013 were added to the table.

A field trip was made to the site June 4, 2014 for a general record of species present but, more importantly, to confirm habitats. At 06:45am it was dry with 0-10% cloud cover and 0-1 wind conditions. Noise level was high. There were four (4) stops at which all species heard and seen from the centre of a 360 degree circle, 100m diameter, were recorded. Based on the results of the initial comprehensive avifaunal survey completed, a verification survey to confirm the presence of the identified SAR (Bobolink, Barn Swallow, Eastern Wood Peewee and Killdeer) was completed on June 13, 2014 at dawn. The weather conditions during the June 13, 2014 survey were sunny with a small breeze, and the temperature was approximately 14 degrees at 6:00 am. Bobolink, Barn Swallow and Eastern Wood Peewee were all recorded during the second avian assessment completed at survey points 1, 2 and 4.

Table 5 summarizes observations from the field trip relevant to potential SARs impacted by the proposed lane widening of Ninth Line.

Table 5: Bird Species Summary Table

Species at Risk Recorded for OBBA Squares 92 & 93	Habitat Present Along Ninth Line	Species Observed and Confirmed Along Ninth Line June 4 and 13, 2014
Common Nighthawk	No	No
Whip-poor-will	No	No
Chimney Swift	No	No
Red-headed Woodpecker	No	No
Eastern Wood-Pewee	Possibly, if enough woodlot extends west of Ninth Line	Yes
Bank Swallow	No	No
Barn Swallow	Yes	Yes
Wood Thrush	No, not enough woodlot	No
Hooded Warbler	No	No
Bobolink	Yes	Yes
Eastern Meadowlark	Yes	No
COSEWIC Candidate Species Recorded for Halton's OBBA Squares 92 & 93	Habitat Present Along Ninth Line	Species Observed and Confirmed Along Ninth Line June 4 and 13, 2014
American Kestrel	Possibly, if enough woodlot with snags exists around the hayfields	No
Killdeer	Yes	Yes
Black-billed Cuckoo	No	No
Belted Kingfisher	No	No
Least Flycatcher	No	No
Field Sparrow	Possibly in scrub fields	No

Three (3) SAR and one COSEWIC Candidate Species were observed. Bobolink was observed singing and flying a territory in the hayfield southwest of 10 Side Road (Survey Point 1) just over 100m from the roadside. A Barn Swallow was also observed foraging over the hayfield at Survey Point 1 and Eastern Wood-Pewee was heard from behind the trees at Survey Point 2, well beyond 100m west of the roadside. As well, a single Barn Swallow was observed foraging at Survey Point 4 (west of Ninth Line roadside). One Candidate Species, Killdeer, was heard calling in the field from Survey Point 3, more than 100m east of Ninth Line roadside.



Figure 3: Locations of Avian and Amphibian Surveys

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*) is a High Priority Candidate. 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.

Area-sensitive species are those species that typically require specific site characteristics, 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). One of the observed bird species, the Eastern Wood Peewee, has been identified by OPIF and Bird Studies Canada (BSC) as a species of conservation concern.

It is important to note however, that both the OPIF and BSC rankings, in and of themselves, confer no protection under the Provincial Policy Statement (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 *ON BCR 13*. OPIF identifies 42 species that regularly breed and/or winter in *ON BCR 13*. 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 three 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 three broad categories: forest, marsh, and open country, and within each category are four 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.

In summary, with the possible exception of the Bobolink whose range can be relatively large, no Species at Risk are expected to be negatively impacted from the proposed lane widening along Ninth Line as these species do not utilize edge woodlot or roadside habitat for nesting or feeding. Eastern wood peewee uses the interior portions of the wood lot which are not expected to be altered by the road widening. Barn swallow habitat is associated with building structures which are also not impacted by the proposed works. Both species are aerial insectivores and there are adequate feeding areas in the surrounding fields. Neither species nests or feeds near the road. As such, the road widening will not impact the species behaviour or their associated habitat. The location of the observed Bobolink was at a distance well beyond the zone of impact associated with the road widening. There is no expected change in the extent of the various habitat types or quality as a result of any upgrades to Ninth Line. The avifaunal species inventory list has been provided in Appendix B for reference purposes.

2.5 Designated Natural Areas

2.5.1 Greenbelt and Niagara Escarpment Plans

According to the Natural Heritage System of the Greenbelt Plan (2005), the study area is located outside of the Greenbelt limits and is not part of the Niagara Escarpment Plan Area.

2.5.2 Natural Heritage System (NHS)

The Halton Regional Official Plan Amendment 38 (ROPA 38) was consulted to review the current regional mapping revisions. The woodlot and wetland features northwest at the intersection of 5 Side Road and Ninth Line are identified as *Key Features* in the NHS.

2.5.3 Environmentally Sensitive Areas (ESAs) and ANSIs

The Region of Halton designates Environmentally Sensitive Areas (ESAs) based on criteria contained in the Regional Official Plan (Office Consolidation, 2006). There are no designated ESAs in the study area. There are no ANSI's located in or adjacent to the study area (50 m) (AECOM, 2011).

2.5.4 Valleylands

There are no significant valleylands associated with the watercourses within the study area.

2.5.5 Wetlands

The small wetland woodlot feature located on the northwest corner of the intersection of Ninth Line and 5 Side Road is identified as a Regionally significant wetland (AECOM, 2011). There are no provincially significant wetlands (PSW) identified within the study area limits.

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 SWH Criteria Schedules for Ecoregions 6E and 7E were reviewed and based on the field assessments completed for this report, the wetland areas, localized vernal pools and the surrounding woodlot areas may provide for Specialized Wildlife Habitat, particularly for amphibians, though none were heard during the amphibian monitoring in 2015. The MNRF description of the four categories is presented in Table 6 below.

Table 6: MNRF Descriptions of Significant Wildlife Habitat

Category	Description
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
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)

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

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 PPS (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 small woodlots within the study area do not meet the criteria defined by the OMNR Natural Heritage Reference Manual (2010). As such, the woodlots within the study area should not be considered Significant provincially, however the woodlots are regionally significant. As noted in historical reports, there is no interior habitat, raptor nesting or deer wintering areas identified within the study area limits (AECOM, 2011).

3.0 ASSESSMENT OF PROPOSED ROAD IMPROVEMENTS

An assessment of the potential impacts of the proposed road improvements was completed to evaluate the potential impacts on the existing natural heritage features and determine appropriate mitigation if needed.

Table 6: Evaluation of the Proposed Alternatives for Ninth Line

No.	Alternative Details	Anticipated Environmental Impacts
1	Do Nothing	No changes or impacts to the existing natural heritage features.
2	Widen even about the existing centerline (max. 42 m ROW)	Loss of existing street trees (approx. 80-90% on east and west sides). Marginal impact to forest edge habitat at 5 Side Road. Main culvert extension may result in loss of amphibian habitat and darkened culvert length for fish movement.
3	Widen to the east (hold existing west property line) (max. 42 m ROW)	Loss of existing street trees (approx. 100% on east side and 60% on west side). Marginal impact to forest edge habitat at 5 Side Road. Main culvert extension may result in loss of amphibian habitat and darkened culvert length for fish movement.
4	Widen to the west (hold existing east property line) (max. 42 m ROW)	Loss of existing street trees (approx. 100% on west side and 60% on east sides). Greater impact to forest edge habitat at 5 Side Road. Main culvert extension may result in loss of amphibian habitat and darkened culvert length for fish movement.
5	Combination of Alternatives 2, 3 and 4 (ROW varies from 42 m to 26.6 m)	Potential reduced loss of street trees in areas. Reduced impact to forest edge habitat at 5 Side Road. Main culvert extension may result in loss of amphibian habitat and darkened culvert length for fish movement.

The woodlot features adjacent to 5 Side Road are the primary natural heritage features potentially impacted by the proposed road widening. An assessment of the woodlot area potentially lost, as area and as a percent of the total woodlot area, is presented in Table 7 below based on the preferred road alignment. Efforts to reduce the impacts on the woodlot edge and wetland edge south of 5 Side Road through a reduced widening in this area is recommended in order to maintain the integrity of the natural feature.

Table 7: Potential Woodlot Losses

Woodlot	Area (ha)	Area Impacted (ha)	Total Area (ha)	Percent Lost (%)
West	11.39	0.127	20.04	0.63
Centre	3.50	0.114	20.04	0.57
East	5.15	0.028	20.04	0.14

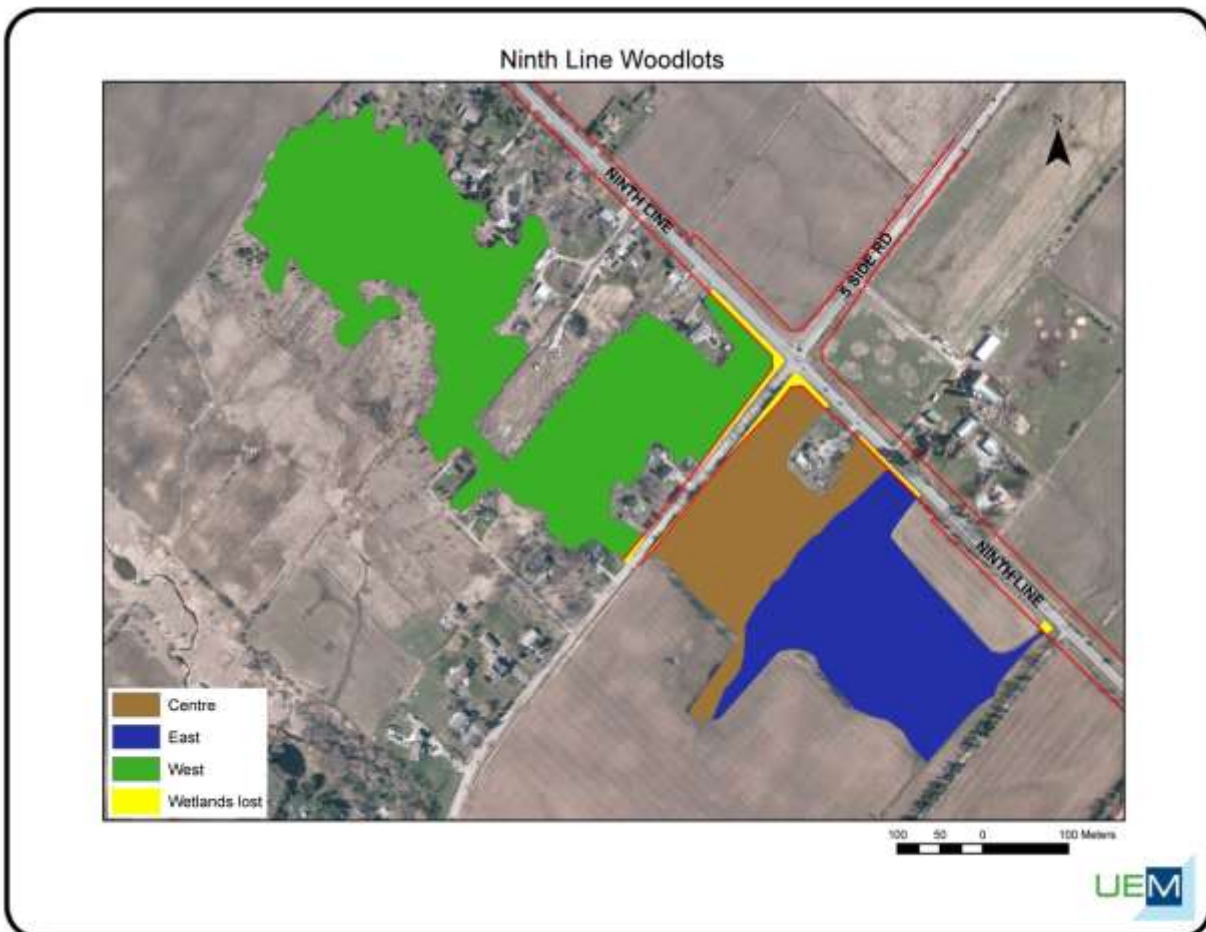


Figure 4: Woodlot Features and Proposed Area of Loss

Based on the preferred alignment, the impacts will be limited to edge habitat along Ninth Line and 5 Side Road. It is not anticipated that the loss of edge habitat will adversely impact the flora and fauna in the woodlot features.

4.0 RECOMMENDATIONS

The findings of this report provide a preliminary assessment of the existing natural heritage feature and functions within the study area in order to assist in evaluating the best alignment for the road widening. In order to ensure that the impacts to the natural features are minimized and the ecological functions of the woodlot edge and watercourse are preserved or enhanced post-construction, there are some additional field assessments that should be completed at the detailed design phase of the project which include the following:

- A comprehensive habitat assessment and fisheries assessment as per the MTO Environmental Guide for Fish and Fish Habitat will provide the details required to ensure that any channel alterations provide equivalent or improved habitat conditions as part of the natural channel design for the watercourse and culvert specifications (open-bottom);
- An assessment of the sediment input from the existing ditches feeding the watercourse to ensure that the newly established ditch and stormwater system is not adversely impact the watercourse;
- An verifications assessment of the street trees (species, dbh, health and condition for each tree) impacted by the preferred design will be required in order to establish a tree compensation plan according to the Halton Region Tree canopy Replacement Policy on Regionally Owned Lands;
- Additional avian surveys may be required by MNRF for identified SAR.

The following general recommendations are based on the field assessments completed for this report and the design alternatives proposed for the road widening. As the primary natural heritage features are limited to the woodlot areas north and south of 5 Side Road and the small tributary in the southern portion of the study area, the recommendations are focused on those areas.

- Options for the intersection at 5 Side Road, including the turning lanes, should strive to reduce the amount of edge habitat lost along the eastern edges of the woodlot features;
- Narrowing the road cross-section south of 5 Side Road will further reduce the potential impacts to the edges of the identified wetland areas;
- Re-establishing the woodlot edged through planting of robust native trees and shrubs in the disturbed edge area will help reduce any associated impacts further into the woodlot (e.g. wind/water impacts or erosion);

- Tree replacement requirements should adhere to the Conservation Halton and Halton Region policies. The actual number of trees lost and relative sizes should be assessed once the final design are determined;
- Construction near the channel should be completed under low flow conditions if possible. The area should be dewatered and any fish within the culvert or channel removed and placed downstream prior to the construction works;
- Reinstating native riparian vegetation along the channel banks in the disturbed areas will help stabilize the banks at the culvert ends; and
- Efforts should be made to control roadside sediment input at the box culvert to alleviate the current sediment input issues.

In all instances, it is recommended that all trees/shrubs that are removed or damaged to the point that their long-term survival is questionable, should be replaced with, where appropriate, native tree species as per the Conservation Halton and Halton Region tree replacement policies. Additionally, it is also recommended that construction activities which result in the loss of herbaceous ground cover and plants be immediately re-seeded (post-construction) in order to reduce erosion. As well, silt fencing should be installed prior to construction in order to reduce the amount of sediment entering nearby waterways and the fencing should remain in place until an adequate amount of herbaceous ground cover has been restored.

5.0 SUMMARY

The Ninth Line EA was initiated to evaluate alternatives for effective road widening as per the requirements of Halton Region. The Natural Science Report was completed to assess the existing natural heritage features and functions within the study area and provide recommendations to preserve, protect, enhance and/or mitigate potential impacts to the natural heritage features.

Based on the field assessments completed for this report, review of existing reports and consultation with review agencies, it was determined that the road widening can proceed with minimal impact to the existing natural heritage features provided that the selected alternative has regard for the woodlot and wetland edge at 5 Side Road. While there is no identified species at risk or associated SAR habitat within the study area that will be impacted by the road widening, the loss of edge habitat and associated disturbance to the woodlot edge will require stabilization through effective planting and construction due diligence. As well, construction at the culvert and channel should adhere to the recommendations provided in this report to minimize disturbance to the channel and riparian areas and ensure that the culvert and channel alterations provide equivalent habitat.

LCA Environmental Consultants

The recommendations provided in this report serve to minimize the impacts associated with the proposed road widening and provide suitable mitigation and/or compensation for the loss of existing street trees and vegetation along the forest edge. The final number of street trees lost should be accurately determined at the detailed design phase and replacement should adhere to the Conservation Halton and Halton Region policies.

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.

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APPENDIX A

Study Area Photographic Records

Appendix A - Photo Locations Map 1



Appendix A - Photo Locations Map 2



Appendix A: Ninth Line (RR# 13- Halton Hills) Photographic Records



Photo #1- Channel (Upstream portion) May 2014



Photo #2- Channel (Downstream portion) May 2014



Photo #3- Channel (Upstream portion) July 2014



Photo #4- Channel (Downstream portion) July 2014



Photo #5- Culvert (Upstream end) July 2014



Photo #6- Northwest corner of 9th and No.5 Side Road



Photo #7- Edge of wetland along No.5 Side Road



Photo #8- Woodlot frontage along Ninth Line



Photo #9- Debris in woodlot



Photo #10- Extensive downed trees and woody debris



Photo #11- Wetland edge transition from woodlot



Photo #12- Dead trees in wetland feature



Photo #13- Woodlot sparse understory layer



Photo #14- Wetland vegetation



Photo #15-Invasive species in wetland



Photo #16-Wetland/woodlot transition along No. 5 Side Road



Photo #17-Red-Bellied Snake (*Storeria occipitomaculata*) found dead on Side Road 5



Photo #18- Red-Bellied Snake (*Storeria occipitomaculata*)

APPENDIX B
Preliminary Avifaunal and Roadside Vegetation Inventory

Appendix B: Roadside Vegetation Inventory Species List - Ninth Line

Common Name	Scientific Name	Quantity	DBH Range
Trees			
Scotch Pine	<i>Pinus sylvestris</i>	4	22-55
Sugar Maple	<i>Acer saccharum</i> var. <i>saccharum</i>	16	<10-60
English Oak	<i>Quercus robur</i>	14	13-40
Spruce sp.	<i>Picea</i> sp.	24	15-50
Poplar sp.	<i>Populus</i> sp.	5	25-45
Green Ash	<i>Fraxinus pennsylvanica</i>	85	<10-60
Elm sp.	<i>Ulmus</i> .sp.	15	<10-45
Apple sp.	<i>Malus</i> sp.	4	14-22
Horse Chestnut	<i>Aesculus hippocastanum</i>	5	35-60
Silver Maple	<i>Acer saccharinum</i>	5	28-42
Black Walnut	<i>Juglans nigra</i>	4	30-55
Eastern White Cedar	<i>Thuja occidentalis</i>	7	20-40
Tulip tree	<i>Liriodendron tulipifera</i>	2	25-55
Cherry sp.	<i>Prunus</i> sp.	2	15-20
Northern Red Oak	<i>Quercus rubra</i>	7	10-60
Hickory sp.	<i>Carya</i> sp.	5	25-45
Basswood	<i>Tilia</i> sp.	5	12-25
Black Locust	<i>Robinia pseudoacacia</i>	4	27-36
Willow sp.	<i>Salix</i> sp.	2	50-75
Pin Oak	<i>Quercus palustris</i>	1	47
Red Maple	<i>Acer rubrum</i>	3	10-15
	Total	219	
Shrubs			
Hawthorn Sp.	<i>Crataegus</i> sp.		
Dogwood sp.	<i>Cornus</i> sp.		
Buckthorn	<i>Rhamnus cathartica</i>		
Herbaceous			
Wild Carrot	<i>Daucus carota</i>		
White Sweet Clover	<i>Melilotus albus</i>		
Curly Dock	<i>Rumex crispus</i>		
Goldenrod sp.	<i>Solidago</i> sp.		
Red Clover	<i>Trifolium pratense</i>		
Sowthistle sp.	<i>Sonchus</i> sp.		
Aster sp.	<i>Aster</i> sp.		
Fuller's Teasel	<i>Dipsacus fullonum</i>		
Grape sp.	<i>Vitis</i> sp.		
Chicory	<i>Cichorium intybus</i>		
Annual Ragweed	<i>Ambrosia artemisiifolia</i>		
Nipple-seed Plantain	<i>Plantago major</i>		
Polygonum sp.	<i>Polygonum</i> sp.		
Bluegrass sp.	<i>Poa</i> sp.		
Reed Canary Grass	<i>Phalaris arundinacea</i>		
Common Reed	<i>Phragmites australis</i>		
Virginia Creeper	<i>Parthenocissus vitacea</i>		
Birds-foot Trefoil	<i>Lotus corniculatus</i>		
Cattail sp.	<i>Typha</i> sp.		
Common Milkweed	<i>Asclepias syriaca</i>		
Purple Loosestrife	<i>Lythrum salicaria</i>		

BIRD INVENTORY

HALTON 9TH LINE														
Bird Inventory 2014														
Nadine Litwin														
					OPIF	OBBA 2001-2005						Area-Sensitive	CBC	
SCIENTIFIC NAME	COMMON NAME	OBSERVED	SARA	SARO	BCR 13	Confirmed 17NJ92	Confirmed 17NJ93	Probable 17NJ92	Probable 17NJ93	Possible 17NJ92	Possible 17NJ93		2011-2013	HABITAT NOTES
ANATIDAE														
Branta canadensis	Canada Goose	x overhead				x	x						x	open water/wetland (OPOF)
Anas platyrhynchos	Mallard	x				x	x						x	urban-tolerant; scrub-shrub wetland (OPIF)
PHASIANIDAE														
Meleagris gallopavo	Wild Turkey						x						x	
ARDEIDAE														
Ardea herodias	Great Blue Heron										x		x	water; colonial nester
Butorides virescens	Green Heron						x				x			small marshes and ponds
CATHARTIDAE														
Cathartes aura	Turkey Vulture										x			roosts overnight in woodlots
ACCIPITRIDAE														
Circus cyaneus	Northern Harrier				x	x					x	√	x	agricultural grasslands (OPIF)
Accipiter striatus	Sharp-shinned Hawk						x					√	x	woodland
Accipiter cooperii	Cooper's Hawk					x			x			√	x	woodland, less sensitive to human encroachment
Accipiter sp.														
Buteo lineatus	Red-shouldered Hawk				x								x	
Buteo jamaicensis	Red-tailed Hawk					x	x						x	nests/roosts along forest edges, hunts fields
Buteo lagopus	Rough-legged Hawk												x	
FALCONIDAE														
Falco sparverius	American Kestrel		LOW		x				x	x		maybe	x	open country; cavity nester
CHARADRIIDAE														
Charadrius vociferus	Killdeer	x	LOW			x	x							open fields
SCOLOPACIDAE														
Actitis macularia	Spotted Sandpiper					x	x							open fields
Scolopax minor	American Woodcock										x	x		early spring breeder; damp areas, woodland edges; scrub-shrub wetland (OPIF); shrub/early successional (OPIF)
COLUMBIDAE														
Columba livia	Rock Pigeon					x	x						x	urban-tolerant
Zenaidura macroura	Mourning Dove	xx				x	x						x	urban-tolerant
CUCULIDAE														
Coccyzus americanus	Yellow-billed Cuckoo										x			shrub/successional; caterpillar specialist; sensitive to pesticides
Coccyzus erythrophthalmus	Black-billed Cuckoo		LOW		x					x	x			shrub/successional; deciduous/mixed forest (OPIF);caterpillar specialist; sensitive to pesticides
Coccyzus sp.	Cuckoo species										x			
STRIGIDAE														
Megascops (Otus) asio	Eastern Screech-Owl						x			x			x	cavity nester
Bubo virginianus	Great Horned Owl						x						x	often shares habitat with Red-tailed Hawk
CAPRIMULGIDAE														
Chordeiles minor	Common Nighthawk		THR	SC							x			aerial insectivore
APODIDAE														
Chaetura pelagica	Chimney Swift		THR	THR	x				x	x				aerial insectivore; urban tolerant; nests in chimneys, hollow trees; needs dark, rough-textured vertical surfaces for nesting
TROCHILIDAE														
Archilochus colubris	Ruby-throated Hummingbird								x					urban-tolerant
ALCEDINIDAE														
Ceryle alcyon	Belted Kingfisher		LOW		x		x			x			x	sensitive to disturbance near nest sites; sensitive to water quality; erosion, flood control measures reduce availability of nesting burrows
PICIDAE														
Melanerpes erythrocephalus	Red-headed Woodpecker		THR	SC	x	x	x							shrub/early successional (OPIF); oak savannahs
Melanerpes carolinus	Red-bellied Woodpecker						x					√	x	woodland; cavity nester
Picoides pubescens	Downy Woodpecker	x					x			x			x	urban-tolerant; cavity nester
Picoides villosus	Hairy Woodpecker					x	x					√	x	woodland; cavity nester
Colaptes auratus	Northern Flicker	xx			x		x			x			x	urban-tolerant; shrub/early successional (OPIF); cavity nester, primary excavator requiring snags >30cm dbh; ant predator
Dryocopus pileatus	Pileated Woodpecker						x			x		√	x	woodland; cavity nester
Woodpecker sp.														
TYRANNIDAE														
Contopus virens														
	Eastern Wood-Pewee	x	SC		x				x	x		maybe		aerial insectivore; intermediate, closed-canopy woodlands; appears not nest near development

BIRD INVENTORY

SCIENTIFIC NAME	COMMON NAME	OBSERVED	SARA	SARO	OPIF	OBBA 2001-2005						Area-Sensitive	CBC	HABITAT NOTES
					BCR 13	Confirmed	Confirmed	Probable	Probable	Possible	Possible		2011-2013	
<i>Empidonax alnorum</i>	Alder Flycatcher													
<i>Empidonax traillii</i>	Willow Flycatcher				x			x	x		x	√		wetland (OPIF); scrub-shrub wetland (OPIF)
<i>Empidonax sp.</i>														
<i>Sayornis phoebe</i>	Eastern Phoebe						x							urban-tolerant
<i>Myiarchus crinitus</i>	Great Crested Flycatcher	xx						x	x			maybe		woodlands; of conservation concern; cavity nester
<i>Tyrannus tyrannus</i>	Eastern Kingbird				x	x	x					maybe		agricultural land
VIREONIDAE														
<i>Vireo gilvus</i>	Warbling Vireo							x	x					urban-tolerant
<i>Vireo olivaceus</i>	Red-eyed Vireo	x							x	x				woodlots; urban tolerant
CORVIDAE														
<i>Cyanocitta cristata</i>	Blue Jay					x	x						x	urban-tolerant
<i>Corvus brachyrhynchos</i>	American Crow					x	x						x	urban-tolerant; gather into winter roosts
ALAUDIDAE														
<i>Eremophila alpestris</i>	Horned Lark						x				x	maybe		fields
HIRUNDINIDAE														
<i>Progne subis</i>	Purple Martin						x	x						aerial insectivore; colonial nester
<i>Tachycineta bicolor</i>	Tree Swallow					x	x							urban tolerant
<i>Stelgidopteryx serripennis</i>	Northern Rough-winged Swallow					x	x							aerial insectivore; semi-colonial
<i>Pipilo fuscus</i>	Bark Swallow		THR		x		x							(OPIF)
<i>Petrochelidon pyrrhonota</i>	Cliff Swallow					x	x							aerial insectivore; colonial nester; urban tolerant
<i>Pseudotsuga</i>	Barn Swallow	xx foraging	THR	THR			x	x						aerial insectivore; colonial nester; urban tolerant
PARIDAE														
<i>Poecile atricapillus</i>	Black-capped Chickadee	x				x	x						x	cavity nester; urban tolerant
SITTIDAE														
<i>Sitta canadensis</i>	Red-breasted Nuthatch						x					√	x	woodland; cavity nester
<i>Sitta carolinensis</i>	White-breasted Nuthatch						x				x	√	x	woodland; cavity nester
CERTHIDAE														
<i>Certhia americana</i>	Brown Creeper								x			√	x	woodland
TROGLODYTIDAE														
<i>Thryothorus ludovicianus</i>	Carolina Wren													undergoing range expansion
<i>Troglodytes aedon</i>	House Wren	xx				x	x							urban-tolerant
<i>Troglodytes troglodytes</i>	Winter Wren										x	√		woodland
REGULIDAE														
<i>Regulus satrapa</i>	Golden-crowned Kinglet						x					√	x	woodland
TURDIDAE														
<i>Sialia sialis</i>	Eastern Bluebird						x	x				√	x	cavity nester
<i>Catharus fuscus</i>	Veery								x			√		woodland
<i>Hylocichla ustulata</i>	Wood Thrush		THR		x		x	x				√		deciduous/mixed forest (OPIF)
<i>Turdus migratorius</i>	American Robin	xx				x	x						x	urban-tolerant
MIMIDAE														
<i>Dumetella carolinensis</i>	Gray Catbird						x	x						urban-tolerant; fields, shrubby thickets
<i>Mimus polyglottos</i>	Northern Mockingbird					x	x					maybe	x	fields, shrubby thickets
<i>Toxostoma rufum</i>	Brown Thrasher				x		x	x				maybe		forest (OPIF)
STURNIDAE														
<i>Sturnus vulgaris</i>	European Starling	x				x	x						x	urban-tolerant; cavity nester
BOMBYCILLIDAE														
<i>Bombycilla cedrorum</i>	Cedar Waxwing					x			x				x	urban-tolerant; thickets near trees
PARULIDAE														
<i>Dendroica petechia</i>	Yellow Warbler					x	x							urban-tolerant; damp areas
<i>Dendroica magnolia</i>	Magnolia Warbler								x					
<i>Dendroica pinus</i>	Pine Warbler								x			√		woodland
<i>Setophaga ruticilla</i>	American Redstart						x					√		woodland
<i>Seiurus aurocapilla</i>	Ovenbird								x			√		woodland
<i>Oporornis philadelphia</i>	Mourning Warbler					x	x					√		woodland
<i>Geothlypis trichas</i>	Common Yellowthroat	x					x	x						damp areas
THRAUPIDAE														
<i>Piranga olivacea</i>	Scarlet Tanager					x			x			√		deciduous/mixed forest (OPIF)
EMBERIZIDAE														
<i>Pipilo erythrophthalmus</i>	Eastern Towhee				x					x	x			shrub/mid- to late successional
<i>Spizella arborea</i>	American Tree Sparrow												x	wintering species only
<i>Spizella passerina</i>	Chipping Sparrow	xx					x	x						urban-tolerant
<i>Spizella pusilla</i>	Field Sparrow		MID		x		x			x		√		grassland, shrub/early successional (OPIF)
<i>Poocetes gramineus</i>	Vesper Sparrow				x		x					√		grassland
<i>Passerculus sandwichensis</i>	Savannah Sparrow	xx			x	x	x					√		grassland, fields, may be area-sensitive
<i>Melospiza melodia</i>	Song Sparrow	xxx				x	x							shrub/early successional (OPIF)
<i>Melospiza georgiana</i>	Swamp Sparrow							x			x			
<i>Zonotrichia albicollis</i>	White-throated Sparrow											√	x	woodland
<i>Junco hyemalis</i>	Dark-eyed Junco												x	wintering species only
<i>Plectrophenax nivalis</i>	Snow Bunting												x	wintering species only
CARDINALIDAE														
<i>Cardinalis cardinalis</i>	Northern Cardinal	x					x	x					x	urban-tolerant

BIRD INVENTORY

[illegible]