TOWN OF CALEDON PLANNING RECEIVED

Sept.17, 2021

Comprehensive Environmental Impact Study and Management Plan (CEISMP) Snell's Hollow East Secondary Plan

Part A – Existing Baseline Conditions & Characterization Part B – Land Use Evaluation & Impact Assessment

Snell's Hollow Developers Group c/o Glenn Schnarr & Associates Inc. 700-10 Kingsbridge Garden Circle Mississauga ON L5R 3K6

[Logo Placeholder]

August 2021 300051670.0000

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

Distribution List

No. of Hard Copies	PDF	Email	Organization Name
0	Yes	Yes	Glen Schnarr & Associates Inc. (GSAI)
0	Yes	Yes	Toronto and Region Conservation Authority (TRCA)
0	Yes	Yes	Town of Caledon

Record of Revisions

Revision	Date	Description
0	July 8, 2021	Initial Submission to Landowners Group c/o GSAI for
		Review
1	August 12, 2021	Draft Submission to the Town and TRCA

Report Prepared By:

Hannah Maciver Project Coordinator/Ecologist HM:bs

Report Reviewed By:

Jennifer Szczerbak Vice President Ecology, Land Development JS:bs

Table of Contents

PART	A – E	XISTING	BASELINE CONDITIONS & CHARACTERIZATION	1		
1.0	Intro	duction	to the Study Area	1		
2.0	Report Structure1					
3.0	Planning and Policy Considerations					
	3.1 Species at Risk Act, 2002					
	3.2	Federal	Fisheries Act, 1985	5		
		3.2.1	Background and the Fisheries Act	5		
		3.2.2	New Fish and Fish Habitat Provisions Under Bill C-68	5		
		3.2.3	Proponent-led Self Assessment Process	6		
	3.3	Migrato	ry Birds Convention Act, 1994	6		
	3.4	Plannin	g Act, 1990/Provincial Policy Statement, 2020	7		
	3.5	Provinc	ial Endangered Species Act, 2007	8		
	3.6	Toronto	and Region Conservation Authority	.10		
		3.6.1	Ontario Regulation 166/06	.10		
		3.6.2	Toronto and Region Conservation Authority Living City Policies	.10		
		3.6.3	Other Toronto and Region Conservation Authority Reports	.11		
	3.7	Municip	al Official Plans	.11		
		3.7.1	Region of Peel Official Plan	.11		
		3.7.2	Town of Caledon Official Plan	.12		
4.0	Back	ground	Environmental Information and Agency Consultation	.12		
4.0 5.0	Back Phys	ground ical Env	Environmental Information and Agency Consultation	.12 .14		
4.0 5.0	Back Phys 5.1	ground ical Env Physiog	Environmental Information and Agency Consultation vironment – Baseline Inventory graphy and Topography	. 12 . 14 .14		
4.0 5.0	Back Phys 5.1 5.2	ground ical Env Physiog Geology	Environmental Information and Agency Consultation vironment – Baseline Inventory graphy and Topography y and Hydrogeology	. 12 . 14 .14 .14		
4.0 5.0	Back Phys 5.1 5.2 5.3	ground ical Env Physiog Geology Erosion	Environmental Information and Agency Consultation vironment – Baseline Inventory graphy and Topography y and Hydrogeology	.12 .14 .14 .14 .15		
4.0 5.0	Back Phys 5.1 5.2 5.3	ground ical Env Physiog Geology Erosion 5.3.1	Environmental Information and Agency Consultation vironment – Baseline Inventory graphy and Topography y and Hydrogeology Fluvial Geomorphological Assessment	.12 .14 .14 .15 .15		
4.0 5.0	Back Phys 5.1 5.2 5.3	ground ical Env Physiog Geology Erosion 5.3.1 5.3.2	Environmental Information and Agency Consultation vironment – Baseline Inventory graphy and Topography y and Hydrogeology Fluvial Geomorphological Assessment Erosion Threshold Analysis	.12 .14 .14 .15 .15 .17		
4.0 5.0	Back Phys 5.1 5.2 5.3 5.4	ground ical Env Physiog Geology Erosion 5.3.1 5.3.2 Water E	Environmental Information and Agency Consultation vironment – Baseline Inventory graphy and Topography y and Hydrogeology Fluvial Geomorphological Assessment Erosion Threshold Analysis Balance	.12 .14 .14 .15 .15 .15 .17 .20		
4.0 5.0	Back Phys 5.1 5.2 5.3 5.4	ground ical Env Physiog Geology Erosion 5.3.1 5.3.2 Water E 5.4.1	Environmental Information and Agency Consultation vironment – Baseline Inventory graphy and Topography y and Hydrogeology Fluvial Geomorphological Assessment Erosion Threshold Analysis Balance Pre-Development Water Budget	.12 .14 .14 .15 .15 .15 .17 .20 .20		
4.0 5.0	Back Phys 5.1 5.2 5.3 5.4 5.5	ground ical Env Physiog Geology Erosion 5.3.1 5.3.2 Water E 5.4.1 Surface	Environmental Information and Agency Consultation prironment – Baseline Inventory graphy and Topography y and Hydrogeology Fluvial Geomorphological Assessment Erosion Threshold Analysis Balance Pre-Development Water Budget Water Resources	.12 .14 .14 .15 .15 .17 .20 .20 .21		
4.0 5.0	Back Phys 5.1 5.2 5.3 5.4 5.5	ground ical Env Physiog Geology Erosion 5.3.1 5.3.2 Water E 5.4.1 Surface 5.5.1	Environmental Information and Agency Consultation vironment – Baseline Inventory	.12 .14 .14 .15 .15 .17 .20 .20 .21		
4.0 5.0	Back Phys 5.1 5.2 5.3 5.4 5.5	ground ical Env Physiog Geology Erosion 5.3.1 5.3.2 Water E 5.4.1 Surface 5.5.1 5.5.2	Environmental Information and Agency Consultation prironment – Baseline Inventory	.12 .14 .14 .15 .15 .17 .20 .21 .21 .22		
4.0 5.0	Back Phys 5.1 5.2 5.3 5.4 5.5	ground ical Env Physiog Geology Erosion 5.3.1 5.3.2 Water E 5.4.1 Surface 5.5.1 5.5.2 5.5.3	Environmental Information and Agency Consultation prironment – Baseline Inventory	.12 .14 .14 .15 .15 .20 .20 .21 .21 .22 .24		
4.0 5.0	Back Phys 5.1 5.2 5.3 5.4 5.5	ground ical Env Physiog Geology Erosion 5.3.1 5.3.2 Water E 5.4.1 Surface 5.5.1 5.5.2 5.5.3 5.5.4	Environmental Information and Agency Consultation provide the provide the provided the pro	.12 .14 .14 .15 .15 .20 .20 .21 .22 .22 .24 .25		
4.0 5.0	Back Phys 5.1 5.2 5.3 5.4 5.5 5.6	ground ical Env Physiog Geology Erosion 5.3.1 5.3.2 Water E 5.4.1 Surface 5.5.1 5.5.2 5.5.3 5.5.4 Natural	Environmental Information and Agency Consultation graphy and Topography	.12 .14 .14 .15 .15 .20 .21 .20 .21 .22 .24 .25 .27		
4.0 5.0	Back Phys 5.1 5.2 5.3 5.4 5.5 5.6	ground ical Env Physiog Geology Erosion 5.3.1 5.3.2 Water E 5.4.1 Surface 5.5.1 5.5.2 5.5.3 5.5.3 5.5.4 Natural 5.6.1	Environmental Information and Agency Consultation prironment – Baseline Inventory	.12 .14 .14 .15 .15 .20 .21 .21 .21 .22 .24 .25 .27 .27		
4.0 5.0	Back Phys 5.1 5.2 5.3 5.4 5.5 5.6	ground ical Env Physiog Geology Erosion 5.3.1 5.3.2 Water E 5.4.1 Surface 5.5.1 5.5.2 5.5.3 5.5.4 Natural 5.6.1 5.6.2	Environmental Information and Agency Consultation rironment – Baseline Inventory	.12 .14 .14 .15 .15 .20 .21 .20 .21 .22 .21 .22 .24 .25 .27 .27 .30		
4.0 5.0	Back Phys 5.1 5.2 5.3 5.4 5.5 5.6	ground ical Env Physiog Geology Erosion 5.3.1 5.3.2 Water E 5.4.1 Surface 5.5.1 5.5.2 5.5.3 5.5.4 Natural 5.6.1 5.6.2 5.6.3	Environmental Information and Agency Consultation	.12 .14 .14 .15 .15 .20 .21 .21 .22 .24 .27 .30 .31		

PART	B – L	AND USE EVALUATION & IMPACT ASSESSMENT	34
6.0	Ecol	ogical Field Investigations Methodology	34
	6.1	Avifauna	34
		6.1.1 Barn Swallow and Chimney Swift Structure Surveys	36
	6.2	Herpetofauna	37
		6.2.1 Amphibian Breeding Call Surveys	37
		6.2.2 Basking Turtle Surveys	39
		6.2.3 Turtle Nesting Surveys	42
	6.3	Bats	43
		6.3.1 Leaf-off Survey	46
		6.3.2 Leaf-on Survey	46
		6.3.3 Snag Density Calculation	47
		6.3.4 Structures	47
		6.3.5 Exit Surveys	47
	6.4	Aquatic Habitat Assessment	48
	6.5	Incidental Wildlife Observations	48
	6.6	Anthropogenic Features	48
7.0	Ecolo	ogical Existing Conditions	49
	7.1	Ävifauna	49
		7.1.1 Barn Swallow and Chimney Swift Structure Surveys	50
	7.2	Herpetofauna	50
		7.2.1 Amphibian Breeding Call Surveys	50
		7.2.2 Turtle Basking Surveys	50
		7.2.3 Turtle Nesting Surveys	51
	7.3	Bats	52
		7.3.1 Leaf-off Survey Results	52
		7.3.2 Leaf-on Survey Results	54
		7.3.3 Structures	54
		7.3.4 Exit Survey Results	54
	7.4	Aquatic Habitat Assessment	54
		7.4.1 Background Information Review	54
		7.4.2 Existing Habitat Conditions	55
	7.5	Incidental Wildlife Observations	57
	7.6	Anthropogenic Features	31
	7.7	Provincially Significant Natural Features	31
		7.7.1 Provincially Significant Wetlands	31
		7.7.2 Significant Valleylands	32
		7.7.3 Significant Woodlands	33
		7.7.4 Significant Areas of Natural and Scientific Interest (ANSI)	35
		7.7.5 Significant Wildlife Habitat	36
		7.7.6 Habitat of Endangered and Threatened Species	37
	7.8	Wildlife Linkages and Corridors	39
	7.9	Identification of a Natural Heritage System	72

8.0	Des	cription of Proposed Land Use Change	74
	8.1		
	8.2	Preliminary Grading	
	8.3	Stormwater Management Plan	11
		8.3.1 SWM Design Criteria	
		8.3.2 Low Impact Development Measures Evaluation	78
		8.3.3 SWM Strategy	88
		8.3.4 Feature Based Water Balance	93
		8.3.5 Site-Wide Post-Development Water Balance	93
		8.3.6 Floodplain Analysis	97
	8.4	Water and Wastewater Servicing	98
		8.4.1 Water Supply Analysis	98
		8.4.2 Wastewater Servicing	100
9.0	Impa	act Assessment, Avoidance and Mitigation Measures	103
10.0	Eco	ogical Offsetting and Compensation Considerations	119
11.0	Env	ronmental Permits and Approvals During Detailed Design	120
12.0	Guid	Jelines for Site Specific Environmental Studies During Detailed	
12.0	Desi	an	121
13.0	Sum	marv	123
14.0	Pofe	rancas	125
14.0	Reit		120
Table	s		
Table	1: Ge	eneral Reach Characteristics	16
Table	2: Me	easured and Computed Channel Parameters	18
Table	3: Er	osion Thresholds and Average Channel Parameters	19
Table	4: Ex	isting Condition Water Balance Summary	20
Table	5: Su	mmary of Pre-Development Drainage Areas	22
Table	6: Mi	nimum and Maximum Water Depths at Each Sampling Location	22
Table	7: Av	erage Velocity and Measured Discharge at Each Sampling Location in	
	20	19	
Table	8. Pc	nd Monitoring Minimum Maximum and Average Pond Water Level	
1 3010	Flé	evations for Each Location in 2020	24
Tahle	9· Si	mmary of TRCA Existing Model Catchment Parameters	24 25
Table	10· F	xisting TRCA Flows for Catchments 41 24 and 447	20
Tahle	10. ⊑ 11· ⊑	visting Peak Flows for Catchments 1, 2, and 3	20
1 abio		Aloung router to outermonter, 2, and 0	

 Table 12: ELC Communities on the Subject Property
 27

Table 14: Summary of Amphibian Breeding Call Survey Weather Conditions Conducted

Table 13: Summary of Breeding Bird Survey Weather Conditions Conducted by

Table 15: Summary of Basking Turtle Survey Weather Conditions Conducted by

Table 16:	Summary of Nesting Turtle Survey Weather Conditions Conducted by	
	Burnside Staff	43
Table 17:	Summary of Bat Acoustic Exit Survey Weather Conditions Conducted by	/
	Burnside Staff	48
Table 18:	Summary of Basking Turtle Surveys Conducted by Burnside Staff	51
Table 19:	Candidate Bat Maternity Leaf-off Results for the Subject Property	53
Table 20:	Fish Species Historically Observed in the Tributary of Heart Lake	55
Table 21:	Summary of Incidental Wildlife Observations by Burnside Staff on the Su	ıbject
	Property	58
Table 22:	Candidate and Confirmed SWH on the Subject Property	66
Table 23:	Candidate and Confirmed Habitat for Endangered and Threatened Spec	ies
	on the Subject Property and Adjacent Lands	67
Table 24:	TRCA Unit Flow Rate Equations for Etobicoke Creek, Catchment 224	77
Table 25:	Unit Flow Rate as per the Draft Final Report-Etobicoke Creek Hydrology	,
	Update	78
Table 26:	Low Impact Development Benefits	79
Table 27:	Post-Development Drainage Areas	89
Table 28:	Summary of the Allowable Design Flows for SWM Pond 1	89
Table 29:	Erosion Control Required Volume for SWM Pond 1	90
Table 30:	Summary of the Allowable Design Flows for SWM Pond 2	91
Table 31:	Erosion Control Required Volume for SWM Pond 2	92
Table 32:	Summary of the Allowable Design Flows for the South Site Plan	
	(Catchment 203)	92
Table 33:	Erosion Control Required Volume for the South Site Plan	93
Table 34:	Water Balance Summary	95
Table 35:	Water Supply Demand	100
Table 36:	Sanitary Servicing Requirements	103
Table 37:	Impact Assessment, Avoidance and Mitigation Measures	104
Table 38:	Preliminary Summary of Vegetation Communities to be Removed	119
Table 39:	Summary of Anticipated Environmental Permits and Approvals During	
	Detailed Design	120

Figures

Figure 1:	Subject Property	2
Figure 2:	Ecological Land Classification	29
Figure 3:	Headwater Drainage Features and Aquatic Habitat	
Figure 4:	Breeding Bird Survey Stations	35
Figure 5:	Existing Structures and Bat Acoustic Survey Stations	
Figure 6:	Amphibian & Reptile Surveys	40
Figure 7:	Candidate Treed Bat Habitat	45
Figure 8:	Wildlife Linkages and Corridors	71
Figure 9:	Draft Concept Plan	73
Figure 10	: Development Constraints	118

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

Appendices

Appendix A CEISMP Terms of Reference and Agency Correspondence
Appendix B Hydrogeological Assessment and Water Balance
Appendix C Fluvial Geomorphological Assessment and Flow Monitoring
Appendix D Part A Baseline Conditions Reports
Appendix E Stormwater Management Report
Appendix F Feature-Based Water Balance and Wetland Risk Evaluation
Appendix G Natural Heritage Field Data
Appendix H SAR and SWH Screening Tables
Appendix I Functional Servicing Report
Appendix J Water Supply Analysis
Appendix K Sanitary Servicing Strategy

(Note: Appendix A to K have been provided as separate files)

Disclaimer

Other than by the addressee, copying or distribution of this document, in whole or in part, is not permitted without the express written consent of R.J. Burnside & Associates Limited.

In the preparation of the various instruments of service contained herein, R.J. Burnside & Associates Limited was required to use and rely upon various sources of information (including but not limited to: reports, data, drawings, observations) produced by parties other than R.J. Burnside & Associates Limited. For its part R.J. Burnside & Associates Limited has proceeded based on the belief that the third party/parties in question produced this documentation using accepted industry standards and best practices and that all information was therefore accurate, correct and free of errors at the time of consultation. As such, the comments, recommendations and materials presented in this instrument of service reflect our best judgment in light of the information available at the time of preparation. R.J. Burnside & Associates Limited, its employees, affiliates and subcontractors accept no liability for inaccuracies or errors in the instruments of service provided to the client, arising from deficiencies in the aforementioned third party materials and documents.

R.J. Burnside & Associates Limited makes no warranties, either express or implied, of merchantability and fitness of the documents and other instruments of service for any purpose other than that specified by the contract.

PART A – EXISTING BASELINE CONDITIONS & CHARACTERIZATION

1.0 Introduction to the Study Area

R.J. Burnside & Associates Limited (Burnside), Schaeffers Consulting Engineers (Schaeffers), GEO Morphix Limited (GEO Morphix), and Golder Associates Limited ("the Team") was retained by the Snell's Hollow Developers Group to undertake a Comprehensive Environmental Impact Study and Management Plan (CEISMP) for a development located at the northeast corner of Kennedy Road and Mayfield Road (herein referred to as the "subject property"). The subject property is in the Regional Municipality of Peel, in the Town of Caledon (Town), and is within the jurisdiction of Toronto and Region Conservation Authority (TRCA).

The subject property is located at the southern edge of the Town of Caledon, in the proposed Snell's Hollow East Secondary Plan area. The site is bounded by Highway 410 to the north and east, Mayfield Road to the south and Kennedy Road to the west (Figure 1). The subject property contains a portion of the Heart Lake Provincially Significant Wetland (PSW) Complex and an Unnamed Tributary of Spring Creek, which drains beneath Mayfield Road towards Heart Lake Conservation Area to the south. The subject property is within the Spring Creek subwatershed of the Etobicoke Creek watershed. According to the Credit River Watershed and Region of Peel Natural Areas Inventory (NAI) (2014), the area around the subject property has undergone some significant land use changes in the past several decades. Highway 410 was constructed in 2009-2010, which bisected the subject property from the lands north of the highway. In 2010-2011, the residential subdivision to the west across Kennedy Road from the subject property was built. The northeast portion of the site was previously used for cattle grazing. By 2007, it appears that it was left to naturalize, including the area with the wetland depression. Since 2014, the fields on the "tablelands" above the wetland depression have been used for intensive agriculture.

2.0 Report Structure

In preparation for the Snell's Hollow East Secondary Plan Area, the Town, Region of Peel and TRCA developed a TOR for the CEISMP (dated April 3, 2019). A CEISMP is required as a sub-component of the overall Secondary Plan to provide detailed information regarding environmental features, functions, linkages and interdependencies, to recommend environmental protection, management and monitoring measures, and to assess the impacts of planned urban development on the ecosystem.



Figure Title	SNELL SEC	'S HOLLOW E ONDARY PLA	AST N
	SUE	BJECT PROPERT	Y
Drawn	Checked	Date	Figure No.
PS	НМ	2021/08/05	1
Scale		Project No.	I
1:5,000		300051670	

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

Supporting studies by the Team are included in the Appendices; however, summaries have also been provided within the body of this report. This document was prepared in accordance with the approved Terms of Reference (TOR) dated April 8, 2019 (see Appendix A), Section 2.1 (Natural Heritage) of the Provincial Policy Statement (PPS; MMAH, 2020), the Natural Heritage Reference Manual (NHRM) for Natural Heritage Policies of the PPS, 2005 (MNR, 2010), the Significant Wildlife Habitat Technical Guide (SWHTG; MNR, 2000) and Peel-Caledon Significant Woodlands and Significant Wildlife Habitat Study (North-South Environmental Inc. et al., 2009).

The CEISMP is structured into Part A and Part B, per the TOR (2019). Part C Implementation will be part of a future report submission and will include details pertaining to the Long-term Monitoring Plan (LMP) and Adaptive Management Plan (AMP).

Part A – Existing Baseline Conditions & Characterization

- A review of applicable environmental and land use policies and regulations that may affect future development on the subject property.
- A review of existing secondary source data to identify any known natural features and constraints and agency consultation.
- The establishment of baseline conditions and characterization of the physical environment (physiography and topography, geology and hydrogeology, erosion, water balance, surface water resources, and natural heritage).
- Identification of provincially significant natural features to be investigated further in Part B.

The expectation is that the baseline reports, prepared under the TOR dated April 8, 2019, will fulfill the terms of Part A as they pertain to the natural environment.

Part B – Land Use Evaluation & Impact Assessment

- A summary of the detailed ecological studies completed in 2020 in support of the CEISMP.
- Identification of Provincially Significant Natural Features.
- Identification of habitat of Endangered and Threatened species.
- Identification of wildlife linkages and corridors.
- Identification of a Natural Heritage System (NHS).
- Description of the proposed land use change.
- Impact assessment, avoidance and mitigation measures.
- Ecological offsetting and compensation considerations.

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

- Environmental permits and approvals during detailed design.
- Guidelines for site specific Environmental Studies.
- Summary and conclusions.

3.0 Planning and Policy Considerations

The following policies, Acts and regulations apply to features present on the subject property.

3.1 Species at Risk Act, 2002

The *Species at Risk Act, 2002* (SARA), provides protection for Species at Risk (SAR) and their habitat. Schedule 1 of SARA is considered the official list of wildlife species at risk that receive legal protection under the Act and includes species that have been assessed by the Committee on the Status of Endangered Wildlife in Canada (COESWIC) as Extirpated, Endangered, Threatened, or Special Concern (Government of Canada, 2017).

To ensure the protection of SAR, Section 32(1) and (2) of the SARA states;

(1) No person shall kill, harm, harass, capture or take an individual of a wildlife species that is listed as an extirpated species, an endangered species, or a threatened species

(2) No person shall possess, collect, buy, sell or trade an individual of a wildlife species that is listed as an extirpated species, an endangered species or a threatened species, or any part or derivative of such an individual

And Section 33 of the SARA states;

No person shall damage or destroy the residence of one or more individuals of a wildlife species that is listed as an endangered or threatened species, or that is listed as an extirpated species if a recovery strategy has recommended reintroduction of the species into the wild in Canada

SARA prohibitions pertaining to private lands include:

- Aquatic species listed on Schedule 1 as Endangered, Threatened or Extirpated;
- Migratory birds listed in the MBCA and also listed on Schedule 1 as Endangered, Threatened or Extirpated; and

 May apply through an order, to other species listed on Schedule 1 (i.e., not an aquatic or migratory bird species) as Endangered, Threatened or Extirpated, if provincial/territorial legislation or voluntary measures do not adequately protect the species and its habitat.

Although Environment and Climate Change Canada (ECCC) is the overall administrator of SARA, responsibility for implementation of the Act is shared by ECCC and the Canadian Wildlife Service, Parks Canada and DFO. On private lands, ECCC oversees matters related to migratory birds, while DFO oversees matters related to aquatic species. In most cases pertaining to non-aquatic species on private lands, provincial laws (e.g., the *Endangered Species Act, 2007*) provide protection for critical habitat (i.e., habitat that is necessary for the survival or recovery of a listed endangered, threatened or extirpated species). Alternatively, SARA prohibitions can be applied by an order, as described above, or through federal legislation (including SARA).

3.2 Federal Fisheries Act, 1985

3.2.1 Background and the Fisheries Act

Construction activities that have the potential to impact fish or fish habitat must be constructed and operated in compliance with the federal *Fisheries Act*. If the "death of a fish by means other than fishing", or the "harmful alteration, disruption or destruction of fish habitat" will likely result from a project, the proponent responsible for the activities is required to obtain an *Authorization* from the Minister of Fisheries and Oceans Canada (DFO) as per Paragraph 34.4(2) and 35(2)(b) of the *Fisheries Act*.

3.2.2 New Fish and Fish Habitat Provisions Under Bill C-68

On February 6, 2018, the Government of Canada introduced Bill C-68, which reflected a commitment to review the changes made in 2012 to the *Fisheries Act*, in order to restore lost protections and incorporate modern safeguards. Among other updates, proposed changes to the *Fisheries Act* included:

- Protecting all fish and fish habitats (i.e., not restricted to Commercial, Recreational and Aboriginal fisheries).
- Restoring the previous prohibitions against "harmful alteration, disruption, or destruction of fish habitat" (HADD).
- Restoring a prohibition against cause "the death of fish by means other than fishing".

On August 28, 2019, Bill C-68 including the provisions listed above, came into force. The updated provisions supersede previous conditions of the *Fisheries Act* to provide modern safeguards to fish and fish habitat throughout Canada.

3.2.3 Proponent-led Self Assessment Process

DFO has introduced measures to facilitate its review process by allowing proponents to self-assess if projects near water require DFO review. They have provided a list of waterbody types and activities that do not require review prior to undertaking the activity, and codes of practices to mitigate contraventions of the Act. Proponents are responsible to ensure that activities meet the criteria outlined on Fish and Fish Habitat Protection Program website (http://www.dfo-mpo.gc.ca/index-eng.htm) and that best management practices (i.e., Codes of Practice) are implemented in project design to avoid contravention of the Act. To ensure compliance with Fisheries Act, a self-assessment should be completed by a Qualified Aquatic professional. The self-assessment process is a tool that is used to analyze the proposed works and determine the potential impacts, or Pathway of Effects (PoE), to the existing aquatic environment. If the PoE and residual impacts of the proposed works can be disrupted through avoidance and mitigation measures, then the project does not require a review by the DFO. If residual effects are anticipated during the self-assessment (potentially causing the death of a fish, or a HADD), even following the application of feasible avoidance and mitigation strategies, then DFO review is recommended.

Once reviewed, if it is determined that the project will not cause a HADD, the project may be allowed to proceed as planned, or with the condition of additional mitigation measures. If, however, it is determined that a HADD could result, proponents must apply for a *Fisheries Act* Authorization (Paragraph 35[2][b] *Fisheries Act*) from the Minister of Fisheries and Oceans. The Authorization process requires proponents to demonstrate that measures and standards have been applied to first avoid, then mitigate, and finally, offset any residual serious harm to fish that are part of or support a CRA Fishery.

3.3 Migratory Birds Convention Act, 1994

The *Migratory Birds Convention Act, 1994* (MBCA) and the Migratory Bird Regulations (MBR) are federal legislative requirements that are binding on members of the public and all levels of government, including federal and provincial governments. The legislation protects certain species¹, controls the harvest of others and prohibits commercial sale of all species.

¹ Bird species not regulated under the Act include: Rock Dove, American Crow, Brown-headed Cowbird, Common Grackle, House Sparrow, Red-winged Blackbird, and European Starling. In addition, raptors are not regulated under the MBCA. However, they are protected under provincial legislation which restricts and regulates the taking or possession of eggs and nests. Furthermore, if the species identified is protected under Ontario's ESA or the federal SARA, additional restrictions may apply.

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

One key responsibility under the MBCA is described in Section 6 of the associated MBR:

Subject to subsection 5(9), no person shall disturb, destroy or take a nest, egg, nest shelter, eider duck shelter or duck box of a migratory bird, or have in his possession a live migratory bird, or a carcass, skin, nest or egg of a migratory bird except under authority of a permit therefor.

The "incidental take" of migratory birds and the disturbance, destruction or taking of the nest of a migratory bird is prohibited. "Incidental take" is the killing or harming of migratory birds due to actions, such as economic development, which are not primarily focused on taking migratory birds.

No permit can be issued for the incidental take of migratory birds or their nest or eggs as a result of economic activities. These prohibitions apply throughout the year.

On June 1, 2019, proposed changes to the MBCA Regulations were published in Part I of the Canada Gazette. The amended MBRs propose the inclusion of an exception to the prohibition against damaging, destroying, disturbing or removing a nest, if certain conditions are met (i.e., the nest does not contain a live bird or viable egg, and it was built by a species whose nests are protected year-round, such as herons and egrets) (Government of Canada, 2019). The final regulations are currently anticipated to be published in fall of 2021 or winter 2022, and to come into force in July 2022. Until such time as the modernized regulations come into force, the current Regulations remain in place.

Environment Canada and the Canadian Wildlife Service have compiled nesting calendars that show the variation in nesting intensity, by habitat type and nesting zone, within broad geographical areas distributed across Canada. While this does not mean nesting birds will not nest outside of these periods, the calendars can be used to greatly reduce the risk of encountering a nest. Environment Canada advises avoidance as the best approach.

3.4 Planning Act, 1990/Provincial Policy Statement, 2020

The PPS (MMAH, 2020) provides general policies on land use patterns, resources, and public health and safety that guide development across Ontario. This report will address Section 2.1 of the PPS (Natural Heritage).

Eight types of natural heritage features are identified in Sections 2.1.4 and 2.1.5 of the PPS where development and site alteration are not permitted unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions:

1. Significant Wetlands in Ecoregions 5E, 6E, and 7E.

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

- 2. Significant Coastal Wetlands.
- 3. Significant Wetlands in the Canadian Shield north of Ecoregions 5E, 6E, and 7E.
- 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 St. Marys River).
- 6. Significant Wildlife Habitat (SWH).
- 7. Significant Areas of Natural and Scientific Interest (ANSIs).
- 8. Coastal wetlands in Ecoregions 5E, 6E, and 7E that are not subject to policy 2.1.4(b).

Sections 2.1.6, 2.1.7, and 2.1.8 identify three additional development and site alteration prohibitions and exemptions, as follows:

- 1. Fish habitat except in accordance with Provincial and Federal requirements.
- 2. Habitat of Endangered and Threatened species, except in accordance with provincial and federal requirements.
- 3. 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 their ecological functions.

The presence, or potential presence, of these features as well as the policy and planning implications of these features for development are discussed in detail in this report.

3.5 Provincial Endangered Species Act, 2007

The Endangered Species Act, 2007 (ESA) provides protection for SAR and their habitat. The ESA is now administered by the Ministry of the Environment, Conservation and Parks (MECP) and provides policies for the protection of Extirpated, Endangered and Threatened species, as well as species of Special Concern. These four categories of species form the Species at Risk in Ontario (SARO) List, which are classified by the Committee on the Status of Species at Risk in Ontario (COSSARO). COSSARO is also responsible for maintaining criteria for assessing and classifying SAR.

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

The ESA helps protect species (Section 9) and their habitat (Section 10). Section 9(1)(a) of the ESA states:

no person shall 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

Section 10(1)(a) of the ESA states:

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 includes a general habitat regulation as well as species-specific habitat regulations. Species uplisted to Endangered or Threatened automatically receive general habitat protection under the ESA. The province is then required to prepare a species recovery strategy and establish a habitat regulation according to requirements of the ESA.

As of April 1, 2019, the MECP assumed responsibility of the ESA, including SAR in Ontario. It is no longer the responsibility of the MNRF. At the same time, the Government of Ontario proposed changes to the ESA that are part of the Government's proposed Bill 108, *More Homes, More Choice Act, 2019*. The Bill received royal assent on June 6, 2019. Once the regulations have been published, it is expected that there will be changes made related to:

- 1. Assessing SAR and listing them on the SARO List.
- 2. Defining and implementing species and habitat protections.
- 3. Developing new SAR recovery policies.
- 4. Issuing ESA permits and agreements and developing regulatory exemptions.
- 5. Enforcing the ESA.

The SARO List is updated from time to time; therefore, it is the proponent's responsibility to practice due diligence to ensure that the ESA and its regulations are not violated. It is also the proponent's responsibility to be apprised of any amendments to the Act that may come into force for the duration of this project.

3.6 Toronto and Region Conservation Authority

3.6.1 Ontario Regulation 166/06

The PPS (2020) described in Section 3.4 of this report also outlines policies for managing development within, or adjacent to, natural hazard-prone lands. These policies are generally enacted through the Development, Interference with Wetlands and Alternations to Shorelines and Watercourses regulations, administered by Conservation Authorities. A large portion of the subject property is located within TRCA Regulation limits. TRCA administers O. Reg. 166/06: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses under Section 28 of the *Conservation Authorities Act, 1990.* Through this regulation, TRCA can:

- Prohibit development in all areas within the jurisdiction of the Authority that are delineated as the "Regulation Limit" including:
 - Adjacent to or close to the shoreline of the Great Lakes St. Lawrence River System or to inland lakes that may be affected by flooding, erosion, or dynamic beaches.
 - In river or stream valleys that have depressional features associated with a river or stream, whether or not they contain a watercourse.
 - In hazardous lands.
 - In wetlands.
 - In other areas where development could interfere with the hydrologic function of a wetland, including areas within 120 m of all provincially significant wetlands and wetlands greater than 2 ha in size, and areas within 30 m of wetlands less than 2 ha in size.
- Require permission to develop in the aforementioned areas if, in the opinion of the authority, the control of flooding, erosion, dynamic beaches, pollution or the conservation of land will not be affected by the development.

3.6.2 Toronto and Region Conservation Authority Living City Policies

One of TRCA's functions, in partnership with municipal, provincial, and federal governments, is to promote and help implement sustainable community development by advising Stakeholders and regulating activities in the planning and development process. The Living City Policies for Planning and Development in the Watersheds of TRCA (LCP) contains the policies for the administration of TRCA's legislated and delegated roles and responsibilities in the planning and development approvals process.

The LCP is issued under the authority of Section 20 of the *Conservation Authorities Act* and was endorsed by TRCA's Board on November 28, 2014. The LCP document applies to all new applications, matters, or proceedings submitted to TRCA on or after November 28, 2014 and to all active applications, matters or proceedings before TRCA as of November 28, 2014.

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

The LCP serves the following functions:

- Updates the previous Valley and Stream Corridor Management Program with new requirements in Federal, Provincial, and Municipal legislation, policies, and agreements affecting TRCA.
- Indicates to all Stakeholders TRCA's principles and policies for planning and development.
- Reflects the latest science known to TRCA.
- Complements TRCA's mandated regulatory and plan review roles in the planning and development process.
- Implements policies for TRCA's updated Section 28 Regulation (O. Reg. 166/06: Development, Interference with Wetlands and Alterations to Shorelines and Watercourses).
- Clarifies and implements TRCA responsibilities for Lake Ontario shoreline/waterfront management.
- Adds policy emphasis to the restoration, remediation, and enhancement of existing water and natural heritage systems in response to provincial planning directions geared to urban re-development and intensification.

3.6.3 Other Toronto and Region Conservation Authority Reports

Several TRCA reports are available that provide guidance and direction on protection of the Etobicoke Creek watershed and its resources. These include: Greening our Watersheds: Revitalization Strategies for Etobicoke and Mimico Creeks, including the Etobicoke-Mimico Report Card (2002); Etobicoke and Mimico Creeks Watershed Technical Update Report (2010); and the Etobicoke Creek Watershed Report Card (2018).

The Technical Update Report (2010) identified terrestrial natural heritage restoration priority management areas within the Spring Creek subwatershed. The wetland located on the subject property is considered a "Level 4" management priority (on a scale of 1 to 4, with 1 being the highest priority), based on key areas in the watershed that require restoration, enhancement and management.

3.7 Municipal Official Plans

3.7.1 Region of Peel Official Plan

The most recent Region of Peel Official Plan (ROP) (December 2018 consolidation) was consulted to determine Regional land use designations and locations of natural heritage features. The subject property falls within the Mayfield West Secondary Plan Area. According to Schedule 'D' – Regional Structure, the subject property is identified as

Rural Service Centre, which means this area is designated for urban growth. According to Schedule 'D3' – Greenbelt Plan Area Land Use Designations, a River Valley Connection Outside the Greenbelt is located approximately 856 m west of the subject property. The PSW that traverses through the centre of the subject property is designated as Core Areas of the Greenlands System, in Schedule A. Development and site alteration are prohibited within Core Areas of the Greenlands System. According to Schedule D4 – The Growth Plan Policy Areas in Peel, the subject property is a Greenfield Area which means the subject property is designated to become a "completed community" – to support sustainable transportation and provide public open space that supports these activities. According to Figure 2 of the OP – Selected Areas of Provincial Interest, the subject property is a Rural Settlement.

3.7.2 Town of Caledon Official Plan

The current Town of Caledon Official Plan (April 2018 consolidation) includes a series of decisions related to Ontario Municipal Board (OMB) appeals, amendments to ensure conformity with provincial policies and legislation and the ROP policies.

According to Schedule 6 and Schedule 'B' – Mayfield West Land Use Plan, the subject property is designated as Residential Policy Area "A" and the centre of the subject property (coincident with the PSW) is designated as Environmental Policy Area (EPA). According to Section 5.7.3.1.1 of the Town of Caledon Official Plan, new development within Environmental Policy Areas is prohibited. Schedule 'S' – The Greenbelt in Caledon shows the subject property as a settlement area, with a watercourse traversing through the PSW. The closest Greenbelt Plan NHS is approximately 1.6 km northwest of the subject property.

4.0 Background Environmental Information and Agency Consultation

A comprehensive desktop assessment was completed to compile and review existing natural heritage information available for the subject property. All areas within 120 m of the subject property were reviewed as part of the high-level assessment in order to identify significant natural heritage features located within, or directly adjacent to the subject property, that may be impacted by future development (herein referred to as "adjacent lands").

Burnside has reviewed the following resources:

- The Provincial Policy Statement (PPS) (MMAH, 2020).
- Town of Caledon Official Plan (OP) (April 2018 Consolidation).
- Region of Peel OP (December 2018 Consolidation).

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

- Peel-Caledon Significant Woodlands and Significant Wildlife Habitat Study (North-South Environmental Inc. et al., 2009).
- Credit River Watershed and Region of Peel Natural Areas Inventory (NAI) "Kennedy-Highway 410" NAI #10730, 11676, 11677 (Volume 3, April 2014).
- The Living City Policies (TRCA, 2014).
- Greening our Watersheds: Revitalization Strategies for Etobicoke and Mimico Creeks, Including the Etobicoke-Mimico Report Card (TRCA, 2002).
- Etobicoke and Mimico Creeks Watershed Technical Update Report (TRCA, 2010).
- Etobicoke Creek Watershed Report Card (TRCA, 2018).
- Recent Digital Aerial Photography (Google Earth Pro).
- Natural Heritage Information Centre (NHIC) database to identify records of rare wildlife species on, and in the vicinity of, the subject property (January 2019).
- The Ontario Breeding Bird Atlas (OBBA) for records of birds breeding in the area (January 2019).
- Ontario Reptile and Amphibian Atlas (ORAA) for records of reptiles and amphibians in the area (January 2019).
- Department of Fisheries and Oceans Canada (DFO) Aquatic SAR Mapping (April 2019).
- Ministry of Natural Resources and Forestry (MNRF) Aquatic Resources Area (ARA) mapping (2017).
- MNRF Provincially Significant Heart Lake Wetland Complex evaluation (November 2000).
- A turtle population study in an isolated urban wetland complex in Ontario reveals a few surprises (Dupuis-Désormeaux et al., 2019).

The subject property is located within the jurisdiction of TRCA and the MNRF Aurora District Office. Species protected under the ESA is administered by the MECP, Species at Risk Branch.

The MNRF was contacted on January 17, 2019 to retrieve information on SAR, fish dot information, PSW and ANSI reports for the subject property. The SAR information was received on January 22, 2019. The PSW and ANSI reports were later received on February 5, 2019 (see Appendix A).

The TOR for the CEISMP was developed by the Town of Caledon, jointly with the Region of Peel and TRCA and was issued on April 8, 2019. Burnside's approved Environmental Field Study and Baseline Monitoring Plan (February 5, 2019; revised April 8, 2019). Final review of these Part A reports (Baseline Conditions, Environmental

Monitoring Year 1, and HDF Assessment) was provided on November 12, 2021. A Proposed Fieldwork Plan 2020 in Support of the Natural Heritage Study and Aquatic Resources and Water Quality Study was issued to TRCA on May 5, 2020 (see Appendix A).

5.0 Physical Environment – Baseline Inventory

5.1 Physiography and Topography

The subject property is located on the South Slope physiographic region (part of Lake Simcoe-Rideau Ecoregion 6E), characterized by low-lying ground moraines. The property is at the northern tip of the Brampton Buried Esker, which has produced a hilly topography with wetlands in the pockets between the hills. The biologically rich natural area of Heart Lake Conservation Area lies nearby to the southeast across Mayfield Road, providing good opportunity for establishing and maintaining linkage as the surrounding land urbanizes (NAI, 2014; MNR, 2009). The majority of this geological feature is located within the Brampton Buried Esker Earth Science ANSI of the Heart Lake Conservation Area. The Heart Lake Complex PSW is one of the largest wetland complexes remaining on the South Slope and provides the only examples of kettle lakes and kettle peatlands on the South Slope (MNR, 2009).

The subject property features a combination of wetland communities in the lowland and open successional communities recovering from cultivation and grazing on the slopes, with intensive agriculture and several rural properties on the "tablelands" (NAI, 2014).

5.2 Geology and Hydrogeology

According to the geotechnical investigations, completed by Edward Wong (2017) and Golder (2019), the surficial geology on-site is comprised of silty clay till or silty clay encountered at the surface (or beneath fill materials), underlain by silty clay and silty clay till. Silty sand and sand were found underneath the till. Organic deposits are found along the watercourse and wetland complex.

The bedrock at this site is the red shale of the Queenston Formation. Glaciolucustrine-derived silty to clayey till materials were laid down over the bedrock by the glaciers that advanced and retreated from this area, leaving a gently undulating till plain after the last retreat. However, the last glacier also deposited the Brampton Esker running from this site, southward toward Queen Street, most of which has now been mined away. Depressions in the esker created wetlands where organic muck deposits built up, creating organic soils with poor drainage (NAI, 2014).

A summary of the hydrogeological conditions is provided in Burnside's Hydrogeological Assessment and Water Balance (2021) in Appendix B.

5.3 Erosion

5.3.1 Fluvial Geomorphological Assessment

A fluvial geomorphological assessment was undertaken by GEO Morphix and included the completion of rapid and detailed geomorphological assessments, an erosion hazard assessment, and an erosion threshold analysis. A summary is provided in the following sections, with detailed findings included in Appendix C.

5.3.1.1 Reach Delineation

Reaches are homogeneous segments of channel used in geomorphological investigations. They are studied semi-independently as each is expected to function in a manner that is at least slightly different from adjoining reaches. This allows for the meaningful characterization of a watercourse as the aggregate of reaches, or an understanding of a particular reach, for example, as it relates to a proposed activity. Reaches in the study area were delineated first through a desktop assessment using the MNRF stream layer and recent digital aerial photography from Google Earth Pro. Reaches were delineated based on changes in the following:

- Channel planform
- Channel gradient
- Physiography
- Land cover (land use or vegetation)
- Flow, due to tributary inputs
- Soil type and surficial geology
- Certain types of anthropogenic channel modifications

This follows scientifically defensible methodology proposed by Montgomery and Buffington (1997), Richards et al. (1997), Brierley and Fryirs (2005), and the TRCA (2004). Reaches were numbered from downstream to upstream to provide geographic context and then verified during field reconnaissance. A reach map is provided in Appendix C.

Burnside completed headwater drainage feature (HDF) assessments on the subject property, as described in Section 5.6.3 and Appendix D. Existing conditions documented by GEO Morphix focus on geomorphologic observations but should be considered in conjunction with the HDF assessment.

5.3.1.2 Rapid Field Assessment

A reach-based assessment was completed by GEO Morphix on May 10, 2019 and included observations of general riparian conditions, estimates of channel dimensions

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

(where possible), characterization of channel substrates and bank materials and observations of erosion, scour and deposition. Standard geomorphic evaluation tools such as the Rapid Geomorphic Assessment (MOE, 2003) and the Rapid Stream Assessment Technique (Galli, 1996) were not used as these reaches contained low order drainage features that were poorly defined. General reach characteristics are summarized in Table 1, below. For detailed reach descriptions please refer to Appendix C.

	Average	Average	Subst	trate		
Reach	Bankfull Width (m)	Bankfull Depth (m)	Bed	Bank	Riparian Vegetation	Notes
EC-1	17.95	0.32	Organic material, clay, silt, Find Sand	Clay, silt, sand	Mature trees	Wetland-like channel; confined valley; wide, shallow channel; no evidence of channel widening.
EC-2	N/A; Pon	d Feature	N/	A	Grasses	Outlets south to steel culvert crossing at Mayfield Road.
EC-2a	6.0	0.4	Clay, Silt, Sand	Clay, Silt, Sand	Grasses	Extensive vegetation encroached; large man-made woody debris pile mid-reach.
EC-3	N/A; V Fea	N/A; Wetland N/A Feature		A	Grasses	Unconfined; no defined channel; cattails, trees, shrubs, grasses present.
EC-3a	1.4	0.3	Clay, Silt, Sand	Sand, Gravel	Grasses	Channelized feature; moderately entrenched.

Table 1: General Reach Characteristics
--

5.3.1.3 Erosion Hazard Assessment

The TOR for the CEISMP notes that a meander belt width assessment and delineation of the 100-year erosion limit is required to characterize watercourses on the property. When defining the meander belt width for a creek system, the TRCA (2004) protocol treats watercourses differently based on the degree of valley confinement. Unconfined

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

systems are those with poorly defined valleys or slopes well-outside where the channel could realistically migrate. In unconfined systems, the meander belt boundaries centre along the general valley orientation and are defined as parallel lines drawn tangentially to the outside bends of the most laterally extreme meanders within the reach (TRCA, 2004). Partially confined systems are those where meander bends are adjacent to only one valley wall and the watercourse is therefore restricted in migration and floodplain occupation on one side of the valley system. Confined systems are those where the watercourse position is such that meander bends are adjacent to both valley walls and meander migration is restricted on both sides of the valley.

The drainage features assessed by GEO Morphix that outlet to the PSW were generally poorly defined and received run-off from agricultural fields on the tablelands. No evidence of active erosion was documented at the time of the assessment. As the drainage features are low order and showed very limited change in position over the period of available historical record, 100-year erosion limits could not be delineated.

Reaches EC-2a and EC-3a are vegetation controlled and have been assessed as headwater drainage features by Burnside. As these drainage features are unlikely to migrate or adjust their channel planform, delineating an erosion hazard specific to these features is not warranted. Furthermore, the slope stability assessment completed by Golder Associates Ltd. (2019) included a toe erosion allowance (ranging from 2 m to 7 m) and a stable slope allowance. These recommendations adequately address the erosion hazard along the valley from a geomorphological perspective.

5.3.2 Erosion Threshold Analysis

Erosion thresholds are used to determine the magnitude of flow required to potentially entrain and transport bed and/or bank materials. As such, they may be used to inform erosion reduction strategies in channels influenced by conceptual flow management plans. The erosion threshold analysis provides a depth, velocity, or discharge at which sediment of a particular size may potentially be entrained. Due to the variability between bed and bank composition and structure, erosion thresholds are typically determined for both bed and bank materials. Threshold targets are determined using different methods that are dependent on channel and sediment characteristics. For example, thresholds for non-cohesive sediments are commonly estimated using a shear stress approach, similar to that of Miller et al. (1977), which is based on a modified Shield's curve. A velocity approach could also be applied. For non-cohesive materials, a method such as that described by Komar (1987), or empirically derived values such as those compiled by Fischenich (2001) or Julien (1994), could be applied.

5.3.2.1 Detailed Geomorphological Assessment

A detailed geomorphological assessment was completed on May 6, 2019 within Reach EC-1 as this reach was identified as the most sensitive to erosion. Notably this reach was still considered to be a low-risk environment as it was depositional. The

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

specific location within the reach was chosen as it had the most defined section of channel. The assessment included a longitudinal survey of the channel bed and water level to determine gradients, and six detailed cross-section surveys. Two of these cross-sections were monumented and included the installation of erosion pins. At each cross-section, bankfull geometry was recorded, as well as riparian conditions, bank material, bank height/angle, the presence of undercutting, and bank root density.

Characterization of channel bed material at each cross-section was completed using a modified Wolman (1954) pebble count technique or through collection of bed samples, as appropriate. Photographs of each cross-section and both channel banks were also collected at the time of the survey. Results from the detailed assessment are summarized in Table 2. A complete summary of the detailed assessment is provided in Appendix C.

Channel Parameter	EC-1
Measured	
Average bankfull channel width (m)	17.95
Average bankfull channel depth (m)	0.32
Bankfull channel gradient (%)	0.66
D ₅₀ (mm)	< 2.0
Manning's <i>n</i> roughness coefficient	0.050
Computed	
Bankfull discharge (m ³ /s)*	4.30
Average bankfull velocity (m/s)*	0.76
* Based on Manning's Equation	

Table 2: Measured and Computed Channel Parameters

5.3.2.2 Methodology

An erosion threshold is quantified based on the bed and bank materials and local channel geometry, in the form of a critical discharge. Theoretically, above this

$$U = \frac{1}{n} d^{2/3} S^{1/2}$$

discharge, entrainment and transport of sediment can occur. The velocity, U is calculated at various depths, until the average velocity in the cross section slightly exceeds the critical velocity of the bed material. The velocity is determined using a Manning's approach, where the Manning's *n* value is visually estimated through a method described by Arcement and Schneider (1989) or calculated using Limerinos's (1970) approach. The velocity is mathematically represented as:

where, d is depth of water, S is channel slope, and n is the Manning's roughness. The discharge is then calculated using the area of a typical cross-section at that depth.

For the bank materials, following Chow (1959) in a simplified cross-section, 75% of the bed shear stress acts on the channel banks. In a similar approach, the depth of flow is increased until the shear stress acting on the banks exceeds the resisting shear strength of the bank materials.

5.3.2.3 Results

Channel bed and bank materials were considered equivalent, and conservatively estimated to consist of a fairly compact to loose clay. A critical shear stress approach was taken using the criteria of Julien (1994) for this material, which has a critical shear stress of 6.2 N/m^2 . This threshold shear stress was then applied to a representative cross-section measured from the detailed assessment to calculate the critical discharge, or the discharge at which it is expected that sediment entrainment will begin to occur. The results of the erosion assessment are provided in Table 3. Using the criteria of Chow, the critical discharge to entrain the bed materials within Reach EC-1, was determined to be 1.25 m^3 /s.

Channel Parameter	Reach EC-1
Average bankfull channel width (m)	17.95
Maximum bankfull channel depth (m)	0.32
Average channel gradient (%)	0.66
Calculated bankfull discharge (m ³ /s)	4.3
Bankfull shear stress (N/m ²)	20.53
Erosion thresholds for bed and bank materia	ls
Critical shear stress (N/m ²)	6.2
Critical discharge (m ³ /s)	1.25

Reach EC-1, as well as the others that may receive stormwater flows on the subject property, are relatively resilient to potential erosion given their low gradient and wide, oversized bankfull channels. Consequently, we do not advocate for using the erosion threshold assigned to Reach EC-1 to aid in designing the associated SWM pond and outlet structure given the high volume of water the channel has the capacity to tolerate. Doing so could conceivably cause downstream erosion concerns in other reaches that are more sensitive to erosion. Instead, we suggest using the 24 or 48-hour detention of the 25 mm event to prevent erosion both within the subject property, and downstream within Etobicoke Creek.

5.4 Water Balance

5.4.1 Pre-Development Water Budget

The subject property is not located within a WHPA-Q1/Q2 area; however, it is located within a significant groundwater recharge area (SGRA). Therefore, as per TRCA design criteria (August 2012), the subject property requires that post-development infiltration matches existing conditions. An existing condition water balance was conducted to assess the existing recharge volume for the Snell's Hollow East Secondary Plan Area. The total precipitation value was based on the TRCA water budget tool.

As the TRCA water budget tool inputs do not equal outputs, the evaporation value was determined based on prorating the precipitation value. The infiltration factor for pervious areas was determined based on the MOE factors. MOE factors were determined to assume the site has tight clay soils, the terrain has rolling hills, and land cover varies between agricultural, meadow, and natural feature areas. The existing rooftops were considered as impervious area. Please refer to the SWM Report attached in Appendix E for detailed calculations. Table 4 summarizes the existing condition water balance. Overall, the subject property has 112,905 m³/year of infiltration in existing conditions.

	Pre- Development Drainage Area 1	Pre- Development Drainage Area 2	Pre- Development Drainage Area 3	Total Pre- Development
Inputs (Volu	mes)			
Precipitation (m ³ /year)	401,016	109,368	25,172	535,556
Total Inputs (m ³ /year)	401,016	109,368	25,172	535,556
Outputs (Vol	umes)			
Precipitation surplus (m³/year)	193,835	52,668	12,122	258,625
Net Surplus (m³/year	193,835	52,668	12,122	258,625
Total Evapotrans piration (m ³ /year)	207,181	56,700	13,050	276,931
Total Infiltration (m ³ /year)	86,989	21,067	4,849	112,905
Total Runoff (m³/year)	106,846	31,601	7,273	145,720

Table 4: Existing Condition Water Balance Summary

300051670.0000 051670 Snell's Hollow CEISMP_210812.docx

	Pre- Development Drainage Area 1	Pre- Development Drainage Area 2	Pre- Development Drainage Area 3	Total Pre- Development
Total Outputs (m³/year)	401,016	109,368	25,172	535,556

A Feature Based Water Balance assessment was completed for the PSW identified on the subject property. Please refer to Section 8.3.4 and Appendix F.

5.5 Surface Water Resources

5.5.1 Existing Surface Drainage Conditions

The subject property is located within the Etobicoke Creek watershed. The majority of the subject property west of Heart Lake Road generally drains southeast towards the tributary of the Etobicoke located within site, draining to an existing culvert under Mayfield Road. There is a drainage divide located within the site, which diverts the flows from the site to the east towards another tributary of the Etobicoke Creek. Please refer to Figure 2.1 of the SWM Report included in Appendix E for more details.

Based on the TRCA design criteria (August 2012), the site is located within TRCA defined catchment 224.

MMM Group Limited completed a Draft Final Report-Etobicoke Creek Hydrology Update (April 2013), further breaking down the catchment drainage boundaries located within the Etobicoke Creek Spring Creek subwatershed. The subject property was identified as part of three pre-development catchment area IDs. The west portion of the site drains southerly and is within Catchment ID Area 41. The easterly portion of the subject property is split between Catchment ID 447 and 24. Please refer to the SWM Report attached in Appendix E for additional information.

The pre-development drainage areas located within the site boundary were determined based on the available topography data and shown in Figure 2.1 of the SWM Report attached in Appendix E and summarized in Table 5.

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

TRCA Design Criteria (August 2012)	Draft Final Rep Creek Hydrol (April 2	ort-Etobicoke ogy Update 2013)	SCE Pre-Deve Areas (Base	elopment Dra ed on Figure	ainage 2.1)
Catchment ID	Subwatershed	Catchment ID	Catchment ID	Runoff Direction	Area (ha)
224	Spring Creek	41	1	SW	46.2
224	Spring Creek	24	2	SE	12.6
224	Spring Creek	447	3	NE	2.9

	Table 5:	Summary	of Pre-De	velopment	Drainage Areas
--	----------	---------	-----------	-----------	-----------------------

5.5.2 Baseline Monitoring

During 2019 and 2020, flow monitoring was conducted at four locations on the subject property to assess water quantity characteristics. Water level and temperature were recorded at 15-minute intervals between April 1 and November 30 of each year using HOBO U20 pressure loggers and corrected to account for local atmospheric pressure. Periodic velocity measurements were collected, when possible, to calculate discharge at each monitoring location. All sampling activities adhered to the Ontario Stream Assessment Protocol outlined by the MNRF (2017). A map showing monitoring locations is provided for reference in Appendix C.

Minimum and maximum water levels recorded by monitoring equipment in 2019 and 2020 are summarized below in Table 6. The full set of continuous water level measurements, as well as discrete measurements, are provided in Appendix C.

Sampling Location	2019 Water	Depth (m)	2020 Water Depth (m)		
	Minimum	Maximum	Minimum	Maximum	
W Inlet	0.00	0.09	0.00	0.17	
S Inlet	0.00	0.20	0.00	0.14	
Bridge	0.00	0.19	0.00	0.13	
Outlet	0.00	0.09	0.00	0.05	

Table 6: Minimum and Maximum Water Depths at Each Sampling Location

Due to the intermittent/ephemeral nature of these watercourses, all four monitoring locations were dry following the spring freshet, with only short responses to precipitation events. In 2019, velocity measurements were only possible during the spring freshet. Velocity measurements were not possible during monitoring visits at the S Inlet site due

to the lack of channel definition and wetland characteristics at the sensor location. Maximum discharges at the W Inlet, Bridge, and Outlet sites were 0.0009 m³/s, 0.0025 m³/s, and 0.0180 m³/s respectively, which occurred on May 10, 2019 following 21.59 mm of rainfall in 24 hours. A summary of measured discharge at each monitoring location is summarized in Table 7.

Velocity measurements were not collected in 2020 due to relatively dry conditions during the monitoring season. Low water levels and dense vegetation made conditions unfavourable for accurate acoustic doppler velocimeter measurements.

Measurement Date (yyyy-mm-dd)	Location	Average Velocity (m/s)	Discharge (m³/s)
	W Inlet	0.0114	0.0002
2010 04 00	S Inlet	0	0
2019-04-09	Bridge	0	0
	Outlet	0.2734	0.0150
	W Inlet	0.0538	0.0009
2010 05 10	S Inlet	0	0
2019-03-10	Bridge	0.0400	0.0023
	Outlet	0.3392	0.0180
	W Inlet	0	0
2019-06-20	S Inlet	N/A*	N/A*
	Bridge	N/A*	N/A*
	Outlet	0.0170	0.0004
* Channel dry or too shallow f	or measurement		

Table 7: Average Velocity and Measured Discharge at Each Sampling Location in2019

During the 2020 monitoring season, HOBO U20 water level loggers were installed in two ponds. The N Pond site is located north of Mayfield Road at the south east extent of the subject property. The pond stores water between the Bridge and the Outlet instream flow monitoring sites. The S Pond site is located south of Mayfield Road and has no discernable inlet or outlet channels. Water level was recorded at 15-minute intervals and converted to a geodetic datum. Pond monitoring locations are provided in Appendix C. A summary of minimum, maximum, and average water level elevations for both ponds is summarized below in Table 8.

			Pond Wa	ater Level		
Sampling	Mini	imum Maximum		Average		
Location	Depth	Elevation	Depth	Elevation	Depth	Elevation
	(m)	(asl)	(m)	(asl)	(m)	(asl)
N Pond	0.74	255.020	0.97	255.253	0.84	255.118
S Pond	12.74	252.693	12.83	252.785	12.77	252.721

Table 8:	Pond Monitoring	Minimum,	Maximum,	and Average	Pond Water L	evel
Elevatio	ns for Each Locati	ion in 2020		-		

Maximum water elevation for N Pond was recorded by continuous pressure loggers on May 18, 2020 following a 25.9 mm rain event. Maximum water elevation for S Pond was recorded on sensor installation date of June 16, 2020. The pond was likely still within its drawdown time from a 52.3 mm rain event on June 10, 2020. Higher water level elevations are expected earlier in the monitoring season due to the wetter season, spring freshet, and long drawdown times of natural pond systems.

All baseline monitoring equipment was re-installed in late March 2021 and will be maintained until late November 2021.

5.5.3 Existing Stormwater Infrastructure

The existing storm infrastructure within the vicinity of the subject property includes existing SWM ponds, culverts, and a storm sewer system on Mayfield Road, collecting the road drainage. Please refer to Figure 2.1 of the SWM Report attached in Appendix E, which identifies the existing SWM ponds and existing culverts.

There are two existing SWM ponds located near the subject property. One of the existing SWM ponds is located southwest of the subject property in the northeast corner of the Kennedy Road and Mayfield Road intersection. The pond, designed initially by Stantec (2007), was sized to accommodate Mayfield Road's runoff and external area. GHD (May 2017) completed a facility retrofit report to ensure that the pond was providing adequate quality and quantity control. Based on the tributary drawing, the estate lots along Mayfield Road, which are within the subject property boundary, were accommodated in the Pond as an external area; however, the Stantec (2007) report identifies that any future development of the external lands should provide their own quantity and quality control. The pond was sized to accommodate the Mayfield Road Widening. The pond discharges to the Spring Creek tributary that runs through the subject property.

The other SWM pond is located south of Mayfield Road and west of Heart Lake Road, as identified in Figure 2.1 of the SWM Report attached in Appendix E.

5.5.4 Existing Hydrology and Peak Flows

5.5.4.1 TRCA Existing Hydrology Model

The latest Etobicoke Creek Hydrology Model was completed by MMM Group Limited (April 2013). The model was created for TRCA to determine quantity control criteria for development located within the watershed. Etobicoke Creek watershed runs through Caledon, Brampton, Mississauga and Toronto. The Etobicoke Creek model delineated sub-basins, in which the Snell's Hollow East Secondary Plan Area is located within the Spring Creek subwatershed in Sub-basin Number 6.

5.5.4.2 Existing Catchment Parameters

The Draft Final Report-Etobicoke Creek Hydrology Update (April 2013) by MMM Group Limited determined watershed parameters through the DTM, aerial photographs, and soil maps. SCS Curve Number method was used in the model, which is a function of land use, soil type, and AMC conditions; the weighted average was calculated using GIS software. Initial abstraction was calculated based on the Visual OTTHYMO Model Hydraulic Reference manual. As discussed in Section 5.5.1, the subject property falls within three catchment areas of the Spring Creek subcatchment. Table 9 summarizes the existing catchment parameters defined in the MMM Group Limited TRCA hydrology model (April 2013).

TRCA Model		TRCA Catchment ID	TRCA Catchment Area (ha)	CN	IA	TP (hr)
Existing-2 to 100yr	AMCII	41	263.00	74	8.9	0.516
Existing- Regional_12hr_AMCIII	AMCIII	41	263.00	88	8.9	0.516
Existing-2 to 100yr	AMCII	24	140.14	76	8.1	0.557
Existing- Regional_12hr_AMCIII	AMCIII	24	140.14	89	8.1	0.557
Existing-2 to 100yr	AMCII	447	106.74	79	6.8	0.585
Existing- Regional_12hr_AMCIII	AMCIII	447	106.74	91	6.8	0.585

Table 9: Summary of TRCA Existing Model Catchment Parameters

5.5.4.3 Corresponding Flows (TRCA)

The Flows from the TRCA Hydrology modelling corresponding to Catchments 41, 24, and 447 are summarized below in Table 10.

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

	TRCA	TRCA	TRCA
Storm Event	Catchment	Catchment	Catchment
	ID 41	ID 24	ID 447
2-Year	2.66 cms	1.55 cms	1.41 cms
5-Year	4.69 cms	2.69 cms	2.36 cms
10-Year	6.25 cms	3.55 cms	3.06 cms
25-Year	8.36 cms	4.71 cms	4.00 cms
50-Year	10.01 cms	5.62 cms	4.73 cms
100-Year	11.74 cms	6.57 cms	5.48 cms
Regional Event	32.36 cms	17.05 cms	12.96 cms

Table 10:	Existing TRCA	Flows for	Catchments 41	24, and 447
-----------	---------------	-----------	---------------	-------------

5.5.4.4 Subject Property Hydrology

A separate hydrology model was not prepared for the subject property to analyze the peak flows from the subject property. Instead, the flows from the existing TRCA model were used to establish the flows from the subject property using the MTO Prorating Methodology. This approach was used to establish the flows to ensure that the subject property flows correspond to the calibrated TRCA Existing model.

The existing flows for the subject property are summarized in Table 11 below. Detailed calculations are provided in Appendix E.

Storm Event	SCE Catchment ID 1	SCE Catchment ID 2	SCE Catchment ID 3
2-Year	0.72 cms	0.26 cms	0.09 cms
5-Year	1.27 cms	0.44 cms	0.16 cms
10-Year	1.70 cms	0.58 cms	0.20 cms
25-Year	2.27 cms	0.77 cms	0.27 cms
50-Year	2.72 cms	0.92 cms	0.32 cms
100-Year	3.19 cms	1.08 cms	0.37 cms
Regional Event	8.78 cms	2.80 cms	0.87 cms

Table 11: Existing Peak Flows for Catchments 1, 2, and 3

5.6 Natural Heritage

5.6.1 Vegetation Communities and Species Inventory

A three-season vegetation inventory and Ecological Land Classification (ELC) survey was undertaken on May 15, 2019, July 11, 2019 and September 10, 2019. Vegetation communities were assessed and described using the Ecological Land Classification System for Southern Ontario: First Approximation and its Application (Lee et al., 1998), with reference to Second Approximation 2008 codes (Lee, 2008) for communities which could not be accurately described by the First Approximation 1998 codes (see Figure 2 of this report).

The subject property is mainly comprised of agricultural row crops, naturalized meadows, woodland inclusions and a large swamp thicket and marsh wetland associated with an Unnamed Tributary of Spring Creek that meanders through the centre of the site, before diverting south and crossing Mayfield Road. The wetland is part of the provincially significant Heart Lake PSW Complex which straddles the City of Brampton and the Town of Caledon, extending about 1 km north of Mayfield Road, south to Bovaird Drive, and centered along Heart Lake Road (see Section 5.2.1). Fourteen ELC communities were identified on the subject property, as listed in Table 12. All of them are ranked as S5 (secure; common, widespread, and abundant in the province).

ELC Classification		
Cultural / Anthropogenic		
CUM1-1: Dry-Moist Old Field Meadow		
Commercial and Institutional		
CVC_2: Light Industrial		
Residential		
CVR_4: Rural Property		
Agricultural Infrastructure		
IAGM_1: Agricultural Buildings		
Open Agriculture		
OAGM1: Annual Row Crop		
Forest		
Mixed Forest		
FOM: Mixed Forest		
Thicket		
Deciduous Thicket		
HR: Hedgerow		

Table 12: ELC Communities on the Subject Property

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

ELC Classification		
Wetland		
Meadow Marsh		
MAM2-2: Reed Canary Grass Graminoid Mineral Marsh		
Shallow Marsh		
MAS2-1: Cattail Mineral Shallow Marsh		
MAS3-1: Cattail Organic Shallow Marsh		
Submerged Shallow Aquatic		
SAS1-1: Pondweed Submerged Shallow Aquatic		
Deciduous Swamp		
SWD6-1: Red Maple Organic Deciduous Swamp		
Thicket Swamp		
SWT: Thicket Swamp		
SWT3-1: Alder Organic Swamp		




Figure Title			
ECO	SNELL SEC	'S HOLLOW E ONDARY PLA	AST N FICATION
Drawn	Checked	Date	Figure No.
PS	НМ	2021/08/05	2
Scale		Project No.	2
1:5,000		300051670	

The following summarizes the flora observed on the subject property during field studies in 2019, with a focus on the "tablelands" and species observed during wetland monitoring. A full botanical inventory of the wetland communities within the NHS was not completed for this study, as these communities have been evaluated through the MNRF Provincially Significant Heart Lake Wetland Complex evaluation (2000):

- 122 plant taxa were observed. Of those, 109 were identified to species or subspecies level.
- Of those species, 72 (66.1%) were native and 37 (33.9%) were non-native to Ontario.
- Among the native species observed, 72 are considered secure common or apparently secure uncommon (S5 or S4) in Ontario.
- Two species observed are considered rare to the Greater Toronto Area (GTA):
 - Foxglove Beardtongue (*Penstemon digitalis*)
 - Red Pine (*Pinus resinosa*)
- Six species observed are considered species of regional conservation concern (L1 to L3):
 - Speckled Alder (*Alnus incana*) (L3)
 - Common Spikerush (*Eleocharis palustris*) (L3)
 - Common Winterberry (*llex verticillate*) (L3)
 - Harlequin Blue Flag (*Iris versicolore*) (L3)
 - Red Pine (L1)
 - Swamp Red Currant (*Ribes triste*) (L3).
- Two of the wetland communities have a TRCA local rank of L2 ("community of regional conservation concern"): SWT3-1 and SWD6-1.

A detailed description of the vegetation field methodology and findings is described in Burnside's Baseline Conditions Report (2020), in Appendix D.

5.6.2 Pre-Construction Wetland Monitoring

Two years of pre-construction wetland monitoring (wetland vegetation and breeding amphibians) have been completed to date (2019 and 2020).

Wetland Vegetation Monitoring

Methodology for the wetland vegetation monitoring survey was based on the TRCA's *Wetland Vegetation Monitoring Protocol, Terrestrial Long-term Fixed Plot Monitoring Program* (January 2016). A transect was established within the Alder Organic Thicket Swamp Type (SWT3-1) vegetation community, located within Wetland No. 1 of the Heart Lake Provincially Significant Wetland Complex. Please refer to the Year 1 Report for a detailed description of the methodology (Burnside, 2020).

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

Baseline vegetation and soil condition data was collected on July 4, 2019. Monitoring in Year 2 was performed on July 14, 2020. Overall results of the Year 2 vegetation assessment survey were comparable to Year 1, with no significant coefficient of wetness (cw) or composition changes. As in Year 1, Broad-leaved Cattail dominated all subplots except for 1A and 1B, as expected. Composition percentages for Broad-leaved Cattail either remained the same or very low variances within 5% were recorded. As expected, no change in the number of woody vegetation species were noted.

Amphibian Monitoring

Burnside staff conducted amphibian breeding call surveys following the *Marsh Monitoring Program Participant's Handbook for Surveying Amphibians* (Bird Studies Canada, 2008), during the 2019 and 2020 breeding season to detect potential early, mid and late season amphibian breeding activity in Central Ontario. Survey stations were chosen in Year 1 (2019) to provide information on potential amphibian breeding sites within representative wetland communities, located throughout the subject property. Surveys were carried out at four stations.

Surveys were conducted for the first year of monitoring on April 24, May 15, and June 21, 2019. For the second year of monitoring surveys were conducted on April 6, May 15, and June 17, 2020.

In the first year, three amphibian species were documented calling within the wetland stations on the first, second and third field visits: Wood Frog (*Lithobates sylvaticus*), American Toad (*Anaxyrus americanus*) and Green Frog (*Lithobates clamitans*). The same three species of amphibians were documented in the second year as well as an additional species, Gray Treefrog (*Hyla versicolor*).

Detailed monitoring reports for Year 1 and Year 2 can be found in Appendix D. The data collected during these surveys are to be used to assess the impacts of construction on the existing wetland and re-examine mitigation and impact prevention methods during and after development. A third year of monitoring may be warranted prior to the commencement of the development phase.

5.6.3 Headwater Drainage Features Assessment

A total of three HDF surveys were completed, based on the protocol outlined in the *Evaluation, Classification and Management of Headwater Drainage Features Guideline* (The Guideline) (TRCA and CVC, 2014) and supporting guidance provided in the *Ontario Stream Assessment Protocol* (OSAP) *Section 4: Modules 10 and 11.* Accessibility to sites on the subject property enabled adaptation to a reach-based approach, primarily utilizing OSAP S4:M11. A background review of existing TRCA Hillshade LIDAR, hydrolayer mapping and satellite imagery were utilized to identify potential HDF features from desktop. Each potential HDF location was investigated during the initial site visit on April 9 to 11, 2019, with subsequent monitoring visits

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

completed at sites based on observations from previous visits on May 27 and August 26, 2019.

The majority of features on the subject property were found in actively tilled agricultural fields, with poor definition and lacking natural channel vegetation. Overall, 12 potential drainage networks were investigated (H1 to H12) throughout the subject property (Figure 3 of this report). All the drainage networks, except for H3, flow, partially or wholly, through cultivated agricultural fields. Of the 33 reaches within these networks, 20 were classified as 'No Management Concern', 12 as 'Mitigation' and one as 'Conservation', based on the management decision matrix provided in Figure 2 of The Guideline.

A detailed description of the HDF field methodology and findings is described in Burnside's Technical Memorandum – 2019 HDF Assessment (March 12, 2020), in Appendix D.

5.7 Identification of Provincially Significant Natural Features

As part of the baseline conditions and characterization, a desktop assessment of provincially significant features was completed based on background natural heritage databases, reports and preliminary data collected during baseline surveys in 2019. These preliminary findings guided targeted field surveys completed in 2020 in support of the EIS. The following features were initially identified on the subject property and are detailed in Burnside's Baseline Conditions Report (2020) found in Appendix D:

- Provincially Significant Wetlands
- Significant Valleylands
- Significant Wildlife Habitat (Confirmed and Candidate)
- Habitat of Endangered and Threatened Species (Candidate)

Confirmation of these features following surveys completed in support of the EIS are summarized in Section 7.7.



Figure Title	SNELL SEC	'S HOLLOW E ONDARY PLA	AST N
HEA	DWATER AC	R DRAINAGE FEA QUATIC HABITAT	TURES &
Drawn	Checked	Date	Figure No.
PS	HM	2021/08/05	3
Scale		Project No.	5
1:5,000		300051670	

PART B – LAND USE EVALUATION & IMPACT ASSESSMENT

6.0 Ecological Field Investigations Methodology

6.1 Avifauna

Standard breeding bird surveys were completed by Burnside staff, in combination with targeted surveys for marsh birds and SAR grassland birds (i.e., Eastern Meadowlark (EAME), and Bobolink (BOBO)). Surveys were conducted according to the *Ontario Breeding Bird Atlas (OBBA) Guide for Participants* (Bird Studies Canada March 2001), *Marsh Monitoring Program Participant's Handbook for Surveying Marsh Birds*, (Bird Studies Canada 2009) and the MNRF's *Survey Protocol for Eastern Meadowlark in Ontario* (August 2013), tailored to the needs of this project. Surveys were conducted at designated point counts, shown on Figure 4, that captured the different vegetation communities present. The methodology for these surveys is summarized below and in Table 13.

Eastern Meadowlark and Bobolink are listed as Threatened, under the ESA. These species were identified as having potential to be on the subject property based on background databases and reports, correspondence with agencies and the presence of suitable grassland/cultural meadow habitat. Both species have similar habitat requirements and were surveyed concurrently.

Marsh bird survey stations were established at certain locations around the perimeter of the wetlands, based on suitable habitat and background records indicating the potential presence of marsh birds.

 Each EAME/BOBO point count location was chosen based on good visibility of the surrounding fields/open areas. Per the protocol, the surveyor completed 10 minutes of passive observation and recorded all species observed or heard.



Figure Title	SNELL SEC	'S HOLLOW E ONDARY PLA	AST N
BRE	EEDING	BIRD SURVEY S	TATIONS
Drawn	Checked	Date	Figure No.
PS	НМ	2021/08/05	Λ
Scale		Project No.	-
1:5,000		300051670	

- At each marsh bird survey point count station, the surveyor completed 5 minutes of passive observation (i.e., recorded all species observed or heard), followed by 5 minutes of playback recordings of secretive marsh bird calls, and another 5 minutes of passive observation, for a total of 15 minutes at each marsh monitoring protocol station.
- All birds recorded, including level of breeding evidence, are summarized in Appendix G.
- Field data was collected using a mobile data collection application (Fulcrum) on an iOS device.

Table 13: Summary of Breeding Bird Survey Weather Conditions Conducted by Burnside Staff Survey Weather Conditions Conducted by

Survey Date	Observers	Time of Day (Start/End) (24 hours)	Weather Conditions(Air Temp °C/Beaufort Sky Code1/Wind Scale2)
Mar. 05	Nadia - Drian and		Start: 21°C; End: 26°C
May 25,	Nadine Price and Meredith Meeker	1ce and 05:52 to 10:32	Sky: 1
2020			Wind: 1
June 8,	Nadine Price and		Start: 10°C; End: 16°C
2020	Meredith Meeker	05:47 to 10:07	Sky: 0
			Wind: 2
June 22,	Nadine Price and		Start: 12°C; End: 25°C
2020	Meredith Meeker	05:59 to 10:29	Sky: 1
2020			Wind: 1

¹NAAMP/ Beaufort Sky Codes

- 0 = clear (no cloud cover)
- 1 = partly cloudy (scattered or broken) or variable
- 2 = cloudy or overcast
- 3 = sandstorm, dust storm or blowing snow
- 4 = fog, smoke, thick dust, or haze
- 5 = drizzle or light rain
- 6 = rain
- 7 = snow or snow/rain mix
- 8 = showers
- 9 = thunderstorms

²Beaufort Wind Scale

- 0 = calm, smoke rises vertically (0-2 km/hr)
- 1 = Light air movement, smoke drifts (3-5)
- 2 = Slight breeze, wind felt on face; leaves rustle (6-11)
- 3 = Gentle breeze, leaves & twigs in constant motion (12-19)
- 4 = Moderate breeze, small branches moving, raises dust & loose paper (20-30)
- 5 = Fresh breeze, small trees begin to sway (31-39)
- 6 = Strong breeze, large branches in motion (40-50)

6.1.1 Barn Swallow and Chimney Swift Structure Surveys

Barn Swallow (*Hirundo rustica*) and Chimney Swift (*Chaetura pelagica*) are listed as Threatened under the ESA. Both species are known to nest in anthropogenic structures (i.e., barns, sheds, uncapped brick chimneys). Structure surveys were completed to identify potential habitat for Barn Swallow, Chimney Swift and SAR bats.

A site reconnaissance completed on April 24, 2020 identified a total of nine structures present on the subject property located east of Kennedy Road: one residential dwelling (S1), three chimneys (S2, S8, and S9), one garage (S3), two corrugated metal storage sheds (S4 and S5) and one remnant barn foundation (S6), located on the east side of Kennedy Road. One additional structure, an old fallen down sign (S7), was also inspected and is located on the north side of Mayfield Road (see Figure 5). Based on the results of this reconnaissance, inspections of the exterior and interior of structures identified as potential Barn Swallow habitat were surveyed for evidence of nesting during the breeding window on June 22, 2020 (S1, S3, S4, and S5).

If a chimney is determined to be capped or lined, it is considered unsuitable habitat for Chimney Swift and no further investigations are required. If a chimney is uncapped or not lined, or it cannot be determined whether it is capped or lined, further surveys would be required. This may include either a more thorough inspection of the base of the chimney inside the structure, if access is possible, or additional presence/absence survey(s) to confirm evidence of Chimney Swift activity (i.e., roosting/nesting). The three chimneys on S1 (labeled as S2, S8 and S9) were visually inspected at Kennedy Road on April 24, 2020 to determine if habitat suitability was present for Chimney Swift (Figure 5).

6.2 Herpetofauna

6.2.1 Amphibian Breeding Call Surveys

Burnside staff conducted amphibian breeding call surveys, following the *Marsh Monitoring Program Participant's Handbook for Surveying Amphibians* (Bird Studies Canada (BSC), during the 2020 breeding season. Surveys were conducted on April 6, May 16 and June 17, 2020 by Burnside staff to detect potential early, mid, and late season amphibian breeding activity in Central Ontario.

Four survey stations were chosen to provide information on potential amphibian breeding sites within representative wetland communities, located throughout the subject property. While outside of the subject property limits, one of the stations was located at the existing SWM pond as a control site. Stations are depicted on Figure 6.

The Marsh Monitoring Program guidelines state that three call surveys should be completed when nighttime air temperatures are greater than 5°C, 10°C and 17°C, respectively, and when wind strength is less than 19 km/h (\leq 3 on the Beaufort Scale). Conditions during the surveys are outlined in Table 14.



Figure Title			
	SNELL	'S HOLLOW E	AST
	SEC		N
	ULC		
	EXISTIN	IG STRUCTURES	AND
BA	T ACOU	STIC SURVEY ST	ATIONS
Drawn	Checked	Date	Figure No.
PS	НМ	2021/08/05	5
Scale		Project No.	5
1:5,000		300051670	

April 6, 2020	Amphibian Breeding Call Survey #1	
Time (24-hr): 20:37 to 21:28	Air Temp: Start: 10°C; End: 9.3°C	
	Sky Code ¹ : 2	
	Wind Scale ² : 2	
May 16, 2020	Amphibian Breeding Call Survey #2	
Time (24-hr): 21:09 to 21:54	Air Temp: Start: 11.5°C; End: 10.7°C	
	Sky Code ¹ : 1	
	Wind Scale ² : 2	
June 17 2020	Amphibian Breeding Call Survey #3	
Time (24-hr): 21:34 to 22:10	Air Temp: Start: 20.3°C; End: 18°C	
	Sky Code ¹ : 0	
	Wind Scale ² : 1	

Table 14: Summary of Amphibian Breeding Call Survey Weather ConditionsConducted by Burnside Staff

	¹ NAAMP/	Beaufort	Sky Codes	
--	---------------------	----------	-----------	--

0 = clear (no cloud cover)

- 1 = partly cloudy (scattered or broken) or variable
- 2 = cloudy or overcast
- 3 = sandstorm, dust storm or blowing snow
- 4 = fog, smoke, thick dust, or haze
- 5 = drizzle or light rain
- 6 = rain
- 7 = snow or snow/rain mix

8 = showers

9 = thunderstorms

²Beaufort Wind Scale

- 0 = calm, smoke rises vertically (0-2 km/hr)
- 1 = Light air movement, smoke drifts (3-5)
- 2 = Slight breeze, wind felt on face; leaves rustle (6-11)
- 3 = Gentle breeze, leaves & twigs in constant motion (12-19)
- 4 = Moderate breeze, small branches moving, raises dust & loose paper (20-30)
- 5 = Fresh breeze, small trees begin to sway (31-39)
- 6 = Strong breeze, large branches in motion (40-50)

6.2.2 Basking Turtle Surveys

Visual encounter surveys for turtles were conducted in the spring, based on the MNRF's *Survey Protocol for Blanding's Turtle in Ontario* (MNRF, 2015), tailored to the needs of this project. While Blanding's Turtle is not expected for this area, this protocol provides a comprehensive method for surveying generally for turtle overwintering/basking habitat for species expected in this location (i.e., Midland Painted Turtle (*Chrysemys picta marginata*) and Snapping Turtle (*Chelydra serpentina*). Three main survey stations were established where open water was present: Station 1 (SWM pond control site), Station 2 (south side of wetland) and Station 3 (shallow aquatic open water pond). It was assumed that any turtles observed at the control site may also be using the adjacent wetland habitats during their life cycle. Burnside staff also walked the perimeter of the wetlands and pond where suitable. See Figure 6.



Figure Titl	SNELL	'S HOLLOW E	AST
	SEC	ONDARY PLA	Ν
	AMPHIBIA	N & REPTILE SU	RVEYS
Drawn	Checked	Date	Figure No.
PS	НМ	2021/08/05	6
Scale		Project No.	0
1:5,000)	300051670	

The survey methodology for basking turtles is summarized in Table 15 and in the list below:

- As per the Protocol, a minimum of five surveys were conducted at the wetland communities on the subject property.
- Surveys were spread over five weeks after ice melt between April and June between 08:00 and 17:00 on clear, sunny days with air temperatures above 5°C, or on cloudy or overcast days with air temperatures above 15°C.
- The surveyor used high quality binoculars to ensure that vegetation was surveyed appropriately.

Table 15: Summary of Basking Turtle Survey Weather Conditions Conducted byBurnside Staff

April 4, 2020	Basking Survey #1
Time (24-hr): 11:20 to 11:32	Air Temp (°C): 6 to 8
Sky Code ¹ : 2	Wind Scale ² : 3
April 6, 2020	Basking Survey #2
Time (24-hr): 12:10 to 13:42	Air Temp (°C): 14.1 to 15.1
Sky Code ¹ : 1	Wind Scale ² : 1
April 25, 2020	Basking Survey #3
Time (24-hr): 12:18 to 14:25	Air Temp (°C): 11.6 to 15.0
Sky Code ¹ : 1	Wind Scale ² : 2
April 27, 2020	Basking Survey #4
April 27, 2020 Time (24-hr): 13:45 to 15:20	Basking Survey #4 Air Temp (°C): 13.1 to 14.5
April 27, 2020 Time (24-hr): 13:45 to 15:20 Sky Code ¹ : 2	Basking Survey #4Air Temp (°C): 13.1 to 14.5Wind Scale2: 1
April 27, 2020 Time (24-hr): 13:45 to 15:20 Sky Code ¹ : 2 May 5, 2020	Basking Survey #4Air Temp (°C): 13.1 to 14.5Wind Scale²: 1Basking Survey #5
April 27, 2020 Time (24-hr): 13:45 to 15:20 Sky Code ¹ : 2 May 5, 2020 Time (24-hr): 11:55 to 14:51	Basking Survey #4 Air Temp (°C): 13.1 to 14.5 Wind Scale ² : 1 Basking Survey #5 Air Temp (°C): 13.3 to 17.2
April 27, 2020 Time (24-hr): 13:45 to 15:20 Sky Code ¹ : 2 May 5, 2020 Time (24-hr): 11:55 to 14:51 Sky Code ¹ : 2	Basking Survey #4 Air Temp (°C): 13.1 to 14.5 Wind Scale ² : 1 Basking Survey #5 Air Temp (°C): 13.3 to 17.2 Wind Scale ² : 3
April 27, 2020 Time (24-hr): 13:45 to 15:20 Sky Code ¹ : 2 May 5, 2020 Time (24-hr): 11:55 to 14:51 Sky Code ¹ : 2 May 13, 2020	Basking Survey #4 Air Temp (°C): 13.1 to 14.5 Wind Scale ² : 1 Basking Survey #5 Air Temp (°C): 13.3 to 17.2 Wind Scale ² : 3 Basking Survey #6
April 27, 2020 Time (24-hr): 13:45 to 15:20 Sky Code ¹ : 2 May 5, 2020 Time (24-hr): 11:55 to 14:51 Sky Code ¹ : 2 May 13, 2020 Time (24-hr): 11:18 to 13:22	Basking Survey #4 Air Temp (°C): 13.1 to 14.5 Wind Scale ² : 1 Basking Survey #5 Air Temp (°C): 13.3 to 17.2 Wind Scale ² : 3 Basking Survey #6 Air Temp (°C): 11.2 to 15.5

¹NAAMP/ Beaufort Sky Codes

- 0 = clear (no cloud cover)
- 1 = partly cloudy (scattered or broken) or
- variable
- 2 = cloudy or overcast
- 3 = sandstorm, dust storm or blowing snow
- 4 = fog, smoke, thick dust, or haze 5 = drizzle or light rain
- 6 = rain
- 7 = snow or snow/rain mix
- 8 =showers
- 9 = thunderstorms

²Beaufort Wind Scale

- 0 = calm, smoke rises vertically (0-2 km/hr)
- 1 = Light air movement, smoke drifts (3-5)
- 2 = Slight breeze, wind felt on face; leaves rustle (6-11)
- 3 = Gentle breeze, leaves & twigs in constant motion (12-19)
- 4 = Moderate breeze, small branches moving, raises dust & loose paper (20-30)
- 5 = Fresh breeze, small trees begin to sway (31-39)
- 6 = Strong breeze, large branches in motion (40-50)

6.2.3 Turtle Nesting Surveys

Turtle nesting surveys were based on the MNRF Guelph District's *Blanding's Turtle Nest and Nesting Survey Guidelines* (May 2016). The protocol was modified slightly to better suit the needs of the project and increase the likelihood of detecting turtle nesting evidence. These modifications were made in consultation with TRCA.

The survey methodology for nesting turtles is summarized below and in Table 16:

- Surveys were completed within areas suitable for nesting (i.e., friable soils dominated by sand and gravel and exposed to sun and warmth), with a focus on south-facing slopes and areas within close proximity to the wetland communities on the subject property, depicted on Figure 6. These areas were surveyed by walking systematic, repetitive transects. The SWM pond was also surveyed as a control site.
- As per the Protocol, nesting surveys are to commence when the first sign of Midland Painted Turtle or Snapping Turtle nesting in the area has begun and continue for three weeks. The first survey was conducted on June 3, 2020 to search for evidence of nesting. A mailing list for turtle nesting notifications was reviewed daily to determine when surveys should commence (this list was organized by Heather Fotherby, Terrestrial and Wetland Biologist, Natural Resource Solutions Inc.). On June 8, 2020, commencement of Midland Painted Turtle and Snapping Turtle nesting was reported in the Greater Toronto Area.
- Surveys were completed the day after an evening of suitable weather conditions: warm, humid nights with air temperatures above 14°C. It was agreed with TRCA that daytime searches for evidence of nesting can reduce search effort by eliminating the need for further evening surveys once nesting activity is detected.
- All signs of turtle nesting were noted, including test scrapes, tracks and trails made by commuting turtles, freshly laid nests, predated nests, and the presence of turtles laying eggs or commuting to/from nesting sites.

Table 16:Summary of Nesting Turtle Survey Weather Conditions Conducted byBurnside Staff

June 3, 2020 (Survey #1)	
Time (24-hr): 19:15 to 21:55	Air Temp (°C): 25 to 21
Sky Code ¹ : 1	Wind Scale ² : 3
June 11, 2020 (Survey #2)	
Time (24-hr): 17:22 to 20:03	Air Temp (°C): 24 to 21
Sky Code1: 1	Wind Scale ² : 2
June 12, 2020 (Survey #3)	
Time (24-hr): 8:24 to 10:37	Air Temp (°C): 16
Sky Code1: 2	Wind Scale ² : 4
June 17, 2020 (Survey #4)	•
Time (24-hr): 18:27 to 20:57	Air Temp (°C): 32 to 23
Sky Code1: 0	Wind Scale ² : 0
June 24, 2020 (Survey #5)	
Time (24-hr): 10:37 to 12:56	Air Temp (°C): 17 to 23
Sky Code ¹ : 5	Wind Scale ² : 6
June 30, 2020 (Survey #6)	
Time (24-hr): 18:17 to 20:30	Air Temp (°C): 31 to 28
Sky Code¹: 1	Wind Scale ² : 1

¹NAAMP/ Beaufort Sky Codes

0 = clear (no cloud cover)

1 = partly cloudy (scattered or broken) or

- variable 2 = cloudy or overcast
- 3 = sandstorm, dust storm or blowing snow
- 4 = fog, smoke, thick dust, or haze
- 5 = drizzle or light rain
- 5 = drizzle c6 = rain
- b = rarrier and rar and r
- 7 = snow or snow/rain mix
- 8 = showers
- 9 = thunderstorms

²Beaufort Wind Scale

0 = calm, smoke rises vertically (0-2 km/hr)

1 = Light air movement, smoke drifts (3-5)

- 2 = Slight breeze, wind felt on face; leaves rustle (6-11)
- 3 = Gentle breeze, leaves & twigs in constant motion (12-19)

4 = Moderate breeze, small branches moving, raises dust & loose paper (20-30)

5 = Fresh breeze, small trees begin to sway (31-39)

6 =Strong breeze, large branches in motion (40-50)

6.3 Bats

Survey methodology for SAR bat maternity roosting habitat was based on the Guelph District MNRF's *Survey Protocol for Species at Risk Bats within Treed Habitats* (April 2017). Although it is understood that MECP now administers applications for permits and authorizations under the ESA, this protocol is the latest to be developed and is used in the absence of a protocol created by MECP.

According to the protocol, coniferous, deciduous and mixed wooded ecosites, including treed swamps, that contain trees that are at least 10 cm diameter-at-breast height (DBH), should be considered suitable maternity roost habitat (MNRF, 2017).

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

Furthermore, small habitat communities (<10 ha) require a comprehensive walkthrough of the ecosite to look for snag trees, as opposed to larger sites where subsamples and snag density surveys are more appropriate. Most of the subject property is comprised of agricultural and meadow habitats; however, there are a few smaller treed communities identified. Surveys were completed in the following treed and cultural communities: FOM, SWD6-1, HR, and CUM1-1, as well as residential areas and the boulevard trees surrounding the residential properties, along Kennedy Road and Mayfield Road. Comprehensive walkthrough surveys of these communities were completed during both leaf-off and leaf-on surveys and are depicted on Figure 7. Surveys were not completed within the treed communities of the PSW. This feature is part of the NHS. Currently, no development is proposed within the PSW; if future intrusions are proposed in the wetland and trees will be impacted, further studies would be required. The treed communities located in the PSW are assumed candidate habitat for SAR bats, as shown on Figure 7.



Figure Title	SNELL SEC	'S HOLLOW E ONDARY PLA	AST N
C	ANDIDA	TE TREED BAT H	ABITAT
Drawn	Checked	Date	Figure No.
PS	НМ	2021/08/05	7
Scale		Project No.	
1:5,000		300051670	

6.3.1 Leaf-off Survey

A leaf-off survey was conducted on April 24, 2020, to survey for candidate maternity roosting habitat for Northern Myotis and Little Brown Myotis. The following criteria were considered when identifying a candidate maternity roosting tree during this survey:

- Tree snag height.
- Number of cavities or crevices often originating as cracks, scars, knot holes or woodpecker cavities.
- Snag DBH (>25 cm).
- Proximity to other identified snags.
- Amount of loose, peeling bark (naturally occurring/due to decay).
- Location of cracks, crevices, and loose/peeling bark high on the tree (>10 m) or is chimney-like, with a low entrance.
- Tree species.
- Open Community/forest gap.
- Snag Decay Class (1 to 6) (Watt and Caceres, 1999).

Each candidate tree was recorded with a GPS waypoint.

6.3.2 Leaf-on Survey

A leaf-on survey was conducted on June 18, 2020, to survey for candidate maternity roosting habitat of Tri-colored Bat within suitable habitat that may be impacted as part of the proposed development.

According to the protocol, the following candidate trees are to be surveyed to determine suitability for maternity roosting habitat:

- Any Oak tree ≥10 cm DBH.
- Any Maple trees ≥10 cm DBH if the tree included dead/dying leaf clusters.
- Any Maple trees ≥25 cm DBH.

Based on recent studies that indicate White Pine may also provide adequate maternity roosting habitat for Tri-colored Bats, White Pine trees ≥10 cm DBH with dead/dying needle clusters were included as well (Silvis, Perry, and Ford, 2016).

As with leaf-off surveys, each tree identified as a candidate maternity roosting tree was recorded with a GPS waypoint.

6.3.3 Snag Density Calculation

Snag density can be helpful when determining the quality (e.g., high, medium, or low quality) of maternity roosting habitat for Northern Myotis and Little Brown Myotis. The protocol states that although there is no minimum threshold when determining whether a given community is suitable for maternity roosting habitat, ecosites that contain 10 or more snags per hectare may be considered high quality candidate maternity roosting habitat for SAR bats.

The following snag density calculation was performed on the communities where candidate maternity roosting habitat was found:

Snag Density = number of identified snags/survey community (ha)

6.3.4 Structures

Seven of the nine existing structures on the subject property were surveyed on April 24, 2020 for candidate bat habitat (excluding S6, an old barn foundation, and S7, a fallen down sign). These structures on the east side of Kennedy Road were surveyed for entry and exit points (holes, cracks, broken windows, etc.) that could be accessed by bats and that may lead to potential roosting sites (see Figure 5).

6.3.5 Exit Surveys

Based on the results of the structure survey on April 24, 2020, the residential dwelling (S1) was the only structure that was considered candidate habitat for roosting bats. Burnside staff completed two acoustic exit surveys, on June 11 and June 30, 2020, at S1 to confirm SAR bat roosting habitat. Both surveys followed the methodology described in the MNRF Guelph District's *Use of Buildings and Isolated Trees by Species at Risk Bats: Survey Methodology* (October 2014), described below. S1 was surveyed for a total of 90 minutes, from one half hour before sunset to one hour after sunset. Surveys took place during favourable weather conditions (i.e., during periods of low wind and no rain).

Surveyors were positioned within viewing distance of three potential exit points on the structure. If bats were to exit the structure, the number of bats would be recorded. An Echo Meter Touch 2 Pro Bat Call Detector (heterodyne) was used to record calls if bats were detected exiting the structure and foraging within proximity to the survey area. Survey conditions are summarized in Table 17 below.

Structure ID	Survey	Date	Time Start	Time End	Weather
Structure 1	#1	June 11, 2020	20:30	21:40	Temp: 22°C Wind ¹ : 2 Precip: 0 Cloud ² : 0
House	#2	June 30, 2020	20:33	22:03	Temp: 24°C Wind ¹ : 1 Precip: 0 Cloud ² : 2

Table 17: Summary of Bat Acoustic Exit Survey Weather Conditions Conducted by Burnside Staff

¹NAAMP/ Beaufort Sky Codes

0 = clear (no cloud cover)

1 = partly cloudy (scattered or broken) or

variable

2 = cloudy or overcast

- 3 = sandstorm, dust storm or blowing snow
- 4 = fog, smoke, thick dust, or haze 5 = drizzle or light rain

- 6 = rain7 = snow or snow/rain mix
- 8 = showers

9 = thunderstorms

²Beaufort Wind Scale

0 = calm, smoke rises vertically (0-2km/hr)

1 =Light air movement. smoke drifts (3-5)

2 = Slight breeze, wind felt on face; leaves rustle (6-11)

- 3 = Gentle breeze, leaves & twigs in constant motion (12-19)
- 4 = Moderate breeze, small branches moving, raises dust & loose paper (20-30)

5 = Fresh breeze, small trees begin to sway (31-39)

6 = Strong breeze, large branches in motion (40-50)

6.4 **Aquatic Habitat Assessment**

An aquatic habitat assessment was completed on July 22, 2020 by Burnside staff, utilizing Burnside's Standard Operating Procedure (SOP) for Aquatic Assessment – Waterbodies, based on the Ministry of Transportation Environmental Guide for Fish and Fish Habitat (2009) ('The Guide'). The weather conditions during the site visit were overcast, with some light rain. The ambient temperature was approximately 24°C.

6.5 Incidental Wildlife Observations

General wildlife surveys were conducted concurrently with all field investigations. All observations and signs of species were recorded (e.g., tracks/trails, scat, burrows, dens, browse, vocalizations) and are included within this report.

6.6 Anthropogenic Features

Aside from structures that may be habitat for SAR birds and bats (as discussed above), anthropogenic features could be present on the subject property that might be suitable habitat for other wildlife, such as snakes. Additional searches for man-made features (e.g., rock piles, rock fences or old foundations extending into the ground) were

undertaken during field studies conducted for all site investigations and were reviewed for evidence of wildlife use.

7.0 Ecological Existing Conditions

7.1 Avifauna

A total of 50 resident bird species, exhibiting some level of breeding evidence (possible, probable or confirmed), were observed on the subject property during targeted breeding bird surveys on the subject property in 2020 (see Appendix G).

Eight species were observed on the subject property during the breeding bird window, but no breeding evidence (i.e., suitable breeding habitat or breeding behavior) was recorded: Barn Swallow, Common Raven (*Corvus corax*), Cooper's Hawk (*Accipiter cooperii*), Great Blue Heron (*Ardea herodias*), Herring Gull (*Larus argentatus*), Osprey (*Pandion haliaetus*), Ring-billed Gull (*Larus delawarensis*) and Turkey Vulture (*Cathartes aura*).

According to MNRF's Significant Wildlife Habitat Technical Guide (MNR, 2000), "area-sensitive" species are defined as species that require large areas of suitable habitat for long term population survival. Fragmentation of essential habitats can result in overall declines in populations. Two "area-sensitive" bird species, as defined by the MNRF, were observed exhibiting breeding evidence on the subject property during the breeding bird surveys: American Redstart (*Setophaga ruticilla*) and Savannah Sparrow (*Passerculus sandwichensis*). Cooper's Hawk is also an "area-sensitive" species; however, no breeding evidence was recorded.

Five species were observed exhibiting breeding evidence on the subject property during the breeding bird surveys that have a TRCA local rarity rank of L3 ("species of Regional Conservation Concern, generally less sensitive and more abundant than L1 and L2 ranked species"): American Woodcock (*Scolopax minor*), Black-billed Cuckoo (*Coccyzus erythropthalmus*), Field Sparrow (*Spizella pusilla*), Sora (*Porzana Carolina*) and Virginia Rail (*Rallus limicola*).

Two bird species, listed as both provincially and federally significant, were observed on the subject property during breeding bird surveys: Barn Swallow (Threatened) and Eastern Wood-pewee (*Contopus virens*) (Special Concern). Eastern Meadowlark and Bobolink were not recorded during the three breeding surveys. A SAR Screening Table for the subject property is included in Appendix H. Barn Swallow were observed foraging over the subject property, but none were recorded nesting in any of the structures on the subject property (see Figure 5). Eastern Wood-pewee were recorded in two communities, CUM1-1 and CVR_4 in the central portion of the subject property.

The significance of these species is discussed in more detail in Section 7.7 of this report.

7.1.1 Barn Swallow and Chimney Swift Structure Surveys

No Barn Swallow nests were observed on the exterior or interior of the structures surveyed on June 22, 2020 (S1, S3, S4, and S5) located on the property east of Kennedy Road (see Figure 5). Additionally, the storage sheds did not feature any exit/entry points for Barn Swallow and are not suitable for nesting habitat (comprised of corrugated sheet metal).

The site reconnaissance on April 24, 2020 revealed that the chimneys (S2, S8, and S9) on the residential dwelling labeled as S1 were not suitable for Chimney Swift. Chimney S2 is brick and is of suitable size for Chimney Swift (i.e., one side is four bricks wide) but is capped with a metal screen. Chimney S8 is also of suitable size (i.e., two bricks wide on all sides) but is capped with a metal screen. Chimney S9 is similar to S2; it is brick and of suitable size (i.e., one side is four bricks wide) but appears to be covered (McIllwraith Field Naturalists, 2007). Additionally, no Chimney Swift were observed during the breeding bird surveys.

Given these findings, Barn Swallow and Chimney Swift will not be discussed further in this report.

7.2 Herpetofauna

7.2.1 Amphibian Breeding Call Surveys

A total of four different species of frogs/toads were recorded during breeding call surveys in 2019 and 2020: Wood Frog (*Lithobates sylvaticus*), American Toad (*Anaxyrus americanus*), Gray Treefrog (*Hyla versicolor*) and Green Frog (*Rana clamitans*). These species are ranked as S5 in Ontario (very common and secure). Two species recorded on the subject property have a TRCA local rank of L2 ("species of Regional Conservation Concern, somewhat more abundant and generally slightly less sensitive than L1 species"): Wood Frog and Gray Treefrog. Detailed results of the surveys are provided under separate cover as part of the annual wetland monitoring (see Appendix D). The following is a summary of species recorded at each station in 2019 and 2020:

- AMPH1 (MAS2-1) Wood Frog (2019 only)
- AMPH2 (SWM Pond Control Site) American Toad, Green Frog
- AMPH3 (SWT/SWD) Wood Frog
- AMPH4 (SAS1-1) American Toad, Gray Treefrog, Green Frog

7.2.2 Turtle Basking Surveys

Overwintering/basking habitat for one species of turtle, Midland Painted Turtle (*Chrysemys picta*), was confirmed on the subject property during targeted basking

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

surveys. The highest number of Midland Painted Turtle recorded at each wetland station was one at Station 1 (SWM pond control site), zero at Station 2 (south side of wetland) and 18 at Station 3 (shallow aquatic open water pond). One Snapping Turtle has observed incidentally on June 30, 2020 at Station 3 shallow basking during turtle nesting surveys (see Section 7.5). Individuals that were observed were either basking on dead vegetation, or shallow basking in the pond itself. One hatchling Midland Painted Turtle was observed at Station 1 on May 2, 2020. See Table 18 below.

Field Survey	Station	Species Observed	Number of
Date			individuals
	1	None	0
April 3, 2020	2	None	0
	3	Midland Painted Turtle	1
	1	None	0
April 6, 2020	2	None	0
	3	Midland Painted Turtle	14
	1	None	0
April 25, 2020	2	None	0
	3	Midland Painted Turtle	14
	1	None	0
April 27, 2020	2	None	0
	3	Midland Painted Turtle	18
	1	Midland Painted Turtle	1
May 2, 2020	2	None	0
	3	Midland Painted Turtle	7
	1	None	0
May 13, 2020	2	None	0
	3	Midland Painted Turtle	15

 Table 18: Summary of Basking Turtle Surveys Conducted by Burnside Staff

Midland Painted Turtle and Snapping Turtle are ranked as "S4" (Apparently Secure) in Ontario. According to TRCA's scoring and local ranking of fauna species in their jurisdiction, Midland Painted Turtle and Snapping Turtle are ranked as "L3". Although the Midland Painted Turtle is not listed under the ESA, it is listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as "Special Concern". Snapping Turtle is listed as "Special Concern" under the ESA, as well as SARA.

7.2.3 Turtle Nesting Surveys

Turtle nesting was confirmed on the subject property in the cultural meadow (CUM1-1), directly upland from the shallow aquatic pond (SAS1-1) and at the edge of the SWM pond control site. These nesting sites are shown on Figure 6. Nesting turtles typically prefer well-drained soil substrate, usually sand or sand mixed with gravel for oviposition

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

sites. Most of the habitat along the north side of the wetland and shallow aquatic pond features tall, dense vegetation and shrubs with small pockets of bare soil or sparse vegetation. This made searching these areas challenging. While the south side of the wetland and shallow aquatic pond were also surveyed, no evidence of turtle nesting was observed; this is likely attributed to the fact that turtles typically choose south or southwest facing slopes to lay their eggs. The banks of the SWM pond have been landscaped and feature short herbaceous vegetation with exposed, bare soil interspersed throughout. The SWM pond currently provides suitable nesting habitat; however, this may change over time as the plantings establish and cover more of the exposed soil.

Four predated nests were observed clustered together, adjacent to the shallow aquatic (SAS1-1). Species was not able to be confirmed due to the broken condition of the eggs. Additionally, one Midland Painted Turtle was observed depositing eggs on the bank of the SWM pond, and one hatchling was observed.

Due to the disturbed nature of the site, nest predation and destruction rates of nests are likely to be high due to the presence of numerous predators that are active within the residential areas (i.e., Raccoon (*Procyon lotor*), Striped Skunk (*Mephitis mephitis*), Red Fox (*Vulpes vulpes*) and Coyote (*Canis latrans*)).

7.3 Bats

7.3.1 Leaf-off Survey Results

12 snags were identified in the treed communities, located on the subject property outside of the NHS. Of the snags identified, five were Sugar Maple (*Acer Saccharum*), two were Black Walnut (*Juglans nigra*), two were Willow sp. (*Salix sp.*), one was Eastern Cedar (*Thuja occidentalis*) and two were decayed past the point of identification. They were all large deciduous trees, with a DBH over 40 cm, with multiple cracks and crevices. See Table 19 below.

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

ID	Species	Common Name	DBH	Height	Decay Class ¹	Number of Cracks and Crevices	Significant Features
1	Acer saccharum	Sugar Maple	81	15	2	5+	Large hollow in main trunk, several knot
			01		-	Ũ	holes, furrowed bark
2	Acer saccharum	Sugar Maple	93	16	2	2	One cavity, one knot hole, and woodpecker
2		Sugai Maple		10			activity
3	Acer saccharum	Sugar Maple	81	8	4	2	Hollow trunk, one large crevice, and knot hole
4	Acer saccharum	Sugar Maple	89	16	1	3	Small crevices and knot hole
5	-	Dead	69	9	6	4	Many crevice (small-large)
6	6 Acer saccharum	Sugar Maple	91	15	2	2	Large crevice with nest, one cavity, broken
0							limb
7	Juglans nigra	Black Walnut	61	11	3	1	One crevice
8	Juglans nigra	Black Walnut	83	12	2	3	Hollow Trunk
9	Salix sp	Willow sp	66	14	2	8	Multiple cracks and crevices along main
	S Sanx Sp.				-	8	trunk, deeply furrowed bark
10	Salix sp.	Willow sp.	68	14	2	3	Multiple cavities, deeply furrowed bark
	Eastern Codar	45	12	2	3	Four cavities, lots of woodpecker activity,	
		Inga occidentalis Eastern Cedar 45	40	12	۷	3	barbed wire girdling tree
12	-	Dead	55	10	6	1	One cavity in main trunk

Table 19: Candidate Bat Maternity Leaf-off Results for the Subject Property

¹Decay Class Descriptions:

1 Healthy, live tree.

2 Declining live tree, part of the canopy list.

3 Very recently dead, no canopy, bark intact, branches intact.

4 Recent dead, bark peeling, only large branches intact.

5 Older dead tree, 90 percent of bark lost, few branches stubs, broken top.

6 Very old dead tree, advanced decay, no branches, parts of the stem have rotted away.

7.3.2 Leaf-on Survey Results

54 candidate maternity roosting trees were identified on the subject property outside of the NHS during leaf-on surveys: 20 Sugar Maple (*Acer saccharum*), 13 Silver Maple (*Acer saccharinum*), 10 Scots Pine (*Pinus sylvestris*), five Norway Maple (*Acer platanoides*), three Red Pine (*Pinus resinosa*), two Red Maple (*Acer rubrum*) and one White Pine (*Pinus strobus*). No Red Oak were observed, the preferred tree type for roosting Tri-colored Bat, during the survey (MNRF, 2017).

Individual trees have not been mapped at this time, but the raw field data is included in Appendix G, as reference. Each ELC community that is considered candidate bat habitat has been depicted on Figure 7. More detailed bat habitat surveys will be required during detailed design once tree removals and intrusions into the NHS are better understood. Additionally, future acoustic monitoring surveys should be completed where candidate habitat has been identified to confirm presence or absence of SAR bats. Requirements under the ESA are discussed further in Section 7.7.6.

7.3.3 Structures

Of the seven structures surveyed on April 24, 2020, the residential dwelling (S1) was the only one considered to have potential to function as maternity roosting habitat, based on the presence of entry and exit points.

7.3.4 Exit Survey Results

No bats were observed or detected by the Echo Meter Touch 2 Pro Bat Call Detector (heterodyne) during the two exit surveys at S1. Given that no SAR bats were observed exiting the structures, and no SAR bat calls were recorded during the surveys, no compensation for bat habitat will be required for the proposed development on the subject property for the removal of S1.

7.4 Aquatic Habitat Assessment

7.4.1 Background Information Review

An Unnamed Tributary of Spring Creek ("the watercourse") flows generally southwest to northeast through the subject property, entering a waterbody (SAS1-1) approximately 770 m downstream from the origin of the watercourse, as shown on Figure 3. The MNRF ARA mapping identifies two tributaries that form a confluence, approximately 520 m upstream of the shallow water aquatic pond (SAS1-1).

The drainage system on the subject property is a tributary to Heart Lake, with both the watercourse and waterbody categorized as warm-water thermal regimes. The MNRF ARA sampling database and MNRF PSW Evaluation (2009) has documented six

species of fish, outlined in Table 20, that have historically been observed in the watercourse and pond on the subject property.

The DFO SAR and the NHIC mapping do not indicate the presence of any aquatic SAR on the subject property, or in the immediate vicinity.

Species Name	Scientific Name	Thermal Regime
Brook Stickleback	Culaea inconstans	Cool
Brown Bullhead	Ameiurus nebulosus	Warm
Central Mudminnow	Umbra limi	Cool
Golden Shiner	Notemigonus crysoleucas	Cool
Pumpkinseed	Lepomis gibbosus	Warm
Fathead Minnow	Pimephales promelas	Warm

 Table 20:
 Fish Species Historically Observed in the Tributary of Heart Lake

7.4.2 Existing Habitat Conditions

Pond Observations

The open water pond has a maximum depth of 1.5 m and the littoral zone depth ranges from 0.5 m to 1 m deep. The substrate of the pond is primarily comprised of silt and muck, with subdominant detritus composition noted. The water colour of the pond at the time of observation was yellow-brown.

Flows are conveyed to the pond from overland flows, originating in the southwest and conveyed through the watercourse on the subject property. The lands surrounding the pond are steep and vegetated with trees, meadow vegetation and scrubland.

The entirety of the pond features a combination of submergent, floating and emergent vegetation. Submergent vegetation inundated the pond during the July 2020 site visit, with subdominant presence of duckweed and emergent rushes observed. The pond is large enough that the vegetation on the shore provides limited functional shade or riparian cover.

When water levels permit, the pond discharges through a small Corrugated Steel Pipe (CSP), located at the southeast corner of the feature. The inlet of the small CSP is set at an elevation so that the pond does not discharge during low-flow conditions, fragmenting the feature to downstream habitat. During seasonal flows (i.e., spring freshet) the pond may discharge through the culvert. However, defined bed and banks of the overland flow route were not observed, suggesting discharge from the feature is limited.

Downstream of the outlet culvert, a short length of the flow route conveys discharge to a large smooth wall steel pipe culvert, approximately 1 m in diameter, under

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

Mayfield Road. Seasonal flows are conveyed downstream of Mayfield Road, but limited channelization and scouring were noted during the field investigation, suggesting discharge frequency and velocity is limited. The channel and culverts were dry during the July 2020 site visit. A small amount of substrate material was observed within the Mayfield Road crossing structure, but the culvert was not embedded and does not provide permanent connectivity to the downstream reaches of potential fish habitat. Downstream of Mayfield Road, the channel lacked defined bed and banks, with multiple overland flow routes observed.

Watercourse Observations

The watercourse was dry throughout the assessment area during the July 2020 site visit. Dry conditions were also observed in May and August 2019 during HDF assessments, with interstitial flows observed during the April field investigation. The watercourse flows in a generally linear depressional channel, from southwest to northeast. Catchment flows are conveyed to it from headwater drainage features to the east and from overland flows throughout the adjacent meadows.

The average bankfull width was measured to be 1.1 m and the bankfull depth ranged form 0.6 m to 0.8 m. The substrate was comprised of gravel and sand. The entirety of the watercourse is covered by overhanging and in-stream grasses, with bank structure typically vertical and slightly unstable.

Anthropogenic modifications have been made at the upstream headwaters, through infilling and agricultural practices. The gradient and limited flow within the watercourse may not allow fish to migrate upstream from the pond downstream. The watercourse is not considered permanent fish habitat and provides limited direct habitat potential during spring conditions. However, it does contribute to fish habitat downstream (e.g., pond) through the transport of sediment, nutrients, and water quality.

Fisheries Sampling

During the July 2020 site visit, Burnside staff completed fisheries sampling to determine the fish community assemblage within the pond and watercourse. Given dry conditions were present within the watercourse, sampling activities were limited to the pond area at the northeast extent of the subject property. Sampling was completed using dipnets, seine netting and electrofishing. Some fish were captured using seine netting, but due to the dense aquatic vegetation, the methodology was not used throughout the pond. Electrofishing and dip netting were also conducted in the littoral zone of the watercourse, where safe conditions permitted. The locations of the sampling are outlined on Figure 3.

The fish species captured during the sampling included Brook stickleback, Central mudminnow and unidentified young of the year cyprinid species (i.e., <20 mm). These are relatively tolerant species of fish and development of the surrounding lands should

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

not cause Harmful Alteration, Disruption, or Destruction (HADD) of fish habitat or the death of fish, which is prohibited under the federal *Fisheries Act*.

7.5 Incidental Wildlife Observations

Incidental observations of wildlife were collected during field investigations. Observations were documented to provide a general characterization of the habitat functions of the subject property. Examples include tracks, scat, carcasses, live sightings, etc.

Provincial NHIC ranks (i.e., S1 to S5) are used to set protection priorities for rare species and natural communities. With the exception of Monarch (Special Concern) and Chimney (or 'Terrestrial') Crayfish (S3), the remaining species observed are not listed as provincially and/or federally significant and are listed as secure or apparently secure in Southern Ontario (in other words, they are ranked as S5 or S4, which is defined by the MNRF as species that are common, widespread and abundant in the province or uncommon but not rare). Two species, Bobolink and Chimney Crayfish, have a TRCA local rank of L2; six species (Snapping Turtle, Brown Thrasher, Double-crested Cormorant, Hooded Merganser, White-throated Sparrow and Wild Turkey) have a TRCA local rank of L3. For one species, Milkweed Leaf Beetle, there is not enough data available to rank this species and is ranked as SNR. One additional species, Seven-spotted Ladybird Beetle, is not native to Ontario and is not ranked. Table 21 provides a summary of incidental observations on the subject property that have been recorded to date.

57

Common Name	Scientific Name	Number Observed	TRCA Fauna	S-Rank	Location/Comments		
Mammals							
Coyote	Canis latrans	2	L5	S5	Two coyotes observed/heard vocalizations; also tracks and scat.		
Eastern Chipmunk	Tamias striatus	3	L4	S5	Various locations on the subject property.		
Eastern Cottontail	Sylvilagus floridanus	2	L4	S5	Various locations on the subject property.		
Muskrat	Ondatra zibethicus	2	L4	S5	Individual observed building a hutch and swimming in SAS1-1 on multiple occasions. Possible den observed.		
Beaver	Castor canadensis	1	L4	S5	Observed in SAS1-1, slapped tail.		
Raccoon	Procyon lotor	1	L5	S5	Found dead on side of Mayfield Road.		
White-tailed Deer	Odocoileus virginianus	1	L4	S5	Buck observed foraging; scat; tracks in mud; browsing observed.		
Herpetofauna							
Snapping Turtle	Chelydra serpentina	1	L3	S4	Observed in pond during nesting turtle survey (shallow basking) – June 2020.		
Avifauna							
Bobolink	Dolichonyx oryzivorus	2	L2	S4B	Two males observed incidentally in meadow at west end of site (near Kennedy Rd) on May 13, 2020. Not recorded during breeding bird surveys; assumed migrants.		

Table 21: Summary of Incidental Wildlife Observations by Burnside Staff on the Subject Property

Common Name	Scientific Name	Number Observed	TRCA Fauna Rank ¹	S-Rank	Location/Comments	
Brown Thrasher	Toxostoma rufum	1	L3	S4B	Observed in hedgerow during bat habitat survey on April 24, 2020. Not recorded during breeding bird surveys; assumed migrant.	
Bufflehead	Bucephala albeola	1	-	S4	Observed in SAS1-1 on April 25 and May 2, 2020 – migrant.	
Double-crested Cormorant	Phalacrocorax auritus	1	L3	S5B	Observed in SAS1-1 on April 24, 2020.	
Hooded Merganser	Lophodytes cucullatus	1	L3	S5B, S5N	Observed in SAS1-1 on May 2, 2020. Not recorded during breeding bird surveys; assumed migrant.	
Northern Rough- winged Swallow	Stelgidopteryx serripennis	1	L4	S4B	Flew over SAS1-1 on April 27, 2020. Not recorded during breeding bird surveys; assumed migrant.	
Trumpeter Swan	Cygnus buccinator	1	L+	S4	Observed in SAS1-1 on April 25 and May 13, 2020. Not recorded during breeding bird surveys.	
White-throated Sparrow	Zonotrichia albicollis	1	L3	S5B	Heard singing near swamp on May 13, 2020. Not recorded during breeding bird surveys; assumed migrant.	
Wild Turkey	Meleagris gallopavo	2	L3	S5	Foraging in agricultural field on May 13, 2020. Not recorded during breeding bird surveys.	
Lepidoptera						
Inornate Ringlet	Coenonympha tullia	3	-	S5	-	
Monarch	Danaus plexippus	2+	-	S2N, S4B	Special Concern, both caterpillars and adults were observed in CUM1-1 ecosites. Host plant also recorded.	
Northern Crescent	Phyciodes cocyta	1	-	S5	-	

Common Name	Scientific Name	Number Observed	TRCA Fauna Rank ¹	S-Rank	Location/Comments	
Odonata						
Widow Skimmer	Libellula luctuosa	2	-	S5	-	
Coleoptera	·					
Milkweed Leaf	Labidomera	2	-	SNR	-	
Beetle	clivicollis					
Seven-spotted	Coccinella	1	-	SNA	-	
Ladybird Beetle	septempunctata					
Crustacean						
"Chimney"	Fallicambarus	0	L2	S3	More than 10 crayfish burrows recorded near	
(Terrestrial)	fodiens				SAS1-1.	
Crayfish						

¹TRCA Fauna Ranks and Scores for the TRCA Jurisdiction, 2019

L1 – Species of Regional Conservation Concern, regionally scarce due to either accidental occurrence or extreme sensitivity to human impacts

L2 – Species of Regional Conservation Concern, somewhat more abundant and generally slightly less sensitive than L1 species

L3 – Species of Regional Conservation Concern, generally less sensitive and more abundant than L1 and L2 ranked species

L4 – Species of Urban Concern, occur throughout the region but could show declines if urban impacts are not mitigated effectively

L5 – Species that are considered secure through the region

L+ - Introduced species, not native to the Toronto region

LX - Extirpated species, species not recorded in the region in the past 10 years

LS - Sporadic breeder, species not recorded in the region in the past 10 years

7.6 Anthropogenic Features

Searches for other anthropogenic features were conducted during field studies to determine evidence of wildlife use. While no wildlife use of anthropogenic features was confirmed, it is possible that the old barn foundation (S6), present on the property east of Kennedy Road, may provide potential reptile hibernaculum and refuge for other wildlife (photos are provided in Appendix G). The walls and foundation are crumbling, and numerous piles of rock and cement blocks are piled around the dilapidated structure. A search of this area in early spring to check for evidence of hibernacula should occur during detailed design, once impacts to this feature are better understood. Anthropogenic features are discussed as they relate to Significant Wildlife Habitat in Section 7.7.5.

7.7 Provincially Significant Natural Features

7.7.1 Provincially Significant Wetlands

Section 6.0 of the PPS (MMAH, 2020) defines significant wetlands as "an area identified as provincially significant by the Ministry of Natural Resources using evaluation procedures established by the Province, as amended from time to time."

The Heart Lake PSW Complex consists of 40 wetlands; the largest wetland in the complex as well as 14 other smaller wetlands occur within the Heart Lake Conservation Area. A portion of the Heart Lake PSW Complex (referred to as "Wetland No. 1" in the MNRF evaluation) is present on the subject property and is 7.53 ha in size. This wetland is protected and contained within TRCA regulated limits and the NHS. The wetland is located on the headwater reaches of the Spring Creek subwatershed of Etobicoke Creek; most of the wetlands are hydrologically linked by the watercourse within the complex (MNR, 2009). Please refer to Burnside's Annual Wetland Monitoring Reports – Year 1 (2019) and Year 2 (2020), provided in Appendix D.

Detailed field surveys have been completed in the past by MNRF and TRCA. The Heart Lake PSW Complex was initially evaluated in November 2000 and updated in November 2009. The MNRF then attended a site visit at Wetland No. 1, in September 2011, to delineate the eastern portion of the wetland boundary. At the site visit, refinements were made to the wetland boundary, based on a surveyed wetland staking with TRCA staff in attendance. As such, the boundary of Wetland No. 1 was updated.

The Credit River Watershed and Region of Peel NAI compiled ecological data from various surveys that had been completed in 1996 and 2003 and provided a summary characterization of the site, named "Kennedy-Highway 410" NAI #10730, 11676, 11677 (Volume 3, April 2014). This report recognizes the wetland complex supports high biodiversity function and contains provincially rare vegetation communities but is also challenged by the presence of non-native and invasive species (i.e., Purple Loosestrife,

Common Buckthorn, Curly Pondweed). It also recognizes the importance of maintaining a biological linkage between this portion of the PSW Complex and the remainder of the Heart Lake PSW Complex, south of Mayfield Road.

According to Burnside's ELC surveys completed in 2019, there are six ELC communities that comprise the wetland complex located on the subject property:

- Pondweed Submerged Shallow Aquatic (SAS1-1) (S5);
- Cattail Organic Shallow Marsh (MAS3-1) (S5);
- Reed-canary Grass Graminoid Mineral Meadow Marsh Type (MAM2-2) (S5);
- Alder Organic Thicket Swamp Type (SWT3-1) (S5);
- Thicket Swamp (SWT)/Red Maple Organic Deciduous Swamp Ecosite (SWD6-1); and
- Red Maple Organic Deciduous Swamp Ecosite (SWD6-1) (S5).

As mentioned in Section 5.6.1, two of the wetland communities have a TRCA local rank of L2 ("community of regional conservation concern"): SWT3-1 and SWD6-1.

7.7.2 Significant Valleylands

The NHRM (MNR, 2010) provides criteria for identifying Significant Valleylands, including a variety of landform related functions and attributes as well as ecological features and functions. A valleyland system associated with an Unnamed Tributary of Spring Creek is present on the subject property and meets the criteria for significant. According to the NHRM a Significant Valleyland is defined as:

a natural area that occurs in a valley or other landform depression that has water flowing through or standing for some period of the year. Large, well-defined valleylands are often significant landscape features essential to the character of an area.

Additionally, the PPS (2020) defines Significant Valleylands as:

ecologically important in terms of features, functions, representation or amount, and contributing to the quality and diversity of an identifiable geographic area or natural heritage system.

The NHRM further defines the recommended Significant Valleyland evaluation criteria and standards for areas with well-defined valley morphology (i.e., floodplains, meander belts, and valley slopes). One of the criteria is that features having an average width of 25 m are considered significant. The valleyland system associated with the Unnamed Tributary of Spring Creek includes a floodplain, meander belt, steep valley slopes greater than 10 m from the top of bank (TOB) to the toe of slope, and a corridor width

between 150 m to 300 m. It should also be noted that TRCA staff staked/approved the TOB associated with the creek and valleyland on October 24, 2018. It is the Landowners' understanding that this staking may be subject to further adjustments, as deemed appropriate, through the development approval process. This is discussed further in Section 7.9.

The Core Area of the Greenlands System, as depicted on Schedule A of the ROP (2018), identifies that a significant portion of the subject property is located within the Core Area land use designation. The Region's Core Area land use designation is an additional criterion used to determine significance, as it relates to valley corridors. Core Areas represent provincially and regionally significant features and areas and are considered a sub-set of what would be significant under the PPS. Where there is a discrepancy between Schedule A and the identification of Core Areas in the text of the OP, the text shall govern. Section 2.3.2.2 (g) (Core Areas) of the ROP identify Core Areas as being valley and stream corridors, meeting one or more of the criteria in Table 2: Criteria and Thresholds for the Identification of Core Valley and Stream Corridors. It is TRCA's opinion that the valleyland system associated with the Unnamed Tributary of Spring Creek meets the test of Core Areas, as identified in the text of the ROP (TRCA, 2020).

7.7.3 Significant Woodlands

Significant Woodlands are typically identified by the local municipality. According to the PPS (MMAH, 2020), significant woodland is defined as:

an area which is ecologically important in terms of features such as species composition, age of trees and stand history; functionally important due to its contribution to the broader landscape because of its location, size or due to the amount of forest cover in the planning area; or economically important due to site quality, species composition, or past management history.

The PPS indicates that significant woodland criteria is to be identified using criteria established by the MNRF; however, it is Burnside's understanding that these criteria have not yet been provided.

The Peel-Caledon Significant Woodlands and Significant Wildlife Habitat Study (North-South Environmental Inc. et al., 2009) identifies criteria for determining significance in Peel-Caledon as follows:

Woodlands outside of the Oak Ridges Moraine planning boundaries satisfying any one of the following criteria should be considered significant:

1. With respect to woodland size (application of recommended thresholds to the Regional and Town scales may be determined through the policy development phase for the Region's and Town's Official Plan review exercises):

Option 1: Recommendation based on Urban-Rural System Distinction

Woodlands satisfying the following size criteria should be considered significant:

i. Urban System (i.e., within the 2031 urban boundaries for the Cities of Brampton and Mississauga): all woodlands equal to and larger than 4 ha in size.

ii. Rural System (i.e., the Rural System that comprises all of the Town of Caledon): all woodlands equal to and larger than 16 ha.

Option 2: Recommendation based on Physiography/Historical Land Use

Woodlands satisfying the following size criteria should be considered significant:

iii. areas on and above (west of) the Niagara Escarpment: all woodlands equal to and greater than 16 ha in size.

iv. Rural and Urban System below the Niagara Escarpment: all woodlands equal to and greater than 4 ha.

2. Woodlands, or inclusions in woodlands, that are 0.5 ha or greater in size, and older than 90 years should be considered significant.

3. It is recommended that any woodland (>0.5 ha) identified as supporting a linkage function, as determined through a natural heritage study approved by the Region or Town, be considered significant (Regional and Town threshold).

4. Woodlands (>0.5 ha) within 100 m of another significant feature (Regional and Town threshold).

5. Woodlands within 30 m of a watercourse, surface water feature or evaluated wetland (Regional and Town threshold).

6. Woodlands that supports any of the following (Regional and Town threshold):

i. any G1, G2, G3, S1, S2, or S3 plant or animal species, or community as designated by NHIC; or

ii. any species designated by COSEWIC or COSSARO as Threatened, Endangered, or of Special Concern.
Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

- iii. The following forest communities:
 - Dry-Fresh White Pine-Red Pine Coniferous Forest Type (FOC1-2)
 - Dry-Fresh White Pine-Oak Mixed Forest Type (FOM2-1)
 - Dry-Fresh White Pine-Sugar Maple Mixed Forest Type (FOM 2-2)
 - Moist-Fresh Hemlock-Sugar Maple Mixed Forest Type (FOM6-1)
 - Dry-Fresh Red Oak Deciduous Forest Type (FOD1-1)
 - Dry-Fresh White Oak Deciduous Forest Type (FOD1-2)
 - Dry-Fresh Mixed Oak Deciduous Forest Type (FOD 1-4)
 - Dry-Fresh Oak-Hickory Deciduous Forest Type (FOD 2-2)
 - Dry-Fresh Hickory Deciduous Forest Type (FOD 2-3)
 - Fresh Sugar Maple-Black Maple Deciduous Forest (FOD 6-2)

The only woodland community present on the subject property is FOM, with FOC4-1 inclusion. This small woodland (0.37 ha) meets the criteria for significant based on criteria number 5 only: "woodlands within 30 m of a watercourse and evaluated wetland". This woodland feature is in the central portion of the subject property and abuts the south end of MAS3-1 (evaluated wetland) and the north end of CVR_4 (see Figure 2). Because it is less than 0.5 ha, it does not meet any of the other criteria that otherwise may apply.

7.7.4 Significant Areas of Natural and Scientific Interest (ANSI)

The PPS (MMAH, 2020), Section 6.0 defines ANSIs as:

areas of land and water containing natural landscapes or features that have been identified as having life science or earth science values related to protection, scientific study or education.

According to the NHRM (MNR, 2010), provincially significant ANSI's include some of the most significant and best examples of these features in the province, and only include ANSIs identified as provincially significant.

No significant ANSIs are present on the subject property; however, adjacent lands south of Mayfield Road consist of the Heart Lake Forest and Bog Life Science ANSI and the Brampton Buried Esker Earth Science ANSI.

7.7.5 Significant Wildlife Habitat

Determination of SWH is broadly categorized and described in the NHRM (MNR, 2010). Additionally, the MNRF's SWHTG (MNR, 2000) and SWH Criteria Schedule for Ecoregion 6E (MNRF, 2015) are further supplemental documents intended to assist in identifying SWH. The Peel-Caledon Significant Woodlands and Significant Wildlife Habitat Study (North-South Environmental Inc. et al, 2009) is another supplemental document intended to assist in identifying SWH in the Peel-Caledon area, part of Ecoregion 6E. The four categories of SWH are identified as:

- 1. Habitats of seasonal concentrations of animals.
- 2. Rare vegetation communities or specialized habitat for wildlife.
- 3. Habitat of species of conservation concern.
- 4. Animal movement corridors.

Appendix H includes a screening of the various categories of SWH for the subject property, based on background records review, agency records and aerial photo interpretation as well as Burnside's field investigations for the subject property, completed in 2019 and 2020.

Table 22 summarizes Candidate and Confirmed SWH on the subject property.

Table 22: Candidate and Confirmed SWH on the Subject Property

Seasonal Concentration Areas of Animals
Candidate Bat Maternity Colonies
Confirmed Turtle Wintering Areas
Candidate Reptile Hibernaculum
Candidate Colonially Nesting Bird Breeding Habitat (Trees/Shrubs) for Green Heron
Specialized Habitats for Wildlife Considered Significant Wildlife Habitat
Confirmed Turtle Nesting Areas
Habitat for Species of Conservation Concern Considered Significant Wildlife Habitat
Confirmed Marsh Bird Breeding Habitat
Candidate Shrub/Early Successional Bird Breeding Habitat
Confirmed Terrestrial Crayfish
Confirmed Special Concern and Rare Wildlife Species – Eastern Wood-pewee, Monarch,
Snapping Turtle, Midland Painted Turtle, Terrestrial Crayfish

The majority of Candidate/Confirmed habitat on the subject property is associated with the NHS (i.e., provincially significant wetland, significant valleyland, and riparian corridor). Exceptions to this are Candidate Bat Maternity Colonies (identified in the NHS

and within the development limits), Candidate Reptile Hibernaculum, and Special Concern and Rare Wildlife Species for Monarch.

7.7.6 Habitat of Endangered and Threatened Species

Burnside's background database review, consultation with agencies, and field investigations in 2019 and 2020 revealed the potential for species listed as Endangered or Threatened under the ESA on the subject property and adjacent lands (Appendix D). These are all listed in the SAR and SCC Screening Table located in Appendix H. Table 23 below summarizes Confirmed and Candidate habitat for Endangered and Threatened species.

Confirmed and Candidate Habitat	Subject Property	Adjacent Lands
Confirmed Habitat Present	Barn Swallow (foraging only) Butternut	Barn Swallow (breeding and foraging)
Candidate Habitat Present	Little Brown Myotis (roosting) Northern Myotis (roosting Tri-colored Bat (roosting)	Bobolink Chimney Swift Eastern Meadowlark Least Bittern Little Brown Myotis (roosting) Northern Myotis (roosting) Tri-colored Bat (roosting) Butternut

Table 23: Candidate and Confirmed Habitat for Endangered and Threatened Species on the Subject Property and Adjacent Lands

The following summarizes the ESA process for candidate and confirmed SAR on the subject property.

7.7.6.1 Butternut

Naturally occurring Butternut trees of any size and age are protected under the ESA due to widespread infection with Butternut Canker, a fungal disease that typically results in tree mortality. Hybrid trees that have a Butternut ancestor are not currently protected under the ESA. Sometimes visual characteristics can indicate whether a tree is a hybrid, but any Butternut-like tree that is proposed for removal should be assessed by a Butternut Health Assessor (BHA). By law, what you can do with a butternut tree depends on its health.

General habitat for Butternut trees includes suitable areas within a 50 m radius, centered on the trunk or stem of each Butternut tree in Ontario (regardless of its size). Butternut trees are divided into three categories:

Category 1 – In the advanced stages of disease because of butternut canker ("non-retainable") and its habitat is 25 m from the trunk or stem and includes the

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

immediate habitat conditions surrounding the tree that support the growth and persistence of the tree over its lifetime.

Category 2 – The tree does not have butternut canker or disease is not as advanced ("retainable") and its habitat is 25 m to 50 m from the trunk or stem and includes the surrounding habitat conditions, supporting the core nut dispersal and seedling establishment areas up to 50 m from a parent tree.

Category 3 – Could be useful in determining how to prevent or resist butternut canker ("archivable").

Exemptions for activities that would otherwise be prohibited by the Act are allowed under O. Reg. 242/08. The BHA report is submitted to the Ministry for approval. The report must be sent to the Ministry's office 30 days before the proposed activity. If all the trees are assessed as non-retainable and the BHA's report is approved, they may be removed without any further requirements. If some trees are assessed as retainable and the report is approved, removing trees may be permissible but conditions may apply.

After the 30 days, Butternut trees that can be removed or harmed include:

- Trees in the advanced stages of disease (Category 1) as identified in the report.
- Up to a maximum of ten retainable trees (Category 2) as identified in the report but the activity must be registered with the Ministry and certain rules apply (e.g., plant butternut seedlings).

Butternut trees cannot be removed or harmed if they appear to be resistant to Butternut canker (Category 3 trees).

For Category 2 (retainable) trees, up to ten trees can be removed by any one development application. Beyond this threshold, remaining trees must be retained. In this case, the following rules apply:

- Register the activity with the Ministry.
- Plant butternut seedlings following certain ratios and planting requirements.
- Tend and monitor the seedlings.
- Maintain records that relate to planting, tending, and monitoring.

Beyond this threshold, remaining trees must be retained. A permit may still be required if:

- Category 3 trees will be removed or harmed.
- If more than ten Category 2 trees will be removed or harmed.

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

Three Butternut are confirmed on the subject property: two Category 1 and one Category 2 trees. An additional Butternut hybrid was identified. A BHA report will need to be sent to the Ministry's office 30 days before the proposed activity. Depending on when trees are proposed for removal, another health assessment may be required (prior to submitting the BHA report) during detailed design, once impacts are better understood.

7.7.6.2 SAR Bats

Species at Risk bats receive general habitat protection under the ESA. This protection includes maternity roosting habitat used by SAR bat species to raise their young during spring and summer seasons.

While acoustic surveys of the structures did not identify any SAR bats, the leaf-on and leaf-off surveys for SAR bats identified candidate habitat for SAR bats on the subject property, within the development limits. Suitable habitat is also assumed in the NHS, given the treed wetland communities present. Leaf-on/leaf-off surveys may need to be updated during detailed design for trees that are proposed for removal, including intrusions into the NHS (i.e., grading, LIDs, outfalls), once specific impacts are better understood. Over time, tree features change due to growth and weather, etc. Acoustic surveys may also be required to confirm the presence of SAR bats because candidate habitat is present. Acoustic surveys can only be completed in June and early July.

Following the completion of all required surveys, MECP will likely request the submission of an Information Gathering Form (IGF) detailing the results of all SAR surveys, to determine whether an authorization or permit under the ESA is required. The purpose of this form is to collect information that proponents need to inform the Ministry's determination of whether or not a proposed activity is likely to contravene subsections 9(1) or 10(1) of the ESA and whether it is advisable for the proponent to apply for an overall benefit permit, under Section 17 of the ESA, prior to proceeding with the activity. If it is determined that an overall benefit permit is required, it can take up a year for the Ministry to issue the permit. Planning ahead is advised to avoid any project delays.

Appropriate mitigation and compensation measures will be required, in consultation with MECP, during detailed design as impacts are assessed on a case-by-case basis. These may include installation of bat boxes, adhering to timing windows for tree removal to avoid harm to SAR bats, and providing an overall benefit to the species (i.e., create new habitat off-site).

7.8 Wildlife Linkages and Corridors

The Heart Lake PSW Complex is mainly comprised of a series of small, interconnected wetlands and is characterized by Heart Lake kettle lake, southeast of the subject property. A portion of the Heart Lake PSW Complex ("Wetland No. 1" in the MNRF

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

evaluation) is located on the subject property and is at the far northwest extent of this Complex. Wetland No. 1 is surrounded by suburban environments and is bounded by Highway 410 to the north, Mayfield Road to the south (a busy west to east artery), Kennedy Road to the west and Heart Lake Road to the east. Mayfield Road is a barrier between Wetland No. 1 and other wetlands in the Complex that are located south of this artery (mostly contained within Heart Lake Conservation Area). Similarly, Highway 410 prevents wildlife movement north to agricultural lands. The proximity of the subject property to Heart Lake Conservation Area and a large portion of the PSW Complex creates some potential for wildlife movement between the subject property and the natural areas across Mayfield Road.

At the risk of Wetland No. 1 becoming more isolated due to adjacent development, the existing wildlife linkage at the existing culvert crossing described in Section 7.4 at Mayfield Road should be maintained between these two natural areas for safe wildlife movement. As per the NAI (Volume 3, April 2014), this connectivity will help to maintain ecosystem resilience and the health of this natural area, particularly for the wetland communities. This culvert is a smooth wall steel pipe culvert that is embedded and is 1,050 mm in diameter. Currently, the culvert conveys limited seasonal flow downstream of Mayfield Road and appears to remain mostly dry much of the year. While connectivity with respect to fish passage is not available through this culvert, some native substrate material such as rocks and cobblestone is present (see image below). Based on the size and conditions of the culvert, it is expected that small-sized mammals, as well as amphibians and turtles, may utilize the feature for passage under existing conditions.

One of the goals of the Heart Lake Conservation Area Master Plan (2006) and TRCA's Crossings Guideline for Valley and Stream Corridors (September 2015) and Credit Valley Conservation's (CVC) Fish and Wildlife Crossing Guidelines (2017) includes maintaining and creating natural connections to allow for species movement, such as connections from creeks to wetlands and lakes. In addition, "consideration should also be given to providing connections to natural spaces that border Heart Lake Conservation Area, such as the wetland area north of Mayfield Road..." (i.e., the subject property). See Figure 8. The presence of this existing culvert helps to ensure that the movement of reptiles, amphibians and small mammals at the north end of the Complex will be permitted, despite surrounding suburban development pressures, thereby serving to mitigate the negative effects of road mortalities and isolation/fragmentation of communities and species populations.



Figure Title SNELL'S HOLLOW EAST SECONDARY PLAN						
	WILDLIFE LINKAGES AND CORRIDORS					
	Drawn	Checked	Date	Figure No.		
	PS	НМ	2021/08/05	8		
	Scale		Project No.	0		
	1:5,000		300051670			



Interior View of Crossing Under Mayfield Road (Photo taken July 2020)

7.9 Identification of a Natural Heritage System

As stated in Section 3.7.2, the Town of Caledon OP (2018) Schedule 6 depicts a conceptual EPA that includes Natural Core Areas and Natural Corridors (aka the NHS). For the purposes of this assessment, the NHS has been identified on the subject property as the TRCA staked TOB limits plus 10 m buffer (see Figure 9). TRCA staff staked/approved the TOB associated with the creek and valleyland on October 24, 2018 (TRCA, 2020). This limit also generally corresponds to the natural cover that exists on the site. Additionally, the Concept Plan proposes to remove 2.20 ha of the recommended NHS limits. However, the Landowners are proposing further adjustments, based on a more fulsome examination through grading and stable bank design as deemed appropriate through the development approval process. See Section 10.0 for a discussion on ecological offsetting and compensation considerations.



Figure Title	SNELL SEC	'S HOLLOW E ONDARY PLA	AST N		
DRAFT CONCEPT PLAN					
Drawn	Checked	Date	Figure No.		
PS	HM	2021/08/05	Q		
Scale		Project No.	9		
1:5,000		300051670			

The following excerpt is taken from GSAI's draft Planning Justification Report (2021):

"The EPA designation includes all Natural Core Areas and Natural Corridors. In the context of the subject lands, the EPA designation recognizes the existing wetlands, valleylands and related vegetation. New development is generally prohibited within the EPA designation. Section 5.7.3.1.4 of the Official Plan allows minor refinements to the limits of the EPA designation subject to the availability of more detailed environmental information deriving from approved studies, or site investigations/inspections. Section 5.7.3.7 of the Official Plan states that development adjacent to EPA lands require the completion of an Environmental Impact Study (EIS) and Management Plan (MP) to the satisfaction of the Town and other relevant agencies.

The limit of the EPA lands...were originally staked with the TRCA on September 20, 2011. The remainder of the subject lands were staked with the Town and the TRCA on October 23, 2018. During the 2018 staking, the proponents of the proposed Official Plan Amendment questioned the location of the staked limit within portions of the [subject property] on the north side of the valley as well as within the area of the proposed "Medium-High Density" development block. The proponents cited that the location of the stakes in those areas were either not reflective of the natural vegetated limit and/or that there was no identifiable top-of-bank as the topography of the area consisted of a gradual slope.

As agreed during the 2018 staking exercise between the proponents, the Town and the TRCA, the staked limit through these areas could be reassessed during the processing of the related development application. As shown on Figure 3 (Development Concept Plan), portions of the proposed development encroach beyond the top-of bank where the staked limit was (and continues to be) in question. While the TRCA has advised that land compensation for encroachments would be required at a 1:1 ratio, we propose a combination of land and vegetation enhancements to achieve a net ecological gain for the existing natural heritage feature.

In our opinion, the proposed Official Plan Amendment conforms to the Environmental Policy Area designation policies of the Official Plan as (subject to further dialogue with the Town and TRCA."

8.0 Description of Proposed Land Use Change

8.1 Concept Plan

The proposed Development Concept Plan comprises a mix of low, medium and high-density residential, commercial, and open space uses and internal public road network. As depicted on Figure 9, the location for the proposed low-density residential uses are shown in yellow and include detached, semi-detached and townhouses dwellings and is generally located internal to the plan area. Proposed medium-density

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

residential housing includes 3-storey dual-frontage and back-to-back townhouse dwellings and are shown in orange and brown, respectively. The proposed medium-density housing is generally located on the periphery of the plan area, near the entrances to the community. Two blocks for medium-high density residential housing is shown in red and are intended to allow for stacked townhouses and/or apartment dwellings, up to eight storeys. Both blocks would be subject to a future Site Plan Approval process for the design of the proposed development within the blocks.

It is proposed that the existing heritage-listed Snell Farmhouse will be retained in-situ, on a custom detached residential lot with driveway access to the east-west collector road. Further details on the preservation of the existing building are provided by way of the Heritage Impact Assessment, prepared under separate cover.

A 1.47 ha (3.63 acre) commercial block is proposed on Mayfield Road, north of the existing Stonegate Drive intersection. The commercial block is intended to allow for a broad range of retail and service commercial land uses. Access to the commercial block would be provided from Mayfield Road, at the existing Stonegate Drive intersection. The block would be subject to a future Site Plan Approval process for the design of the proposed commercial development.

Proposed open space uses within the plan include parks, SWM (SWM) ponds and the existing NHS and buffers. Two public parks are proposed within the plan: a 1.31 ha (3.24 acre) park within the westerly portion of the plan and a 0.38 ha (0.94 acre) park within the easterly portion of the plan. Two SWM pond facilities are also proposed within the plan: a 1.6 ha (3.95 acre) pond block within the westerly portion of the plan and a 1.73 ha (4.27 acre) pond block within the easterly portion of the plan.

The existing NHS is based on the TRCA staked TOB, is approximately 22.6 ha (54.36 acres) in size and is intended to be retained. The TOB is the greatest constraint on the subject property as other constraints, such as the wetland and woodland features, are contained within the valleyland. Buffers (or "Vegetated Protection Zones"), as described in the NHRM (2010), are defined as being located between a natural feature and lands subject to development or site alteration, permanently vegetated (preferably with native species) and providing protection to the natural feature against the impacts of the adjacent land use. As described in Section 7.9 and Section 8.2, revisions to the conceptual 10 m buffer setback from the TRCA staked TOB limits (NHS) is proposed in certain locations. A 10 m buffer is proposed from the existing and proposed revised limits of the NHS. A 14 m buffer is also proposed along the Highway 410 corridor, as required to provide for the minimum 14 m MTO setback. Additional arterial road buffers are also provided where noise abatement features (i.e., earthen berms) may be required for residential land uses. Refinements to the edges of the NHS are proposed to regularize the limits of the NHS feature and to allow for a more efficient development pattern for the surrounding table land (see GSAI's draft Planning Justification Report (2021)). The buffers will be vegetated to provide protection to wetland core habitat in the

valleyland and its associated critical function zone (i.e., turtle nesting habitat), as well as the Significant Woodland.

Vehicular access to the proposed development is provided by way of a collector road connection to Kennedy Road (at the existing Snellview Boulevard intersection) and to Heart Lake Road (on both sides), generally at the mid-point between the existing Mayfield Road intersection and the Highway 410 underpass.

8.2 Preliminary Grading

A Preliminary Grading Plan for the development of the subject property has been prepared to demonstrate that acceptable lot and road grading can be achieved in accordance with the Town of Caledon's criteria. The preliminary grading plans are provided in the drawings in Appendix I for reference (see Drawing GR-1-5). The Plan has been prepared recognizing not only the physical constraints of the site but also the existing grades of the nearby streets, the proposal for SWM facilities; and the promotion of the surface water balance.

Prior to the creation of the proposed grading scheme, a conceptual design for the SWM Facility 1 and SWM Facility 2 was prepared. Based on the sizing of these ponds, which were constrained by topographical and environmental factors, the approximate serviceable areas were determined. Recognizing the maximum serviceable area to each pond as well as the existing topography, the Preliminary Grading Plan was prepared.

Considerable effort was taken not only to minimize cut and fill requirements, but also to allow positive drainage by gravity towards the proposed SWM facilities. The resulting general direction of overland flows is summarized on Drawing GR-1-5 in the drawings in Appendix I. Where continuous overland flows to the SWM ponds are not possible, low points are proposed to allow major system flows to be captured to the minor system.

Based on the latest Concept Plan, some encroachments are proposed onto the staked TOB at two locations, at the centre of the proposed development (west of Heart Lake Road) and at the west SWM pond (SWM Facility 1) as shown in the Grading Plans. The proposed grading ensures that an engineered stable TOB is provided. The revised stable TOB +10 m buffer dictated the proposed development limits shown on the Concept Plan. The encroachments onto the TOB south of SWM Facility 1 are proposed due to the limitations on the available area for the proposed pond block. The pond block is limited by the road layout to the north and an existing heritage dwelling limiting the usable space for the pond block. The proposed encroachments ensure that a feasible SWM pond facility is available and that a stable TOB is established.

8.3 Stormwater Management Plan

8.3.1 SWM Design Criteria

As per TRCA design criteria (August 2012), the following design criteria will need to be considered in the development of the Snell's Hollow East Secondary Plan Area:

• **Quantity Control:** Peak flows are to be controlled to the unit flow rates described in the TRCA Appendix A for Etobicoke Creek Catchment 224. The unit flow rates are summarized in Table 24 below:

Return Period (Years)	Unit Flow Equation (I/s/ha)
2	7.5
5	13.3
10	18.7
25	27
50	35.2
100	42.1

Table 24: TRCA Unit Flow Rate Equations for Etobicoke Creek, Catchment 224

- **Design Storms:** Peak flows are to be modelled using the 6-hour AES storm as defined in the TRCA criteria.
- **Erosion Control:** Erosion control will be provided either through the 5 mm retention (for site plans <2.0 ha) or the 25 mm 48-hour detention in SWM ponds.
- **Quality Control:** Enhanced level of quality protection (80% TSS removal) is required as per the latest MOE SWMP Manual.
- Water Balance: The subject property is within a significant groundwater recharge area (SGRA); therefore, pre-development recharge conditions are to be maintained in post-development conditions.
- Feature-Based Water Balance: PSW's have been identified on the subject property, runoff to these features should be maintained in post-development conditions.

The following design criteria were established in the *Draft Final Report-Etobicoke Creek Hydrology Update,* by MMM Group Limited, dated April 2013:

• **Design Storms:** The report recommends utilizing the 12-hour AES rainfall distribution for a 2 to 100-year rainfall event to establish the peak flows. The Regional event should be modelled with the final 12 hours of the Hazel event under AMC III conditions.

• Quantity Control: New unit flow rates were established for infill developments for both the 2 to 100-year storm events and regional storm events (please Table 25 below); however, any development on the subject property cannot be considered infill. It was confirmed with TRCA that regional control is required for this site based on the release rate of 127.44 l/s/ha.

As per the report, the pre-development Regional flows are to be maintained in post-development conditions and unit flow rates have been developed. Regional storage will require an additional 214 m³/ha, which is to be added after the Regional Storm storage has been sized using the unit flow rates.

Table 25: Unit Flow Rate as per the Draft Final Report-Etobicoke Creek Hydrology Update

Return Period (Years)	Unit Flow Equation Catchment 41 (I/s/ha)	Unit Flow Equation Catchment 24 (I/s/ha)	Unit Flow Equation Catchment 447 (I/s/ha)		
2	10.11	11.09	13.21		
5	17.85	19.20	22.06		
10	23.75	25.34	28.65		
25	31.77	33.63	37.45		
50	38.08	40.12	44.28		
100	44.65	46.85	51.32		
Regional	127.44 (Basin 6)				

The subject property is bounded by the Mayfield Region of Peel Right of Way (ROW). The applicable design criteria stated in the Region of Peel Public Works Stormwater Design Criteria and Procedural Manual, June 2019, will apply for works within the Regional ROW.

8.3.2 Low Impact Development Measures Evaluation

The development of an effective SWM plan requires the blending of various best management and low impact development technologies to create a comprehensive strategy for water quality and water quantity control. This section identifies the various water quality and water quantity control technologies and comments on their feasibility for the proposed development.

As per the SWM Planning and Design Manual (MOE, March 2003), a hierarchy of SWM practices was considered as follows:

- Lot level controls
- Conveyance controls
- End-of-pipe solutions

300051670.0000 051670 Snell's Hollow CEISMP_210812.docx

The main features, applicability, sizing, and resulting effectiveness are summarized in the following sections.

8.3.2.1 Lot Level Controls

Lot level controls refer to those measures that can be implemented at source (e.g., on individual subdivision lot). Such measures should be considered first in any strategy as they address urban runoff on a small scale and are typically more cost effective to implement.

Low Impact Development (LID) is an innovative SWM approach with the basic principle of managing rainfall at the source using decentralized micro-scale controls that are small, cost effective landscape features located at the lot level. The goal is to mimic the pre-development hydrology of the development by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to the source. The following table outlines potential low impact development technologies and their benefits.

		Potential Benefits					
LID Measures	Increase Evaporation/ Evapotranspiration	Increase Infiltration Potential	Increase Travel Time	Disconnect Imperviousness	Decrease Runoff Volume	Improve Water Quality	Decrease Peak Flows
Canopy Cover	\checkmark		\checkmark		\checkmark		\checkmark
Enhanced Vegetation	\checkmark				\checkmark	\checkmark	\checkmark
Bioretention Swales	\checkmark	\checkmark	\checkmark	\checkmark		\checkmark	\checkmark
Bioretention Cells/Rain Gardens	\checkmark	\checkmark	\checkmark	\checkmark		\checkmark	\checkmark
Tree Box Filters	\checkmark	\checkmark		\checkmark			\checkmark
Rear Yard Grassed Swales							
Roadside Swales		\checkmark	\checkmark		\checkmark	\checkmark	\checkmark

Table 26:	Low Impact	Development Benefits
-----------	------------	-----------------------------

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

		Potential Benefits					
LID Measures	Increase Evaporation/ Evapotranspiration	Increase Infiltration Potential	Increase Travel Time	Disconnect Imperviousness	Decrease Runoff Volume	Improve Water Quality	Decrease Peak Flows
Vegetated Filters/Buffer Strips		\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	
Lot Level Depressions	\checkmark	\checkmark	\checkmark		\checkmark	\checkmark	
Direct Roof Leaders to Pervious Areas	\checkmark	\checkmark		\checkmark			\checkmark
Direct Roof Runoff to Soak-away Pits		\checkmark		\checkmark	\checkmark		\checkmark
Constructed Infiltration Facilities		\checkmark					
Pervious Pipe Systems		\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
Pervious Catch basins		\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	
Roof Storage	\checkmark		\checkmark				
Green Roofs	\checkmark		\checkmark	\checkmark	\checkmark		
Parking Lot Storage	\checkmark		\checkmark				
Superpipes							
Reduced Lot Grading			\checkmark				
Increased Topsoil Depth						\checkmark	
Soil Amendments		\checkmark				\checkmark	
Permeable Pavers				\checkmark			

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

		Potential Benefits					
LID Measures	Increase Evaporation/ Evapotranspiration	Increase Infiltration Potential	Increase Travel Time	Disconnect Imperviousness	Decrease Runoff Volume	Improve Water Quality	Decrease Peak Flows
Porous		\checkmark	\checkmark	\checkmark		\checkmark	\checkmark
Asphalt							
Pavement							
Rain Barrels							
(garden)							
Cisterns				\checkmark	\checkmark		
(irrigation)							

Source: Northwest Brampton, Low Impact Development Analysis, Drawing 1 (June 2008)

Reduced Lot Grading

Measures such as reducing lot grading and maximizing the overland flow distances serve to slow runoff and provide for additional infiltration opportunities. Current municipal standards require a minimum yard slope of 2% near houses to ensure safe drainage and prevent flooding.

Applicability to the proposed development:

The proposed development proposes will minimize lot slopes while still satisfying municipal requirements.

Increased Topsoil Depth

Increasing topsoil depths within lot areas can be easily achieved as topsoil is typically a surplus material in most construction projects.

Feasibility for the proposed development:

Due to its ease of implementation and low maintenance requirements, this low impact development approach is recommended throughout the subject property.

Current standard residential construction practices call for 150 mm of topsoil within lawn areas. Topsoil depths should be maximized within front and rear yard areas.

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

Disconnected Roof Leaders

Residential lands throughout the development will utilize disconnected roof downspouts directed to lawn surfaces, thereby promoting infiltration into the ground and delaying the arrival of water from the roof to drainage system. The effectiveness of such an approach can be enhanced by discharging roof leaders to soak-away pits or by increasing topsoil depths to increase the water holding capacity of the lawn areas.

Applicability to the proposed development:

This practice is recommended for the proposed development and will be explored further in detailed design.

Constructed Infiltration Facilities

The use of soak-way pits promotes the infiltration of clean rooftop runoff into the surrounding native soils to replenish the ground water table. The feasibility of backyard soak-away pits depends greatly on the specific underlying hydrogeologic conditions on the site. Ideally, such conditions should consist of percolation rates of at least 15 mm/hr and high-water table elevations at least 1 m below the soak-away pit bottoms.

The challenge with soak-away pit systems is their need for maintenance. While the frequency of required maintenance would be rare, the responsibility of such maintenance would fall upon the individual private owners (as they would be located within the privately-owned lots).

Applicability to the proposed development:

Based on the geotechnical investigations conducted by Golder Associates Ltd., dated 2019, it was found that groundwater levels are low subject property on the subject property.

Therefore, infiltration options are feasible subject property on the subject property. The infiltration trenches are recommended; however, in detailed design, the groundwater levels (GWL) should be reviewed again. The infiltration trenches should be designed to be at least 1 m above the GWL. Even though the Town of Caledon does not currently endorse this practice, these measures can help achieve the post to pre-water balance.

Bioretention (Lot-Level – Bioswale/Rain Gardens)

Bioretention areas (i.e., swales, cells, or rain gardens) typically have porous backfill under the vegetated surface and an underdrain that encourages infiltration and water quality filtering while avoiding extended ponding. Bioretention applications are typically used to treat stormwater that has run over impervious surfaces in more built-up areas. For this reason, and since roof leaders are to be directed to lawn surfaces and infiltration

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

facilities, this technology is not recommended for residential use. However, bioretention could have potential uses in median strips, parking lot islands, and swales in parks and ROWs.

Applicability to the proposed development:

Bioretention cells are currently not recommended for the proposed development, but this approach can be reviewed again at the detailed design stage.

Rain Barrels

Stormwater reuse within residential use could consist of cisterns to collect rooftop runoff, which could later be used for irrigation purposes. While quite effective at reducing runoff volumes, this measure relies heavily upon individual homeowners' continued operation and maintenance. As a result, this measure is difficult to rely upon on a subdivision scale. However, this approach could be implemented on a case-by-case basis in the interest of individual homeowners.

Applicability to the proposed development:

As discussed above, the Implementation of a rain barrel or any other homeowner dependent LID possesses challenges as homeowners can alter them. In addition, the enforcement of measures to prevent this practice is often challenging. As such, the quality performance of these options over time cannot be guaranteed. However, this measure can be re-approached during the detailed design stage.

Permeable Pavement

Permeable pavement provides a means to reduce the amount of runoff from the lot areas, effectively reducing the overall imperviousness for the development. Such pavements could be used to replace conventional asphalt driveways. This technology requires periodic maintenance and care to ensure its continued effectiveness (i.e., the pavement material's infiltration ability could be reduced by fines or dirt clogging the permeable areas). As well, this technology represents a cost premium over conventional technologies. The focus for infiltration should rather focus on rooftop runoff and lawn infiltration due to its greater ease of implementation.

Applicability to the proposed development:

Permeable pavements can prove to be challenging for contractors. Therefore, the actual performance of these techniques in terms of quality performance can vary based on the Contractor's experience. Residents may also forgo proper maintenance of these pavements, such as vacuuming sediments, impacting the overall SWM scheme over time. Therefore, this LID technique is currently not recommended for the proposed development; however, this approach can be revisited during the detailed design stage.

8.3.2.2 Conveyance Controls

Stormwater conveyance controls are intended to promote the attenuation, filtering, and infiltration of runoff during transport. Potential conveyance alternatives include:

- Perforated storm sewers and pervious catchbasins
- Grassed swales and/or Bioswales

Perforated Storm Sewers and Pervious Catchbasins

Perforated storm sewers and catchbasins can be useful at promoting infiltration and reducing runoff rates provided that certain conditions are met. For example, soils with good infiltration potential and a deep-water table, and runoff pre-treatment (to remove excess sediment that can clog the infiltration media) are required.

Applicability to the proposed development:

A Perforated Clean Water Collector system is one of the options that is currently explored to meet the water balance requirements.

Grassed Swales/Bioswales

Grassed swales and vegetated filter strips can be designed to promote infiltration of stormwater and to slow down the rate at which stormwater enters the sewer, especially for smaller low intensity rainstorms. Unless significant storage and flow reduction is provided within the conveyance system, these types of SWMP are not sufficient on their own, for quantity and quality control (i.e., treatment of the first flush). Even though they do not constitute an effective SWMP by themselves, they can be incorporated into the public landscaped areas, in larger commercial development sites, and residential rear lots.

Applicability to the proposed development:

The multiple bioswales across the road increases the costs of operation and maintenance; therefore, they are not recommended for the subject property. However, they can be further investigated during detailed design.

Approach for the proposed subdivision

Stormwater runoff is proposed to be conveyed by a combination of storm sewer systems and overland road drainage towards end-of-pipe facilities for control and treatment prior to discharging to the outlets. This approach was developed to satisfy the desire for a traditional curb and urban gutter type of development. While not as environmentally oriented as drainage swales, the proposed drainage approach will substantially minimize the municipality's maintenance requirements over time.

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

8.3.2.3 End-of-Pipe Controls

Several end-of-pipe alternatives are available including the following:

- Wet ponds
- Wetlands
- Dry ponds
- Infiltration basins (Bioretention cells)
- Infiltration trenches
- Sand filters
- Oil/grit separators

The criteria for selecting the preferred end-of-pipe SWMP facility include:

- Downstream flooding
- Downstream erosion
- Water quality
- Temperature impacts
- Maintaining the pre-development water budget
- Site-specific feasibility (topography, soils, water table, etc.)
- Longevity concerns
- Operation and maintenance costs

End-of-pipe SWM practices for the proposed development was evaluated, as per the above criteria and discussed below.

Wet Ponds/Wetlands

As shown, the wet pond and wetland solutions are most preferred. Wetlands are thought to provide better water quality treatment than wet ponds due to their increased vegetative filtering. Due to the ability of wetland vegetation to provide shade, wetlands are more favorable than wet ponds with respect to water temperature mitigation. However, wet ponds provide a greater sediment storage capacity, thereby suggesting less frequent maintenance.

Applicability to the proposed development:

Currently, two wet ponds are being proposed to service the majority of the proposed development.

Dry ponds

Dry ponds are primarily used for flood control and provide minimal water quality control. When used with other SWM practices in a treatment train approach, an effective solution could be developed. However, land area consumption by dry ponds is an inefficient use of land unless they can be combined with some other compatible use, such as a park.

Applicability to the proposed development:

Dry pond is not recommended for the subject property since a wet pond design will provide both quantity and quality controls.

Infiltration Basins (Bioretention Cells)/Infiltration Trenches

Infiltration basins and trenches are applicable in areas with pervious soil conditions and low water tables. Infiltration trenches are more feasible when considered at block level.

Infiltration basins, herein referred to as bioretention cells, can be designed to satisfy the required infiltration volumes on the subject property. Since these are proposed as an end-of-pipe facility, the operation and maintenance of these cells is more effective. Providing pre-treatment options reduce the maintenance requirements of the facility. They can be constructed to mimic existing natural conditions.

Applicability to the proposed development:

Infiltration trenches are proposed at the backyards of residential lots to meet the water balance requirement for the subject property.

Sand Filters/Oil Grit Separators

Sand filters and oil/grit separators, such as Stormceptors[™], may be applicable for smaller areas where wet ponds or wetlands are inappropriate. Since they do not provide flood control, they must be used in conjunction with other SWM ponds. These measures can be an effective method of achieving some of the SWM goals in localized areas. There are different performance levels from various oil/grit separators; some can achieve the water quality criteria of the 80% removal of suspended solids, and others cannot achieve this criterion. Those who cannot achieve this criterion would have to be used in a treatment train with other LID techniques to achieve the design criteria.

Applicability to the proposed development:

Sand Filters are not recommended for the proposed development due to high maintenance requirements.

Based on the size of the proposed developments (>10 ha), if OGS's are used, multiple OGS units might be required. However, since it is a common type of pre-treatment

method recommended by Cities and Conservation Authorities, this option was further considered.

8.3.2.4 Summary of Recommended SWM Measures

The above sections summarize the various LID practices that can be implemented on the subject property. Based on the above review and considering a treatment train method is required to achieve the SWM design criteria, Schaeffers prepared various alternative treatment train approaches for the subject property.

Please note a preliminary SWM scheme was discussed in detail in the SWM Report (dated February 2021) attached in Appendix E.

The SWM measures that were considered for various areas of the development are presented below.

Catchment Draining to SWM Pond 1 (Catchment 201)

Approximately 14.51 ha, located at the west side of the subject property, is proposed to drain to the SWM Facility 1. Figure 5-2 of the SWM Report included in Appendix E, presents the proposed servicing figure. The SWM Pond will provide quantity, quality, and erosion control for Catchment 201.

The required permanent pool volume to satisfy the 80% TSS requirement based on MOE Table 3.2 for a wet pond is approximately, 2,137 m³ based on tributary area of 14.51 ha and imperviousness of 54%.

Catchment Draining to SWM Pond 2 (Catchment 202 and Catchment 204)

Approximately 19.73 ha, located at the east side of the subject property is proposed to drain to SWM Facility 2. Figure 5-2 of the SWM Report included in Appendix E, presents the proposed servicing figure. The SWM Pond will provide quantity, quality and erosion control for Catchment 202 and Catchment 204.

The required permanent pool volume to satisfy the 80% TSS requirement based on MOE Table 3.2 for a wet pond is approximately, $3,317 \text{ m}^3$ based on tributary area of 19.73 ha and imperviousness of 63%.

South Site Plan (Catchment 203)

The Site Plan located at the south side of the subject property has an area of 2.72 ha. The SWM requirements of the site should be satisfied by on-site measures.

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

The proposed SWM treatment options for the South Site Plan are:

Alternative 1: OGS + Underground Storage

The first alternative proposes the use of centralized OGS units (TSS removal of 50% as is credited by the TRCA) as an initial layer of treatment. The flows will then be directed to an underground storage system which will have a permanent pool sized to provide 60% TSS removal. Infiltration will also be provided in the underground storage chamber providing an additional 60% of TSS removal. This approach will provide an effective treatment train of 92% TSS removal

(i.e., (0.5 + (1.0 - 0.5) * 0.6 + (1 - (0.5 + (1 - 0.5) * 0.6)) * 0.6) * 100% = 92%) prior to discharging from the site.

Alternative 2: Jellyfish Filter Units + Underground Storage

The second alternative proposes the use of Jellyfish Filter units (80% TSS removal) as an initial layer of treatment instead of OGS units, meeting the quality control criteria of the subject property. The flows will then be directed to an underground storage system. The infiltration in the underground chamber will provide additional quality control for the subject property.

8.3.3 SWM Strategy

To provide the required SWM control and meet the design criteria presented in Section 8.3.1, two SWM facilities are proposed. The two SWM facilities service the majority of the subject property. SWM Facility 1 discharges to the Unnamed Tributary of Spring Creek located in the central portion of the subject property and SWM Facility 2 discharges to the existing 525 mm diameter storm sewer on Heart Lake Road. The remaining catchment (South Site Plan – Catchment 203) is proposed to follow the existing drainage conditions and drain towards the Unnamed Tributary of Spring Creek located on the subject property, providing on-site controls.

The proposed SWM 1 and SWM 2 facilities are proposed to provide water quality, quantity treatment and erosion control during the post-development conditions. SWM Facility 1 services the western half of the subject property lands west of Heart Lake Road, and SWM Facility 2 services the eastern half and the subject property east of Heart Lake Road. The water balance criterion is proposed to be met site-wide as discussed in Section 8.3.5 below.

The tributary to each SWM facility and the corresponding imperviousness is presented in Table 27 below. Please refer to the SWM Report attached in Appendix E for more details.

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

Facility	Post- Development Catchment ID	Area (ha)	Total area (ha)	Imperviousness	Runoff Coefficient
SWM Facility 1	201	14.51	14.51	54%	0.58
SWM	202	13.68	10.72	63%	0.64
Facility 2	204	6.05	19.75	0370	0.04
On-site Controls	203	2.72	2.72	90%	0.83

Table 27:	Post-Development	Drainage Areas
-----------	-------------------------	----------------

8.3.3.1 SWM Strategy – Area Draining to SWM Pond 1 (Catchment 201)

A detailed evaluation of the SWM and LID measures that apply to the proposed development were reviewed and presented in Section 8.3.2. As presented in the SWM Report attached in Appendix E, a SWM Pond is proposed to achieve the quality, quantity and erosion control requirements for Catchment 201, as per the design criteria discussed in Section 8.3.1. SWM Pond 1 discharges to the creek located on the subject property.

Allowable Release Rates

As discussed in the previous sections, approximately 14.51 ha is proposed to drain to the SWM Facility 1. The maximum allowable release rates from SWM Pond 1 are based on the unit flow rates described in the TRCA guidelines Appendix A, for Etobicoke Creek Catchment 224. The pond release rates are based on a pre-development drainage area of 19.44 ha. A summary of the allowable flows from SWM Pond 1 are outlined in Table 28 below.

Return Period (Years)	Target Flow Rate (m ³ /s/ha)	Target Rate (m³/s)
2	0.0075	0.146
5	0.0133	0.259
10	0.0187	0.364
25	0.0270	0.525
50	0.0352	0.684
100	0.0421	0.819
Regional Event	0.123*	1.785

Table 28: Summary of the Allowable Design Flows for SWM Pond 1

*The regional unit flow rate is based on TRCA's existing peak flow of 32.36 cms for Catchment 41 with an area of 263 ha.

Quantity Control

According to the latest SWM plan, it is proposed to drain approximately 14.51 ha of the subject property to SWM Pond 1. The required 100-year storage volume is 2,863 m³, and the required regional event volume is 5,968 m³. Please note that since the post-development regional peak flow of 1.47 m³/s was less than the allowable release rate of 1.785 cm, the regional storage volume was estimated by adding the 214 m³/ha to the 100-year storage volume. Currently, SWM Pond 1 is adequately sized to provide 100-year storage of 4,200 m³ and a regional volume of 7,180 m³. Please refer to the SWM Report attached in Appendix E for more details.

Quality Control

Quality Control for the tributary area to SWM Pond 1 (14.51 ha and 54% of TIMP) will be provided at the pond. The permanent pool is sized to provide 80% of TSS removal based on Table 3.2 in the MOE SWM Planning and Design Manual. The required permanent pool volume is summarized is calculated to be 3,237 m³. Currently the pond is sized with a provided permanent pool volume of 2,250 m³. Please refer to the SWM Report attached in Appendix E for more details.

Erosion Control

As per the TRCA SWM guidelines, erosion control is required by detaining 25 mm event over 48 hours.

Additionally, the Fluvial Geomorphological Assessment completed by GEO Morphix (April 8, 2021) recommended a 24-hour or 48-hour detention of the 25 mm to prevent erosion in the subject property area and downstream. Therefore, SWM Pond 1 was sized to ensure that the 25 mm event is released over 48 hours. Table 29 below provides a summary of the required erosion control volume. Please refer to the SWM Report attached in Appendix G for more details.

Contributing	RV (mm) (Value	Required Storage	Peak Outflow
Area	from VO model)	Volume (m³)	(m³/s)
14.51	14.8	2147	0.019

Table 29:	Erosion	Control	Required	Volume	for	SWM	Pond	1
-----------	---------	---------	----------	--------	-----	-----	------	---

8.3.3.2 SWM Strategy – Area Draining to SWM Pond 2 (Catchments 202 & 204)

A detailed evaluation of the SWM and LID measures that apply to the proposed development were reviewed and presented in Section 8.3.2. As presented in the report, a SWM Pond is proposed to achieve the quantity, quality, and erosion control requirements for Catchments 202 and 204, as per the design criteria discussed in Section 8.3.1. SWM Pond 2 discharges to the existing 525 mm diameter storm sewer on Heart Lake Road.

Allowable Release Rates

As discussed in the previous sections, approximately 19.73 ha is proposed to drain to the SWM Facility 2. The maximum allowable release rates from SWM Pond 2 are based on the unit flow rates described in the TRCA guidelines Appendix A, for Etobicoke Creek Catchment 224. The pond release rates are based on a pre-development drainage area of 12.65 ha. A summary of the allowable flows from SWM Pond 2 are outlined in Table 30 below.

Return Period (Years)	Target Flow Rate (m³/s/ha)	Target Rate (m³/s)
2	0.0075	0.095
5	0.0133	0.168
10	0.0187	0.236
25	0.0270	0.341
50	0.0352	0.445
100	0.0421	0.532
Regional Event	0.122*	1.538

Table 30:	Summar	y of the	Allowable	Design	Flows	for SWM	Pond 2

*The regional unit flow rate is based on TRCA's existing peak flow of 17.05 cms for Catchment 24 with an area of 140.14 ha.

Quantity Control

According to the latest SWM plan, it is proposed to drain approximately 19.73 ha of the subject property to SWM Pond 2. The required 100-year storage volume is 7,925 m³, and the required regional event volume is 19,037 m³. The regional storage volume was estimated by adding the 214 m³/ha to the regional storm storage sized using the unit flow rates. Currently, SWM Pond 2 is adequately sized to provide 100-year storage of 7,980 m³ and a regional volume of 19,510 m³. Please refer to the SWM Report attached in Appendix E for more details.

Quality Control

Quality Control for the tributary area to SWM Pond 2 (19.73 ha and 63% of TIMP) will be provided at the pond. The permanent pool is sized to provide 80% of TSS removal based on Table 3.2 in the MOE SWM Planning and Design Manual. The required permanent pool volume is calculated to be 3,317 m³. Currently, the pond is sized with a provided permanent pool volume of 4,400 m³. Please refer to the SWM Report attached in Appendix E for more details.

Erosion Control

As per the TRCA SWM guidelines, erosion control is required by detaining 25 mm event over 48 hours.

Additionally, the Fluvial Geomorphological Assessment completed by GEO Morphix (April 8, 2021) recommended a 24-hour or 48-hour detention of the 25 mm to prevent erosion in the subject property area and downstream.

Therefore, SWM Pond 2 was sized to ensure that the 25 mm event is released over 48 hours. Table 31 below provides a summary of the required erosion control volume.

Table 31: Erosion Control Required Volume for SWM Pond 2

Contributing	RV (mm) (Value	Required Storage	Peak Outflow
Area	from VO model)	Volume (m³)	(m³/s)
19.73	16.776	3310	0.029

8.3.3.3 SWM Strategy – South Site Plan Area (Catchment 203)

Allowable Release Rates

As previously discussed, the site plan area (Catchment 203) located at the south side of the subject property is proposed to have on-site controls. The on-site storage will control peak flows to the unit flow rates described in the TRCA guidelines Appendix A, for Etobicoke Creek Catchment 224. The release rates are based on a pre-development drainage area of 2.72 ha. A summary of the south site plan's allowable flows is outlined in Table 32 below.

Return Period (Years)	Target Flow Rate (m³/s/ha)	Target Rate (m³/s)
2	0.0075	0.020
5	0.0133	0.036
10	0.0187	0.051
25	0.0270	0.073
50	0.0352	0.096
100	0.0421	0.115
Regional Event	0.123*	0.335

Table 32: Summary of the Allowable Design Flows for the South Site Plan(Catchment 203)

*The regional unit flow rate is based on TRCA's existing peak flow of 32.356 cms for Catchment 41 with an area of 263 ha.

Quantity Control

On-site controls are proposed for the South Site Plan to maintain the allowable release rates. The required 100-year storage volume is 1,486 m³, and the required regional event volume is 2,550 m³. The on-site retention methods (underground storage, parking storage or roof storage) will be determined at the site plan stage when additional information is available. Please refer to the SWM Report attached in Appendix E for more details.

Quality Control

On-site measures should be designed to provide 80% TSS removal to achieve the quality control requirements. The on-site measures can be stand-alone units like Jellyfish Filter units or a combination of Lot-level techniques, including but not limited to infiltration galleries, bioswales, tree pits, permeable pavers or underground infiltration/retention tanks.

Erosion Control

As per the TRCA SWM guidelines, erosion control is required by detaining 25 mm event over 48 hours. Table 33 below provides a summary of the required erosion control volume.

Contributing	RV (mm) (Value	Required Storage	Peak Outflow
Area	from VO model)	Volume (m³)	(m³/s)
2.72	22.692	617	0.005

Table 33: Erosion Control Required Volume for the South Site Plan

Since achieving an outflow of 5 L/s is not feasible, the erosion control requirements can be met via 5 mm on-site retention given the small area of the site (2.72 ha). Please refer to the SWM Report attached in Appendix G for more details.

8.3.4 Feature Based Water Balance

The subject property drains to the Heart Lake PSW Complex. A Wetland Water Balance Risk Evaluation was completed that classified the wetlands on the subject property as "High Risk." As required by TRCA, a continuous water balance model was prepared by Schaeffers. The details are presented in the report titled "Feature-Based Water Balance – Snells Hollow Secondary Plan Area," dated April 2021 included in Appendix F.

8.3.5 Site-Wide Post-Development Water Balance

As discussed in Section 5.4.1, the subject property is not located within a WHPA-Q1/Q2 area; however, some areas are located within a significant groundwater recharge area (SGRA). Therefore, as per TRCA design criteria (August 2012), the subject property

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

requires that post-development infiltration matches existing conditions. A post to pre-development conditions detailed water balance was undertaken for the proposed development. The total precipitation value was based on the TRCA water budget tool.

As the TRCA water budget tool inputs do not equal outputs, the evaporation value was determined based on prorating the precipitation value. The infiltration factor for pervious areas was determined based on the MOE factors. MOE factors were determined to assume the site has tight clay soils, the terrain has rolling hills, and land cover varies between agricultural, meadow, and natural feature areas. The existing rooftops were considered impervious areas.

It is determined that the site annual infiltration capacity for pre-development conditions is approximately 112,905 m³, and it will drop to 75,621 m³ per year under the post-development conditions. Thus, the approximate annual infiltration deficit is calculated to be 37,284 m³.

To achieve the post to pre-infiltration for the subject property, the following options were explored in detail. Please note the below options are explored only for the lands west of Heart Lake Road. There are limited options for lands east of Heart Lake Road due to limited space. For example, the Clean water collector system (proposed in Option 3) below will be challenging as it introduces a new sewer system that requires crossing the Regional ROW. Additionally, grading constraints and limited spacing constrict the ability to propose infiltration facilities.

Option 1: Infiltration Trenches for Catchments 201 & 202 and On-site Measures for Catchment 203

The following option proposes infiltration trenches where feasible to meet the water balance requirements and assumes the Catchment 203 will provide its own site plan measures.

The proposed measures in this option are detailed below:

- Catchment 203 to provide own site plan control to achieve 5 mm infiltration:
 - Various LID measures that can help achieve the required SWM criteria were discussed in Section 8.3.2.
- Infiltration trenches are proposed at Low-Density Development area (Detached/Semi-Detached/St. Townhouses):
 - Approximately 2,000 m of infiltration trench (width = 1.5 m and depth = 0.72 m) is required to meet the water balance. A design infiltration rate of 15 mm/hr with a safety factor of 2.5 was utilized to complete these calculations. Based on the development plan, approximately 2,339 m is available for infiltration trenches.

- Infiltration trenches in the park area:
 - Approximately 201 m of infiltration trench (width = 1.5 m and depth = 0.72 m) is required to meet the water balance. A design infiltration rate of 15 mm/hr with a safety factor of 2.5 was utilized to complete these calculations.

The above measures help achieve the 34,820 m³/year of the above mentioned 37,284 m³/year deficit. This option is currently recommended for the proposed development. It helps achieve the required post to pre-water balance, and the operation and maintenance costs are estimated to be low compared to the other options discussed below. In addition to Schaeffers analysis, Burnside prepared and provided their analysis. The analysis by Burnside also confirms that the proposed mitigation measures in Option 1 satisfy the post to pre-water balance requirement.

Table 34 summarizes the pre to post-development conditions water balance with mitigation measures presented in Option 1.

tics			9		
Characteris	Total Pre- Development	Post- Development	Percent Change (Pre to Post)	Post- Development with Mitigation (OPTION 1)	Change (pre to post with Mitigation) (OPTION1)
Inputs (Volui	mes)		•		
Precipitation (m³/year)	535,556	535,556	0%	535,556	0%
Total Inputs (m³/year)	535,556	535,556	0%	535,556	0%
Outputs (Vol	umes)				
Precipitation surplus (m³/year)	258,625	340,197	24%	340,197	24%
Net Surplus (m³/year	258,625	340,197	24%	340,197	24%
Total Evapotrans piration (m ³ /year)	276,931	195,359	-42%	195,359	-42%
Total Infiltration (m³/year)	112,905	75,621	-49%	110,441	-2%

Table 34: Water Balance Summary

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

tics	Site					
Characteris	Total Pre- Development	Post- Development	Percent Change (Pre to Post)	Post- Development with Mitigation (OPTION 1)	Change (pre to post with Mitigation) (OPTION1)	
Total Runoff (m³/year)	145,720	264,576	45%	229,756	37%	
Total Outputs (m³/year)	535,556	535,556	0%	535,556	0%	

Option 2: Infiltration Trenches (Catchments 201 & 202), Infiltration Gallery (Catchment 201) and On-site Measures for Catchment 203

The following option proposes infiltration trenches where feasible to meet the water balance requirements and assumes the Catchment 203 will provide its own site plan measures. Additionally, an infiltration gallery is proposed to provide a post to pre-water balance for the area draining to the facility.

The proposed measures in this option are detailed below:

- Catchment 203 to provide own site plan control to achieve 5 mm infiltration:
 - Various LID measures that can help achieve the required SWM criteria were discussed in Section 8.3.2.
- Infiltration gallery in park area (Catchment 201):
 - A separate CWC is proposed to convey the flows to an infiltration galley (approximately 0.3 ha) to provide infiltration for the roof areas within Catchment 201.
- Infiltration trenches are proposed at Low-Density Development area (Detached/Semi-Detached/St. Townhouses) within Catchment 202 and Catchment 201:
 - Approximately 935 m of infiltration trench (width = 1.5 m and depth = 0.72 m) is required to meet the water balance. A design infiltration rate of 15 mm/hr with a safety factor of 2.5 was utilized to complete these calculations. Based on the development plan, approximately 1,111 m is available for infiltration trenches.

The above measures help achieve the 39,940 m³/year, which is greater than the 37,284 m³/year deficit. This option is currently not recommended as it involves a third pipe system and a separate infiltration gallery. However, this option can be explored in the detailed design stage to achieve the requirements if the agency requires.

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

Option 3: Perforated Clean Water Collector System & On-site Measures for Catchment 203

The following option proposes a perforated clean water pipe system that collects clean water from the roofs and promotes infiltration. Like the other two options, Catchment 203 is proposed to provide its infiltration measures.

The proposed measures in this option are detailed below:

- Catchment 203 to provide own site plan control to achieve 5 mm infiltration:
 - Various LID measures that can help achieve the required SWM criteria were discussed in Section 8.3.2.
- Perforated CWC's:
 - A perforated CWC system is proposed and the storm sewers to enable infiltration from the clean roof areas. Approximately 1,950 m of 300 mm diameter perforated pipe is required to satisfy the infiltration requirements.

The above measures help achieve the 37,284 m³/year deficit. This option is currently not recommended as it involves a third pipe system. However, this option can be explored in the detailed design stage to achieve the requirements.

Please refer to the SWM Report attached in Appendix E for more detailed calculations.

8.3.6 Floodplain Analysis

A floodplain analysis has been conducted for the subject property to determine the conveyance capacity of the tributary. The method of establishing the existing floodplain has been discussed with TRCA due to the backwater conditions caused by the 1,050 mm diameter culvert under the Mayfield Road crossing. Schaeffers previously conducted the analysis using conventional 1-D HEC-RAS Modelling. It was found that the water spills over the Mayfield Road at various locations, including the culvert's location. Due to the very limited capacity of the culvert, the system acts in backwater; 1-D Modelling ignores the impacts of storage available within the valley. This information was conveyed to the TRCA during a meeting held on August 7, 2020 between the TRCA and Schaeffers. It was concluded to establish the floodplain assuming the culvert being plugged and assuming the valley as a complete storage unit.

In following this methodology, Schaeffers established the floodline for the subdivision based on the total runoff volume generated from the future drainage conditions at the request of the TRCA. It is to note that the spill elevation to Mayfield Road has been established based on the field survey as 257.50 masl. The total available storage within the valley is calculated to be 183,870 m³ at the elevation of 257.50 masl. The overall drainage area towards the watercourse in future conditions is calculated to be 51.75 ha. This area includes the 9.76 ha drainage area to the Kennedy SWM Pond as per the SWM report by GHD (SWM Facility Retrofit Report), the 17.23 ha from the proposed

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

subdivision, and the 24.76 ha of drainage from the valley. Please refer to the SWM Report attached in Appendix E for more details.

8.3.6.1 Runoff Generated

The runoff volume calculation has been carried out using Visual OTTHYMO. Overall drainage parameters have been updated to reflect the future drainage conditions and the land uses. Based on the VO hydrograph output for the Hurricane HAZEL regional storm case, a total runoff volume of 184.452 mm is expected. This amounts to 95,454 m³ of volume. With the assumption that the culvert is plugged, it has been estimated that the water surface elevation will be 256.65 masl within the valley when retaining 95,454 m³ of water, lower than the spill elevation. As such, the proposed grading and servicing has been carried out to safely maintain a freeboard from this elevation. Furthermore, this floodline has been delineated on the existing floodplain drawing.

8.4 Water and Wastewater Servicing

8.4.1 Water Supply Analysis

8.4.1.1 Existing Water Supply Servicing

The subject property is located within the Region of Peel Pressure Zone 7 Central (7C) within the Central Transmission System. Pressure Zone 7 services the areas with an elevation of 243.4 m to 289.6 m.

The existing water supply network adjacent to the subject property consists of watermains and feedermains along Mayfield Road, Heart Lake Road and Kennedy Road. There are 400 mm diameter, 750 mm diameter and 600 mm diameter watermains along Mayfield Road, and 400 mm diameter watermain, as well as 900 mm diameter and 1,200 mm diameter feedermains running along Heart Lake Road. There is a 300 mm watermain and a 600 mm feedermain on Kennedy Road.

8.4.1.2 Water Supply Servicing Design Criteria

Watermains for the development shall be designed in accordance with the Region of Peel's Public Works Design, Specifications & Procedures Manual, Linear Infrastructure, Watermain Design Criteria (Revised June 2010).

Typical criteria for Residential land uses are summarized as follows:

- Average Consumption Rate of 280 L/cap/day
- Maximum Day Factor of 2.0
- Peak Hour Factor of 3.0

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

Typical criteria for Industrial, Commercial and Institutional (ICI) land uses are summarized as follows:

- Average Consumption Rate of 300 L/employee/day
- Maximum Day Factor of 1.4
- Peak Hour Factor of 3.0

Pressure:

- Minimum operation pressure during the peak hour demand: 40 psi
- Maximum operation pressure under static load or during minimum hourly demand: 100 psi

Watermain diameter:

• Minimum diameter for residential area: 150 mmØ

Fire Protection Demand:

- Fire Underwriters Survey fire flow calculation cannot be performed since residential unit details are not available; therefore, fire flow requirements from the neighbouring municipalities will be used until the detailed water supply analysis:
 - A minimum fire flow demand of 7,000 L/min for single-family and semi-detached units.
 - A minimum fire flow demand of 9,000 L/min for townhouses.
 - A minimum fire flow demand of 19,000 L/min for multi-unit apartment buildings.
 - A minimum fire flow demand of 25,000 L/min for commercial areas.

8.4.1.3 Proposed Water Supply Servicing Plan

It is proposed to service most of the subject property (Area A as per Figure 1.2 of the Water Supply Analysis Report attached in Appendix J) internally by a network of 200 mm diameter watermains that will connect to the 300 mm diameter watermain on Kennedy Road and the 400 mm diameter watermain on Heart Lake Road. Area B (shown in Figure 1.2 of the Water Supply Analysis Report attached in Appendix J) will be serviced by connections to the 400 mm watermain on Mayfield Road east of Heart Lake Road and the 400 mm diameter on Heart Lake Road. The South Site Plan (Area C as per Figure 1.2 attached in Appendix J) will connect to the 400 mm diameter watermain on Mayfield Road.

Please refer to Figure 1.3 of the Water Supply Analysis Report attached in Appendix J for the Water Supply Servicing Plan.

Two hydrant tests were performed in October 2020, one on Kennedy Road north of Mayfield Road and one on Heart Lake Road north of Mayfield Road. Hydrant tests

reported static pressure of 78 psi and 80 psi, respectively, resulting in the hydraulic grade of 317.85 m and 317.26 m. These values were used as the boundary conditions in the water supply model. The detailed WaterCAD modelling results are presented in the report titled "Water Supply Analysis Report, Snell's Hollow Secondary Plan Area, Town of Caledon," dated February 2021. Based on the modelling results, all the water supply demands, and fire flow requirements are satisfied.

The total population for the subject property is estimated to be 3,192 persons. The expected domestic supply and fire flow demands are summarized in Table 35. Please refer to the Water Supply Analysis Report attached in Appendix J for more details.

Land Use	Average Day Demand (L/s)	Peak Hourly Demand (L/s)	Maximum Day Demand (L/s)	Maximum Day Demand + Fire Flow (L/s)
Residential (Low Density)	4.05	12.14	8.10	124.76
Residential (Townhouses)	3.26	9.79	6.53	156.53
Residential (Medium-High Density)	2.73	8.20	5.46	322.13
Commercial	0.32	0.96	0.45	417.12
Total	10.36	31.09	20.54	1,020.54

Table 35: Water Supply Demand

8.4.2 Wastewater Servicing

8.4.2.1 Existing Sanitary Servicing

Currently, the subject property is predominantly surrounded by vacant lands. There is an existing sanitary sewer system south west of the subject property, between Kennedy Road and Heart Lake Road, at the existing residential subdivision.

8.4.2.2 Background Studies and Future Infrastructure

Additional studies and projects are currently in progress/completed by the Region of Peel and other surrounding developments that provide sanitary servicing for the proposed development.

The studies and projects have been summarized below.

Region of Peel – Kennedy Road Sanitary Sewer

The Region of Peel has retained EXP to provide engineering services for sanitary sewer construction on Kennedy Road North and Conservation Drive in the City of Brampton.
Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

The sanitary sewers' construction was deemed necessary by the Peel Region to service the future residential development, Mayfield West Phase 1.

As per the drawings shown in Appendix N, a 1,200 mm diameter CPP sanitary sewer, approximately 2,055 m long, is proposed on Kennedy Road from 100 m north of Mayfield Road to Conservation Drive and along Conservation Drive from Kennedy Road to 150 m West of Dawnridge Trail in the City of Brampton. The proposed sewers connect to the existing sewer network at Conservation Drive and Dawnridge Trail.

Based on the correspondence dated February 9, 2021, the completion of the construction is currently unknown. A construction tender is expected to be issued for late spring of 2021.

The relevant excerpts are presented in Appendix K.

Heart Lake Road Employment Lands, Master Environmental Servicing Plan (MESP) by TMIG (dated March 2015)

As part of the Heart Lake Road Employment lands development located east of Heart Lake Road and north of Countryside Drive, TMIG proposed a sanitary sewer network to service the lands. The sanitary sewer network proposed along the Ecopark Close Road from the Heart Lake Road considered an external area of approximately 54.38 ha and a population of 6,663 in the infrastructure design.

As per the Sanitary Drainage plan, EXSAN03 prepared by TMIG, a portion of the proposed development west of Heart Lake Road (approximately 24.03 ha and equivalent population of 4002), and the subject property east of Heart Lake Road (approximately 7.0 ha and equivalent population of 1,645) was considered in the design of the downstream sewer.

Region of Peel has confirmed that the works for the project have been completed in an email correspondence dated February 9, 2021.

The relevant excerpts are presented in Appendix K.

8.4.2.3 Sanitary Design Criteria

The sanitary flow calculations are based on the following Region of Peel's Public Works Design, Specifications & Procedures Manual, Linear Infrastructure, Sanitary Sewer Design Criteria (Revised July 2009):

- A sanitary demand of 308.8 L/cap/day;
- Harmon Peaking Factor, K is [1+14/(4+P^{0.5})], Where P is the population in thousands;
- An infiltration rate of 0.2 L/s/ha;

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

- A maximum velocity of 3.5 m/s; and
- A minimum velocity of 0.75 m/s.

8.4.2.4 Proposed Sanitary Servicing Plan

As shown in Figure K.1 attached in Appendix K, two separate sewer networks are proposed to service the west and east development area.

The western area (approximately 13.54 ha) will connect to the 1,200 mm sewer on Kennedy Road, proposed by Region of Peel.

The eastern area (20.7 ha) and the South Site Plan (2.72 ha) will be serviced by the proposed sewers on Heart Lake Road. The proposed sewers will connect to the sanitary sewer stub at Heart Lake Road and Ecopark Close installed as part of Heart Lake Road Employment Lands.

Two alternatives are proposed for the servicing of the South Site Plan (2.72 ha). As per Option 1, the South Site Plan connects to the proposed sewers on Heart Lake Road that will connect to the existing sanitary sewer stub at Heart Lake Road and Ecopark Close. This option requires sanitary sewers along Mayfield Road with a significant length to connect to the proposed sewers on Heart Lake Road. Therefore, an additional option is proposed. As per Option 2, the South Site Plan connects to the existing sanitary sewers along Stonegate Drive. The downstream capacity analysis as well as the serviceability via the existing sanitary sewers on Stonegate Drive will be reviewed in detailed design. Please refer to Figures K.1 and K.2 attached in Appendix K for an illustration of the two alternatives.

As mentioned in Section 8.4.1 above, the downstream sewer network is designed to accommodate an external area, including the subject property. Out of the total population of 3,192, approximately 2,417 is proposed to drain to the Heart Lake Road. The downstream sewers at the Heat Lake Road and Ecopark Close have considered a population of 4,647 for the subject property.

The sanitary flows were estimated for the proposed developments based on the generation rate of 302.8 L/c/day and the estimated population. The summarized results are presented below in Table 36.

Please refer to Figure K.1 attached in Appendix K for the proposed sanitary servicing scheme. The detailed sanitary demand calculations are presented in Appendix K.

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

Discharge Location	Area ID*	Population	Average Demand (L/s)	K (Harmon Peaking Factor)	Peak Flow (L/s)	Infiltration (L/s)	Total Peak Flow (L/s)
Site Discharge to	A1	1,042	3.65	3.79	13.84	2.93	16.77
East (Heart Lake Road)	В	863	3.02	3.84	11.61	1.21	12.82
	С	512	1.79	3.97	7.12	0.54	7.66
	Total	2,417	8	-	32.57	4.68	37.26
Site Discharge to West (Kennedy Road)	A2	775	2.72	3.87	10.51	2.71	13.21

 Table 36:
 Sanitary Servicing Requirements

*As per Figure 1.2 of the Water Supply Analysis Report attached in Appendix H

9.0 Impact Assessment, Avoidance and Mitigation Measures

The following preliminary evaluation of environmental impacts and recommended mitigation measures is based on an assessment of the potential effects that could occur to natural heritage features and functions over the short and long-term, following the implementation of the proposed Concept Plan. This section also identifies planning, design and construction practices that will pinpoint avoidance, mitigation and/or restoration opportunities as well as net effects and monitoring measures, if applicable. Net effects are defined as negative environmental effects of a project and related activities that will remain after mitigation and impact management measures have been applied.

This impact assessment is provided based on field investigations, the proposed Concept Plan and supporting studies included in the appendices and will need to be refined during detailed design. Development constraints are depicted on Figure 10.

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

Environmental Component	Potential Environmental Effects	Avoidance, Mitigation and/or Restoration Measures	Net Effects	Recommended Monitoring Activities
General Impacts				
Vegetation Communities	Direct effects of construction activities will include clearing and loss/injury of both herbaceous and woody vegetation in upland areas within the subject property. Specifically, the following area will be removed from these vegetated ecosites: CUM1-1 (cultural meadow): 5.81 ha MAS2-1 (wetland): 0.08 ha HR (hedgerow): 0.43 ha Other direct impacts can be expected during construction and may include soil compaction and changes in soil moisture. Indirect effects include the increase to edge habitats, which consists a number of potential effects, such as windthrow and sunscald, introduction of invasive plant and wildlife species which may outcompete or predate native species, change in soil moisture regime and water availability to plants and plant communities, increases in light penetration (pollution) and noise, soil compaction, equipment and pedestrian "traffic", equipment laydown and spills.	General MitigationVegetation loss should be minimized, where possible, and compensatory planting plans that promote native species stablished in the study area where no clearing activities are proposed, referencing TRCA's Post-Construction Restoration Guidelines (2004) and Seed Mix Guidelines (2004) for the existing soil and vegetation communities (if available). Potential for establishing pollinator species of plants should also be included when establishing a formal planting plan.The inclusion of bio swales, infiltration galleries or other features to promote localized surface water infiltration to maintain the existing water balance should be included as part of the detailed design and landscape plan.A minimum 10 m vegetated buffer shall be applied to the existing and proposed NHS limits to provide protection to wetland core habitat in the valleyland and its associated critical function zone (i.e., turtle nesting habitat) as well as the Significant Woodland. The vegetated buffer presents an opportunity to increase forest cover in the Etobicoke Watershed to meet TRCA's Regional Terrestrial NHS Strategy (TNHSS) and to stabilize the TOB. This may also enhance SWH habitat for species such as Eastern Wood-pewee and bats and compensate for some loss of trees on the tablelands.Construction Mitigation construction hoarding should be installed prior to commencement of construction activities to prevent pedestrian access, prevent the unnecessary encroachment/disturbance by humans and machinery into vegetation communities and to prevent wildlife from entering the construction areas. Hoarding should be installed and inspected prior to any land disturbance. Hoarding should be installed at the dripline of any trees to be preserved.	Permanent loss of 6.25 ha of vegetation communities on the subject property. Wetland vegetation communities present in the Heart Lake PSW Complex and the Significant Woodland (FOM) will not be removed.	Fencing shall be inspected regularly to ensure damage is repaired in a timely manner. Hoarding site visit required.

Table 37: Impact Assessment, Avoidance and Mitigation Measures

Environmental Component	Potential Environmental Effects	Avoidance, Mitigation and/or Restoration Measures	Net Effects
Trees	An Arborist Report, completed by a Qualified	General Mitigation	No net effects are anticipated.
	Professional, should be completed to identify the scope	An Arborist Report should delineate the extent of	
	of potential impacts to trees within and immediately	vegetation removal for the vegetation clearing and	
	adjacent to the construction area. Municipal guidelines	grubbing contractor. All vegetation must be cut in a way	
	scope of work required	impacts to adjacent trees and vegetation	
	Trees may require removal if it is determined through	A Tree Inventory and Preservation Plan will be completed	
	the completion of an Arborist Report that their locations	during detailed design. Tree removals will be minimized.	
	are in conflict with the proposed design elements of the	Compensation requirements and implementation	
	Secondary Plan, including ditches or grading (cut or fill)	strategies for tree removal should be identified in the	
	or are determined to be in poor condition.	Arborist Report and should be determined based on	
		applicable tree protection by-laws.	
	Impacts to trees will generally include removal or injury	Edge management may require pruning or selective	
	as a result of construction activities (including grading	removal of remaining trees at edges of treed communities	
	and earthworks). Trees may also be subject to soil	if the trees at the exposed edges are not suitable for	
	compaction, injury from machinery, loss of root zones,	retention. Trees with poor health (e.g., severe crown	
	change in hydrology, and or pruning as part of the	dieback) and/or condition (e.g., severe unsupported lean)	
	proposed construction.	will require removal if there is a greater risk to cause	
		injury or property damage. Trees exhibiting symptoms of	
	Disturbance extending to the limits of the proposed	harmful pests (i.e., Ash, Beech, and Elm) may require	
	development may result in impacts to trees beyond the	additional vigilance during the review of retained trees if it	
	subject property where rootzones may extend.	is determined that infections are causing significant harm	
	See Species at Pick (below) for impacts to Butternut	to the tree's health.	
	See Species at Risk (below) for impacts to butternut.	Where pruning and tree removal are required, good	
		arboriculture practices should be used and completed	
		by/supervised under the direction of an ISA Certified	
		Arborist.	
		Culturally eignificant properties and residential lards that	
		Culturally significant properties and residential lands that	
		native woody vegetation to compliment cultural beritage	
		aesthetics and provide privacy.	
		[].	
		A landscape/streetscaping plan will need to be	
		coordinated with the detailed design for aesthetics and	
		compensation for removals.	
		A detailed mitigation plan that uses a variety of native	
		species suited to the varied site conditions will be	
		required for preparation, in conjunction with detailed	
		design requiring impacts or removal of trees.	
		- · • ·	

Recommended Monitoring Activities
Pre-construction land clearing activities will be monitored by a Qualified Environmental Inspector to confirm that all activities are conducted in accordance with mitigation plans and within specified work zones.
Inspection of tree protection measures by the Site Supervisor or Qualified Environmental Inspector to be coordinated with review of ESC measures throughout the construction period. All damaged, sagging or deficient measures must be fixed immediately.
An Arborist shall review all trees adjacent to the work zone and prior to opening the road for use by the general public. Branches and trunks damaged during the construction period that may cause damage or injury must be mitigated.
The success of compensation vegetation will be monitored for two years. Success of less than 80% of plantings will require further follow-up planting and monitoring for an additional two years, until an 80% success rate has been achieved.
A Qualified Environmental Inspector is required throughout the construction period to ensure that protection measures are implemented, maintained and enforced.

Environmental Component	Potential Environmental Effects	Avoidance, Mitigation and/or Restoration Measures	Net Effects	Recommended Monitoring Activities
		To reduce the risk of disturbing breeding birds (and contravening the <i>Migratory Birds Convention Act, 1994</i>), timing constraints shall be applied to avoid vegetation clearing (including grubbing) and/or structure works (construction, maintenance) during the core breeding bird period – broadly from April 1 to August 31 for most species (regardless of the calendar year). See Avifauna (below) for more details.		
		 Construction Mitigation – General Tree Protection Guidelines Specific construction mitigation for impacts to trees should be addressed in the Arborist Report but should consider the following general mitigation measures: Determine and illustrate Tree Protection Zones on Tree Preservation Plan. Tree protection barriers will be installed around Tree Protection Zones. Locations of barriers to be identified in the completed Arborist Report. No stockpiles, storage or disturbance to grade will occur within the TPZ to minimize soil compaction and root damage. Install tree protection hoarding based on municipal standards. Tree removal will be undertaken in accordance with the municipal tree protection by-law. 		
Wetlands and Provincially Significant Wetlands (Heart Lake Wetland Complex)	One small wetland community (MAS2-1; cattail shallow marsh) will be directly removed. It is 0.08 ha in size. It appears that this wetted feature is present due to the historical development of the adjacent industrial lands and associated driveway that block surface drainage flow, thereby creating a wet pocket. No surface connectivity between this wetland and the downstream network has been identified. Potential channelization or surface conveyance of the wetland to nearby HDFs was not evident during field investigations. This feature has very limited ecological functionality on the landscape, is isolated from the Heart Lake PSW Complex and is not hydrologically connected. Additionally, this feature has not been identified as part of the Town of Caledon's Environmental Policy Area, Region of Peel's Greenland System, or during the Heart Lake PSW Complex boundary evaluation and/or	General Mitigation Vegetated protection zones around the PSW wetlands adjacent to the proposed construction area should be established to reduce impacts. Opportunities for other wetland enhancement strategies (i.e., invasive species management, native species plantings, etc.) should be considered. The road type and surfaces will be determined in consultation with the Town, Region and TRCA. Permeable materials are recommended, if possible, but final surface materials will be selected with consideration to maintenance requirements, geotechnical conditions and impacts of flooding in the area and other conditions identified during detailed design. A Grading Plan will be developed during detailed design to ensure the development does not impact surface drainage patterns.	The wetlands and other vegetation communities within the Heart Lake PSW Complex will be protected from direct effects, as they are protected within the Significant Valleyland/NHS. Development, including site alteration, will respect the 30 m setback that is applied to the PSW. Therefore, no net effects are expected from the construction phase within the PSW provided mitigation measures are applied. Net effects to the PSW from adjacent development can be reduced, provided stormwater and LID measures are effective in maintaining water balance.	A Qualified Environmental Inspector should be on-site during any dewatering, within 120 m of natural features. The Inspector should ensure that the filter bag is working appropriately and ensure that no sediment is entering significant natural features or watercourse. An Environmental Monitoring Plan (EMP) will be required during construction to confirm that erosion and sediment control measures and spill prevention and response measures are installed and functioning as designed. Remedial measures should be implemented as soon as possible if deficiencies or

Environmental Component	Potential Environmental Effects	Avoidance, Mitigation and/or Restoration Measures	Net Effects	Recommended Monitoring Activities
	stakings in 2000, 2009 and 2011 with MNRF/TRCA	Stormwater management, including LID measures, will be		unanticipated negative effects are
	and TRCA TOB staking of the NHS in 2018. Given this	used to maintain water balance to the wetland.		identified during monitoring.
	feature is small and isolated from other natural heritage			
	features and is surrounded by a major roadway,	Lighting should be directed away from the PSW.		Long-term monitoring of wetland
	cultivated farmland and a driveway, removal of this			vegetation communities pre and
	feature is considered acceptable. Avoidance and	Pedestrian recreational trails should be avoided within the		post-construction is recommended for
	mitigation measures apply to the PSW wetlands only.	NHS.		identifying changes in plant species
				composition, flow regime and soil
	While site alteration and development will occur	Where possible, pedestrian access to the NHS should be		moisture content.
	adjacent to the Heart Lake PSW Complex, direct	limited in order to ensure that degradation and		
	impacts to wetland features are not expected.	disturbance of sensitive habitats within this feature are		
		minimized post-development. Rear yards that abut the		
	Indirect impacts to wetland communities in the Heart	NHS should be fenced to limit encroachments.		
	Lake PSW Complex will occur because of construction	A Franking Darad Weter Dalamas Otyphyka a datamainad		
	activities and the proposed development. These may	A Feature-Based water Balance Study has determined		
		that a continuous water balance model will be required,		
	Erosion and sedimentation during and post	per TRCA's welland water balance Risk Evaluation		
	construction that could impact water quality and	(2017), to ensure that water balance is maintained for		
	vegetation within the wetland.	natural reatures designated for protection.		
	Sedimentation can bury organic soils and alter the	A Long Term Monitoring Plan and an Adaptive		
	vegetation communities.	Management Plan (AMP) will be implemented and will		
	Accidental contaminant splits from construction	provide direction on appropriate mitigative measures that		
	equipment could impact water quality and	can be adjusted in response to monitoring results		
	Effects on hydrology due to changes to site			
	Ellects off hydrology due to changes to site grading and decreased normachility (reads	Construction Mitigation		
	grading and decreased permeability (roads,	Construction within and adjacent to the PSW Complex		
	parking, buildings).	should be avoided or minimized, where possible. If		
	Ellects on hydrology due to dewatering.	impacts (i.e., vegetation removal and changes to		
	Alterations to surface and/or groundwater inputs to the wetland due to changes in surface/groundwater	hydrology) are proposed, compensation and protective		
	drainage petterne (i.e., stermyster infiltration and	measures should be discussed with TRCA.		
	runoff in the estebaent area)			
		A Construction Emergency Response and		
	Increase in pedestrian use.	Communications Plan shall be developed and followed		
	Habitat degradation and increased risk of exotic	throughout the construction phase (including spill		
	and invasive species colonizing in the wetland from	response plans). The Contractor shall develop spill		
		prevention and contingency plans during the construction		
	INOISE and human disturbance to wildlife.	phase.		
	Increased lighting from adjacent residential	·		
	aevelopment.	All requirements under the Ontario Water Resources Act,		
		R.S.U. 1990, C. U.40 with respect to the quality of Water		
		the following mitigation measures and heat practices:		
	SVVIT AHU SAK.	the following mitigation measures and best practices.		

Environmental Component	Potential Environmental Effects	Avoidance, Mitigation and/or Restoration Measures	Net Effects	Recommended Monitoring Activities
	The Heart Lake PSW Complex and Uppamed Tributary	 Any discharge from dewatering should outlet to a vegetated area at least 30 m from a significant natural feature, or watercourse, utilizing a sediment filter bag. In the event of sediment discharge, all operations will stop immediately until the problem can be resolved. If significant changes in water levels/seepage areas are noted, operations will cease until water levels recover. Erosion and sediment control measures will be used during construction to avoid/minimize potential for off-site sedimentation into the PSW. 	Site alteration (aut/fill) is proposed within	See Wetlands and Provincially Significant
Significant Valleylands	The Heart Lake PSW Complex and Unnamed Tributary of Spring Creek is located within a Significant Valleyland system. Direct (permanent) impacts to the form of the Valleyland due to cut and fill proposed for the development within the staked TOB. As per the concept plan, some intrusions are proposed within the TOB limit and 10 m setback. See also Geotechnical Setback Assessment for Erosion Hazard Limit, Snell's Hollow Secondary Plan (Golder, 2019). Potential alterations to water balance within the valley that may result in erosion. Potential for indirect effects to the function of the Valleyland (see Wetlands and Provincially Significant Wetlands above).	See Wetlands and Provincially Significant Wetlands above for mitigation and restoration measures related to indirect effects of the Valleyland. Erosion and sediment control measures will be used during construction along the TOB to avoid/minimize potential for erosion and soil mobility into the valleyland features and tributary. See also Geotechnical Setback Assessment for Erosion Hazard Limit, Snell's Hollow Secondary Plan (Golder, 2019).	Site alteration (cut/fill) is proposed within the TOB staked limit in support of the proposed development. Development, including site alteration, will respect the 30 m setback that is applied to the PSW located in the Significant Valleyland.	See Wetlands and Provincially Significant Wetlands above.
Woodlands and Significant Woodlands	The only woodland community present on the subject property is FOM (mixed forest), with FOC4-1 inclusion. This small woodland (0.37 ha) meets the criteria for significant based on "woodlands within 30 m of a watercourse and evaluated wetland". This woodland is located within the 30 m setback of the PSW Complex and is entirely within the Significant Valleyland system. Eastern Wood-pewee (Special Concern) was recorded during breeding bird surveys in CVR_4 (central) ecosite, where trees are planted around the property and abuts the FOM ecosite. It is possible, though not confirmed, that the FOM ecosite is breeding habitat for this species.	 General Mitigation A minimum 10 m setback has been applied to this FOM feature. Enhancements within the setback will include native plantings (trees/shrubs). Construction Mitigation Where possible, efforts to avoid and minimize the destruction or injury to trees within woodlands should be made (i.e., reducing grading and construction activities within designated woodlands). Where impacts to a woodland are unavoidable, applicable Regional and Municipal policies should be reviewed to determine the appropriate permitting requirements. 	No net effects are anticipated if the 10 m setback is respected and enhancements are applied.	A Qualified Environmental Inspector should monitor the success of the vegetation plantings within the buffer zone.

Environmental Component	Potential Environmental Effects	Avoidance, Mitigation and/or Restoration Measures	Net Effects
	The CVR_4 ecosite will be removed within the	To reduce the risk of disturbing breeding birds (and	
	development limits; therefore, potential indirect effects	contravening the Migratory Birds Convention Act, 1994)	
	may include noise disturbance as a result of	and Eastern Wood-pewee breeding habitat, timing	
	construction (cut and fill), and/or operations and	constraints shall be applied to avoid vegetation clearing	
	maintenance activities that will occur directly adjacent	(including grubbing) and/or structure works (construction,	
	to this feature. Noise disturbance may impact breeding	maintenance) during the core breeding bird period –	
	success of avian species, including Special Concern	broadly from April 1 to August 31 for most species	
	(Eastern Wood-pewee), whose habitat is considered SWH.	(regardless of the calendar year) (see Avifauna for more details).	
	Other indirect effects may include:		
	Potential changes in form and function of the woodland due to edge effects associated with	Areas of woodlands to be protected should be clearly delineated by construction hoarding, or Tree Protection	
	removal of surrounding vegetation (i.e., sun scald	Fencing, that should be installed prior to commencement	
	windthrow, increased light penetration).	of construction activities.	
	Increase in pedestrian use.		
	Habitat degradation and increased risk of exotic	Construction activity should be outside of the dripline of	
	and invasive species colonizing in the wetland from adiacent residential development.	any trees that are to remain.	
	 Noise and human disturbance to wildlife. 	Stormwater management, including LID measures, will be	
	Increased lighting from adjacent residential	used to maintain water balance to the woodland feature	
	development.	that is directly adjacent to the PSW communities.	
		Lighting should be directed away from the woodland	
		ecosite.	
Significant Areas of Natural and	The subject property does not feature any ANSIs.	N/A	N/A
Scientific Interest (ANSIs)	Adjacent lands south of Mayfield Road consist of the		
	Reart Lake Forest and Bog Life Science ANSI and the		
	brampton bulled Esker Earth Science ANSI.		
	Given that Mayfield Road is a busy arterial road that		
	bisects the subject property to the north from the		
	features to the south, no negative long-term		
	environmental effects from the proposed development		
	to the ANSI is anticipated if wildlife linkages are		
	enhanced and maintained (see Wildlife Linkages and		
	Corridors).		
Wildlife and General Wildlife	Provincially common species considered 'habitat	In the event that an animal is encountered during	Permanent removal of the followir
Habitat	generalists' that are known to utilize a mosaic of	construction and does not move from the construction	communities that are confirmed w
	agricultural, meadow, welland and woodland nabilals	zone, the Contract Administrator shall be notified. If the	habitat:
	include Covote, White tailed Deer, Raccoon, Eastern	construction in the area would result in harm to wildlife	
	Cottontail and Eastern Chinmunk	construction activities in that location shall temporarily	MAS2-1 (0.08 ha)
		ston and the MNRE or MECP shall be contacted for	CLIM1 1 (5.91 hc)
	Temporary displacement of and disturbance to wildlife	direction	
	and wildlife habitat during the construction phase		Hedgerow (0.43 ha)

	Recommended Monitoring Activities
	N/A
owing d wildlife	A Biologist may be required on an as-needed basis during construction works if wildlife is trapped within the construction zone and requires removal and relocation to land outside of the construction zone. They may also be required on-site as needed should a species that is protected under the <i>ESA</i> be identified within, or adjacent to the

Environmental Component	Potential Environmental Effects	Avoidance, Mitigation and/or Restoration Measures	Net Effects	Recommended Monitoring Activities
	(i.e., vegetation removals, noise, light trespass),	Exclusion fencing shall be installed to allow wildlife to	CVR_4 (1.88 ha)	construction site. The Biologist may be
	including SAR. Development in these habitats may	leave the fenced area during vegetation clearing. Once		required to confirm the presence and
	limit wildlife movement and reduce useable habitat.	the work area has been cleared, it can be securely fenced	Wildlife may be permanently displaced	identification of a species prior to
	The development will permanently remove upland	(and keyed into the ground) to prevent wildlife from	because of the proposed development, as	contacting MECP for further advice.
	agricultural lands that some of these species are	returning.	wildlife linkages and corridors are limited	
	agricultural lands that some of these species are known to use as foraging and movement corridors. The majority of higher quality wildlife habitat on the subject property is located within the Heart Lake PSW Complex (NHS) and will be protected. There is one small wetland ecosite (MAS2-1; cattail shallow marsh) that will be directly removed. It is 0.08 ha in size. It is isolated from the Heart Lake PSW Complex and is not hydrologically connected to other natural heritage features. In addition, the CUM1-1 (dry moist old field meadow) vegetation communities in the southern portion of the subject property will be removed, which function as general wildlife habitat. It is 5.81 ha in size. Changes to surface water runoff and infiltration on the subject property has the potential to alter hydrology in the Unnamed Tributary of Spring Creek and PSW Complex. This could affect the functions of the watercourse and wetlands, including the type of wildlife species and habitats this corridor supports. The proposed development will increase road traffic both on the subject property and in the general area.	 returning. The excluded area shall be searched immediately following fencing installation for any wildlife (including SAR) that may have become trapped. Any wildlife shall be safely relocated, or permitted to escape, to a suitable habitat. All works shall stop immediately in the area and MECP contacted should a SAR be encountered within a construction or operational area to ensure compliance with the ESA. Avoid vegetation clearing or disturbance during sensitive times of the year for local wildlife (when many animals bear their young or migrate between wintering and summer habitats). Specific timing of works should be determined, in consultation with the appropriate Agency. Generally, the following avoidance windows apply if working within any of these habitats: Breeding birds and/or birds protected under the MBCA, 1994 (trees/shrubs/vegetation): April 1 to August 31. SAR Bats (trees/structures): April 1 to October 31. Overwintering reptiles (wetlands/subsurface features such as foundations, bedrock): October to April. Breeding Amphibians (wetlands/open water features): April to June. 	wildlife linkages and corridors are limited in this area (see below). It should be noted that MAS2-1 provides very limited ecological function and diversity on the landscape due to its small size, isolation and location; the Heart Lake PSW Complex provides a larger, contiguous wetland community that will continue to support a variety of species, including mammals, birds and herpetofauna.	Fencing should be monitored by a Qualified Environmental Inspector on a regular basis to ensure there is no damage that may result in a decrease in function or opportunities for injury or death to wildlife species. An Avian Biologist may be required on-site, as needed, should a nesting migratory bird (or SAR protected under <i>ESA</i>) be identified within or adjacent to the construction site. The Avian Biologist may be required to confirm the presence and identification of an active nest and/or breeding bird prior to contacting MECP for further advice.
	I his may increase wildlife road mortalities as wildlife linkages and corridors are limited in this area (see below).	See Wildlife Linkages and Corridors below for how to enhance existing features.		
	SWH and SAR habitat are discussed separately, below.			
Avifauna and Area-Sensitive Species	Potential for disturbance or destruction of migratory breeding birds and their habitat (prohibitions under the <i>Migratory Birds Convention Act, 1994</i>) during construction, including area-sensitive species. SWH and SAR habitat are discussed separately, below.	General Mitigation To reduce the risk of contravening the <i>Migratory Birds</i> <i>Convention Act, 1994</i> , timing constraints shall be applied to avoid any limited vegetation clearing (including grubbing) and/or structure works (construction, maintenance) during the breeding bird period – broadly from April 1 to August 31 for most species (regardless of the calendar year)	Permanent removal of the following communities that are confirmed or candidate avifauna habitat, including area-sensitive habitat for Savannah Sparrow: CUM1-1 (5.81 ha)	An Avian Biologist may be required on site, as needed, should a nesting migratory bird (or SAR protected under <i>ESA</i>) be identified within or adjacent to the construction site. The Avian Biologist may be required to
			Hedgerow (0.43 ha)	contirm the presence and identification of

Environmental Component	Potential Environmental Effects	Avoidance Mitigation and/or Restoration Measures	Net Effects
		Active nests (nests with eags or young birds) of protected	CVR 4 (1.88 ha)
		migratory birds, including SAR protected under the	
		Endangered Species Act (ESA), 2007, cannot be	
		destroyed at any time of the year. The destruction of	
		inactive nests for some species may also be prohibited.	
		Construction Mitigation	
		If a nesting migratory bird (or SAR protected under <i>ESA</i>)	
		is identified within or adjacent to the construction Site (or	
		during operations and maintenance activities), and the	
		activities are such that continuing works in that area	
		would result in a contravention of the <i>Migratory Birds</i>	
		Convention Act, 1994 or ESA, all activities will stop and	
		the Contract Administrator (with assistance from an Avian	
		Biologist) shall discuss mitigation measures with the	
		Town. Should SAR be identified, all activities will stop	
		and MECP will be contacted immediately to ensure	
		compliance with the ESA. The Contract Administrator	
		shall instruct the Contractor on how to proceed based on	
		the mitigation measures established through discussions	
		with the City, the MECP and/or Environment Canada.	
Hernetofoune	See Wildlife and General Wildlife Habitat and SWH		
Repetorauna	Direct imposts to behitste within the development	Concerd Mitigation	Democratic removal of the following
Significant wildlife Habitat	Direct impacts to habitats within the development	See also Wildlife and General Wildlife Habitat	
	Dentile Liberneeulum, Condidete Shrub/Cardidate	See also wildine and General Wildine Habitat.	communities:
	Reptile Hibernaculum, Candidate Shrub/Early	The MNRE have published a Significant Wildlife Habitat	Candidate Bat Maternity Colori
	Successional Breeding Bird Habitat and Confirmed	Mitigation and Support Tool (2014). This document	Candidate Shrub/Early Success
	habitat for Special Concern and Rare wildlife Species:	provides advice and recommendations for mitigating	Candidate Shildb/Early Succes Breeding Bird Habitat
	Monarch and Eastern Wood-pewee.	development effects in, and adjacent to SWH, and should	Confirmed babitat for Special (
	Indirect impacts to babitate contained within the NIUS:	be used as a guide.	and Rare Wildlife Species: Mo
	Confirmed Turtle Wintering Areas, Candidate Rentile		and Fastern Wood-pewee
	Hibernaculum, Candidate Colonially Nesting Bird	Opportunities should be explored to enhance wildlife	
	Breeding Habitat (Trees/Shrubs) for Green Heron	habitat within the NHS such as the creation of turtle	Marginal habitat for Eastern Wood-
	Confirmed Turtle Nesting Areas, Confirmed Marsh Bird	nesting sites and reptile hibernaculum.	(Special Concern) is present on the
	Breeding Habitat, Candidate Shrub/Early Successional		subject property – this species was
	Breeding Bird Habitat, Confirmed Terrestrial Crayfish,	Where possible, pedestrian access to the PSW within the	recorded at CUM1-1 ecosite (when
	Confirmed Special Concern and Rare Wildlife Species	NHS should be limited in order to ensure that degradation	scattered trees are present) and C
	Eastern Wood-pewee, Monarch, Snapping Turtle,	and disturbance of sensitive habitats within this feature	(central) ecosite where trees are pl
	Midland Painted Turtle and Terrestrial Crayfish.	are minimized as much as possible post-development.	around property and abuts the sma
		For Condidate politate within the development limite	ecosite (0.37 ha). However, this sp
	See also Wildlife and General Wildlife Habitat and	detailed site surveys may be required during detailed	has been confirmed on adjacent la
	Wetlands and Provincially Significant Wetlands.	design prior to Project construction to confirm processo	the Heart Lake Conservation Area
		design, phor to Project construction, to commit presence.	higher quality and quantity of habita

	Recommended Monitoring Activities
	an active nest and/or breeding bird prior
	to contacting MECP for further advice.
	See Wildlife and Conoral Wildlife Habitat
owing	See wildlife and General wildlife habitat.
Colonias	
CCESSIONAI	
aial Canaarn	
·	
lood-newee	
on the	
was	
where	
nd CVR 4	
are planted	
small FOM	
nis species	
ent lands in	
Area where	
nabitat is	

Environmental Component	Potential Environmental Effects	Avoidance, Mitigation and/or Restoration Measures	Net Effects	Recommended Monitoring Activities
		For Confirmed habitats within the development limits:	present. Numerous records for the CA	
			are found on eBird during the breeding	
		Monarch:	season, which also support this	
		Milkweed should be included in all seed mixes used	conclusion. Given the lack of high-quality	
		to revegetate setback areas to provide host plant for	habitat for this species on the subject	
		larval Monarch.	property, net effects to this species is	
			considered low.	
		Eastern Wood-pewee:		
		Maintain the FOM and 10 m buffer		
		Adhering to this timing constraint will also ensure that		
		harm to Eastern Wood-pewee (Special Concern) is		
		avoided.		
		Opportunities for native deciduous tree plantings		
		within any setbacks or in the NHS may be considered		
		to increase tree cover on the subject property that		
		would benefit this species.		
		Avoid vegetation clearing during sensitive times of the		
		year for local wildlife, such as spring and early summer		
		(when many animals bear their young or migrate between		
		wintering and summer habitats).		
		Construction Mitigation		
		Prior to construction works commencing, installation of		
		construction hoarding is recommended along the		
		perimeter to prevent pedestrian access around the limit of		
		construction, which includes all areas required for		
		and material lawdown in order to provent any wildlife from		
		ally material laydown in order to prevent any wildlife from		
		construction works specifically foncing shall be		
		installed at the beginning of April or earlier		
		If designated areas are created during construction for		
		the stockpilling of materials, especially fill, soil and gravel		
		the Contractor shall install temporary construction		
		hoarding around the perimeter of these areas to prevent		
		any reptile species from entering the area and attempting		
		to nest (reptiles are attracted to these materials for		
		nesting).		
		If temporary construction hoarding is used at a location, it		
		shall be installed to allow wildlife to leave the fenced area		
		during vegetation clearing. Once the work area has been		
L	1		L	

Environmental Component	Potential Environmental Effects	Avoidance, Mitigation and/or Restoration Measures	Net Effects	Recommended Monitoring Activities
		cleared, it can be securely fenced to prevent wildlife from returning. The excluded area should be searched immediately		
		following fencing installation for any wildlife (including SAR) that may have become trapped. Any wildlife should be safely relocated, or permitted to escape, to a suitable		
		habitat no more than 200 m away from the work zone. Wildlife shall be released no more than 200 m away from the work zone in a similar ecosystem type. All works		
		should stop immediately and MECP contacted should a SAR be encountered within a construction or operational area to ensure compliance with the <i>ESA</i> .		
Habitat of Endangered and Threatened Species	Sensitive or significant species or their habitat potentially affected (direct or indirect), including Barn Swallow (foraging habitat only), Butternut and SAR bats (trees).	An Information Gathering Form will likely be required from MECP detailing what SAR have been confirmed on the subject property and what surveys have been completed to confirm presence/absence. This is the first step in the	No net effects are anticipated if all requirements under the ESA are met.	See Wildlife and General Wildlife Habitat.
	It is assumed that all structures that are present in the development limits will be removed. Structures located on the subject property have been surveyed for Barn Swallow, Chimney Swift and SAR bats and none have been identified.	Ministry's permitting process. Upon review of the IGF, the MECP will determine whether an activity is likely to contravene Sections 9 and 10 of the Endangered Species Act, 2007 (i.e., kill, harm or harass a listed species and/or damage or destroy its habitat). The data helps to inform MECP as to whether an authorization is required for impacts to SAR and their habitat.		
		For SAR where specific exemptions under the ESA Regulations are detailed (Butternut), all requirements under the ESA must be met.		
	Candidate habitat for SAR Bats (Treed Habitats) has been identified. Removal of select trees or woodland habitat has the potential to destroy SAR bat maternity (BMH) roosting areas.	A Tree Preservation Plan should be developed to limit the amount of tree removal, to the extent possible. Trees considered for removal should be studied to determine their potential to support bat maternity roosting habitat.	No net effects are anticipated if all requirements under the ESA are met.	See Wildlife and General Wildlife Habitat.
		Should bat habitat be identified, the design will be altered to protect the identified habitat, where possible.		
		Removal of candidate BMH trees may require appropriate compensation during suitable timing windows, including acoustic monitoring and the installation of bat house(s) to compensate for loss of habitat. The recommended approach from MECP may include proactive		

Environmental Component	Potential Environmental Effects	Avoidance, Mitigation and/or Restoration Measures	Net Effects
		establishment of alternate bat habitat features within the study area.	
		All requirements under the ESA must be met.	
Wildlife Linkages and Corridors	Wildlife linkages and corridors are present within the portion of the Heart Lake PSW Complex present on the subject property (Wetland No. 1). This linkage/corridor is at risk for becoming more isolated from the proposed development unless the linkage is maintained.	The existing culvert at Mayfield Road is a wildlife linkage between the subject property (Wetland No. 1) and the other wetlands in the PSW Complex located in the Heart Lake Conservation Area should be maintained.	If the existing wildlife linkage is maintained, no net effects are exp
Fish and Fish Habitat	Potential for indirect impacts to downstream fish habitat from water quality and quantity influences (i.e., sediment, pollutants, thermal loading and changes to water balance).	 General Mitigation SMP and ESC Plans shall be developed as noted above. Work will be avoided near watercourses and headwater drainage features during periods of excessive precipitation and/or excessive snow melt. Compliance with the Ontario Water Resources Act, 1990 shall be maintained with respect to the quality of water discharging into natural receivers. Sediment and erosion control measures (such as silt fence barriers, etc.) shall be installed and maintained during the work phase and until the site has been stabilized. If control measures are not functioning properly, no further work shall occur until the problem is resolved. All temporary ESC measures shall be installed in accordance with recognized provincial standards. Extra silt fence and ESC control materials shall be stored on-site, should additional sediment mitigation be required. Construction Mitigation All disturbed areas of the work site should be stabilized immediately, and re-vegetated as soon as conditions allow. All equipment and personal protective equipment must arrive on-site clean to prevent the potential transfer of invasive species (i.e., phragmites) to the local environment. Any stockpiled material shall be stored and stabilized away from the watercourse. All materials and equipment used for the purpose of site preparation and road construction shall be operated and stored in a manner that prevents any deleterious substance (e.g., petroleum 	In-water works are not required fo proposed works and thus HADD of habitat and the death of fish will m as a result of direct impacts from the proposed works. The implementation of the SMP a plans will mitigate indirect impacts downstream fish habitat from the quality and quantity influences.

	Recommended Monitoring Activities
expected.	N/A
for the D of fish I not occur in the P and ESC cts to he water	A Qualified Environmental Inspector shall regularly monitor construction activities to confirm the requirements outlined in the SMP and ESC plans are followed. Workers shall report any instances of spills or impacts to surface water features.

Environmental Component	Potential Environmental Effects	Avoidance, Mitigation and/or Restoration Measures	Net Effects
		products, silt, etc.) from entering the water. All equipment fueling and maintenance should be done outside of the regulated area to ensure that no deleterious substances enter the watercourse.	
		No equipment refueling should occur within 30 m of a watercourse or NHS feature (e.g., woodland, wetland, valleyland), and all stationary equipment should be outfitted with drip pans (i.e., secondary containment) to prevent/contain oil spills.	
		Spills should be immediately contained and cleaned up, in accordance with provincial regulatory requirements and the contingency plan. A hydrocarbon spill response kit should be on site at all times during the work. Spills should be reported to the Ontario Spills Action Center at 1-800-268-6060.	
		TRCA shall be consulted during detailed design with regard to potential works within, or in close proximity to flood regulated areas, as appropriate.	
Headwater Drainage Features	Potential for loss of hydrologic contribution to watercourses, habitat loss for terrestrial and aquatic species, impacts to groundwater contributions, reduction in sediment control capacity, impacts to downstream water quality and increases in flooding.	General Mitigation Potential HDFs were investigated within the subject lands with land use recommendations provided in the preceding sections, based on their function to the aquatic network, as outlined in Figure 2 of the HDF Guideline (TRCA/CVC, 2014).	Direct impacts to HDF's within the lands are anticipated to be minor, low sensitivity features located wit developable limits. Net effects to the hydraulic functio HDF's, which includes maintaining
		HDF's classified as no management concern (i.e., H1, H4-H7, and upstream reaches of H8 to H12) will be addressed through general minor and major stormwater management systems and do not require specific mitigation efforts, provided water balance within the receiving features are maintained.	flows to the downgradient PSW co can be minimized provided water is maintained through stormwater management and/or LID design strategies.
		Features H2 and H3, and the downstream reaches of H8 to 12, are classified as Mitigation. H3 and the downstream reaches of H9 to H12 will not be altered within the proposed design. However, SWM ponds are proposed to be constructed in the vicinity of H2 and H8. To mitigate these impacts, efforts should be made to replicate the existing drainage patterns and locate SWM outfalls or LID structures to feed the lower reaches of H3	

	Recommended Monitoring Activities
the subject or, given within the ction of ning surface / complex, er balance ter	Monitoring will not be required as per the management recommendations.

Environmental Component	Potential Environmental Effects	Avoidance, Mitigation and/or Restoration Measures	Net Effects
		and H8. Through these efforts, the H2 and H8 features	
		can be mitigated through stormwater discharge.	
		The management recommandation for Facture U2 D1 is	
		Conservation This feature will not be directly altered by	
		the proposed design, but changes to hydrology and flow	
		may occur through modifications to drainage patterns	
		from the site.	
Soils, Erosion and Sediment	Potential for localized surface water or groundwater	General Mitigation	
Control, and Surface Water	impacts as a result of spills, discharge or dumping of	The Town is required to comply with the Ontario Water	
- ,	materials, fluids and other wastes during construction	Resources Act, R.S.O. 1990, c. O.40 with respect to the	
	of proposed road extension and associated surface	quality of water discharging into natural receivers. The	
	water facilities (e.g., swales).	footprint of disturbed areas shall be minimized to the	
		extent possible. For example, vegetated buffers shall be	
		left in place adjacent to natural vegetation features	
		(lorested areas) to the maximum extent possible.	
		A Soil Management Plan (SMP) will be prepared by a	
		Qualified Professional, as defined in Q. Reg. 160/06 for	
		managing soil materials on-site (includes excavation,	
		location of stockpiles, reuse and off-site disposal).	
		An Erosion and Sediment Control (ESC) Plan will be	
		developed during detailed design, in consultation with	
		TRCA, and will conform to industry best management	
		practices and recognized standard specifications, such as	
		Ontario Provincial Standards Specification (OPSS).	
		Construction Mitigation	
		Any in-water work will be conducted in isolation of flowing	
		water. All work zones will be clearly marked on detailed	
		design drawings and the ESC Plan to indicate that no	
		work should occur outside the work zone.	
		ESC measures shall be installed and maintained during	
		the construction phase and until all areas of the	
		construction site nave been stabilized. ESC measures	
		and maintained as required. If ESC measures are not	
		functioning properly no further work in the affected areas	
		will occur until the sediment and/or erosion problem is	
		resolved.	
		All disturbed areas of the construction site will be	
		stabilized and re-vegetated as soon as conditions allow.	

Recommended Monitoring Activities
A Qualified Environmental Inspector shall regularly monitor construction activities to confirm the requirements outlined in the SMP and ESC are being followed.
A Qualified Environmental Inspector shall inspect, suggest and confirm the repair of ESC measures as needed.
Workers shall report any instances of spills to their supervisors.

Environmental Component	Potential Environmental Effects	Avoidance, Mitigation and/or Restoration Measures	Net Effects	Recommended Monitoring Activities
		Wet weather restrictions shall be applied during site		
		preparation and excavation.		
		Any construction works within TRCA regulated areas will		
		require a permit under O. Reg. 166/06.		
		Refueling and maintenance of construction equipment		
		should occur within designated areas only. Any		
		hazardous materials used for construction will be handled		
		in accordance with appropriate regulations.		
		A Construction Emergency Response and		
		Communications Plan shall be developed and followed		
		throughout the construction phase (including spill		
		response plans). The Contractor shall develop spill		
		prevention and contingency plans during the construction		
		phase. Personnel shall be trained in how to apply the		
		plans and the plans shall be reviewed to strengthen their		
		effectiveness and continuous improvement. Spills or		
		depositions into watercourses shall be immediately		
		contained and cleaned up, in accordance with provincial		
		regulatory requirements and the contingency plan. A		
		hydrocarbon spill response kit will always be on site		
		during the work. Spills will be reported to the Ontario		
		Spills Action Centre at 1-800-268-6060.		





Figure Title SNELL'S HOLLOW EAST SECONDARY PLAN			
	DEVEL	OPMENT CONSTRAI	NTS
Drawn	Checked	Date	Figure No.
PS	НМ	2021/08/05	10
Scale		Project No.	10
1:5,000		300051670	

10.0 Ecological Offsetting and Compensation Considerations

For ecological offsetting and compensation discussions with Agencies during the approvals process, a preliminary summary of vegetation communities to be removed is provided below in Table 38. The estimated total area is 6.25 ha. It should be noted that the area calculations are preliminary in nature and will need to be refined during detailed design. Intensive agricultural communities and other anthropogenic features (i.e., rural residential, industrial, and commercial properties) were not included in the compensation considerations for natural features.

ELC Code	Community Type	Total Area (ha) to be Impacted
CUM1-1	Cultural	5.81
HR	Cultural	0.43
MAS2-1	Wetland	0.08
Total Area of Im	pacted Communities	6.25

As stated in Section 7.9, the estimated total area of encroachment into the existing NHS is 2.20 ha, which includes portions of these vegetation communities. The estimated total area of NHS compensation proposed is 1.01 ha. See also GSAI's draft Planning Justification Report (2021).

While MAS2-1 is classified as a wetland, it is dominated almost exclusively by a monoculture of cattail (Typha latifolia). Per Burnside's Baseline Conditions report (2019), this feature is likely the result of a natural depression in the topography due to the historical impacts of the surrounding industrial and agricultural lands and the associated driveway to the south that acts as a barrier to surface drainage flow (i.e., no culvert is present under the driveway). It was noted during HDF surveys that this feature was wet in April and May but dry by August. Potential channelization or surface conveyance of the wetland to nearby HDFs was not evident during field investigations. This feature has very limited ecological functionality on the landscape and is not hydrologically connected to the Heart Lake PSW Complex or to any other natural-heritage features. Additionally, this feature has not been identified as part of the Town of Caledon's Environmental Policy Area, the Region of Peel's Greenland System, or during the Heart Lake PSW Complex boundary evaluation and/or stakings in 2000, 2009 and 2011 with MNRF/TRCA and TRCA TOB staking of the NHS in 2018. Given this feature is small and isolated from other natural heritage features and is surrounded by a major roadway, cultivated farmland and a driveway, no negative or long-term impacts for removing this feature are expected.

TRCA has adopted a Regional Terrestrial NHS Strategy (TNHSS) to protect and improve regional biodiversity. The Etobicoke and Mimico Creeks Watersheds Technical Update Report (2010) identifies an expanded targeted terrestrial NHS, as well as priority restoration and management opportunities specific to these watersheds.

Figures 8-6 and 8-7 of the Report (2010) depict the existing natural cover present on the subject property associated with the PSW, as well as targets for "potential natural cover", highlighting opportunities for restoration. Priority management areas were ranked from Level 1 (high) to Level 4 (low). The PSW on the subject property is identified as Level 4; however, the Report states that "all areas identified in the Target System represent excellent potential for restoration/management work if opportunities arise." The NAI (2014) highlights the need to protect the quality of the wetlands by encouraging the development of forest cover on the successional lands through restoration plantings, using native species and community composition found at the nearby Heart Lake Conservation Area as a guide. If a site-specific ecological offsetting plan is required, the TRCA Report (2010) may also be used to assist with identifying off-site compensation areas, as there are several sites depicted in close geographic proximity to the subject property where opportunities may exist, including Heart Lake Conservation Area. Future consultation with TRCA will be required to refine the requirements of an offsetting plan.

11.0 Environmental Permits and Approvals During Detailed Design

Based on Burnside's field investigations for the subject property, we anticipate the project will require the following environmental permits and approvals during detailed design. See Table 39 below.

Permits/Approvals	Rationale	Approval Mechanism
Provincial Endangered Species Act	SAR Bats Trees that have been identified as candidate or confirmed habitat for SAR bats.	LOA or Authorization Letter and/or Overall Benefit Permit 17(b)(c) (subject to proposed works and consultation with MECP).
	Butternut Any removal of Category 2 and 3 trees.	Ontario Regulation 242/08 of the ESA, Section 23.7.
TRCA Regulation 166/06	Any development, interference with wetlands and alterations to shorelines and watercourses and associated hazard lands.	A permit will be required for development within all lands regulated through Section 28 of the <i>Conservation</i> <i>Authorities Act</i> .

Table 39: Summary of Anticipated Environmental Permits and Approvals During Detailed Design

Permits/Approvals	Rationale	Approval Mechanism
Town of Caledon	To regulate and/or prohibit destruction of	A permit would be
Tree Removal	trees in woodlands.	required for the
By-law		removal of trees in
(No. 2000-100)		woodland communities.

12.0 Guidelines for Site Specific Environmental Studies During Detailed Design

Per the requirements of the TOR (2019), guidelines are required for carrying out future site-specific environmental studies, including site specific EIS and Long-Term Monitoring and Adaptive Management Plans, to be prepared by individual applicants in support of development proposals on the subject property. These site-specific studies will assess the merits of the application and will apply findings, recommendations and strategies contained in the CEISMP. Establishing guidelines for the preparation of site-specific environmental studies will assist future applicants in determining the scope and content of such studies.

The TRCA has published Environmental Impact Statement Guidelines (2014) that provides a comprehensive outline of the consultation and review process and the key components of an EIS report. These guidelines should be referenced prior to any future studies that are completed.

Site-specific environmental studies that may be required include:

- **Bats:** While acoustic surveys of the structures did not identify any SAR bats, the leaf-on and leaf-off surveys for SAR bats identified candidate habitat for SAR bats on the subject property, within the development limits. Suitable habitat is also assumed in the NHS, given the treed wetland communities present. Surveys may need to be updated during detailed design for trees that are proposed for removal, including intrusions into the NHS (i.e., grading, LIDs, outfalls), once specific impacts are better understood. Over time, tree features change due to growth and weather, etc. Acoustic surveys may also be required to confirm the presence of SAR bats because candidate habitat is present. These surveys can only be completed in June and early July.
- **Significant Wildlife Habitat:** Additional consultation with TRCA may be required to discuss the need to complete surveys for any Candidate SWH identified on the subject property during detailed design once impacts are better understood (Candidate Bat Maternity Colonies and Candidate Reptile Hibernaculum (old barn foundation). Section 10.0 outlines mitigation measures to avoid negative impacts to these features; it is Burnside's opinion that if these measures are implemented, no long-term negative effects to SWH are expected to occur.

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

As per Part C of the TOR (2019), Long-Term Monitoring Plans (LMP) and Adaptive Management Plans (AMP) are required after baseline conditions are established. The following summary is borrowed from the TOR (2019) and provides a general framework for the Snell's Hollow East Secondary Plan. Future consultation with TRCA will be required to refine the Plans specific to the subject property.

The LMP should be designed in such a way that impacts can be distinguished from natural trends at an early stage. This plan will be included in the final study report; the costs and responsibilities for long-term monitoring must be addressed. Items to be monitored over the long-term may include but is not limited to:

- Water quality and quantity, including stormwater system performance (including any best management practice measures and/or designs used).
- Fisheries and aquatic resources.
- Hydrology and hydraulics.
- Groundwater quality and quantity.
- Stream morphology and slope stability.
- Terrestrial resources woodlots, wetlands, flora and fauna, terrestrial linkages, buffer areas, invasive species, natural system encroachments, natural system edge management.
- Water balance and the effectiveness of groundwater recharge enhancement measures.

The broad objective of the AMP is to provide direction for monitoring the performance of the recommended aquatic and terrestrial resource mitigation strategies, and to provide a flexible mitigation system that can be adjusted in response to monitoring results. For the AMP to be effective, flexible measures must be accommodated at the initial stages of all aspects of the community design (i.e., SWM infrastructure, open space system, transportation network, landscaping, etc.) to allow for an adaptive system that can react to required change.

The AMP is a management framework that encompasses and provides for the following:

- Identify key features and functions and associated protection goals and objectives.
- Management targets required to meet goals and objectives.
- Mitigation measures to address the performance targets.
- Monitoring requirements to monitor the success of the mitigation measures in relation to the targets.
- Evaluation of the monitoring results in relation to the management targets.
- Long-term adjustment of the overall Plan/AMP as needed.

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

The AMP will include a framework for long-term environmental monitoring to measure the performance of the recommended mitigation/management strategies. Recommendations for long-term monitoring of surface water, groundwater, water quality, fisheries, stream morphology and terrestrial/wetland resources will be provided. The data collected as part of the CEISMP will form a baseline for monitoring change over time and for evaluating proposed management practices. Monitoring frequency, parameters and responsibility will also be addressed. The monitoring program will be designed in a way that will help to distinguish between natural variation in ecosystem function and potential land use development impacts.

The AMP will discuss responses to changing conditions, or anticipated impacts. This might include more aggressive monitoring necessary to determine the cause-and-effect relationship associated with the change or anticipated impact, as well as providing general directions for consideration of impact contingency measures where necessary, after taking into account monitoring results.

The AMP will address mitigation and monitoring plans, as well as enhancement and restoration, to ensure they are consistent and integrated and address the identified resource protection targets.

13.0 Summary

The Team was retained by the Snell's Hollow Developers Group to undertake a CEISMP for a development, located at the northeast corner of Kennedy Road and Mayfield Road. The subject property is situated in the proposed Snell's Hollow East Secondary Plan area and contains a portion of the Heart Lake Provincially Significant Wetland (PSW) Complex and an Unnamed Tributary of Spring Creek, which drains beneath Mayfield Road towards Heart Lake Conservation Area to the south. This report contains Part A and Part B of the CEISMP, per the TOR (2019).

The main body of this report provides a summary of existing baseline conditions and characterization of the natural environment (Part A), as well as a land use evaluation and impact assessment (Part B). Existing natural heritage constraints and features are assessed in the context of applicable planning and policy considerations and the planned urban development proposed (i.e., SWM, water supply analysis, feature-based water balance and wetland risk evaluation, sanitary servicing strategy, functional servicing). It is intended that the findings of each component study and analysis are integrated throughout the report. Environmental permits and approvals during detailed design are summarized, as well as guidelines for site specific environmental studies during future stages of the development.

Part C Implementation will be part of a future report submission and will include details pertaining to the Long-Term Monitoring Plan (LMP) and Adaptive Management Plan (AMP). These Plans will ensure that the principle of adaptive management and an

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

appropriate level of flexibility will be incorporated into the design in consultation with TRCA.

The most significant constraint to development is the Heart Lake PSW and associated Unnamed Tributary of Spring Creek that is contained within the Significant Valleyland system that traverses through the centre of the subject property. The NHS has been identified as all of the features contained within this system, based on TRCA's staked TOB limits (2018). The "tablelands" are mostly comprised of rural properties and intensive agriculture and generally the proposed development is contained to the "tablelands", outside of this constraint. Portions of the proposed development encroach beyond the TOB and will require further discussions with reviewing Agencies.

Natural heritage constraint features present on the "tablelands" include Candidate SAR bat habitat and a small wetland ecosite with limited ecological functionality that will require removal. The majority of significant features are found within the NHS and include Butternut, higher quality Candidate SAR bat habitat, Confirmed Turtle Wintering and Nesting Areas, Confirmed Terrestrial Crayfish habitat, Candidate Colonially Nesting Bird Breeding Habitat (Trees/Shrubs) for Green Heron, Confirmed Marsh Bird Breeding Habitat, additional Candidate Shrub/Early Successional Bird Breeding Habitat and Confirmed Special Concern and Rare Wildlife Species for Eastern Wood-pewee, Monarch, Snapping Turtle, Midland Painted Turtle and Terrestrial Crayfish.

Ecological offsetting and compensation may be considered in consultation with TRCA for removal of natural features (i.e., cash-in-lieu, off-site compensation) and should be discussed further during the approvals process.

An evaluation of potential environmental impacts and recommended mitigation measures has been completed in consideration of the proposed development activities. Overall, the proposed Concept Plan is in general agreement with applicable natural heritage legislation and policies, with additional refinement of the design and supporting mitigation measures anticipated during the development of the detailed design and through consultation with regulatory agencies.

14.0 References

Arcement, G. J., and Schneider, V. R. 1989. Guide for selecting Manning's roughness coefficients for natural channels and flood plains.

Brierley, G. J. and Fryirs, K. A. 2005. Geomorphology and River Management: Applications of the River Styles Framework. Blackwell Publishing, Oxford, UK, 398 pp. ISBN 1-4051-1516-5.

Chow, V.T. 1959. Open channel hydraulics. McGraw Hill, New York.

Conservation Authorities Act. 1990. Royal Statutes of Ontario, Chapter 27.

Credit River Watershed and Region of Peel Natural Areas Inventory (NAI) – "Kennedy-Highway 410" NAI #10730, 11676, 11677 (Volume 3, April 2014).

Dobbyn, J. 1994. Atlas of the mammals of Ontario. Federation of Ontario Naturalists.120 pp.

Dupuis-Désormeaux, M., D'Elia, V., Burns, R., White, B. and MacDonald, S.E. 2019. A turtle population study in an isolated urban wetland complex in Ontario reveals a few surprises. FACETS 4: 584-597.

Endangered Species Act. 2007. Statutes of Ontario, Chapter 6.

Fischenich, C. 2001. Stability Thresholds for Stream Restoration Materials. EMRRP Technical Notes Collection (ERDC TN-EMRRP-SR-29), U.S. Army Engineer Research and Development Center, Vicksburg, MS.

Fisheries Act. 1985. Royal Statutes of Canada, Chapter F-14.

Galli, J. 1996. Rapid Stream Assessment Technique, Field Methods. Metropolitan Washington Council of Governments.

Julien, P. Y. 1994. Erosion and Sedimentation (1st ed.). Cambridge University Press.

Komar, P.D. 1987. Selective gravel entrainment and the empirical evaluation of flow competence. Sedimentology, 34: 1165-1176.

Lee, H.T, W.D. Bakowsky, J.L. Riley, J. Bowles, M. Puddister, P. Uhlig, S. McMurray. 1998. Ecological Land Classification for Southern Ontario: First Approximation and its Application. Ministry of Natural Resources, Southcentral Region, Science Development and Transfer Branch. Technical Manual ELC-005.

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

Limerinos, J.T. 1970: Determination of the Manning coefficient from measured bed roughness in natural channels. United States Geological Survey Water-Supply Paper 1898B.

McIllwraith Field Naturalists of London. 2007. Chimney Swifts in London, Ontario. A Fact Sheet.

Migratory Birds Convention Act (MBCA). 1994. Statutes of Canada, Chapter 22.

Miller, M.C., McCave, I.N. and Komar, P.D. 1977. Threshold of sediment erosion under unidirectional currents. Sedimentology, 24: 507-527.

Ministry of the Environment (MOE). 2003. Ontario Ministry of the Environment. SWM Guidelines.

Ministry of Municipal Affairs and Housing (MMAH). 2020. Provincial Policy Statement (PPS) under the Planning Act. Obtained online at:

https://files.ontario.ca/mmah-provincial-policy-statement-2020-accessible-final-en-2020-02-14.pdf

Ministry of Natural Resources (MNR). 2000. Significant Wildlife Habitat Technical Guide (SWHTG) & Appendices. 151 pp.

Ministry of Natural Resources (MNR). 2009. *Provincially Significant Heart Lake Wetland Complex.* Aurora District: MNR.

Ministry of Natural Resources (MNR). March 2010. Natural Heritage Reference Manual for Natural Heritage Policies of the Provincial Policy Statement, 2005. Second Edition. Toronto: Queen's Printer for Ontario. 248 pp.

Ministry of Natural Resources and Forestry (MNRF). 2015. Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E.

Ministry of Natural Resources and Forestry (MNRF). 2017. Ontario Stream Assessment Protocol Version 10.

Montgomery, D.R. and J.M. Buffington. 1997. Channel-reach morphology in mountain drainage basins. Geological Society of America Bulletin, 109 (5): 596-611.

Natural Heritage Information Centre (NHIC). Species Lists. 2018 <u>https://www.ontario.ca/page/get-natural-heritage-information</u>

North-South Environmental Inc., Dougan & Associates and Sorensen Gravely Lowes. 2009. Peel-Caledon Significant Woodlands and Significant Wildlife Habitat Study. Report prepared for the Region of Peel and the Town of Caledon, Ontario. xi + 187 pp + app.

Comprehensive Environmental Impact Study and Management Plan (CEISMP) August 2021

Region of Peel. December 2018. Region of Peel Official Plan.

Richards, C., Haro, R.J., Johnson, L.B. and Host, G.E. 1997. Catchment and reach-scale properties as indicators of macroinvertebrate species traits. Freshwater Biology, 37: 219-230.

Species at Risk Act. 2002. Statutes of Canada. Chapter 29.

Toronto and Region Conservation Authority (TRCA). 2002. Greening our Watersheds: Revitalization Strategies for Etobicoke and Mimico Creeks, including the Etobicoke-Mimico Report Card.

TRCA. 2004. Belt Width Delineation Procedures.

TRCA. 2010. Etobicoke and Mimico Creeks Watershed Technical Update Report.

TRCA. 2015. Crossings Guideline for Valley and Stream Corridors, September 2015.

TRCA. 2017. Wetland Water Balance Risk Evaluation.

TRCA. 2018. Etobicoke Creek Watershed Report Card.

TRCA. 2020. Review of Snell's Hollow CEISMP Baseline Existing Conditions Analysis and Monitoring Results. Letter dated July 21, 2020.

Town of Caledon. April 2018. Town of Caledon Official Plan.

Varga, S., Leadbeater, D., Webber, J., Kaiser, J., Crins, B., Kamstra, J., Banville, D., Ashley, E., Miller, G., Kingsley, C., Jacobsen, C., Mewa, K., Tebby, L., Mosley, E. and E. Zajc. 2000. Distribution and Status of the Vascular Plants of the Greater Toronto Area. Ministry of Natural Resources Aurora District. 103 pp.

Wolman, M.G. 1954. A method of sampling coarse river-bed material. Transactions of the American Geophysical Union, 35: 951-956.