Victoria Square Boulevard Class Environmental Assessment

Woodbine Avenue (north connection) to Woodbine Avenue (south connection)

Environmental Study Report

Appendix H

Natural Environment Report

June 2018

VICTORIA SQUARE BOULEVARD IMPROVEMENTS CLASS EA - CITY OF MARKHAM

Natural Environment Report

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REPORT

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Distribution:

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Golder Associates

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1.0 INTRODUCTION

Golder Associates Ltd. (Golder) was retained by HDR Inc. (HDR) to complete natural heritage studies supporting the Schedule C Class Environmental Assessment (EA) for the Victoria Square Boulevard improvements in the City of Markham, Ontario (the Project).

The Project involves urbanization, installation of a curb and gutter, multi-use paths and associated storm water management along Victoria Square Boulevard. One culvert replacement is proposed at Carlton Creek along Victoria Square Boulevard. The need for these improvements is in response to rapid growth in the Victoria Boulevard area, and the need to support this growth with adequately scaled transportation and storm water management infrastructure.

1.1 Site and Study Area Description

The preferred concept for the Project, as outlined in the draft preliminary design drawings, were provided by HDR on May 2, 2017. The study area for the Project was based on the preferred concept alignment and extends approximately 2.7 km along Victoria Square Boulevard, and approximately 100 m on each side of the road (Figure 1).

The study area is located within a developed setting, consisting primarily of residential properties, public parks, and some commercial and institutional land uses. The residential areas are a mixture of low-density residential with treed lots, and other areas of densely packed, subdivision-style townhouses. Municipal parks, including Victoria Square Park, and Vine Cliff Park, occur along Victoria Square Boulevard. Four storm water management ponds are also in the study area; two of which are naturalized storm water management ponds located east and west of Victoria Square Boulevard, on the south side of Betty Roman Boulevard / Stony Hill Avenue.

Natural areas, including wetlands, watercourses and valleylands occur throughout the study area, and are discussed further in Section 5.0.

2.0 POLICY CONTEXT

2.1 Provincial Policy Statement (PPS)

The PPS was issued under Section 3 of the *Planning Act*, and came into effect on April 30, 2014.

The natural heritage policies of the PPS (MMAH 2014) indicate that:

- 2.1.1 Natural features and areas shall be protected for the long term;
- 2.1.2 The diversity and connectivity of natural features in an area, and the long-term ecological function and biodiversity of natural heritage systems, should be maintained, restored or, where possible, improved, recognizing linkages between and among natural heritage features and areas, surface water features and ground water features;
- 2.1.3 Natural heritage systems shall be identified in Ecoregions 6E and 7E, recognizing that natural heritage systems will vary in size and form in settlement areas, rural areas, and prime agricultural areas;
- 2.1.4 Development and Site alteration shall not be permitted in:

a) Significant wetlands in Ecoregions 5E, 6E and 7E; and

b) Significant coastal wetlands.

- 2.1.5 Unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions, development and Site alteration shall not be permitted in:

a) Significant wetlands in the Canadian Shield north of Ecoregions 5E, 6E and 7E;

b) Significant woodlands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River);

c) Significant valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River);

d) Significant wildlife habitat;

e) Significant areas of natural and scientific interest; and

f) Coastal wetlands in Ecoregions 5E, 6E and 7E that are not subject to policy 2.1.4(b).

- 2.1.6 Development and Site alteration shall not be permitted in fish habitat except in accordance with provincial and federal requirements;

- 2.1.7 Development and Site alteration shall not be permitted in habitat of endangered species and threatened species, except in accordance with provincial and federal requirements; and

- 2.1.8 Development and Site alteration shall not be permitted on adjacent lands to the natural heritage features and areas identified in policies 2.1.3, 2.1.4 and 2.1.5 unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions.

2.2 Species at Risk

2.2.1 Species at Risk Act (SARA)

At a federal level, species at risk (SAR) designations for species occurring in Canada are initially determined by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). If approved by the federal Minister of the Environment, species are added to the federal List of Wildlife Species at Risk (Canada 2002). Species that are included on Schedule 1 as endangered or threatened are afforded protection of critical habitat on federal lands under the *Species at Risk Act* (SARA). On private or provincially-owned lands, only aquatic species listed as endangered, threatened or extirpated and migratory birds are protected under SARA, unless ordered by the Governor in Council.

2.2.2 *Endangered Species Act* (ESA)

SAR designations for species in Ontario are initially determined by the Committee on the Status of Species at Risk in Ontario (COSSARO), and if approved by the provincial Minister of Natural Resources and Forestry, species are added to the provincial *Endangered Species Act* (ESA), which came into effect June 30, 2008 (Ontario 2007). The legislation prohibits the killing or harming of species identified as ‘endangered’ or ‘threatened’ in the various

schedules to the Act. The ESA also provides habitat protection to all species listed as threatened or endangered. As of June 30, 2008, the Species at Risk in Ontario (SARO) List is contained in O. Reg. 230/08.

Subsection 9(1) of the ESA prohibits the killing, harming or harassing of species identified as 'endangered' or 'threatened' in the various schedules to the Act. Subsection 10(1) (a) of the ESA states that *"No person shall damage or destroy the habitat of a species that is listed on the* SARO *List as an endangered or threatened species"*.

General habitat protection is provided by the ESA to all threatened and endangered species. Species-specific habitat protection is only afforded to those species for which a habitat regulation has been prepared and passed into law under the ESA. The ESA has a permitting process where alterations to protected species or their habitats may be considered.

2.3 Fisheries Act

The purpose of the *Fisheries Act* (Canada 1985) is to maintain healthy, sustainable and productive Canadian fisheries through the prevention of pollution, and the protection of fish and their habitat. In 2012, changes were made to the *Fisheries Act* to enhance Fisheries and Oceans Canada's (DFO) ability to manage threats to Canada's commercial, recreational and Aboriginal (CRA) fisheries.

Projects affecting waterbodies supporting Canada's CRA fisheries must comply with the provisions of the *Fisheries Act*. The proponent is responsible for determining if the project is likely to cause impacts to CRA fish and if these impacts can be avoided or mitigated. The proponent must gather information on the type and scale of impact on the fishery and determine if the impacts will result in *serious harm to fish.* Proponents have a duty to maintain records of self-assessments completed for projects they undertake, and need to provide this information to DFO upon request. Serious harm to fish is defined as: the death of fish; and/or any permanent alteration to, or destruction of, fish habitat. If it is determined that the impacts cannot be avoided or mitigated and will result in serious harm to fish, an application for authorization must be submitted to the DFO. Projects that have the potential to obstruct fish passage or, affect flows needed by fish also require an authorization; even if these occur outside of CRA fishery areas (DFO 2013a).

Proponents of projects requiring a Fisheries Act Authorization are required to submit a Habitat Offsetting Plan, which provides details of how the serious harm to fish will be offset, as well as outlining associated costs and monitoring commitments (DFO 2013b). Proponents also have a duty to notify DFO of any unforeseen activities that cause serious harm to fish and outline the steps taken to address them.

2.4 Migratory Birds Convention Act

The *Migratory Birds Convention Act* (MBCA) (Canada 1994) prohibits the killing or capturing of migratory birds, as well as any damage, destruction, removal or disturbance of active nests. It also allows the Canadian government to pass and enforce regulations to protect various species of migratory birds, as well as their habitats. While Environment and Climate Change Canada (ECCC) can issue permits allowing the destruction of nests for scientific or agricultural purposes, or to prevent damage being caused by birds, it does not typically allow for permits in the case of industrial or construction activities.

2.5 Toronto and Region Conservation Authority

The study area is within the jurisdiction of the Toronto and Region Conservation Authority (TRCA). Specifically, the following areas are within TRCA regulated limits according to the TRCA's online Regulated Area Search tool (TRCA 2016):

- West of Victoria Square Boulevard, between Betty Roman Boulevard and Pope John Paull II Square;
- East of Victoria Square Boulevard, from Vine Cliff Boulevard north approximately 180 m;
- East of Victoria Square Boulevard, between Vine Cliff Boulevard and Woodbine Avenue; and
- South of Woodbine Avenue.

Any work proposed within watercourses, wetlands or waterbodies must be in compliance with the regulations of O. Reg. 166/06 Toronto and Region Conservation Authority: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses.

2.6 City of Markham Official Plan

The study area is located within the City of Markham (the City) and the Project must comply with the policies of the City of Markham Official Plan (OP) (2014).

The study area is located in the municipal Greenway System. In particular, the valleyland and riparian habitat associated with the tributaries are designated as part of the Greenway System (Figure 1). The Greenway System includes all Natural Heritage Network, Enhancement Lands, and protected agricultural lands (Markham 2014).

The Natural Heritage Network includes key natural heritage and hydrologic features, valleylands, woodlands, wetlands, and their associated vegetation protection zones. The Natural Heritage Network also includes certain naturalized storm water management facilities. Development and site alteration is prohibited within the Natural Heritage Network, with some exceptions, including for public infrastructure (Markham 2014). The woodland located west of Woodbine Avenue and north of Major Mackenzie Drive (Figure 1) is a designated woodland feature of the Greenway System (Markham 2014).

The Urban Forest System in the City includes all woodlands, hedgerows and small woodlots, individual trees and shrubs. Compensation, in the form of rehabilitation and enhancement, is required where the urban forest is impacted by the provision of infrastructure (Markham 2014). Any tree removal must also comply with the City's Tree Preservation By-law.

Other key natural heritage and hydrologic features as defined in the City's OP (2014), as well as significant valleylands, woodlands and wetlands, are discussed further in Section 6.0.

2.7 Region of York Official Plan

The Project must also comply with the policies of the Region of York (the Region) OP (2013). According to the Region's OP (2013), portions of the riparian area of Carlton Creek from Woodbine Avenue south to Major Mackenzie Drive are designated as part of the Regional Greenlands System. The Regional Greenlands System consists of cores, corridors and linkages.

Development and site alteration is prohibited within the Greenlands System, and development or site alteration within 120 m requires the completion of an Environmental Impact Study (EIS), with some exceptions. Exceptions include new infrastructure, including water and wastewater systems, authorized under the EA process. Infrastructure design and construction must be sensitive to natural features and should avoid key natural heritage and hydrologic features where possible (York 2013).

3.0 METHODS

3.1 Background Review

The investigation of existing conditions in the study area included a background information search and literature review to gather data about the local area and provide context for the evaluation of the natural features.

As part of the background review, a number of resources were used to evaluate the existing conditions in the study area, including:

- Natural Heritage Information Centre (NHIC) database maintained by the Ontario Ministry of Natural Resources (MNRF) (NHIC 2016);
- Land Information Ontario (LIO) geospatial data (MNRF 2018a);
- Species at Risk Public Registry (ECCC 2018);
- Species at Risk in Ontario (SARO) List (MNRF 2018b);
- Atlas of Breeding Birds of Ontario (Cadman et al. 2007);
- Atlas of the Mammals of Ontario (Dobbyn 1994);
- Bat Conservation International (BCI) range maps (BCI 2016);
- Ontario's Reptile and Amphibian Atlas (Ontario Nature 2016);
- Ontario Butterfly Atlas (Jones et al. 2016);
- City of Markham Official Plan (2014);
- Region of York Official Plan (2013);
- Rouge River State of the Watershed Report (TRCA 2007); and
- Existing aerial imagery.

To develop an understanding of the ecological communities, wildlife habitat and potential natural heritage features that may be affected by the proposed Project, MNRF Land Information Ontario (LIO) data were used to create base layer mapping for the study area. A geographic query of the NHIC database was conducted to identify element occurrences of any natural heritage features, including wetlands, Areas of Natural and Scientific Interest, life science sites, rare vegetation communities, rare, threatened or endangered species and other natural heritage features within the study area.

3.2 Species at Risk Screening

SAR considered for this report includes those species listed under SARA and the ESA, as well as rare species ranked S1-S3 provincially (NHIC). An assessment was conducted to determine which SAR had potential habitat within the study area. A screening of all SAR which have the potential to be found in the study area was conducted as a desktop exercise, using the sources listed above. Species with ranges overlapping the study area, or recent occurrence records in the vicinity, were screened by comparing their habitat requirements to habitat conditions in the study area.

The potential for the species to occur was determined through a probability of occurrence. A ranking of low indicates no suitable habitat availability for that species in the study area and no specimens identified. Moderate probability indicates more potential for the species to occur, as suitable habitat appeared to be present in the study area, but no occurrence of the species has been recorded. High potential indicates a known species record in the study area (as determined through the background data review) and good quality habitat is present (Appendix A).

3.3 Field Investigation

3.3.1 Ecological Land Classification

Plant communities in the study area were first delineated at a desktop level using high-resolution aerial imagery, then ground-truthed in the field using the Ecological Land Classification (ELC) system for southern Ontario (Lee et al. 1998). During the field surveys, information on plant community structure and composition was recorded in order to better define and refine the plant community polygons.

The botanical inventory included area searches in all naturally-occurring habitats in the study area, where access was possible. The searches were conducted by systematically walking through all habitats, in a meandering fashion, generally paralleling the principal (long) axis of a natural area, where feasible, and ensuring that the full width of the area was examined. Where access was not possible, an assessment was conducted from the roadside. Lists of all plant species identified during the botanical, or other, surveys were compiled.

3.3.2 Breeding Bird

Breeding bird point count surveys for songbirds and other diurnal birds were conducted at three stations in the study area (Figure 2). Surveys followed protocols from the Canadian Breeding Bird Survey (Downes and Collins 2003), and the OBBA (Cadman et al. 2007). Point count stations were established in representative habitats found in the study area and were spaced a minimum of 250 m apart. Surveys were conducted between 30 minutes before sunrise and 10:00 am to encompass the period of maximum bird song.

Each station consisted of a circle with a 100 m radius from the centre point (where the observer stands), and each point count was 10 minutes in duration, and was separated into survey windows of 0-3, 3-5, and 5-10 minutes. All birds seen or heard were noted on pre-printed datasheets and observations were made regarding sex, age and notable behaviour, when possible. Birds heard or seen outside of the 100 m radius were also noted using methods from the OBBA, including estimated distance (where possible).

3.3.3 Anuran Call Count

Surveys to determine the presence and relative abundance of calling anurans (frogs and toads) were completed at two locations in the study area (Figure 2).

Surveys were completed using the Marsh Monitoring Program (MMP) method for vocalizing frog surveys (Bird Studies Canada 2008). This method involves collection of call data from fixed stations over three survey periods during the spring and early summer (April to early July), with an interval of at least 15 days between surveys. Surveys begin one half-hour after sunset and end by midnight during evenings with appropriate weather conditions (i.e., little wind and a minimum air temperature of 5˚C, 10˚C, and 17˚C for each respective survey period).

Potential locations for anuran call count survey stations were identified at the desktop level using aerial imagery and then confirmed and adjusted, as necessary, in the field. Survey station locations were chosen based on suitable habitat.

3.3.4 Fish and Fish Habitat

Surveys to assess fish and fish habitat were completed at all surface water locations in the study area, where access was possible (Figure 2). The aquatic habitat at each station was assessed, and parameters recorded included water flow, morphology, in-stream vegetation and substrates, and riparian conditions.

3.3.5 General Wildlife Surveys

General wildlife surveys (visual encounter surveys) included track and sign surveys, area searches, and incidental observations, concurrent with other field surveys.

The full range of habitats across the study area were searched. Areas of exposed substrate such as sand or mud were located and examined for any visible tracks. Any wildlife (including mammals, butterflies, and dragonflies) seen and identified were recorded. When encountered, tracks and other signs (e.g., tracks, scats, hair, tree scrapes, etc.) were identified to a species, if possible, and recorded. Observations of wildlife species or signs during all field surveys were recorded.

4.0 EXISTING CONDITIONS

4.1 Ecosystem Setting

The study area is located in the Rouge River watershed and the Middle Tributaries sub-watershed. The Rouge River watershed drains approximately 336 square kilometres (km^2) and travels from the headwaters in the Oak Ridges Moraine south to Lake Ontario. The watershed is primarily composed of agricultural and urban land uses (TRCA 2007).

The study area is located in the Peel Plain physiographic region (Chapman and Putnam 1984). This region is composed of clay soils underlain by shale and limestone till. The dominant soil in this region is the Peel clay which has imperfect drainage (Chapman and Putnam 1984).

4.2 Surface Water Resources

Carlton Creek runs through the study area, crossing Victoria Square Boulevard just south of Betty Roman Boulevard, then travelling south along the eastern side of Victoria Square Boulevard to Major Mackenzie Drive (Figure 2). Further downstream (outside of the study area), Carlton Creek meets Berczy Creek (TRCA 2007).

Carlton Creek is defined as a permanent or intermittent stream and is considered a Key Hydrologic Feature by both the City's OP (Markham 2014) and the Region's OP (York 2013). In general, policies of the City's OP

(Markham 2014) prohibit development or site alteration within Key Hydrologic Features and their vegetation protection zones (minimum 10 m). However, additional policies may exist where the need for required infrastructure is demonstrated, and no reasonable alternative is available, such as avoiding Key Hydrologic Features were feasible, and minimizing impacts and disturbance (Markham 2014). According to the Region's OP, development and site alteration is prohibited within and adjacent to Key Hydrologic Features, with some exceptions, including if the activity is authorized through an EA (York 2013).

Development or site alteration adjacent to watercourses, or within the floodplain, must also comply with the policies of the relevant conservation authority (i.e., TRCA). A culvert replacement is proposed for the crossing at Carlton Creek approximately 185 m south of Stony Hill Avenue. Consultation with the TRCA is required to confirm permitting requirements for work within Carlton Creek.

A headwater drainage feature, as shown on Appendix B of the City's OP (Markham 2014), is located east of Victoria Square Boulevard, and south of Boyd Court (Figure 1). The mapped Headwater Drainage Feature is shown passing through an area of residential subdivisions. Golder found no evidence of streams or drainage systems in the study area in the vicinity of this mapped feature during field surveys. The Headwater Drainage Feature may have been previously altered or removed as part of previous developments, and this feature is not carried forward to the impact assessment. The TRCA may require that a site walk be completed with their staff to confirm the absence of the watercourse during their project review and permitting under Ontario Regulation 166/06.

Four storm water management ponds also occur in the central and southern portions of the study area (Figure 2). Storm water ponds OL-E1 and OL-E2 are connected to the east branch of Carlton Creek or its tributaries. Storm water pond W1 at the south end of the study area, south of Woodbine Avenue, was under construction for bank enhancements at the time of the field investigation.

4.3 Aquatic Habitat and Fish

4.3.1 Aquatic Habitat

Although no fish were observed in the study area during the field survey, Carlton Creek was assessed as suitable to provide fish habitat. Carlton Creek is considered a warmwater fishery (TRCA 2007). Development and site alteration is prohibited within fish habitat, except in accordance with provincial or federal requirements (Markham 2014; MMAH 2014; York 2013). In addition, a minimum vegetation protection zone of 30 m is applied adjacent to fish habitat under the City's OP policies (Markham 2014). A culvert replacement is proposed for the crossing at Carlton Creek approximately 185 m south of Stony Hill Avenue. Potential impacts to fish or fish habitat in Carlton Creek are discussed further in Section 5.3.

Storm water management ponds are considered "Sewage Works" under the *Ontario Water Resources Act* and are not intended to provide fish habitat. Because they are often connected to watercourses via inflow/outflows or within a floodplain, these ponds can become inhabited by fish (MNRF 2016). Where storm water management ponds are considered fish habitat (as defined by the *Fisheries Act*), proposed development must be in compliance with the *Fisheries Act*, and any other relevant policies of the MNRF and TRCA. Potential impacts to fish or fish habitat in storm water management ponds are discussed further in Section 5.3.

4.3.2 Fish

Species known to occur in Fisheries Management Zone (FMZ) 2, which includes Carlton Creek and Berczy Creek to the east of the study area, include black crappie (*Pomoxis nigromaculatus*), bluntnose minnow (*Pimephales notatus*), brook stickleback (*Culaea inconstans*), brown trout (*Salmo trutta*), common shiner (*Luxilus cornutus*), creek chub (*Semotilus atromaculatus*), fathead minnow (*Pimephales promelas*), johnny darter (*Etheostoma nigrum*), largemouth bass (*Micropterus salmoides*), longnose dace (*Rhinichthys cataractae*), northern redbelly dace (*Phoxinus eos*), pumpkinseed (*Lepomis gibbosus*), rainbow darter (*Etheostoma caeruleum*), and white sucker (*Catostomus commersoni)* (TRCA 2007).

Significant and Sensitive Species

Redside dace are known to have occurred in FMZ 2, with records of species occurrences prior to 2005. Carlton Creek does not contain suitable habitat for this species based on its warmwater regime and is not hydraulically connected to any watercourses identified as recovery habitat for redside dace (i.e., Berczy Creek). Redside dace is not considered further in this report.

4.4 Vegetation

4.4.1 Regional Setting

The study area is located in the Great Lakes – St. Lawrence Forest Region and the Huron-Ontario sub-region. This forest region contains a wide variety of coniferous and deciduous species. Species characteristic of the Huron-Ontario sub-region include sugar maple (*Acer saccharum*) and beech (*Fagus sylvatica*) in combination with basswood (*Tilia americana*), red maple (*Acer rubrum*), yellow birch (*Betula alleghaniensis*), white ash (*Fraxinus americana*), red oak (*Quercus rubra*), white oak (*Quercus alba*) and bur oak (*Quercus macrocarpa*). Coniferous species included eastern hemlock (*Tsuga canadensis*), eastern white pine (*Pinus strobus*) and balsam fir are also frequent. Scattered largetooth aspen (*Populus grandidentata*), bitternut hickory (*Carya cordiformis*), butternut (*Juglans cinerea*), hop-hornbeam (*Ostrya virginiana*), and black cherry (*Prunus serotina*) also occur (Rowe 1972).

Local occurrences of blue-beech (*Carpinus caroliniana*), silver maple (*Acer saccharinum*), rock elm (*Ulmus thomasii*) and black ash (*Fraxinus nigra*) occur in swampy areas or along rivers. These deciduous species are common on the deep calcareous soils, while coniferous species such as eastern hemlock (*Tsuga canadensis*) and white pine (*Pinus strobus*) are more common on shallow, acidic soils (Rowe 1972).

Topography of the Huron-Ontario sub-region is irregular but generally flat, and is underlain by Ordovician bedrock covered with glacial deposits. Soils are mainly gray-brown luvisols and melanic brunisols (Rowe 1972).

4.4.2 Plant Communities

Overall, the study area consists mainly of landscaped parks and developed residential plots. Small, isolated natural areas of meadows, thickets, woodlands, naturalized storm water ponds, and small wet meadows occur throughout the study area. The ELC communities are shown on Figure 2 and are briefly described in Table 1.

Table 1: Plant Communities in the Study Area

ELC Community	Field Description
ANTHROPOGENIC	
OAGM Open Agricultural	Areas of open agricultural fields, typically planted in row crops such as soy.
RES Residential	Residential properties, including single family homes and townhomes.
DIST Disturbed	Areas that have been stripped of soil and vegetation for development or other purposes.
CVC Commercial/ Institutional	Areas developed for commercial or institutional purposes, such as schools and churches.
Park	Areas designated as municipal parks, which may include areas of walking trails, open meadow or lawn and scattered standing trees. Cathedral (King David) Park located north of Reflection Road is also planted as an arboretum and heritage orchard.
Lawn	Areas of manicured and maintained lawn.
CULTURAL	
CUM - A Cultural Meadow	A fallow meadow dominated by forb species, such as knapweed (*Centaurea nigrescens*), Queen Anne's lace (*Daucus carota*), goldenrod spp., and horseweed (*Conyza canadensis*). A stock pile of top soil separates this feature from the storm water pond to the east.
CUW - A Cultural Woodland	Small woodland dominated by white willow (*Salix alba*) within Vine Cliff Park.
CUM – B / CUW - B Cultural Meadow and Cultural Woodland Complex	A fallow upland mixture of meadow and woodland dominated by Scots pine (*Pinus sylvestris*), honey locust (*Gleditsia triacanthos*), bur oak (*Quercus macrocarpa*), green ash (*Fraxinus pennsylvanica*), hawthorn (*Crataegus* sp.), Canada thistle (*Cirsium arvense*), mullein (*Verbascum thapsus*), smooth brome (*Bromus inermis*), Canada goldenrod (*Solidago canadensis*), riverbank grape (*Vitis riparia*) and Queen Anne's lace. The eastern edge of this community transitions to a wetter, willow-dominated woodland.
CUW - C Cultural Woodland	A small woodland dominated by eastern cottonwood (*Populus deltoides*).
AQUATIC	
OAO Open Water	The majority of open water areas within the study area are constructed storm water management ponds or other dug-out ponds. The pond at the south end of the study area is currently undergoing bank enhancement. Various forbs and shrubs line the edge of this pond, including white spruce (*Picea glauca*), red oak, staghorn sumac (*Rhus typhina*), honey locust, silver maple, ninebark (*Physocarpus opulifolius*), white willow, phragmites and goldenrods. In addition, some boulevard trees, including horse chestnut (*Aesculus hippocastanum*) and Kentucky coffee tree (*Gymnocladus dioicus*), were recently planted along the west side of Woodbine Avenue By-Pass.

ELC Community	Field Description
WETLAND	
MAM - A Meadow Marsh	A small, fallow meadow marsh adjacent to a residential property at the north end of the study area. This community is dominated by reed canary grass (*Phalaris arundinacea*).
MAM - B Meadow Marsh	Meadow marsh community adjacent to the storm water pond on the west side of Victoria Square Boulevard at Betty Roman Boulevard. This community is primarily composed of phragmites and reed canary grass.
MAM – C Meadow Marsh	A small meadow marsh at the edge of Vine Cliff Park dominated by phragmites.

4.4.3 Vascular Plants

A total of 25 vascular plant species were observed during the botanical survey completed in the study area (Appendix B). Of these, 14 (56%) are native species, and 11 (44%) are alien. The plant species observed are commonly found in suburban environments, including parklands and naturalized storm water ponds.

Significant and Sensitive Species

The majority of the plant species identified through the botanical surveys are secure and common in Ontario and globally (S4 or S5; G4 or G5). None of the plant species identified in the desktop SAR screening as having ranges which overlap the study area were found during the botanical, or other, field surveys (Appendix A). Kentucky coffee tree, designated threatened under the ESA, was observed in the study area during field surveys. However, the individual observed was planted by the City as a boulevard tree and was not a naturally-occurring tree. Planted individuals are often cultivars of non-native specimens and are not treated as protected SAR individuals. Because the boulevard tree is considered non-native, it is not carried forward to the impact assessment.

4.5 Wildlife

4.5.1 Breeding Bird Survey

Seventeen (17) species of birds were observed in the study area during breeding bird, or other, surveys (Appendix C). Species observed in the study area included those that are common in suburban habitats and parkland such as American robin (*Turdus migratorius*), European starling (*Sturnus vulgaris*) and red-winged blackbird (*Agelaius phoeniceus*).

Significant and Sensitive Species

All of the bird species observed during the surveys are provincially ranked S4 (apparently secure – uncommon, but not rare), S5 (secure – common, widespread and abundant in the province), or SNA (not applicable – species is not a target for conservation). One species designated threatened under the ESA was observed in the study area during field surveys: barn swallow (*Hirundo rustica*). Barn swallow is discussed further in Section 5.1.

4.5.2 Anuran Call Count Survey

A single gray tree frog (*Hyla versicolor*) was observed during anuran call count surveys (Appendix C). This species was recorded in the vicinity of storm water management pond E2 (Figure 2).

Significant and Sensitive Species

Gray tree frog is provincially ranked S5 (secure – common, widespread and abundant in the province).

5.0 SIGNIFICANT NATURAL HERITAGE FEATURES

This section assesses the significant natural heritage features and functions (as outlined in Section 2.0) located within the study area.

5.1 Habitat of Endangered or Threatened Species

The MNRF designates “significant” or critical habitat that is necessary for the maintenance, survival, and/or recovery of naturally occurring or reintroduced populations of endangered and threatened species, and where those areas of occurrence are occupied or habitually occupied by the species during all or any part(s) of their life cycles.

Barn swallow, designated threatened under the ESA, was recorded in the study area during breeding bird surveys. Barn swallow was observed flying over the study area adjacent to storm water pond E2, north of Vine Cliff Boulevard. Barn swallow breeds in areas that contain a suitable nesting structure, open areas for foraging, and a body of water. This species nests in human made structures including barns, buildings, sheds, bridges, and culverts. Preferred foraging habitat includes grassy fields, pastures, agricultural cropland, lake and river shorelines, cleared right-of-ways, and wetlands (COSEWIC 2011). Mud nests are fastened to vertical walls or built on a ledge underneath an overhang. Suitable nests from previous years are reused (Brown and Brown 1999).

No suitable nesting structures were recorded in the study area. It is likely that the observed individuals were foraging over the open water of the storm water pond. Large areas of open farmland with potentially suitable nesting structures occur east of the storm water pond and may be where individuals are nesting. Based on the results of the field surveys, there is low potential for direct impact to the individual or nesting habitat as a result of the Project.

No suitable habitat was noted in the study area for any other endangered or threatened species that were identified as having ranges which overlap the study area (Appendix A).

5.2 Significant Wetlands

The MNRF designates provincially significant wetlands (PSW). PSWs are designated based on a standardized evaluation system known as the Ontario Wetland Evaluation System (OWES). Wetlands are assessed based on a range of criteria, including biology, hydrology, societal value and special features (MNRF 2015a). There are no significant wetlands in the study area.

5.3 Fish Habitat

To assess the implications of the federal *Fisheries Act*, fish habitat impacts are described in terms of direct, on-site habitat and indirect, off-site effects of the Project.

Carlton Creek has been assessed to provide fish habitat. A culvert replacement is proposed for the crossing at Carlton Creek, and grading conducted along the embankments adjacent to Carlton Creek will require the creek to be realigned.

The existing concrete culvert at the Carlton Creek crossing measures 19.4 m long and 1.25 m x 1.25 m at the opening. It will be replaced by a larger, open-footing concrete culvert, measuring 20.2 m long and 8.5 m x 1.5 m at the opening. The new culvert will be 0.8 m longer, 7.25 m wider, and 0.25 m taller than the existing culvert. Carlton Creek is proposed to be realigned both upstream (west side of road) and downstream (east side of road) of the culvert crossing. The length of the proposed channel realignment is approximately 35 m on the upstream side of the crossing and approximately 30 m on the downstream side.

Because Carlton Creek will be impacted by the proposed Project activities, fish habitat is carried forward to the impact assessment (Section 6.1).

Although the storm water management ponds within the study area may also provide fish habitat, these features are exempt under the *Fisheries Act* and are not required to undergo review by the DFO. No development or site alterations are proposed in any of the four existing storm water management ponds in the study area.

5.4 Significant Woodlands

Significant woodlands should be defined and designated by the planning authority. General guidelines for determining significance of these features are presented in the Natural Heritage Reference Manual (NHRM) for Policy 2.3 of the PPS (MNR 2010).

Significant woodlands are not mapped in either the City's or Region's OP. Both the City and Region (Markham 2014; York 2013) define significant woodlands as woodlands that are:

- 0.5 ha or larger in size and that directly supports:
  i) Globally or provincially rare plant, animals or communities, or
  ii) Directly supports threatened or endangered species; or
  iii) Is within 30 m of a PSW or wetland (shown on Map 4 of the Region's OP), waterbody, or a permanent or intermittent stream;

  OR

- 4 ha or larger in size.

The woodland located west of Woodbine Avenue By-Pass and north of Major Mackenzie Drive (immediately south of storm water pond W1) (Figure 1) is designated as a Woodland under the municipal Greenway System (City of Markham 2014). The woodland is greater than 0.5 ha in size and is adjacent to a stream, and meets the significance criteria outlined by both the City and the Region.

According to both the City's OP (Markham 2014) and the Region's OP (York 2013), development or site alteration is prohibited within significant woodlands and their vegetation protection zone, which is a minimum distance of 10 m from the drip line. The preferred concept plan indicates construction activities end at the intersection of Victoria Square Boulevard and Woodbine Avenue, approximately 215 m north of the woodland. Because no development or site alterations are proposed within the significant woodland, or within the 10 m buffer, further analysis is not warranted.

5.5 Significant Valleylands

Significant valleylands should be defined and designated by the planning authority. General guidelines for determining significance of these features are presented in the NHRM for Policy 2.3 of the PPS (MNR 2010). Recommended criteria for designating significant valleylands under the PPS (MMAH 2014) include prominence a distinctive landform, degree of naturalness, importance of its ecological functions, restoration potential, and historical and cultural values.

The riparian area associated with Carlton Creek that crosses Victoria Square Boulevard just south of Betty Roman Boulevard and continues south adjacent to Victoria Square Boulevard to Major Mackenzie Drive is designated as a valleyland on Map 6 of the City's OP (Markham 2014). According to the City's OP (Markham 2014), valleylands shown on Map 6 include significant valleylands, as well as permanent and intermittent streams. Development and site alteration within valleylands and stream corridors is only permitted within Special Policy Areas and in accordance with the TRCA regulations, or within existing developed properties regulated by the TRCA (Markham 2014).

However, according to Section 3.1.2.10 of the City's OP (Markham 2014), required infrastructure may be located in key natural heritage or hydrologic features (including significant valleylands), where need is demonstrated and there are no reasonable alternatives. In such situations, impacts to the valleyland and associated vegetation protection zone should be avoided where feasible, and designed to minimize the amount of these areas that are traversed. In addition, impacts and disturbance to the existing landscape must be minimized, and mitigation measures implemented to minimize impacts on wildlife habitat.

The study area is part of the Regional Greenlands System, which encompasses Key Hydrologic Features, including significant valleylands (Region of York 2013). According to the Region's OP, development and site alteration is prohibited within and adjacent to Key Hydrologic Features, with some exceptions, including activities that are authorized through an EA (Region of York 2013).

Potential impacts to significant valleylands are discussed further in Section 6.2.

5.6 Significant Areas of Natural or Scientific Interest (ANSIs)

Areas of Natural and Scientific Interest (ANSI) are designated by the province according to standardized evaluation procedures. There are no ANSIs within or adjacent to the study area.

5.7 Significant Wildlife Habitat

Significant wildlife habitat (SWH) is one of the more complicated natural heritage features to identify and evaluate. The Natural Heritage Reference Manual (NHRM; MNR 2010) includes criteria and guidelines for designating SWH. There are two other documents, the Significant Wildlife Habitat Technical Guide (SWHTG) and the Significant Wildlife Habitat Mitigation Support Tool (SWHMiST) (MNR 2000 and MNRF 2014), that can be used to help decide what areas and features should be considered SWH. These documents were used as reference material for this study. SWH should be evaluated in the context of the entire planning authority's jurisdiction, and only the best examples are considered significant.

There are four general types of SWH: migration corridors, seasonal concentration areas, rare or specialized habitats, and habitat for species of conservation concern. The specific habitats considered in this report are

evaluated based on the criteria outlined in the Ecoregion 7E Criterion Schedule (MNRF 2015b). All types of SWH are discussed below in relation to the study area and the Project.

5.7.1 Seasonal Concentration Areas

Seasonal concentration areas are those areas where large numbers of a species congregate at one particular time of the year. Examples include deer yards, bird nesting colonies, bat hibernacula, raptor roosts, and passerine migration concentrations. If a species is at risk, or if a large proportion of the population may be lost if significant portions of the habitat are altered, all examples of certain seasonal concentration areas may be designated.

The SWHTG (MNR 2000) and Ecoregion 7E Criterion Schedule (MNRF 2015b) identifies the following 12 types of seasonal concentrations of animals that may be considered SWH:

- winter deer yards and congregation areas;
- colonial bird nesting sites;
- waterfowl stopover and staging areas;
- shorebird migratory stopover areas;
- landbird migratory stopover areas;
- raptor winter feeding and roosting areas;
- reptile hibernacula;
- turtle wintering areas;
- bat hibernacula;
- bat maternity colonies;
- bat migratory stopover areas; and
- migratory butterfly stopover areas.

No candidate seasonal concentration areas were identified in the study area during field investigations.

5.7.2 Migration Corridors

The SWHTG (MNR 2000) defines animal movement corridors as elongated, naturally vegetated parts of the landscape used by animals to move from one habitat to another. This is generally in response to different seasonal habitat requirements. For example, trails used by deer to move to wintering areas or areas used by amphibians between breeding and summer habitat. To qualify as SWH, these corridors would be a critical link between habitats that are regularly used by wildlife.

No known migration corridors occur within the study area.

5.7.3 Specialized Habitats

Specialized habitats are microhabitats that provide a critical resource to some groups of wildlife. Examples include salt licks for ungulates and groundwater seeps for wild turkeys.

The SWHTG (MNR 2000) and Ecoregion 7E Criterion Schedule (MNRF 2015b) defines 7 specialized habitats that may be considered SWH. They are:

- habitat for area-sensitive species;
- amphibian breeding habitat (woodlands and wetlands);
- turtle nesting habitat;
- specialized raptor nesting habitat;
- waterfowl nesting areas;
- bald eagle and osprey habitat; and
- seeps and springs.

No specialized habitats were identified in the study area during field surveys.

5.7.4 Rare Habitat

This category includes plant communities that are considered rare in the province. Generally, communities assigned an SRANK of S1 to S3 (extremely rare to rare-uncommon) by the NHIC could qualify. It is assumed that these habitats are at risk and that they are also more likely to support rare species and other features that are considered significant.

No rare vegetation communities were identified in the study area during field surveys.

5.7.5 Habitat for Species of Conservation Concern

Habitat for Species of Conservation Concern (SOCC) includes four types of species: those that are rare, those whose populations are significantly declining, those that have been identified as being at risk to certain common activities, and those with relatively large populations in Ontario compared to the rest of the world.

Rare species are considered at five levels: globally rare, nationally rare, provincially rare, regionally rare; and locally rare (in the municipality). This is also the order of priority that should be attached to the importance of maintaining species. Some species have been identified as being susceptible to certain practices, and their presence may result in an area being designated SWH. Examples include species vulnerable to forest fragmentation and species such as woodland raptors that may be vulnerable to forest management or human disturbance. The final group of SOCC includes species that have a high proportion of their global population in Ontario. Although they may be common in Ontario, they are found in low numbers in other jurisdictions.

The SWHTG (MNR 2000) and Ecoregion 7E Criterion Schedule (MNRF 2015b) defines 5 specialized habitats that may be considered SWH. They are:

- marsh bird breeding habitat;
- open country bird breeding habitat;
- shrub/early successional bird breeding habitat;
- terrestrial crayfish; and

- special concern and rare wildlife species

No special concern or rare wildlife species were observed in the study area during field surveys. Based on habitat identified during field surveys, two species designated special concern under the ESA with ranges that overlap the study area (Appendix A) were assessed to have a moderate potential to occur. Special concern species do not receive individual or habitat protection under the ESA.

Monarch (*Danaus plexippus*) occurs wherever there are milkweed (*Asclepius* spp.) plants for its caterpillars and wildflowers that supply a nectar source for adults. It is often found on abandoned farmland, meadows, open wetlands, prairies and roadsides, but also in city gardens and parks. Important staging areas during migration occur along the north shores of the Great Lakes (COSEWIC 2010). The numerous parks and meadows in the study area may provide suitable foraging habitat for this species. However, this type of habitat is not limiting in the study area or larger region, and does not represent significant breeding or foraging habitat for this species. In addition, the proposed development will generally be limited to road right-of-way, minimizing the amount of habitat impacted. Because habitat for this species is not limiting in the area, and the habitat on Site is not likely significant for monarch, monarch is not considered to be a constraint to the proposed Project.

Snapping turtle (*Chelydra serpentina*) uses a wide range of waterbodies, but shows preference for areas with shallow, slow-moving water, soft substrates and dense aquatic vegetation. Hibernation takes place in soft substrates under water. Nesting sites consist of sand or gravel banks along waterways or roadways (COSEWIC 2008). The storm water management ponds within the study area may provide suitable aquatic habitat for these species. Road shoulders and embankments, as well as the gravel edges of parking lots, in the study area may also provide suitable nesting substrates. In addition, there are NHIC records of occurrence from 2011 within the study area (NHIC 2017). Because there is suitable habitat for snapping turtle in the study area, potential impacts to snapping turtle as a result of the Project are discussed further in Section 6.2.

6.0 IMPACT ASSESSMENT

6.1 Fish Habitat

Carlton Creek has been assessed to provide fish habitat and may be impacted by the proposed Project.

The proposed culvert replacement on Carlton Creek will result in temporary impacts to fish habitat during culvert removal and installation, including sedimentation / erosion and temporary restrictions to flow and fish passage. Long-term, the proposed culvert replacement may enhance existing fish habitat through improvements to the quality and quantity of fish habitat. The replacement culvert will be 7.25 m wider and 0.25 m taller than the existing culvert, which will maintain, or improve, average creek flow and maintain adequate water supply throughout the year. The larger culvert will also span the bankfull width of the creek and improve fish passage (i.e., allow passage of larger fish).

The open-footing design of the replacement culvert may also enhance existing fish habitat by maintaining the natural stream bed, natural substrates, and stream gradient through the length of the culvert. This will allow for more naturalized stream conditions through the culvert, which will improve the quality of fish habitat through the connection.

Carlton Creek will be realigned both up- and downstream of the crossing to allow for grading along the road as part of the proposed road improvements. Alternatives to the creek realignment were considered, but realignment was assessed to be the best option. Approximately 65 m of the creek is proposed for realignment (i.e., 35 m upstream and 30 m downstream of the crossing). The realignment will result in temporary impacts to fish habitat, including erosion / sedimentation during construction, removal of aquatic vegetation, dredging, and temporary restrictions to flow and fish passage. However, the realignment may also present opportunities to enhance existing fish habitat, such as incorporation of design elements that reflect natural channel design or reduce road run-off.

A Project Review by DFO in accordance with the *Fisheries Act* will be required for the culvert replacement and realignment of Carlton Creek to determine if an Authorization is required under Paragraph 35(2)(b) to proceed with the Project. A Request for Project Review will be prepared and submitted to DFO as part of the application process. The request will summarize the existing conditions on site, anticipated Project activities and construction schedule, the potential pathways of effects, and applicable mitigation measures. The TRCA will also be consulted during the permitting stage. Measures to avoid or mitigate harm to fish, which will be implemented as part of this Project, are described in Section 7.2.

The culvert replacement and realignment of Carlton Creek will be conducted based on recommendations from DFO, such as guidance contained in the Fisheries Protection Policy Statement (DFO 2013a) and Measures to Avoid Causing Harm to Fish and Fish Habitat (DFO 2013c).

6.2 Significant Valleyland

A portion of the significant valleyland at the Carlton Creek crossing will be impacted as a result of the proposed Project. Carlton Creek is proposed to be realigned on both sides of Victoria Square Boulevard, which will permanently alter the form of the significant valleyland.

However, the proposed alteration may result in a positive effect by improving the overall form and function of the valleyland. The proposed creek realignment provides opportunities for enhancement of existing fish habitat, as well as enhancement of creek form and function (see Section 6.1). With considerations during the design stage (e.g. riparian plantings, bank slope), the creek realignment may also improve the overall quality and function of the valleyland as a wildlife corridor, increase the degree of naturalness, and increase habitat value.

Impacts during construction (e.g. erosion / sedimentation) will be temporary, and construction best management practices will be implemented to prevent or reduce adverse effects on the valleyland during this phase of the Project (Section 7.0). Further analysis is not warranted.

6.3 Snapping Turtle

There is habitat for snapping turtle in the study area, and specifically may occur within, or adjacent to, storm water management ponds. There is no species-specific habitat protection for snapping turtle under the ESA. Based on the preferred alignment, habitat for snapping turtle is not expected to be directly impacted as a result of the proposed Project. However, to avoid any potential impact to snapping turtles that may be encountered in the study area, specifically during the nesting period (May 15-July 15), mitigation measures are recommended. Further details are outlined in Section 7.3.

7.0 MITIGATION AND RECOMMENDATIONS

The following mitigation should be implemented to minimize any potential effects of the Project on adjacent natural features.

7.1 Vegetation and Wildlife

- In accordance with the City's Tree Preservation Requirements (Streetscape Manual, June 2009), tree and vegetation protection will be implemented.
- Post-construction planting will be undertaken to restore vegetation cover in all areas disturbed by construction activities, where reasonable.
- All vegetation clearing should occur outside of the breeding bird season (April 15 – August 15).
- Rehabilitate, re-stabilize and re-vegetate all disturbed areas upon completion of the construction works to restore the Project site to its pre-construction condition, where possible.

7.2 Fish Habitat

The following mitigation measures should be considered in the conceptual/preliminary stage of the culvert replacement and creek realignment to minimize potential impacts on fish and fish habitat in Carlton Creek:

- Design the new channel using a natural channel/geomorphic approach. Address riparian needs in the design.
- Construct in respect to timing windows. Since the fish community in Carlton Creek is classified as warmwater, no in-water work will occur between the restriction periods for southern Ontario (March 15 to July 15; DFO 2013d), subject to confirmation with DFO and/or MNRF.
- Construct the new channel segments (including instream and riparian restoration/compensation) in the dry - leaving 'plugs' at connection points to the existing watercourse. Remove plugs and swap flows to new channel once the new channel is constructed. This will minimize impacts to instream function and fish movement.
- Implement standard and accepted mitigation measures outlined in the Land Development Guidelines for the Protection of Aquatic Habitat (DFO 1993), Fisheries Protection Policy Statement (DFO 2013a) and Measures to Avoid Causing Harm to Fish and Fish Habitat (DFO 2013c) during construction.
- **Fish Protection:** DFO considers the following measure an appropriate measure to avoid harm to fish and fish habitat: "Retain a qualified environmental professional to ensure applicable permits for relocating fish are obtained and to capture any fish trapped within an isolated/enclosed area at the work site and safely relocate them to an appropriate location in the same waters. Fish may need to be relocated again, should flooding occur on the Site". Where it is not possible to relocate in the same waters, all attempts should be made to relocate the fish to waters in the same watershed (DFO 2013c). Prior to any work associated with the drainage ditches and pond, a fish collection permit will be obtained from the MNRF. The fish will be salvaged and relocated downstream. Any non-native species encountered during the fish salvage will be euthanized and disposed of using appropriate methods. The euthanization of non-native, invasive species is a standard practice and is generally included as a condition of the collection permit from the MNRF in order to comply with the *Fisheries Act*.

- **Erosion and Sediment Control**: An erosion and sediment control plan will be developed to minimize the risk of sedimentation of Carlton Creek during all phases of the project. These include installation of sediment barriers on all catch basin and maintenance holes and a silt fence barrier along all areas that sheet drain off-site, and installation of straw bale check dams in outlet ditches, etc. Exposed soils will be stabilized if above the high water mark and any in-water work will be isolated via turbidity curtains, etc. All sedimentation and erosion control measures will be regularly inspected and adapted to meet needs.
- **Contamination and Spill Management**: A response plan will be developed that will be implemented immediately in the event of a sediment release or spill of a deleterious substance and an emergency spill kit will be kept on site.
- **Operation of Machinery**: Machinery will be operated on land above the high water mark where possible. All refueling, washing, and servicing of machinery will be completed beyond 30 m of the water courses where fish are present.

7.3 Snapping Turtle

Because there are MNRF records of snapping turtle in the vicinity of the site, mitigation consisting of exclusion fencing as detailed below, will be implemented to avoid potential impact or injury to individuals in the study area that have potential to migrate into the site.

Exclusion fencing will be installed around the extent of the construction to prevent the migration of snapping turtle from surrounding areas onto the site. Details of the fencing include the following:

- The exclusion fencing should consist of a silt fence or other similar fencing with fine mesh hardware cloth of ¼ to ½ inch (on wildlife side of fence) buried at least 10 cm into the soil, with an additional 10 cm horizontal lip, and a recommended height of 60 cm (MNR 2013);
- Fence posts should be placed at 2 m to 3 m apart, and driven into the ground to a depth of at least 30 cm (MNR 2013);
- All fencing should be securely fastened to structures or culverts. There should be no gaps between the fence posts and structures or culverts through which reptiles could pass (MNR 2013);
- Curve the ends of the fencing inward (i.e., away from the construction site) to help reduce access to these locations (MNR 2013);
- To prevent individuals from climbing the fence, the stakes or posts should be placed on the construction side of the fence and/or as recommended by MNRF; and
- The exclusion fencing should be installed prior to construction activities, during a period of inactivity for reptiles and amphibians (i.e., November through April) and maintained throughout the active season for reptiles (May to October), and in particular the nesting season for snapping turtle (May 15-July 15).

8.0 SUMMARY AND CONCLUSIONS

The proposed Project study area has been assessed for presence of natural features, wildlife and species and risk. Ecological impacts relevant to legislation including the ESA, SARA, the *Fisheries Act,* and the MBCA were assessed and considered for the Project. Although not applicable to the proponent as a provincial crown agency, potential ecological impacts under the Provincial Policy Statement, the policies of the Region of York and City of Markham Official Plans, and the *Conservation Authorities Act* were also reviewed to provide ecological context to the report and discussion of impacts.

Based on the surveys and assessments completed for this Natural Environment Report, and with the implementation of mitigation measures outlined in Section 7.0, it is expected that there will be no negative impacts to the significant natural features and functions on site or in the study area. These conclusions are based on the following recommendations and assumptions:

- There are no provincially rare species with habitat present within the study area;
- There are no endangered or threatened species with habitat within the study area;
- Potential impacts to locally rare or special concern species under the ESA that have been identified in the study area can be avoided through a combination of Project planning, design and construction mitigation measures;
- Sediment/erosion controls during construction will be implemented adjacent to natural features during construction;
- The input of water to the wetland adjacent to the site will not be altered as a result of the proposed Project (i.e., new culverts);
- A Project Review by DFO in accordance with the *Fisheries Act* will be prepared and submitted for the culvert replacement and creek realignment of Carlton Creek;
- No alterations to existing storm water management ponds are proposed;
- A tree preservation plan will be created and implemented to comply with municipal by-law as required; and
- Further consultation with the TRCA is recommended to obtain updated mapping to confirm the location and extent of regulation limits. Discussion with the TRCA is also required to confirm permitting requirements and appropriate mitigation measures for work proposed within Carlton Creek. Discussions may include confirmation that previously mapped headwater drainage features have been removed as part of past development in the area.

Report Signature Page

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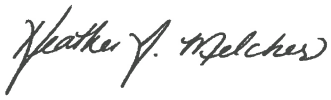
Ecologist



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AVS/RB/HM/mp

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FIGURES

LEGEND

- BIKE LANE
- OFF-ROAD MULTI-USE TRAIL
- PAVED SHOULDER
- SHARED PATHWAY (IN-BOULEVARD)
- SHARED ROADWAY (SIGNED ROUTE)
- INTERMITTENT WATERCOURSE
- PERMANENT WATERCOURSE
- WATERBODY
- WETLAND
- UNEVALUATED WETLANDS
- WOODED AREA
- GREENWAY SYSTEM BOUNDARY
- STUDY AREA

GREENWAY SYSTEM; CITY OF MARKHAM 2014

- WOODLAND
- NATURALIZED STORMWATER MANAGEMENT FACILITY
- NATURAL HERITAGE NETWORK

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REFERENCE(S)

1. BASEDATA MNRF 2016, YORK REGION 2016, NEPTIS GEOWEB
2. IMAGERY: © 2018 MICROSOFT CORPORATION © 2018 DIGITALGLOBE ©CNES (2018) DISTRIBUTION AIRBUS DS
3. PROJECTION: TRANSVERSE M ERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17

CLIENT
CITY OF MARKHAM

PROJECT
EVIRONMENTAL ASSESSMENT
VICTORIA SQUARE BOULEVARD, MARKHAM, ONTARIO

TITLE
PRELIMINARY NATURAL ENVIRONMENT CONSTRAINTS

CONSULTANT
Golder Associates

YYYY-MM-DD	2018-05-09
DESIGNED	JMC
PREPARED	JMC
REVIEWED	AS
APPROVED	HM

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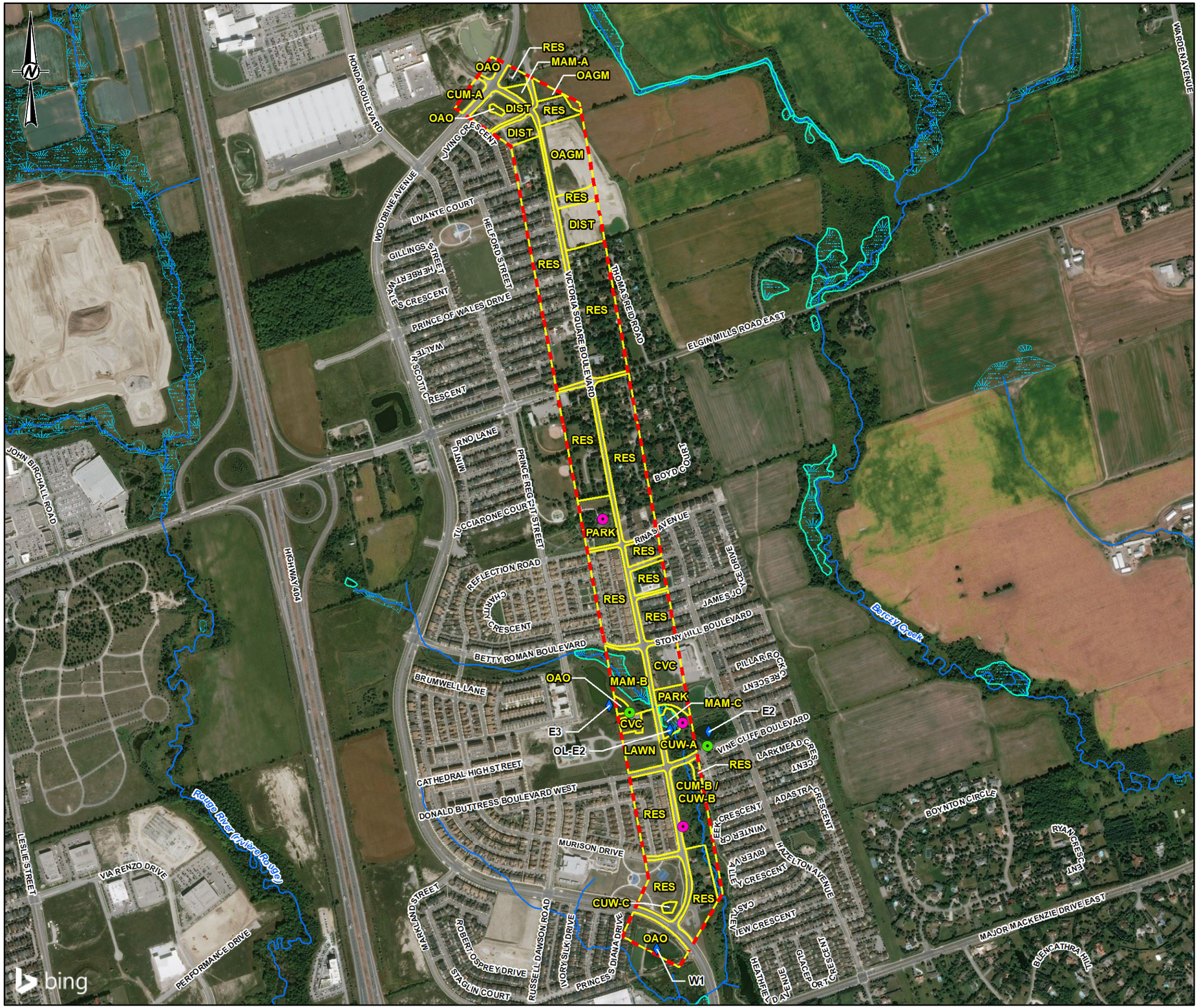

LEGEND

- EXISTING STORM WATER MANAGEMENT PONDS
- ACC = ANURAL CALL COUNT SURVEY STATION
- BBS = BREEDING BIRD SURVEY STATION
- PERMANENT WATERCOURSE
- WETLAND
- UNEVALUATED WETLANDS
- ECOLOGICAL LAND CLASSIFICATION (ELC)
- STUDY AREA

ELC Code	Description
OAGM	Open Agricultural
RES	Residential
DIST	Disturbed
CVC	Commercial/ Institutional
Park	—
Lawn	—
CUM	Cultural Meadow
CUW	Cultural Woodland
OAO	Open Aquatic
MAM	Meadow Marsh

0 500 1,000

1:12,000 METRES

REFERENCE(S)

1. BASEDATA MNRF 2016, YORK REGION 2016, NEPTIS GEOWEB
2. IMAGERY: © 2018 MICROSOFT CORPORATION © 2018 DIGITALGLOBE ©CNES (2018) DISTRIBUTION AIRBUS DS
3. PROJECTION: TRANSVERSE M ERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17

CLIENT
CITY OF MARKHAM

PROJECT
EVIRONMENTAL ASSESSMENT
VICTORIA SQUARE BOULEVARD, MARKHAM, ONTARIO

TITLE
ECOLOGICAL LAND CLASSIFICATION AND SURVEY STATIONS

CONSULTANT
Golder Associates

YYYY-MM-DD	2018-05-09
DESIGNED	JMC
PREPARED	SFC
REVIEWED	AS
APPROVED	HM

PROJECT NO.	CONTROL	REV.	FIGURE
1544413	001	0	**2**

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 25mm

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APPENDIX A

Species at Risk Screening

Common Name	Scientific Name	Species At Risk Act (Sch 1)[1]	Endangered Species Act[2]	COSEWIC[3]	Provincial (SRank)[4]	Habitat Requirements[5]	Potential to Occur in the Study Area
Jefferson salamander	*Ambystoma jeffersonianum*	END	END	END	S2	In Ontario, Jefferson salamander is found only in southern Ontario, along southern portions of the Niagara Escarpment and western portions of the Oak Ridges Moraine. Jefferson salamander prefers moist, well-drained deciduous and mixed forests with a closed canopy. It overwinters underground in mammal burrows and rock fissures, and moves to vernal pools and ephemeral wetlands in the early spring to breed. Breeding ponds are typically located in or near to forested habitats, and contain submerged debris (i.e. sticks, vegetation) for egg attachment sites. Ephemeral breeding pools need to have water until at least mid-summer (mid to late July) (Jefferson Salamander Recovery Team 2010).	Low No suitable woodland habitat in the study area to provide overwintering or breeding habitat.
Western chorus frog - Great Lakes St Lawrence/Canadian Shield Population	*Pseudacris triseriata*	THR	—	THR	S3	In Ontario, habitat of this amphibian species typically consists of marshes or wooded wetlands, particularly those with dense shrub layers and grasses, as this species is a poor climber. They will breed in almost any fishless pond including roadside ditches, gravel pits and flooded swales in meadows. This species hibernates in terrestrial habitats under rocks, dead trees or leaves, in loose soil or in animal burrows. During hibernation, this species is tolerant of flooding (Environment Canada 2015).	Low No individuals were observed during targeted surveys.
Monarch	*Danaus plexippus*	SC	SC	END	S2N, S4B	In Ontario, monarch is found throughout the northern and southern regions of the province. This butterfly is found wherever there are milkweed (*Asclepius* spp.) plants for its caterpillars and wildflowers that supply a nectar source for adults. It is often found on abandoned farmland, meadows, open wetlands, prairies and roadsides, but also in city gardens and parks. Important staging areas during migration occur along the north shores of the Great Lakes (COSEWIC 2010).	Moderate Suitable foraging or host plants may occur in parks, stormwater ponds or roadside edges.
West Virginia white	*Pieris virginiensis*	—	SC	—	S3	In Ontario, West Virginia white is found primarily in the central and southern regions of the province. This butterfly lives in moist, mature, deciduous and mixed woodlands, and the caterpillars feed only on the leaves of toothwort (*Cardamine* spp.), which are small, spring-blooming plants of the forest floor. These woodland habitats are typically maple-beech-birch dominated. This species is associated with woodlands growing on calcareous bedrock or thin soils over bedrock (Burke 2013).	Low No suitable woodland habitat in the study area.
Bank swallow	*Riparia riparia*	THR	THR	THR	S4B	In Ontario, the bank swallow breeds in a variety of natural and anthropogenic habitats, including lake bluffs, stream and river banks, sand and gravel pits, and roadcuts. Nests are generally built in a vertical or near-vertical bank. Breeding sites are typically located near open foraging sites such as rivers, lakes, grasslands, agricultural fields, wetlands and riparian woods. Forested areas are generally avoided (Garrison 1999).	Low There are no steep banks or river valleys in the study area to provide suitable nesting habitat.
Barn swallow	*Hirundo rustica*	THR	THR	THR	S4B	In Ontario, barn swallow breeds in areas that contain a suitable nesting structure, open areas for foraging, and a body of water. This species nests in human made structures including barns, buildings, sheds, bridges, and culverts. Preferred foraging habitat includes grassy fields, pastures, agricultural cropland, lake and river shorelines, cleared right-of-ways, and wetlands (COSEWIC 2011). Mud nests are fastened to vertical walls or built on a ledge underneath an overhang. Suitable nests from previous years are reused (Brown and Brown 1999).	High Individuals were observed in the study area during targeted field surveys.

Common Name	Scientific Name	Species At Risk Act (Sch 1)[1]	Endangered Species Act[2]	COSEWIC[3]	Provincial (SRank)[4]	Habitat Requirements[5]	Potential to Occur in the Study Area
Black tern	*Chlidonias niger*	—	SC	NAR	S3B	In Ontario, black tern breeds in freshwater marshlands where it forms small colonies. It prefers marshes or marsh complexes greater than 20 ha in area and which are not surrounded by wooded area. Black terns are sensitive to the presence of agricultural activities. The black tern nests in wetlands with an even combination of open water and emergent vegetation, and still waters of 0.5-1.2 m deep. Preferred nest sites have short dense vegetation or tall sparse vegetation often consisting of cattails, bulrushes and occasionally burreed or other marshland plants. Black terns also require posts or snags for perching (Weseloh 2007).	Low No suitable marsh wetland habitat in the study area.
Bobolink	*Dolichonyx oryzivorus*	THR	THR	THR	S4B	In Ontario, bobolink breeds in grasslands or graminoid dominated hayfields with tall vegetation (Gabhauer 2007). Bobolink prefers grassland habitat with a forb component and a moderate litter layer. They have low tolerance for presence of woody vegetation and are sensitive to frequent mowing within the breeding season. They are most abundant in established, but regularly maintained, hayfields, but also breed in lightly grazed pastures, old or fallow fields, cultural meadows and newly planted hayfields. Their nest is woven from grasses and forbs. It is built on the ground, in dense vegetation, usually under the cover of one or more forbs (Martin and Gavin 1995).	Low No suitable large, open grassland habitat in the study area.
Canada warbler	*Cardellina canadensis*	THR	SC	THR	S4B	In Ontario, breeding habitat for Canada warbler consists of moist mixed forests with a well-developed shrubby understory. This includes low-lying areas such as cedar and alder swamps, and riparian thickets (McLaren 2007). It is also found in densely vegetated regenerating forest openings. Suitable habitat often contains a developed moss layer and an uneven forest floor. Nests are well concealed on or near the ground in dense shrub or fern cover, often in stumps, fallen logs, overhanging stream banks or mossy hummocks (Reitsma et al. 2010).	Low No suitable woodland habitat in the study area.
Chimney swift	*Chaetura pelagica*	THR	THR	THR	S4B, S4N	In Ontario, chimney swift breeding habitat is varied and includes urban, suburban, rural and wooded sites. They are most commonly associated with towns and cities with large concentrations of chimneys. Preferred nesting sites are dark, sheltered spots with a vertical surface to which the bird can grip. Unused chimneys are the primary nesting and roosting structure, but other anthropogenic structures and large diameter cavity trees are also used (COSEWIC 2007).	Low There are no suitable chimney structures or large-diameter cavity trees within the study area to provide nesting habitat.
Common nighthawk	*Chordeiles minor*	THR	SC	THR	S4B	These aerial foragers require areas with large open habitat. This includes farmland, open woodlands, clearcuts, burns, rock outcrops, alvars, bog ferns, prairies, gravel pits and gravel rooftops in cities (Sandilands 2007)	Low The majority of open habitat in the study area is maintained (i.e. parks, lawns), and likely too disturbed to provide suitable habitat.
Eastern meadowlark	*Sturnella magna*	THR	THR	THR	S4B	In Ontario, the eastern meadowlark breeds in pastures, hayfields, meadows and old fields. Eastern meadowlark prefers moderately tall grasslands with abundant litter cover, high grass proportion, and a forb component (Hull 2003). They prefer well drained sites or slopes, and sites with different cover layers (Roseberry and Klimstra 1970)	Low There is no large, open grassland habitat in the study area.

Common Name	Scientific Name	Species At Risk Act (Sch 1)[1]	Endangered Species Act[2]	COSEWIC[3]	Provincial (SRank)[4]	Habitat Requirements[5]	Potential to Occur in the Study Area
Eastern wood-pewee	*Contopus virens*	SC	SC	SC	S4B	In Ontario, the eastern wood-pewee inhabits a wide variety of wooded upland and lowland habitats, including deciduous, coniferous, or mixed forests. It occurs most frequently in forests with some degree of openness. Intermediate-aged forests with a relatively sparse midstory are preferred. In younger forests having a relatively dense midstory, it tends to inhabit the edges. Also occurs in anthropogenic habitats providing an open forested aspect such as parks and suburban neighborhoods. Nest is constructed atop a horizontal branch, 1-2 m above the ground, in a wide variety of deciduous and coniferous trees.	Low Although the parkland and other treed areas in the study area may be suitable for nesting, no individuals were observed in the study area during field surveys.
Grasshopper sparrow *pratensis* subspecies	*Ammodramus savannarum* (*pratensis* subspecies)	SC	SC	SC	S4B	In Ontario, grasshopper sparrow is found in medium to large grasslands with low herbaceous cover and few shrubs. It also uses a wide variety of agricultural fields, including cereal crops and pastures. Close-grazed pastures and limestone plains (e.g. Carden and Napanee Plains) support highest density of this bird in the province (COSEWIC 2013).	Low There is no large, open grassland habitat in the study area.
Henslow's sparrow	*Ammodramus henslowii*	END	END	END	SHB	In Ontario, Henslow's sparrow breeds in large grasslands with low disturbance, such as lightly grazed and ungrazed pastures, fallow hayfields, grassy swales in open farmland, and wet meadows. Preferred habitat contains tall, dense grass cover, typically over 30 cm high, with a high percentage of ground cover, and a thick mat of dead plant material. Henslow's sparrow generally avoids areas with emergent woody shrubs or trees, and fence lines. Areas of standing water or ephemerally wet patches appear to be important. This species breeds more frequently in patches of habitat greater than 30 ha and preferably greater than 100 ha (COSEWIC 2011).	Low There is no large, open grassland habitat in the study area.
Least bittern	*Ixobrychus exilis*	THR	THR	THR	S4B	In Ontario, the least bittern breeds in marshes, usually greater than 5 ha, with emergent vegetation, relatively stable water levels and areas of open water. Preferred habitat has water less than 1 m deep (usually 10 – 50 cm). Nests are built in tall stands of dense emergent or woody vegetation (Woodliffe 2007). Clarity of water is important as siltation, turbidity, or excessive eutrophication hinders foraging efficiency (COSEWIC 2009).	Low There is no suitable marsh wetland habitat in the study area.
Loggerhead shrike	*Lanius ludovicianus (migrans subsp)*	END	END	END	S2B	In Ontario, the loggerhead shrike breeds in open country habitat characterized by short grasses with scattered shrubs or low trees. Unimproved pasture containing scattered hawthorns (*Crataegus* spp.) on shallow soils over limestone bedrock is the preferred habitat. Preferred nest sites include isolated hawthorns or red cedar. Males defend large territories of approximately 50 ha (Chabot 2007)	Low There is no large, open grassland habitat in the study area.
Peregrine falcon (*anatum* subspecies)	*Falco peregrinus anatum*	SC	SC	SC	S3B	In Ontario, peregrine falcon breeds in areas containing suitable nesting locations and sufficient prey resources. Such habitat includes both natural locations containing cliff faces (heights of 50 - 200 m preferred) and also anthropogenic landscapes including urban centres containing tall buildings, open pit mines and quarries, and road cuts. Peregrine falcons nest on cliff ledges and crevices and building ledges. Nests consist of a simple scrape in the substrate (COSEWIC 2007).	Low There are no large cliffs or tall buildings in the study area to provide suitable nesting habitat.

Common Name	Scientific Name	Species At Risk Act (Sch 1)[1]	Endangered Species Act[2]	COSEWIC[3]	Provincial (SRank)[4]	Habitat Requirements[5]	Potential to Occur in the Study Area
Red-headed woodpecker	*Melanerpes erythrocephalus*	THR	SC	THR	S4B	In Ontario, the red-headed woodpecker breeds in open, deciduous woodlands or woodland edges and are often found in parks, cemeteries, golf courses, orchards and savannahs (Woodliffe 2007). They may also breed in forest clearings or open agricultural areas provided that large trees are available for nesting. They prefer forests with little or no understory vegetation. They are often associated with beech or oak forests, beaver ponds and swamp forests where snags are numerous. Nests are excavated in the trunks of large dead trees (Smith et al. 2000).	Low Although suitable open treed areas occur in residential areas and parks in the study area, there were few large, dead trees observed to provide nesting and perching sites. In addition, no individuals were observed during field surveys.
Short-eared owl	*Asio flammeus*	SC	SC	SC	S2N,S4B	In Ontario, the short-eared owl breeds in a variety of open habitats including grasslands, tundra, bogs, marshes, clearcuts, burns, pastures and occasionally agricultural fields. The primary factor in determining breeding habitat is proximity to small mammal prey resources (COSEWIC 2008). Nests are built on the ground at a dry site and usually adjacent to a clump of tall vegetation used for cover and concealment (Gahbauer 2007).	Low There is no large, open grassland habitat in the study area.
Wood thrush	*Hylocichla mustelina*	THR	SC	THR	S4B	In Ontario, wood thrush breeds in moist, deciduous hardwood or mixed stands that are often previously disturbed, with a dense deciduous undergrowth and with tall trees for singing perches. This species selects nesting sites with the following characteristics: lower elevations with trees less than16 m in height, a closed canopy cover (>70 %), a high variety of deciduous tree species, moderate subcanopy and shrub density, shade, fairly open forest floor, moist soil, and decaying leaf litter (COSEWIC 2012).	Low The treed areas in the study area are likely too small and open to provide suitable habitat for this species.
Yellow-breasted chat	*Icteria virens virens*	END	END	END	S2B	In Ontario, yellow-breasted chat breeds in early successional, shrub-thicket habitats including woodland edges, regenerating old fields, railway and hydro right-of-ways, young coniferous reforestations, and wet thickets bordering wetlands. Tangles of grape (*Vitis* spp.) and raspberry (*Rubus* spp.) vines are features of most breeding sites. There is some evidence that the yellow-breasted chat is an area sensitive species. Nests are located in dense shrubbery near to the ground (COSEWIC 2011).	Low There is no suitable shrub land or successional habitat in the study area to provide nesting habitat. In addition, there are no recent occurrence records in the area.
American eel	*Anguilla rostrata*	—	END	THR	S1?	In Ontario, the American eel is native to the Lake Ontario, St. Lawrence River and Ottawa River watersheds. Their current distribution includes lakes Huron, Erie, and Superior and their tributaries. The Ottawa River population is considered extirpated. The preferred habitat of the American eel is cool water of lakes and streams with muddy or silty substrates in water temperatures between 16 and 19°C. The American eel is a catadromous fish that lives in fresh water until sexual maturity then migrates to the Sargasso Sea to spawn (Eakins 2012; Burridge et al. 2010).	Low The watercourses in the study area are too small to support American eel.
Lake sturgeon - Great Lakes / upper St. Lawrence Population	*Acipenser fulvescens*	—	THR	THR	S2	In Ontario, the lake sturgeon, a large prehistoric freshwater fish, is found in all the Great Lakes and in all drainages of the Great Lakes and of Hudson Bay. This species typically inhabits highly productive shoal areas of large lakes and rivers. They are bottom dwellers, and prefer depths between 5-10 m and mud or gravel substrates. Small sturgeons are often found on gravelly shoals near the mouths of rivers. They spawn in depths of 0.5 to 4.5 m in areas of swift water or rapids. Where suitable spawning rivers are not available, such as in the lower Great Lakes, they are known to spawn in wave action over rocky ledges or around rocky islands (Golder Associates Ltd. 2011).	Low The watercourses in the study area are too small to support lake sturgeon.

Common Name	Scientific Name	Species At Risk Act (Sch 1)[1]	Endangered Species Act[2]	COSEWIC[3]	Provincial (SRank)[4]	Habitat Requirements[5]	Potential to Occur in the Study Area
Redside dace	*Clinostomus elongatus*	—	END	END	S2	In Ontario, the redside dace, a small coolwater species common in the USA but less so in Canada, is found in tributaries of western Lake Ontario, Lake Erie, Lake Huron and Lake Simcoe. They are found in pools and slow-moving areas of small headwater streams with clear to turbid water. Overhanging grasses, shrubs, and undercut banks, are an important part of their habitat, as are instream boulders and large woody debris. Preferred substrates are variable and include silt, sand, gravel and boulders. Spawning occurs in shallow riffle areas (Redside Dace Recovery Team 2010).	Low Although Berczy Creek is identified as a reach with recovery or occupied habitat for redside dace, it is located east of the site, and outside of the study area.
Eastern cougar	*Puma concolor couguar*	—	END	DD	SU	This species historically inhabited extensive forested areas in Ontario. It is found in habitats suitable for white-tailed deer and mule deer, which are the preferred prey of the cougar. Dense cover is considered the key habitat feature for cougar. An average home range for males is 300 square kilometers, and for females, 150 square kilometers (Environment Canada and Canadian Wildlife Federation 2013).	Low The overall study area is too developed and fragmented from a larger region of forest to provide suitable habitat.
Gray fox	*Urocyon cinereoargenteus*	THR	THR	THR	S1	While the Ontario range of this species extends across much of southern and southeastern Ontario, the only known population in the province is on Pelee Island, with very rare sightings elsewhere in the province at points close to the border with the United States. This species inhabits deciduous forests and marshes, and will den in a variety of features including rock outcroppings, hollow trees, burrows or brush piles, usually where dense brush provides cover and in close proximity to water. This species is considered a habitat generalist (COSEWIC 2002).	Low This species is only recently known to occur on Pelee Island.
Eastern small-footed myotis	*Myotis leibii*	—	END	—	S2S3	This species is not known to roost within trees, but there is very little known about its roosting habits. The species generally roosts on the ground under rocks, in rock crevices, talus slopes and rock piles. It occasionally inhabits buildings. Areas near the entrances of caves or abandoned mines may be used for hibernaculum, where the conditions are drafty with low humidity, and may be subfreezing.	Low There is no suitable roosting habitat, such as rock piles or talus slopes, as most of the ground in the study area is developed or maintained for parks, etc.
Little brown myotis	*Myotis lucifugus*	END	END	END	S4	In Ontario, this species range is extensive and covers much of the province. It will roost in both natural and man-made structures. They require a number of large dead trees, in specific stages of decay and that project above the canopy in relatively open areas. May form nursery colonies in the attics of buildings within 1 km of water. Caves or abandoned mines may be used for hibernaculum, but high humidity and stable above freezing temperatures are required.	Low Few large diameter cavity trees were recorded in the study area during field surveys. Some large trees occur along the street edge, but these are typically managed for safety and aesthetic value and lack the preferred characteristics. Individuals that may roost in attics or barns in the general area may forage over the storm water ponds in the study area.
Tri-colored bat	*Perimyotis subflavus*	END	END	END	S3?	In Ontario, tri-colored bat may roost in foliage, in clumps of old leaves, hanging moss or squirrel nests. They are occasionally found in buildings although there are no records of this in Canada. They typically feed over aquatic areas with an affinity to large-bodied water and will likely roost in close proximity to these. Hibernation sites are found deep within caves or mines in areas of relatively warm temperatures. These bats have strong roost fidelity to their winter hibernation sites and may choose the exact same spot in a cave or mine from year to year.	Low Few large diameter cavity trees were recorded in the study area during field surveys. Some large trees occur along the street edge, but these are typically managed for safety and aesthetic value and lack the preferred characteristics. Individuals that may roost in attics or barns in the general area may forage over the storm water ponds in the study area.

Common Name	Scientific Name	Species At Risk Act (Sch 1)[1]	Endangered Species Act[2]	COSEWIC[3]	Provincial (SRank)[4]	Habitat Requirements[5]	Potential to Occur in the Study Area
Northern myotis	*Myotis septentrionalis*	END	END	END	S3	In Ontario, this species range is extensive and covers much of the province. It will usually roost in hollows, crevices, and under loose bark of mature trees. Roosts may be established in the main trunk or a large branch of either living or dead trees. Caves or abandoned mines may be used for hibernaculum, but high humidity and stable above freezing temperatures are required.	Low Few large diameter cavity trees were recorded in the study area during field surveys. Some large trees occur along the street edge, but these are typically managed for safety and aesthetic value and lack the preferred characteristics. Individuals that may roost in attics or barns in the general area may forage over the storm water ponds in the study area.
Blanding's turtle - Great Lakes / St. Lawrence population	*Emydoidea blandingii*	THR	THR	END	S3	In Ontario, Blanding's turtle will use a range of aquatic habitats, but favor those with shallow, standing or slow-moving water, rich nutrient levels, organic substrates and abundant aquatic vegetation. They will use rivers, but prefer slow-moving currents and are likely only transients in this type of habitat. This species is known to travel great distances over land in the spring in order to reach nesting sites, which can include dry conifer or mixed forests, partially vegetated fields, and roadsides. Suitable nesting substrates include organic soils, sands, gravel and cobble. They hibernate underwater and infrequently under debris close to water bodies (COSEWIC 2005).	Low The watercourses and stormwater ponds in the study area are unlikely to provide suitable aquatic habitat.
Eastern ribbonsnake - Great Lakes population	*Thamnophis sauritius*	SC	SC	SC	S4	In Ontario, eastern ribbonsnake is semi-aquatic, and is rarely found far from shallow ponds, marshes, bogs, streams or swamps bordered by dense vegetation. They prefer sunny locations and bask in low shrub branches. Hibernation occurs in mammal burrows, rock fissures or even ant mounds (COSEWIC 2012).	Low - Moderate Wetland habitat and the riparian zone along the tributary in the study area may provide suitable habitat.
Milksnake	*Lampropeltis triangulum*	SC	NAR	SC	S4	In Ontario, milksnake uses a wide range of habitats including prairies, pastures, hayfields, wetlands and various forest types, and is well-known in rural areas where it frequents older buildings. Proximity to water and cover enhances habitat suitability. Hibernation takes place in mammal burrows, hollow logs, gravel or soil banks, and old foundations (COSEWIC 2014).	Low Although naturalized areas, including the tributaries and wetland, may provide suitable habitat for milksnake, there are no recent occurrence records in the area.
Northern map turtle	*Graptemys geographica*	SC	SC	SC	S3	In Ontario, the northern map turtle prefers large waterbodies with slow-moving currents, soft substrates, and abundant aquatic vegetation. Ideal stretches of shoreline contain suitable basking sites, such as rocks and logs. Along Lakes Erie and Ontario, this species occurs in marsh habitat and undeveloped shorelines. It is also found in small to large rivers with slow to moderate flow. Hibernation takes place in soft substrates under deep water (COSEWIC 2012).	Low The study area lacks a large, interconnected system of watercourses and waterbodies to provide suitable habitat.
Snapping turtle	*Chelydra serpentina*	SC	SC	SC	S3	In Ontario, snapping turtle utilizes a wide range of waterbodies, but shows preference for areas with shallow, slow-moving water, soft substrates and dense aquatic vegetation. Hibernation takes place in soft substrates under water. Nesting sites consist of sand or gravel banks along waterways or roadways (COSEWIC 2008).	Moderate Potential habitat may occur in Carlton Creek and the storm water ponds in the study area.
Stinkpot or Eastern musk turtle	*Sternotherus odoratus*	THR	SC	SC	S3	In Ontario, eastern musk turtle is very rarely out of water and prefers permanent bodies of water that are shallow and clear, with little or no current and soft substrates with abundant organic materials. Abundant floating and submerged vegetation is preferred. Hibernation occurs in soft substrates under water. Eggs are sometimes laid on open ground, or in shallow nests in decaying vegetation, shallow gravel or rock crevices (COSEWIC 2012).	Low The storm water management ponds in the study area are unlikely to provide suitable habitat for this species. In addition, there are no recent occurrence records.

Common Name	Scientific Name	Species At Risk Act (Sch 1)[1]	Endangered Species Act[2]	COSEWIC[3]	Provincial (SRank)[4]	Habitat Requirements[5]	Potential to Occur in the Study Area
American ginseng	*Panax quinquefolius*	END	END	END	S2	In Ontario, American ginseng is found in moist, undisturbed and relatively mature deciduous woods often dominated by sugar maple. It is commonly found on well-drained, south-facing slopes. American ginseng grows under closed canopies in neutral, loamy soils (COSEWIC 2000).	Low There is no suitable, undisturbed forest habitat in the study area.
Butternut	*Juglans cinerea*	END	END	END	S2?	In Ontario, butternut is found along stream banks, on wooded valley slopes, and in deciduous and mixed forests. It is commonly associated with beech, maple, oak and hickory (Voss and Reznicek 2012). Butternut prefers moist, fertile, well-drained soils, but can also be found in rocky limestone soils. This species is shade intolerant (Farrar 1995).	Low Although there are recent occurrence record in the vicinity of the study area, no individuals were recorded during field surveys.

[1] *Species at Risk Act* (SARA), 2002. Schedule 1 (Last amended 02 Nov 2017); Part 1 (Extirpated), Part 2 (Endangered), Part 3 (Threatened), Part 4 (Special Concern)

[2] *Endangered Species Act* (ESA), 2007 (O.Reg 242/08 last amended 27 March 2018 as O.Reg 219/18). Species at Risk in Ontario List, 2007 (O.Reg 230/08 last amended 2 June 2017 as O. Reg 167/17, s. 1.); Schedule 1 (Extirpated - EXP), Schedule 2 (Endangered - END), Schedule 3 (Threatened - THR), Schedule 4 (Special Concern - SC)

[3] Committee on the Status of Endangered Wildlife in Canada (COSEWIC) http://www.cosewic.gc.ca/

[4] Provincial Ranks (SRANK) are Rarity Ranks assigned to a species or ecological communities, by the Natural Heritage Information Centre (NHIC). These ranks are not legal designations. SRANKS are evaluated by NHIC on a continual basis and updated lists produced annually. SX (Presumed Extirpated), SH (Possibly Extirpated - Historical), S1 (Critically Imperiled), S2 (Imperiled), S3 (Vulnerable), S4 (Apparently Secure), S5 (Secure), SNA (Not Applicable), S#S# (Range Rank), S? (Not ranked yet), SAB (Breeding Accident), SAN (Non-breeding Accident), SX (Apparently Extirpated). Last assessed November 2017.

[5] General References:

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APPENDIX B

Vascular Plant List

Vascular Pant List

Scientific Name[a]	Common Name[b]	Origin[b]	Status[b]	G Rank[c]	S Rank[c]
Trees (12 taxa)					
Acer saccharinum	Silver maple	N	—	G5	S5
Aesculus hippocastanum	Horse-chestnut	I	—	GNR	SNA
Fraxinus pennsylvanica	Green ash	N	—	G5	S5
Gleditsia triacanthos	Honey locust	(N)	—	G5	S2
Gymnocladus dioicus	Kentucky coffee-tree	N	THR	G5	S2
Picea glauca	White spruce	N	—	G5	S5
Pinus sylvestris	Scots pine	I	—	GNR	SNA
Quercus macrocarpa	Bur oak	N	—	G5	S5
Quercus rubra	Red oak	N	—	G5	S5
Salix alba	White willow	I	—	G5TNR	SU
Salix babylonica	Weeping willow	I	—	—	—
Salix x *fragilis*	Crack willow	I	—	GNR	SNA
Small trees, shrubs and woody vines (4 taxa)					
Crataegus sp.	Hawthorn	N	—	—	—
Physocarpus opulifolius	Ninebark	N	—	G5	S5
Rhus typhina	Staghorn sumac	N	—	G5	S5
Vitis riparia	Riverbank grape	N	—	G5	S5
Graminoids (2 taxa)					
Bromus inermis	Smooth brome	I	—	GNR	SNA
Phragmites australis	Common reed	N	—	G5	S5
Forbs (7 taxa)					
Centaurea nigrescens	Knapweed	I	—	GNR	SNA
Cirsium arvense	Canada thistle	I	—	GNR	SNA
Conyza canadensis	Horseweed	N	—	G5	S5
Daucus carota	Wild carrot	I	—	GNR	SNA
Solidago canadensis	Canada goldenrod	N	—	G5T5	S5
Solidago sp.	Goldenrod sp.	N	—	—	—
Verbascum thapsus	Common mullein	I	—	GNR	SNA

APPENDIX C

Wildlife List

Wildlfie List

Common Name	Scientific Name	SRANK[1]	GRANK[2]	ESA[3]
Birds				
American Crow	*Corvus brachyrhynchos*	S5B	G5	—
American Goldfinch	*Carduelis tristis*	S5B	G5	—
American Robin	*Turdus migratorius*	S5B	G5	—
Barn Swallow	*Hirundo rustica*	S4B	G5	THR
Black-capped Chickadee	*Poecile atricapilla*	S5	G5	—
Brown-headed Cowbird	*Molothrus ater*	S4B	G5	—
Canada Goose	*Branta canadensis*	S5	G5	—
Cedar Waxwing	*Bombycilla cedrorum*	S5B	G5	—
Common Loon	*Gavia immer*	S5B, S5N	G5	—
Downy Woodpecker	*Picoides pubescens*	S5	G5	—
European Starling	*Sturnus vulgaris*	SNA	G5	—
Mourning Dove	*Zenaida macroura*	S5	G5	—
Northern Cardinal	*Cardinalis cardinalis*	S5	G5	—
Rock Pigeon	*Columba livia*	SNA	G5	—
Red-winged Blackbird	*Agelaius phoeniceus*	S4	G5	—
Song Sparrow	*Melospiza melodia*	S5B	G5	—
Tree Swallow	*Tachycineta bicolor*	S4B	G5	—
Amphibians				
Gray Treefrog	*Hyla versicolor*	S5	G5	—

Notes

[1] Provincial Ranks (SRANK) are Rarity Ranks assigned to a species or ecological communities, by the Natural Heritage Information Centre (NHIC). These ranks are not legal designations. SRANKS are evaluated by NHIC on a continual basis and updated lists produced annually. SX (Presumed Extirpated), SH (Possibly Extirpated - Historical), S1 (Critically Imperiled), S2 (Imperiled), S3 (Vulnerable), S4 (Apparently Secure), S5 (Secure), SNA (Not Applicable), S#S# (Range Rank), S? (Not ranked yet), SAB (Breeding Accident), SAN (Non-breeding Accident), SX (Apparently Extirpated). Last assessed August 2011.

[2] Global Ranks (GRANK) are Rarity Ranks assigned to a species based on their range-wide status. GRANKS are assigned by a group of consensus of Conservation Data Centres (CDCs), scientific experts and the Nature Conservancy. These ranks are not legal designations. G1 (Extreemly Rare), G2 (Very Rare), G3 (Rare to uncommon), G4 (Common), G5 (Very Common), GH (Historic, no record in last 20yrs), GU (Status uncertain), GX (Globally extinct), ? (Inexact number rank), G? (Unranked), Q (Questionable), T (rank applies to subspecies or variety). Last assessed August 2011

[3] *Endangered Species Act* (ESA), 2007 (O.Reg 242/08 last amended 14 Sept 2016 as O.Reg 308/16). Species at Risk in Ontario List, 2007 (O.Reg 230/08 last amended 2 June 2017 as O. Reg 167/17, s. 1.); Schedule 1 (Extirpated - EXP), Schedule 2 (Endangered - END), Schedule 3 (Threatened - THR), Schedule 4 (Special Concern - SC)

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