THORNY BRAE PLACE, MISSISSAUGA, ON

RESIDENTIAL RE-DEVELOPMENT

SCOPED ENVIRONMENTAL IMPACT STUDY


Prepared for:

2462357 Ontario Inc. (Pace Developments)

Prepared By:

WSP Canada Group Ltd.
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1.0 INTRODUCTION

1.1 Study Overview and Context

WSP Canada Group Ltd. (formerly MMM Group Limited) has been retained by Pace Developments (2462357 Ontario Inc.) to complete a Scoped Environmental Impact Study (EIS) for two proposed developments: 1) a proposed residential re-development at 1745, 1765, and 1775 Thorny Brae Place in Mississauga, Ontario (the “subject property”; aka “The Hazel”); and 2) a stormwater management (SWM) outlet that will accept flows from the subject property and neighbouring properties to the south (the Church of Croatian Martyrs and “The Archways”).

A Scoped EIS in support of the SWM outlet was submitted in March 2017, as part of application (T-09/002; hereafter referred to as the "SWM Outlet" application). That report addressed item 2: the SWM outlet that will accept flows from the subject property and neighbouring properties to the south. The current report addresses the residential re-development and builds on the previous submission, with consideration of agency comments received to date.

The subject property encompasses approximately 2.1ha and is bounded by Mississauga Road to the west, Eglington Avenue West to the north, the Church of Croatian Martyrs to the south and Natural Hazard Lands associated with the Credit River Valley to the east (see attached Figure 1). A portion of the subject property is located within the valley system and regulatory floodplain of the Credit River. A portion of the subject property at the Credit River is within the City of Mississauga and Region of Peel natural heritage systems. The subject property is dominated by a former farmstead and abandoned residential lands adjacent to a forested slope of the Credit River Valley. The adjacent forested valley is comprised of a mosaic of remnant and anthropogenically influenced vegetation (e.g., deciduous forest, cultural meadow).

An EIS is required under the Region of Peel Official Plan, POP (1996; December 2016) and the City of Mississauga Official Plan, MOP (2018) when development is proposed on lands adjacent to the *Greenlands System* and/or *Significant Natural Area* to demonstrate that any negative impacts can be avoided. Negative impacts that cannot be avoided will be mitigated through restoration and enhancement, to the greatest extent possible. This report summarizes findings of the natural heritage assessment of the subject property, including: a review of existing background information; results of field surveys to characterize existing ecological conditions; evaluation of the sensitivity and significance of the natural features in the subject property; review and assessment of natural heritage policy; and proposed development details. Impacts on the identified natural features and functions as a result of the proposed development are presented along with recommendations for mitigation measures to eliminate or reduce the potential impacts. Recommendations for ecological restoration and enhancements are also provided.

Scope of work for the current study has been determined through an agency-approved Terms of Reference (TOR), included in Appendix A.

1.2 Planning History / Background

The site has some planning history, with re-development contemplated from the mid-2000s by previous owners. As part of that process, a number of technical studies and points of agency contact were undertaken, as listed in Section 3.1.

In addition, the subject property and a nearby site (the "Archways", 4583-4601 Mississauga Road), south of the church property, are proposed to share a stormwater management (SWM) outlet location at an existing outlet on the subject property (see Figure 2). Some work and agency liaison has occurred in 2015, 2016 and 2017 in relation to that proposal and for the current lands, as follows:

- Site walk with City and CVC staff on December 14, 2015
- Preparation of a Scoped EIS Draft TOR for the SWM Headwall and Outfall (MMM 2015), submitted to City and CVC on December 10, 2015 (via email)
- Preparation of a Tree Inventory Plan (BTI, January 2016, updated March 6, 2019)
- A Report to 2462357 Ontario Inc. A Soil Investigation for Proposed Residential Development. 1745, 1765 and 1775 Thorny Brae Place, City of Mississauga (Oct. 2016)
- Stormwater Management Design Brief, The Archways and Hazel Common Element Condominium. 4583, 4589 and 4601 Mississauga Road, City of Mississauga (Cole Engineering; December 13, 2016; Revised June 29, 2017)
- Comments from CVC in a letter dated February 2, 2016
- Preparation of an EIS Draft TOR for the proposed residential re-development at the subject property (MMM 2016) submitted to City and CVC on May 24, 2016 (via email)
- Comments from CVC via an email dated June 27, 2016.
- Comments from CVC via an email dated November 23, 2017
- Site walk with City and CVC staff on July 17, 2018

1.3 Existing Natural Heritage Features

1.3.1 Aquatic Resources

The Credit River forms the eastern boundary of the subject property. This reach of the Credit River is classified as a warmwater watercourse (Land Information Ontario (LIO) database, 2011). An existing stormwater outlet / headwall, currently draining stormwater from the church property, is located within the *Natural Hazard Lands* on the valley slope, approximately 50 m linear distance from the Credit River and at an elevation of 19 m above the High Water Mark. Discharge from the outlet is conveyed to the Credit River via a narrow drainage feature with barriers to fish migration from the river; hence, the drainage feature represents indirect fish habitat, contributing to a downstream fish-bearing watercourse (Credit River).

There is a small, ephemeral un-named tributary that conveys surface flows across a portion of the subject property, via a culvert under the Thorny Brae Place, discharging to a ravine to the southeast (where the existing SWM outlet is present further downslope). This feature, which is dry except during rain or snow melt events, is discussed in Sections 4.1 and 4.2.

1.3.2 Terrestrial Resources

The majority of the subject property is comprised of abandoned residential / former farmstead lands. A portion of the subject property is located within the valley system and regulatory floodplain of the Credit River and the lands to the east are designated as *Natural Hazard Lands* in the MOP (2017). The east portion of the subject property has natural heritage and/or open space designations under the Region and City Official Plans. Refer to Sections 5 and 6 for details.

Vegetation on the subject property has a history of anthropogenic influence / disturbance; it includes cultural habitats around the existing residences, successional meadow / thicket on the tablelands, and forested habitat types on and adjacent to the steep valley slope and the un-named tributary ravine (the only remnant or relatively undisturbed vegetation on the property).

2.0 POLICY AND PLANNING FRAMEWORK

This EIS is being undertaken in accordance with relevant federal and provincial policies and guidelines, as well as those of the City of Mississauga, Region of Peel and CVC.

Additional relevant planning legislation and policy pertinent to this study are listed below and discussed in further detail in Section 6.0 Policy Review and Assessment.

- Federal:
  - Fisheries Act (1985)
  - Migratory Birds Convention Act (1994)
  - Species at Risk Act, SARA (2002)
- Provincial:
  - Endangered Species Act, ESA (2007)
  - Provincial Policy Statement (2014)
- Regional/Municipal
  - Region of Peel Official Plan (December 2016 Office Consolidation)
  - City of Mississauga Official Plan (2018 Office Consolidation)
- CVC Regulation 160/06 (2013) and Watershed Planning and Regulation Policies (2010)

3.0 STUDY APPROACH

This report relies on field studies conducted on the subject property in 2015 and 2016 and a review of background information and relevant policy. A summary of the field methodology and results of those surveys are provided in Section 4.0. Policies pertinent to this study are listed discussed in further detail in Section 6.0: Policy Review and Assessment.

3.1 Background Review

As part of the current EIS, MMM initiated agency consultation and reviewed relevant background material to provide a focus to field investigations and ensure compliance with regulations and policy. Available resources were reviewed and updated in support of the current study.

Specifically, the following sources of information were reviewed to supplement and provide context for field investigations:

- Ministry of Natural Resources and Forestry (MNRF):
- Natural Heritage Information Centre (NHIC) Biodiversity Explorer database and mapping
- Land Information Ontario (LIO)
- Species at Risk (SAR) Website

- Topographic mapping and aerial photography
- Region of Peel Official Plan (Dec. 2016 Office Consolidation)
- City of Mississauga Official Plan (Aug. 2017 Office Consolidation)
- Existing technical reports:
    - Scoped Environmental Impact Study for Thorny Brae Place, Part of Lot 3 & 4, Range 5 (N. of Dundas Street), Mississauga, Ontario (Dougan & Associates, 2009).
    - Slope Stability Study (McClymont and Rak Engineering Inc. February 2009)
    - Slope Stability Study Addendum (Soil Engineers Ltd. Dec. 2016)
    - Slope Stability Study Revised Addendum (Soil Engineers Ltd. March 2019)
    - Top of Bank, as delineated by Credit Valley Conservation (CVC) in 2004 and shown on the drawing prepared by Schaeffer Dzaldov Bennett Ltd., dated July 21, 2015.
    - Thorny Brae Place, Mississauga, ON. Scoped Environmental Impact Study for SWM Outlet (MMM Group; March 2017)
    - Thorny Brae Place, Mississauga, ON. Residential Re-Development. Scoped Environmental Impact Study (WSP; December 2017)
    - *Draft* Thorny Brae Woodland Enhancement Strategy (WSP; November 6, 2018)
    - Restoration Landscape Plan (Budrevics, January 12, 2018)
    - 2462357 Ontario Inc.(Pace Developments). Functional Servicing Report. The Hazel, City of Mississauga, UD15-0682 (Cole Engineering, March 2019)
- Background and other data sources are also listed in the References section of this report.

3.2 Field Surveys

An overview of field work to date is provided below. For a detailed summary of all ecological field surveys undertaken, see the Field Survey Chronology provided in Appendix B. Methodologies and results for all field surveys are provided in detail in Section 4.0.

Vegetation

- Botanical Inventory and Floristic Analysis
- Vegetation community classification and description
- Butternut Health Assessment (BHA) – Report #: 602-002
- Woodland Delineation / Site Walk

Wildlife

- Avifaunal surveys (breeding bird surveys)
- General Wildlife
- Significant Wildlife Habitat Assessment

Aquatic Resources

- Aquatic habitat characterization in drainage feature
- Headwater Drainage Feature (HDF) Assessment upstream of headwall outlet.

Species at Risk

- Species at Risk (SAR) habitat screening analysis
- Cavity Tree Survey (SAR bat habitat assessment)

3.3 Agency Liaison

As part of the EIS for the SWM Headwall and Outfall, CVC was provided with a draft Terms of Reference on December 10, 2015 (via email) which outlined the proposed scope of work (see Appendix A). Comments from CVC were received in a letter dated February 2, 2016.

As part of the EIS for the proposed residential re-development at the subject property, CVC was provided with a draft Terms of Reference on May 24, 2016 (via email) which outlined the proposed scope of work (see Appendix A). Comments from CVC were received in an email dated June 27, 2016. The City had no comments per correspondence on July 18, 2016.

Site Walks

- Site walk with City and CVC staff on December 14, 2015
- Site walk with MNRF on September 7, 2016; assessment of Butternut
- Site walk with City and CVC staff on July 17, 2018

4.0 EXISTING CONDITIONS

An overview of the subject property and existing natural heritage features are provided in Section 1.0. of this report. The following sections provide additional characterization of the natural features and functions within the subject property.

4.1 Past and Present Land Use

Based on a review of historical aerial photography from 1954 to present, the following key site characteristics are evident:

- 1954: the general area is dominated by agriculture, with a few farmsteads visible, including a home / laneway on the subject property. Several homes are present south of the 'church' property. The subject property is open / non-treed up to the top of valley slope. The unnamed tributary that discharges to the ravine at the southeast property limits is evident as a very small, non-vegetated feature that extends a short distance north of the farmstead laneway. Limits of the forested valley / ravine are generally similar in 1954 through to the present.
- 1966: four residential properties are present on Thorny Brae Place and the farm homestead is still present on the subject property. The remainder (east portion) of the subject property is open / non-treed up to the top of valley slope. The unnamed tributary is not evident north of the lane. Surrounding lands are still agriculture-dominated. Eglinton Avenue is present at the north property limit.
- 1985: the church is present to the south. The subject property shows some evidence of vegetation regeneration in the east portion. The unnamed tributary is not evident. Surrounding lands are still agriculture-dominated.
- 1989: Residential housing is present west of Mississauga Road, north of Eglinton Avenue and east of the Credit River. The subject property is similar, except that the east portion appears to be mostly non-treed. The unnamed tributary is faintly evident.
- 1995: Eglinton Avenue has been widened. The subject property is generally unchanged. The unnamed tributary is not evident.
- 2006: The subject property shows some evidence of early successional regeneration in the east portion, but is mostly non-treed. The unnamed tributary is not evident.

Given the long-standing residential / agricultural use, the subject property has a high degree of anthropogenic disturbance.

Currently, the property is comprised of: a remnant residential area near Mississauga Road (vacant homes; ~ 1/3 of the property area); culturally influenced vegetation on former farmstead areas in the central portion (~ 2/3 of the property area); and a small area comprised of deciduous forest on the Credit River valley and un-named tributary slopes in the east portion.

4.2 Land Use Designations

Currently, the property is designated in the MOP (2017) as follows:

- West portion (~2/3): *Residential Low Density 1*
- East portion (~1/3): *Natural Hazards* (the Credit River valley and un-named tributary ravine up to confirmed Top of Bank); and *Greenlands* (the valley / ravine and a portion of adjacent tableland).

The following designated natural features, shown in Figure 1, are found within (or partially within) the subject property. Some of these features have multiple / overlapping natural environment designations.

- No features designated at the provincial or federal level (e.g., PSW, ANSI etc.)
- CVC Regulated Areas (O. Reg. 160/06)
    - Credit River valley / slopes and adjacent areas
- Region of Peel Official Plan (2016)
    - *Core Areas of the Greenlands System* – Credit River Valley, including the west valley slope on the subject property
- City of Mississauga Official Plan (2017)
    - Tablelands (west):
        - none (residential)
    - Credit River valley and tablelands (east):
        - Schedule 1 (Urban System): *Green System*
        - Schedule 3 (Natural System): *Natural Hazard*
        - Schedule 4 (Parks and Open Spaces): *Public and Private Open Space*
        - Schedule 10 (Land Use Designations): *Greenlands* and *Natural Hazards*
- No lands on the subject property are designated as *Significant Natural Areas and Natural Greenspaces* (per Schedule 3). Lands associated with the Credit River and east floodplain are designated as such.
- City of Mississauga Natural Areas Survey (2014):

- *Significant Natural Site CRR11* (Along the Credit River from Highway 403 to Eglington Avenue West). This feature extends to the west bank of the Credit River in the vicinity of the east property limit and does not include the west valley slope or tablelands on the subject property.

4.3 Vegetation Resources

4.3.1 Approach

A three-season botanical inventory and vegetation assessment were conducted on the subject property and adjacent lands on the following dates:

- October 16, 2015
- October 29, 2015
- May 20, 2016
- June 23, 2016
- Sept 7, 2016 (MNRF Butternut Health Assessment Review)
- July 6, 2018

Refer to the field chronology for additional detail (Appendix B) and Figure 3 for vegetation and floral coverage and results.

The scope of field work and analyses for the current EIS included the following:

- Botanical inventory and analysis, including preparation of a vascular plant species list, and (Table C, Appendix C)
- Plant species status was evaluated using the Plants of the Credit River Watershed (Credit Valley Conservation [CVC] 2002) for regional significance; the NHIC website for provincial rarity ranks (i.e., S-Ranks); the Species at Risk in Ontario list (MNRF; updated periodically) for provincial status designations; and the Canadian Species at Risk list (COSEWIC; updated periodically) for national status designations
- Nomenclature generally follows NatureServe Explorer (2010)
- Analysis of floristics of all inventoried plant species was completed by using their *Coefficient of Conservatism* (CC) and *Coefficient of Wetness* (CW)
- Butternut Health Assessment for one tree located in Veg. Unit 5b. The assessment was completed by a qualified Butternut Health Assessor (BHA # 602) using guidance provided

in the Butternut Health Assessor's Field Guide: 2015 Edition (MNRF, 2015) and Butternut Health Assessment Guidelines: Assessment of Butternut Tree Health for the Purposes of the Endangered Species Act, 2007, Version 2 (MNRF, 2014)

- Classifying, mapping and evaluating vegetation communities within the subject property. Vegetation communities were classified using the Ecological Land Classification for Southern Ontario (ELC) (Lee et al. 1998).
- Vegetation community significance was evaluated using Natural Heritage Resources of Ontario: Vegetation Communities of Southern Ontario (Bakowsky 1996; NHIC website);
- General notes were taken on community health and site disturbance.
- Inventory and health assessment of trees within the subject property (BTI; March 6, 2019). Refer to Appendix J.

4.3.2 Botanical Inventory and Floristic Analysis

In total, 109 vascular plant species were recorded within the subject property. Of these, 5 taxa (*Crataegus*, *Carex*, *Lonicera*, *Poa*, and *Ribes*) were identified to genus only. Of the identified species, 57 (53%) are native and 52 (48%) are non-native.

One species, (Butternut, *Juglans cinerea*), is listed as "S3" (rare to uncommon within the province), and one species (Black Walnut [*Juglans nigra*[1]] listed as "S4", which indicates that this species is uncommon but not rare in the province. All other native species are ranked as "S5" (common and widespread within the province).

Of the 57 native species recorded for which *coefficient of conservatism*[2] (CC) values are provided, CC values range from 0 to 6, with the majority between 4 and 6. Species recorded are as expected for site conditions, consisting of disturbance tolerant and / or early successional species.

Butternut was the only Species at Risk recorded on or adjacent to the subject property (Figure 3).

Three species ranked as regionally *uncommon* (per Varga et.al. 2000) were recorded:

- Allegheny Serviceberry (*Amelanchier laevis*): Unit 5a - one individual
- Wild Cranes'-bill (*Geranium maculatum*): Unit 5a and 5b - occasionally occurring throughout both units.

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1 Some of the trees identified as Black Walnut show leaf length characteristics of Japanese Walnut (*Juglans ailantifolia*)

2 Coefficient of Conservatism: Rank of 0 to 10 based on plants degree of fidelity to a range of synecological parameters: (0-3) Taxa found in a variety of plant communities; (4-6) Taxa typically associated with a specific plant community but tolerate moderate disturbance; (7-8) Taxa associated with a plant community in an advanced successional stage that has undergone minor disturbance; (9-10) Taxa with a high fidelity to a narrow range of synecological parameters (Oldham et al., 1995)

- Virginia Stickseed (*Hackelia virginiana*): Units 1, 3, 4, 6a and 6b - occurring sparsely throughout units.

One locally rare species (i.e., rare per CVC 2002) was recorded:

- Catchweed Bedstraw (*Galium aparine*): Unit 2 - occurring sparsely in localized patches

Botanical inventory results are generally consistent with previous work (Dougan & Associates, 2009), where 49 species were recorded, the majority of which are non-native. The only plant SCC recorded in that study was Butternut.

4.3.3 Vegetation Communities

The vegetation on the subject property is characterized by a mosaic of early successional meadows, thickets, and young forest with low to moderate botanical quality. The subject property slopes gently in the west portion, then steeply towards the Credit River to the east.

Vegetation community types in nine natural / semi-natural vegetation units are present, as shown in Figure 3:

- Dry-Moist Old Field Meadow (CUM1-1)
- Mineral Cultural Savanah (CUS1)
- Raspberry Cultural Thicket (CUT1-5)
- Fresh - Moist Lowland Deciduous Forest Type (FOD7)
- Fresh – Moist White Elm Lowland Deciduous Forest Type (FOD7-1)
- Fresh – Moist Ash Lowland Deciduous Forest Type (FOD7-2)
- Mineral Cultural Woodland Ecosite (CUW1).

None of these vegetation community types is considered provincially significant (per Bakowsky 1996 / NHIC website). Each community is described briefly below. For detailed descriptions of each vegetation layer, see Table 1. In addition, representative site photographs are provided in Appendix D.

Vegetation classifications are generally consistent with previous work (Dougan & Associates, 2009), where four ELC vegetation communities were described: Cultural Woodland; Cultural Meadow; Cultural Thicket; Deciduous Forest; and complexes of CUW / CUM / CUT.

4.3.3.1 Cultural Meadow (CUM1-1) – Unit 1a & b

Cultural meadow is found in disjunct pockets around the road (Thorny Brae Place) and the west / north portions of the property. It is characterized by common cultural meadow species including pioneer species such as Tall Goldenrod (*Solidago altissima*), Awnless Brome (*Bromus inermis ssp. inermis*), Kentucky Bluegrass (*Poa pratensis*) and Meadow Timothy (*Phleum pratense*). In addition, a small patch of Scotch Pine (*Pinus sylvestris*) and Eastern White Cedar (*Thuja occidentalis*) is present near the Thorny Brae Place Cul-de-sac. A small drainage swale, as identified in Figure 5, is located within Unit 1b, which contains several species indicative of wetlands, such as Purple Loosestrife (*Lythrum salicaria*), Elecampane Flower (*Inula helenium*), and Reed Canary Gass (*Phalaris arundinacea*). The small drainage swale is dominated by non-native species such as This unit is highly disturbed, reflecting the land use history (e.g., dumped garbage near Thorny Brae Place Cul-de-sac and trails leading to the river and northeastern portion of the property).

4.3.3.2 Mineral Cultural Savannah (CUS1) – Unit 2

Unit 2 occurs in the northern corner of the subject property adjacent to the steep valley slope. This unit is dominated by Staghorn Sumac (*Rhus typhina*) in the subcanopy, and Tree-of-heaven (*Ailanthus altissima*) in the canopy and understory layers with occasional Manitoba Maple (Acer negundo) in the canopy. Tree-of-Heaven is a highly invasive species and this community contains less than 10% native trees by abundance. The CUT1-1 community (Unit 6a) transitions from Staghorn Sumac dominated to Tree-of-heaven dominated in Unit 2. Dense growth of Allegheny Blackberry (*Rubus allegheniensis*) and Thicket Creeper (*Parthenocissus vitacea*) are present in the ground layer. This unit also contains dumped garbage and recreational trails.

4.3.3.3 Raspberry Cultural Thicket (CUT1-5) – Unit 3

The Raspberry thicket occurs in the northeastern side of the subject property on a gentle slope adjacent to the steep valley slope. This unit is characterized by dominant Allegheny Blackberry, with a minor component of the vegetation found in Unit 1; Tall Goldenrod, Awnless Brome, Kentucky Bluegrass and Meadow Timothy. Scarce Black Walnut and Colorado Spruce (Picea pungens) are also present in the canopy layer. The botanical quality in this unit is low with many disturbances including exotic species and recreational trails. There are also a number of snags and deadfalls.

4.3.3.4 Fresh - Moist White Elm Lowland Deciduous Forest (FOD7-1) – Unit 4

The Elm Lowland Forest is on sloping tableland adjacent to valleylands associated with the unnamed tributary and Credit River. It is dominated by American Elm (*Ulmus americana*) in the

canopy and sub-canopy layers, with occasional Black Cherry (*Prunus serotina*), and scarce Black Walnut in the sub-canopy. The stand is young with few trees greater than 24 cm DBH and most less than 10cm DBH. The topography begins as a gentle slope in the west and becomes increasingly steep to the east. The soil moisture regime is closer to fresh than moist.

4.3.3.5 Fresh – Moist Lowland Deciduous Forest (FOD7) – Unit 5a

This Lowland Forest is a fairly disturbed community located directly adjacent to the Credit River and along the ravine slope to the east of the subject property. The topography is a steep slope running down to the river. The unit is characterized by frequent to occasional Black Walnut, Green Ash (*Fraxinus pennsylvanica*), and Manitoba Maple with occasional Black Cherry in the canopy, and Hawthorn (*Crataegus* sp.), Manitoba Maple, and Green Ash in the sub-canopy. There is also a concentration of Manitoba Maple near the river. The stand is young; few trees are greater than 50 cm DBH, and most are 10 - 24 cm DBH. This unit also contains dumped garbage, recreational trails and windthrow.

4.3.3.6 Fresh–Moist Ash Lowland Deciduous Forest (FOD7-2)–Unit 5b / 5c

These Ash Lowland Forests are located on the northeastern side of the subject property along the top of and partially within the ravine. The topography is a steep slope running down to the ravine and towards the river. The unit is characterized by dominant Green Ash, abundant American Elm and Black Walnut with occasional Black Cherry in the canopy, and Hawthorn (*Crataegus* sp.), Bitternut Hickory (*Carya cordiformis*) and Green Ash in the sub-canopy. Unit 5c is nearest Unit 6b, which contains a concentration of Black Walnut trees. The Unit 5c stand is young with few trees greater than 25 cm DBH, and most 10 - 24 cm DBH. This small strip of forest is located between the neighbouring parking lot to the south and Unit 6b and is highly disturbed by cultural influences, including a very high concentration of invasive species and garbage. While Unit 5b is also culturally influenced and contains high concentrations of invasive species, but has higher ecological importance, as it is part of the Credit River valleylands.

4.3.3.7 Sumac Cultural Thicket (CUT1-1) – Unit 6a

The second of two CUT1-1 units occurs along the northern edge of the subject property, bordering Eglington Ave W. This unit is characterized by dominant Staghorn Sumac with a component of Hawthorn and Tartarian Honeysuckle (*Lonicera tatarica*) in the understory. Few trees occupy the canopy layer, including Tree-of-heaven, Manitoba Maple, Norway Maple (*Acer platanoides*), Trembling Aspen (*Populous tremuloides*) and Colorado Spruce. Thick vegetation of Lesser Periwinkle (*Vinca minor*), Crown-vetch (*Coronilla varia*), Tall Goldenrod, Awnless Brome, Kentucky Bluegrass and Meadow Timothy are present in the understory and ground layer. This

unit also contains dumped garbage, recreational trails, evidence of Emerald Ash Borer (*Agrilus planipennis*) and old plantation as well as a significant amount of noise from Eglinton Ave W.

4.3.3.8 Mineral Cultural Woodland (CUW1) – Unit 6b

The Mineral Cultural Woodland is located directly south of Thorny Brae Place, extending southwest toward the un-named tributary ravine. The canopy in this unit is sparse with many areas under 30% cover with a few areas over 50% cover, however, there has been substantial growth since the last site inventory by Dougan and Associates (2009). It is characterized by dominant Black Walnut in the canopy and dominant Black Walnut with a component of American Basswood (*Tilia americana*) and Green Ash in the sub-canopy. The ground layer consists of Creeping Thistle (*Cirsium arvense*), Common Starwort (*Stellaria media*), Tall Goldenrod, Awnless Brome, Kentucky Bluegrass and Meadow Timothy. The stand is young with few trees greater than 25 cm DBH, and most 10 - 24 cm DBH. This unit also contains dumped garbage, recreational trails, windthrow and evidence of Emerald Ash Borer.

4.3.3.9 Hedgerow

A single row of mid-aged Littleleaf Linden trees (< 25 cm DBH) is located along the Croatian Martyrs Church parking lot property boundary with mown lawn underneath. While the canopy trees are not located on the subject property, some of the dripline extends onto the subject property and there are some sub-canopy trees and understory shrubs located within the subject property. Species present within the hedgerow are similar to that of Unit 6b (above).

Table 1. Vegetation Community Descriptions and ELC Classification

Unit	ELC Vegetation Type	Area	Vegetation Layer	Component Species	Plant Species of Conservation Concern
1 a / b	CUM1-1	1a: 0.367 ha 1b: 0.891 ha	Canopy	Scarce White Ash (*Fraxinus americana*), Eastern Cottonwood (*Populous deltoides*) and Slippery Elm (*Ulmus rubra*) throughout the unit	Virginia Stickseed
			Sub-canopy	Dotted Hawthorn (*Crataegus punctata*) abundant throughout the unit, with Riverbank Grape (*Vitis riparia*) and Allegheny Blackberry occurring occasionally	
			Understory	Closely resembles sub-canopy with Dotted Hawthorn abundant throughout the unit, with Riverbank Grape and Allegheny Blackberry occurring occasionally	
			Ground Layer	Tall Goldenrod is abundant with frequent Awnless Brome, Kentucky Bluegrass and Meadow Timothy	
2	CUS1-1	0.043 ha	Canopy	Occasional young Manitoba Maple and Tree-of-heaven throughout the unit	Catchweed Bedstraw
			Sub-canopy	Dominant Staghorn Sumac with occasional young Green Ash	
			Understory	Dominant Staghorn Sumac throughout unit with abundant Allegheny Blackberry and occasional Thicket Creeper and Tartarian Honeysuckle	
			Ground Layer	Abundant Garlic Mustard (*Alliaria petiolata*) with occasional Orange Daylily (*Hemerocallis fulva*), and Greater Burdock (*Arctium lappa*)	
3	CUT1-5	0.099 ha	Understory	Unit dominated by Allegheny Blackberry	Virginia Stickseed
			Ground Layer	Tall Goldenrod is abundant with frequent Awnless Brome, Kentucky Bluegrass and Meadow Timothy	
4	FOD7-1	0.082 ha	Canopy	American Elm dominates canopy layer	Virginia Stickseed
			Sub-canopy	Dominant American Elm with occasional Black Cherry, and scarce Black Walnut	
			Understory	Allegheny Blackberry abundant with frequent European Buckthorn (*Rhamnus cathartica*) and occasional Tartarian honeysuckle and Staghorn Sumac	
			Ground Layer	Abundant species include Garlic Mustard, White Avens (*Geum canadense*), Tall Goldenrod and Awnless Brome	
5a	FOD7	0.213 ha	Canopy	Stand dominated equally by Green Ash and Black Walnut with occasional Black Cherry as well as Manitoba Maple concentrated near the river	Allegheny Serviceberry Wild Crane's-bill
			Sub-canopy	Equally frequent Hawthorn, Manitoba Maple, and Green Ash	
			Understory	Equally frequent Hawthorn species, Tartarian Honeysuckle, European Buckthorn, and Staghorn Sumac	

Unit	ELC Vegetation Type	Area	Vegetation Layer	Component Species	Plant Species of Conservation Concern
			Ground Layer	Equally abundant Garlic Mustard, Virginia Strawberry (*Fragaria virginiana*) and White Avens	
5b / c	FOD7-2	Unit 5b: 0.150 ha Unit 5c: 0.043 ha	Canopy	Green Ash dominant with Black Walnut and American Elm as frequent, as well as Sugar Maple, White Ash, and American Basswood as occasional	Unit 5b: Wild Crane's-bill Butternut (END)
			Sub-canopy	Green Ash and Bitternut Hickory are both occasional	
			Understory	Occasional Hawthorn species, Tartarian and Morrow's Honeysuckle, and European Buckthorn,	
			Ground Layer	Abundant Garlic Mustard, frequent Virginia Strawberry (*Fragaria virginiana*) and Yellow Avens, and occasional Calico Aster (*Symphyotrichum lateriflorum*)	
6a	CUT1-1	0.299 ha	Sub-canopy	Frequent Tree-of-heaven, Manitoba Maple, Norway Maple, Trembling Aspen and Colorado Spruce	Virginia Stickseed
			Understory	Dominated by Staghorn Sumac and Hawthorn species with frequent Tartarian Honeysuckle	
			Ground Layer	Lesser Periwinkle and Crown-vetch equally dominate ground layer with occasional Tall Goldenrod and Awnless Brome, Kentucky Bluegrass and Meadow Timothy	
6b	CUW1	0.156 ha	Canopy	Dominated by Black Walnut	Virginia Stickseed
			Sub-canopy	Dominated by Black Walnut with frequent American Basswood, and occasional Green Ash	
			Understory	Dominated by Hawthorn species with frequent young Black Walnut and Green Ash	
			Ground Layer	Tall Goldenrod is abundant with frequent Awnless Brome, Kentucky Bluegrass, Meadow Timothy, and Lesser Periwinkle and Crown-vetch	
N/A	Hedgerow	0.051 ha	Canopy	Littleleaf linden (*Tilia cordata*) located off property	
			Sub-canopy	Common Buckthorn, Black Walnut, Hawthorn species, and Manitoba Maple	
			Understory	Scattered Tartarian Honeysuckle and Common Privet	
			Ground Layer	Cultural meadow species on the subject property side of the fence and mown lawn to the south of the property line	

4.4 Wildlife Resources

4.4.1 Breeding Birds and Other Wildlife

4.4.1.1 Approach

Breeding bird / wildlife surveys were conducted by WSP staff on 3 dates: June 23, 2016, July 4, 2016, and July 6, 2018. The purpose of these surveys was to evaluate wildlife habitat, assess SAR wildlife potential habitat, record all wildlife observations and document breeding bird use within the subject property. Breeding Bird data had previously been collected within the subject property by Dougan and Associates staff on June 18, 2007, and can be found in Appendix 2 of their scoped EIS report (Dougan and Associates, 2009). That information has been included in the total list of species observed on site that is presented in Table 2 below.

The breeding bird surveys were undertaken by thoroughly walking random transects within the subject property and recording presence, abundance and level of breeding evidence[3]. Additional evidence of breeding activity (e.g., fledged young, breeding displays in early spring etc.) was recorded during other field surveys within and outside of the breeding window, as observed.

Level of breeding evidence was determined using the Ontario Breeding Bird Atlas [OBBA] methodology and terminology (Cadman et.al. 2007; Bird Studies Canada 2001). Avifaunal species status was evaluated using the following sources:

- The COSEWIC[4] list for national status designations (current list at the time of report preparation)
- The Species At Risk Act (SARA) for federally listed species (current at the time of report preparation)
- The Species At Risk in Ontario list (O. Reg 230/08) for provincial status designations under the Endangered Species Act (ESA) (current list at the time of report preparation)
- The MNRF / NHIC website for provincial rarity ranks (i.e., S-Ranks);
- The Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E for area sensitivity (MNRF 2015)
- The Credit Valley Conservation Species of Conservation Concern Project (2010) for local significance

[3] Breeding birds include species for which any level of breeding evidence was recorded (i.e. possible, probable, confirmed; or `observed` where some potential for local breeding exists. Determined using Ontario Breeding Bird Atlas protocols

[4] COSEWIC: Committee on the Status of Endangered Wildlife In Canada

During the breeding bird surveys, particular attention was paid to assessing habitat for potential SAR use or potential *Significant Wildlife Habitat* (SWH) features; see Sections 4.4.3 and 4.6 for discussion.

In addition, all direct wildlife observations and wildlife signs (including browse, track / trails, animal scat, bird nesting activity, tree cavities, burrows, excavated holes and vocalizations) made during all field surveys were recorded. Targeted amphibian breeding surveys were not conducted on the property due to the lack of suitable breeding / overwintering habitat (i.e., ponds or wetlands).

4.4.1.2 Results - Avifauna

In total, 36 'breeding' bird species were observed within the subject property (Table 2). Avifaunal species observed are a diverse mix of common generalists and urban-adapted species, with forest-associated species in the treed areas of the subject property.

Avifaunal Species of Conservation Concern

An overview of survey results in consideration of SCC status is provided below:

- None is designated as a Species at Risk (SAR) in Canada (by COSEWIC or under the SARA)
- None is designated as a Species at Risk in Ontario (by COSSARO[5] or under the ESA)
- One species is considered *Area Sensitive* (per MNRF 2015):
    - Coopers Hawk (*Accipiter cooperii*)
- One Species of Interest in the Credit Valley Watershed was recorded:
    - Cooper's Hawk (i.e., Tier 2 per CVC 2010)

[5] COSSARO: Committee on the Status of Species at Risk in Ontario

Table 2. Breeding Bird Survey Results

Common Name	*Scientific Name*	GRANK[1]	SRANK[2]	SARO (ESA) Status[3]	COSEWIC Status[4]	SARA Status [5]	CVC (2010) [6]	MNR Area Sensitive[7]	Site Visit Details									
									18-Jun-07[6]		23-Jun-16		4-Jul-16		6-Jul-18		Overall	
									Number	Highest BE	Number	Highest BE	Number	Highest BE	Number	Highest BE	Highest Abundance	Highest breeding Status
American Crow	*Corvus brachyrhynchos*	G5	S5B				4		1	S							1	POSS
American Goldfinch	*Spinus tristis*	G5	S5B				4		3	S	6	S/H	13	S/H	9	S	13	POSS
American Robin	*Turdus migratorius*	G5	S5B				4		1	S	3	FY	2	S/H	2	S	3	CONF
Baltimore Oriole	*Icterus galbula*	G5	S4B				3		1	S	1	S/H	1	S/H			1	POSS
Black-capped Chickadee	*Poecile atricapillus*	G5	S5				4		1	CF	4	S/H	10	H	3	S	10	CONF
Blue Jay	*Cyanocitta cristata*	G5	S5				4				2	H					2	POSS
Brown-headed Cowbird	*Molothrus ater*	G5	S4B				4		2	FY							2	CONF
Cedar Waxwing	*Bombycilla cedrorum*	G5	S5B				4				1	S/H	5	H			5	POSS
Chipping Sparrow	*Spizella passerina*	G5	S5B				4				1	S/H					1	POSS
Cliff Swallow	*Petrochelidon pyrrhonota*	G5	S4B				3										2	OBS
Common Grackle	*Quiscalus quiscula*	G5	S5B				4				1	P	2	P			2	PROB
Cooper's Hawk	*Accipiter cooperii*	G5	S4				2	X					1	H	1	H	1	POSS
Downy Woodpecker	*Picoides pubescens*	G5	S5				4						2	H			2	POSS
Eastern Kingbird	*Tyrannus tyrannus*	G5	S4B				3								2	P	2	PROB
Eastern Phoebe	*Sayornis phoebe*	G5	S5B				3				2	FY	1	S/H			2	CONF
European Starling	*Sturnus vulgaris*	G5	SNA				5		4	CF	2	S/H	4	S/H	6	A/T	6	CONF
Gray Catbird	*Dumetella carolinensis*	G5	S4B				3		1	S	3	CF	2	S/H	2	S	3	CONF
House Finch	*Carpodacus mexicanus*	G5	SNA				5		1	S							1	POSS

[6] Data adapted from Dougan and Associates 2009 report – Appendix 2..

Common Name	*Scientific Name*	GRANK[1]	SRANK[2]	SARO (ESA) Status[3]	COSEWIC Status[4]	SARA Status[5]	CVC (2010)[6]	MNR Area Sensitive[7]	Site Visit Details									
									18-Jun-07[6]		23-Jun-16		4-Jul-16		6-Jul-18		Overall	
									Number	Highest BE	Number	Highest BE	Number	Highest BE	Number	Highest BE	Highest Abundance	Highest breeding Status
House Sparrow	*Passer domesticus*	G5	SNA				5		1	H			2	P			2	PROB
House Wren	*Troglodytes aedon*	G5	S5B				4				1	S/H					1	POSS
Indigo Bunting	*Passerina cyanea*	G5	S4B				3						2	S/H	1	S	2	POSS
Mallard	*Anas platyrhynchos*	G5	S5B				4		1	X							1	OBS
Mourning Dove	*Zenaida macroura*	G5	S5				4		1	S/H							1	POSS
Northern Cardinal	*Cardinalis cardinalis*	G5	S5				4		1	S/H	2	S/H	4	S/H	2	S	4	POSS
Northern Flicker	*Colaptes auratus*	G5	S4B				3		1	S					1	H	1	POSS
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	G5	S4B				3		2	X					2	X	2	OBS
Red-eyed Vireo	*Vireo olivaceus*	G5	S5B				4						2	S/H	2	S	2	POSS
Red-winged Blackbird	*Agelaius phoeniceus*	G5	S4				4				2	S/H	2	S/H	8	X	8	POSS
Rock Pigeon	*Patagioena livia*	G5	SNA				5		4	H							4	POSS
Song Sparrow	*Melospiza melodia*	G5	S5B				4		2	CF	4	S/H	1	S/H	2	S	4	CONF
Spotted Sandpiper	*Actitis macularius*		S5						1	H							1	POSS
Tree Swallow	*Tachycineta bicolor*	G5	S4B				3				5	FY	4	H	7	X	7	CONF
Turkey Vulture	*Cathartes aura*	G5	S5B				3								1	X	1	OBS
Warbling Vireo	*Vireo gilvus*	G5	S5B				4		1	S	1	S/H					1	POSS
White-breasted Nuthatch	*Sitta carolinensis*	G5	S5				3	X							3	S	3	POSS
Yellow Warbler	*Setophaga petechia*	G5	S5B				4		1	P/A	1	FY	3	S/H	4	S	4	CONF
Total No. of Species									**20**		**18**		**19**		**18**		**36**	

4.4.1.3 Results - Mammals

Four mammal species were observed during field visits: Eastern Chipmunk (*Tamias striatus*), Gray Squirrel (*Sciurus carolinensis*), Eastern Cottontail (*Sylvilagus floridanus*) and White-tailed Deer (*Odocoileus virginianus*). A similar diversity\ of species was also recorded during previous work (Dougan & Associates 2009).

The general area also likely supports other mammals often found in urban and semi-natural areas, including: Striped Skunk (*Mephitis mephitis*); Coyote (*Canis latrans*); Red Fox (*Vulpes vulpes*); Raccoon (*Procyon lotor*); Groundhog (*Marmota monax*); Muskrat (*Ondatra zibethicus*); and a number of small mammals that often go undetected (for example shrews, voles and mice).

No SCC mammals were recorded on the subject property during field surveys and we are not aware of any specific records of mammal SCC in the vicinity.

4.4.1.4 Results - Herpetofauna

No herpetofauna species were observed during the field surveys for the current study. Two species were recorded during previous work (Dougan & Associates 2009): Eastern Red-backed Salamander (*Plethodon cinereus*) and Dekay's Brownsnake (*Storeria dekayi*). The general area, including lands along the Credit River, likely also supports Eastern Gartersnake (*Thamnophis sirtalis*), Green Frog (*Lithobates clamitans*), Northern Leopard Frog (*Lithobates pipiens*), American Toad (*Anaxyrus americanus*), and possibly Midland Painted Turtle (*Chrysemys picta marginata*).

WSP staff did not observe evidence of turtle nesting (e.g., past nest predation) along the banks of the Credit River or anywhere within the subject property – during searches completed with breeding bird and bat habitat assessment surveys. Ideal nest sites for turtles tend to face south or west with little overhead cover, have gravely, sandy or loamy soil, and are within a few metres of water (Brooks 2007). Based on this definition, no 'ideal' turtle nesting habitat occurs within the subject property. The shorelines of the Credit River are mostly steep and rocky with no natural breeding habitat (sand or gravel beaches and shoals). In addition, there are very limited turtle basking opportunities within the Credit River in proximity to the subject property (i.e., limited to a few scattered boulders).

No reptile hibernacula or potential hibernacula sites were noted within the subject property or vicinity.

4.4.1.5 Results – Lepidoptera

One Monarch (*Danaus plexippus*) butterfly was incidentally observed during the July 6, 2018 site visit. No other Lepidoptera were recorded during previous site visits.

4.4.2 SAR Bat Habitat

4.4.2.1 Approach

Four endangered bat species, all subject to provisions of the ESA, are known from the area (per MNRF SARO list) or potentially present based on records in southern Ontario:

- Eastern Small-footed Myotis (*Myotis leibii*);
- Little Brown Bat (*Myotis lucifugus*);
- Northern Long-eared Bat (*Myotis septentrionalis*);
- Tri-colored Bat (*Perimyotis subflavus*).

At present, there is no General Habitat Description or Habitat Regulation for any of these bat SAR. The following has informed our assessment of bat habitat:

- Correspondence with MNRF Guelph and Aurora staff on multiple dates in 2015 and 2016
- Technical Note, Species at Risk (SAR) Bats (MNRF Regional Operations Division, June 2015)
- Bat and Bat Habitat Surveys of Treed Habitats (MNRF Guelph District, May 2016)
- Use of Buildings and Isolated Trees by Species at Risk Bats. Survey Methodology (MNRF Guelph District, October 2014)
- Correspondence with MNRF Aurora staff in November 2017 and July 2018.

Current guidance regarding surveys focuses on identification of candidate maternity roost habitat, though all SAR bat habitat (i.e., day roosting habitat, foraging habitat, hibernacula) is protected under the ESA.

Survey methodology is as follows:

- **Tier 1. Habitat suitability assessment**. This focuses on snags / cavity trees (in woodland or non-woodland habitats).

  Snags / Cavity Trees. There is, at present, no explicit criteria for determining what is a 'suitable' snag / cavity tree for maternal roosting, but guidance is provided in the Technical

Note (MNRF 2015) and Bat and Bat Habitat Surveys of Treed Habitats (MNRF Guelph District, May 2016) for selection of best candidate roost trees for acoustic monitoring; these have been used in our determination of snag habitat suitability.

  - Trees within the subject property (Figure 4) were assessed using those characteristics, with notes and representative photos taken.
  - A reconnaissance level assessment of trees within adjacent valley slope forest was undertaken for context, though none of those trees will be removed / impacted by proposed works.
  - A targeted habitat assessment survey was completed on October 12, 2016, with supplementary searches during other field surveys from October 2015 through September 2016.

- **Tier 2. Presence / absence survey**. To be undertaken if any suitable habitat could potentially be removed or impacted.

As no potentially suitable cavity trees that could be impacted by the proposed works were recorded, presence / use surveys were not deemed to be required and none was undertaken.

4.4.2.2 Results - Bat Habitat Assessment

In total, three deciduous trees with cavities that may be suitable for bat roosting / maternity colony use were recorded during field surveys in 2015 and 2016 (as shown on Figure 4 and described in Table 3):

- All are within the valley slope / ravine forest areas. None is within areas proposed for development / potential impact areas
- These trees have been ranked as 'poor' (Butternut and Basswood) or 'moderate' (Willow); see Table 3. Rankings are based on criteria in the MNRF Technical Note (2015).

Note that woodland habitat is well-represented along the Credit River valley in the local landscape and trees on the subject property are not unique in this regard.

It is also likely that bats forage along the Credit River and open park / meadow areas on adjacent lands and in the local landscape.

WSP corresponded with MNRF in November 2017 and July 2018 regarding SAR bat habitat. See Section 4.6.5 for discussion.

Table 3. Assessment of bat roosting tree habitat suitability

Snag Description								Snag Ranking								Impact (Retained or Removed)
Cavity/ Snag Number	Decay Class	Cavity Descriptions	Species	Dbh (cm)	Open canopy surrounding tree (%)	Max. Cavity Height (m)	Relative Tree Height (m)	Tree Height Rank	DBH rank	high density of snags	Cavity height rank	Decay class rank	Equal Weight Rank	Weighted Rank	Comments / Rationale	
								Ranked out of								
								7	6	1	1	1				
								Weight								
								5	4	3	2	1				
Forest / Treed Habitat Snags (max rank: 15)																
1	2	1 knothole cavity (5x5cm), 2.5 m up; 1 shallow cavity (5x6cm), 1.5 m up; 1 cavity (8x5cm) 6m up	Butternut	35	70	6	-1	3	2	0	0	1	1.8	4.5		Retained; close proximity to existing SWM outlet
2	2	2 small cavities (3x3cm), 6m up	Willow	50	90	6	+3	6	4	0	0	1	2.5	8.0	Cavities likely too small for bats	Retained within valley slope TOB
3	1	1 cavity entrance (7x6cm) to hollow trunk, 6m up; 1 long split (20x6cm) entrance to hollow trunk, 5m up	Basswood	42	70	6	+3	6	3	0	0	1	2.4	7.3		Retained within valley slope TOB

LEGEND

Height Rank	
Height Relative to Canopy	Rank
+5+ m	7
+3-4m	6
+1-2m	5
=	4
-1-2m	3
-3-4m	2
-5+m	1

DBH Rank	
DBH	Rank
>70cm	6
61-70cm	5
50-60cm	4
40-49cm	3
30-39cm	2
<30cm	1

Snag Density Rank	
Proximity to other Snags	Rank
clustered	1
not clustered	0

Cavity Height Rank	
Cavity Height	Rank
>10m	1
<10m	0

Decay Class Rank	
Decay Class	Rank
1	1
2	1
3	1
>3	0

Weighted Rank Outcomes		
Treed		Snag Suitability
13-15		Very Good
10-13		Good
8-10		Moderate
<8		Poor

4.4.3 Significant Wildlife Habitat

The presence of candidate *Significant Wildlife Habitat* (SWH) on the subject property was determined based on the Peel-Caledon Significant Wildlife Habitat Study (North-South Environmental 2009), with reference to the provincial Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E (MNRF 2015) and Significant Wildlife Habitat Technical Guide (MNRF 2000), and the Oak Ridges Moraine SWH guide (Government of Ontario 2007).

A comprehensive evaluation is provided in Appendix E. Each SWH criterion in the Peel-Caledon guidelines was evaluated based on the description of Candidate SWH using the results of the background information and field investigations. For several criteria, candidate SWH is described; however, no criteria are available to confirm SWH and it could not be evaluated, though commentary is provided. Where candidate SWH was identified outside the area of impact of the development, further studies to confirm SWH were deemed to be not required.

Key results of the SWH evaluation are as follows, with areas mapped on Figure 4:

- No SWH is currently identified on the subject property.
- Five *Candidate SWH* types are present:
    - **Snake Hibernacula**: some potentially suitable hibernacula habitat is present on exposed rock areas on the valley slope, but it is shaded and not ideal. None is present on the tablelands of the subject property. As the development limit is set back from the top of valley slope, no direct impacts and no impacts to overall function are anticipated.
    - **Bat Maternal Roosts and Hibernacula**: no hibernacula habitat is present. Three potentially suitable cavity trees are present on the subject property. All are in areas to be retained. The development proposes the removal of ~ 0.03 ha of treed habitat of an ELC type that meet candidate SWH: a very small portion of Unit 5c ([FOD7-2),] a young Ash-dominated forest. The proposed woodland removal represents a very small proportion of the contiguous woodland along the Credit River valley and nearby woodland on adjacent lands west of Mississauga Road. In Units 5c and 6b, trees proposed for removal are young to mid-aged, with no observed cavities. Approximately 30 trees are greater than 15 cm dbh.
    - **Raptor Nesting Habitat** (wetlands, ponds and rivers): potential Osprey nesting habitat (candidate SWH) is associated with the Credit River treed areas. No nests or SWH has been confirmed on the subject property and all valley forest will be retained with the proposed plan, though there will be removal of young woodland/forest on the tablelands. As noted above, this represents a very small proportion of the contiguous woodland along the Credit River valley and nearby woodland on adjacent lands west of Mississauga Road.

- **Raptor Nesting Habitat** (woodland): potential for raptor nesting in immature woodland on the subject property (primarily on the valley slope and ravine) and Cooper's Hawk was recorded as a potential breeding species in the area (flyover). Nesting has not been confirmed during targeted searches. The more mature, less disturbed forest areas (i.e., valley / ravine slope forest) and additional forest will be retained with the proposed plan.
- **Animal Movement Corridors**: Although there are no specific criteria for confirming corridors as SWH, the Credit River valley, including the eastern edge of the property, functions as a corridor for movement of wildlife and dispersal of plants. Natural vegetation within the valley will be retained and protected with the proposed development.

- Three *Confirmed SWH* types:
  - **Species listed as Rare in Ontario**: 1 Butternut tree is present in ELC Unit 4 (ravine).
    - However, given its declining health and conclusions of the BHA (i.e., Category 1 – do not need to retain) as discussed in Section 4.6.1, it is uncertain whether this would be considered SWH. We have conservatively mapped as SWH, including a 25m radius from the trunk
    - Notwithstanding this, there will no impact to Butternut habitat or individuals as a result of the proposed works, with implementation of mitigation and protection measures and best management practices during construction.
  - **Species Identified as Nationally Endangered or Threatened by COSEWIC which are not listed as Endangered or Threatened under Ontario's Endangered Species Act.:** One Monarch butterfly was recorded on a single date. No Monarch breeding habitat will be impacted as all significant natural areas (including Unit 3, where Milkweed is present in low abundance) are being retained with setbacks. In addition, open areas outside of the development envelope will be enhanced with a native seed mix to increase foraging and breeding opportunities for Monarch
  - **Species Identified as Special Concern based on the Species at Risk in Ontario list that is updated annually by MECP**: As above.

4.4.4 Wildlife Movement Opportunities

The Credit River and associated riparian corridor function as a natural wildlife movement corridor stretching northwest-southeast across the city of Mississauga. The Credit River corridor connects the Credit River Watershed beyond the city boundaries to the northwest to Lake Ontario in the southeast. This natural wildlife movement corridor provides a linkage between shelter, foraging, breeding and/or wintering habitats and provides a natural route for juvenile dispersal as well as the dispersal of plant seeds that may be carried by wildlife to new habitats.

4.5 Aquatic Resources

4.5.1 Aquatic Habitat Assessment

4.5.1.1 Methodology

Field surveys included taking representative photographs and assessment of the following aquatic habitat parameters:

- Flow condition, clarity, general gradient and velocities
- Dimensions and general character
- Morphology (e.g., riffles, pools)
- Cover opportunities (i.e., woody debris, undercut banks, boulders, aquatic vegetation)
- Substrate type
- Bank height, character and stability / evidence of erosion
- Riparian vegetation (general)
- Physical barriers to fish movement
- Potential specialized and important habitat areas including potential spawning habitat, good nursery cover, holding habitat (deeper refuge pools)
- Evidence of groundwater discharge
- Disturbances, habitat limitations and potential habitat enhancement opportunities

On October 16, 2015 and August 9, 2016, a detailed aquatic habitat characterization was undertaken on the drainage feature within the subject property, from the roadside ditch north of Thorny Brae Place to the Credit River. On February 23, 2017, a site visit was undertaken to observe the effects of a spring freshet on the drainage feature from upstream of Thorny Brae Place to the Credit River.

Additional observations were recorded during other field surveys in 2015 and 2016.

4.5.1.2 Results

The drainage feature has been partitioned into four separate reaches (Figure 5):

- Reach 1: This drainage swale on the tablelands is the most upstream reach, beginning as roadside drainage to the north of Thorny Brae Place and continuing downstream to the Credit River natural hazard lands at the ravine. This reach flows through a cultural woodland south of Thorny Brae Place.

- Reach 2: This reach begins at the natural hazard lands (ravine) of the Credit River downstream to the SWM outlet. This reach is more defined than Reach 1 and flows through a Fresh-Moist White Ash Lowland Deciduous Forest (FOD7-2).
- Reach 3: This reach begins at the SWM outlet, downstream to the base of the slope. This is a steep, well-defined reach with a slope of approximately 50° through a Fresh-Moist White Ash Lowland Deciduous Forest (FOD7-2).
- Reach 4: This reach occurs within the floodplain of the Credit River, from the base of the slope east to the confluence with the river. It is an open drainage feature through manicured lawn.

Reach 1 begins as roadside drainage to the north of Thorny Brae Place and is conveyed under the road by a corrugated steel pipe (CSP). Both Reach 1 and Reach 2 were dry during aquatic survey visits in the late summer / fall and no flow or standing water was noted during field surveys completed in 2015 and 2016 (including visits in October, December, May, June, July, August and September). Water was observed in Reach 1 upstream of Thorny Brae Place (<2cm depth) during the spring freshet on February 23, 2017. Trickle flow (<0.01 m/s) was observed through the culvert, pooling at the culvert outlet downstream of Thorny Brae Place (standing water only). Water depth did not exceed 2 cm depth downstream of the culvert and did not extend beyond the culvert outlet (i.e., the remainder of Reach 1 and Reach 2 was dry with no evidence of recent flow). Water was observed discharging from the outfall during the October 29, 2015, and February 23, 2017 visits only, with flow evident in both Reach 3 and Reach 4. Based on a review of historic air photos, this drainage pattern appears to have been established from 1954; no defined drainage course is evident beyond (north) of the current limits of Eglinton Avenue.

Water is conveyed under the road via CSP and flows into a landscape depression through immature Cultural Woodland (Veg. Unit 6b) towards the headwall / outfall. No discernable drainage feature was evident upstream of the outfall (Reaches 1 and 2), only a depression in the landscape. Discharge from the outlet is conveyed to the Credit River via a 0.5-1.0 m wide steep drainage feature down the side of the valley wall (Reach 3), a grade of approximately 50°. The large gradient of the watercourse on the forested valley slope, combined with a 1.5 m high knick point approximately 5 m downstream of the outfall, provides a substantial barrier to fish migration. Substrate through the valley slope reach (Reach 3) consists mainly of bedrock and boulders. Below the slope, the gradient flattens out and watercourse flows as a small drainage ditch 0.45 m wide with vertical banks 0.24 m in height (Reach 4). Substrate consists mainly of cobble and silt and riparian vegetation consists solely of manicured lawn. This ditch meanders for approximately 30 m before discharging over the top-of-bank of the Credit River (approximately 1.5 m vertical height).

The habitat characteristics within the drainage feature throughout its length suggests it acts as contributing habitat to downstream reaches (Credit River) but does not support direct fish use.

4.5.2 Headwater Drainage Feature (HDF) Assessment

4.5.2.1 Methodology

Per comments received from CVC on June 27, 2016 on the draft TOR, we have evaluated the un-named drainage feature on the portion of the subject property above the confirmed top of bank (Reach 1) following the Evaluation, Classification and Management of Headwater Drainage Features Guidelines (the HDF Guidelines) (CVC & TRCA, January 2014). This evaluation is best applied in the short period of time following a major freshet event, which in southern Ontario generally occurs during late winter and spring (March to early April), and before new vegetative growth covers and disrupts any newly deposited sediment. This assessment was completed on February 23, 2017, following a major freshet event. These observations were supplemented with observations during other field visits in, May, June, July, August, September, October and December.

Part 1: Evaluation

Based on the February 23, 2017 assessment, it was concluded that the HDF upstream of the Hazards Lands on the subject property was a 'low sensitivity site' (i.e., features that are ill-defined, contain only ephemeral flow and are unlikely to contain sensitive species and/or habitat) and as such, the Rapid Survey Technique was used for assessment, as outlined in the HDF Guidelines (CVC & TRCA, January 2014). Using this evaluation method, components of the headwater sampling protocol (Ontario Stream Assessment Protocol [OSAP] Section 4 Module 10, March 2013) were applied, documenting HDF form and flow conditions, riparian vegetation and site features that are important components of habitat.

HDF information collected during the field survey encompassed the following general parameters, where relevant:

- Feature Type (e.g., defined natural drainage feature, channelized, not defined, etc.)
- Riparian Conditions (e.g., none, cropped land, forest, etc.)
- Flow Conditions (e.g., no water, standing water, interstitial flow, minimal or substantial flow)
- Feature Vegetation
- Feature / Bankfull Widths / Depths
- Sediment Deposition / Transport
- Flow Measures
- Longitudinal Gradient
- Site Features (e.g., roughness)
- Connectivity
- Representative site photographs

Part 2: Classification

The data collected during the HDF evaluation phase (Part 1: Evaluation) was used to apply appropriate classifications to the HDFs being assessed, identifying the functions of each HDF that were considered for Management Recommendations. Following the HDF Guidelines, a classification was applied to each of the following four categories: Hydrology; Riparian; Fish and Fish Habitat; and Terrestrial Habitat (see Table 4).

Part 3: Management Recommendations

The classification categories identified in Part 2 provide the basis of the management recommendations provided below. A flow chart in the HDF Guidelines provides guidance for translating classification results to management recommendations. The classifications and Management Recommendations are summarized for each segment and HDF in Table 4.

4.5.2.2 Results

The classification and management recommendation for the HDF identified on the subject property resulting from the field surveys and evaluation is provided in Table 4.

Table 4. Summary of HDF functional classifications and management recommendations

Functional Classification and Management Recommendations		**Drainage Feature Upstream of Hazard Lands**
Step 1	Hydrology*	FC – 1 and 2 (No Surface Water / Standing water) FT – 7 (Swale) ***Limited or Recharge***
	Modifiers	None
Step 2	Riparian	***Important Functions*** (CUW)
Step 3	Fish Habitat	***Contributing Functions***
Step 4	Terrestrial Habitat	***Limited Functions***
Management Recommendation	***No Management Required***	

* FC = OSAP Flow Condition Codes; FT = OSAP Feature Type Codes

Although trickle flow was observed through the culvert at Thorny Brae Place during the 2017 freshet assessment, standing water only (<2 cm depth) was observed immediately upstream and downstream of the culvert; the remainder of the drainage feature upstream of the Hazard Lands was dry at the time of assessment with no defined drainage feature / flow path evident. The feature exists as swale only with no identified substrate sorting. Lack of flow or standing water in May-June and lack of moisture tolerant plants along the swale indicate that it is not a feature with valued or contributing hydrology. Therefore, we concluded, per Figure 2 in the HDF Guidelines, our Management Recommendation for this feature above the confirmed top of bank is 'No Management Required' as the feature does not provide an important hydrological function, is not a wetland and does not function as a wildlife movement corridor.

4.6 Species at Risk (SAR)

A SAR habitat assessment for the subject property has been undertaken based on the SAR list for Peel Region (MNRF 2016), as well as any specific records indicated on the MNRF NHIC database, via correspondence with MNRF or CVC biologists or based on recent additions to the Species at Risk in Ontario (SARO) list (e.g., Tri-colored Bat). The likelihood of presence on the subject property for each species was determined based on evaluation of preferred habitat in the context of background and field surveys, as well as known ranges and occurrences of the species. The likelihood of development works impacting each species was determined by considering the likelihood of presence, the life functions supported by the impacted habitat (e.g., nesting), and the proximity of development to the potential habitat.

The SAR Habitat assessment is provided in Appendix F.

We concluded that most species have no / minimal likelihood to be present on and/or impacted by proposed works on the subject property. Details of SAR that were confirmed on the subject property or were assessed as having a potential for presence or impacts are discussed below.

4.6.1 Butternut

One Butternut was recorded; in Vegetation Unit 5b at the southeast edge of the property. A *Butternut Health Assessment* was completed for the tree on May 20, 2016 and it was classified as Category 1 (non-retainable). A Butternut Health Assessment Report (#602-02) was submitted to MNRF on September 6, 2016. The tree was assessed on-site by MNRF (B. Kowalyk) on September 7, 2016; it was confirmed after some discussion that the tree should be classified as Category 1. An updated BHA Report was submitted to MNRF on September 8, 2016 and MNRF confirmed findings and classification as Category 1 via an email dated September 21, 2016.

As Category 1, this tree is not subject to the provisions of the ESA (i.e., it could be harmed / removed). Notwithstanding this, the proposed activities do not require removal and it will be retained. Per MNRF comments, nails in the tree will be removed (Appendix K).

4.6.2 Barn Swallow (*Hirundo rustica*) and Chimney Swift (*Chaetura pelagica*)

Neither species was recorded on the subject property during field investigations. However, both species are known from the general area (MNRF regional list), and a small amount of suitable foraging habitat is present on the subject property; hence, there is some (low) potential for presence.

WSP staff conducted searches under and on the Eglinton Avenue bridge as part of the breeding bird surveys. One Eastern Phoebe nest was recorded under the bridge. No Barn Swallow nests were recorded.

We conclude that no breeding habitat for either species is present on the property, therefore the likelihood and magnitude of potential impacts to these species is minimal, and would consist only of impacts to a very small amount previously disturbed foraging habitat, which is abundant in the surrounding landscape. No further ESA compliance measures are anticipated for these species.

4.6.3 Monarch

One Monarch butterfly was incidentally observed during the July 6, 2018 site visit. The host plant for Monarch reproduction, Common Milkweed (*Asclepias syriaca*), was present in low numbers in Vegetation Unit 3. Unit 3 will be retained in full. Monarchs may also use old field (CUM1-1) species for a source of nectar, such as Fuller's Teasel (*Dipsacus fullonum*), aster species (*Symphyotrichum* spp.), goldenrod species (*Solidago* spp.), etc.; however, these plant species are common throughout the broader landscape and no impacts are anticipated for Monarchs by removal of CUM1-1 communities. No further ESA compliance measures are anticipated for this species.

4.6.4 American Eel

Although not observed during field surveys, CVC has indicated that American Eel is present within the Credit River, immediately adjacent the subject property. American Eel is designated *Endangered* under the Endangered Species Act (2007) and receives species and general habitat protection. No direct impacts are anticipated as the drainage feature on the subject property contains contributing habitat only (i.e. does not support direct fish use). Indirect impacts (e.g. downstream sedimentation) will be prevented through the installation of proper mitigation (e.g. ESC fencing).

4.6.5 SAR Bats

MNRF Aurora staff were consulted by WSP in November 2017 and July 2018 in regard to bat habitat and in reference to two conceptual residential development options. The following key points were expressed by MNRF:

- The first step is determining the significant woodland limit (i.e., no point in completing SAR bat surveys until this is resolved)

- SAR bat habitat would include contiguous significant woodland on the tableland, but not the CUW (Unit 6b); hence acoustic monitoring surveys would not be required to pursue removal of Unit 6b

As part of the current revised Scoped EIS (Section 6), we have concluded that *Significant Woodland*, as a component of the *Natural Areas and Corridors* (NAC) designation in the ROP, is present in the Credit River valleylands (defined by the LTSSL) and a 25m radius surrounding the Butternut. In addition, *Significant Woodland*, as a component of the *Significant Natural Areas* designation in the City OP, is present in the valleyland forest communities (i.e., valley portions of Units 5a, and 5b). With the proposed development, all of these areas will be retained in full (including the three cavity trees located within the valleylands on the subject property, which provide suitable maternity roosting habitat). In addition, woodland, thicket and forest communities beyond the LTSSL and Butternut habitat will be retained with the proposed development (i.e., Unit 2, Unit 4, and portions of Unit 5c and 6a) and enhanced with the *Woodland Enhancement Strategy*.

Conclusion: Provided that all tree removals occur outside the SAR bat active period (April 1 – Sept. 30), there will be no impact to potentially suitable SAR bat habitat and no requirement for acoustic monitoring surveys.

4.7 Geotechnical

Information presented in this section is based on the Soils Investigation (Soil Eng. Oct. 2016; Addendum Dec. 22 2016; Revised Addendum March 2019). In that study, 12 boreholes were drilled to a depth of 3.0 to 6.6 m below ground surface (bgs) and soils were analyzed for grain type and permeability. Key results are as follows:

- Soils consist of pavement or topsoil over hard silty clay till interstratified with firm silty clay, with shale bedrock at ~3.7 to 5.6 m bgs
- Groundwater not encountered in boreholes (i.e., minimal depth of 6+m bgs)
- Slope Stability Study: confirmed a Long-term Stable Slope Line (LTSSL), as shown on all figures herein. This incorporates the specified stable gradient component and toe erosion setback (where necessary). It is generally coincident with the agency approved Top of Bank around the south portion of the property (at the un-named drainage feature ravine), but slightly west of the TOB in the north portion of the site.
- Note that there is a minor change to the LTSSL limit, based on agency comments and as identified in the 2019 Revised Addendum. The revised LTSSL limit is shown on all base plans for the current submission.

5.0 PROPOSED ACTIVITIES

As input to the proposed development and activities, natural heritage and geotechnical feature limits were delineated and/or confirmed (Section 5.1). Setback requirements were then determined based on the features and functions of these adjacent features, and literature guidance (Section 4.2). Brief descriptions of the proposed stormwater management strategy (Cole Engineering 2017) and design are included in Section 5.3.

For the purposes of the impact assessment herein, we focus on development of the tablelands above the valley top of slope. All works associated with the proposed stormwater management strategy (including SWM design and fluvial geomorphology assessment / recommendations) are discussed as part of the previous submission. The reader is directed to the March 2017 EIS and associated documents for details.

5.1 Delineation of Feature Limits

The following natural feature limits have been reviewed, with recommended limits established or confirmed as part of the current study. See Section 6 for additional discussion.

5.1.1 Region of Peel Greenlands

Core Areas of the Greenlands System in Peel are mapped on ROP Schedule A as generally coincident with the top of valley slope on the subject property.

- Based on a review of ROP policies (Section 6.3), we conclude that the un-named tributary ravine also meets criteria as a *Core Areas of the Greenlands System in Peel*
- This limit, including the ravine, has been more accurately delineated as a “Top of Bank” defined by CVC (Young and Young Surveying Inc., February 23, 2004)
    - This limit has been verified through current work, as documented in the Slope Stability Study Addendum (Soil Engineers Ltd. 2016; 2019)

      The Long-Term Stable Slope Line (LTSSL) generally follows the previously delineated Top of Bank, TOB (CVC 2004) along the un-named tributary / drainage feature, but extends up to approximately 12.5 m west of the previous TOB along the Credit River drainage feature.

      The LTSSL (per Soil Engineers Ltd. 2016; 2019) is the recommended ‘valley’ limit as input to natural heritage designations discussed herein.
- The *Core Area* limit has been confirmed at the LTSSL, and extended to include a 25m radius around the Butternut (see Figure 6)

5.1.2 City of Mississauga Natural Hazard

The *Natural Hazard* per Schedule 3 (Natural System) of the MOP is generally coincident with the top of valley slope on the subject property, including a northwest projection that encompasses the ravine associated with the un-named tributary.

- This limit has been more accurately delineated as a "Top of Bank" / "Top of Slope" defined by CVC (Young and Young Surveying Inc., February 23, 2004)
    - Verified through current work, as documented in the Slope Stability Study Addendum (Soil Engineers Ltd. 2016) and revised Addendum (2019)
    - It follows the LTSSL on Soil Engineers Ltd. 2019 Dwg. No. 1 and figures herein
- This limit has been confirmed at the LTSSL, and extended to include a 25m radius around the Butternut (see Figure 6)

5.1.3 City of Mississauga Natural Area CRR11

The *Significant Natural Areas and Natural Green Spaces* feature per Schedule 3 (Natural System) of the MOP is generally coincident with the west bank of the Credit River on the subject property, derived from mapping of *Natural Area CRR11* in the City of Mississauga Natural Areas Survey 2014 Update (North-South Environmental Inc. and City of Mississauga 2014). The CRR11 Natural Areas Fact Sheet is included in Appendix G.

- This is also an *Environmentally Significant Area*; limits of the *Environmentally Significant Area* were confirmed in the field with CVC staff on November 12, 2008 (Dougan & Associates 2009).
- No change to the limits are proposed as part of the current study – the *Significant Natural Areas and Natural Green Spaces* / ESA / CRR11 limit is at the west Credit River bank, following the LTSSL, and including a 25m radius around the Butternut

5.1.4 City of Mississauga Greenlands

The *Greenlands* (Schedule 10 Land Use Designations) and *Green System* (Schedule 1a Urban System – Green System) designations on the subject property are coincident and include the following:

- Natural Heritage System elements (i.e., the *Significant Natural Area CRR11* and *Natural Hazard* per MOP Schedule 3), associated with the Credit River / valley slope
    - Limits are confirmed as the LTSSL (hazards) and west river bank (SNA CRR11), and including a 25m radius around the Butternut
- *Public and Private Open Spaces*, per MOP Schedule 4 (Parks and Open Spaces). This encompasses the natural vegetation in the valley as well as regenerating vegetation on the tableland above the valley slope on the east portion of the subject property

5.2 Setbacks and Development Constraint Limits

5.2.1 Setbacks

The natural heritage features and functions recommended for retention and protection are all associated with the Credit River valley, including the un-named tributary ravine, and all are within the defined top-of-bank / natural hazard limit.

Recommended development setbacks from those features are based on a combination of: the nature and sensitivity of features to be protected; relevant policy and guidance; endeavoring to be consistent with buffers applied to natural features in the area; and buffer guidelines from published literature.

Recommended setbacks:

1. Region *Core Area* + 10 m
2. City *Significant Natural Area* + 10 m
3. Top of Bank / Natural Hazard + 10 m
4. Confirmed *Significant Wildlife Habitat* + 10m

5.2.2 Development Constraint Limit

The recommended development constraint limit is the greater of the recommended setbacks described in Section 5.2.1, as shown on Figure 6. The development limit extends well beyond the constraint limit, including lands to be restored / enhanced as described herein. The development setback is one of the recommended natural heritage mitigation and protection measures; additional measures are described in following sections.

5.3 Description of Proposed Activities

The proposed activities are removal of existing residential homes and construction of one single-detached house and 37 townhouses, along with associated grading, road access and servicing. All works will be restricted to the proposed development envelope, as shown on Figure 6.

Note that some of the servicing / road installation has or will be undertaken as part of the previous 'SWM Outlet' application, with pertinent details summarized herein.

The new storm sewer was constructed in 2018 on Thorny Brae Place with an outfall to the Credit River as part of the approved subdivision agreement under file number T-09002M (4601 Mississauga Road, south of the Church). This storm sewer was sized to also capture storm flows from the proposed development, including sections of Mississauga Road. The location of the approved and constructed storm sewer has been designed in conjunction with the future Thorny Brae Place extension to the east with a new watermain, sanitary sewer system, service connections, roadway

and utilities to be constructed as part of the subject development. Per requirements of the T-09002 approval and associated MOE, CVC, and City permits, work was undertaken in the following sequence: ESC and vegetation protection fencing was installed and inspected and subsequently cleared by City Staff in March 2018; trees and vegetation were removed in accordance with TRP-18-14 prior to April 6, 2018; grading and storm sewer installation and headwall works commenced through Summer 2018 with the completion of works on Thorny Brae in August 2018. Outstanding work includes installation of the restoration plantings, which is scheduled to be completed in Spring 2019, subject to weather conditions.

The proposed development and activities discussed herein are shown on the following:

- Concept Plan (RN Design Ltd., March 2019)
- Stormwater Management Design Brief - Revised. The Archways and Hazel Common Element Condominium (Cole Engineering; June 29, 2017)
- Functional Grading Plan (Cole Engineering; March 2019)
- Functional Servicing Plan (Cole Engineering; March 2019)
- Tree Inventory & Preservation Plan (BTI Landscape Architecture; March 6, 2019)

Key elements of the proposed activities are as follows:

- Prior to any construction, sedimentation control measures and vegetation protection fencing are to be installed at the limits of grading, as shown on Drawing ESC-01 (Cole Engineering; March 2019).
- Restoration and enhancement works within the future valley buffer and contiguous tablelands is discussed within the *Woodland Enhancement Strategy* (Appendix M).
- Existing trees are to be removed inside the designated limit of construction, in compliance with in compliance with the Migratory Birds Convention Act (MBCA), and in consideration of potential SAR bat habitat (i.e., removal during the bat hibernation period from October 1 to March 31 to prevent harm to individuals).
- The Tree Inventory & Preservation Plan and letter (BTI; March 6, 2019) quantify tree retention and removals, as follows:

  In total 144 trees are recommended for removal, 96 of which are due to construction on the subject property:

  - 80 private trees between 10-30cm DBH are recommended for removal:
    - 43 trees due to construction on the subject property
    - 37 trees due to poor condition
  - 39 private trees between over 30cm DBH are recommended for removal:
    - 28 trees due to construction on the subject property

        - 11 trees due to poor condition
    - 25 City owned trees between 10-30cm DBH including one ash tree are recommended for removal due to construction on the subject property

- For trees recommended for removal due to construction, compensation in accordance with City requirements will be determined as a condition of approval.
- The replacement trees should be selected from native tree and shrub species such as Trembling Aspen, White Oak, Basswood, Eastern Hemlock, Eastern White Pine, Northern Bush Honeysuckle, Staghorn Sumac, Flowering Raspberry.
- Buffer enhancement is a component of the *Woodland Enhancement Strategy* (Appendix M), to be finalized as a condition of approval.
- *Woodland Enhancement Strategy* (Appendix M), including the following key elements:
    - Retention of existing higher quality woodland associated with the FOD7-1 vegetation community (as well as CUS communities) north of the approved stormwater management (SWM) outfall easement and temporary access / work area. Retain standing snags, if not hazards.
    - Removal of woodland south of the SWM easement. This is primarily CUW1, with a small amount of FOD7-2 (extension of Vegetation Unit 5c).
    - Creation of new woodland habitat north of the SWM easement (currently cultural meadow), contiguous with retained woodland – via native species plantings and retention of non-invasive tree species.
    - Invasive species control within retained woodland areas and proposed restoration areas. There are several high-density concentrations of five priority taxa identified through scoped field surveys undertaken by WSP in 2018
    - Woodland enhancement plantings with native species.
    - Seed collection of Virginia Stickseed and dispersal through enhancement areas
    - Salvage of logs, rootwads and brush from areas of tree removal.
    - Installation of additional wildlife habitat elements + retention of existing habitat (utilizing materials salvaged from the site).
    - Closure of the informal pedestrian trail.
    - Garbage removal.

5.4 Stormwater Management

The SWM strategy for Thorny Brae is outlined in the Stormwater Management Design Brief - Revised. The Archways and Hazel Common Element Condominium (Cole Engineering; June 29, 2017) and Functional Servicing Report (Cole Engineering; March 2019).

The proposed stormwater management plan meets criteria outlined by the City of Mississauga, CVC and the MOE. Key elements of the SWM strategy are as follows:

- The existing SWM outlet on the subject property will be utilized (with improvements) to accept drainage from the subject property and adjacent two properties to the south: the Church of the Croatian Martyrs; Mississauga Road; and the Archways
- **Water Quantity**. Due to the close proximity to the Credit River, quantity controls are not required.
- **Water Quality**. Since the total asphalt area of the site is comparable to the existing conditions, and the proposed rooftops are will generate "clean" runoff (to infiltration galleries), the overall water quality of the site will remain comparable to existing conditions; therefore, no additional quality controls are required. Notwithstanding this, Low Impact Development (LID) techniques will be considered at detailed design; effective use of LID's will promote infiltration and provide additional water quality measures for the development site. LID techniques being considered include at source infiltration, rain barrels, treatment swales, increased topsoil, etc.,
- **Water Balance**. To be confirmed at detailed design. LID's to be considered as they can promote water balance objectives. LID features may be a combination of at source infiltration, rain barrels, treatment swales, increased topsoil, etc.
- **Erosion & Sedimentation**. Mitigation for erosion and sedimentation in the receiving watercourse (Credit River), via channel improvements / restoration in the drainage channel, as demonstrated through the following previously submitted documents:
    - Plan, Profile and Cross-Section Drawing DET1 and PP1 (Water's Edge; February 2017). These propose fluvial geomorphological works to mitigate erosion potential downstream of the outlet via measures for erosion protection and aquatic habitat enhancement (riffle / pool and step pools; riparian plantings).
    - Tree Inventory & Preservation Plan (BTI Landscape Architecture; March 6, 2019)
    - The Archways Restoration Landscape Plan (Alexander Budrevics & Associates Ltd.; January 12, 2018)

6.0 POLICY ASSESSMENT

Relevant planning legislation and policy pertinent to this study are summarized in the following sections. An overview of key policies and implications is provided along with an assessment of the policy as it relates to natural heritage features within the subject property.

6.1 Federal

6.1.1 Fisheries Act

The Canadian Fisheries Act (1985) provides provisions for the protection of fish and fish habitat. Section 35 (1) of the Fisheries Act states:

> "No person shall carry on any work, undertaking or activity that results in serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery."

The Act interprets 'serious harm to fish' as "the death of fish or any permanent alteration to, or destruction of, fish habitat".

Proponents that plan to undertake activities in or near water have potential to negatively affect fisheries, as such, are responsible for avoiding, mitigating, and offsetting 'serious harm to fish'. Avoidance is achieved by undertaking measures which completely prevent serious harm to fish. These measures include project design considerations, location of activity, and timing of works. Mitigation is implemented by following best practices such as those described in the 'measures to avoid harm' to fish and fish habitat'. Any residual impacts are then required to be addressed by offsetting. An offsetting measure is one that counterbalances serious harm to fish resulting from a project, where serious harm remains after all feasible mitigation measures have been applied.

6.1.1.1 Study Assessment

For the current proposal, no works are proposed in direct or contributing fish habitat.

As part of the separate SWM Outlet process / application, the existing headwall and SWM outlet on the subject property will be upgraded to accommodate additional flows from the re-development of the subject property and adjacent properties to the south (i.e., existing flows from the Church of the Croatian Martyrs and future flows from the 'Archways' property). The requirement for review by the Federal Department of Fisheries and Oceans (DFO) and potential for authorization under the Fisheries Act will be determined at the detailed design phase of the project when the details of the undertaking are known.

Key applicable self-assessment criteria applicable to the construction of, and repairs to, water outfalls include:

- No temporary or permanent increase in existing footprint below the High-Water Mark
- No new temporary or permanent fill placed below the High-Water Mark
- No work occurring below the High-Water Mark of a nearby waterbody

In addition, the drainage swale on the subject property, including the existing SWM outfall draining into the Credit River, was assessed in context of the Fisheries Act. It was concluded that this drainage feature acts as contributing habitat to downstream reaches (i.e., the Credit River) but does not support direct fish use. The portion of the swale above the existing outlet will be piped directly to the outlet post-construction.

The only disturbances and potential for impacts within the Credit River are secondary impacts (e.g. sedimentation) associated with upgrading the existing headwall. Based on the proposed works, review by DFO will not be required as long as all appropriate measures to avoid harm are implemented. Refer to 'Measures to Avoid Harm' on the DFO website: http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/measures-mesures-eng.html. Proposed activities for development of the subject property do not require DFO review.

6.1.2 Migratory Birds Convention Act (1994)

The Migratory Birds Convention Act, MBCA (1994) and Migratory Birds Regulations, MBR (2014) protect most species of migratory birds and their nests and eggs anywhere they are found in Canada, including surrounding ocean waters, regardless of ownership. General prohibitions under the MBCA and MBR protect migratory birds, their nests and eggs and prohibit the deposit of harmful substances in waters / areas frequented by them.

The MBR includes an additional prohibition against incidental take, defined by Environmental Canada as:

> "The inadvertent harming, killing, disturbance or destruction of migratory birds, nests and eggs."

Environment Canada implements policies and guidelines to protect migratory birds, their eggs and their nests. There is guidance on the Environment Canada website to minimize the risk of incidental take effects to migratory birds, to achieve compliance with the law and to maintain sustainable populations of migratory birds.

Compliance with the MBCA and MBR is best achieved through a due diligence approach, which identifies potential risk, based on a site-specific analysis in consideration of the *Avoidance Guidelines* and *Best Management Practices* information on the Environment Canada website

6.1.2.1 Study Assessment

Works with potential MBCA implications may occur during the construction phase of the project when vegetation is removed for project activities, potentially removing nests of migratory birds.

Twenty-three breeding migratory bird species subject to the MBCA were recorded on the subject property. None of these species is solely dependent on the habitat to be directly impacted by proposed development and there is no suitable nesting habitat for several species in areas of proposed development (i.e., Bank Swallow, Barn Swallow, Chimney Swift and Great-blue Heron).

Compliance with the MBCA will be achieved using the following due diligence approach:

- Proponent awareness of the MBCA, potential for nesting in the area and potential for impacts to migratory birds, nests and eggs:
- Implementation of the following avoidance and mitigation measures (to be determined at detailed design), considering for example:
    - Avoiding works (i.e., vegetation / potential nesting habitat removal) within the "regional nesting period" for this area, where possible.
    - Avoiding works in key sensitive locations.
        - The proposed development area is entirely outside of the *Significant Natural Area* (CRR11) and Credit River valley lands.
    - Minimizing encroachment into higher quality, more sensitive habitats.
        - No removal or disturbance of higher quality natural vegetation communities associated with the valley is proposed. Vegetation to be removed is comprised of immature / successional culturally influenced communities (i.e., cultural meadow, cultural thicket, cultural woodland and immature forest) which have established on a former farmstead. These areas provide habitat for avifaunal species that are primarily generalists and/or urban-adapted.
    - Recommended Best Management Practices (BMPs) during construction to minimize potential indirect impacts to vegetation / potential nesting habitat outside of the direct footprint.

6.1.3 Species at Risk Act (2002)

The federal Species at Risk Act (SARA) includes a number of prohibitions to protect individuals of listed Species at Risk, including:

- No person shall kill, harm, harass, capture or take an individual of a threatened, endangered or extirpated species.
- No person shall possess, collect, buy, sell or trade an individual of a threatened, endangered or extirpated species, or any part or derivative of such an individual.
- No person shall damage or destroy the residence of one or more individuals of a threatened or endangered species, or of an extirpated species if a recovery strategy has recommended the reintroduction of the species into the wild in Canada.

These prohibitions apply on private lands throughout Canada only to aquatic species and species of migratory birds protected by the MBCA listed as *Endangered*, *Threatened*, or *Extirpated* under Schedule 1 of SARA. For other listed wildlife species, these prohibitions apply only on federal lands or where recommended by order of the Governor in Council.

SARA also includes provisions to protect critical habitat; these are complex and vary according to the species in question and the location of the critical habitat. SARA's provisions also permit the Minister of the Environment, the Minister of Fisheries and Oceans and the Minister of Canadian Heritage broad discretionary powers to implement (or not) prohibitions to protect critical habitat. Generally, critical habitat protection applies to Threatened, Endangered and Extirpated species.

6.1.3.1 Study Assessment

Applicability:

The proposed development is on non-federal (private) lands and there is no order by Governor in Council; hence SARA applies only to aquatic and migratory bird species / habitat.

Individuals and Residences:

No aquatic species are present in the footprint area and there are no direct impacts to aquatic habitat / species. We are aware of no downstream critical habitat for aquatic SAR species which would be impacted by the proposed activities, with proper implementation of recommended measures to avoid harm during construction. Closest known SAR records are: Shortnose Cisco (*Coregonus reighardi*; approximately 5km downstream at Erindale Park); and Redside Dace (*Clinostomus elongatus*; approximately 6.5km upstream at Highway 401) (DFO SAR Mapping, 2016). The Shortnose Cisco record is likely historical as it has not been captured in Lake Ontario or its tributaries since 1964 and is believed to be extinct.

No federally designated SAR birds were recorded during field surveys.

Critical Habitat:

No critical habitat for SARA-listed aquatic or migratory species is present on the subject property and none is known on adjacent lands where there is potential for direct or indirect impact.

6.2 Provincial

6.2.1 Endangered Species Act (2007)

Species designated as *Threatened* or *Endangered* by COSSARO, otherwise known as Species at Risk in Ontario (SARO), and their habitats (e.g., areas essential for breeding, rearing, feeding, hibernation and migration) are afforded legal protection under the Endangered Species Act (ESA) (Government of Ontario 2007). The ESA (Subsection 9(1)) states that:

"No person shall,

(a) kill, harm, harass, capture or take a living member of a species that is listed on the Species at Risk in Ontario List as an extirpated, endangered or threatened species;

(b) possess, transport, collect, buy, sell, lease, trade or offer to buy, sell, lease or trade,

(i) a living or dead member of a species that is listed on the Species at Risk in Ontario List as an extirpated, endangered or threatened species,

(ii) any part of a living or dead member of a species referred to in subclause (i),

(iii) anything derived from a living or dead member of a species referred to in subclause (i); or

(c) sell, lease, trade or offer to sell, lease or trade anything that the person represents to be a thing described in subclause (b) (i), (ii) or (iii)."

Clause 10(1)(a) of the ESA states that:

"No person shall damage or destroy the habitat of a species that is listed on the Species at Risk in Ontario list as an endangered or threatened species"

The ESA also calls for the development of species-specific Recovery Strategies and Habitat Regulations. Unlike the general habitat of a species, regulated habitat may include areas that are currently unoccupied by the species. These areas are commonly referred to as "recovery habitat."

In order to balance social and economic considerations with protection and recovery goals, the ESA also enables the MNRF to issue permits or enter into agreements with proponents in order to authorize activities that would otherwise be prohibited by subsections 9(1) or 10(1) of the Act provided the legal requirements of the Act are met.

6.2.1.1 Study Assessment

Applicability:

Species afforded protection under the ESA (2007) and their habitats have been recorded within the subject property.

Habitat Screening / Assessment:

A SAR habitat assessment was undertaken, as described in Section 4.6.

Individuals and Residences:

No aquatic habitat is present in areas directly impacted by proposed works and there are no direct impacts to aquatic habitat / species. CVC has indicated that American Eel (*Anguilla rostrate*) is present within this reach of the Credit River; however, any indirect impacts (e.g. downstream sedimentation) will be mitigation with proper implementation of recommended measures to avoid harm during construction (e.g. ESC fencing and other Best Management Practices).

One *Endangered* species was recorded within the subject property: Butternut. As Category 1 evaluated tree, this tree is not subject to the provisions of the ESA (i.e., it could be harmed / removed). Notwithstanding this, the proposed activities do not require removal and it will be retained. Per MNRF comments, nails in the tree will be removed. Refer to Section 4.6.

There is potentially suitable foraging habitat for two *Threatened* bird species (Barn Swallow and Chimney Swift) on the subject property; however no confirmed and/or critical habitat for either of these species will be impacted by the proposed development.

See Section 4.6.5 for additional commentary regarding SAR bats.

6.2.2 Provincial Policy Statement

The Ontario Provincial Policy Statement, PPS (2014) was issued under Section 3 of the Ontario Planning Act. Section 3 of the Planning Act requires that decisions affecting planning matters "shall be consistent with" policy statements issued under the Act (OMMAH 1990). The PPS provides policy direction on land use planning and development matters that are of provincial interest which protect the natural environment as well as public health and safety. Key natural heritage policies are discussed below.

Per Section 2.1.4 of the PPS, development and site alteration shall not be permitted in:

1. *significant wetlands* in Ecoregions 5E, 6E and 7E1; and
2. *significant coastal wetlands*.

Per Section 2.1.5 of the PPS, development and site alteration shall not be permitted in:

3. *significant wetlands* in the Canadian Shield north of Ecoregions 5E, 6E and 7E1;
4. *significant woodlands* in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River);
5. *significant valleylands* in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River);
6. *significant wildlife habitat*;
7. *significant areas of natural and scientific interest*; and
8. *coastal wetlands* in Ecoregions 5E, 6E and 7E1 that are not subject to policy 2.1.4(b)

unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions."

Per Section 2.1.6:

> "Development and site alteration shall not be permitted in *fish habitat* except in accordance with provincial and federal requirements."

Per Section 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."

Per Section 2.1.8:

> "Development and site alteration shall not be permitted on adjacent lands to the natural heritage features and areas identified in policies 2.1.4, 2.1.5, and 2.1.6 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."

6.2.2.1 Study Assessment

The following features are present on or adjacent to the subject property: *significant valleylands*; candidate and confirmed *significant wildlife habitat* (SWH); *fish habitat*; and habitat of *Endangered* and *Threatened* species.

An assessment of PPS natural heritage policies for these attributes is presented below.

Significant Woodlands

None is identified on the subject property (LIO 2016). Analysis of woodland significance is provided under the Region of Peel Official Plan Section 2.3.2.18 (Dec. 2016) and City of Mississauga Official Plan (2018). Significant woodland, as a component of the *Natural Areas and Corridors* (NAC) designation in the ROP, is present within the woodland in the valley (i.e., defined by the valley LTSSL and 25m radius around the Butternut). In addition, *Significant Woodland*, as a component of the *Significant Natural Areas* designation in the City OP, is present in the valleyland forest communities (i.e., valley portions of Units 5a, and 5b).

> **Conclusion**: no development within significant woodland; no impact to feature or function.

Significant Valleylands

The Credit River valley up to the top of bank / LTSSL is designated as a significant valley (per Schedule A of the ROP).

Conclusion: no development within significant valleyland; no impact to feature or function.

Significant Wildlife Habitat

No confirmed SWH is currently identified on the subject property (per existing mapping / databases). Candidate SWH was identified in five categories: Snake hibernacula; bat maternal roosts; Raptor nesting habitat (rivers); Raptor nesting habitat (woodlands); and Wildlife movement corridors. Three confirmed SWH types are present: Species listed as rare in Ontario (Butternut); species listed as Endangered by COSEWIC, but not listed as Endangered or Threatened under the ESA (Monarch); species listed as Special Concern by SARO (Monarch).

Conclusion: Confirmed SWH will be retained in full, with no direct impacts. The proposed activities will not result in negative impact to SWH/candidate SWH features and functions with recommended retention, protection, mitigation and enhancement measures discussed herein. Refer to Table E.1, Appendix E for additional details and Figure 4 for locations.

Fish Habitat

See Section 4.4 for an assessment of aquatic features and fish habitat. The Credit River supports direct fish use; however, the drainage swale located on the subject property provides only contributing habitat to the Credit River and does not support direct fish use.

Conclusion: no development within fish habitat; no impact to feature / function (i.e., no harm), with implementation of recommended protection, mitigation and enhancement measures.

Endangered or Threatened Species

See discussion in Section 4.6 and 6.2.1.

Conclusion: no development within confirmed and/or critical habitat; no impact to feature function with implementation of recommended protection, mitigation and enhancement measures discussed herein.

Development of Adjacent Lands

Lands adjacent to features identified in Policies 2.1.4, 2.1.5 and 2.1.6 have been considered in the current study. Development is proposed on the tablelands portion of the subject property, with potential impacts to ecological features and functions addressed in Section 7.

Conclusion: no impacts to identified ecological features and functions associated with the Credit River valley, with proposed protection and mitigation measures identified herein.

6.3 Regional / Municipal

6.3.1 Region of Peel Official Plan (ROP) (2016)

The ROP was adopted by Regional Council in July 1996 and subsequently approved with modifications by the Minister of Municipal Affairs and Housing in October 1996. Sections of the Plan deemed not under appeal became effective in October 1997. The appeals of the plan were separated into four OMB hearing phases, the last of which become effective in July 1998. The Office Consolidation includes Ministry and OMB approvals as well as approved amendments made through December 2016. The ROP identifies a *Greenlands* System of environmental features and linkages among them. Policies of the Plan have the goal of protecting the natural environment, supporting and strengthening the integrity and long-term sustainability of the ecosystems in Peel and neighbouring municipalities. The *Greenlands System* is comprised of *Core Areas*, *Natural Areas and Corridors* (NAC), and *Potential Natural Areas and Corridors* (PNAC). A summary of designations met on the subject property is presented in Table 5.

6.3.1.1 Core Areas

Core Areas of the Greenlands System in Peel are shown on Schedule A of the ROP as well as on Figure 1. As noted above, a portion of the subject property includes a *Core Area*, whose mapped limit is generally coincident with the top of valley slope (including the un-named tributary ravine) on the subject property, but extended to include a 25m radius around the Butternut. This has been more accurately delineated as a "Top of Bank" / "Top of Slope" defined by CVC (Young and Young Surveying Inc., February 23, 2004).

The *Core Area* on the property is interpreted to have been derived from the *ESA / SNA* (*Natural Area CRR11*), but includes contiguous and naturally vegetated valley slope on the subject property.

No additional *Core Areas*, as defined in Section 2.3.2.2 of the ROP, are present on the subject property outside of the currently mapped limit, but an extension of the mapped limit is recommended. An evaluation of *Core Area* criteria is provided below.

- *significant wetlands*
    - No wetlands are present.
- significant coastal wetlands
    - No wetlands are present.
- core *woodlands* meeting one or more of the criteria in Table 1 of the ROP
    - None is present. Refer to detailed evaluation in Appendix I.

- *Environmentally Sensitive or Significant Areas*[7]
    - The existing *Environmentally Sensitive or Significant Areas* were determined by CVC staff, in conjunction with Dougan and Associates, on November 12, 2008. The surveyed limit generally follows the valley limit. No ESAs are present on tablelands on the subject property and there is no rationale to extend the existing CRR11 *Significant Natural Area* / *Environmentally Sensitive Area*.
- Provincial Life Science *Areas of Natural and Scientific Interest*
    - None is present
- *Significant* habitats of *threatened* and *endangered* species
    - None is present on tablelands on the subject property. One Butternut (end) is present adjacent to the *natural hazard* / *Core Area* associated with the un-named tributary. It will not be harmed by proposed development.
- *Escarpment Natural Areas* of the Niagara Escarpment Plan (NEP)
    - None is present. Not within the NEP area.
- Core *Valley and stream corridors* meeting one or more of the criteria in Table 2 of the ROP
    - Credit River valleyland and ravine associated with the un-named tributary meet evaluation criteria. Refer to detailed evaluation in Appendix I.

Recommendation: Core Area limit to follow surveyed LTSSL / Top of Bank, including the ravine associated with the un-named tributary and within a 25m radius of the Butternut tree. See Figure 6. This is consistent with description of core areas in the introduction of Section 2.3 of the Official Plan: "The Core Areas contain ecological features, forms and/or functions that provide favourable conditions for uninterrupted natural systems and maximum biodiversity." P.47

Policy Compliance

Per Policy 2.3.2.6 of the ROP, *development*[8] and *site alteration*[9] within *Core Areas* is prohibited, with some exceptions.

- The recommended *Core Area* will be retained in full, with development setbacks of 10 m.
- As part of the separate SMW Outlet process / application, *minor development*[10] / *site alteration*

[7] **Environmentally Sensitive or Significant Areas**: places where ecosystem functions warrant special protection. These may include, but are not limited to, rare or unique plant or animal populations or habitats, plant or animal communities, or concentrations of ecological functions.

[8] **Development:** means the creation of a new lot, a change in land use or construction of buildings and structures, requiring approval under the Planning Act but does not include activities that create or maintain infrastructure authorized under an environmental assessment process or works subject to the Drainage Act.

[9] **Site alteration:** activities, such as grading, excavation and the placement of fill that would change the landform and natural vegetative characteristics of a site.

[10] **Minor development:** development, which due to its scale or intensity, can demonstrate no significant incremental or cumulative impacts on the landform, features or ecological functions of the Greenlands System in Peel, as set out in further detail in the area municipal official plans.

[11] for *essential*[12] *infrastructure* is proposed for the modification to the existing SWM outlet and channel.

6.3.1.2 Natural Areas and Corridors

Natural Areas and Corridors (NAC) of the Greenlands System in Peel are defined in Section 2.3.2.9 of the ROP. The Official Plan also notes that: NACs contain ecologically important features and play a crucial role in support of Core Areas; and disturbance to NACs could have an immediate or cumulative impact on ecosystem integrity.

No NACs are mapped in the ROP and they are intended to be identified through the municipal Official Plans. An evaluation of NAC criteria for the subject property is presented below.

- Evaluated non-provincially *significant wetlands*
    - No wetlands are present. Wetlands are present in the adjacent floodplain.
- NAC *woodlands* meeting one or more of the criteria in ROP Table 1
    - The valleyland portion of the woodland on the subject property (i.e., valley portions of Veg. Units 5a and 5b) meets 3 criteria (linkage, surface water quality, significant species and communities). Note that this area is within the recommended *Core Area* limit, which would take precedence over the *NAC* designation.
- *Significant wildlife habitat* meeting one or more of the criteria in Figure 5 of the ROP.
    - No SWH is currently mapped / identified.
    - Based on the detailed evaluation in Appendix E and summary of results in Section 4.4.3, three *Confirmed SWH* types are present: species listed as rare in Ontario (Butternut, S3); species listed as Endangered by COSEWIC, but not listed as *Endangered* or *Threatened* under the ESA (Monarch); species listed as Special Concern by SARO (Monarch). See Figure 4 for locations.
- *Fish habitat*[13]
    - The drainage feature on the subject property acts as contributing habitat to downstream reaches (Credit River) but does not support direct fish use. No impacts to fish habitat with proposed mitigation.
- Regionally significant Life Science *Areas of Natural and Scientific Interest*
    - None is present
- Provincially significant Earth Science *Areas of Natural and Scientific Interest*

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[11] **Minor site alteration:** site alteration, which due to its scale or intensity, can demonstrate no significant incremental or cumulative impacts on the landform, features or ecological functions of the Greenlands System in Peel, as set out in further detail in the area municipal official plans.

[12] **Essential:** necessary to the public interest after all reasonable alternatives have been considered (ROP p. 236)

[13] **Fish habitat:** spawning grounds and nursery, rearing, food supply, and migration areas on which fish depend directly or indirectly in order to carry out their life processes. (ROP pg. 237)

- None is present

- *Escarpment Protection Areas* of the Niagara Escarpment Plan (NEP)
  - None is present. Not within the NEP area.
- The Lake Ontario *shoreline* and *littoral zone* and other *natural lakes* and their *shorelines*
  - None is present
- Any other *valley and stream corridors* that have not been defined as part of the *Core Areas*
  - The ravine associated with the un-named tributary meets this criterion; it is recommended for inclusion in the *Core Area* (limit defined by the LTSSL)
- *Headwater* source and discharge areas
  - None is present
- Any other natural features and functional areas interpreted as part of the Greenlands System Natural Areas and Corridors by the individual area municipalities, in consultation with the conservation authorities and the Ministry of Natural Resources, including, as appropriate, elements of the *Potential Natural Areas and Corridors*
  - PNACs are present, as discussed below

Recommendation: Vegetation Units 5a and 5b within the valleylands are recommended for inclusion as an NAC; however, all areas where NAC criteria are met per the above evaluation are within the recommended Core Area associated with the Credit River valley, including the ravine associated with the un-named tributary.

Policy Implications

The ROP defers protection / stewardship of NACs to area municipal official plans, but suggests that losses of NAC could have an immediate or cumulative impact on ecosystem integrity. No NACs are located within the development envelope and no impacts are anticipated.

6.3.1.3 Potential Natural Areas and Corridors

Potential Natural Areas and Corridors (PNAC) of the Greenlands System in Peel are defined in Section 2.3.2.10 of the ROP. As noted in the Official Plan, PNACs support NAC and Core Area integrity, and may contain important ecological features. The ROP recommends the evaluation and, where appropriate, protection of these features.

None is mapped in the ROP and they are intended to be identified through the municipal Official Plans. An evaluation of PNAC criteria for the subject property is presented below.

- unevaluated *wetlands*
  - No wetlands are present. Wetlands are present in the adjacent floodplain.

- *Cultural woodlands* and *cultural savannahs* within the Urban System and Rural Service Centres meeting one or more of the criteria in Table 1. The evaluation of *Cultural woodlands* and *cultural savannahs* is also subject to policy 2.3.2.19
    - When combined, Units 2, 4, 5c, 6b meet the criteria for inclusion as a PNAC based on size and proximity.
    - Refer to detailed evaluation in Appendix I.
- Any other woodlands greater than 0.5 hectares (1.24 acres)
    - None is present.
- Regionally significant earth Science *Areas of Natural and Scientific Interest*
    - None is present
- Sensitive *groundwater recharge areas*
    - None is present.
- Portions of *Historic shorelines*[14]
    - None is present
- Open space portions of the *Parkway Belt West Plan Area*
    - The portion of the subject property within the defined Credit River valley (excluding the ravine associated with the un-named tributary) is within the *Parkway Belt West Plan Area* and identified as open space in the ROP and MOP
- Potential ESA's identified as such by the conservation authorities
    - None is present
- Any other natural features and functional areas interpreted as part of the *Greenlands System Potential Natural Areas and Corridors*, by the individual area municipalities, in consultation with the conservation authorities
    - None is present.

Recommendation: When combined with natural areas in the adjacent valleylands, the treed vegetation communities on the tablelands (Units 2, 4, 5c, 6b) meet PNAC criteria based on size and proximity, but would not meet the criteria on their own.

The recommended PNAC limit follows the approved treed limit staked on July 17, 2018. See Figure 6.

Policy Implications

Section 2.3 of the ROP recommends that PNACs be evaluated and, where appropriate, protected, but defers to the area municipal official plan. Within the subject property, treed habitats on the tablelands (i.e., (Units 2, 4, 5c, 6b) are concluded to be a PNAC. With the development proposal, the majority of these vegetation communities will be protected. The area proposed for removal (i.e., Unit 6b and a portion of Unit 5c; ~0.2 ha in total) is young, highly disturbed, and does not provide an

[14] Historic shorelines: the steep slopes or other remnants of the shorelines of glacial Lake Iroquois and Lake Peel.

ecological linkage to other natural areas. Moreover, an equivalent area will be protected an enhanced as part of the proposed *Woodland Enhancement Strategy* discussed herein (Appendix M).

The primary objective of this strategy is to enhance the existing but degraded woodland community on the property, relative to the current condition (i.e., presence of non-native / invasive species, limited woodland plant species composition, high edge ratio, and limited woodland understory and ground layer), including retention of the higher quality areas of the woodland. This will result in a healthy, functional deciduous forest community that supports natural succession and has better long-term viability. See the *Woodland Enhancement Strategy* (Appendix M) for further details.

Table 5. Summary of Peel O.P. Designations Met on the Subject Property

Official Plan	Desig-nation	Component	Met?
Region of Peel	Core Areas	Significant wetland	No
		Significant coastal wetlands	No
		Environmentally sensitive areas	Yes, Credit River valleylands
		Provincial Life Science Areas of Natural and Scientific Interest	No
		Significant habitats of Threatened and Endangered Species	Yes, 25 m surrounding Butternut (based on MNRF habitat guidance)
		Core Valley and Stream Corridors	Yes, Credit River valleylands
	NAC	Evaluated non-provincially significant wetlands	No
		NAC woodlands meeting one or more of the criteria in ROP table 1	Yes, Credit River valleylands + 25 m surrounding Butternut
		Fish habitat	Yes, indirect fish habitat from SWM outlet (within the valley)
		Regionally significant Life Science Areas of Natural and Scientific Interest	No
		Provincially significant Earth Science Areas of Natural and Scientific Interest	No
		Escarpment Protection Areas of the Niagara Escarpment Plan	No
		The Lake Ontario shoreline and littoral zone and other natural lakes and their shorelines	No
		Any other valley and stream corridors that have not been defined as part of the Core Areas	No
		Headwater source and discharge areas	No
		Other natural features and functional areas interpreted as part of the Greenlands System Natural Areas and Corridors by municipalities	No
	PNAC	Unevaluated wetlands	No
		Cultural woodlands and savannahs within the Urban System and Rural Service Centres meeting one or more of the criteria in Table 1.	Yes, Units 2, 4, 5c, 6b meet criteria for inclusion as PNAC based on size and proximity
		Any other woodlands greater than 0.5 hectares (1.24 acres)	No
		Regionally significant earth Science Areas of Natural and Scientific Interest	No
		Sensitive groundwater recharge areas	No
		Portions of Historic shorelines	No
		Open space portions of the Parkway Belt West Plan Area	No
		Potential ESA's identified as such by the conservation authorities	No
		Other natural features and functional areas interpreted as part of the Greenlands System Potential Natural Areas and Corridors by municipalities	No

6.3.2 City of Mississauga Official Plan (August 2018 Office Consolidation)

The City of Mississauga Official Plan (MOP) was adopted by Regional Council in July 1996 and approved in October 1996 with an updated consolidation in 2018. Goals of the Plan include the protection, enhancement, restoration and expansion of the *Natural Heritage System*.

The Plan identifies the *Green System* (as mapped on Schedule 1a) in the City of Mississauga which includes: the *Natural Heritage System; Urban Forest*; *Natural Hazard Lands*; and *Parks and Open Spaces*. A portion of the subject property is identified as part of the *Green System*, and each of the four components is mapped and/or present on or adjacent to the subject property – in the Credit River valley and tablelands (north/east):

- Schedule 1 (Urban System): *Green System*
- Schedule 3 (Natural System):
    - *Significant Natural Areas and Natural Green Spaces*
    - *Natural Hazard*
- Schedule 4 (Parks and Open Spaces): *Public and Private Open Space*
- Schedule 10 (Land Use Designations): *Greenlands* and *Natural Hazards*

An evaluation of the various designations and discussion of policy compliance is provided below.

6.3.2.1 Natural Heritage System

The *Natural Heritage System* (per Policy 6.3.9 and as mapped on Schedule 3) is composed of the following (with commentary on application to the subject property): *Significant Natural Areas*; *Natural Green Spaces*; *Special Management Areas*; *Residential Woodlands*; and *Linkages*. The extent of the *Natural Heritage System* is determined through completion of an approved EIS. Minor refinements to the boundaries of the *Natural Heritage System* may occur through an EIS, updates of the *Natural Heritage System*, or other appropriate studies accepted by the City without amendment to the Official Plan, while major boundary changes require an amendment.

Significant Natural Areas

In the Mississauga Official Plan (August 2018), a portion of *Significant Natural Areas* are mapped at the north / east property limit and lands to the east associated with the Credit River valley extending to the west bank of the river. None is mapped on the west valley slope or tablelands on the subject property. It is assumed that this limit is derived from the *Significant Natural Site CRR11*, as mapped in the City of Mississauga Natural Areas Survey 2014 Update. The *Significant Natural Areas* designations are described in Section 6.3.12 of the OP and achieved by meeting one or more of the following criteria:

a. Provincially or regionally significant life science areas of natural and scientific interest (ANSI);

- None is present

b. Environmentally sensitive or significant areas;

- The existing *Environmentally Sensitive or Significant Areas* were determined by CVC staff, in conjunction with Dougan and Associates, on November 12, 2008. The surveyed limit generally follows the valley limit, with an extension to include a 25m radius around the Butternut. No ESAs are present on tablelands on the subject property and there is no rationale to extend the existing CRR11 Significant Natural Area / Environmentally Sensitive Area

c. Habitat of threatened or endangered species;

- One S3 / Endangered species was recorded (Butternut) in Unit 5b. Habitat includes a 25m radius from the trunk

d. Fish habitat;

- The drainage feature acts as contributing habitat to downstream reaches (Credit River) but does not support direct fish use

e. Significant wildlife habitat;

- Three confirmed SWH types are present: Species listed as rare in Ontario (Butternut); species listed as Endangered by COSEWIC, but not listed as Endangered or Threatened under the ESA (Monarch); species listed as Special Concern by SARO (Monarch). All SWH areas are within the retained natural area. See Appendix E for additional details and Figure 4 for locations

f. Significant woodland

- See Table 6 for analysis
- The valleyland forest communities (i.e., the valley portions of Units 5a, and 5b) within the subject property meet criteria for significant woodland

g. Significant wetlands;

- No wetlands are present

h. Significant valleylands are associated with the main branches, major tributaries and other tributaries and watercourse corridors draining directly to Lake Ontario including Credit River

- Valleylands within the Credit River are present within the east portion of the subject property, as defined by the LTSSL

Table 6. Assessment of Woodland Significance based on the Mississauga Official Plan Criteria in Section 6.3.12

Criteria	Criteria Met
Woodlands, excluding *cultural savannahs* >/= 4 ha	No. Total woodland area is ~ 1.5 ha (excluding Unit 2 and 6b[15])
Woodlands, excluding *cultural woodlands* and *cultural savannahs*, >/= 2 ha and < 4ha	No. Total woodland area is ~ 1.5 ha (excluding unit 2 and 6b[15] – see note below)
Any *woodland* > 0.5 ha that supports old growth trees (< 100 yrs old)	No. Trees within the subject property are immature to mid-aged; no older growth present and no late successional characteristics
Any *woodland* > 0.5 ha that supports a linkage function as determined through an approved EIS.	Yes. The forest communities within the valleylands (i.e., the valley portions of Units 5a, and 5b) provide support and function to the Credit River movement corridor. Vegetation communities on the tablelands do not to support the linkage function, as there are no natural features on lands to the west
Any *woodland* > 0.5 ha that is located within 100 m of another Significant Natural Area supporting a significant ecological relations ship between the two features	Yes. The forest communities within the valleylands (Units 5a, and 5b) are located within 100 m of the Credit River valleylands and fish habitat. The forest communities along the tablelands are not considered to provide a significant ecological relationship with the valleylands.
Any *woodland* > 0.5 ha that Is located within 30 m of a watercourse or significant wetland	Yes. The forest communities within the valleylands (Units 5a, and 5b) are located within 100 m of the Credit River. The forest communities on the tablelands are located outside of this distance.
Any *woodland* > 0.5 ha that supports significant species or communities	Yes. One S3 / Endangered species was recorded (Butternut) in Unit 5b (FOD7-2)
Total	**Four** criteria are met by the valleyland forests (Units 5a, and 5b) within the subject property, and thus are considered significant woodland. The tablelands[15] do not meet significant woodland criteria

[15] Section 6.3.13 of the Mississauga OP indicates that cultural savannah and cultural woodland communities that are confirmed to have significant ecological value, as determined by an approved EIS, will be included for the purpose of determining the size of a Significant Woodland and will be included. Based on the vegetation and wildlife characteristics of unit 2 (CUS1) and unit 6b (CUW1), for the purposes of this EIS these communities have been excluded from the calculations and have not been included as Significant Natural Area as they do not provide significant ecological value that contributes to the integrity and function of the broader woodland features on the subject property.

Natural Green Spaces

- Natural Green Spaces are identified if a natural area does not fulfil the requirements of a Significant Natural Area.
    - None is mapped
- Per Policy 6.3.14, the subject property does not meet any of the four criteria for Natural Green Spaces
    a. woodlands greater than 0.5 hectares that do not fulfill the requirements of a significant woodland
        i. Per analysis in Table 6, significant woodland criteria are met for the portions of forest communities within the valley (i.e., portions of Veg. Units 5a and 5b within the valley limit defined by the LTSSL) and habitat within 25m of the butternut. Forest communities on the tablelands (Veg. Unit 5a / b in part) are considered significant woodland
        ii. Under the ROP, the same area is also considered NAC / Significant Woodland. See discussion in Section 6.3.1 and Appendix I.
        iii. Other woodland on the property (i.e., Veg. Units 2, 4, 5c, and 6b; total area ~0.46 ha) does not meet the size threshold
    b. wetlands that do not fulfill the requirements of a significant wetland;
        i. no wetlands are present
    c. watercourses that do not fulfill the requirements of a significant valleyland, even if they are predominantly engineered; and
        i. the un-named watercourse in the ravine is within the valleyland *Core Area*.
    d. all natural areas greater than 0.5 hectares that have vegetation that is uncommon in the city.
        i. With the exception of habitat associated with one Butternut, considered part of the SNA, vegetation outside of the recommended valleyland *Core Area* is common, culturally derived communities that are widespread and abundant.

Special Management Areas

Special Management Areas are areas adjacent to, or in close proximity to, *Significant Natural Areas* or *Natural Green Spaces*. These should be managed to enhance and restore natural functions in support of the Significant Natural Area or Natural Green Space.

- Lands adjacent the SNA will be maintained and enhanced, where possible, to improve the natural function and support the SNA. Refer to the *Woodland Enhancement Strategy*

Residential Woodlands

Residential Woodlands are areas that contain mature trees forming a “fairly continuous canopy and minimal native understory due to maintenance of lawns and landscaping”.

- None is present

Linkages

Linkages are areas necessary to maintain the biodiversity and ecological functions of *Significant Natural Areas* and *Natural Green Spaces* but are not determined to fall under the designations above.

- None is present west of the valleylands. Lands adjacent to the Credit River valley on the tablelands of the subject property will be maintained and enhanced to improve the natural corridor linkage along the valley.

Recommendation:

- SNAs within the subject property are located along the valleylands (from LTSSL to the Credit River), as well as surrounding the Butternut tree. No SNAs are present within the development envelope
- No *Natural Green Spaces* are present on the subject property.
- *Special Management Areas* include the lands adjacent to the SNA
- No *Residential Woodlands* present on the subject property

Table 7. Summary of Natural Heritage System designations from the Mississauga Official Plan

Official Plan	Designation	Component	Met?
City of Mississauga	Significant Natural Area	Provincially/regionally significant life science areas of natural and scientific interest	No
		Environmentally sensitive/significant areas	Yes, Credit River valleylands
		Habitat of threatened/endangered species	Yes, 25 m surrounding Butternut (based on MNRF habitat guidance)
		Fish habitat	No direct fish habitat
		Significant wildlife habitat	Yes, within area defined by the staked treed limit (July 2018) – primarily within the valleylands and partially on adjacent tablelands
		Significant woodland	Yes, Credit River valleylands + 25 m surrounding Butternut
		Significant wetlands	No
		Significant valleylands	Yes, Credit River valleylands – defined by LTSSL
	Natural Green Spaces	Woodlands > 0.5 ha that do not fulfill the requirements of a significant woodland	No
		Wetlands that do not fulfill the requirements of a significant wetland	No
		Watercourses that do not fulfill the requirements of a significant valleyland, even if they are predominantly engineered	No
		All natural areas > 0.5 ha that have vegetation that is uncommon in the city.	No
	Special Management Areas		Yes, lands adjacent to the SNAs
	Residential Woodlands		No
	Linkages		Yes, within the Credit River valley

Policy Compliance:

The proposal complies with natural heritage protection policies (i.e., 6.3.23 through 6.3.38, where relevant), as follows:

- the portion of the *Natural Heritage System* on and adjacent to the development envelope (i.e., the *Significant Natural Area*) will be retained in full, with setbacks and buffer management identified in the current study. No development or site alteration is proposed in *Core Areas* of the *Greenlands System*, *Significant Natural Areas*, *Natural Green Spaces* or *Linkages*.
- Buffer enhancement plantings will utilize appropriate native species
- The current EIS characterizes ecological attributes, significance and sensitivity, and includes recommendations to protect, enhance, restore and expand the *Natural Heritage System* and associated ecological functions
- Potential negative impacts that cannot be avoided will be mitigated through restoration and enhancement as discussed herein, with no net impacts.
- The current EIS demonstrates that negative impacts have been minimized in accordance with the *Greenlands* designation and that there are no negative impacts to natural heritage feature and function (per policy 6.3.29). Refer to Section 7 for additional discussion.

6.3.2.2 Urban Forest & Tree Protection

The *Urban Forest* includes all trees in the City on public and private lands (not mapped). Trees are present on the subject property, within and outside of the *Natural Heritage System.*

In addition, the Private Tree Protection By-law (254-12) applies to the property. This by-law identifies a general prohibition and exceptions for injury / destruction of trees, with requirements for replacement trees as input to permits, where required.

An inventory and assessment of trees on the subject property was undertaken, as shown on the Tree Inventory & Preservation Plan (BTI; March 6, 2019). It is included in Appendix J.

Policy Compliance:

The proposal complies with *Urban Forest* policies (i.e., 6.3.39 through 6.3.46, where relevant) and By-law 254-12, as follows:

- Portions of the *Urban Forest* within the *Natural Heritage System* will be retained in full, as discussed in Section 6.3.2.1.
- The Tree Inventory & Preservation Plan inventoried and assessed health of trees within the subject property and quantified removals (BTI; March 6, 2019). Refer to Appendix J.
- For trees recommended for removal due to construction, compensation in accordance with

City requirements will be determined as a condition of approval, thereby demonstrating no negative impact to the *Urban Forest* resulting from proposed development / site alteration.

6.3.2.3 Natural Hazard Lands

Schedule 3 (Natural System) of the MOP maps *Natural Hazard Lands* at the north / east property limit – coincident with the Credit River valley top of slope, including the ravine associated with the un-named tributary.

- Top of Bank / valley slope for the valleyland *Natural Hazard*, previously delineated by the CVC in 2004 and shown on the drawing prepared by Schaeffer Dzaldov Bennett Ltd., dated July 21, 2015.
    - This limit has been verified through current work, as documented in the Slope Stability Study Addendum (Soil Engineers Ltd. 2016) and the Revised Slope Stability Study Addendum (Soil Engineers Ltd.; March 2019).
    - The LTSSL generally follows the previously delineated Top of Bank, TOB (CVC 2004) along the un-named drainage feature, but extends approximately 12.5 west of the TOB limit on the north portion of the property.

Policy Compliance:

The proposal complies with *Valleylands* and *Flood Plain* policies (i.e., 6.3.47 through 6.3.55, where relevant), as follows:

- Proposed works are supported by detailed engineering studies in reports prepared under separate cover and considered herein (i.e., slope stability, erosion, fluvial geomorphology)
- No development or site alteration is proposed in the valley or floodplain. Note that works associated with the upgraded SWM outlet and drainage feature enhancements have been completed as part of the approved SWM Outlet authorization.
- Slope stability. No works for the development are proposed within the LTSSL; grading limits respect the recommended LTSSL + 10 m setback. Note that works associated with the SWM outlet improvements minimize footprint and provide mitigation measures and post-construction enhancements.

6.3.2.4 Parks and Open Spaces

Schedule 4 (Parks and Open Spaces) of the MOP maps *Public and Private Open Spaces* on the east portion of the subject property (see Figure 1).

- The subject property is private land and it is not clear what component of *Public and Private Open Spaces* has been identified; it is presumed to be “conservation”.

Policy Compliance:

The proposal complies with *Parks and Open Space* policies (i.e., 6.3.64 through 6.3.86, where relevant), as follows:

- The significant treed areas associated with the valleyland *Core Area* and recommended buffer will be retained
- Given the steepness of slopes and sensitivity of adjacent *Core Areas* in the valleyland, this is not recommended for park land and no pedestrian access is proposed
- Stormwater Best Management Practices are proposed for consideration (e.g., Low Impact Development [LID] measures such as lot-level infiltration galleries and/or swales). LID's will be discussed in the detailed design submission.

6.3.3 Credit Valley Conservation Authority

The Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses (Ontario Regulation 160/06), is a regulation issued under the Conservation Authorities Act, R.S.O. 1990. Through this, CVC has the responsibility to regulate activities in natural and hazardous areas (e.g., areas in and near rivers, streams, floodplains, wetlands, slopes and shorelines).

A permit will be required from the CVC under the Reg. 160/06 to proceed with site alteration within regulated areas. In addition, site alteration proposed within 120 m of these features, requires the completion of an EIS to evaluate and demonstrate that there will be no negative impacts on the identified natural feature or on its ecological functions, as described under Reg. 160/06.

Policy Compliance:

The north/east portion of the subject property (~1/2) is located within CVC regulated lands (i.e., Credit River valley and adjacent lands). The current application complies with requirements of the Planning and Development Administrative Procedural Manual (CVC Dec. 2011), as follows:

- Completion of an EIS in accordance with the Environmental Impact Study Terms of Reference (CVC 2008), as informed by: pre-consultation; meetings with CVC staff; review of / input to the draft TOR by CVC staff; site walks; and review of the submitted EIS.
- Per Section 4.1, a permit will be required for the current application since development within a regulated area are proposed. Per O. Reg. 160/06, Section 3(1), the proposal will not affect the control of flooding, erosion, dynamic beaches, pollution or the conservation of land, based on the following:
    - Stable top of slope has been determined and respected in the proposed design/works. The proposed works will not negatively impact the stable top of slope.
    - Floodplain / 100-year flood – detailed design of the stormwater management pipe

(from the right of way, upstream of the existing headwall) and the proposed rehabilitation/restoration of the existing drainage feature (downstream of the existing headwall) takes into account and is meant to withstand impacts from a 100-year flood.

- The proposed SWM strategy will not exacerbate erosion in the existing drainage feature. As part of the 'SWM Outlet' application, potential erosion impacts in the channel are discussed, with mitigation proposed through design measures (Waters Edge; February 2017).
- Natural Heritage. No wetlands are impacted. Natural heritage features and functions are protected and enhanced as discussed herein. Stable top of slope has been determined and respected in the proposed design / works

7.0 IMPACT ANALYSIS AND MITIGATION

7.1 Impact Overview and Mitigation Measures

With the proposed development, there will be minor direct impacts to some natural vegetation on the tablelands of the subject property (i.e., removal), with no long-term impact to retained natural heritage features (predominantly within the valleylands) and their ecological functions. Potential indirect impacts include 'during' and 'post-construction' effects such as construction related activities, surface runoff effects on receiving areas and occupancy related effects on retained adjacent natural areas.

Proposed mitigation measures are outlined below, with a detailed assessment in Table 8, for three primary natural environment factors (aquatic habitat, vegetation and wildlife / habitat). In Table 8, each factor is reviewed in terms of potential effects, proposed mitigation and residual effects. The identified mitigation measures will be incorporated with appropriate wording on construction drawings and the detailed site plans that will be finalized prior to any site grading / disturbance. The proposed works and recommended mitigation / enhancement measures are provided on drawings included in Appendix H and Appendix J.

With the proposed development envelope, there will be no direct impact to currently designated natural heritage features, features which meet criteria for designation based on analysis presented herein or known habitat for species at risk.

Specific mitigation and environmental management measures are discussed in Table 8. These include:

- Development setbacks as described in Section 5.2.1
- Buffer restoration / enhancement, as part of the *Woodland Enhancement Strategy* discussed below and in consideration of recommendations in Section 5.3

- A *Woodland Enhancement Strategy* has been prepared by WSP (Appendix M). The plan was submitted as a draft in November 2018 and the revised version discussed herein incorporates edits and comments from CVC and City staff. Key elements of the strategy include: retention of existing higher quality woodland; retaining standing snags, if not hazards; removal of woodland south of the SWM easement / temporary access - work area; creation of new woodland habitat north of the SWM easement (currently cultural meadow); invasive species control within retained woodland areas and proposed restoration areas; woodland enhancement plantings with native species; seed collection of Virginia Stickseed and dispersal through enhancement areas; salvage of logs, rootwads and brush from areas of tree removal; installation of additional wildlife habitat elements + retention of existing habitat (utilizing materials salvaged from the site); closure of the informal pedestrian trail; and garbage removal.

  For additional details, refer to Appendix M.

- Post-construction biological monitoring plan, included in the *Woodland Enhancement Strategy*, and including the following key elements:
  - Two years of post-construction monitoring of plantings, invasive species, breeding bird use and general woodland health.
- Permanent fencing at the development / retained natural area interface - to restrict uncontrolled access to the valleylands and prevent rear yard 'creep' into the natural area
- Signage identifying the presence of a ‘sensitive natural area’ is recommended at regular intervals along the development / valley interface.
- Implementation of the recommended SWM strategy, with refinements at detailed design, which will maintain water inputs to the channel / Credit River and mitigate potential erosion and sedimentation in downstream receiving areas
- Implementation of the recommended SWM outlet / channel improvements (previous submission Water's Edge; 2017). That proposal will mitigate potential additional erosion (relative to the current condition where erosion is occurring and the drainage feature will continue to degrade over time) via stabilization and drainage feature design measures. Outstanding works are anticipated for completion in 2019.
- Best management practices during construction:
  - Erosion and Sediment Control (ESC) Plan including ESC fencing installed at grading limits prior to and throughout construction;
  - Installation of vegetation protection fencing, coincident with the ESC fencing, prior to and throughout construction.
  - Spills Management Plan; guidelines for heavy equipment use to reduce potential for damage to natural areas (mechanical damage to trees, soils compaction etc.);

- Follow the Clean Equipment Protocol for Industry (Ontario Invasive Plant Council 2013);
- Clear delineation of the protected natural area / valleylands via permanent fencing and signage at the development / valley interface
- Restricted access to the natural area / valleylands via fencing and no trail connections

Table 8. Thorny Brae Development – Impact Assessment

Feature Significance and Sensitivity	Natural Environment Impacts	Mitigation Measures	Residual Effects
Aquatic Resources			
<u>Subject Property</u> • Un-named ephemeral drainage feature includes reaches on the Credit River valley slope and within the floodplain and a poorly defined draw on tablelands above the slope • No evidence of springs or groundwater seepage • Majority of drainage feature on steep slopes and tablelands does not provide direct fish habitat. The lower reach on the Credit River floodplain may provide temporary habitat for fish during high water events **<u>Adjacent Lands</u>** • Credit River – with intermittent direct connectivity as noted above	**Long-term** • No removal of, or direct impacts to fish habitat as part of the development proposal. • Potential impacts to the drainage feature and receiving watercourse (Credit River) resulting from increased erosion / sedimentation (due to increased SWM discharge) from the development lands • The upper reaches of the drainage feature within the development envelope have been removed via the approved SWM strategy (per TRP-18-14 and T-09002), detailed as part of the SWM Outlet application. Lower reaches will be improved via the proposed channel restoration strategy. • **Hydrogeology and Hydrology.** There is potential for impacts to the drainage feature resulting from changes to groundwater and surface water inputs post-construction. • **Occupancy-related Impacts.** There is some potential, including: informal trail creation reducing the amount of stream shading and cover provided by riparian vegetation; refuse dumping; or water quality effects related to residential uses (i.e. salt, pesticides). **During-construction.** There is potential for temporary impacts to the retained reaches of the drainage feature (downstream of the SWM outlet) during construction. These include: erosion and sedimentation; and spills of contaminants/fuels; impacts from dewatering (interruption of groundwater contribution; discharge increasing potential for sedimentation).	• **Long-term Impacts** mitigated by: ○ Maintaining water inputs to the retained portion of the drainage feature and Credit River. Water balance to be clarified at detailed design. ○ Specific mitigation measures for the SWM outlet / channel works under the separate SWM Outlet process / application, including: ▪ Stabilization of the drainage feature to reduce erosion potential and sedimentation of downstream reaches and the Credit River ▪ Aquatic and riparian zone enhancements (riffle – pool and step – pool sequences, riparian zone plantings) ○ Considering the implementation of LIDs to reduce surface runoff and promote infiltration and improved water quality. LIDs manage SWM runoff and mimic the natural process of infiltration. They improve water quality by removing surface pollutants such as nutrients, contaminants, bacteria and suspended solids and preventing them from entering the Credit River. To be confirmed at detailed design. • **During-construction (short-term).** Mitigated by ○ Specific mitigation measures for the SWM outlet / channel works under the separate SWM Outlet process / application, including: ▪ Respecting a warmwater timing window for protection of spawning salmonids in the Credit River. Note that works will not block salmonid movement in the river. ▪ Utilizing designated stockpile and dewatering areas, as required ○ Implementing an ESC plan, with ESC fencing to be installed prior to any site grading ○ Implementing a Spills Management Plan and BMPs during construction	• There will be no direct impacts to fish or habitat for direct fish use. • No anticipated adverse effects to groundwater, aquatic habitat and fisheries from construction activities are anticipated with implementation of recommended mitigation measures, with details to be provided at detailed design. • Residual long-term effects to aquatic habitat and fisheries are anticipated to be minor or negligible, considering: ○ Aquatic habitat will be enhanced relative to the current condition, via improved drainage feature stabilization (mitigating erosion) and improvements to aquatic habitat via recommended works (per recommendations in the 'SWM Outlet' application)

Feature Significance and Sensitivity	Natural Environment Impacts	Mitigation Measures	Residual Effects
Vegetation			

• **Vegetation**. The subject property is composed of a mosaic of culturally derived or culturally influenced vegetation on a former farmstead (tablelands) and forested slopes within the Credit River valley. None of the vegetation communities is provincially rare.
• **Flora**. 105 vascular plant species were recorded, 48% of which are non-native. This is a mix of typical early successional, tolerant species in more disturbed areas with forest-associates on the valley slope
• **SAR**. One SAR was recorded in the subject property: Butternut. One tree is present in the vicinity of the SWM outlet within Unit 5b in the valley.
• Four regionally or locally rare species were recorded:
  ○ Allegheny Serviceberry (Unit 5a - one individual);
  ○ Wild Cranes'-bill (occasional within Units Unit 5a and 5b);
  ○ Virginia Stickseed (sparse within Units 1, 3, 4, 6a and 6b); and
  ○ Catchweed Bedstraw (sparse in localized patches in Unit 2)
• **Designated / Natural Areas**. The vegetation communities within the Credit River valley (as defined by the LTSSL) are considered *Core Areas* of the Greenlands System in Peel and City of Mississauga Natural Hazard / Significant Natural Area / Greenlands. See additional discussion in Section 6
	Direct Impacts.
	• Permanent removal of (~ 8,765 m^2 of successional / tolerant vegetation on the tablelands above the LTSSL).
	• Recommended tree removals (per the Tree Inventory & Preservation Plan (BTI; March 6, 2019) as follows:
	  ○ 25 trees (10 - 30 cm DBH) due to construction on the subject property, including one dead / dying ash tree
	  ○ 89 trees (10 - 30 cm DBH) due to construction on City property, including 12 dead / dying ash trees
	  ○ 30 trees (10 - 30 cm DBH) due to construction on City property, including two dead / dying ash trees
	  ○ Trees over 10 cm DBH to be replaced with native tree and shrub species
	• No impacts to SAR
	Potential impacts to regionally / locally significant species: Virginia Stickseed. While the majority of the individuals of this species found on the subject property are being retained within the enhancement areas, they are sparsely found within Unit 6b as well. Further mitigation to occur via seed collection and distribution in enhancement areas.
	Indirect Impacts. There is potential for indirect impacts to vegetation as the result of construction.
	• **Edge Effects.** Vegetation dieback at the forest edge can result from exposure of retained trees and forest habitat to additional sunlight and invasive plant species which can lead to trunk damage (sunscald), increased drying of the forest, and localized changes in ground flora (e.g. increase in exotic / invasive species).
	However, theses impacts are anticipated to be very limited to negligible as there is a strong anthropogenic influence already and retained forest will be protected through the retention of vegetation in the proposed buffer.
	• **Occupancy-related Impacts.** There is some potential, including: informal trail creation damaging vegetation and introducing invasive species; refuse dumping; or water quality effects related to residential uses (i.e. salt, pesticides).
	• **Construction-related Impacts (short-term)**, including: damage to vegetation outside the work zone; sedimentation; spills of contaminants; root pruning; damage to limbs; and soil compaction.
		Direct Impacts to be mitigated by:
		• Maintaining high quality, more mature forest vegetation within the valley
		• Installing temporary **Vegetation Protection Fencing** prior to any site grading to delineate the work zone and prevent direct damage to adjacent retained vegetation (i.e. mechanical damage, root damage, soil compaction). This fencing will remain until construction is complete.
		• Implementing buffer management measures, as a component of the *Woodland Enhancement Strategy*, and finalized as a condition of approval
		• Implementing the *Woodland Enhancement Strategy*
		  ○ Compensating for tree removals in accordance with City requirements (to be determined) Recommendations for tree planting to compensate for the removal of these trees will be determined as part of a future submission, to the satisfaction of City and CVC
		  • Retaining regionally / locally rare species, where possible, within the future buffer and considering seed salvage for Virginia Stickseed in areas to be removed.
		Indirect Impacts to be mitigated by:
		• Implementing an ESC plan, with ESC fencing to be installed prior to any site grading
		• Installing vegetation protection fencing at grading limits
		• Maintaining hydrogeological inputs to dependent vegetation, as required - to be confirmed at detailed design
		• Measures to mitigate occupancy-related effects:
		  ○ Permanent fencing at the development / retained natural area interface to restrict access and prevent rear year 'spread'
		  ○ Signage at the development / retained natural area interface
		  ○ No trail access to the retained natural area / valley
		  ○ Encouraging resident stewardship (e.g., watering, contaminants, vegetation / rubbish dumping, controlling pets)
			Residual impacts to vegetation are anticipated to be minor, with proper implementation of recommended mitigation measures.
			• Direct impacts will be restricted to removal of early successional vegetation and immature woodland within anthropogenically influenced / derived vegetation communities.
			These removals represent a very minor proportion of woodland vegetation in the Credit River valley and broader landscape
			• No provincially significant vegetation types or SAR / provincially significant plants will be removed or impacted
			• Tree removals will be compensated, in accordance with City and CVC requirements
			• Overall woodland function will be improved with implementation of the *Woodland Enhancement Strategy*
			• Residual impacts from construction are anticipated to be negligible, with implementation of recommended vegetation protection fencing, ESC fencing and spills management plan and compensation / enhancement plantings.

Feature Significance and Sensitivity	Natural Environment Impacts	Mitigation Measures	Residual Effects
Wildlife			
• **General**. Small site that provides habitat for a mix of urban-adapted and wetland / woodland associated species (the latter primarily associated with the Credit River valley). • **Avifauna**. 23 breeding bird species recorded; these are a mix of common generalists and urban-adapted species, with forest-associated species in the treed areas of the subject property and adjacent lands. • **Herpetofauna**. None recorded during current work; two species recorded during previous studies. No amphibian breeding areas are present and no reptile hibernacula / potential hibernacula sites were noted within the subject property or vicinity. • **Mammals**. Four common urban-adapted species recorded. Woodland habitat, including three deciduous trees with cavities that may be suitable for SAR bat roosting / maternity colony is present, with more mature forest restricted to the valley. • **SAR habitat**. No confirmed SAR wildlife habitat. Potential SAR bat habitat as noted above. • **SCC**. Cooper's Hawk (Area Sensitive per MNRF [2015] and Species of Interest per CVC [2010]) was recorded as a potential breeding species. • **SWH**. None is currently identified/mapped. Three confirmed SWH type identified during current study: SAR (Butternut) habitat; END species by COSEWIC not listed as END or THR under the ESA (Monarch); SC species by SARO (Monarch). Five candidate SWH types identified during current study, associated with treed/riverine/slope habitats in the Credit River valley and forest habitats on the tablelands. • **Wildlife Movement Corridors**. The Credit River valley on adjacent lands is a natural wildlife movement corridor. None is present on the majority of the subject property (i.e., on any lands outside of the valley).	Potential impacts on wildlife habitat are similar to those discussed for vegetation (i.e. removal of culturally influenced vegetation within the proposed development envelope). • **Direct impacts**. Removal of ~ 8,765 m^2 of culturally derived wildlife habitat (CUM, CUT, CUW and FOD) within Units 1a, 1b, 4, 5c, 6a and 6b. None of this habitat is within the valley as defined by the LTSSL. ○ **Movement opportunities**. No impact to wildlife movement opportunities is anticipated. No defined movement trails are present on the subject property and significant barriers to movement exist at the west and north limits of the property. Broader movement opportunities along the Credit River valley will be maintained. ○ **Habitat for wildlife species of concern** will not be impacted. Potential woodland habitat (for Cooper's Hawk) in the retained natural area / valley will be retained. ○ **SAR habitat** will not be impacted. Suitable SAR bat maternal roosting habitat (3 cavity trees and forest habitat) retained. Small area of potentially suitable Monarch breeding habitat and some foraging habitat retained and Butternut habitat will be retained. ○ **SWH** will not be impacted. Vegetation removals on the tableland will not impact function of confirmed or candidate SWH predominantly associated with the Credit River valley (which is abundant in the local landscape). • **Indirect Impacts**. ○ Occupancy-related Impacts. There is some potential, including: informal trail creation damaging vegetation and introducing invasive species; refuse dumping; pet predation of wildlife; or water quality effects related to residential uses (i.e. salt, pesticides). ○ **Construction-related Impacts (short-term)**. These include: damage to vegetation outside the work zone; sedimentation; spills of contaminants / fuels; root pruning; damage to limbs; and soil compaction.	Retention and protection of vegetation in the retained natural area / Credit River valley (as defined by the LTSSL) will also protect wildlife habitat. Mitigation measures for vegetation also apply to wildlife habitat. Mitigation measures for wildlife are as follows: • All measures specified under 'vegetation'. • **Timing of works**. ○ To protect breeding birds, avoid works (particularly vegetation / potential nesting habitat removal) within the "regional nesting period", or use other suitable approach to demonstrate compliance with the MBCA. The regional nesting period for the majority of species in this area (Zone C2) is early April – late August. Restriction of activities which could harm birds/nests/eggs within the nesting period is one mechanism of a demonstration of MBCA compliance; however, it is the responsibility of the proponent to demonstrate compliance. ○ To protect SAR bats potentially present, trees are to be removed inside the designated limit of construction during the bat hibernation period from October 1 to March 31 (when bats are not present).	Residual impacts to wildlife and wildlife habitat resulting from the proposed development are anticipated to be very minor considering: • The proposed footprint is very small and there is no direct impact to unique, significant or sensitive wildlife habitats or wildlife movement opportunities. Vegetation removals are limited to early successional meadow / thicket and immature woodland. • Measures are proposed to reduce potential for indirect impacts to offsite wildlife habitat during construction (i.e. work zone delineation / tree protection fencing, ESC measures and other BMPs during construction) and resulting from occupancy. • Overall woodland function will be improved with implementation of the *Woodland Enhancement Strategy*

7.2 Net Effects

With proper implementation of proposed protection, mitigation and enhancement measures identified herein, net effects to natural heritage features and functions are expected to be minor. Ecological features and functions of the Credit River valley and significant contiguous habitats will be maintained and overall woodland function will be improved with implementation of the *Woodland Enhancement Strategy*.

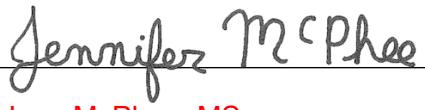
8.0 CONCLUSIONS & RECOMMENDATIONS

Based on the review discussed herein, we support the proposed development on the subject property. The proposed works can be undertaken while protecting environmental features, in consideration of the following:

- The broader environmental context has been considered in the following manner:
    - The natural environment review and site investigations have fulfilled the role of addressing ecosystem features / functions and identifying opportunities, constraints and mitigation strategies.
    - The proposed works comply with policies at the local, regional, provincial and federal level, including species designations and policies of the City of Mississauga Official Plan, Peel Region Official Plan and PPS
- The SWM strategy and SWM outlet / channel design (per separate application, partially implemented as of late winter 2019) have minimized potential impacts to natural heritage features and functions (all associated with the Credit River valley) to the extent possible.
- The proposed development will mitigate potential impacts to the Credit River valley ecological features and functions, by:
    - Retaining all valley vegetation with a minimum 10 m setback from the LTSSL
    - Retaining significant vegetation, wildlife habitat and species of conservation concern, all of which are primarily associated with the valleylands and areas of contiguous forest habitat
    - Enhancing the existing woodland via a *Woodland Enhancement Strategy* included herein and to be finalized at detailed design

- Ensuring water inputs to receiving watercourses and vegetation
- Installing fencing at the development / retained natural area interface to delineate the natural area, restrict access, and prevent rear yard 'creep' into the natural area
- Installing signage at the development / retained natural area interface and encouraging stewardship of the adjacent natural area
- Utilizing best management practices during construction, including: ESC fencing, vegetation protection fencing; timing restrictions for tree removals; and other measures.

Prepared by



March 22, 2019

Jenn McPhee, MSc.,
Ecologist

Date

Reviewed by

March 22, 2019

Jeff Gross, MSc.,
Senior Ecologist

Date

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