Environment AECOM

The Corporation of the City of Mississauga

Natural Environment Report
Creditview Road
Class Environmental Assessment

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AECOM: 2015-04-13

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1. Introduction

AECOM Canada Limited (AECOM) was retained by the City of Mississauga to complete a Natural Environment Report for the proposed widening of a 2.2 kilometre (km) section of Creditview Road in the City of Mississauga, Region of Peel (hereafter referred to as the Study Area). The following report will summarize the existing terrestrial and aquatic features, forms and functions within and in the vicinity of the Study Area; analyze the significance of these features, assess the potential impacts of the project and recommend mitigation measures.

As part of this study, current and historical background information was collected and reviewed and applicable regulatory agencies were consulted regarding specific natural heritage data sources. Furthermore, field investigations were conducted where data gaps were identified in the Study Area through the background information review. The description of the Study Area provided below identifies the limits investigated for the purpose of this Report. Information presented herein serves as the baseline for identifying and assessing potential impacts associated with proposed undertaking.

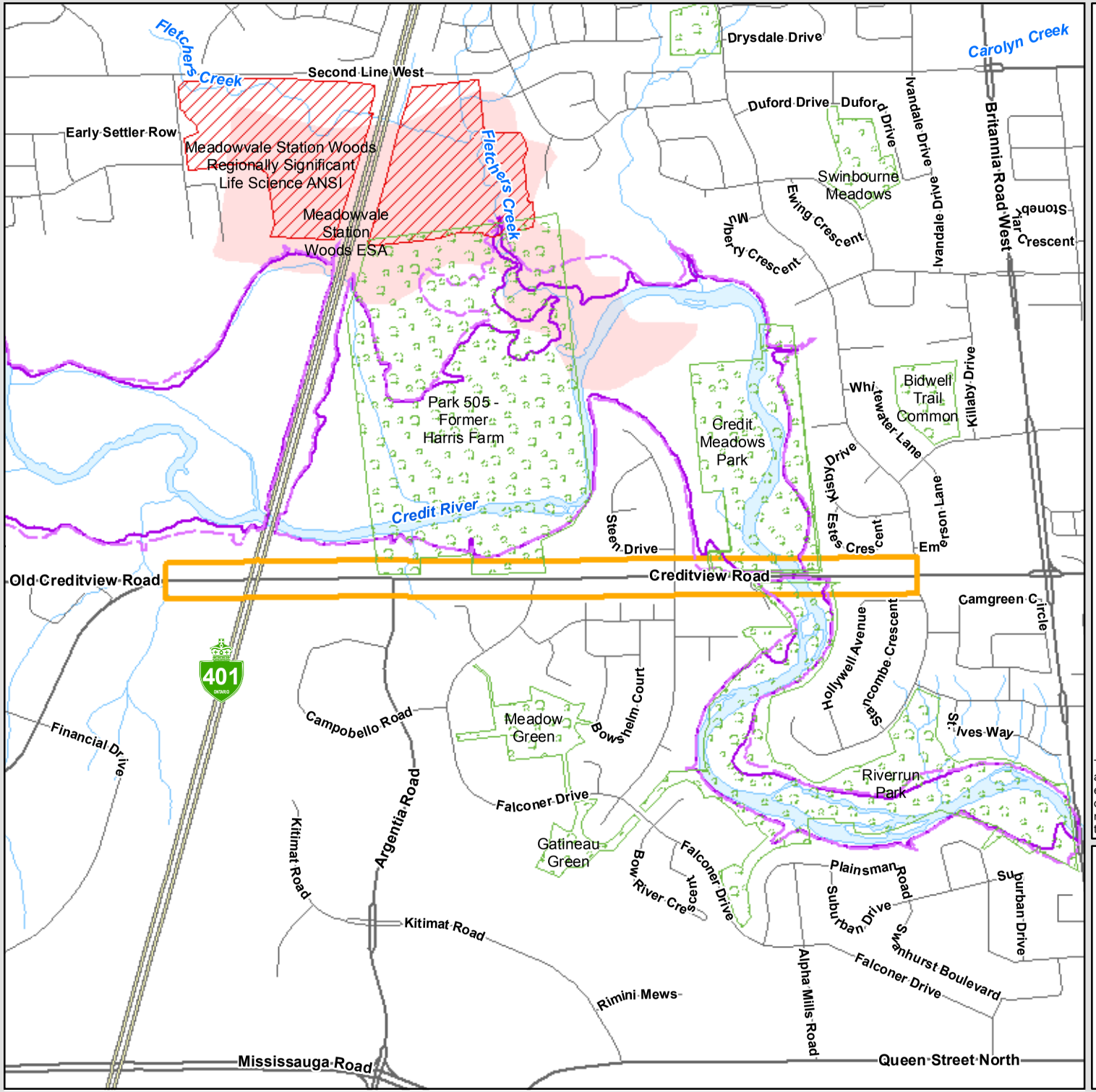
1.1 Study Area

The Study Area is located along a 2.2 km section of Creditview Road in the City of Mississauga, Region of Peel. Creditview Road is a major north-south collector road with a 2-lane cross section. The Study Area runs from Bancroft Drive to Old Creditview Road and includes a bridge over the Credit River at the south end and a bridge over Highway 401 in the north end. The Study Area falls entirely within the jurisdiction of the Credit Valley Conservation Authority (CVC). The Study Area includes a 120 metre (m) setback applied to either side of Creditview Road wherein identified natural features were documented through background information review and where vegetation was mapped. Field investigations were concentrated within a 50 m setback which was determined to be sufficient to identify potential impacts on the natural heritage features associated with the proposed undertaking.

The southern portion of the Study Area is generally comprised of heavy residential areas and two park properties either owned or managed by the City, including Credit Meadows Park and Riverrun Park located near the Creditview Road crossing of the Credit River. The northern portion of the Study Area is mostly comprised of culturally influenced meadows and woodland, primarily associated with the City-owned former Harris property situated on the east side of Creditview Road, and commercial/industrial developments on the west. **Figure 1** below presents the Study Area boundaries used for the purpose of this report.

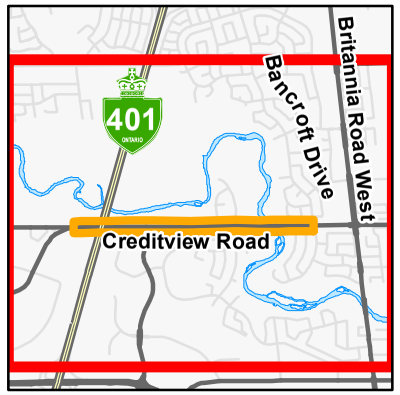
This Municipal Class Environmental Assessment (Class EA) study is being carried out to address potential road improvements to Creditview Road, but not directly with the bridge over the Credit River. A separate Class EA study was completed by the City of Mississauga in January 2013 for the Creditview Road Bridge over the Credit River which addressed environmental conditions and identified potential impacts.

In addition, a Transportation Environmental Study Report was prepared for the MTO Class Environmental Assessment Study for Highway 401 improvements from east of the Credit River to Trafalgar (W.O. 07-20021) in May 2013 which documented existing environmental conditions in the vicinity of the Creditview Bridge over Highway 401. This recent secondary source information was referenced in the assessment of existing conditions for this study.



Legend

- Study Area
- 100-Year floodline
- Regulatory floodline
- Freeway
- Major Road
- Local Road
- Watercourse
- Waterbody
- City Park
- Areas of Natural and Scientific Interest (ANSI)
- Environmentally Sensitive Areas (ESA)



Basemapping from Ontario Ministry of Natural Resources Orthophotography:

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Natural Environment Existing Conditions Interim Report for Creditview Road Class EA

Natural Environment Existing Conditions

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Figure 1

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2. Methods

2.1 Background Information Review

A review of natural heritage features and functions within and in the vicinity of the Study Area was established through a review of secondary information sources, including the following:

- Ontario Ministry of Natural Resources (MNR) Natural Resource Values Information System (NRVIS) mapping
- Digital orthoimagery
- Credit River Watershed and subwatershed studies
- Conservation Ontario 2013 Aquatic Species at Risk distribution mapping
- Credit Valley Conservation Authority (CVC) Fish Collection Records
- Forest Regions of Canada (Rowe, 1972)
- Atlas of the Breeding Birds of Ontario online data summaries for the 1981-1985 and 2001-2005 records (Cadman et al., 2005)
- Atlas of the Mammals of Ontario (Dobbyn, 1994)
- Ontario Reptile and Amphibian Atlas (Ontario Nature, 2011)
- City of Mississauga Natural Area Survey 2011 and 2012 Updates
- City of Mississauga Official Plan (2013)
- Terrestrial Ecosystems and Impact Assessment Report for Highway 401 Widening from Highway 403/401 Interchange to the Credit River (AECOM, 2012)
- Ontario Ministry of Natural Resources Species at Risk in Ontario website (http://www.mnr.gov.on.ca/en/Business/species/index.html)

Secondary source information was compiled and analyzed in order to develop a general understanding of the terrestrial and aquatic ecosystems, vegetation and wildlife within the Study Area. In addition, correspondence was initiated with Credit Valley Conservation Authority (CVC), and the Ontario Ministry of Natural Resources and Forestry (MNRF) to confirm information presented in this report is current and to request any additional relevant natural heritage information.

2.2 Field Investigations

Terrestrial field investigations took place within the Study Area on October 18, 2013; and April 21, May 20, June 6 and June 23, 2014. These surveys focused on describing vegetation communities identified through aerial photographic interpretation along Creditview Road and on specific wildlife surveys, as described below.

Field investigation methods used by AECOM field biologist are detailed as follows.

2.2.1 Ecological Lands Classification

Each vegetation community was assessed and delineated into Ecological Land Classification (ELC) units following Lee et al., (1998). This protocol currently uses a six level classification system (Site Region, System, Community Class, Community Series, Ecosite and Vegetation Type). Vegetation communities are defined as a mappable

landscape unit that contains consistent environmental conditions and vegetation characteristics. Wherever possible, vegetation communities were described to the Vegetation Type, which is the finest level of classification and is based on the dominant plant species composition present in the community. Where vegetation communities did not fit within ELC designations or "codes" as described in the First Approximation of the Southern Ecological Land Classification (Lee et al., 1998), new ELC codes that provided a better fit for the vegetation community descriptions were used from the Second Approximation of the ELC (Lee et al., 2009), which is still being developed by the MNR. In some cases, AECOM Staff created a list of "new" ELC codes (e.g., CUHa, CUW1a, etc.) when no existing ELC codes were applicable. The full ELC assessment consisted of a combination of soil profile analysis where applicable and multilayer (canopy, sub-canopy, shrub layer and ground cover) vegetation inventories. GPS coordinates were taken at each vegetation community and a complete vascular plant list was compiled . Identified sources of anthropogenic disturbances within vegetation communities were also noted.

2.2.2 Wetland Classification

Wetland communities were searched for within the Study Area and delineated using the ELC protocol as described above. More specifically, wetland boundaries were delineated where 50% of the ground cover was covered by wetland indicator species, which prefer temporary or permanent wet conditions, in accordance with the Ontario Wetland Evaluation System protocol (MNR, 2013a). To further confirm the wetland boundary, a soil profile of at least 60 centimetres (cm) deep was sampled using a soil auger in order to determine if there was indication of hydric soils such as the presence of mottles and/or gley.

2.2.3 Wildlife

Nocturnal amphibian surveys were conducted on April 21 and May 20, 2014. These consisted of listening for calling amphibians at locations potentially suitable for breeding amphibians. Only one candidate amphibian breeding site was present in the Study Area. Site conditions and the possible presence of amphibians were also documented at this candidate breeding site on June 6, 2014.

Breeding bird surveys were conducted on the mornings of June 6 and June 23, 2014 during the peak of the breeding season. All birds seen and heard within 100 m on either side of Creditview Road were mapped at their respective locations. Any evidence of breeding was documented such as territorial singing male or pairs present within suitable habitat. Species recorded on both dates, following protocol for the Ontario Breeding Bird Atlas (Cadman et al. 2006), were considered to be probable breeders.

Incidental observations of wildlife such as species sighting, tracks, scat, as well as any other wildlife activity were noted on all field visits.

2.2.4 Species at Risk

A habitat assessment for each of the potential Species at Risk identified through the background information review was undertaken to determine whether suitable habitat was present within the limits of the Study Area.

3. Existing Conditions

The following sections detail the existing conditions within the Study Area as determined through a combination of background information review and field investigations.

3.1 Background Information Review

3.1.1 Aquatic Environment

The Study Area is situated within the Credit River Watershed which covers a drainage area of approximately 1,000 square kilometres (km^2) and is under the jurisdiction of the CVC. Credit River and its tributaries flow approximately 1,500 km^2 southeast towards Lake Ontario from its headwaters in Orangeville (CVC, 2011). The Credit River Watershed is divided into three physiographic zones including the Upper, Middle and Lower Watersheds. The Study Area is located within the Lower Watershed, which includes most of the City of Mississauga and contains 87% of the entire watershed's population (CVC, 2012a). The Lower Watershed has a flat landscape and is highly urbanized. Land use in the Lower Watershed is dominated by urban use (60%) followed by agricultural and open space (24%). Upland woodlands, successional meadows and wetlands comprise 7%, 8% and 1% of the remaining landscape respectively (CVC, 2012b).

CVC monitors key aquatic and terrestrial indicators to track the health of the Credit River Watershed. CVC also monitors the groundwater quality of the Watershed following the PGMN Long-term Groundwater Quality Sampling Program and uses two groundwater quality parameters, chloride and nitrogen concentrations. In the Lower Watershed, chloride concentrations are below the Canadian Water Quality Guidelines (CWQG) and Ontario Drinking Water Standards, Objective and Guidelines (ODWS) while nitrogen concentrations exceed the same guidelines. High nitrogen concentrations are likely the result of agricultural run-off although there is a weak decreasing trend of nitrogen concentrations for the whole watershed (CVC, 2012c).

The water quality in Fletcher's Creek, a tributary of Credit River which runs approximately 500 m east of Creditview Road, is poor due to the high concentrations of chloride, phosphorus, aluminum, copper and iron that exceed Provincial Water Quality Objectives (PWQO), thereby reducing the water quality of Credit River (CVC, 2013a). Overall, the Credit River Watershed Report Card 2013 (CVC) ascertains the Lower Watershed to have poor to very poor water quality in Credit River and its tributaries and poor to very poor forest conditions (CVC, 2013b).

The Credit River Watershed also is divided into 22 subwatersheds, of which the Study Area falls within the Norval to Port Credit Subwatershed. A Norval to Port Credit Subwatershed Study is currently in progress and partially completed by CVC.

3.1.1.1 Fish and Fish Habitat

The section of the Credit River that falls within the Study Area supports a mix of cool and warm water fish communities as described in the Credit River Fisheries Management Plan (MNR and CVC, 2002). The Lower Watershed is known for its migratory runs of trout and salmon in Credit River and for its restoration of Atlantic Salmon to Lake Ontario (CVC, 2011). Although there are healthy populations of trout, salmon and bass, minnows are the most common fish species in Credit River. Fish communities in the Lower Watershed are generally classified as having poor fish community health with fish communities primarily comprised of species that are tolerant to environmental disturbance such as Blacknose Dace (*Rhinichthys atratulus*) and Creek Chub (*Semotilus atromaculatus*) (CVC, 2013c).

Fish data collection records for the Study Area were obtained from CVC on November 11, 2013. A total of 25 fish species were recorded at eight monitoring stations along Credit River between 1954 and 2001. The majority of the species are representative of an intermediate to tolerant, mixed cool and warmwater fish community. Common fish species include Bluntnose Minnow (*Pimephales notatus*), Common Shiner (*Luxilus cornutus*), Creek Chub, Rainbow Darter (*Etheostoma caeruleum*) and White Sucker (*Catostomus commersonii*). In addition, there are two historical records of Redside Dace (*Clinostomus elongatus*), designated as Endangered under the ESA, reported at two separate locations along the Credit River which are more than 600 m upstream and more than 450 m downstream of Creditview Road, respectively. These records are more than 20 years old (from 1989 and 1954) and therefore are considered to be historical records. As a result, it is not anticipated that Redside Dace still occurs within the Study Area.

Furthermore, according to CVC 2013 Aquatic Species at Risk mapping (Conservation Ontario, 2013), Fletcher's Creek, which flows into the Credit River north of the Study Area, is identified as having known distributions of fish species designated as Extirpated, Endangered or Threatened that are not currently on Schedule 1 of the federal *Species at Risk Act* (SARA), but are anticipated to be added to Schedule 1. This tributary has been identified as Redside Dace recovery Habitat by MNR.

The Study Area does not include the bridge spanning the Credit River therefore no impacts to the Credit River are anticipated. Mitigation measures would mitigate any indirect effects of the purposed works on the nearby Credit River. Considering that the Fletcher's Creek is 500 m away from the Study Area and that no impacts are expected in the connecting Credit River, no negative impacts are anticipated for Species at Risk or Species at Risk habitat within Fletcher's Creek.

3.1.2 Terrestrial Environment

The Study Area is located within Ecoregion 7E (Lake Erie – Lake Ontario Ecoregion, also known as the Carolinian Forest Ecoregion). An ecoregion is defined by the Ministry of Natural Resources (MNR) as "an area of land within which the response of vegetation to the features of landform follows a consistent pattern" and is "defined by a characteristic range and pattern of climatic variables" (MNR, 2007). Ecoregion 7E is the southernmost Ecoregion in Ontario and generally consists of a flat landscape formed as a result of thick deposits glacial and post-glacial sediments in the Late Wisconsin glacial period. The bedrock is primarily composed of exposed limestone, with the exception of the southern portion of the Niagara Escarpment. Wetlands and water are found on less than 2% of the ecoregion (MNR, 2007a). Ecoregion 7E has the greatest diversity of flora and fauna species in Canada, and is home to approximately 2,200 species of herbaceous plants, 70 species of trees, and 400 species of birds (MNR, 2007a).

According to the Forest Regions of Canada (Rowe, 1972), the study area occurs within the Deciduous (Carolinian) Forest Region which are dominated by deciduous trees. Dominant tree species in this region predominantly consist of Sugar Maple (*Acer saccharum*) and American Beech (*Fagus grandifolia*) as well as Basswood (*Tilia americana*), Red Maple (*Acer rubrum*), White Oak (*Quercus alba*) and Bur Oak (*Quercus macrocarpa*) (Rowe, 1972).

The Study Area stretches along 2.2 km of Creditview Road from Bancroft Avenue to north of Hwy 401, crossing the Credit River at the south end. The majority of the terrestrial environment consists of roadside trees planted approximately 5-10 metres from Creditview Road. Other terrestrial features include riparian vegetation and wooded areas surrounding Credit River that are considered as part of the Natural Heritage System as identified in Schedule 3 of the City of Mississauga Official Plan (2015).

According to the CVC Credit River Watershed Health Report, the forest integrity of the Lower Watershed is generally poorer than the Middle and Upper Watershed as result of heavy urbanization. Forest communities in the Lower

Watershed have low species richness, few ephemeral spring species, and a higher abundance of weedy non-native species that are tolerant of disturbance. Bird species similarly contain a higher abundance of habitat generalists that are typical of highly urbanized areas (CVC, 2013d). The wetland integrity for the Lower Watershed is ranked as fair to poor which is attributed to the high abundance of non-native and invasive species. Frog communities are dominated by disturbance tolerant species such as Green Frogs and American Toads (CVC, 2013e).

3.1.2.1 Wildlife

Some common mammals, birds and herpetofauna of southern Ontario are anticipated to be present in the Study Area. These are discussed in more detail below.

Birds

A list of breeding bird species previously recorded within the general vicinity of the Study Area was obtained from the Atlas of the Breeding Birds of Ontario Database (Bird Studies Canada 2013). The study area lies within a 10 x 10 kilometre UTM square 17PJ02, whereby common birds to the area were listed (refer to **Appendix A** for a complete bird species list). The majority of these birds are common and are adapted to human-modified landscapes, such as urban or suburban areas or agricultural fields. Seven of these bird species, including Barn Swallow (*Hirundo rustica*), Bobolink (*Dolichonyx orzyvorus*), Chimney Swift (*Chaetura pelagica*), Common Nighthawk (*Chordeiles minor)*, Eastern Meadowlark (*Sturnella magna*), Eastern Wood Pewee (*Contopus virens*) and Peregrine Falcon (*Falco peregrinus*), are designated as Species at Risk in Ontario under the *Endangered Species Act 2007* (the ESA). These species are discussed in greater detail in the following Section 3.1.2.2 below, including a description of their preferred habitat attributes and whether negative effects as a result of this project are anticipated.

Mammals

According to the Atlas of the Mammals of Ontario (Dobbyn, 1994), the geographic distributions of the following mammal species of southern Ontario overlap with the Study Area: Little Brown Bat (*Myotis lucifugus*), Silver-haired Bat (*Lasionycteris noctivagans*), Big Brown Bat (*Eptesicus fuscus*)**,** Northern Myotis (*Myotis* septentrionalis), White-tailed Deer (*Odocoileus virginianus*), Red Squirrel (*Tamiasciurus hudsonicus*), Eastern Gray Squirrel (Sciurus carolinensis), Virginia Possum (*Didelphis virginiana*), Eastern Chipmunk (*Tamias striatus*), Meadow Vole (*Microtus pennsylvanicus*), Woodchuck (*Marmota monax*), Beaver (*Castor canadensis*), White-footed Mouse (*Peromyscus leucopus*), House Mouse (*Mus musculus*), Muskrat (*Ondatra zibethicus*), Meadow Jumping Mouse (Zapus hudsonius), Red Fox (*Vulpes vulpes*), Raccoon (*Procyon lotor*), Mink (*Mustela vison*), Striped Skunk (*Mephitis mephitis*) and Eastern Cottontail (*Sylvilagus floridanus*). These species are generally common mammals with the exception of Little Brown Bat and Northern Long-eared Bat which are designated as Endangered under the ESA. These are discussed in greater detail in Section 3.1.2.2, including a description of their preferred habitat attributes and whether negative effects as a result of this project are anticipated.

Herpetofauna

According to the Ontario's Reptile and Amphibian Atlas (Ontario Nature, 2013), the following amphibian species have historical and/or recent occurrence records within the 10 x 10 km atlas square 17PJ02 which includes the Study Area: Common Mudpuppy (*Necturus maculosus*), Jefferson Salamander (*Ambystoma jeffersonianum*), Red-spotted Newt (*Notophthalmus viridescens*), Eastern Red-backed Salamander (*Plethodon cinerus*), Spotted Salamander (*Ambystoma maculatum*), American Toad (*Bufo americanus*), Spring Peeper (*Pseudacris crucifer*), Western Chorus Frog (*Pseudacris triseriata*), Gray Treefrog (*Hyla versicolor*), Wood Frog (*Rana sylvatica*), Northern Leopard Frog (*Rana pipiens*), Green Frog (*Rana clamitans*), and Bullfrog (*Rana catesbeiana*). Breeding amphibians are generally found in ponds and temporary vernal pools in spring where they mate and lay eggs in the water. As

such, suitable habitat may be located within wooded areas in the Study Area for these species. Jefferson Salamander is a Species at Risk, designated as Endangered under the ESA and is discussed in greater detail in the following Section 3.1.2.2.

According to the Ontario's Reptile and Amphibian Atlas (Ontario Nature, 2013), the following reptile species have historical and/or recent occurrence records within the atlas square 17PJ02: Midland Painted Turtle (*Chrysemys picta marginata*), Snapping Turtle (*Chelydra serpentina*), Dekay's Brownsnake (*Storeria dekayi*), Eastern Gartersnake (*Thamnophis sirtalis*), Eastern Ribbonsnake (*Thamnophis sauritus*), Milksnake (*Lampropeltis triangulum*), Northern Watersnake (*Nerodia sipedon sipedon*) and Red-bellied Snake (*Storeria occipitomaculata*). Generally, turtles are found in or near permanent water bodies and snakes hibernate in rock crevices, rock piles or abandoned foundations. As such, suitable habitats for these reptile species have the potential to occur in the Study Area. Snapping Turtle, Eastern Ribbonsnake and Eastern Milksnake are Species at Risk in Ontario and are discussed in greater detail in Section 3.1.2.2.

This past year (2013), two Snapping Turtles and two Midland Painted Turtles were reported anecdotally by a local resident as roadkill near the Creditview Road Bridge, crossing the Credit River. The two Snapping Turtles were reported to be laying eggs at the time. This observation confirms that there is a population of Snapping Turtles present in the Credit River and that some gravid female turtles come up from the river to lay eggs in the shoulder of Creditview Road in sand and gravely substrate.

3.1.2.2 Species at Risk

With respect to Species at Risk (SAR) within the Study Area, the Ontario Ministry of Natural Resources Species at Risk in Ontario website (MNR, 2013b) was searched for SAR that may occur within the Region of Peel. A list of SAR known to occur within the Region of Peel and their preferred habitat was obtained. This list is supplemented with the results from the Atlas of Breeding Birds in Ontario, Ontario's Reptile and Herpetofauna Atlas and Atlas of Mammals of Ontario to create a complete list (**Table 1**). Species at Risk habitat assessments and their respective potentials to occur in the Study Area were examined during field investigations and the results of which are discussed in Section 3.2.3 below.

Table 1. Known Species at Risk within Region of Peel

Endangered Species	Threatened	Special Concern
▪ Loggerhead Shrike (*Lanius ludovicianus*) ▪ Henslow's Sparrow (*Ammodramus henslowii*) ▪ Redside Dace (*Clinostomus elongates*) ▪ Rapids Clubtail (*Gomphus quadricolor*) ▪ Butternut (*Juglans cinerea*) ▪ Jefferson Salamander (*Ambystoma jeffersonianum*) ▪ Rusty-patched Bumble Bee (*Bombus afinis)* ▪ Little Brown Bat (*Myotis lucifugus*) ▪ Northern Long-eared Bat (*Myotis septentrionalis*)	▪ Least Bittern (*Ixobrychus exilis*) ▪ Barn Swallow (*Hirundo rustica*) ▪ Bobolink (*Dolichonyx oryzivorus*) ▪ Cerulean Warbler (*Dendroica cerulean*) ▪ Chimney Swift (*Chaetura pelagica*) ▪ Eastern Meadowlark (*Sturnella magna*) ▪ Blanding's Turtle (*Emydoidea blandingii*) ▪ Eastern Musk Turtle (*Sternotherus odoratus*)	▪ Peregrine Falcon (*Falco peregrinus*) ▪ Common Nighthawk (*Chordeiles minor*) ▪ Eastern Wood Pewee (*Contopus virens)* ▪ Eastern Ribbonsnake (*Thamnophis sauritus*) ▪ Milksnake (*Lampropeltis triangulum*) ▪ Snapping Turtle (*Chelydra serpentina*) ▪ Map Turtle (*Graptemys geographica*) ▪ Northern Brook Lamprey (*Ichthyomyzon fossor*) ▪ Lake Sturgeon (*Acipenser fulvescens*) ▪ Monarch (*Danaus plexippus*) ▪ Hart's-tongue Fern (*Asplenium scolopendrium*) ▪ Hill's Pondweed (*Potamogeton hillii*)

3.1.2.3 Designated Natural Areas

According to MNR's Natural Resource Values Information System (NRVIS) mapping (MNR, 2011), there are no Provincially or Locally Significant Wetlands, unevaluated wetlands or Provincial Parks in or within the vicinity of the Study Area. In addition, there are no Areas of Natural Scientific Interest (ANSI) or Environmentally Sensitive Areas (ESA) located in the Study Area; however, the Meadowvale Stations Woods Environmentally Sensitive Area (ESA), Conservation Area and Regionally Significant Life Science ANSI are approximately 550 m east of the Study Area near Hwy 401 (Figure 1). Meadowvale Station Woods ESA and ANSI provides habitat for a high diversity of plant and wildlife species. In addition, this forested area supports a high deer population (MMM and Ecoplans Ltd., 2005; CVC, Date Unknown). No negative impacts are anticipated to this ESA and ANSI as result of the proposed undertaking given its distance from the Study Area.

3.1.2.4 Credit Valley Conservation Authority (CVC) Regulated Areas

The Study Area is located within the jurisdiction of the CVC, which enforces the Ontario Regulation 160/06 - Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses under Section 28 of the *Conservation Authorities Act*. Therein, Regulated Areas are defined where development could be subject to flooding, erosion or dynamic beaches, or where interference with wetlands and alterations to shorelines and watercourses might have an adverse effect on those environmental features. Any proposed development, interference or alteration within a Regulated Area would require a permit from CVC. The study area includes a portion of the Credit River Valley. Regulated Area mapping for the Study Area was obtained from CVC and is shown on **Figure 1.**

3.1.2.5 City of Mississauga Natural Areas

The City of Mississauga employs a Natural Areas System in order to protect, enhance and restore features in the natural environment and their ecological function and integrity. Natural Areas are characterized into Significant Natural Sites and Natural Sites classifications. An area is considered as a Significant Natural Site if it contains at least one of the following criteria: an Area of Natural and Scientific Interest (ANSI)/ Environmentally Sensitive Area (ESA); woodlands greater than 10 hectares in size; Floristic Quality Index (FQI) greater or equal than 40; areas which support provincially significant species (S1, S2, S3) or species at risk listed as special concern, threatened or endangered; woodlands which support old-growth trees; Significant Wetlands; and the Credit River and Etobicoke Creek valleys. While, Natural Sites must meet at least one of the following criteria: a woodland greater than two (2) ha but less than ten (10) ha; areas which support uncommon vegetation communities; areas which support regionally significant plant/animal species; areas that include natural landscape features.

According to the City of Mississauga Natural Areas Survey (NAS) 2011 Update, the following Significant Natural Site is located in the Study Area:

I. *CRR2 Credit Meadows - this natural area consists of cultural meadows, woodlands and deciduous forests within the Credit River valley along Creditview Road, south of Hwy 401. Five (5) Butternut trees (Juglans cinerea), a Species at Risk designated as Endangered under the ESA, were found in this Natural Area at two locations. These Butternuts were recorded as possible hybrids given their good health and lack of canker. Bird Species at Risk documented include Barn Swallow, Bobolink and Eastern Meadowlark. Amphibian surveys conducted in 2011 concluded that American Toad and Green Frog were prevalent at this site; however, no salamander species were found. Snapping Turtle was also recorded at this Site in 2011. A large cultural meadow located within the Study Area along the east side of Creditview Road and south of Hwy of 401 was added as a Special Management Area with the intention of restoring this cultural meadow to provide a bigger buffer to the adjacent CRR2 forests.*

Minimal vegetation removal is anticipated within the CRR2 Credit Meadows Significant Natural Site for the proposed widening of Creditview Road. Under Section 6.3.1.13 of the Mississauga Official Plan (City of Mississauga, 2013), development and site alteration is prohibited within or adjacent to Natural Areas and Special Management Areas unless an Environmental Impact Study (EIS) is conducted demonstrating that are no negative impacts to the features or their ecological function as result of the proposed development.

3.1.2.6 CVC Landscape Scale Analysis

CVC conducted a Landscape Scale analysis (LAS) of the City of Mississauga which assesses the ecosystem function of the City's natural and semi-natural areas and complements the existing Mississauga Natural Areas Survey (NAS). LAS uses nine criteria including (i) woodlands, (ii) wetlands, (iii) successional habitats, (iv) valleylands, (v) high habitat diversity, (vi) uncommon vegetation communities, (vii) ecological proximity , (viii) sub-regional connectivity and (ix) regional and provincial connectivity and applies a scoring system for each criterion based on established thresholds to determine habitat patches that are high – functioning. Based on this analysis, the Study Area contains lands that are considered as a high functioning woodland, wetland, successional area, valleyland, habitat diversity and regional and provincial connectivity linkage (CVC, 2012d).

3.2 Field Investigations

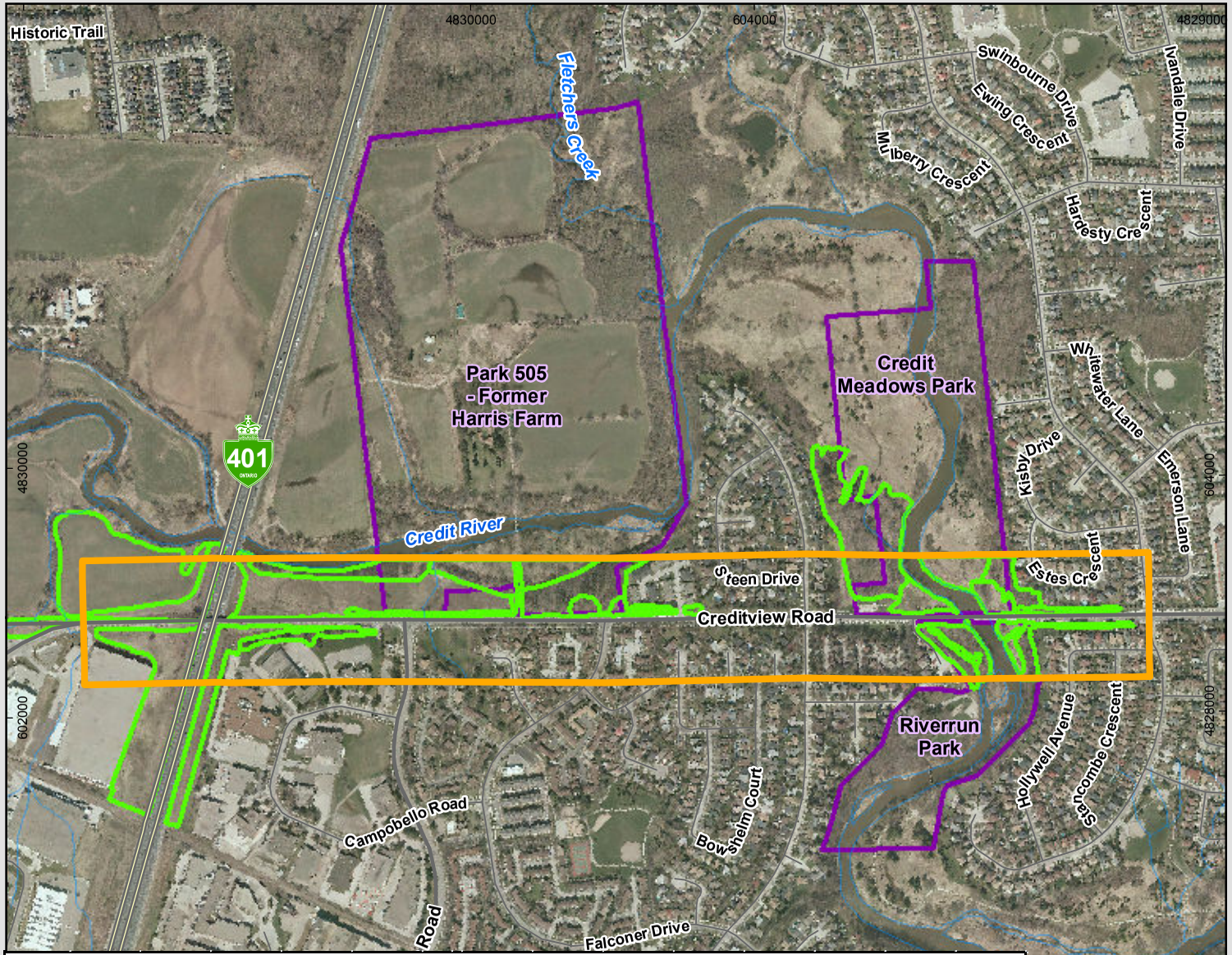
Site specific field investigations were conducted on October 18, 2013 along the section of Creditview Road that runs from Bancroft Drive to Old Creditview Road. Field investigations were concentrated within 50 m from Creditview Road but vegetation communities were mapped out to 120 m using airphoto interpretation since property access was not available.

3.2.1 Vegetation

Generally, the terrestrial conditions found within the Study Area comprise of anthropogenically influenced communities consisting of cultural meadows, woodlands and savannahs, as well as planted tree hedgerows along Creditview Road. Five natural areas of interest were identified through background review and aerial photography interpretation as natural areas occurring within the Study Area requiring further terrestrial surveys. These natural areas of interest are defined as follows:

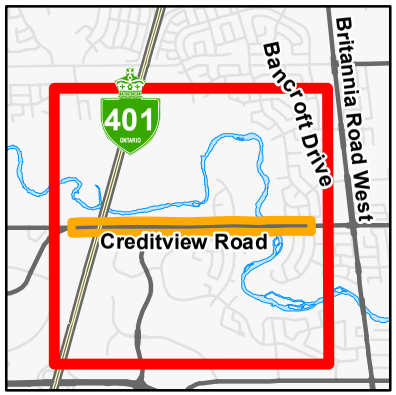
a) Credit Meadows Park;
b) Riverrun Park;
c) Woodland feature located on east side across from Falconer Drive (former Harris Farm property);
d) Meadow feature located on the east side of Creditview Road south of Hwy 401, a portion of which comprises the former Harris Farm property; and
e) Meadow features located around Creditview Road near Hwy 401.

The following sections describe the ELC vegetation communities found within each of the five natural areas of interest as well as any other vegetation communities located in between these natural features along Creditview Road. The locations of vegetation communities are shown on **Figure 2a to 2c**. A complete list of vascular plants observed in each vegetation community (excluding cultural hedgerows) is provided in **Appendix B**. A total of 124 plant species were observed in the Study Area. Of these, 57% of the plants are native species and 43% of the plants are non-native and/or invasive, indicating a high level of disturbance. No rare plant species including species with designations by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), Species at Risk in Ontario (SARO), or Provincially Ranked S1 to S3 species were observed in the Study Area. Although the City of Mississauga (NAS) 2011 Update has recorded Butternut (*Juglans cinerea*) within the CRR2 Significant Natural Site which contains these natural areas of interest, no Butternuts were observed in the Study Area limits during the field investigation.



Legend

- Study Area
- Freeway
- Major Road
- Local Road
- Watercourse
- Waterbody
- Ecological Land Classification
- Parklands



Basemapping from Ontario Ministry of Natural Resources
Orthophotography:

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UTM Zone 17N, NAD 83

Ecological Land Classification Vegetation Community Definitions			
MAMM 1-6	Tall Manna Grass Graminoid Mineral Meadow Marsh	CUS 1a	Black Walnut - White Ash - Sugar Maple Cutural Savannah
FODM 5-9	Dry - Fresh Sugar Maple - Hardwood Deciduous Forest	CUS 1b	Black Walnut - Hybrid Crach Willow Cultural Savannah
FOD 6-2	Fresh - Moist Sugar Maple - Black Maple Deciduous Forest	CUS 1c	Carolina Poplar Cultural Savannah
FOD 5-1	Dry - Fresh Sugar Maple Deciduous Forest	CUM 1-1	Dry - Moist Old Field Meadow
FOD	Deciduous Forest	CUH a	Austrian Pine - Blue Spruce Cultural Hedgerow
CUW	Cultural Woodland	CUH b	Norway Spruce Cultural Hedgerow
CUW 1a	Bur Oak - Shagbark Hickory - White Ash Cultural Woodland	CUH c	Norway Maple - Black Walnut - Silver Maple Cultural Hedgerow
CUW 1b	Shagbark Hickory - Weeping Willow - European Ash Cutural Woodland	CUH d	Sugar Maple - Black Walnut Cultural Hedgerow
CUW 1c	Sugar Maple - Black Walnut - White Pine Cultural Woodland	CUH e	Austrian Pine - Black Walnut - Norway Maple Cultural Hedgerow
CUT 1a	Tartarian Honeysuckle Cultural Thicket	AGR	Agircultural Field
CUT	Cultural Thicket		

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Vegetation Communities in the Study Area

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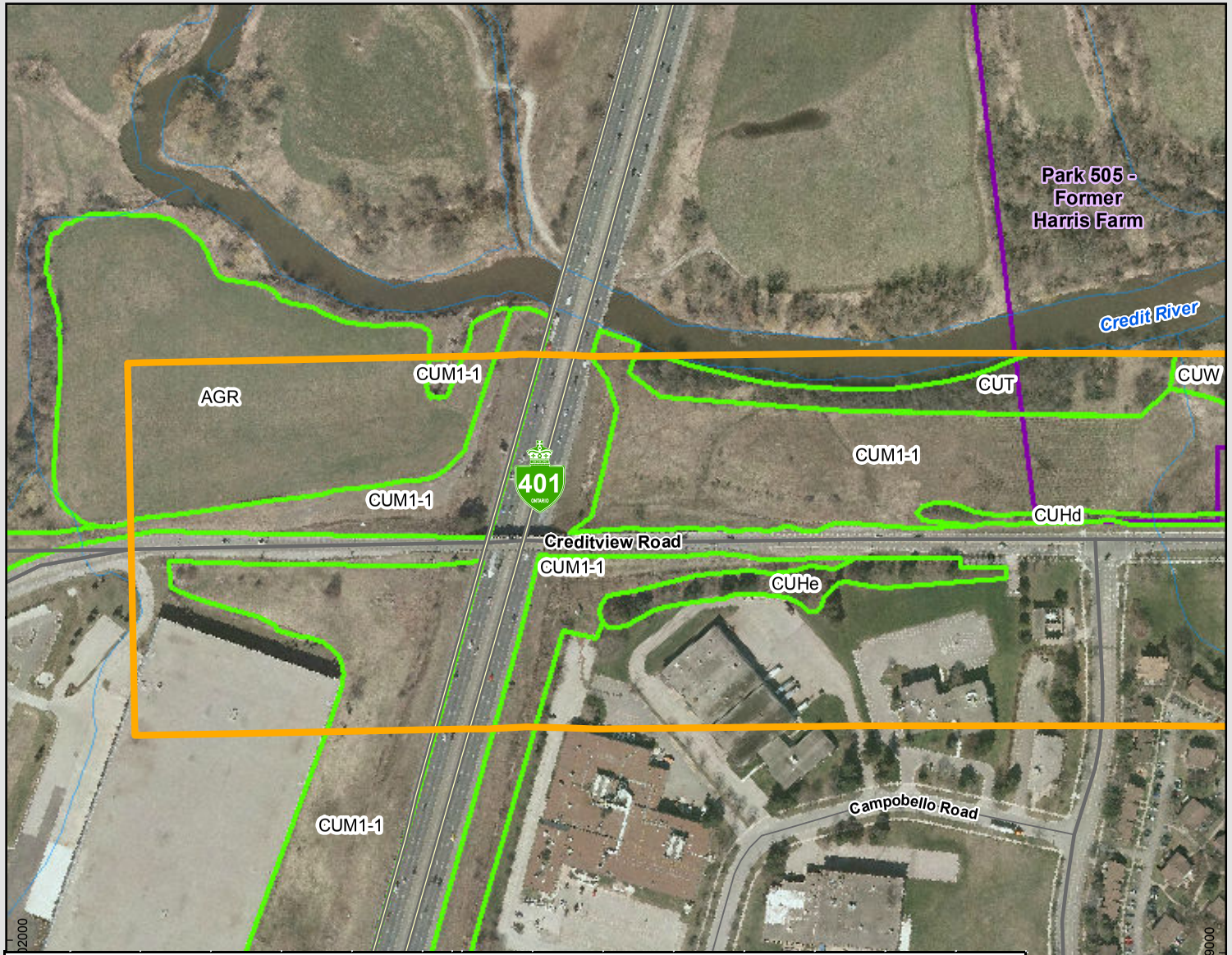
Figure 2



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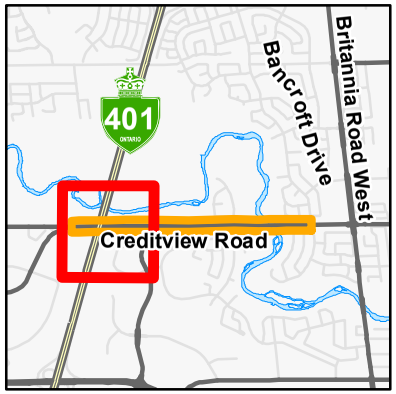

Basemapping from Ontario Ministry of Natural Resources
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UTM Zone 17N, NAD 83

Natural Environment Existing Conditions Interim Report for Creditview Road Class EA

Vegetation Communities in the Study Area

November 2015
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Figure 2a

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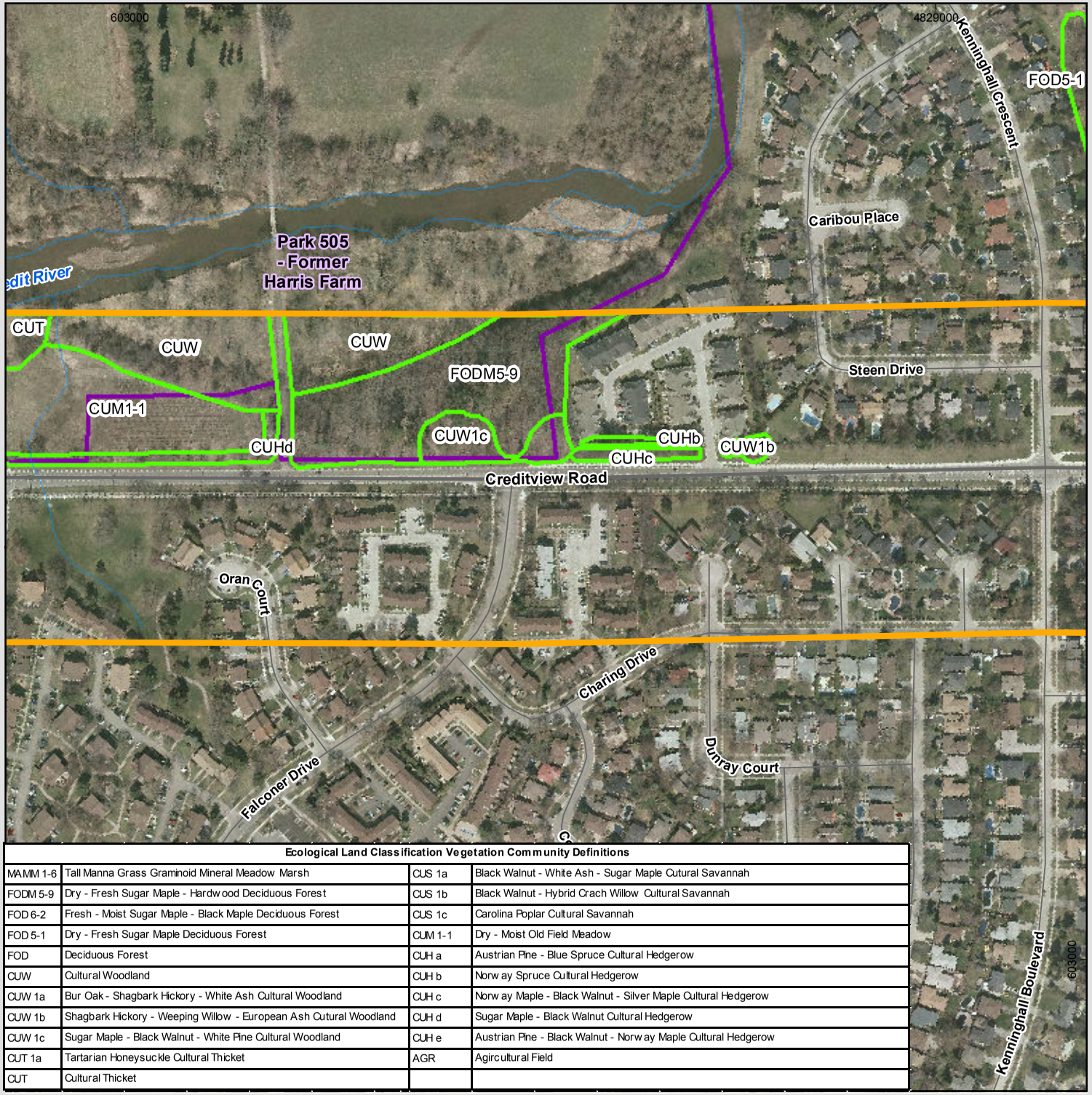

Legend

- Study Area
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- Major Road
- Local Road
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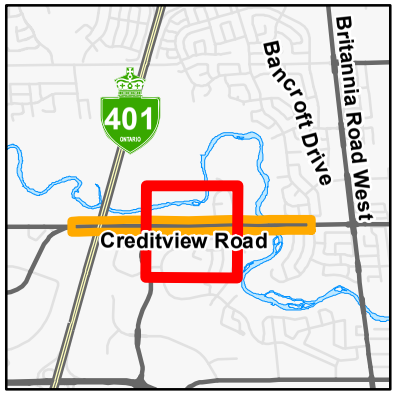
- Parklands



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UTM Zone 17N, NAD 83

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CUT 1a	Tartarian Honeysuckle Cultural Thicket	AGR	Agircultural Field
CUT	Cultural Thicket		

Natural Environment Existing Conditions Interim Report
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Vegetation Communities in the Study Area

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60304588

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Figure 2b

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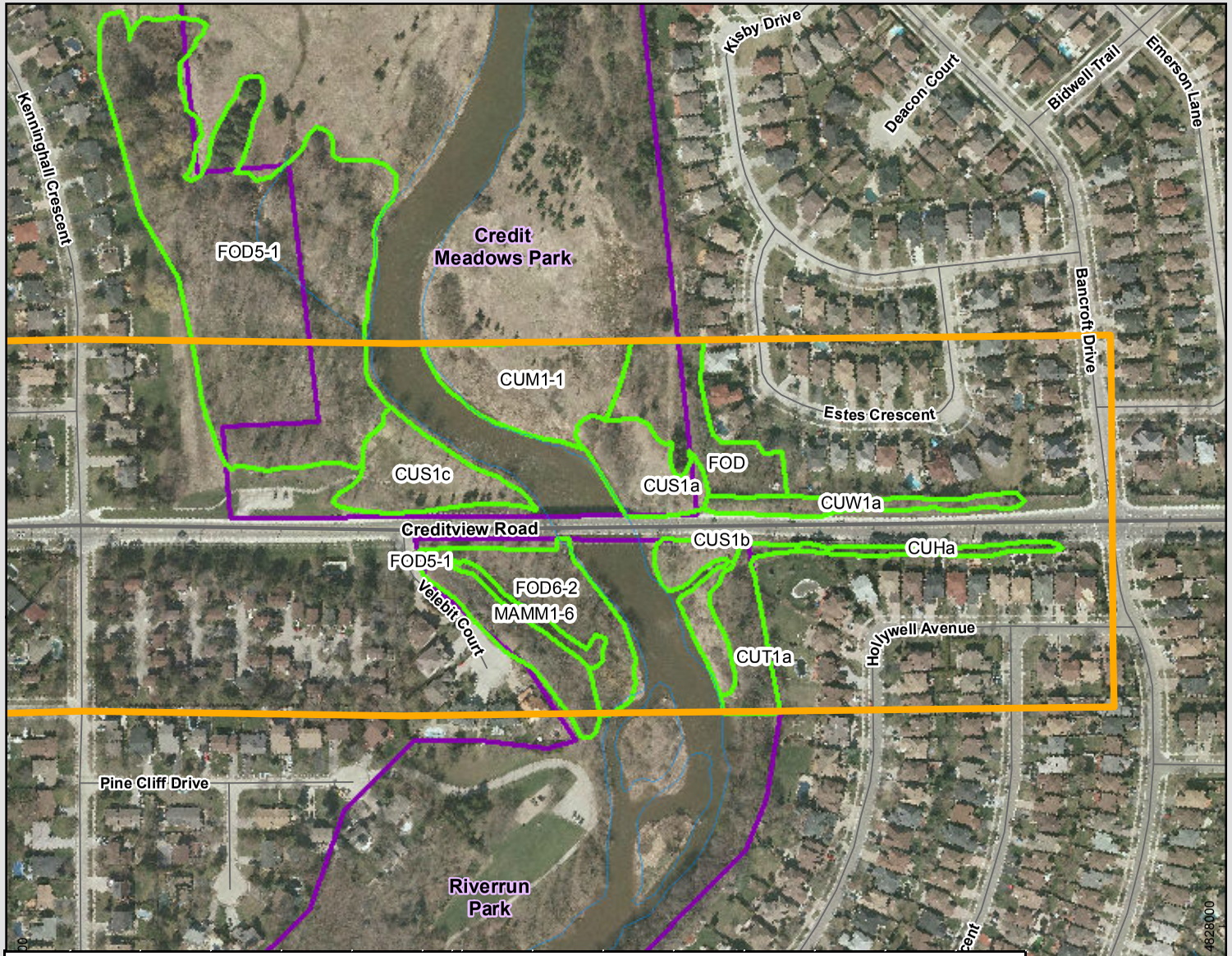

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FOD	Deciduous Forest	CUH a	Austrian Pine - Blue Spruce Cultural Hedgerow
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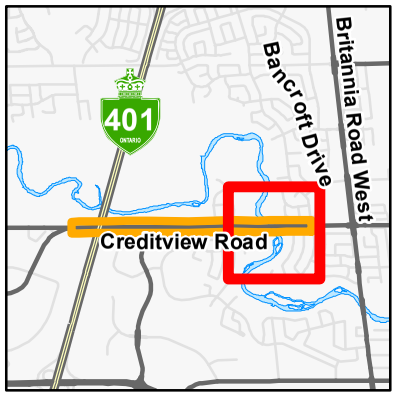

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Natural Environment Existing Conditions Interim Report for Creditview Road Class EA

Vegetation Communities in the Study Area

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Figure 2c

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3.2.1.1 Bancroft Drive to Credit Meadows Park

Two vegetation communities, a cultural woodland and cultural hedgerow were delineated during field investigations. These are described further below.

CUHa: Cultural Hedgerow – this planted hedgerow community is present along the west side of Creditview Road and consists of Austrian Pine (*Pinus nigra*) and Blue Spruce (*Picea pungens*).

CUW1a: Bur Oak – Shagbark Hickory – White Ash Cultural Woodland – the canopy of this mid-aged cultural woodland is co-dominated by Bur Oak (*Quercus macrocarpus*), Shagbark Hickory (*Carya ovata)* and White Ash (*Fraxinus americana*), with lesser amounts of Red Oak (*Quercus rubra*). Cultural woodland contains a tree canopy of between 35 and 60% resulting from human-caused disturbance. The shrub layer is largely dominated by Common Buckthorn (*Rhamnus cathartica*) with some Tartarian Honeysuckle (*Lonicera tartarica*) and Staghorn Sumac (*Rhus hirta*) also present. Dominant species in the forb layer include Quack Grass (*Elymus repens*), Garlic Mustard (*Alliaria petiolata*) and Tall Goldenrod (*Solidago altissima*). This cultural woodland is highly disturbed as evidenced by the relatively high proportions of invasive species such as Common Buckthorn and Garlic Mustard present.

3.2.1.2 Credit Meadows Park

Credit Meadows Park is located on the floodplain of Credit River, upstream of the Creditview Road crossing. Three vegetation communities were delineated during field investigations, including two cultural savannahs and deciduous forest. Each community is comprised as the following:

CUS1a: Black Walnut – White Ash – Sugar Maple Cultural Savannah– This young cultural savannah is located on the east valley slope of the Credit River. The canopy is co-dominated by Black Walnut (*Juglans nigra*), White Ash and Sugar Maple (*Acer saccharum*). Cultural savannah contains a tree canopy of between 25 and 35% resulting from human-caused disturbance. The shrub layer contains Russian Olive (*Elaeagnus angustifolia*) and Tartarian Honeysuckle. The ground layer is co-dominated by a mix of Reed-canary Grass (*Phalaris arundinacea*), Kentucky Bluegrass (*Poa pratensis*), Tall Goldenrod and Wild Teasel (*Dipsacus fullonum*).

CUS1c: Carolina Poplar Cultural Savannah– This young cultural savannah is located on the north valley slope of the Credit River. The sparse canopy is largely dominated by Carolina Poplar (*Populus X canadensis*) with a minor amount of Sugar Maple also present. Reed-canary grass and Tall Goldenrod dominate the ground layer, with some Wild Teasel also present. The ground cover contains Quack Grass, Kentucky Bluegrass and Wild Teasel. There are a few inclusions of Cattail Graminoid Mineral Meadow Marsh (MAMM1-2) found in the cultural savannah, located on the floodplain. The small and isolated meadow marsh depressions are comprised of Reed-canary Grass and Hybrid Cattail (*Typha X glauca*) and are likely the result of the undulating topography. Although there are isolated patches of meadow marsh communities, these are not considered to be suitable amphibian breeding habitat since these small depressions are unlikely to hold enough water throughout the amphibian breeding season. In addition, there are a few Trembling Aspen (*Populus tremuloides*) saplings planted in the cultural savannah with fencing around the base to protect the saplings from wildlife.

FOD5-1: Dry – Fresh Sugar Maple Deciduous Forest – This mature deciduous forest is located on the north valleys slope of credit River, adjacent to the cultural savannah. The canopy of this forest is largely dominated by Sugar Maple with lesser amounts of Black Walnut. The sub-canopy consists of Black Maple (*Acer nigra*) and Sugar Maple with some Common Buckthorn. Sugar Maple saplings with some Common Spindle Tree (*Euonymus europaeus*) and Wood Avens (*Geum urbanum*), an invasive species, are present in the ground cover.

3.2.1.3 Riverrun Park

Riverrun Park is located on the floodplain of Credit River, downstream of the Creditview Road crossing. A total of four vegetation communities were delineated during field investigations, including a cultural savannah, two deciduous forests. Each community is comprised of the following:

CUS1b: Black Walnut – Hybrid Crack Willow Cultural Savannah – this young cultural savannah is located on the south bank of Credit River. The canopy consists of equal parts of Black Walnut, Hybrid Crack Willow (*Salix X rubens*) and Carolina Poplar. The sub-canopy contains Bebb's Willow (*Salix bebbiana*) and Silver Maple (*Acer saccharinum*). The shrub layer is dominated by Tartarian Honeysuckle with some non-native rose (*Rosa sp.*). Kentucky Bluegrass dominates the ground cover, although some Tall Goldenrod is also present.

CUT1a: Tartarian Honeysuckle Cultural Thicket - A small dense cultural thicket is largely composed of Tartarian Honeysuckle occurs on a disturbed valley slope.

FOD6-2: Fresh – Moist Sugar Maple – Black Maple Deciduous Forest – this mature bottomland deciduous forest is located on the west bank of Credit River. The canopy is co-dominated by Sugar Maple and Black Maple with some Black Walnut present. The sub-canopy is comprised by Sugar Maple, Black Maple and Green Ash (*Fraxinus pennsylvanica*). The shrub layer contains Tartarian Honeysuckle and Choke Cherry (*Prunus virginiana*). Species present in the ground cover include Giant Goldenrod (*Solidago canadensis*), Wood Avens, Garlic Mustard and Sugar Maple seedlings.

MAMM1-6: Tall Manna Grass Graminoid Mineral Meadow Marsh – This is a narrow meadow marsh located at the western interface of the bottomland (FOD6-2) and upland deciduous forest (FOD5-1). This meadow marsh contains a large vernal pool, estimated to be 4 metres wide and 20 metres long, which is bordered on the north side by a dense stand of Giant Manna Grass (*Glyceria maxima*). The standing water was measured to be 30 cm deep at the time of field investigations on October 18, 2013. The surface water was approximately 95% covered with Common Duckweed (*Lemna minor*). Although this meadow marsh is located close to the busy Creditview Road, it is considered to be a very suitable amphibian breeding habitat since it has potential to hold enough water through the amphibian breeding season that will allow for critical life stages to be carried out.

FOD5-1: Dry – Fresh Sugar Maple Deciduous Forest – this mature upland deciduous forest is located on a steep slope running up to Velebit Court. The composition of this forest is similar to the composition of the FOD5-1 forest found in Credit Meadows Park.

One regionally significant plant species was encountered during field investigations. Two Black Oak (*Quercus velutina*) occur at the edge of FOD5-1 community at the southwest corner of Velebit Court and Creditview Road. This is a dry site at the top of slope. Black Oak is recognized as rare in the Credit Valley watershed and Peel Region by CVC (2002) and rare in the Greater Toronto Area by Varga *et al.* (2000). The trees were measured to be 18.5 and 23.5 cm diameter at breast height. This is a southern or Carolinian tree species that is at the northern edge of its range in Peel Region.

3.2.1.4 Kenninghall Crescent to Rivergate Place

Three vegetation communities, cultural woodland and two cultural hedgerows, were delineated on the east side of Creditview Road near Rivergate Place during the field investigation. There is no natural vegetation in the road right of way on the west side of Creditview Road in this section. These vegetation communities are described as follows.

CUW1b: Shagbark Hickory – Weeping Willow – European Ash Cultural Woodland – the broken canopy of this young to mid-age cultural woodland is co-dominated by Shagbark Hickory, Weeping Willow (*Salix alba var. vitellina*) and European Ash (*Fraxinus excelsior*). The tall shrub layer consists of a dense Common Buckthorn, an invasive species, thicket with some Tartarian Honeysuckle and crabapple (*Malus sp.*) present. Common Buckthorn is also present in the ground cover. This small cultural woodland is heavily overwhelmed by invasive species such as Common Buckthorn which has adapted to disturbed conditions and thus greatly decreases the ecological integrity and function of this natural area.

In addition to, the following two planted hedgerows are located adjacent this vegetation community on the northeast side of Creditview Road: CUHb – Norway Spruce (*Picea abies*) Cultural Hedgerow and CUHc - Norway Maple (*Acer platanoides*) - Black Walnut - Silver Maple Cultural Hedgerow.

3.2.1.5 Woodland Feature Located on East Side Across from Falconer Drive (portion of former Harris Farm property)

This woodland feature is located on the northeast side of Creditview Road across from Falconer Drive. A total of two vegetation communities, cultural woodland and deciduous forest, were delineated during the field investigation. There is no natural vegetation in the road right of way along the west side of Creditview Road in this section. Each community is comprised as follows.

CUW1c: Sugar Maple – Black Walnut – White Pine Cultural Woodland – This mid-aged cultural woodland is located at the edge of Creditview Road. The co-dominant tree species observed in the canopy of this woodland are Sugar Maple, Black Walnut and White Pine (*Pinus strobus*). The sub-canopy is dominated largely by Sugar Maple with lesser amounts of Norway Maple, Common Buckthorn and Black Maple. Dominant shrub species include Common Buckthorn and Black Raspberry (*Rubus occidentalis*). The ground cover is dominated by Wood Avens and Tall Goldenrod with a some Dame's Rocket (*Hesperis matronalis*). A portion of the canopy of this historically intact and mature forest feature has been removed which resulted in this cultural woodland that contains species, both native and non-native, that are adapted to disturbed conditions.

FODM5-9: Dry – Fresh Sugar Maple – Hardwood Deciduous Forest – This mature deciduous forest represents the majority of this feature. The canopy is co-dominated by Sugar Maple and Norway Maple with lesser amounts of Black Walnut and Black Locust (*Robinia pseudo-acacia*). The sub-canopy consists of Sugar Maple and Black Locust. The dominant shrub species throughout the community include Common Buckthorn and Black Raspberry. The ground cover is dominated by Wood Avens and Garlic Mustard, both of which are invasive species, with some sedge (*Carex sp.).*

3.2.1.6 Meadow Feature Located on the East Side of Creditview Road South of Highway 401 (portion of former Harris Farm property)

Three vegetation communities, cultural meadow and two cultural hedgerows were delineated during the field investigation. These vegetation communities are described as follows.

CUM1-1: Dry – Moist Old Field Meadow – this large and pioneer cultural meadow, approximately 35 ha in size, used to be a cultivated agricultural field until approximately two years ago as evidenced by deep plow furrows running along the length of the field. The herbaceous cover is very dense and reaches a height of up to 2 m in places. This cultural meadow is largely dominated by Canada Goldenrod with some Wild Teasel, Bull Thistle (*Cirsium vulgare*) Crown Vetch (*Securigera varia*) and other species. There is some woody regeneration along the fringe of the field, consisting of isolated Black Walnut saplings.

In addition to, there is a cultural hedgerow (CUHd) present on the east side of Creditview Road. This hedgerow is comprised mainly of Sugar Maple and Black Walnut. The west side at this section of Creditview Road is dominated by residential and commercial development areas; however, there is a cultural hedgerow present (CUHe) consisting of Austrian Pine, Black Walnut and Norway Maple along Creditview Road running north towards the Highway 401 crossing.

3.2.1.7 Meadow Features Located around Creditview Road Crossing of Highway 401

One vegetation community, a cultural meadow, was delineated during the field investigation. This section of Creditview Road is dominated by commercial development area on the west side and agricultural fields on the east side. The vegetation community is comprised as follows.

CUM1-1: Dry – Moist Old Field Meadow –Cultural meadows along the immediate sides of the Creditview Road and in the Hwy 401 right-of-way on both north and south sidesorners. These features are disturbed given their proximity to these roads and are occasionally mowed as part of road maintenance. The dominant herbaceous species include Kentucky Bluegrass, Crown Vetch and Quack Grass with patches of Wild Teasel. Cultural thickets comprised of Common Buckthorn, Russian Olive and Tartarian Honeysuckle make up approximately 20% of the cover in some areas.

In the north corner of Highway 401 crossing, there is a large agricultural field, approximately 38 ha in size, of which a portion of it falls within the northern section of the Study Area. At the time of the field investigation, this agricultural field was planted with hay.

3.2.2 Wetlands

A small wetland community, Giant Manna Grass Graminoid Mineral Meadow Marsh (MAMM1-6) was observed at the bottom of a slope in between a bottomland deciduous forest (FOD6-2) and upland Sugar Maple Forest (FOD5-1). The composition of this wetland community is described above in section 3.2.1.3. Due to its small size of approximately 0.01 ha, this Meadow Marsh was originally considered as an inclusion of the bottomland deciduous forest (FOD6-2); however, given the presence of a vernal pool therein, this vegetation community was delineated separately to emphasize the location of potential suitable amphibian breeding habitat. Other wetland communities consist of isolated inclusions of Cattail Graminoid Mineral Meadow Marsh (MAMM1-2) in shallow depressions within the Carolina Poplar Cultural Savannah (CUS1c) that were individually far less than 0.5 ha in size. These are unlikely to support breeding amphibian populations given the shallow depth of the water in the small and isolated vernal pools. According to the Ontario Ministry of Natural Resources' Ontario Wetland Evaluation System (OWES) manual for Southern Ontario (MNR, 2013a), wetland communities that are less than 2 hectares are not evaluated and thus these small and isolated wetland communities identified in the Study Area do not require OWES evaluations.

3.2.3 Wildlife

Wildlife surveys were conducted in 2014 and consisted of breeding bird surveys and amphibian surveys since there was potential for Species at Risk among these two groups.

3.2.3.1 Breeding Birds

During the breeding bird surveys conducted on June 6 and 23, 2015, 31 species of birds were recorded (**Table 2**). These consisted mostly of common species that are adaptable to disturbed conditions such as forest edges and remnant groves of trees in an urban setting. Examples of these include Blue Jay *(Cyanocitta cristata*), American Robin (*Turdus migratorius*), Baltimore Oriole (*Icterus galbula*) and Northern Cardinal (*Cardinalis cardinalis*). Appendix C shows that only two species were confirmed breeders, 18 were probable breeders and 11 were possible breeders.

Table 2. Breeding Bird Survey Results

Common Name	Scientific Name	ESA Status	COSEWIC Status	NHIC Status Ranking[1]	Breeding Bird Surveys Record		Breeding Status
					June 6, 2014	*June 23, 2014*	
American Goldfinch	*Cardeulis tristis*			S5	6	4	Probable
American Robin	*Turdus migratorius*			S5	16	7	Probable
Baltimore Oriole	*Icterus galbula*			S4	2	1	Probable
Black-capped Chickadee	*Poecile atricapillus*			S5	2	1	Probable
Brown-headed Cowbird	*Molothrus ater*			S4	5	1	Probable
Blue Jay	*Cyanocitta cristata*			S5	3	1	Probable
Cedar Waxwing	*Bombycilla cedrorum*			S5	1		Possible
Cliff Swallow	*Petrochelidon purrhonota*			S4	2	3	Confirmed
Common Grackle	*Quiscalus quiscula*			S5	8	4	Probable
Common Yellowthroat	*Geothlypis trichas*			S5	1		Possible
Eastern Wood-Pewee	*Contpus virens*	SC	SC	S4	1		Possible
European Starling	*Sturnus vulgaris*			SNA	14	4	Probable
Gray Catbird	*Dumetella carolinensis*			S4	1		Possible
Great Blue Heron	*Ardea herodias*			S4		3	Possible
Great Crested Flycatcher	*Myiarchus crinitus*			S4	2		Possible
Hairy Woodpecker	*Picoides villosus*			S5	1	1	Probable
House Sparrow	*Passer domesticus*			SNA	8	1	Probable
House Wren	*Troglodytes aedon*			SNA	1		Possible
Mallard	*Anas platyrhynchos*			S5		1	Possible
Mourning Dove	*Zenaida macroura*			S5	4	1	Probable
Northern Cardinal	*Cardinalis cardinalis*			S5	8	5	Probable
Northern Mockingbird	*Mimus polyglottus*			S4	1		Possible
Rock Pigeon	*Columba livia*			SNA	2	2	Confirmed
Red-eyed Vireo	*Vireo olivaceus*			S5	4	1	Probable
Red-winged Blackbird	*Agelaius phoeniceus*			S4	16	5	Probable
Savannah Sparrow	*Passerculus sandwichensis*			S4	2		Possible
Song Sparrow	*Melospiza melodia*			S5	9	9	Probable
Spotted Sandpiper	*Actitis macularia*			S5	1		Possible
Warbling Vireo	*Vireo gilvus*			S5	1	1	Probable
Willow Flycatcher	*Empidonax trailli*			S5	2	1	Probable
Yellow Warbler	*Dendroica petechia*			S5	6	3	Probable

A small colony of Cliff Swallows (*Petrochelidon pyrrhonota*) was nesting under the concrete bridge over the Credit River. The bridge is not part of the current EA but was studied in a previous EA by LGL Ltd.(2012). They also identified and addressed this Cliff Swallow colony. The only SAR that was encountered was Eastern Wood Pewee (*Contopus virens*). A single bird was singing in the woodlot opposite Falconer Drive on the first survey date only.

3.2.3.2 Amphibians

Generally the study area consists of an urban area with minimal habitat available for breeding amphibians, which need standing water. However a single vernal pool is present within the deciduous forest located below the valley slope, on the west side of Creditview and just north of the Credit River. This pool was first identified in October 2013 and appeared to have conditions suitable for breeding amphibians, as it was reasonably deep and surrounded by emergent Giant Manna Grass. A nocturnal site visit was conducted on April 21, 2014. At 20:00 air temperature was 13°C., it was calm and overcast and therefore ideal for amphibian calling. The pool was up to 1 m deep in the central area and fringing manna grass was flooded. No calling amphibians were present in the pool. A flashlight was used to check the waters of the pool and any submerged twigs for the presence of salamander or frog egg masses, however none were observed.

A second nocturnal survey was conducted on May 20, 2014. At 22:30 air temperature was 15°C., there was light wind and 25% cloud cover. These conditions are also considered suitable for calling amphibians. The pool was at least 50 cm deep in the central area. No calling amphibians were present in the pool. As per the April 2014 survey, a flashlight was used to check the waters of the pool and any presence of amphibian egg masses, or tadpoles, however none were observed. The pool was further investigated for the presence of amphibians during the day on June 6, 2014, however no tadpoles or adult amphibians were identified. It was concluded that the pool did not form significant wildlife habitat for breeding amphibians, nor did it support Jefferson Salamanders.

3.2.4 Species at Risk

Based on a review of current and historical records, 25 Species at Risk (SAR) are known to occur throughout the Region of Peel (please refer to Table 1). A habitat assessment for each SAR was conducted during the field investigation in order to determine whether the species has the potential to occur in the Study Area based on the presence of its respective suitable habitat. **Appendix D** provides a habitat assessment of each of the twenty-five (25) SAR, including their habitat preferences, geographic distributions and assessments of potential occurrence in the Study Area. Through this assessment, 11 Species at Risk were determined to have suitable habitat present within the Study Area boundaries; these are listed in **Table 3** below. It should be noted that habitat assessment for aquatic SAR were not specifically investigated as part of the fieldwork but are addressed in a separate Natural Heritage Report prepared by LGL limited (2012) for the Replacement of the Creditview Road Bridge Municipal Class EA Study.

Table 3. Potential Species at Risk in the Study Area

Endangered Species	Threatened	Special Concern
Butternut	Barn Swallow	Eastern Wood Pewee
Jefferson Salamander	Bobolink	Milksnake
Little Brown Bat	Eastern Meadowlark	Snapping Turtle
Northern Myotis		Monarch

These ten (10) SAR may be potentially affected as result of the proposed widening of Creditview Road, which would likely require minimal vegetation removal in the vegetation communities adjacent to the road that contain suitable habitat for these species. The only confirmed habitat in the Study Area is that of Snapping Turtle, Butternut, Barn Swallow, Bobolink and Eastern Meadowlark. Although habitat for Jefferson Salamander is not confirmed in the Study Area as identified through the background review, there is some potential that suitable habitat may occur given the proximity of Meadowvale Station Woods, which contains confirmed habitat, close to the Study Area. A request was made to the Aurora MNR District for information regarding the presence of SAR occurring in or adjacent to the Study Area on September 16, 2013. The response received from the MNR (on November 27, 2013) indicates that four (4) Species at Risk were also recorded in the Study Area, including Butternut, Northern Myotis, Snapping Turtle and Milksnake.

Butternut

Butternut is designated as Endangered species and is protected under the ESA. This species typically grows in deciduous forests on rich, moist, well-drained loams often found on stream bank sites but also on well-drained gravelly sites, especially those of limestone origin. Butternuts are shade-intolerant and as a result are often found in open canopy pockets and on forest edges (COSEWIC, 2003). According to the City of Mississauga Natural Area Survey 2011 Update, five Butternut trees (*Juglans cinerea)* were found in the CRR2 Credit Meadows Significant Natural Site, of which a small portions fall within the Study Area boundaries. It is likely that those Butternuts are found well away from the narrow Study Area. No Butternuts were observed in the Study Area limits during the field investigation and thus this species will not be affected by the proposed undertaking.

Jefferson Salamander

The Jefferson Salamander is designated as Endangered. Suitable habitat for this species includes deciduous or mixed upland forests which contain suitable breeding pools (COSEWIC, 2010b). Suitable breeding pools are often ephemeral, do not contain predatory fish, contain attachment sites for the egg masses and hold sufficient water for the duration of larval development (COSEWIC, 2010b). Suitable breeding habitat for Jefferson Salamander is located north of Highway 401 within Meadowvale Station Woods as confirmed by CVC and MNR (AECOM, 2012; MMM & Ecoplans Ltd., 2005). Meadowvale Station Woods is located more than 900 m away from Creditview Road. One potential breeding site was identified in the study area on the west side of Creditview Road just north of the Credit River, consisting of a vernal pool within the mineral meadow marsh (MAMM1-6). It was sufficiently deep (up to 1 m in early spring) to maintain water for a sufficient period and was surrounded by mature deciduous forest approximately 1.5 ha in area that is connected to some other small patches of deciduous forest (FOD5-1 and FOD6-2) along Credit River.

Amphibian surveys conducted in April and May of 2014 found no amphibians of any kind in the vernal pool. Diurnal searches for egg masses and larvae also failed to turn up any amphibians. In addition surveys targeting salamanders were conducted in the CRR2 Credit Meadows Significant Natural Site as part of the City of Mississauga Natural Area Surveys (City of Mississauga, 2011) and No Jefferson Salamanders were found there. Consequently we conclude that the vernal pool in MAMM1-6 and the nearby woodlot in Credit Meadows do not provide habitat for Jefferson Salamander.

Northern Myotis and Little Brown Myotis

Both species are designated as Endangered due to their precipitous population declines in recent years as a result of the White Nose Syndrome. Little Brown Myotis is more likely to be present in the general area as it was the most common bat in southern Ontario prior to the fairly recent spread of this disease. Northern Myotis are typically more northern in their distribution and were less numerous. These bats are migratory and hibernate in caves but inhabit cavity trees during the spring and summer season. Females use cavity trees as maternity roosts in the month of June. Given the presence of deciduous forest stands in the Study Area, there may be suitable habitat for this species in the study area. However, the bats are likely to avoid trees on the immediate roadside due to noise, motion and openness. Bats are more likely to use trees in mature forests, well back from the roadside. No bats were observed during the field investigations, but specific surveys were not conducted. Further surveys may be required prior to tree removal to determine if SAR bats are present. These surveys should occur in the forest blocks which include communities FOD5-1, FODM5-9, FOD6-2 and CUW1c on Figures 2b and 2c.

Barn Swallow

Barn Swallow is designated as Threatened species and is protected under the ESA. This species lives and nests in man-made structures such as open barns, buildings, under bridges and culverts (COSEWIC, 2011a). According to the City of Mississauga Natural Area Survey 2011 Update, a Barn Swallow was observed in the CRR2 Credit Meadows Significant Natural Site. No Barn Swallows were observed during the June breeding bird surveys.

Bobolink and Eastern Meadowlark Habitat

Bobolink and Eastern Meadowlark are both designated as Threatened in the Province of Ontario and are protected under the ESA. Both inhabit similar habitats and prefer to breed in large tracts of tall grass prairies, meadows and natural grassland; although, in southern Ontario they are more commonly found in hayfields and pastures (COSEWIC 2010a and 2011b). According to the City of Mississauga Natural Area Survey 2011 Update, these species were observed in the CRR2 Credit Meadows Significant Natural Site; however, they likely occurred in the meadow area that is at least 300 m east of Creditview Road. The hayfield northeast of Creditview Road and Highway 401 another meadow east of Creditview Road south of Highway 401 were identified as having some potential to provide suitable habitat for Bobolink and/or Eastern Meadowlark.

During the breeding bird surveys conducted on June 6 and 23, 2014 the meadow areas were specifically examined for the possible presence of either Eastern Meadowlark or Bobolink, however these species were not recorded on either visit. As such, it is concluded that they are not present. The hayfield north of Highway 401 is approximately 3 ha in area which is generally too small for these area sensitive species. Furthermore, the constant traffic and high noise level along Highway 401 and to a lesser extent along Creditview Road would cause them to avoid the southern and western portions of that field.

The large cultural meadow on the east side of Creditview Road south of Hwy 401 was plowed with deep furrows and contained a tall, very dense cover dominated by Tall Goldenrod (*Solidago altissima*) and Teasel (*Dipsacus fullonum*) with minimal grass cover. The field is quite narrow, only 60 m to 70 m in width and approximately 1.5 ha in area. Bobolink and/or Eastern Meadowlark prefer to breed in meadows or hayfields with a relatively even mix of grass and forbs. Both species are considered grassland area sensitive and therefore require rather extensive contiguous areas of habitat of at least 10 ha (Herkert 1991). Consequently both the hayfield and cultural meadow in the Study Area are too small to support them.

Eastern Wood Pewee

The Eastern Wood Pewee is a small non-descript flycatcher with a distinctive call that inhabits deciduous forests across southern Ontario. The species has shown a long term population decline which is why it is now designated as Special Concern, even though it is still widespread and fairly common. During the breeding bird survey held on June 6, 2014, a single Eastern Wood Pewee was heard calling in the patch of mature deciduous forest (FOD5-9) on the east side of Creditview Road, across from Falconer Drive. It was not recorded on the second survey held on June 23, 2014, and therefore only qualifies as a possible breeder. It is likely that the bird was present as the woodlot provides suitable breeding habitat where the species would be expected. The woodlot is at approximately 2.75 ha in area which is large enough to support a breeding territory.

Snapping Turtle

The Snapping Turtle, designated as Special Concern is a generalist species found in a wide range of freshwater habitat although their preferred habitat is a slow-moving watercourse with soft mud bottom and dense aquatic vegetation (COSEWIC, 2010). Snapping Turtles are also tolerant of some environmental pollution and therefore can persist in urbanized areas (COSEWIC, 2010). For these reasons, the Credit River, which even though has poor water quality as determined by the Credit River Watershed Report Card 2013 (CVC), still provides suitable habitat for this species. None were observed by AECOM field biologists; however, road kill occurrences of Snapping Turtles have been reported anecdotally by a local resident within the past year near the Creditview Road Bridge over the Credit River. In an effort to protect any Snapping Turtles which may be present during construction; mitigation should be developed to address species specific mitigation measures.

Milksnake

Milksnake is designated as Special Concern and can be found underneath logs, stones or boards, in farmlands and meadows, forest stands and river bottoms. The cultural meadows located in the northern end of the Study Area and also the cultural savannahs located along the Credit River may provide suitable habitat for this species; however this species was not observed during the field investigation. The species is highly susceptible to road mortality and therefore it is more likely to occur in habitat further removed from the roadside.

Monarch Butterfly

The Monarch butterfly is well known for its long distance migration from southern Ontario to wintering areas in Mexico. Although it was not actually observed during field investigations, the species is ubiquitous in field habitat within the GTA and during the autumn migration period in August and September, they will move through virtually

every type of habitat, including urban areas. Some of the meadow areas in the Study Area contain Common Milkweed which is the food plant of the Monarch larvae. The species is almost certainly present in the Study Area as a migrant and summer resident.

Summary of Species at Risk

The Study Area was investigated for the presence of SAR through a combination of ELC, vegetation, breeding bird and amphibian surveys. Nearly all of the potential SAR originally identified as potentially present were found to not be present in the immediate Study Area. There was clear evidence of only two Special Concern species, which are Eastern Wood Pewee and Snapping Turtle.

3.2.5 Significant Wildlife Habitat

Significant Wildlife Habitat (SWH) needs to be addressed as required by the PPS. Many types of potential SWH have been listed by MNRF who have provided guidelines and specific criteria to identify them (MNRF 2015). The SWH types are grouped into five main categories: Seasonal Concentration Areas; Rare Vegetation Communities; Specialized Habitats of Wildlife; Habitats of Species of Conservation Concern; and Animal Movement Corridors. An assessment of each SWH type was completed (**Appendix E**) in order to determine whether it has the potential to occur in the Study Area based on the presence of suitable habitat. **Appendix E** identifies all of the SWH types which are either not present, or may be present as candidate or confirmed habitat. The types with candidate or confirmed SWH are described below:

Turtle Hibernation Habitat and Turtle Nesting Habitat

Most of the types of SWH listed in Appendix E are not present in the Study Area given the type of vegetation present, the size of existing habitats and the amount of disturbance. Only Turtle Wintering Habitat may be present along the Credit River given the reports of Snapping Turtle there. Hibernation would likely occur in the river itself or other wetland pockets and not near the immediate roadside. Another SWH is Turtle Nesting habitat. The floodplain of Credit River on the Credit Meadows Park may support nesting turtles since it is a suitable sandy substrate close to where Snapping Turtles and possibly Midland Painted Turtles are known to occur. The turtles are not likely nesting near the roadside as the edges are curbed without gravel shoulders.

Bat Maternity Colonies

Habitat for Bat maternity colonies was not assessed as part of the field studies. Colonies may occur in large trees containing cavities where bats are able to enter into an internal cavity for roosting and sheltering their young. Some deciduous forest occurs in the Study Area which may contain suitable cavity trees. Trees that are closest to the road are less likely to be used by bats than those further into the woodlot due to noise, pollution and lighting. A survey for cavity trees should be conducted at the detailed design stage prior to removal of trees. To be significant, a forest must have at least 10 suitable cavity trees per hectare.

Special Concern and Rare Wildlife Species

The immediate habitat of plant or animal species which are either designated as Special Concern by MNRF, or provincially rare (S1, S2 or S3) by the Natural Heritage Information Centre, qualify as SWH. Three Special Concern species were present in the study area (Eastern Wood Pewee, Snapping Turtle and Monarch), as discussed in Section 3.2.4

4. Environmental Protection Requirements

4.1 Endangered Species Act, 2007

The *Endangered Species Act* (*ESA*) was passed in 2007 and mandates for the protection and recovery of Ontario's Species at Risk and their habitats at the provincial level. The following are two key protection provisions in the ESA:

- Subsection 9(1) prohibits the killing, harming, harassment, capture, taking, possession, transport, collection, buying, selling, leasing, trading or offering to buy, sell, lease or trade species listed as Extirpated, Endangered or Threatened on the Species at Risk Ontario (SARO) List.
- Section 10 states that no person shall damage or destroy the habitat of an Endangered, Threatened or Extirpated species on the SARO list.

Species listed on the SARO List as Extirpated, Endangered or Threatened receive automatic protection under the ESA. The ESA 2007 contains tools that allow for a range of activities that would otherwise be prohibited under Section 9 and/or Section 10 of the Act such as permits and other authorizations by the Ministry of Natural Resources. Effective July 1, 2013, the ESA was updated to streamline the permit approval process. As per the update, species-specific exemptions and regulations have been set forth that authorize certain activities that affect a Species at Risk and its habitat. In general, the proponent must satisfy the following activities in order for an activity to be exempted from Section 9 and 10 of the ESA:

a) Register a notice of activity, which includes details of the proposed activity and the species affected, to the Minister through the Registry;
b) Minimize the effects to a newly protected species or habitat;
c) Create and implement a mitigation and/or compensation plan for each affected species;
d) Report sightings of the species;
e) Monitor and report the effectiveness of these actions; and
f) Prepare an annual report on the plan's effectiveness.

Permits may still be required if the proposed Project or activity that are not covered by these exemptions or timeframes.

With respect to the Project, none of the seven (7) Endangered or Threatened Species identified as possibly occurring were found to be present within the Study Area (refer to section 3.2.4 and **Table 3**) and therefore no ESA permits or exemptions are anticipated to be required.

4.2 Mississauga Official Plan

The Mississauga Official Plan (City of Mississauga, 2012) presents the Green System which consists of the Natural Areas System, Natural Hazard Lands and parks and open spaces. Under Section 6.3.1.13 of the Mississauga Official Plan (2012), development and site alteration is prohibited within or adjacent to Natural Areas and Special Management Areas unless an Environmental Impact Study (EIS) is conducted demonstrating that are no negative impacts to the features or their ecological function as result of the proposed development. A Significant Natural Site, CRR2 Credit Meadows, is located within the Study Area as described in the City of Mississauga Natural Areas Survey (NAS) 2011 Update.

4.3 Credit Valley Conservation Authority Ontario Regulation 160/06

The CVC enforces the Ontario Regulation 160/06 - Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses under Section 28 of the *Conservation Authorities Act*. Therein, Regulated Areas are defined where development could be subject to flooding, erosion or dynamic beaches, or where interference with wetlands and alterations to shorelines and watercourses might have an adverse effect on those environmental features. Any proposed development, interference or alteration within a Regulated Area would require a permit from CVC.

4.4 Provincial Policy Statement (2005)

The Provincial Policy Statement (PPS) provides a strong mandate for the protection of Natural Features and Areas for the long term (Section 2.1.1). The PPS defines Natural Features and Areas as:

> **"***features and areas, including significant wetlands, significant coastal wetlands, fish habitat, significant woodlands south and east of the Canadian Shield, significant valley lands south and east of the Canadian Shield, significant habitat of endangered species and threatened species, significant wildlife habitat, and significant areas of natural and scientific interest, which are important for their environmental and social values as a legacy of the natural landscapes of an area".*

Under Sections 2.1.3 to 2.1.6 of the PPS, development and site alteration in or adjacent to the following Natural Features and Areas are prohibited unless it has been demonstrated that there will be no negative impacts on said features or on their ecological function:

- significant habitat of endangered species and threatened species;
- significant wetlands in Ecoregions 5E, 6E and 7E1;
- significant coastal wetlands;
- significant wetlands in the Canadian Shield north of Ecoregions 5E, 6E and 7E1;
- significant woodlands south and east of the Canadian Shield2 ;
- significant valleylands south and east of the Canadian Shield2;
- significant wildlife habitat;
- significant areas of natural and scientific interest; and
- fish habitat except in accordance with provincial and federal requirements.

According to the Natural Heritage Reference Manual (MNR, 2010), significant wildlife habitat includes the habitat of species of conservation concern, which consists of species designated as Special Concern in Ontario under the ESA on the Species at Risk Ontario List. As such, this legislation applies to the reported Snapping Turtle sightings by a local resident at the Creditview Road Bridge over Credit River as well as potential Milksnake habitat.

4.5 Migratory Birds Convention Act, 1994

This legislation provides federal protection of 700 listed migratory birds and prohibits the destruction or disturbance of nests, eggs or offspring during the breeding season. The Act also prohibits the release of harmful substances in areas regularly used by migratory birds. The vegetation communities identified in the Study Area contain suitable habitat for breeding birds that could be affected by the removal of trees and woody vegetation within the widening limits of Creditview Road. Although no permit is required by the legislation, mitigation measures such as construction timing restrictions are required to avoid possible disturbance or destruction to active nests during development activities. However, if construction activities must occur during the breeding bird season, nest surveys are required to be conducted by a qualified Biologist prior to construction in relevant areas in order to avoid contravention of the Act.

5. Constraint Assessment of Natural Features

The Study Area contains a Significant Natural Site (CRR2 Credit Meadows) as determined by the City of Mississauga which consists of deciduous forests, cultural woodlands and cultural meadows located in the Credit River valley. This Significant Natural Site was determined to provide suitable habitat for eight (8) different Species at Risk identified to potentially occur in the Study Area (refer to Section 3.2.3.1). These vegetation communities also provide breeding habitat for a number of different bird species. Overall, there are several environmental constraints associated with developing adjacent or within the identified natural features. The constraint level of the natural features has been assessed in relation to the proposed works and ranked from high to low based on the following criteria: a high constraint requires a permit; medium constraints may or may not require a permit based on confirmation of SAR presence; and a low constraint requires an Environmental Impact Assessment (EIS) but no permit. The table below summarizes these constraints.

Table 4. Constraint of identified Natural Features within the Study Area

Constraint	Natural Feature
High	**CVC Regulated Areas** - The 100-year and regulatory floodline of Credit River and its tributaries is a Regulated Area identified by CVC. Credit River also contains fish habitat that supports both warm and coolwater fish communities. Development within a Regulated Area requires a permit from CVC. Furthermore, any development within or in a fish habitat requires authorization from the Minister of Fisheries and Oceans Canada under the *Federal Fisheries Act*. Note that bridge related impacts are addressed in separate report by LGL Ltd. (2012)
Medium	**Endangered Little Brown Myotis and Northern Myotis Habitat –** MNRF has records of these species near the Study Area so there is some potential. The presence of these species will need to be determined through habitat assessment and, if necessary, acoustic monitoring at the detailed design stage.
Medium	**Special Concern Snapping Turtle and Milksnake Habitat** – Reports of Snapping Turtle roadkill near Creditview Road Bridge confirm its presence in the general Study Area. MNRF indicates records of Milksnake in the vicinity. Under Section 2.1.4 of the Provincial Policy Statement (2005), no development or site alteration shall occur in significant wildlife habitat unless it has been demonstrated that there will be no negative impacts on the natural heritage features or their ecological function.
Low	**Significant Natural Site (CRR2 Credit Meadows)** – Under the Mississauga Official Plan, development and site alteration is prohibited within or adjacent to Natural Areas unless an EIS is completed demonstrating there are no negative effects on the natural area or function as result of the proposed undertaking.
Low	**Breeding Bird Habitat** – Migratory birds and their habitat are protected under the *Migratory Birds Convention Act*. Although no permit is required by the legislation, mitigation measures such as construction timing restrictions are required to avoid disturbance or destruction to active nests during development activities.

6. Impact Assessment

6.1 Proposed Alternatives

The preferred design for Creditview Road through the study area consists of a Preliminary Preferred Alternative and Long-term Solution. As part of the Preliminary Preferred Alternative, Creditview Road will be widened to three lanes. Three roundabouts will be introduced at Creditview Road's intersections with Kenninghall Boulevard, Falconer Drive and Argentia Road. A wide multi-use trail will be added on the west side and a standard sidewalk will be added on the east side for the entire length of the roadway within the Study Area. A tall noise barrier will be installed along those portions where residential areas run immediately along Creditview Road.

As part of the Long-term Solution, Creditview Road would be widened to four lanes. The existing roundabouts will be widened to accommodate an additional lane. The multi-use trail on the west side of the road will be moved back westward and the sidewalk will be adjusted further east because of the additional lanes. The sound barriers will not need to be moved from their original positions.

The Preliminary Preferred Alternative is expected to support traffic operations to year 2031 and potentially beyond. The City will implement a monitoring program on Creditview Road to ensure the road continues to meet the needs of the community. The Long-term Solution would be implemented if and when additional capacity is required.

6.2 Environmental Impacts

6.2.1 Vegetation Impacts

The area of natural vegetation that is anticipated to be affected from the road widening is considered minor since potential impacts area are limited to an area along the edge of an existing road right-of-way. The amount of vegetation proposed to be removed by the Preliminary Preferred Alternative and Long-term Solution are shown on **Table 5**. Approximately 1.425 ha of natural vegetation may be removed in association with the Preliminary Preferred Alternative. Most vegetation loss is anticipated to occur in association with the Preliminary Preferred Alternative, since the Long-term Solution is expected to result in the additional removal of approximately 0.246 ha (i.e., approximately 17% of additional vegetation may be removed). Additional impacts to some of the vegetation communities are not expected in relation to the Long-term Solution, however some vegetation may require minor additional trimming. A new edge will be created for some communities. The largest portion of vegetation to be removed (55%) consists of cultural meadow (i.e. non-treed). The treed area includes deciduous forest, cultural woodland, cultural savannah and cultural hedgerow that will be removed in the ultimate stage is 0.73 ha. However overall, the total amount of proposed vegetation removal is considered quite small.

Table 5. Vegetation Removal Resulting from the Preliminary Preferred and Long-Term Solution

ELC Community	Description	Vegetation Loss (ha)		New Edge (m)	
		Preliminary	*Long-Term*	*Preliminary*	*Long-Term*
FOD5-1		0.040	0.040	20	20
FODM5-9		0.050	0.079	120	125
FOD6-2		0.025	0.025	35	35
FOD Subtotal	Deciduous Forest	0.116	0.145	175	180
CUM1-1	Cultural Meadow	0.856	0.921	NA	NA
CUW1a		0.068	0.069	30	30
CUW1b		0.004	0.004	0	0

ELC Community	Description	Vegetation Loss (ha)		New Edge (m)	
		Preliminary	*Long-Term*	*Preliminary*	*Long-Term*
CUW1c		0.056	0.126	20	95
CUW Subtotal	Cultural Woodland	0.129	0.199	50	125
CUS1c		0.041	0.078	120	125
CUS1a		0.010	0.027	55	55
CUS1b		0.052	0.070	55	65
CUS Subtotal	Cultural Savannah	0.103	0.174	230	245
CUT1a	Cultural Thicket	0.017	0.018	40	45
CUHa		0.044	0.044	135	140
CUHc		0.014	0.019	93	96
CUHd		0.115	0.116	200	210
CUHe		0.030	0.033	105	120
CUH Subtotal	Cultural Hedgerow	0.203	0.213	533	566
MAMM1-6		0.001	0.001	10	10
Total		1.425	1.671	1038	1226
Treed Total (FOD, CUW, CUS, CUH)		0.551	0.731	988	1116

*Note: * Vegetation loss in the Ultimate includes what was already removed in the Interim Stage*

Vegetation impacts are primarily limited to the removal of roadside vegetation. These communities are already subjected to edge impacts such as periodic cutting, road salt spray, spread of invasive groundcover, accidental damage and garbage dumping; however, trees and shrubs have developed a firm edge. Creating a new edge will result in the edge effects penetrating further into the woodlot and may result in some dieback due to sunscald or exposure. More than 1 km of new edge will be created along vegetation that is dominated by trees. Much of this is hedgerow which is already quite disturbed. The approximately 180 m of new edge to deciduous forest has more potential for edge effects. Depending on where the tree trunks are situated, vegetation removal may consist only of branch trimming or it may involve tree cutting. Overall the edge effects are not expected to be significant.

The only wetland vegetation to be removed is a very minor area (i.e., 0.001 ha) of Tall Manna Grass Mineral Meadow Marsh. This community is dominated by a non-native grass, Giant Manna Grass and therefore was not deemed to be a highly significant feature. It was not found to provide amphibian breeding habitat.

There is expected to be a minor area of vegetation loss within the Credit Meadows Park (i.e., 0.055 ha) as part of the Preliminary Preferred Alternative, and approximately 0.109 ha in relation to the Long-term Solution. Riverrun Park, located on the south side of Creditview Road is anticipated to experience a loss of approximately 0.118 ha in association with the Preliminary Preferred Alternative, and approximately 0.136 ha in association with the Long-term Solution. Approximately 0.106 ha of vegetation within the 2.75 ha woodlot within the City owned form Harris property is expected to be impacted as part of the Preliminary Preferred Alternative, and approximately 0.205 ha as part of the Long-term Solution. Much of the vegetation expected to be removed is associated with the new roundabout being proposed at Falconer Road. Along most of this woodlot, the vegetation anticipated to be removed comprises a narrow strip (i.e., approximately 5 m wide). The total approximately area of vegetation loss at the roundabout may be up to 20 m in from the existing edge. The other woodlot along the west side of Creditview Road, just north of the Credit River is anticipated to lose approximately 0.065 ha of vegetation as part of the Preliminary Preferred Solution, however no additional impacts to vegetation is expected in this area in association with the Long-term Solution.

6.2.2 Wildlife Impacts

The only Significant Wildlife Habitat that was confirmed in the study area was Turtle Hibernation Habitat and Turtle Nesting Habitat which are associated with the Credit River and associated floodplain rather than the area where

road construction is proposed to occur. There is some potential for habitat for Bat maternity colonies to be present, however the potential is low. Overall the impact of the proposed upgrades to Significant Wildlife Habitat is considered minor.

The area of vegetation to be removed is very small and therefore the impact to wildlife from loss of habitat is minimal. A relatively large area of natural habitat consisting of more than 100 ha occurs immediately east of Creditview Road (including Credit Meadows Park). Consequently wildlife habitat is available in the area. The total amount of vegetation that may be removed as part of the Long-term Solution is approximately 1.67 ha, 0.92 ha of which is disturbed cultural meadow and only 0.27 ha are forest.

The proposed road modifications consist of widening an existing transportation corridor. The road already forms a barrier effect to wildlife movement. Widening may add to the barrier effect.

The only location for an east-west wildlife corridor is along the downstream section of the Credit River. The rest of the west side of Creditview Road is heavily urbanized and does not line up with any of the other natural vegetation units along the east side. The bridge over Credit River is probably used for passage under the roadway by some wildlife, however the river occupies the entire bridge bottom and therefore does not provide adequate terrestrial passage. This is an existing condition which will continue with the proposed road upgrades.

Wildlife is highly susceptible to road mortality as they are frequently run over when trying to cross. Increases in traffic, especially when it becomes a four-lane road is likely to result in increased wildlife road mortality.

6.2.3 Species at Risk Impacts

None of the Endangered or Threatened Species identified in the background review was found to be present in the study area. Specific searches were conducted for Butternut, Jefferson Salamander, Eastern Meadowlark, Bobolink and Barn Swallow, , however none were identified.

Three Special Concern species were found or are highly suspected to be present. The Eastern Wood Pewee was found in a 2.75 ha woodlot along the east side of Creditview Road. This woodlot is expected to be reduced by approximately 0.106 ha as a result of the Preliminary Preferred Alternative, and up to approximately 0.205 ha in association with the Long-term Solution. More than 90% of the woodlot is expected to remain as part of the Long-term Solution. In addition, it is assumed that the Eastern Wood Pewee will continue to be able to breed there. The Snapping Turtle was reported to occur in the Credit River in Credit Meadows and road mortality was reported near the bridge over Credit River. The turtles are able to move under the bridge through the river but are likely moving out of the river onto the road when looking for a place to nest. The Monarch likely occurs in adjacent meadows, mainly as a passage migrant but also as a breeder where milkweed is present. Overall the loss of meadow as a result of road upgrades is minor.

A survey for Bat maternity habitat was not conducted. However, since the anticipated area of vegetation to be removed consists of a narrow strip that is very close to the existing heavily travelled roadside, it seems unlikely that roosting bats would be present within that limited area. Nevertheless, tree cavity surveys should be conducted at the detailed design stage and prior to tree removal to determine if potential bat roosting trees are present and likely to be impacted by construction activities.

7. Environmental Protection / Impact Mitigation

Avoidance and mitigation measures were developed to reduce or eliminate potential impacts to the natural environment as much as possible. These can be summarized as follows:

1. **Avoidance Measures** – a plan that protects natural heritage features and functions by keeping the development envelope outside of the natural feature where possible.
2. **Standard Construction Mitigation Measures** – involves the implementation of measures designed to reduce impacts in the construction phase.
3. **Compensation and Restoration Mitigation Measures** – involves the replacement or restoration of a feature or function that may be lost as a result of the construction and the development.

7.1 Avoidance Mitigation Measures

The proposed modifications to Creditview Road were planned to avoid removal and/or intrusion into the adjacent natural features as much as possible. The area of vegetation that is expected to be removed has been minimized such than only 1.67 ha of natural vegetation is expected to be directly impacted. It will be important to ensure that no accidental intrusion occurs any further into the natural features.

7.2 Standard Construction Mitigation Measures

Standard mitigation measures include measures to reduce or eliminate potential impacts to the natural environment. The following measures are recommended to further mitigate potential impacts.

Installation of Fencing

The installation of temporary construction fencing, including tree protection and silt fencing, can reduce or eliminate construction related impacts such as damage to trees that are to be retained or sediment loading in adjacent natural features. Fencing will be important along the edges of the City-owned former Harris property, Credit Meadows and Riverrun Parks to prevent accidental intrusion into those areas. These fences need to be installed prior to vegetation removal to keep personnel and equipment out of the natural areas that are to be protected.

Additionally, wildlife barrier fencing should be installed along the east side of Creditview Road to keep wildlife from entering the construction area. This fencing should be capable of excluding most wildlife present within the adjacent natural features, including mammals such as White-tailed Deer, Raccoons and rabbits. Proper installation and maintenance are necessary to ensure that impacts are mitigated effectively.

Tree Removal

Ideally, tree removal should occur in the winter when most wildlife has migrated or is dormant. Trees should be cut and felled so as not to damage adjacent vegetation. Exposed roots should be cut cleanly where damaged and covered with soil. Damaged branches of trees to be retained should be cut off cleanly. Any tree removal activities should be undertaken in accordance with an approved Tree Preservation Plan and Construction Management Plan.

Timing Restrictions

Restricting construction related activities outside of sensitive periods can limit disturbance during life cycle stages. In particular, vegetation clearing should occur outside of the breeding bird nesting season (April 15th to August 15th) to avoid incidental take and accidental destruction of nests.

Should SAR bat presence be confirmed, the following recommended timing window is important in reducing the effects of construction on Bat Maternity Roosting Habitat and potential SAR bat habitat. All tree removal should be conducted outside of the bat roosting period (April 30th to September 1st).

Temporary Storage Areas/Refueling Stations

Construction activities can result in the trampling of adjacent vegetation communities and the compaction of soil. Designated laydown areas should be installed away from natural heritage features that are being retained to prevent disturbance caused by construction equipment.

Erosion and Dust Controls

In addition to the installation of silt fencing, other measures to reduce or eliminate sediment loading into the adjacent natural features includes temporary siltation ponds, riprap swales and hay-bale check dams can be installed prior to construction activities. Similarly, to mitigate dust deposition, a dust suppressant can be applied to areas of exposed soils to reduce or eliminate dust generation.

7.3 Compensation and Restoration Mitigation Measures

Direct impacts associated with the proposed road modifications include the ultimate loss of approximately 1.67 ha of natural vegetation, including deciduous forest and various cultural communities. Between the Credit Meadows and Riverrun Parks on the Credit River floodplain, approximately 0.245 ha of natural vegetation will be removed. This vegetation should be compensated for and will require a restoration planting plan.

7.4 Additional Recommendations

The following additional recommendations are provided:

- Based on the preliminary design for the Preliminary Preferred Alternative, impacts to the Regionally rare Black Oak trees are not anticipated. Temporary fencing should be installed along the outer driplines, in particular to protect the roots and canopies of the Black Oaks. If the trees cannot be retained, then some Black Oaks should be planted as part of the compensation planting plan since moving these trees is not feasible.
- Cavity tree surveys should be conducted in areas of substantial tree removal during the detailed design stage in all deciduous forest that include communities FOD5-1, FODM5-9, FOD6-2 and CUW1c on Figures 2b and 2c. If found to be significant, bat habitat compensation should be implemented which may involve tree planting, installing artificial bat roosts or moving cavity trees to protected locations within the area.
- If suitable cavity trees are present, acoustic monitoring may be required to determine if the Endangered Little Brown Myotis or Northern Myotis are present. If present, an ESA permit and compensation plan will be required.
- Turtles that live in Credit River may move onto the road, particularly during the nesting season in June. Wildlife barrier fencing should be installed to keep turtles away from the road and working area during construction.
- The forest near the road is already subject to edge effects however in the deepest area of tree removal edge effects are likely to penetrate deeper. Equipment and personnel must stay out of any woodland area that will remain to prevent compaction or breaking up of soil. Saplings or seedlings of native tree and shrub species should be planted along the new edge to firm it up and prevent rapid regeneration of invasive species. Vegetation along the new edge should be monitored in the growing season one year following installation to monitor plantings and determine if invasive plants should be controlled.

8. Conclusions

Modifications to Creditview Road along the 2.2 km long study area are proposed to occur in two stages. Most of the vegetation removal will as part of the Preliminary Preferred Alternative, with the remainder occurring as part of the Long-term Solution, if and when the road is widened to four lanes. Since the proposed works amount to widening in an existing right of way, the amount of vegetation that needs to be affected is relatively small, a total of 1.67 ha of which only 0.27 ha are forest. Vegetation removal is essentially confined to removal of a narrow strip along the entire roadway that is already quite disturbed. The most sensitive adjacent feature is the floodplain of the Credit River including two parks that abut Creditview Road. Otherwise the environmental features and functions in the rest of the study area are relatively low consisting of one woodlot, and cultural influenced vegetation such as meadow, thicket, woodland, and hedgerows. A large natural area occurs on adjacent lands to the east where high environmental functions are present and therefore it will be important to contain impacts within the right-of-way to maintain the integrity of that area.

Surveys have concluded there are few Species at Risk present and no Endangered or Threatened species. ESA permitting is not expected to be required. Surveys also assessed Significant Wildlife Habitat and found that it is limited to turtle wintering and nesting habitat associated with the Credit River floodplain. Bat maternity habitat will need to be assessed at the detailed design stage, however there is low potential that the Study Area will qualify as Significant Wildlife Habitat.

With mitigation implement as recommended, the proposed modifications to Creditview Road will have a relatively minor environmental impact to the immediately adjacent natural heritage features.

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Appendix A

Atlas of Breeding Birds in Ontario List

Appendix A. Atlas of Breeding Birds of Ontario List

Common Name	Scientific Name	Status			Peel Region	
		SARA (*Species at Risk Act*) Federal status	Species at Risk (SARO) Provincial Status	NHIC Status	Level	Habitat
Alder Flycatcher	*Empidonax alnorum*			S5B	Level 3	Forest
American Crow	*Corvus brachyrhynchos*			S5B		
American Goldfinch	*Cardeulis tristis*			S5B	Level 3	Open country
American Kestrel	*Falco sparverius*			S4	Level 2	Open country
American Redstart	*Setophaga ruticilla*			S5B	Level 2	Forest
American Robin	*Turdus migratorius*			S5B		
American Woodcock	*Scolopax minor*			S4B	Level 4	Forest
Baltimore Oriole	*Icterus galbula*			S4B		
Bank Swallow	*Riparia riparia*			S4B	Level 1	Open country
Barn Swallow	*Hirundo rustica*	Threatened	Threatened	S4B	Level 3	Open country
Belted Kingfisher	*Ceryle alcyon*			S4B		
Black-billed Cuckoo	*Coccyzus erythropthalmus*			S5B	Level 1	Forest
Black-capped Chickadee	*Poecile atricapillus*			S5	Level 4	Forest
Blue Jay	*Cyanocitta cristata*			S5		
Bobolink	*Dolichonyx oryzivorus*	Threatened	Threatened	S4B	Level 2	Open country
Brown Creeper	*Certhia americana*			S5B		
Brown Thrasher	*Toxostoma rufum*			S4B	Level 1	Open country
Brown-headed Cowbird	*Molothrus ater*			S4B		
Canada Goose	*Branta canadensis*			S5		
Carolina Wren	*Thryothorus ludovicianus*					
Cedar Waxwing	*Bombycilla cedrorum*			S5B		
Chimney Swift	*Chaetura pelagica*	THR	THR	S4B, S4N		
Chipping Sparrow	*Spizella passerina*			S5B		
Cliff Swallow	*Petrochelidon pyrrhonota*			S4B	Level 3	Open country
Common Grackle	*Quiscalus quiscula*			S5B		
Common Nighthawk	*Chordeiles minor*	No status	SC	S4B	Level 1	Open country
Common Snipe	*Gallinago gallinago*					
Common Yellowthroat	*Geothlyphis trichas*			S5B		
Downy Woodpecker	*Picoides pubescens*			S5		
Eastern Kingbird	*Tyrannus tyrannus*			S4B	Level 3	Open country
Eastern Meadowlark	*Sturnella magna*		Threatened	S4B	Level 2	Open country

Appendix A. Atlas of Breeding Birds of Ontario List

Common Name	Scientific Name	Status			Peel Region	
		SARA (*Species at Risk Act*) Federal status	Species at Risk (SARO) Provincial Status	NHIC Status	Level	Habitat
Eastern Phoebe	*Sayornis phoebe*			S5B	Level 3	Forest
Eastern Screech-Owl	*Megascops asio*			S4		
Eastern Towhee	*Pipilio erythrophthalmus*			S4B	Level 2	Forest
Eastern Wood-Pewee	*Contopus virens*			S4B		
European Starling	*Sturnus vulgaris*			SNA		
Field Sparrow	*Spizella pusilla*			S4B	Level 3	Open country
Gray Catbird	*Dumetella carolinensis*			S4B	Level 4	Forest
Great Crested Flycatcher	*Myiarchus crinitus*			S4B		
Great Horned Owl	*Bubo virginianus*			S4		
Green Heron	*Butorides virescens*			S4B	Level 4	Marsh
Hairy Woodpecker	*Picoides villosus*			S5		
Horned Lark	*Eremophila alpestris*			S5B	Level 3	Open country
House Finch	*Carpodacus mexicanus*			SNA		
House Sparrow	*Passer domesticus*			SNA		
House Wren	*Troglodytes aedon*			S5B		
Indigo Bunting	*Passerina cyanea*			S4B		
Killdeer	*Charadrius vociferus*			S5B,S5N		
Least Flycatcher	*Empidonax minimus*			S4B	Level 3	Forest
Mallard	*Anas platyrhynchos*			S5		
Mourning Dove	*Zenaida macroura*			S5		
Mourning Warbler	*Oporornis philadelphia*			S4B	Level 1	Forest
Northern Cardinal	*Cardinalis cardinalis*			S5		
Northern Flicker	*Colaptes auratus*			S4B		
Northern Mockingbird	*Mimus polyglottus*			S4	Level 1	Open country
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*			S4B	Level 2	Open country
Northern Waterthrush	*Seiurus noveboracensis*			S5B	Level 2	Forest
Orchard Oriole	*Icterus spurius*			S4B	Level 3	Forest
Ovenbird	*Seiurus aurocapillus*			S4B	Level 4	Forest
Peregrine Falcon (anatum ssp)	*Falco peregrinus anatum*		Special Concern	S4B		
Pileated Woodpecker	*Dryocopus pileatus*			S5	Level 2	Forest
Pine Warbler	*Dendroica pinus*			S5B	Level 2	Forest

Appendix A. Atlas of Breeding Birds of Ontario List

Common Name	Scientific Name	Status			Peel Region	
		SARA (*Species at Risk Act*) Federal status	Species at Risk (SARO) Provincial Status	NHIC Status	Level	Habitat
Purple Martin	*Progne subis*			S4B	Level 2	Marsh
Red-eyed Vireo	*Vireo olivaceus*			S5B		
Red-tailed Hawk	*Buteo jamaicensis*			S5		
Red-winged Blackbird	*Agelaius phoeniceus*			S5		
Rock Pigeon	*Columba livia*			S5		
Rose-breasted Grosbeak	*Pheucticus ludovicianus*			S4B		
Savannah Sparrow	*Passerculus sandwichensis*			S4B	Level 1	Open country
Scarlet Tanager	*Piranga olivacea*			S4B	Level 2	Forest
Sharp-shinned Hawk	*Accipiter striatus*				Level 3	Forest
Song Sparrow	*Melospiza melodia*			S5B		
Spotted Sandpiper	*Actitis macularia*			S5	Level 3	Open country
Swamp Sparrow	*Melospiza georgiana*			S5B	Level 1	Marsh
Tree Swallow	*Tachycineta bicolor*			S4B		
Turkey Vulture	*Cathartes aura*			S5B	Level 3	Forest
Veery	*Catharus fuscescens*			S4B	Level 3	Forest
Warbling Vireo	*Vireo gilvus*			S5B		
White-breasted Nuthatch	*Sitta carolinensis*			S5B		
Willow Flycatcher	*Empidonax traillii*			S5B		
Wood Duck	*Aix sponsa*			S5	Level 4	Forest
Wood Thrush	*Hylocichla mustelina*			S4B		
Yellow Warbler	*Dendroica petechia*			S5B		
Yellow-billed Cuckoo	*Coccyzus americanus*			S5B		

Appendix B

Vascular Plant List

Appendix B. List of the Vascular Plants Recorded for the Study Area

Natural Environment Existing Conditions Interim Report for Creditview Road Class Environmental Assessment

AECOM

BOTANICAL NAME		COMMON NAME	COEFFICIENT OF CONSERVATISM	WETNESS INDEX	WEEDINESS INDEX	PROVINCIAL STATUS	OMNR STATUS	COSEWIC STATUS	GLOBAL STATUS	LOCAL STATUS PEEL	CUW1a	CUS1a	CUW1b	CUS1b	FOD6-2	MAMM1-6	CUS1c	FOD5-1	CUW1c	FODM5-9	CUM1-1 (east of Creditview Rd)	CUM1-1 (Hwy 401 crossing)
			OLDHAM ET AL	OLDHAM ET AL	OLDHAM ET AL	NEWMASTER			NEWMASTER	VARGA 2000												
PTERIDOPHYTES		**FERNS & ALLIES**																				
Dryopteridaceae		**Wood Fern Family**																				
Matteuccia	*struthiopteris*	Ostrich Fern	5	-3		S5			G5	X					X							
GYMNOSPERMS		**CONIFERS**																				
Cupressaceae		**Cedar Family**																				
Juniperus	*communis*	Common Juniper	4	3		S5			G5	P	X											
Pinaceae		**Pine Family**																				
Picea	*abies*	Norway Spruce		5	-1	SE3			G?	X							X		X			
Picea	*glauca*	White Spruce	6	3		S5			G5	p							X					
Picea	*pungens*	Colorado Spruce				SE1			G5		X								X			
Pinus	*resinosa*	Red Pine	8	3		S5			G5	p							X					
Pinus	*strobus*	Eastern White Pine	4	3		S5			G5	X	X						X		X			
Pinus	*sylvestris*	Scotch Pine		5	-3	SE5			G?	X	X											
Pseudotsuga	*menziesii*	Douglas Fir									X											
DICOTYLEDONS		**DICOTS**																				
Aceraceae		**Maple Family**																				
Acer	*ginnala*	Amur Maple		5	-2	SE1			G?	p	X											
Acer	*negundo*	Manitoba Maple	0	-2		S5			G5	X	X				X				X			
Acer	*platanoides*	Norway Maple		5	-3	SE5			G?	X	X						X		X	X		
Acer	*rubrum*	Red Maple	4	0		S5			G5	X							X					
Acer	*saccharinum*	Silver Maple	5	-3		S5			G5	X		X		X					X			
Acer	*saccharum*	Sugar Maple	4	3		S5			G5T?	X	X	X			X		X	X	X	X		
Acer	*nigrum*	Black Maple	7	3		S4?			G5Q	X	X			X	X		X	X	X			
Anacardiaceae		**Sumac or Cashew Family**																				
Rhus	*hirta*	Staghorn Sumac	1	5		S5			G5	X	X											
Apiaceae		**Carrot or Parsley Family**																				
Daucus	*carota*	Wild Carrot		5	-2	SE5			G?	X	X						X					
Pastinaca	*sativa*	Wild Parsnip		5	-3	SE5			G?	X	X						X					
Apocynaceae		**Dogbane Family**																				
Vinca	*minor*	Periwinkle		5	-2	SE5			G?	X	X											
Asclepiadaceae		**Milkweed Family**																				
Asclepias	*syriaca*	Common Milkweed	0	5		S5			G5	X	X											
Asteraceae		**Composite or Aster Family**																				
Achillea	*millefolium var. millefolium*	Common Yarrow		3	-1	SE?			G5T?	X	X											
Ambrosia	*trifida*	Giant Ragweed	0	-1		S5			G5	X							X					
Arctium	*minus*	Common Burdock		5	-2	SE5			G?T?	X	X				X		X		X			
Symphyotrichum	*ericoides*	White Heath Aster	4	4		S5			G5T?	X	X											
Symphyotrichum	*lanceolatum*	Tall White Aster	3	-3		S5			G5T?	X	X								X			
Symphyotrichum	*lateriflorum*	Calico Aster	3	-2		S5			G5T5	X					X							
Symphyotrichum	*novae-angliae*	New England Aster	2	-3		S5			G5	X	X						X					
Bidens	*frondosa*	Devil's Beggar-ticks	3	-3		S5			G5	X							X					
Carduus	*acanthoides*	Plumeless Thistle		5	-1	SE5			G?	X									X			
Leucanthemum	*vulgare*	Ox-eye Daisy		5	-1	SE5			G?	X	X											
Cichorium	*intybus*	Chicory		5	-1	SE5			G?	X	X											
Cirsium	*arvense*	Canada Thistle		3	-1	SE5			G?	X	X						X					
Cirsium	*vulgare*	Bull Thistle		4	-1	SE5			G5	X	X										X	
Conyza	*canadensis*	Horseweed	0	1		S5			G5	X	X											

Appendix B. List of the Vascular Plants Recorded for the Study Area

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BOTANICAL NAME		COMMON NAME	COEFFICIENT OF CONSERVATISM	WETNESS INDEX	WEEDINESS INDEX	PROVINCIAL STATUS	OMNR STATUS	COSEWIC STATUS	GLOBAL STATUS	LOCAL STATUS PEEL	CUW1a	CUS1a	CUW1b	CUS1b	FOD6-2	MAMM1-6	CUS1c	FOD5-1	CUW1c	FODM5-9	CUM1-1 (east of Creditview Rd)	CUM1-1 (Hwy 401 crossing)
			OLDHAM ET AL	OLDHAM ET AL	OLDHAM ET AL	NEWMASTER			NEWMASTER	VARGA 2000												
Ageratina	*altissima var. altissima*	White Snakeroot	5	3		S5			G5	X	X											
Eupatorium	*maculatum*	Spotted Joe-pye-weed	3	-5		S5			G5T5	X					X							
Euthamia	*graminifolia*	Flat-topped Bushy Goldenrod	2	-2		S5			G5	X							X					
Prenanthes	*altissima*	Tall White Rattlesnake-root	5	3		S5			G5?	X							X					
Solidago	*altissima*	Tall Goldenrod	1	3		S5				X	X	X		X					X			
Solidago	*canadensis*	Canada Goldenrod	1	3		S5			G5	X	X										X	
Solidago	*gigantea*	Giant Goldenrod	4	-3		S5			G5	X					X		X					
Sonchus	*oleraceus*	Common Sow-thistle		3	-1	SE5			G?	X									X			
Tussilago	*farfara*	Coltsfoot		3	-2	SE5			G?	X									X			
Balsaminaceae		**Touch-me-not Family**																				
Impatiens	*capensis*	Spotted Touch-me-not	4	-3		S5			G5	X					X				X			
Betulaceae		**Birch Family**																				
Betula	*papyrifera*	White Birch		2		S5			G5	X							X					
Boraginaceae		**Borage Family**																				
Cynoglossum	*officinale*	Hound's-tongue		5	-1	SE5			G?	X									X			
Hackelia	*virginiana*	Virginia Stickweed	5	1		S5			G5	U					X				X			
Symphytum	*officinale ssp. officinale*	Common Comfrey		5	-1	SE5				X									X			
Brassicaceae		**Mustard Family**																				
Alliaria	*petiolata*	Garlic Mustard		0	-3	SE5			G5	X	X				X		X		X	X		
Hesperis	*matronalis*	Dame's Rocket		5	-3	SE5			G4G5	X					X				X			
Lepidium	*campestre*	Field Peppergrass		5	-1	SE5			G?	X	X											
Caprifoliaceae		**Honeysuckle Family**																				
Lonicera	*tatarica*	Tartarian Honeysuckle		3	-3	SE5			G?	X	X	X	X	X	X				X			X
Lonicera	*xylosteum*	Fly Honeysuckle		5	-2	SE2			G?	X									X			
Symphoricarpos	*albus*	Snowberry	7	4		S5			G5	R8	X								X			
Viburnum	*opulus*	Guelder Rose		0	-1	SE4			G5	X					X				X			
Celastraceae		**Staff-tree Family**																				
Euonymus	*europaea*	Spindle Tree		5	-1	SE2			G?	X	X							X				
Cornaceae		**Dogwood Family**																				
Cornus	*alternifolia*	Alternate-leaved Dogwood	6	5		S5			G5	X	X				X							
Cornus	*sericea*	Red-osier Dogwood	2	-3		S5			G5	X	X				X							
Dipsacaceae		**Teasel Family**																				
Dipsacus	*fullonum ssp. sylvestris*	Wild Teasel		5	-1	SE5			G?T?	X		X			X		X				X	X
Elaeagnaceae		**Oleaster Family**																				
Elaeagnus	*angustifolia*	Russian Olive		4	-1	SE3			G?	X	X	X					X					X
Elaeagnus	*umbellata*	Autum Olive		3	-3	SE3			G?		X											
Fabaceae		**Pea Family**																				
Medicago	*lupulina*	Black Medick		1	-1	SE5			G?	X	X											
Melilotus	*alba*	White Sweet-clover		3	-3	SE5			G?	X	X											
Robinia	*pseudo-acacia*	Black Locust		4	-3	SE5			G5	X										X		
Securigera	*varia*	Crownvetch									X						X		X		X	X
Vicia	*cracca*	Cow Vetch		5	-1	SE5			G?	X	X											
Fagaceae		**Beech Family**																				
Fagus	*sylvatica*	European Beech									X											
Quercus	*macrocarpa*	Bur Oak	5	1		S5			G5	X	X				X							
Quercus	*rubra*	Red Oak	6	3		S5			G5	X	X											

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			OLDHAM ET AL	OLDHAM ET AL	OLDHAM ET AL	NEWMASTER			NEWMASTER	VARGA 2000												
Grossulariaceae		**Currant Family**																				
Ribes	*americanum*	Wild Black Currant	4	-3		S5			G5	X									X			
Ribes	*rubrum*	Red Currant		5	-2	SE5			G4G5	X					X				X			
Hydrangeaceae		**Hydrangea Family**																				
Philadelphus	*species*	Mock-orange species				SE1			G?													
Hydrophyllaceae		**Water-leaf Family**																				
Hydrophyllum	*virginianum*	Virginia Water-leaf	6	-2		S5			G5	X							X					
Juglandaceae		**Walnut Family**																				
Carya	*cordiformis*	Bitternut hickory	6	0		S5			G5	X	X											
Carya	*ovata*	Shagbark Hickory	6	3		S5			G5	X	X		X									
Juglans	*nigra*	Black Walnut	5	3		S4			G5	X	X	X		X	X			X	X	X	X	
Lamiaceae		**Mint Family**																				
Glechoma	*hederacea*	Creeping Charlie		5	-2	SE5			G?	X					X							
Lycopus	*americanus*	Cut-leaved Water-horehound	4	-5		S5			G5	X							X					
Nepeta	*cataria*	Catnip		1	-2	SE5			G?	X							X					
Lythraceae		**Loosestrife Family**																				
Lythrum	*salicaria*	Purple Loosestrife		-5	-3	SE5			G5	X							X					
Oleaceae		**Olive Family**																				
Fraxinus	*americana*	White Ash	4	3		S5			G5	X	X	X			X				X			
Fraxinus	*excelsior*	European Ash				SE2			G?	X	X		X		X				X			
Fraxinus	*pennsylvanica*	Red Ash	3	-3		S5			G5	X	X											
Syringa	*vulgaris*	Common Lilac		5	-2	SE5			G?	X	X											
Onagraceae		**Evening-primrose Family**																				
Circaea	*lutetiana ssp. canadensis*	Enchanter's Nightshade	3	3		S5			G5T5	X					X				X			
Oenothera	*biennis*	Common Evening-primrose	0	3		S5			G5	U	X											
Oxalidaceae		**Wood Sorrel Family**																				
Oxalis	*stricta*	Upright Yellow Wood-sorrel	0	3		S5			G5	X					X							
Primulaceae		**Primrose Family**																				
Lysimachia	*nummularia*	Moneywort		-4	-3	SE5			G?	X	X											
Ranunculaceae		**Buttercup Family**																				
Anemone	*canadensis*	Canada Anemone	3	-3		S5			G5	X							X					
Clematis	*virginiana*	Virgin's-bower	3	0		S5			G5	X	X				X							
Ranunculus	*repens*	Creeping Buttercup		-1	-1	SE5			G?	X					X							
Thalictrum	*dioicum*	Early Meadow-rue	5	2		S5			G5	X					X							
Rhamnaceae		**Buckthorn Family**																				
Rhamnus	*cathartica*	Common Buckthorn		3	-3	SE5			G?	X	X		X				X	X	X	X		X
Rosaceae		**Rose Family**																				
Crataegus	*species*	Hawthorn species									X											
Geum	*aleppicum*	Yellow Avens	2	-1		S5			G5	X					X							
Geum	*urbanum*	Wood Avens		5	-1	SE2			G5	X	X				X			X	X	X		
Malus	*pumila*	Common Crabapple		5	-1	SE5			G5	X	X											
Malus	*species*	Apple species											X									
Potentilla	*anserina ssp. anserina*	Silverweed	5	-4		S5				R3							X					
Potentilla	*recta*	Rough-fruited Cinquefoil		5	-2	SE5			G?	X	X											
Prunus	*avium*	Sweet Cherry		5	-2	SE4			G?	XSR	X											
Prunus	*serotina*	Black Cherry	3	3		S5			G5	X									X			

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			OLDHAM ET AL	OLDHAM ET AL	OLDHAM ET AL	NEWMASTER			NEWMASTER	VARGA 2000												
Prunus	*triloba*	Flowering Almond									X											
Prunus	*virginiana*	Choke Cherry	2	1		S5			G5T?	X					X				X			
Pyrus	*species*	Pear Species									X											
Rosa	*species*	Rose species									X											
Rubus	*idaeus*	Red Raspberry				SE1			G5T5		X											
Rubus	*occidentalis*	Black Raspberry	2	5		S5			G5	X	X				X				X	X		
Salicaceae		**Willow Family**																				
Populus	*alba*	Silver Poplar		5	-3	SE5			G5	X									X			
Populus	*deltoides ssp. monilifera*	Cottonwood				S5			G5T?	X							X					
Populus	*tremuloides*	Trembling Aspen	2	0		S5			G5	X							X					
Populus X	*canadensis*	Carolina Poplar				SE1			HYB		X			X			X					
Salix	*babylonica*	Weeping Willow											X									
Salix	*bebbiana*	Bebb's Willow	4	-4		S5			G5	X	X			X								
Salix X	*rubens*	Hybrid Crack Willow		-4	-3	SE4			HYB	XSR	X			X								
Scrophulariaceae		**Figwort Family**																				
Linaria	*vulgaris*	Butter-and-eggs		5	-1	SE5			G?	X							X					
Verbascum	*thapsus*	Common Mullein		5	-2	SE5			G?	X	X											
Tiliaceae		**Linden Family**																				
Tilia	*americana*	American Basswood	4	3		S5			G5	X	X				X							
Tilia	*cordata*	Small Leaf Linden				SE1			G?								X		X			
Ulmaceae		**Elm Family**																				
Ulmus	*americana*	White Elm	3	-2		S5			G5?	X	X								X			
Verbenaceae		**Vervain Family**																				
Verbena	*urticifolia*	White Vervain	4	-1		S5			G5	X					X				X			
Vitaceae		**Grape Family**																				
Parthenocissus	*inserta*	Inserted Virginia-creeper	3	3		S5			G5	X	X						X		X			
Vitis	*riparia*	Riverbank Grape	0	-2		S5			G5	X	X				X				X			
MONOCOTYLEDONS		**MONOCOTS**																				
Cyperaceae		**Sedge Family**																				
Carex	*pedunculata*	Long-stalked Sedge	5	5		S5			G5	X									X			
Iridaceae		**Iris Family**																				
Iris	*pseudacorus*	Yellow Iris		-5	-2	SE3			G?	X							X					
Juncaceae		**Rush Family**																				
Juncus	*tenuis*	Path Rush	0	0		S5			G5	X							X					
Lemnaceae		**Duckweed Family**																				
Lemna	*minor*	Lesser Duckweed	2	-5		S5			G5	X	X					X						
Liliaceae		**Lily Family**																				
Asparagus	*officinalis*	Garden Asparagus		3	-1	SE5			G5?													
										X	X								X			
Poaceae		**Grass Family**								X							X					
Dactylis	*glomerata*	Orchard Grass		3	-1	SE5			G?	X	X						X		X			X
Echinochloa	*crusgalli*	Common Barnyard Grass		-3	-1	SE5			G?	R							X					
Elymus	*repens*	Quack Grass		3	-3	SE5			G?	X												
Elymus	*riparius*	River-bank Wild Rye	7	-3		S4?			G5	X												
Elymus	*virginicus var. virginicus*	Virginia Wild Rye	5	-2		S5			G5T?	X		X										
Glyceria	*grandis*	Tall Manna Grass	5	-5		S4S5			G5	X						X	X					

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			OLDHAM ET AL	OLDHAM ET AL	OLDHAM ET AL	NEWMASTER			NEWMASTER	VARGA 2000												
Phalaris	*arundinacea*	Reed Canary Grass	0	-4		S5			G5	X	X											
Phragmites	*australis*	Common Reed	0	-4		S5			G5	X		X							X			X
Poa	*compressa*	Canada Blue Grass	0	2		S5			G?													
Poa	*pratensis ssp. pratensis*	Kentucky Bluegrass	0	1		S5			G5T					X								
																	X					
Sparganiaceae		**Bur-reed Family**																				
Sparganium	*eurycarpum*	Broad-fruited Bur-reed	3	-5		S5			G5													
										X							X					
Typhaceae		**Cattail Family**																				
Typha X	*glauca*	Glaucous Cattail	3	-5		S5			HYB													

FLORISTIC SUMMARY & ASSESSMENT

Species Diversity

Total Species:	**124**	
Native Species:	**71**	57.26%
Exotic Species	**53**	42.74%
S1-S3 Species	0	
S4 Species	1	
S5 Species	69	

Co-efficient of Conservatism and Floral Quality Index

Co-efficient of Conservatism (CC) (average)		**3.31**	
CC 0 to 3	*lowest sensitivity*	36	50.70%
CC 4 to 6	*moderate sensitivity*	31	43.66%
CC 7 to 8	*high sensitivity*	4	5.63%
CC 9 to 10	*highest sensitivity*	0	0.00%
Floral Quality Index (FQI)		**27.89**	

Presence of Weedy & Invasive Species

mean weediness		**-1.83**	
weediness = -1	*low potential invasiveness*	24	45.28%
weediness = -2	*moderate potential invasiveness*	14	26.42%
weediness = -3	*high potential invasiveness*	15	28.30%

Presence of Wetland Species

average wetness value	**1.40**	
upland	34	27.42%
facultative upland	39	31.45%
facultative	18	14.52%
facultative wetland	26	20.97%
obligate wetland	8	6.45%

Local Status

X = Common native or introduced species
P = Planted
R# = Number of stations for a rare plant
U = uncommon native species
X = Species in site district 6E7 that occur outside of GTA
SR = species record based on a sight record

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EXPLANATION OF TERMINOLOGY

Botanical and Common Name: .....From Newmaster et. al, 1998. Species requiring confirmation noted (cf).

Co-efficient of Conservatism: .....This value, ranging from 0 (low) to 10 (high), is based on a species tolerance of disturbance and fidelity to a specific habitat integrity.

Wetness Index: .....This value, ranging from -5 (obligate wetland) to 5 (upland) provides the probability of a species occurring in wetland or upland habitats.

Weediness Index: .....This value, ranging from -1 (low) to -3 (high) quantifies the potential invasiveness of non-native plants. In combination with the percentage of non-native plants, it can be used as an indicator of disturbance.

Provincial Status:.....Provincial ranks are used by the NHIC to set protection priorities for rare species and natural communities. These ranks are not legal designations. S4 and S5 species are generally uncommon to common in the province. Species ranked S1-S3 are considered to be rare in Ontario.

Local Status:

X: native species present (collection-based) and all exotic species
R: species locally rare (number of stations): Durham (<10 stations), GTA (<40 stations), Site District 6E7 (<20 stations)
U: native species locally uncommon Durham (11-20 stations), GTA (41-80 stations), Site District 6E7 (21-40 stations)
P: planted tree

Record Type

SR: sight record
SRP: sight record with photograph
KRAUS-00-001: collection by D.T. Kraus for deposition into OAC (University of Guelph) herbarium

DETAILED EXPLANATION OF TERMS

Floral Quality Index and Coefficient of Conservatism Values

Vegetation species and community sensitivity was assessed through the application of coefficient of conservatism values (CC), assigned to each native species in southern Ontario (Oldham, et. al, 1995). The value of CC, ranging from 0 (low) to 10 (high), is based on a species tolerance of disturbance and fidelity to specific habitat integrity. The occurrence of species with a CC of 9 or 10 can be good indicators of undisturbed conditions such as mature forests, fens or bogs. General habitat values associated with the CC values are:

0-3: species found in a wide variety of communities, including disturbed sites
4-6: species associated with a specific community, but tolerate moderate disturbance
7-8: species associated with a community in an advanced successional stage, tolerant of minor disturbances
9-10: species with a high degree of fidelity to a narrow range of synecological parameters

The floristic quality of an area is reflected in the mean value of CC. For example, an old field or grazed woodlot would tend have a low mean CC; these habitats are dominated by opportunistic species that occur in a wide range of site conditions and are tolerant of disturbance. A bog, prairie or intact forest would have a higher value, reflecting the specific habitat requirements of many of the species and a generally undisturbed condition. The following provides an example of interpretation of CC values:

mean CC value / % spp CC >8 / Condition of the Landscape
5 / 27 / intact
3.5 / 19 / slightly degraded
1.3 / 2 / severely degraded

The FQI accounts for the species diversity of the area by equating the number of native species with the mean CC value. The FQI is generally used for comparing natural areas. The CC value and FQI of the study area were calculated for the entire study area.

Weediness Index

The sensitivity of natural areas can be assessed through application of the Weediness Index. The Weediness Index quantifies the potential invasiveness of non-native plants, and, in combination with the percentage of non-native plants can be used as an indicator of disturbance. Values (ranging from 1- to -3) have been assigned to most non-native species based on the potential impact each species can have in natural areas:

-1: little or no impact on natural areas (most non-native plants are in this category)
-2: occasional impacts on natural areas, generally infrequent or localized
-3: major potential impacts on natural areas

Wetness Index

All plants in southern Ontario have been assigned a wetland category, based on the designations developed for use by the United States Fish & Wildlife Service. Plants are designated into the following categories:

OBL (Obligate Wetland): ..... occurs almost always in wetlands under natural conditions (estimated >99% probability)

FACW (Facultative Wetland): ..... usually occurs in wetlands, but occasionally found in non-wetlands (estimated 67-99% probability)

FAC (Facultative): ..... equally likely to occur in wetlands or non-wetlands (estimated 34-66% probability)

FACU (Facultative Upland): ..... occasionally occurs in wetlands, but usually occurs in non-wetlands (estimated 1-33% probability)

UPL (Upland): ..... occurs almost never in wetlands under natural conditions (estimated <1% probability)

Further refinement of the Facultative categories are denoted by a “+” or “-” to express exaggerated tendencies for those species. The “+” denotes a greater estimated probability occurring in wetlands than species in the general indicator category, but a lesser probability than species occurring in the next higher category. The "-" denotes a lesser estimated probability of occurring in wetlands than species in the general indicator category, but a greater probability than species occurring in the next lower general category.

Each wetland category has been assigned a numerical value to facilitate the quantification of the wetness index. The wetland categories and their corresponding values are as follows:

OBL : .....-5
FACW+:.....-4
FACW:.....-3
FACW-:.....-2
FAC+: .....-1
FAC: 0
FAC-:.....1
FACU+: 2
FACU:.....3
FACU-: 4
UPL: 5

Provincial Status

Provincial ranks are used by the NHIC to set protection priorities for rare species and natural communities. These rankings are based on the total number of extant Ontario populations and the degree to which they are potentially or actively threatened with destruction. The ranks are:

S1:.....*Critically* Imperiled—Critically imperiled in the nation or state/province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province
S2:.....*Imperiled*—Imperiled in the nation or state/province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province
S3:.....*Vulnerable*—Vulnerable in the nation or state/province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation
S4:.....*Apparently* Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.
S5:.....*Secure*—Common, widespread, and abundant in the nation or state/province
SE: .....*Exotic*

Rank ranges, e.g. S2S3, indicate that the rank is either S2 or S3, but that current information is insufficient to differentiate. S#S# Range Rank —A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species or community. Ranges cannot skip more than one rank (e.g., SU is used rather than S1S4).

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Appendix C

Breeding Birds Recorded in Creditview Road Study Area in 2014

Appendix C. Breeding Birds Recorded in Creditview Road Study Area in 2014

Common Name	Scientific Name	ESA Status[1]	COSEWIC Status[1]	NHIC Status Ranking[2]	Breeding Bird Surveys Record		Breeding Status
					June 6, 2014	*June 23, 2014*	
American Goldfinch	*Cardeulis tristis*			S5	6	4	Probable
American Robin	*Turdus migratorius*			S5	16	7	Probable
Baltimore Oriole	*Icterus galbula*			S4	2	1	Probable
Black-capped Chickadee	*Poecile atricapillus*			S5	2	1	Probable
Brown-headed Cowbird	*Molothrus ater*			S4	5	1	Probable
Blue Jay	*Cyanocitta cristata*			S5	3	1	Probable
Cedar Waxwing	*Bombycilla cedrorum*			S5	1		Possible
Cliff Swallow	*Petrochelidon purrhonota*			S4	2	3	Confirmed
Common Grackle	*Quiscalus quiscula*			S5	8	4	Probable
Common Yellowthroat	*Geothlypis trichas*			S5	1		Possible
Eastern Wood-Pewee	*Contpus virens*	SC	SC	S4	1		Possible
European Starling	*Sturnus vulgaris*			SNA	14	4	Probable
Gray Catbird	*Dumetella carolinensis*			S4	1		Possible
Great Blue Heron	*Ardea herodias*			S4		3	Possible
Great Crested Flycatcher	*Myiarchus crinitus*			S4	2		Possible
Hairy Woodpecker	*Picoides villosus*			S5	1	1	Probable
House Sparrow	*Passer domesticus*			SNA	8	1	Probable
House Wren	*Troglodytes aedon*			S5	1		Possible
Mallard	*Anas platyrhynchos*			S5		1	Possible
Mourning Dove	*Zenaida macroura*			S5	4	1	Probable
Northern Cardinal	*Cardinalis cardinalis*			S5	8	5	Probable
Northern Mockingbird	*Mimus polyglottus*			S4	1		Possible
Rock Pigeon	*Columba livia*			SNA	2	2	Confirmed
Red-eyed Vireo	*Vireo olivaceus*			S5	4	1	Probable
Red-winged Blackbird	*Agelaius phoeniceus*			S4	16	5	Probable
Savannah Sparrow	*Passerculus sandwichensis*			S4	2		Possible
Song Sparrow	*Melospiza melodia*			S5	9	9	Probable
Spotted Sandpiper	*Actitis macularia*			S5	1		Possible
Warbling Vireo	*Vireo gilvus*			S5	1	1	Probable
Willow Flycatcher	*Empidonax trailli*			S5	2	1	Probable
Yellow Warbler	*Dendroica petechia*			S5	6	3	Probable

Notes: 1. Endangered Species Act Provincial Status: SC = Special Concern
2. COSEWIC Federal Status: SC = Special Concern
3. Natural Heritage Information Centre: S4, S5 = common and secure; SNA = non-native

Appendix D

Species at Risk Assessment

Appendix D. Species at Risk Assessment and Preferred Habitat in the Study Area

Common Name	**Scientific Name**	**Preferred Habitat** (Significant Wildlife Habitat Technical Guide, Species at Risk Registry & Ontario's Biodiversity - ROM)	**Source of Information**	**Geographic Distribution** (ROM – Range Maps, MNR Publications & COSEWIC Reports)	**Habitat Present within the Study Area** (Y/N)
Endangered					
Butternut	*Juglans cinerea*	Deciduous forests in rich, moist, and well-drained soils often found along streams; may also be found on well-drained gravel sites, especially in limestone areas. Grows alone or in small groups. Butternut is shade intolerant and usually occurs along or near edge of deciduous woodlots and hedgerows. Flowers in May; fruits mature late summer.[1] Can be associated with the following ELC codes: **FOD2, FOD5, FOD6, FOD7; mature hedgerows; Soil: dry rocky or moist (4, 5, 6) to fresh (2, 3).**	• NHIC – City of Mississauga Search, using Spatial Boundary Tool	In Ontario, butternuts are found throughout the southwest, north to the Bruce Peninsula, and south of the Canadian Shield.[1]	**Yes** - Suitable habitat is present within deciduous forest communities (FOD5-1 and FOD6-2) along Credit River. Species was not observed during AECOM field investigation in the Study Area.
Henslow's Sparrow	*Ammodramus henslowii*	This species prefers large, fallow, grassy areas with ground mats of dead vegetation, dense herbaceous vegetation, ground litter and some song perches. Can also be found in neglected weedy fields, wet meadows, cultivated uplands. This species requires a moderate amount of moisture, as well as a tract of grasslands >40 ha, but usually in areas >100 ha. The Henslow's Sparrow is an area-sensitive grassland species that requires this habitat	• Species at Risk in Region of Peel, October 2013	In Canada, this species is restricted to the Mixedwood Plain Ecozone in southern Ontario and southwest Quebec.[2]	**No –** Suitable habitat is not present within the Study Area. Large cultural meadow CUM1-1 located south of Hwy 401 on the east side of Creditview Road is too densely vegetated and is not large enough in size to provide suitable habitat. Other cultural meadows located near the Creditview Road

Common Name	Scientific Name	Preferred Habitat (Significant Wildlife Habitat Technical Guide, Species at Risk Registry & Ontario's Biodiversity - ROM)	Source of Information	Geographic Distribution (ROM – Range Maps, MNR Publications & COSEWIC Reports)	Habitat Present within the Study Area (Y/N)
		type and will occurring at higher densities in larger patches of suitable habitat. In Ontario this colonies of this species have been documented in abandoned fields, lightly grazed pasture and wet meadows.[2] This species can be associated with the following ELC codes: **TPO, CUM1-1 and MAM.**			Crossing of Hwy 401 are too small and highly degraded. Species was not observed during AECOM field investigation in the Study Area.
Jefferson Salamander	*Ambystoma jeffersonianum*	Jefferson Salamanders inhabit deciduous forests with suitable breeding areas like limestone sinkhole ponds, kettle ponds and other natural basins. These bodies of water are often ephemeral (temporary) and are fed by spring runoff, groundwater, or springs. In Canada, the species is associated with mature, Carolinian forests, which have permanent or temporary ponds for breeding. [3]	• Species at Risk in Region of Peel, October 2013 • Ontario Reptile and Amphibian Atlas, November 2013	In Ontario, known populations of Jefferson Salamander exist in suitable habitat on the Niagara Escapment from Grey County to Hamilton Region and on the Oak Ridges Moraine in York Region. [3]	**Yes –** Suitable habitat is present in deciduous forest and marsh communities (FOD5-1, MAMM1-6 and FOD6-2) along Credit River. Species was not observed during AECOM field investigation in the Study Area.
Loggerhead Shrike	*Lanius ludovicianus*	Species inhabits grazed pasture, marginal farmland with scattered hawthorn shrubs, hedgerows. As well as fence posts, wires and associated low-lying wetland; alvars which are located on core areas of limestone plain adjacent to Canadian Shield. The greatest threat is fragmentation of suitable habitat due to natural succession. Species requires at least 25 ha of suitable habitat.[4]	• Species at Risk in Region of Peel, October 2013	Until the 1970s, the Loggerhead Shrike could be found at many locations throughout southern Ontario and other parts of northeastern North America, but populations have declined dramatically. Although the occasional bird is still found within the broader former range, most remaining species are now found in two core	**No** – Suitable habitat is not located within the study area. Loggerhead shrikes are only known to breed within two locations. There is one Cultural Thicket inclusion that is significantly less than 25 ha.

Common Name	Scientific Name	Preferred Habitat (Significant Wildlife Habitat Technical Guide, Species at Risk Registry & Ontario's Biodiversity - ROM)	Source of Information	Geographic Distribution (ROM – Range Maps, MNR Publications & COSEWIC Reports)	Habitat Present within the Study Area (Y/N)
		Can be associated with the following ELC coeds: **ALS, CUT, CUM**		grassland habitats – the Carden Plain north of Lindsay, and the Napanee Limestone Plain. [4]	Species was not observed during AECOM field investigation in the Study Area.
Rapids Clubtail	*Gomphus quadriclor*	The Rapids Clubtail is most commonly observed in clear, cool, medium to large rivers with gravel shallows and muddy pools. Mature females often inhabit forests along riverbanks and only visit shallows and pools when they are ready to mate and lay eggs. This species can be associated with the following ELC codes: **OAO.** Flowing watercourse with both shallow gravel riffles and muddy pools required.[5]	• Species at Risk in Region of Peel, October 2013	The Rapids Clubtail has only been found in four rivers in southern and eastern Ontario: the Thames, Humber, Credit and Mississippi.[5]	**No –** Suitable habitat is not present within the Study Area due to poor water quality of Credit River. Species was not observed during AECOM field investigation in the Study Area.
Redside Dace	*Clinostomus elongatus*	Species can be found in pools and slow-moving sections of relatively small (<10 m width), clear, cool, streams with sand or gravel bottoms and riffle/pool habitat. Their preferred water temperature range is 14-23°C.[6]	• Species at Risk in Region of Peel, October 2013	Populations of this species occur in tributaries to western Lake Ontario from Pringle Creek in the east to Spencer Creek in the west. Although populations have been extirpated from portions of the Credit River Watershed.[6]	**Unknown –** Field assessment for this Species has not been completed for the Study Area. The overall project does not include the bridge span across Credit River. Since the preferred habitat for this species is along Credit River, negative effects are not

Common Name	Scientific Name	**Preferred Habitat** (Significant Wildlife Habitat Technical Guide, Species at Risk Registry & Ontario's Biodiversity - ROM)	**Source of Information**	**Geographic Distribution** (ROM – Range Maps, MNR Publications & COSEWIC Reports)	**Habitat Present within the Study Area** (Y/N)
					anticipated as a result of this project.
Rusty-patched Bumble Bee	*Bombus affinis*	The Rusty-patched Bumble Bee is a habitat generalist that within Ontario is found from the southern Great Lakes – St. Lawrence forest to the Carolinian Forest. This species is occurs in open habitat, such as mixed farmland, savannahs, sand dunes, urban and lightly wooded areas.[7] This species can be associated with the following ELC codes: **SDO, SDS, SDT, TPO, TPS, TPS and CUM**.	• Species at Risk in Region of Peel, October 2013	Historically the Rusty-patched Bumble Bee was common in eastern and North America, and up until 1970 is was the fourth most common species of bumble bee in southern Ontario. The only occurrence of this species in Canada from 2002 to 2010 was at the Pinery Provincial Park.[7]	**No –** Suitable Habitat is not present in study area. Species is locally restricted to Pinery Provincial Park. Species was not observed during AECOM field investigation in the Study Area.
Threatened					
Barn Swallow	*Hirundo rustica*	Nearly all nests are made on man-made structures such as barns, garages, sheds, boat houses, bridges, road culverts, eaves and warfs. Farmlands or rural areas; forages over open country especially near bodies of water. [8] Can be associated with the following ELC codes: Forages in **TPO, CUM1, MAM, MAS, OAO, SAS1, SAM1, SAF1;** nest on suitable structures.	• Species at Risk in Region of Peel, October 2013 • Atlas of Breeding Birds of Ontario Search Square #17PJ02	Found throughout Ontario.[8]	**Yes** – Suitable habitat may be present in residential areas within the Study Area. The species may utilize the bridge spanning the Credit River; however, the overall project does not include this bridge and negative effects are not anticipated as a result of this project. Species was not observed

Common Name	Scientific Name	**Preferred Habitat** (Significant Wildlife Habitat Technical Guide, Species at Risk Registry & Ontario's Biodiversity - ROM)	**Source of Information**	**Geographic Distribution** (ROM – Range Maps, MNR Publications & COSEWIC Reports)	**Habitat Present within the Study Area** (Y/N)
					during AECOM field investigation in the Study Area.
Blanding's Turtle	*Emydoidea blandingii*	Freshwater lakes, permanent or temporary pools, slow-flowing streams, marshes, swamps; prefers shallow water, organic soil & dense vegetation; nest in loose substrates, including sand, organic soil, gravel, cobblestone; overwinter in permanent pools that average about 1 m in depth, or in slow-flowing streams or in bogs; basks on logs, stumps, or banks. [9] Can be associated with the following ELC codes: **SWT2, SWT3, SWD, SWM, MAS2, SAS1, SAM1,** where open water present.	• Species at Risk in Region of Peel, October 2013 • Ontario Reptile and Amphibian Atlas, November 2013	In Ontario, Blanding's Turtle can be found throughout the southern and central portions of the province except along the Bruce Peninsula and the far southeast. [9]	**No –** Suitable habitat is not present within the Study Area due to poor water quality of Credit River and degraded cultural savannahs adjacent to the Credit River. Species was not observed during AECOM field investigation in the Study Area.
Bobolink	*Dolichonyx oryzivorus*	Nests primarily in forage crops, particularly **hayfields and pastures**, dominated by a variety of species such as clover, tall grasses and broadleaved plants; also occurs in wet prairie, graminoid, peatlands and abandoned fields; **generally requires tracts of grassland >5 ha**. Also nests in lightly grazed pastures, fallow and abandoned fields and shallow grassy marshes. [10] Can be associated with the following ELC Codes: **TPO, TPS, CUM1, MAM2**	• Species at Risk in Region of Peel, October 2013 • Atlas of Breeding Birds of Ontario Search Square #17PJ02	In Ontario, Bobolink is widely distributed throughout most of the province south of the boreal forest. It could also potentially be found in the north where suitable habitat exists.[10]	**Yes** – Suitable habitat is present in the form of a large a hayfield and cultural meadow in the north end of the Study Area. Species was not observed during AECOM field investigation in the Study Area.
Cerulean Warbler	*Dendroica cerulea*	The Cerulean Warblers breeding habitat	• Species at Risk in	There are two main geographic	**No –** Suitable habitat is

Common Name	Scientific Name	**Preferred Habitat** (Significant Wildlife Habitat Technical Guide, Species at Risk Registry & Ontario's Biodiversity - ROM)	**Source of Information**	**Geographic Distribution** (ROM – Range Maps, MNR Publications & COSEWIC Reports)	**Habitat Present within the Study Area** (Y/N)
		consists of large tracts of mature deciduous forests with tall trees and an open understory. This species can be found in both wet bottomland forests and upland areas.[11] This species can be associated with the following ELC codes: **FOD and SWD**. Mature forests with an open understory are also required.	Region of Peel, October 2013	clusters of Cerulean Warbler within Ontario, one in the Carolinian region, and the other extending from southeastern Georgian Bay east to the Frontenac Axis. A small number of breeding pairs are also known to occur in southwestern Quebec.[11]	not present within the Study Area. The forest canopy of deciduous forests and cultural woodlands are too open to support species. This species is geographically restricted to two clusters. Species was not observed during AECOM field investigation in the Study Area.
Chimney Swift	*Chaetura pelagica*	Formerly nested in the trunks of large, hollow trees. Today, mainly use chimneys or abandoned buildings as nesting sites. May forage over wide variety of habitats. It **requires dead trees >30 cm** for roosting and possibly nesting. Where swifts observed foraging only, is not Significant habitat. [12] Can be associated with the following ELC codes: Forages in TPO**, CUM1, MAM, MAS, OAO, SAS1, SAM1, SAF1**; nest in any communities where buildings with chimneys present.	• Atlas of Breeding Birds of Ontario Search Square #17PJ02	In Ontario, the Chimney Swift is most widely distributed in the Carolinian zone in the south and southwest portions of the province, however has been detected throughout most of the province south of the 49th parallel. [12]	**No** - Suitable habitat is not present within the study area due to its urbanized nature. Species was not observed during AECOM field investigations.
Eastern Meadowlark	*Sturnella magna*	Most common in native grasslands, savannah, old fields, hayfields, lightly grazed pastures, weedy meadows, fields with	• Species at Risk in Region of Peel, October 2013	In Ontario, the Eastern Meadowlark's current breeding range extends from the southwestern part of the province	**Yes** – Suitable habitat is present in the form of a large a hayfield and

Common Name	Scientific Name	Preferred Habitat (Significant Wildlife Habitat Technical Guide, Species at Risk Registry & Ontario's Biodiversity - ROM)	Source of Information	Geographic Distribution (ROM – Range Maps, MNR Publications & COSEWIC Reports)	Habitat Present within the Study Area (Y/N)
		occasional shrubs. **Minimum area of grassland required is about 5 ha**. [13] Can be associated with the following ELC codes: **TPO, TPS, CUM1, MAM2, MAS2**	• Atlas of Breeding Birds of Ontario Search Square #17PJ02	more or less continuously north to include southern Algoma, Sudbury and Nipissing districts. It also occurs in a northern pocket of agricultural lands associated with the Little Clay Belt in Timiskaming District.[13]	cultural meadow in the north end of the Study Area. Species was not observed during AECOM field investigation
Eastern Musk Turtle	*Sternotherus odoratus*	The Eastern Musk Turtle is generally found in shallow water bodies, less than 2 m in depth, with a soft substrate, which is required for hibernation. Nesting habitat for this species is variable and can be located on the open ground or in shallow excavations in decaying vegetation. Rotting wood or muskrat lodges. Direct sunlight may be an important requirement for this species at northern and eastern Ontario to maintain sufficient incubation temperatures and may be a limiting factor for the breeding success of this species in these locations.[14] This species can be associated with the following ELC codes: **MAS, OAO, SAS**. Water bodies with soft substrates and slow to no flow required.	• Species at Risk in Region of Peel, October 2013 • Ontario Reptile and Amphibian Atlas, November 2013	The majority of the sightings for Eastern Musk Turtle have been along the southern edge of the Canadian Shield. This species has been reported at various locations close to the edges of Lake Huron, Lake Erie and Lake Ontario and in Quebec just north of the Ottawa River.[14]	**No –** Suitable habitat is not present within the Study Area. No ponds are located in the Study Area and the Credit River is too deep for the species. Species was not observed during AECOM field investigation in the Study Area.
Least Bittern	*Ixobrychus exilis*	Occurs in large marshes (especially cattail) with good interspersion of emergents and open water. Nests sit on platforms of stiff stems; nests within 10m of open water.	• Species at Risk in Region of Peel, October 2013	In Ontario, Least Bitterns are mainly found in marshes near the Great Lakes.[15]	**No –** Suitable habitat is not present within the Study Area. There are lack of marshes of a large

Common Name	Scientific Name	**Preferred Habitat** (Significant Wildlife Habitat Technical Guide, Species at Risk Registry & Ontario's Biodiversity - ROM)	**Source of Information**	**Geographic Distribution** (ROM – Range Maps, MNR Publications & COSEWIC Reports)	**Habitat Present within the Study Area** (Y/N)
		Prefers large marshes that have relatively stable water levels throughout the nesting period.[15] Can be associated with the following ELC codes: **MAS2-1, MAS3-1, SA, OAO**			enough size that would support this species. Species was not observed during AECOM field investigation in the Study Area.
Special Concern					
Common Nighthawk	*Chordeiles minor*	The Common Nighthawk nests in a wide range of open, vegetation-free habitats, including dunes, beaches, recently harvested forests, burnt-over areas, logged areas, rocky outcrops, rocky barrens, grasslands, pastures, peat bogs, marshes, lakeshores, and river banks. This species also inhabits mixed and coniferous forests.[16] Can be associated with the following ELC codes: **SD, BB, RB, CUM, MAM, FOM, FOC**	• MNR Peterborough District email correspondence • Atlas of Breeding Birds of Ontario Search squares 17QK10&11	In Ontario, the Common Nighthawk can be found throughout the province except for the coastal regions of James Bay and Hudson Bay.	**No** – Suitable habitat is not located within the study area given its urbanized landscape. Species was not observed during AECOM field investigation in the Study Area.
Eastern Ribbonsnake	*Thamnophis sauritus*	The Eastern Ribbonsnake is a semi-aquatic species that is commonly located along the edges of ponds, streams, marshes, swamps or bogs that are quiet, contain shallow water and are bordered by low, dense vegetation. Sites with abundant basking areas are also important habitat criteria.[17] This species can be associated with the	• Species at Risk in Region of Peel, October 2013 •	The range for the Eastern Ribbonsnake in Canada is concentrated in Ontario, following the southern edge of the Canadian Shield with the majority of the sightings occurring in the Georgian Bay region, particularly Bruce County.[17]	**No –** Suitable habitat is not present within the Study Area. There are no meadows extensive enough to support this species. Species was not observed during AECOM field

Common Name	Scientific Name	Preferred Habitat (Significant Wildlife Habitat Technical Guide, Species at Risk Registry & Ontario's Biodiversity - ROM)	Source of Information	Geographic Distribution (ROM – Range Maps, MNR Publications & COSEWIC Reports)	Habitat Present within the Study Area (Y/N)
		following ELC codes: **MAM, OAO and MAS**.			investigation in the Study Area.
Hart's –tongue Fern	Asplenium scolopendrium	Hart's-tongue Fern grows on calcareous rocks in deep shade on slopes in deciduous forest. Most Ontario occurrences are in maple-beech forest. Established plants can grow in exposed, rocky crevices and on outcrops, but moist, mossy areas seem to be essential for spore germination and early plant development.[18]	• Species at Risk in Region of Peel, October 2013	Hart's-tongue Ferns are found at sites in New York, Michigan, Tennessee, Alabama, Ontario, Oaxaca, Chiapas and Hispaniola. Ontario has the bulk of populations north of Mexico. In this province the fern has been reported at more than 100 sites, mostly on the Niagara Escarpment, with about 75 of these believed to still exist. [18]	**No –** Suitable habitat is not present within the Study Area. This species is known from a few sites in the Niagara Escarpment. Species was not observed during AECOM field investigation in the Study Area.
Hill's Pondweed	Potamogeton hillii	Hill's Pondweed is found in slow-moving streams, ditches, ponds, lakes and wetlands. It grows in clear, cold alkaline waters. [19]	• Species at Risk in Region of Peel, October 2013	Hill's Pondweed grows in northeastern United States and Ontario, ranging from Wisconsin, Michigan and Ontario south to south-central Pennsylvania and western Viriginia, and east to Vermont, Massachusetts and Connecticut. In Ontario, it has been recorded at 26 sites in the Bruce Peninsula, Manitoulin Island, Wellington County and Peel Region. Only about 14 of these are presumed to still support Hill's Pondweed.[19]	**No –** Suitable habitat is not present within the Study Area. Credit River is too fast flowing for this species. Species was not observed during AECOM field investigation in the Study Area.
Lake Sturgeon	Acipenser	The Lake Sturgeon lives almost exclusively	• Species at Risk in	In Ontario, the Lake Sturgeon is found	**Unknown –** Field

Common Name	Scientific Name	**Preferred Habitat** (Significant Wildlife Habitat Technical Guide, Species at Risk Registry & Ontario's Biodiversity - ROM)	**Source of Information**	**Geographic Distribution** (ROM – Range Maps, MNR Publications & COSEWIC Reports)	**Habitat Present within the Study Area** (Y/N)
	fulvescens	in freshwater lakes and rivers with soft bottoms of mud, sand or gravel. They are usually found at depths of five to 20 metres. They spawn in relatively shallow, fast-flowing water (usually below waterfalls, rapids, or dams) with gravel and boulders at the bottom. However, they will spawn in deeper water where habitat is available. They also are known to spawn on open shoals in large rivers with strong currents.[20]	Region of Peel, October 2013	in the rivers of the Hudson Bay basin, the Great Lakes basin and their major connecting waterways, including the St. Lawrence River. There are three distinct populations in Ontario: Great Lakes - Upper St. Lawrence River, Northwestern Ontario, and Southern Hudson Bay - James Bay.[20]	assessment for this Species has not been completed for the Study Area.
Milksnake	*Lampropeltis triangulum*	Species can be found in farmlands, meadows, hardwood or aspen stands. As well as pine forest with brushy or woody cover; river bottoms or bog woods. Occasionally hides under logs, stones, or boards or in outbuildings, and often uses communal nest sites.[21] Can be associated with the following ELC codes: CUM, FOD, FOC	• Species at Risk in Region of Peel, October 2013 • Ontario Reptile and Amphibian Atlas, November 2013	In Ontario, Milksnakes are widespread and locally common within the southern portion of the province, and ranges as far north as Lake Nipissing and Sault Ste. Marie.[21]	**Yes –** Suitable habitat may be present in the cultural meadows, agricultural fields and deciduous forests in the Study Area. Species was not observed during AECOM field investigation in the Study Area.
Northern Brook Lamprey	*Ichthyomyzon fossor*	The Northern Brook Lamprey inhabits clear, coolwater streams. The larval stage requires soft substrates such as silt and sand for burrowing which are often found in the slow-moving portions of a stream. Adults are found in areas associated with spawning, including fast flowing riffles comprised of rock	• Species at Risk in Region of Peel, October 2013	The Northern Brook Lamprey lives in the eastern United States in the upper Mississippi and southern Hudson Bay drainages, ranging from Manitoba and the Great Lakes region south to Missouri, and east to the St. Lawrence River in Quebec. In Ontario, it lives in rivers draining into Lakes Superior,	**Unknown –** Field assessment for this Species has not been completed for the Study Area. The overall project does not include the bridge

Common Name	Scientific Name	**Preferred Habitat** (Significant Wildlife Habitat Technical Guide, Species at Risk Registry & Ontario's Biodiversity - ROM)	**Source of Information**	**Geographic Distribution** (ROM – Range Maps, MNR Publications & COSEWIC Reports)	**Habitat Present within the Study Area** (Y/N)
		or gravel. Spawning occurs in May and June. The males construct small, often inconspicuous, nests by picking up pebbles with their mouths and moving them to form the rims of shallow depressions. The sticky eggs are deposited in the nest and adhere to the substrate.[22]		Huron and Erie, and the Ottawa River.[22]	span across Credit River. Since the preferred habitat for this species is along Credit River, negative effects are not anticipated as a result of this project.
Northern Map Turtle	*Graptemys geographica*	Species inhabits large bodies of water with soft bottoms, and aquatic vegetation. Can be found basking on logs or rocks as well as beaches and grassy edges. Usually uses soft soil or clean dry sand for nest sites, and may nest at some distance from water. Its home range size is larger for females (about 70 ha) than males (about 30 ha) and includes hibernation, basking, nesting and feeding areas. Their aquatic corridors (e.g. stream) are required for movement. Species is not readily observed.[23] Can be associated with the following ELC codes: **OAO, SA**	• Species at Risk in Region of Peel, October 2013 • Ontario Reptile and Amphibian Atlas, November 2013	In southern Ontario, the Northern Map Turtle is found primarily on the shores of Georgian Bay, Lake St. Clair, Lake Erie and Lake Ontario. It can also be found along larger rivers including the Thames, Grand and Ottawa. [23]	**Yes –** Suitable Habitat is present along Credit River within the Study Area. Species was not observed during AECOM field investigation in the Study Area. The overall project does not include the bridge span across Credit River. Since the preferred habitat for this species is along Credit River, negative effects are not anticipated as a result of this project.
Peregrine Falcon	*Falco peregrinus*	The Peregrine Falcon typically nests on tall steep cliff ledges that are close to large	• Species at Risk in Region of Peel,	The eastern subspecies of the Peregrin Falcon is widely distributed	**No –** No suitable habitat present within the Study

Common Name	Scientific Name	**Preferred Habitat** (Significant Wildlife Habitat Technical Guide, Species at Risk Registry & Ontario's Biodiversity - ROM)	**Source of Information**	**Geographic Distribution** (ROM – Range Maps, MNR Publications & COSEWIC Reports)	**Habitat Present within the Study Area** (Y/N)
		bodies of water. This species can also be located in urban areas with tall buildings where they will nest on the ledges of tall buildings.[24] This species can be associated with the following ELC codes: **CLO.**	October 2013 • Atlas of Breeding Birds of Ontario Search Square #17PJ02	and can be found anywhere east of the Rocky Mountains and south of the tree line. [24]	Area. There are no high rise buildings or Cliffs along Creditview Road to support suitable breeding habitat. Species was not observed during AECOM field investigation in the Study Area.
Snapping Turtle	*Chelydra serpentine*	Although Snapping Turtles have been observed in shallow water in almost every kind of freshwater habitat, the preferred habitat of the species is characterized by slow-moving water with a soft mud bottom and dense aquatic vegetation. Established populations are most often located in ponds, sloughs, shallow bays or river edges, and slow streams, or areas combining several of these wetland habitats. Individual turtles will persist in urbanized water bodies, such as golf course ponds and irrigation canals, but it is unlikely that a population could become established in such habitats.[25]	• Species at Risk in Region of Peel, October 2013 • Ontario Reptile and Amphibian Atlas, November 2013 • Anecdotal report by local resident	In Canada Snapping Turtle can be found from Saskatchewan to Nova Scotia. In Ontario it is primarily limited to the southern portion.[25]	**Yes –** Suitable habitat present along Credit River within the Study Area. Species was not observed during AECOM field investigation in the Study Area. Two road kill Snapping Turtles reported by local resident on Creditview Road Bridge, crossing the Credit River in 2013. The overall project does not include the bridge span across Credit

Common Name	Scientific Name	Preferred Habitat (Significant Wildlife Habitat Technical Guide, Species at Risk Registry & Ontario's Biodiversity - ROM)	Source of Information	Geographic Distribution (ROM – Range Maps, MNR Publications & COSEWIC Reports)	Habitat Present within the Study Area (Y/N)
					River. Since the preferred habitat for this species is along Credit River, negative effects are not anticipated as a result of this project.

References:

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[3] COSEWIC 2010. COSEWIC assessment and status report on the Jefferson Salamander *Ambystoma jeffersonianum* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 38 pp. (www.sararegistry.gc.ca/status/status_e.cfm)

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[5] COSEWIC. 2008. COSEWIC assessment and status report on the Rapids Clubtail *Gomphus quadricolor* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 35 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

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[10] COSEWIC 2010. COSEWIC assessment and update status report on the Bobolink *Dolichonyx oryzivorus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 44 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

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[15] COSEWIC. 2009. COSEWIC assessment and update status report on the Least Bittern *Ixobrychus exilis* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 36 pp.(www.sararegistry.gc.ca/status/status_e.cfm).

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[18] Environment Canada. 2013. Management Plan for the Hart's-tongue Fern (*Asplenium scolopendrium*) in Canada. Species at Risk Act Management Plan Series. Environment Canada, Ottawa. iii + 16 pp.

[19] COSEWIC 2005. COSEWIC assessment and update status report on the Hill's pondweed *Potamogeton hillii* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 19 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

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Appendix E

Significant Wildlife Habitat Assessment

Appendix E. Significant Wildlife Habitat Assessment following Ecoregion 7E Criterion Schedule*

Table 1.1: Seasonal Concentration Areas of Animals

Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Candidate or Confirmed Habitat Present Within the Study Area	Conclusions/Recommendations
		ELC Ecosite Codes	Habitat Criteria	Defining Criteria		
Waterfowl Stopover and Staging Areas (Terrestrial)	American Black Duck Northern Pintail Gadwall Blue-winged Teal Green-winged Teal American Wigeon Northern Shoveler Tundra Swan	CUM1, CUT1, and agriculture fields where evidence of annual spring flooding from melt water or run-off	• Fields with temporary sheet water utilized by staging waterfowl during Spring (mid March to May).	Studies verified presence of an annual concentration of any listed and follow conditions: • Any mixed species aggregations of 100 or more individuals. • The area of the flooded field ecosite habitat plus a 100-300m radius. • Annual use of habitat is documented from information sources or field studies	No fields present in study area where evidence of spring flooding	This type of SWH is not present
Waterfowl Stopover and Staging Areas (Aquatic)	All waterfowl species except Mallard and Mute Swan	MAS, SAS, SAM, SAF, SWD	• Ponds, marshes, lakes, bays, coastal inlets, and watercourses used during migration. • These habitats have an abundant food supply (mostly aquatic invertebrates and vegetation in shallow water);	Studies verified presence of: • Aggregations of 100 or more of listed species for 7 daysÍ, results in > 700 waterfowl use days. • Areas with annual staging of ruddy ducks, canvasbacks, and redheads are SWH • The combined area of the ELC ecosites and a 100m radius area is the SWH	No large marshes, or ponds suitable for waterfowl staging present in study area	This type of SWH is not present
Shorebird Migratory Stopover Area	All migratory shorebirds	BBO, BBS, BBT, SDO, SDS, SDT, MAM	• Shorelines of lakes, rivers and wetlands, including beach areas, bars and seasonally flooded, muddy and un-vegetated shoreline habitats. • Great Lakes coastal shorelines, including groynes and other forms of armour rock lakeshores	Studies confirming: • Presence of 3 or more of listed species and > 1000 shorebird use days during spring or fall migration period. • Any site with >100 Whimbrel used for 3 years or more. • The area of significant shorebird habitat includes the mapped ELC shoreline ecosites plus a 100m radius area	No shoreline of lakes or wetlands suitable for shorebird staging present in study area	This type of SWH is not present
Raptor Wintering Area	Rough-legged Hawk Red-tailed Hawk Northern Harrier American Kestrel Snowy Owl **Special Concern:** Short-eared Owl Bald Eagle	**Hawks/Owls** FOD, FOM, FOC. Upland: CUM; CUT; CUS; CUW. **Bald Eagle:** FOD, FOM, FOC, SWD, SWM or SWC on shoreline areas adjacent to large rivers or lakes with open water	• The habitat provides a combination of fields and woodlands that provide roosting, foraging and resting habitats for wintering raptors. • Raptor wintering sites need to be > 20 ha with a combination of forest and upland.. • Fallow or lightly grazed field/meadow (>15ha) with adjacent woodlands • Eagle sites have open water and large trees and snags available for roosting.	Studies confirm the use of these habitats by: • One or more Short-eared Owls or; • At least 10 individuals and two listed spp. • Must be used regularly (3 in 5 years) for a minimum of 20 days by the above number of birdsÍ. • The habitat area for an Eagle winter site is the shoreline forest ecosites directly adjacent to the prime hunting area.	Fields in study area much <15 ha and therefore would not qualify as Raptor Wintering Habitat	This type of SWH is not present
Bat Hibernacula	Big Brown Bat Tri-colored Bat	Bat Hibernacula may be found in these ecosites: CCR, CCA	• Hibernacula may be found in caves, mine shafts, underground foundations and Karsts. • Active mine sites should not be considered as SWH. • The locations of bat hibernacula are relatively poorly known. •	• All sites with confirmed hibernating bats are SWH Í. • The area includes 200m radius around the entrance of the hibernaculum cxlviii, ccvii, Í for most development types and 1000m for wind farms. • Studies are to be conducted during the peak swarming period (Aug. – Sept.	No caves or crevices present in study area	This type of SWH is not present
Bat Maternity Colonies	Big Brown Bat Silver-haired Bat	FOD,FOM,SWD, SWM	• Maternity colonies can be found in tree cavities, vegetation and often in buildlings (buildings are not considered to be SWH). • Maternity colonies located in Mature deciduous or mixed forest stands with >10/ha large diameter (>25cm dbh) wildlife treesccvii • Female Bats prefer wildlife tree (snags) in early stages of decay. • Silver-haired Bats prefer older mixed or deciduous forest	• Maternity Colonies with confirmed use by; – >10 Big Brown Bats, or – >5 Adult Female Silver-haired BatsÍ • The area of the habitat includes the entire woodland or the forest stand ELC Ecosite containing the maternity colonies.	Tree cavities have not assessed for cavities but remnant forest is beside busy road	Survey of cavity trees should be conducted at the detailed design stage prior to tree removal.
Turtle Wintering Areas	Midland Painted Turtle **Special Concern:** Northern Map Turtle Snapping Turtle	Snapping and Midland Painted turtles; SW, MA, OA and SA. ELC Community Series; FEO and BOO Map Turtle - Open Water areas such as deeper rivers and lakes with current can also be used as over-wintering habitat.	• For most turtles, wintering areas are in the same general area as their core habitat. Water deep enough not to freeze and have soft mud substrates. • Over-wintering sites are permanent water bodies, large wetlands, and bogs or fens	• Presence of 5 over-wintering Midland Painted Turtles. • One or more Northern Map Turtle or Snapping Turtle over-wintering. • The mapped ELC ecosite area with the over wintering turtles is the SWH. If the hibernation site is within a stream or river, the deep-water pool where the turtles are over wintering is the SWH. • Over wintering areas identified by searching for basking turtles on warm, sunny days during the fall or spring .	Credit River supports some Snapping Turtles and possibly Painted Turtles and they likely hibernate under river bank or in adjacent wetlands	Ensure that no intrusion by construction equipment into the Credit River during winter where hibernating turtles may be present

Appendix E. Significant Wildlife Habitat Assessment following Ecoregion 7E Criterion Schedule*

Table 1.1: Seasonal Concentration Areas of Animals

Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Candidate or Confirmed Habitat Present Within the Study Area	Conclusions/Recommendations
		ELC Ecosite Codes	Habitat Criteria	Defining Criteria		
Snake Hibernaculum	**Snakes:** All snakes **Special Concern:** Milksnake Eastern Ribbonsnake	Habitat may be found in any ecosite other than very wet ones. Talus, Rock Barren, Crevice and Cave, and Alvar sites may be directly related to these habitats.	• For snakes, hibernation takes place in sites located below frost lines in burrows, rock crevices and other natural locations: e.g. rock piles, stone fences, and crumbling foundations • Wetlands can be important over-wintering habitat in conifer or shrub swamps, poor fens, with sphagnum moss or sedge hummocks.	Studies confirming: • Presence of snake hibernacula used by at least five individuals of one sp. or; individuals of at least two spp. • Same numbers near potential hibernacula (eg. foundation or rocky slope) on sunny warm days in Spring or Fall .	No suitable hibernacula sites identified during field surveys and no snakes were observed	This type of SWH is not present
Colonially -Nesting Bird Breeding Habitat (Bank and Cliff)	Cliff Swallow Northern Rough-winged Swallow (this species is not colonial but can be found in Cliff Swallow colonies).	Eroding banks, sandy hills, borrow pits, and sand piles, cliff faces, bridge abutments, barns. ,BLO1,BLS1,BLT1,CLO1,CLS1,CLT1	• Any site or areas with exposed soil banks, undisturbed or naturally eroding • Does not include man-made structures (bridges or buildings) or recently disturbed soil areas, such as berms or stockpiles • Does not include a licensed Mineral Aggregate Operation	• Presence of nesting site with 8 or more Cliff Swallow and/or Rough-winged Swallow pairs. • A colony identified as SWH will include a 50m radius area from the peripheral nests	10 Cliff Swallow nests were present under the Creditview Rd bridge over Credit River, however man-made structures do not qualify as SWH	This type of SWH is not present Nevertheless active nests of Cliff Swallows must not be disturbed during the breeding season.
Colonially -Nesting Bird Breeding Habitat (Tree/Shrubs)	Great Blue Heron Black-crowned Night-Heron Great Egret Green Heron	SWM, SWD, FET	• Nests in live or dead standing trees in wetlands, lakes, islands, and peninsulas. • Most nests in trees are 11 to 15 m from ground, near the top of the tree.	• Presence of 1or more active nests of the list species. • The edge of the colony and a minimum 300m area of habitat or extent of the Forest Ecosite containing the colony or any island <15.0ha with a colony is the SWH • Confirmation of active colonies must be achieved through site visits conducted during the nesting season	No heron nests present in the study area	This type of SWH is not present
Colonially -Nesting Bird Breeding Habitat (Ground)	Herring Gull Great Black-backed Gull Little Gull Common Tern Caspian Tern Brewer's Blackbird Ring-billed Gull	Any rocky island or peninsula (natural or artificial) within a lake or large river MAM, MAS, CUM, CUT,CUS	• Nesting colonies of gulls and terns are on islands or peninsulas associated with open water or in marshy areas. • Brewers Blackbird colonies are found loosely on the ground in or in low bushes in close proximity to streams and irrigation ditches within farmlands.	• > 25 active nests for Herring or Ring-billed Gulls, >5 active nests for Common Tern, or >2 active nests for Caspian Tern. • Any active nesting colony of one or more Little Gull, or Great Black-backed Gull • Presence of 5 or more pairs for Brewer's Blackbirdí. • The edge of the colony and a minimum 150m radius area of habitat, or the extent of the ELC ecosites containing the colony or any island <3.0ha with a colony is the SWH [cc, ccvii]	No gravel bars or other features with colonial ground nesting birds present in the study area	This type of SWH is not present
Migratory Butterfly Stopover Areas	Painted Lady Red Admiral Special Concern Monarch	CUM,CUT,CUS,FOC,FOD,FOM,CUP	• > 10 ha in size with a combination of field and forest, located within 5 km of Lake Ontario and Erie. • To provide a stopover location to rest prior to migration south • Fields/meadows with an abundance of nectar plants and woodland edge providing shelter • Stopover areas are often spits of land or areas with the shortest distance to cross the Great Lakes	Studies confirm: • The presence of Monarch Use Days (MUD) during fall migration • (MUD of >5000 **or** >3000 with the presence of Painted Ladies or Red Admiral's is to be considered significant.Í.	Study area is much more than 5 km from Lake Ontario and therefore does not qualify as SWH. No Monarchs were observed in study area but they likely migrate through and breed in small numbers.	This type of SWH is not present
Landbird Migratory Stopover Areas	All migratory songbirds	FOC,FOM,FOD,SWC,SWM ,SWD	• Woodlots >5 ha in size and within 5 km of Lake Ontario and Erie. • If woodlands are rare, 2-5 ha can be considered. • Sites have a variety of habitats; forest, grassland and wetland complexes	Studies confirm: • Use of the woodlot by >200 birds/day and with >35 spp with at least 10 bird spp. recorded on at least 5 survey dates. • Studies should be completed during spring and fall migration using standardized assessment techniques.	Study area is more than 5 km from Lake Ontario and therefore does not qualify as SWH.	This type of SWH is not present
Deer Winter Congregation Areas	White-tailed Deer	FOC,FOM,FOD, SWC,SWM , SWD Conifer plantations (CUP) smaller than 50 ha may also be used.	• Woodlots >100 ha in size or if large woodlots are rare in a planning area woodlots>50ha Í. • Deer movement during winter are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands. • Large woodlots > 100ha are known to be used annually by densities of deer that range from 0.1-1.5 deer/ha.	• Deer management is an MNRF responsibility, • Use of the woodlot by white-tailed deer will be mapped and determined by MNRF, • All woodlots exceeding the area criteria are significant, unless determined not to be significant by MNRF.	Nearby Woodlots were not identified as deer wintering habitat by MNRF	This type of SWH is not present

Appendix E. Significant Wildlife Habitat Assessment following Ecoregion 7E Criterion Schedule*

Table 1.2.1 Rare Vegetation Communities.

Rare Vegetation Community	CANDIDATE SWH			CONFIRMED SWH	Candidate or Confirmed Habitat Present Within the Study Area	Conclusions/Recommendations
	ELC Ecosite Code	Habitat Criteria	Detailed Information and Sources	Defining Criteria		
Cliffs and Talus Slopes	TAO, CLO,TAS CLS ,TAT,CLT	• A Cliff is vertical to near vertical bedrock >3m in height. • A Talus Slope is rock rubble at the base of a cliff made up of coarse rocky debris • Most cliff and talus slopes occur along the Niagara Escarpment	.	• Confirm any ELC Vegetation Type for Cliffs or Talus Slopes	No cliffs or talus slopes present in the study area	This type of SWH is not present
Sand Barren	SBO1,SBS1,SBT1 Vegetation cover varies from patchy and barren to continuous meadow (SBO1), thicket-like (SBS1), or more closed and treed (SBT1). Tree cover always ≤ 60%.	• Sand Barrens typically are exposed sand, generally sparsely vegetated and caused by lack of moisture, periodic fires and erosion. They have little or no soil. • A sand barren must be >0.5ha in size.	• Sand Barrens support rare species such as provincially Endangered Forked Three-awned Grass. By extension, sand barren sites that could support these rare species (close proximity to other populations), historically or currently should be considered for higher priority conservation.	• Confirm any ELC Vegetation Type for Sand Barrens • Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics). • Presence of indicator species	No Sand Barrens present in the study area	This type of SWH is not present
Alvar	ALO1,ALS1,ALT1 FOC1,FOC2,CUM2, **Five Alvar Indicator Species:** 1)Carex crawei 2)Panicum philadelphicum 3)Elocharis compressa 4)Scutellaria parvula 5)Trichostema brachiatum	• An alvar is typically a level, mostly unfractured calcareous bedrock feature with a mosaic of rock pavements and bedrock overlain by a thin veneer of soil. • Vegetation cover varies from sparse lichen-moss to grasslands and shrublands with a number of characteristic indicator plant species. • Alvar must be > 0.5 ha	• Alvar is particularly rare in ecoregion 7E	• Field studies identify at least 4 Alvar indicator species. • Confirm and map ELC Vegetation Type polygons for Alvars • Site must not be dominated by exotic or introduced species (<50% cover). • The alvar must be in excellent condition and fit in with surrounding landscape with few conflicting land uses.	No alvars present in the study area	This type of SWH is not present
Old Growth Forest	FOD,FOC,FOM, SWD,SWC,SWM	• Old-growth forests tend to be relatively undisturbed, structurally complex, and contain a wide variety of trees and shrubs in various age classes. These habitats usually support a high diversity of wildlife species. • No minimum size		Field Studies will determine: • If dominant trees species of the ecosite are >140 years old, then stand is Significant Wildlife Habitat • no recognizable evidence of forestry activities • Determine ELC Vegetation Type for forest stand.	No old growth forest present in the study area	This type of SWH is not present
Savannah	TPS1,TPS2,TPW1,TPW2,CUS2	• A Savannah is a tallgrass prairie habitat that has tree cover between 25 – 60%. • Characteristic indicator species e.g. Black Oak • No minimum size • Remnant sites such as railway ROWs are not SWH.	Í Site must be restored or a natural site.	• Field studies confirm one or more of the Savannah indicator species • Area of the ELC Vegetation type is the SWH • Site must not be dominated by exotic or introduced species (<50% cover).	No savannah vegetation present in the study area	This type of SWH is not present
Tallgrass Prairie	TPO1,TPO2	• A Tallgrass Prairie has ground cover dominated by prairie grasses. An open Tallgrass Prairie habitat has < 25% tree cover. • Characteristic indicator species e.g. Big Bluestem • No minimum size • Remnant sites such as railway ROWs are not SWH.	No minimum size to site Í. Site must be restored or a natural site. Remnant sites such as railway right of ways are not considered to be SWH.	• Field studies confirm one or more of the Prairie indicator species • Area of the ELC Vegetation Type is the SWH lxxviii. • Site must not be dominated by exotic or introduced species (<50% cover).	No Tallgrass Prairie present in the study area	This type of SWH is not present
Other Rare Vegetation Communities	Provincially Rare S1, S2 and S3 vegetation communities . Any ELC Ecosite Code that has a possible ELC Vegetation Type that is Provincially Rare is Candidate SWH.	• Rare Vegetation Communities may include beaches, fens, forest, marsh, barrens, dunes and swamps. • ELC Ecosite codes that have the potential to be a rare ELC Vegetation Type as outlined in appendix M • The OMNR/NHIC will have up to date listing for rare vegetation communities	• .	• Field studies should confirm if an ELC Vegetation Type is a rare vegetation community based on listing within Appendix M of SWHTGcxlviii . • Area of the ELC Vegetation Type polygon is the SWH.	No rare vegetation communities present in the study area	This type of SWH is not present

Table 1.2.2 Specialized Habitats of Wildlife considered SWH.

Specialized Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Candidate or Confirmed Habitat within the Study Area	Conclusions/ Recommendations
		ELC Ecosite Codes	Habitat Criteria	Defining Criteria		
Waterfowl Nesting Area .	American Black Duck Northern Pintail Northern Shoveler Gadwall Blue-winged Teal Green-winged Teal Wood Duck Hooded Merganser Mallard	MAS, SAS1, SAM1, SAF1, MAM, SWT1, SWT2, SWD	• A waterfowl nesting area extends 120 m from a wetland (> 0.5 ha) or a wetland (>0.5 ha) with small wetlands (<0.5ha) within 120m or a cluster of 3 or more small (<0.5 ha) wetlands within 120 m of each individual wetland where waterfowl nesting is known to occur • Upland areas should be at least 120m wide so that predators such as racoons, skunks, and foxes have difficulty finding nests. • Wood Ducks and Hooded Mergansers utilize large diameter trees (>40cm dbh) in woodlands for cavity nest sites.	Studies confirmed: • Presence of 3 or more nesting pairs for listed species excluding Mallards • Presence of 10 or more nesting pairs for listed species including Mallards. • Any active nesting site of American Black Duck • Nesting studies should be completed during the spring breeding season. • A field study will determine the boundary of the waterfowl nesting habitat	. No large marsh / swamp / wetland likely to support large numbers of breeding waterfowl present in the study area	This type of SWH is not present
Bald Eagle and Osprey Nesting, Foraging and Perching Habitat	Osprey Bald Eagle	FOD, FOM, FOC, SWD, SWM and SWC directly adjacent to riparian areas – rivers, lakes, ponds and wetlands	• Nests are associated with lakes, ponds, rivers or wetlands along forested shorelines, islands, or on structures over water. • Osprey nests are usually at the top a tree whereas Bald Eagle nests are typically in super canopy trees in a notch within the tree's canopy. • Nests located on man-made objects are not to be included as SWH (e.g. telephone poles and constructed nesting platforms).	Studies confirm the use of nests: • One or more active Osprey or Bald Eagle nests in an area. • For Osprey, the active nest and a 300 m radius is the SWH • For Bald Eagle the active nest and a 400-800 m radius is the SWH, • Nest must be inactive for > 3 years or suspected of not being used for >5 years before being considered not significant	No large stick nests present in the study area	This type of SWH is not present
Woodland Raptor Nesting Habitat	Northern Goshawk Cooper's Hawk Sharp-shinned Hawk Red-shouldered Hawk Barred Owl Broad-winged Hawk	SWC, SWM, SWD and CUP3	• All natural or conifer plantation woodland/forest stands combined >30ha or with >4 ha of interior habitat ,determined with a 200m bufferi • Stick nests found in a variety of intermediate-aged to mature conifer, deciduous or mixed forests within tops or crotches of trees. Species such as Coopers hawk nest along forest edges sometimes on peninsulas or small off-shore islands. • In disturbed sites, nests may be used again, or a new nest will be in close proximity to old nest.	Studies confirm: • Presence of 1 or more active nests from species list. • Red-shouldered Hawk and Northern Goshawk –400m radius around the nest or 28 ha of suitable habitat • Barred Owl – 200m radius around the nest is the SWH • Broad-winged Hawk and Coopers Hawk,– 100m radius around the nest. • Sharp-Shinned Hawk –50m radius around the nest	No extensive forest area >30 ha is present in the study area	This type of SWH is not present
Turtle Nesting Areas	Midland Painted Turtle <u>Special Concern Species</u> Northern Map Turtle Snapping Turtle	MAS1,MAS2,MAS3, SAS1,SAM1,SAF1, BOO1,FEO1	• Best nesting habitat for turtles are close to water and away from roads and sites less prone to loss of eggs by predation from skunks, raccoons or other animals. • Site must provide sand and gravel that turtles are able to dig in open, sunny areas. • Nesting areas on the sides of road embankments and shoulders are not SWH. • Sand and gravel beaches adjacent to undisturbed shallow weedy areas of marshes, lakes, and rivers are most frequently used.	Studies confirm: • Presence of 5 or more nesting Painted Turtles • One Map Turtle or Snapping Turtle nesting is SWH. • The area of exposed mineral soils where the turtles nest, plus a radius of 30-100m dependant on slope, riparian vegetation and adjacent land use is the SWH • Travel routes from wetland to nesting area are to be considered within the SWH. • Field investigations should be conducted in prime nesting season.	Possible nesting area for Snapping Turtle and Painted Turtle on floodplain area in vicinity of Credit River	Ensure that no intrusion by construction equipment onto the Credit River floodplain during spring and summer when turtle nests may be present
Seeps and Springs **<u>Rationale:</u>** Seeps/Springs are typical of headwater areas and are often at the source of coldwater streams.	Wild Turkey Ruffed Grouse White-tailed Deer Salamander spp.	Seeps/Springs are areas where ground water comes to the surface. Often they are found within headwater areas within forested habitats. Any forested Ecosite within the headwater areas of a stream could have seeps/springs.	• Any forested area (with <25% meadow/field/pasture) within the headwaters of a stream or river system • Seeps and springs are important feeding and drinking areas especially in the winter will typically support a variety of plant and animal species	Field Studies confirm: • Presence of a site with 2 or more seeps/springs should be considered SWH. • The area of an ELC forest ecosite containing the seeps/springs is the SWH. The protection of the recharge area considering the slope and groundwater condition need to be considered in delineation the habitat	No seeps or spring found within the study area	This type of SWH is not present
Amphibian Breeding Habitat (Woodland)	Eastern Newt Blue-spotted Salamander Spotted Salamander Gray Treefrog Spring Peeper Western Chorus Frog Wood Frog	FOC,FOM,FOD,SWC,SWM,SWD	• Presence of a wetland, pond or woodland pool (including vernal pools) >500m2 within or adjacent (within 120m) to a woodland (no minimum size). Some small wetlands may not be mapped and may be important breeding pools for amphibians. • Woodlands with permanent ponds or those containing water in most years until mid-July are more likely to be used as breeding habitat	Studies confirm; • Presence of breeding population of 1 or more of the listed salamander species or 2 or more of the listed frog species with at least 20 individuals • An observational study to determine breeding will be required during spring surveys • The habitat is the woodland (ELC polygons) and wetland (ELC polygons) combined. A travel corridor connecting the woodland and wetland polygons is to be included in the habitat.	No amphibian breeding habitat found to be present in the study area. Amphibian calling surveys and larval surveys were conducted at pool that appeared to provide potential amphibian habitat. No amphibians observed.	This type of SWH is not present
Amphibian Breeding Habitat (Wetlands)	Eastern Newt American Toad Spotted Salamander Four-toed Salamander Blue-spotted Salamander Gray Treefrog Western Chorus Frog Northern Leopard Frog Pickerel Frog Green Frog Mink Frog Bullfrog	SW, MA, FE, BO, OA and SA. Wetland areas >120m from woodland habitats.	• Wetlands and pools (including vernal pools) >500m^2 (supporting high species diversity are significant; some small or ephemeral habitats may not be identified on MNR mapping and could be important amphibian breeding habitats clxxxiv. • Presence of shrubs and logs increase significance of pond for some amphibian species because of available structure for calling, foraging, escape and concealment from predators. • Bullfrogs require permanent water bodies with abundant emergent vegetation.	Studies confirm: • Presence of breeding population of 1 salamander or at least 2 or of the listed frog or toad species and with at least 20 individuals • Any wetland with confirmed breeding Bullfrogs • The ELC ecosite wetland area and the shoreline are the SWH. • Surveys to confirm breeding to be completed during spring when amphibians are migrating, calling and breeding. • If a SWH is determined for Amphibian Breeding Habitat (Wetlands) then Movement Corridors are to be considered	No wetland amphibian breeding habitat found to be present in the study area.	This type of SWH is not present

Table 1.3 Habitats of Species of Conservation Concern considered SWH.

Wildlife	Species	CANDIDATE SWH		CONFIRMED SWH	Candidate or Confirmed Habitat within the Study Area	Conclusions/ Recommendations
		ELC Ecosite	Habitat Criteria	Defining Criteria		
Marsh Bird Breeding Habitat	American Bittern Virginia Rail Sora Common Moorhen American Coot Pied-billed Grebe Marsh Wren Sedge Wren Common Loon Green Heron Trumpeter Swan **Special Concern:** Black Tern Yellow Rail	MAM1,MAM2,MAM3,MAM4,MAM5,MAM6,SAS1,SAM1,SAF1,FEO1,BOO1 For Green Heron: All SW, MA and CUM1 sites.	• Nesting occurs in wetlands. • All wetland habitat is to be considered as long as there is shallow water with emergent aquatic vegetation present cxxiv. • For Green Heron, habitat is at the edge of water such as sluggish streams, ponds and marshes sheltered by shrubs and trees. Less frequently, it may be found in upland shrubs or forest a considerable distance from water.	Studies confirm: • Presence of 5 or more nesting pairs of Sedge Wren or Marsh Wren or breeding by any combination of 4 or more of the listed species Í. • Note: any wetland with breeding of 1 or more Trumpeter Swans, Black Terns or Yellow Rail is SWH Í. • Area of the ELC ecosite is the SWH. • Breeding surveys should be done in May/June when these species are actively nesting in wetland habitats. • Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects”[CCXI]	No extensive marshes suitable for marsh breeding birds present in the study area.	This type of SWH is not present
Woodland Area-Sensitive Bird Breeding Habitat	Yellow-bellied Sapsucker Red-breasted Nuthatch Veery Blue-headed Vireo Northern Parula Black-throated Green Warbler Blackburnian Warbler Black-throated Blue Warbler Ovenbird Scarlet Tanager Winter Wren Pileated Woodpecker <u>Special Concern:</u> Canada Warbler	FOC,FOM,FOD,SWC,SWM,SWD	• Habitats where interior forest breeding birds are breeding, typically large mature (>60 yrs old) forest stands or woodlots >30 ha. • Interior forest habitat is at least 200 m from forest edge habitat.	Studies confirm: • Presence of nesting or breeding pairs of 3 or more of the listed birds. • Note: any site with breeding Canada Warbler is to be considered SWH.Í • Conduct field investigations in spring and early summer when birds are singing and defending their territories. • Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects	No forests > 30 ha present in study area	This type of SWH is not present
Open Country Bird Breeding Habitat	Upland Sandpiper Grasshopper Sparrow Vesper Sparrow Northern Harrier Savannah Sparrow **Special Concern** Short-eared Owl	CUM1 CUM2	• Large grassland areas (includes natural and cultural fields and meadows) >30 ha • Grasslands not Class 1 or 2 agricultural lands, and not being actively used for farming • Grassland sites considered significant should have a history of longevity, either abandoned, mature hayfields and pasturelands that are at least 5 years or older. •	Field Studies confirm: • Presence of nesting or breeding of 2 or more of the listed species.Í • A field with 1 or more breeding Short-eared Owls. • The area of SWH is the contiguous ELC ecosite field areas. • Conduct field investigations of the most likely areas in breeding season.	No extensive grassland areas > 30 ha present in the study area	This type of SWH is not present
Shrub/Early Successional Bird Breeding Habitat	<u>Indicator Spp</u>: Brown Thrasher Clay-coloured Sparrow <u>Common Spp.</u> Field Sparrow Black-billed Cuckoo Eastern Towhee Willow Flycatcher **Special Concern:** Golden-winged Warbler	CUT, CUS, CUW	• Large natural field areas succeeding to shrub and thicket habitats >10ha in size. • Class 1 or 2 agricultural lands not being actively used for farming are not SWH • Shrub and thicket habitat sites considered significant should have a history of longevity, either abandoned fields or pasturelands.	Field Studies confirm: • Presence of nesting or breeding of 1 of the indicator species and at least 2 of the common species.Í • A field with breeding Golden-winged Warbler. • SWH is the contiguous ELC ecosite field/thicket area. • Conduct field investigations in spring and early summer breeding season	No grassland areas > 10 ha present in study area	This type of SWH is not present
Terrestrial Crayfish;	Chimney or Digger Crayfish; (*<u>Fallicambarus fodiens</u>*) Devil Crawfish or Meadow Crayfish; (*<u>Cambarus Diogenes</u>*)	MAM1,MAM2 MAM3,MAM4 MAM5,MAM6 MAS1,MAS2,MAS3 SWD,SWT,SWM	• Meadow and edges of shallow marshes (no minimum size) identified should be surveyed for terrestrial crayfish. • Constructs burrows in marshes, mudflats, meadows. • Agricultural fields with crayfisth burrows are not considered SWH	Studies Confirm: • Presence of 1 or more individuals of species listed or their chimneys (burrows) in suitable marsh meadow or terrestrial sites cci • Area of ELC Ecosite polygon is the SWH • Surveys should be done during adult breeding season (April to late June) and in late summer in nearby water bodies for juveniles. • Note the presence of burrows or chimneys are often the only indicator of presence,	No evidence of terrestrial crayfish (e.g. chimneys) was present in study area	This type of SWH is not present
Special Concern and Rare Wildlife Species	All Special Concern and Provincially Rare (S1-S3, SH) plant and animal Species, as tracked by the Natural Heritage Information Centre.	All plant and animal element occurrences (EO) within a 1 or 10km grid. Older element occurrences may lack location accuracy	• When an element occurrence is identified within a 1 or 10km grid for a Special Concern or Provincially Rare species; linking candidate habitat on the site needs to be completed to ELC Ecosites lxxviii	Studies Confirm: • Survey of the site for the identified species needs to be completed when the species is likely present and identifiable. • The area of the habitat identified to the finest ELC scale that protects the habitat form and function is the SWH, and must be delineated through detailed field studies.	Snapping Turtle is known to occur along Credit River, Eastern Wood Pewee was present in 1 woodlot Monarch Butterfly likely present in field areas during migration	• Ensure that no intrusion by construction equipment into the Credit River floodplain where turtles may be present • Minimize area of woodlot removal • Minimize area of meadow removal

Table 1.4 Animal Movement Corridors

Habitat	SPECIES	CANDIDATE SWH		CONFIRMED SWH	Candidate or Confirmed Habitat Present Within the Study Area	Conclusions/Recommendations
		ELC Eco-sites	Habitat Criteria and Information Sources	Defining Criteria		
Amphibian Movement Corridors	All amphibian species	Corridors may be found in all ecosites associated with water. Corridors will be determined based on identifying the significant breeding habitat for amphibians in Table 1.2.2	• Movement corridors between breeding habitat and summer habitat • Movement corridors must be considered when Amphibian breeding habitat is confirmed as SWH from Table 1.2.2.	• Field Studies must be conducted when species are expected to be moving to and from breeding sites. • Corridors should consist of native vegetation, roadless area,with no gaps such as fields, waterways or bodies, • Corridors should be at least 200m wide with gaps <20m • If following riparian area >15m of vegetation on both sides of waterway.	No amphibian breeding habitat is present in the study area and therefore no movement corridors occur.	This type of SWH is not present

Note: * This follows: Ontario Ministry of Natural Resources and Forestry. 2015. Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E: http://www.ontario.ca/document/significant-wildlife-habitat-ecoregional-criteria-schedules-ecoregion-7e