APPENDIX F
Natural Heritage Features Investigation

CITY OF HAMILTON

NATURAL ENVIRONMENT ASSESSMENT

Municipal Class Environmental Assessment
Elevated Water Storage Facility and Pumping Station
Pressure District 7, Hamilton ON

WM16-0435

COLE ENGINEERING GROUP LTD.

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JANUARY 2019

January 14, 2019
Reference No. WM16-0435

Winston Wang, P.Eng.
Project Manager
City of Hamilton
77 James Street North
Hamilton, ON, L8R 2K3

Attention: **Mr. Winston Wang**

Re: **Municipal Class EA and Conceptual Design for PD7**
Elevated Water Storage Facility and Pumping Station
Natural Environment Assessment

Cole Engineering Group Ltd. (COLE) was retained by the City of Hamilton to prepare a Natural Environment Assessment (NEA) as part of the Municipal Class Environmental Assessment (EA) to select the preferred sites for a new Elevated Water Storage Facility (EWSF) and a new Pumping Station (PS). The EWSF and PS facilities are being proposed to address future growth within Pressure District 7 (PD7) and to address security of supply and water system balancing. This project is classified as a Schedule B and is being undertaken in accordance with the planning process outlined in the *Municipal Engineers Association Municipal Class Environmental Assessment* document (October 2000, amended in 2007 and 2015).

The enclosed NEA has been revised in response to City of Hamilton comments from October 5, 2018, December 13, 2018, and January 9, 2019. I trust you will find the revised report satisfactory. Should you have any questions, please feel free to call.

Best Regards,
COLE ENGINEERING GROUP LTD.

M. M Husain

Muin Husain, Ph.D., P.Geo.
Vice President, Environment

A. Szabo

Agneta Szabo, B.Sc.
Botanist

MH/as

c.: Shelley Kuan

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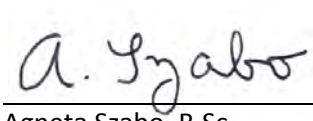

Agneta Szabo, B.Sc.
Botanist

Meredith Meeker, B.A.S.
Biologist

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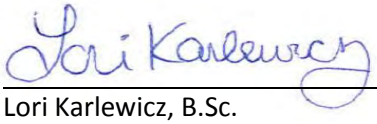
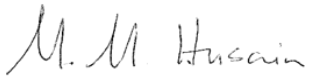


Lori Karlewicz, B.Sc.
Senior Aquatic Biologist

AUTHORIZED FOR ISSUE BY:

COLE ENGINEERING GROUP LTD.



Muin Husain, Ph.D., P.Geo.
Vice President, Environment

Statement of Conditions

This Report / Study (the "Work") has been prepared at the request of, and for the exclusive use of, the Owner / Client and its affiliates (the "Intended User"). No one other than the Intended User has the right to use and rely on the Work without first obtaining the written authorization of Cole Engineering Group Ltd. and its Owner. Cole Engineering Group Ltd. expressly excludes liability to any party except the Intended User for any use of, and/or reliance upon, the work.

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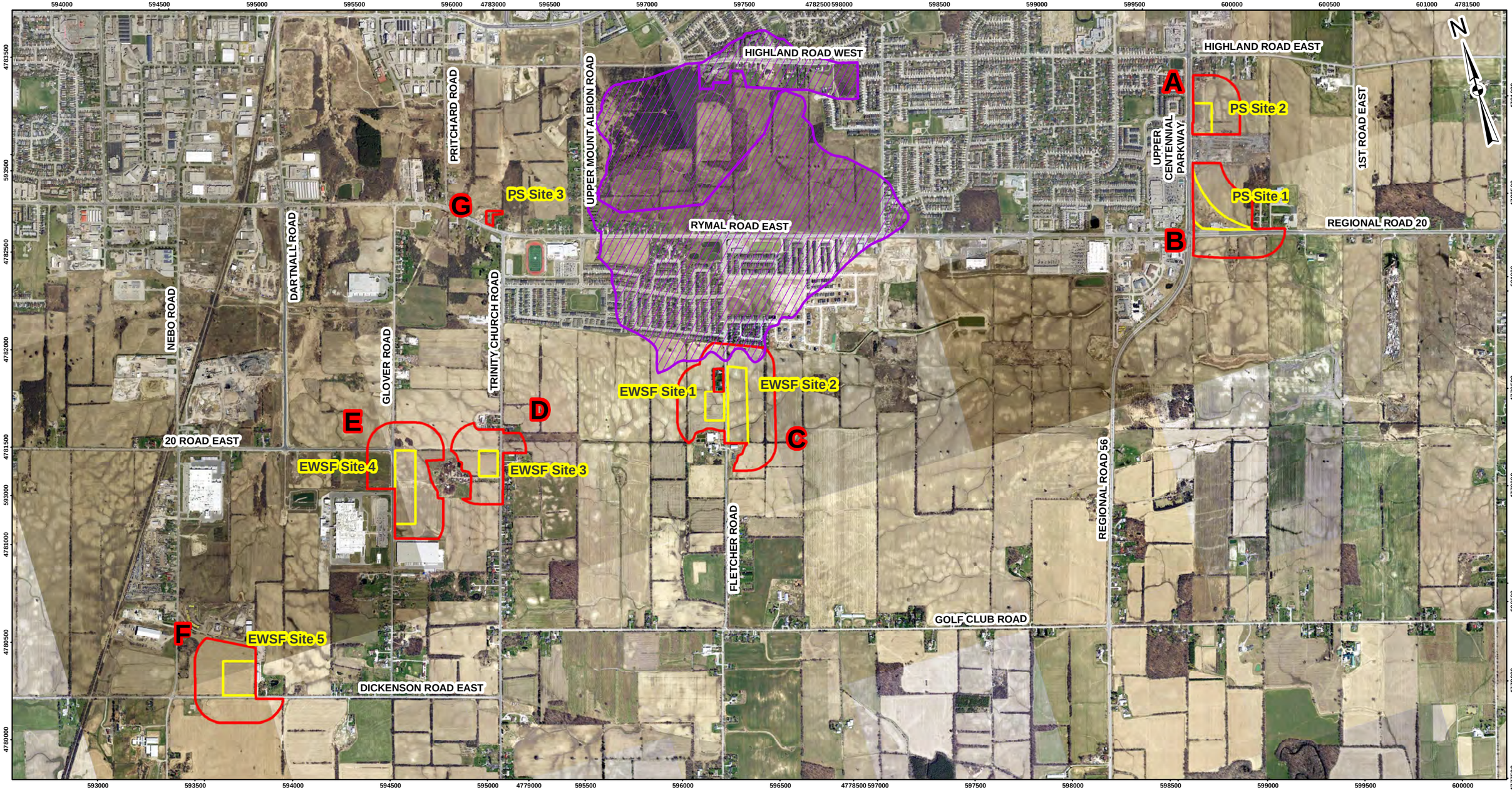
1 Introduction

The City of Hamilton has identified three Alternative Options for a potential Pumping Station (PS) and four for a potential Elevated Water Storage Facility (EWSF) (**Figure 1-1**). As part of a Municipal Class Environmental Assessment (EA), COLE conducted a Natural Environment Assessment of the Alternative Options to inform the selection of the preferred alternatives by avoiding or minimizing negative environmental impacts.

COLE defines the Study Areas as the Alternative Options and the naturally vegetated lands located immediately adjacent (*i.e.*, within 150 m) (**Figure 1-1**). The Alternative Options indicated in yellow on **Figure 1-1** are larger than the anticipated development footprint of both the proposed PS and the proposed EWSF to permit flexibility during site design. The estimated development footprint for each facility is approximately 6,000 m^2; however, the actual footprint of each facility will vary based on the configuration of the site plan. In the opinion of COLE, these Study Areas incorporate all of the natural heritage features and functions that might reasonably be affected by the proposed PS and EWSF and satisfy policy requirements to address adjacent lands.

For ease of reference, COLE has assigned unique identifiers to each of the seven Study Areas:

- **Study Area A** includes PS Site 2 and the immediately adjacent lands;
- **Study Area B** includes PS Site 1 and the immediately adjacent lands;
- **Study Area C** includes EWSF Site 1, EWSF Site 2, and the immediately adjacent lands;
- **Study Area D** includes EWSF Site 3 and the immediately adjacent lands;
- **Study Area E** includes EWSF Site 4 and the immediately adjacent lands;
- **Study Area F** includes EWSF Site 5 and the immediately adjacent lands; and
- **Study Area G** consists of PS Site 3. Study Area G does not include adjacent lands because PS Site 3 is bordered by Rymal Road East to the south and lands to the north within 150 m of PS Site 3 have been urbanized or were actively under development during the preparation of this report.



LEGEND

- Study Areas
- Alternative Options
- Eramosa Karst Earth Science Area of Natural and Scientific Interest (ANSI)

Source: 2016 Orthophotography by
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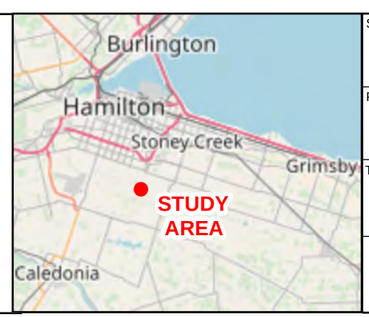

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PROJECT
Pressure District 7 Elevated Water Storage Facility (EWSF) and Pumping Station (PS) Municipal Class EA

TITLE
Overview of Study Areas and Alternative Options

COLE

DATE: 08/14/2018		PROJECT: WM16-0435
GIS	AS	
DESIGN		
CHECK	CP	

Figure 1-1

2 Methodology

COLE used two levels of investigation to obtain information about the natural heritage features and functions of the Study Areas, including a review of existing information sources and supplementary field surveys. Existing information on the Study Areas was obtained from the City of Hamilton and the Ministry of Natural Resources (MNR), now the Ministry of Natural Resources and Forestry (MNRF). Information sources reviewed include the following:

- Elfrida Subwatershed Study: Phase 1 Report (Aquafor Beech 2018);
- Upper Hannon Creek Master Drainage Plan Municipal Class EA (AECOM 2017);
- Natural Heritage Information Centre (NHIC) database records of significant species;
- MNRF online Make A Natural Heritage Area Map feature;
- MNRF Guelph District records of species at risk (SAR) in Hamilton (MNRF 2018);
- The Atlas of the Breeding Birds of Ontario (OBBA 2018);
- eBird (2018);
- Rural Hamilton Official Plan (City of Hamilton 2018a); and
- Urban Hamilton Official Plan (City of Hamilton 2018b).

COLE biologists conducted a reconnaissance-level field investigation on March 21, 2018 to identify gaps in available background information and to define the scope of supplementary fieldwork required to cover these gaps. COLE biologists identified the need for additional detailed field surveys, including the delineation and characterization of vegetation communities, the completion of surveys for plants and breeding birds, the assessment of potential Significant Wildlife Habitat (SWH) as defined by MNR (2000) and/or MNRF (2015), and the application of MNRF protocols to assess the potential presence of SAR within the Study Areas. COLE determined the conservation status of each recorded species based on the *Endangered Species Act, 2007* (SARO) and NHIC S-Ranks as defined at the time of this report's preparation. The following subsections describe in greater detail the methodology of fieldwork completed by COLE to characterize the existing conditions of the Study Areas.

2.1 Ecological Land Classification

A COLE botanist delineated and categorized the vegetation communities present within the Study Areas on July 11, 2018. Vegetation communities were characterized using the methodology of *Ecological Land Classification for Southern Ontario: First Approximation and Its Application* (Lee *et al.* 1998). ELC nomenclature was assigned with reference to the *ELC Catalogue: 2008 Version* (Lee 2008).

2.2 Botanical Survey

A COLE botanist completed a summer botanical survey of the Alternative Options on July 11, 2018. Observed species were recorded with reference to VASCAN (Canadensys 2017).

2.3 Breeding Bird Surveys

COLE obtained background information regarding birds observed within vicinity of the Study Areas from two databases maintained by Bird Studies Canada, including eBird and the Atlas of the Breeding Birds of Ontario. NHIC and eBird indicate that three SAR birds are known to occur in proximity to the Study Areas, namely Barn Swallow (*Hirundo rustica*), Bobolink (*Dolichonyx oryzivorus*), and Eastern Meadowlark (*Sturnella magna*). Due to the potential presence of Bobolink and Eastern Meadowlark, COLE biologists conducted three breeding bird surveys, per MNRF-specified protocols.

The surveys were conducted at 13 point count stations within the Study Areas (**Figure 2-1**) per the protocols of the *Atlas of the Breeding Birds of Ontario* (Cadman *et al.* 2007). Surveys were conducted between dawn and five hours after dawn on June 18, June 26, and July 4, 2018. These survey dates were chosen to ensure favourable weather conditions (*i.e.*, without thick fog or precipitation and wind speeds below 19 km/h) and to ensure that each survey was at least seven days apart, per the MNRF *Survey Methodology under the Endangered Species Act, 2007: Dolichonyx oryzivorus* (MNR 2011).

COLE biologists did not complete breeding bird surveys at PS Site 3 or EWSF Site 4 as breeding bird surveys were previously completed at these sites in 2014 as part of the *Upper Hannon Creek Master Drainage Plan Municipal Class EA*. Breeding bird survey data from this Class EA are presented in **Section 3.3.1**. COLE biologists did not complete breeding bird surveys at EWSF Site 5 because Study Area F consists entirely of agricultural lands under active Soybean cultivation.

Observations of breeding evidence for each bird species were recorded according to the following definitions per Cadman *et al.* (2007):

- **Possible breeding** is indicated by the presence of a singing male (or breeding calls heard) in suitable habitat, or the presence of a bird observed in suitable breeding habitat in its breeding season.
- **Probable breeding** is defined as an observation of any of the following: (i) a pair in breeding season in suitable habitat, (ii) permanent territory presumed through registration of territorial song on at least two days, a week or more apart, at the same place, or (iii) courtship or display between a male and a female or two males, including courtship feeding or copulation, visiting probable nest site, agitated behaviour or anxiety calls of an adult, brood patch on an adult female or cloacal protuberance on an adult male, nest building or excavation of a nest hole.
- **Confirmed breeding** is defined as observation of any of the following: (i) a distraction display or injury feigning, (ii) used nest or egg shell found (occupied or laid within the period of the study),(iii) recently fledged young or downy young, including young incapable of sustained flight, (iv) adults entering or leaving nest site in circumstances indicating occupied nest (*e.g.*, adult carrying fecal sac or adult carrying food for young), or (v) a nest containing eggs, or a nest with young seen or heard.

HIGHLAND ROAD WEST
HIGHLAND ROAD EAST
PRITCHARD ROAD
UPPER MOUNT ALBION ROAD
UPPER CENTENNIAL PARKWAY
1ST ROAD EAST
REGIONAL ROAD 20
RYMAL ROAD EAST
NEBO ROAD
DARTNALL ROAD
GLOVER ROAD
TRINITY CHURCH ROAD
20 ROAD EAST
FLETCHER ROAD
REGIONAL ROAD 56
GOLF CLUB ROAD
DICKENSON ROAD EAST

A
B
C
D
E
F
G

PS Site 1
PS Site 2
PS Site 3
EWSF Site 1
EWSF Site 2
EWSF Site 3
EWSF Site 4
EWSF Site 5

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N

LEGEND

- Study Areas
- Alternative Options
- Breeding Bird Stations

Source: 2016 Orthophotography by
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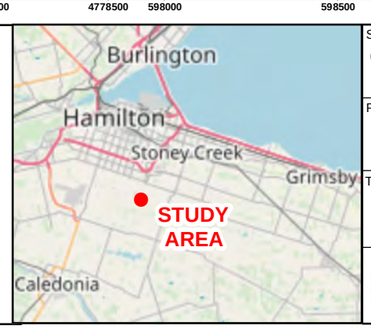

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PROJECT
Pressure District 7 Elevated Water Storage Facility (EWSF) and Pumping Station (PS) Municipal Class EA

TITLE
Breeding Bird Survey Station Locations

COLE

DATE: 08/14/2018		PROJECT: WM16-0435
GIS	MM	
DESIGN		
CHECK	CP	

Figure 2-1

2.4 Significant Wildlife Habitat Assessment

The MNRF broadly categorizes SWH as (i) seasonal concentration areas, (ii) rare vegetation communities or specialized habitats for wildlife, (iii) habitats of species of conservation concern, excluding the habitats of endangered and threatened species, and (iv) animal movement corridors (MNR 2000). Based on the reconnaissance-level survey of the Study Areas completed on March 21, 2018, and the results of ELC fieldwork completed on July 11, 2018, COLE assessed the potential occurrence of SWH within the Study Areas based on the criteria outlined by the *Significant Wildlife Habitat Technical Guide* (MNR 2000) and/or the *Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E* (MNRF 2015).

2.5 Species at Risk Screening

MNRF recommends that specific surveys be completed for SARO listed species known or suspected to occur in proximity to the Study Areas, if potentially suitable habitat for the species is present. Accordingly, COLE biologists used background information and the results of fieldwork completed in 2018 to categorize the occurrence of 65 SARO-listed species identified by MNRF known or with the potential to occur in Hamilton. The potential for each of these 65 species to occur within the Study Areas was characterized using a set of five occurrence categories (**Table 2.1**).

Table 2.1 Categories of Occurrence Assigned to SARO listed Species

Occurrence Category	Definition
1	**Present** – The species has been recorded from one or more of the Study Areas.
2	**Potentially Present** – Potentially suitable habitat is present within one or more of the Study Areas but no individuals were observed incidentally.
3	**Absent** – The species does not occur in any of the Study Areas; potentially suitable habitat is present but no specimens were observed during surveys completed per generally accepted and/or MNRF-specified protocols.
4	**Absent** – The species does not occur in any of the Study Areas; potentially suitable habitat is not present.
5	**Absent** – The species does not occur in any of the Study Areas; potentially suitable habitat is not present and no specimens were observed during surveys completed per generally accepted and/or MNRF-specified protocols.

3 Existing Conditions

The Study Areas are located within a predominantly agricultural landscape, with some adjacent residential and commercial land use (**Figure 1-1**). The following sections describe in greater detail the existing ecological conditions within the Study Areas, including terrestrial features, surface water features, fish and wildlife habitat, and SAR.

3.1 Terrestrial Environment

3.1.1 Designated Natural Areas

The Study Areas consist primarily of agricultural land. According to Schedule B of the Urban Hamilton Official Plan and Schedule B of the Rural Hamilton Official Plan, the Study Areas are mostly outside of the City of Hamilton's Natural Heritage System; however, Linkage features border the northern edge of Study Area F and Study Area C.

3.1.2 Ecological Land Classification

A COLE botanist delineated and categorized vegetation communities within the Study Areas. **Figure 3-1** to **Figure 3-6** illustrate the ELC communities within the seven Study Areas, as delineated by COLE during 2018 fieldwork. None of the ELC communities consist of sensitive vegetation communities. ELC communities of potential interest include the following:

- Aquafor Beech (2018) identifies the woodland in Study Area B (ELC Unit B4) as a potential ESA and a potential linkage feature.
- Several small wetlands are present within the following Study Areas:
    - Study Area A: ELC Unit A5;
    - Study Area B: ELC Units B2 and B5; and
    - Study Area E: ELC Unit E3.
- The northern portion of Study Area C (within ELC Unit C1) comprises part of the Eramosa Karst Earth Science Area of Natural and Scientific Interest (ANSI).
- Study Area G is located within an area identified as "Buried Eramosa Escarpment" by the Urban Hamilton Official Plan (Trinity West Secondary Plan).

599500

600000

4781500

N

PINEWOODS DRIVE

UPPER CENTENNIAL PARKWAY

HIGHGATE DRIVE

BANKFIELD CRESCENT

A1

A2

A3

A4

A5

A6

599500

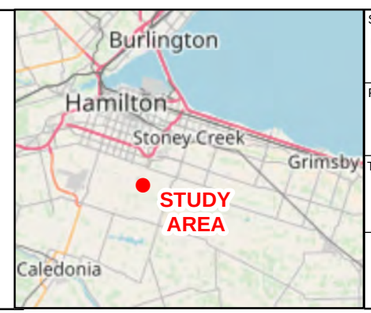
600000

LEGEND

- ELC Units
- Alternative Options

ELC Units

A1 - Fresh - Moist Mixed Meadow (MEMM4)
A2 - Native Shrub Deciduous Hedgerow (THDM3-2)
A3 - Soybean Agricultural (OAGM1-1)
A4 - Shrub Agriculture (SAG)
A5 - Reed-canarygrass Graminoid Mineral Meadow Marsh (MAMM1-3)
A6 - Deciduous Woodland (WOD)



SCALE
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PROJECT
Pressure District 7 Elevated Water Storage Facility (EWSF) and Pumping Station (PS) Municipal Class EA

TITLE
Ecological Land Classification (ELC) Study Area A

COLE

DATE: 08/14/2018		PROJECT: WM16-0435
GIS	AS	**Figure 3-1**
DESIGN		
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599500

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CANDLEWOOD COURT

HIGHGATE HEIGHTS

UPPER CENTENNIAL PARKWAY

HARBINGER DRIVE

RYMAL ROAD EAST

REGIONAL ROAD 56

REGIONAL ROAD 20

B1

B2

B3

B4

B5

B6

B7

B8

B9

B10

N

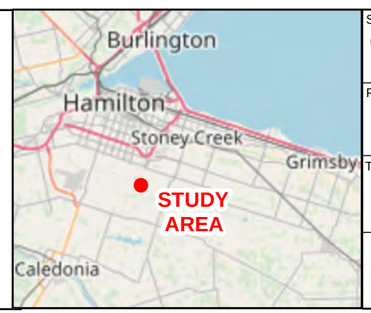
LEGEND

- ELC Units
- Alternative Options

ELC Units

B1,B6 - Fresh - Moist Mixed Meadow (MEMM4)
B2,B5 - Cattail Mineral Shallow Marsh (MASM1-1)
B3,B7,B10 - Soybean Agricultural (OAGM1-1)
B4 - Deciduous Forest (FOD)
B8 - Naturalized Deciduous Hedgerow (FODM11)
B9 - Forb Meadow (MEF)

Source: 2016 Orthophotography by



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PROJECT
Pressure District 7 Elevated Water Storage Facility (EWSF) and Pumping Station (PS) Municipal Class EA

TITLE
Ecological Land Classification (ELC) Study Area B

COLE

DATE: 08/14/2018		PROJECT: WM16-0435
GIS	AS	**Figure 3-2**
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596500 4781000 597000 597500

4781000 4780500 597500

C1
C2
C3
C4
C5
C6
C7
FLETCHER ROAD

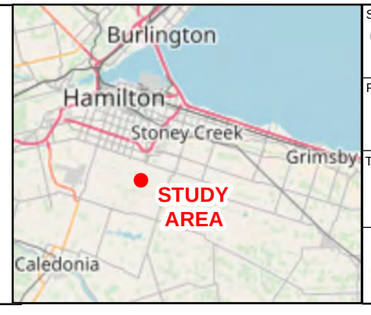
596500 597000

LEGEND

- ELC Units
- Alternative Options

ELC Units

C1,C3,C7 - Soybean Agricultural (OAGM1-1)
C2,C6 - Naturalized Deciduous Hedgerow (FODM11)
C4,C5 - Corn Agricultural (OAGM1-2)



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PROJECT
Pressure District 7 Elevated Water Storage Facility (EWSF) and Pumping Station (PS) Municipal Class EA

TITLE
Ecological Land Classification (ELC) Study Area C

COLE

DATE: 08/14/2018		PROJECT: WM16-0435
GIS	AS	**Figure 3-3**
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595000 4781000 595500

4781000

4780500

595000

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E11 E2 E1 D4 D1 E12 E5 D2 E4 E3 D3 20 ROAD EAST E6 E7 D5 D6 E8 E13 D7 D8 E9 D9 GLOVER ROAD TRINITY CHURCH ROAD E10

N

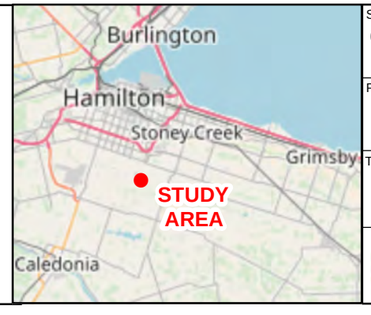
LEGEND

- ELC Units
- Alternative Options

ELC Units

D1 - Dry - Fresh Goldenrod Forb Meadow (MEFM1-1)
D2,D5 - Naturalized Deciduous Hedgerow (FODM11)
D3 - Barren Agricultural (OAGM1-4)
D4 - Wheat Agricultural (OAGM1-3)
D6 - Dry - Fresh White Sweet-clover Forb Meadow (D6)
D7 - Corn Agricultural (OAGM1-2)
E1 - Wheat Agricultural (OAGM1-3)
E2,E4,E5 - Fresh - Moist Grey Dogwood Deciduous Thicket (THDM5-1)
E3 - Reed-canarygrass Graminoid Mineral Meadow Marsh (MAMM1-3)
E6,E11,E13 - Dry - Fresh Goldenrod Forb Meadow (MEFM1-1)
E7 - Native Shrub Deciduous Hedgerow Thicket (THDM3-2)
E8 - Corn Agricultural (OAGM1-2)
E9,E12 - Soybean Agricultural (OAGM1-1)
E10 - Fresh - Moist Mixed Meadow (MEMM4)

Source: 2016 Orthophotography by



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PROJECT
Pressure District 7 Elevated Water Storage Facility (EWSF) and Pumping Station (PS) Municipal Class EA

TITLE
Ecological Land Classification (ELC) Study Areas D & E

COLE

DATE: 08/14/2018		PROJECT: WM16-0435
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Figure 3-4

593500

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N

NEBO ROAD

F1

DICKENSON ROAD EAST

593500

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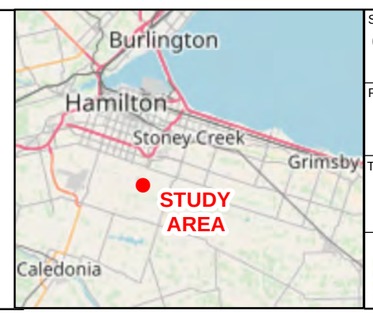
LEGEND

- ELC Units
- Alternative Options

ELC Units

F1 - Soybean Agricultural (OAGM1-1)

Source: 2016 Orthophotography by



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PROJECT
Pressure District 7 Elevated Water Storage Facility (EWSF) and Pumping Station (PS) Municipal Class EA

TITLE
Ecological Land Classification (ELC) Study Area F

COLE

DATE: 08/14/2018		PROJECT: WM16-0435
GIS	AS	**Figure 3-5**
DESIGN		
CHECK	CP	

LEGEND

- ELC Units
- Alternative Options

ELC Units

G1 - Dry - Fresh Field Thistle Forb Meadow (MEFM1-4)

Source: 2016 Orthophotography by
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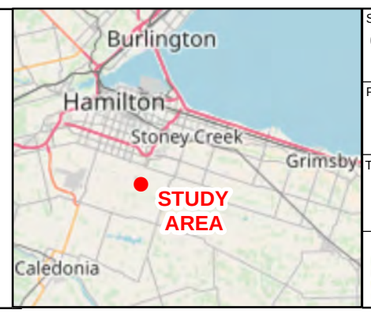

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PROJECT
Pressure District 7 Elevated Water Storage Facility (EWSF) and Pumping Station (PS) Municipal Class EA

TITLE
Ecological Land Classification (ELC) Study Area G

COLE

DATE: 08/14/2018		PROJECT: WM16-0435
GIS	AS	**Figure 3-6**
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3.1.3 Botanical Survey

A COLE botanist conducted a summer botanical survey of the Alternative Options on July 11, 2018. **Table 3.1** lists the vascular plant species recorded during the botanical survey. Plant species are presented according to the ELC Unit in which they were found. COLE recorded a total of 94 plant species within the Alternative Options, including one introduced Rose (*Rosa* sp.) and one native Hawthorn (*Crataegus* sp.) identified only to genus. Hawthorns were observed in ELC Units B1 and D8, but were not identified to species due to an absence of key identifying features at the time of the botanical survey. Accordingly, it is not possible to determine whether these hawthorns are considered locally uncommon or rare.

Of the 94 species, 62 (66%) are considered introduced to Hamilton. The remaining 32 (34%) are considered native to Hamilton. None of the plant species identified during the 2018 botanical inventory are designated SAR, and all of the native plant species have an NHIC S-Rank of S4 (apparently secure) or S5 (secure). One species considered uncommon in the City of Hamilton was found in ELC Unit B2, namely Necklace Sedge (*Carex projecta*).

Table 3.1 Vascular Plant Species Recorded from Study Areas

Plant Species		Status		Location (ELC Unit)											
Scientific Name	Common Name	S-Rank	Hamilton NAI	A1	A2	A3	B1	B2	C1	D5 & D8	D6	D7	E9	F1	G1
Abutilon theophrasti	Velvetleaf	SNA									X				
Acer platanoides	Norway Maple	SNA								X					
Acer saccharinum	Silver Maple	S5								X					
Achillea millefolium	Common Yarrow	SNA					X								
Agrimonia gryposepala	Hooked Agrimony	S5					X								
Agrostis gigantea	Redtop	SNA		X			X								
Alliaria petiolata	Garlic Mustard	SNA								X					
Ambrosia artemisiifolia	Annual Ragweed	S5		X			X			X					
Anthemis arvensis	Corn Chamomile	SNA		X											
Arctium lappa	Great Burdock	SNA		X							X				
Asclepias syriaca	Common Milkweed	S5		X			X			X					
Brassica nigra	Black Mustard	SNA								X					
Bromus inermis	Smooth Brome	SNA		X			X			X					
Carex cristatella	Crested Sedge	S5					X	X							
Carex projecta	Necklace Sedge	S5	h				X	X							
Carex vulpinoidea	Fox Sedge	S5					X	X							
Cichorium intybus	Chicory	SNA		X			X			X	X				
Cirsium arvense	Canada Thistle	SNA		X			X				X				X
Cirsium vulgare	Bull Thistle	SNA		X			X				X				
Convolvulus arvensis	Field Bindweed	SNA		X											
Cornus racemosa	Gray Dogwood	S5								X					
Cornus sericea	Red-osier Dogwood	S5		X	X										
Crataegus sp.	Hawthorn	-	-				X			X					
Daucus carota	Wild Carrot	SNA		X			X			X	X				X
Dianthus armeria	Deptford Pink	SNA		X	X										

Plant Species		Status		Location (ELC Unit)											
Scientific Name	Common Name	S-Rank	Hamilton NAI	A1	A2	A3	B1	B2	C1	D5 & D8	D6	D7	E9	F1	G1
Dipsacus fullonum	Common Teasel	SNA		X			X	X		X	X				X
Elymus repens	Creeping Wildrye	SNA		X			X	X		X	X				
Epilobium ciliatum ssp. ciliatum	Northern Willowherb	S5					X			X					
Epilobium hirsutum	Hairy Willowherb	SNA													X
Epilobium parviflorum	Small-flowered Willowherb	SNA					X								
Erigeron annuus	Annual Fleabane	S5		X	X		X			X	X				X
Euthamia graminifolia	Grass-leaved Goldenrod	S5					X	X							
Fragaria virginiana ssp. virginiana	Wild Strawberry	SU					X								
Geum aleppicum	Yellow Avens	S5		X											
Glycine max	Soy Bean	SNA				X			X				X	X	
Hemerocallis fulva	Orange Daylily	SNA		X											
Hordeum jubatum ssp. jubatum	Foxtail Barley	S5?					X								
Hypericum perforatum	Common St. John's-wort	SNA		X			X			X	X				X
Inula helenium	Elecampane	SNA					X								
Juglans nigra	Black Walnut	S4?								X					
Juncus compressus	Flattened Rush	SNA					X	X							
Juncus dudleyi	Dudley's Rush	S5					X	X							
Lactuca serriola	Prickly Lettuce	SNA					X			X					
Lathyrus tuberosus	Tuberous Vetchling	SNA					X								
Lepidium campestre	Field Peppergrass	SNA		X							X				
Leucanthemum vulgare	Oxeye Daisy	SNA		X			X			X					
Lolium arundinaceum	Tall Fescue	SNA		X											
Lonicera tatarica	Tartarian Honeysuckle	SNA		X	X					X					
Lotus corniculatus	Garden Bird's-foot Trefoil	SNA		X			X			X	X				
Lythrum salicaria	Purple Loosestrife	SNA					X	X							

Plant Species		Status		Location (ELC Unit)											
Scientific Name	Common Name	S-Rank	Hamilton NAI	A1	A2	A3	B1	B2	C1	D5 & D8	D6	D7	E9	F1	G1
Malus pumila	Common Apple	SNA					X			X					
Medicago lupulina	Black Medic	SNA		X							X				
Melilotus albus	White Sweet-clover	SNA		X	X		X				X				X
Melilotus officinalis	Yellow Sweet-clover	SNA		X							X				X
Nepeta cataria	Catnip	SNA		X											
Parthenocissus vitacea	Thicket Creeper	S5						X							
Persicaria maculosa	Spotted Lady's-thumb	SNA					X								
Phalaris arundinacea var. arundinacea	Reed Canary Grass	S5		X			X	X		X					
Phleum pratense	Common Timothy	SNA								X	X				
Phragmites australis ssp. australis	European Reed	SNA		X			X								
Plantago major	Common Plantain	SNA					X			X					X
Poa pratensis ssp. pratensis	Kentucky Bluegrass	SNA		X			X	X			X				X
Potentilla recta	Sulphur Cinquefoil	SNA		X											
Prunella vulgaris ssp. vulgaris	Common Self-heal	SNA													X
Pyrus communis	Common Pear	SNA								X					
Quercus rubra	Northern Red Oak	S5								X					
Rhamnus cathartica	Common Buckthorn	SNA					X			X	X				
Rhus typhina	Staghorn Sumac	S5					X	X							
Rosa sp.	Rose	-	-				X								
Rumex crispus	Curly Dock	SNA		X			X			X	X				X
Salix cf. ×sepulcralis	(Salix alba × Salix babylonica)	SNA													X
Salix discolor	Pussy Willow	S5					X								
Salix euxina	Crack Willow	SNA						X							
Sinapis arvensis	Corn Mustard	SNA		X			X				X				
Solidago altissima var. altissima	Eastern Tall Goldenrod	S5		X			X	X			X				X

Plant Species		Status		Location (ELC Unit)											
Scientific Name	Common Name	S-Rank	Hamilton NAI	A1	A2	A3	B1	B2	C1	D5 & D8	D6	D7	E9	F1	G1
Sonchus arvensis ssp. arvensis	Glandular Field Sow-thistle	SNA		X							X				
Sonchus asper	Prickly Sow-thistle	SNA		X			X								X
Sonchus oleraceus	Common Sow-thistle	SNA					X								
Symphyotrichum ericoides var. ericoides	White Heath Aster	S5					X	X							
Symphyotrichum lanceolatum ssp. lanceolatum	White Panicled Aster	S5					X	X			X				
Symphyotrichum lateriflorum var. lateriflorum	Calico Aster	S5								X					
Symphyotrichum novae-angliae	New England Aster	S5		X			X			X	X				
Taraxacum officinale	Common Dandelion	SNA								X					
Thuja occidentalis	Eastern White Cedar	S5													X
Toxicodendron radicans var. rydbergii	Western Poison Ivy	S5					X								
Trifolium repens	White Clover	SNA		X			X			X	X				
Tripleurospermum inodorum	Scentless Chamomile	SNA								X					
Tussilago farfara	Colt's-foot	SNA		X											
Typha angustifolia	Narrow-leaved Cattail	SNA		X			X	X							
Ulmus americana	American Elm	S5					X								
Urtica dioica ssp. gracilis	Slender Stinging Nettle	S5		X											
Vicia cracca	Tufted Vetch	SNA		X			X				X				X
Vitis riparia	Riverbank Grape	S5		X											
Zea mays	Corn	SNA										X			

Legend:

- = not listed
X = observed

S-Rank (NHIC 2017a):
S4 = apparently secure
S5 = secure
SNA = not applicable
? = rank uncertain

Hamilton NAI (HCA 2014):
h = uncommon in the City of Hamilton, known from six to ten sites

3.2 Aquatic Environment

Figure 3-7 illustrates watercourse mapping obtained from MNRF's Land Information Ontario (LIO) database as well as the areas regulated by the Hamilton Conservation Authority (HCA) and the Niagara Peninsula Conservation Authority (NPCA). Surface water and fisheries investigations for Study Areas A, B, C and D were conducted as part of the *Elfrida Subwatershed Study* in 2016 (Aquafor Beech 2018). The hydrology, hydrogeology and aquatic habitat of Study Areas E and G were characterized in 2014 through the completion of the *Upper Hannon Creek Master Drainage Plan Municipal Class Environmental Assessment* (AECOM 2017).

Study Area A is located within the jurisdiction of HCA, in the Stoney Creek subwatershed. Aquafor Beech (2018) makes a "no management required" recommendation for the headwater drainage features within this Study Area.

Study Area B is located within the jurisdiction of NPCA, in the Sinkhole Creek subwatershed. The zero order watercourse at the southeastern corner of the Study Area is considered a key hydrologic feature according to Schedule B8 of the Rural Hamilton Official Plan. Aquafor Beech (2018) indicates that the headwater drainage feature within Study Area B is intermittent, and makes a "mitigation" management recommendation for this feature.

Study Area C is located predominantly within the jurisdiction of NPCA, in the Sinkhole Creek subwatershed. The first order watercourse that crosses through the Study Area is considered a key hydrologic feature according to Schedule B8 of the Rural Hamilton Official Plan. Aquafor Beech (2018) indicates that the headwater drainage feature within Study Area C is intermittent and is plowed over during the planting season. A "mitigation" management recommendation is made for this feature. During their 2016 electrofishing survey, Aquafor Beech (2018) found four Central Mudminnows (*Umbra limi*) and fourteen Fathead Minnows (*Pimephales promelas*) in the pond located immediately downstream of Study Area C.

Study Area D is divided between the jurisdictions of HCA and NPCA and intersects both the Hannon Creek and Twenty Mile Creek subwatersheds. There are no surface water features within this Study Area.

Study Area E is divided between the jurisdictions of HCA and NPCA and intersects both the Hannon Creek and Twenty Mile Creek subwatersheds. Portions of three headwater drainage features of Hannon Creek run through this Study Area. These features are located within a "Feeder Area" that contributes surface flow to a downstream "Core Area" of karst features. Flow from these features is ultimately conveyed to a major sinkpoint located between Dartnall Road and Glover Road, approximately 100 m south of Rymal Road East (AECOM 2017).

Study Area F is within the jurisdiction of NPCA, in the Twenty Mile Creek subwatershed. There are no surface water features within this Study Area.

Study Area G is within the jurisdiction of HCA, in the Hannon Creek subwatershed. There are no surface water features within this Study Area. However, Study Area G is located within an area identified as "Buried Eramosa Escarpment" by the Urban Hamilton Official Plan (Trinity West Secondary Plan). This is an area of karstic bedrock covered by shallow soil (City of Hamilton 2018b). A small, unmapped watercourse with two karst sinkpoints is located approximately 300 m north of Study Area G.

All of the Study Areas, with the exception of Study Area G, contain areas that are regulated by HCA and/or NPCA. HCA and NPCA both administer a Development, Interference with Wetlands and Alterations to Shorelines and Watercourses regulation, specifically Ontario Regulation 161/06 and Ontario Regulation 155/06, respectively. Through these regulations and in accordance with Section 28.1 of the *Conservation Authorities Act, 1990*, HCA and NPCA have the authority to create regulations applicable in the area under their jurisdiction, including the following:

> (a) restricting and regulating the use of water in or from rivers, streams, inland lakes, ponds, wetlands and natural or artificially constructed depressions in rivers or streams
>
> (b) prohibiting, regulating or requiring the permission of the authority for straightening, changing, diverting or interfering in any way with the existing channel of a river, creek, stream or watercourse, or for changing or interfering in any way with a wetland
>
> (c) prohibiting, regulating or requiring the permission of the authority for development if, in the opinion of the authority, the control of flooding, erosion, dynamic beaches or pollution or the conservation of land may be affected by the development

Development is defined under the *Conservation Authorities Act, 1990* as the following:

> (a) the construction, reconstruction, erection or placing of a building or structure of any kind
>
> (b) any change to a building or structure that would have the effect of altering the use or potential use of the building or structure, increasing the size of the building or structure or increasing the number of dwelling units in the building or structure
>
> (c) site grading
>
> (d) the temporary or permanent placing, dumping or removal of any material, originating on the site or elsewhere

Accordingly, with the exception of Study Area G, any of the selected Alternative Options for the proposed PS and EWSF may require a permit from HCA or NPCA to comply with Ontario Regulation 161/06 or Ontario Regulation 155/06. When the preferred alternatives are selected, HCA and/or NPCA should be consulted to confirm these requirements.

HIGHLAND ROAD WEST
HIGHLAND ROAD EAST
PRITCHARD ROAD
UPPER MOUNT ALBION ROAD
UPPER CENTENNIAL PARKWAY
1ST ROAD EAST
REGIONAL ROAD 2
RYMAL ROAD EAST
NEBO ROAD
DARTNALL ROAD
GLOVER ROAD
TRINITY CHURCH ROAD
20 ROAD EAST
FLETCHER ROAD
REGIONAL ROAD 56
GOLF CLUB ROAD
DICKENSON ROAD EAST

A
B
C
D
E
F
G

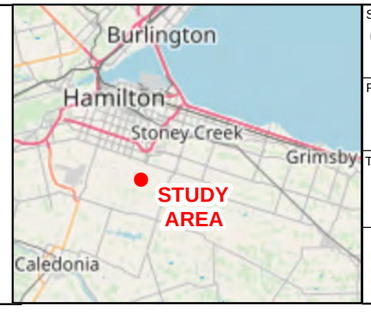
PS Site 1
PS Site 2
PS Site 3
EWSF Site 1
EWSF Site 2
EWSF Site 3
EWSF Site 4
EWSF Site 5

N

LEGEND

- Study Areas
- Alternative Options
- Watercourses
- Conservation Authority Jurisdiction Boundary
- Hamilton Conservation Authority (HCA) Regulated Areas
- Niagara Peninsula Conservation Authority (NPCA) Regulated Areas

Source: 2016 Orthophotography by
© First Base Solutions Inc.



SCALE
0 145 290 580 870 1,160
Meters

PROJECT
Pressure District 7 Elevated Water Storage Facility (EWSF) and Pumping Station (PS) Municipal Class EA

TITLE
Watercourses and Regulated Areas

COLE

DATE: 08/14/2018		PROJECT: WM16-0435
GIS	AS	**Figure 3-7**
DESIGN		
CHECK	CP	

3.3 Wildlife Habitat

3.3.1 Breeding Bird Surveys

COLE biologists obtained records from the 10 km x 10 km Ontario Breeding Bird Atlas (OBBA) square (17PJ07) that encompasses the Study Areas. A total of 89 bird species has been recorded from this square, including six SAR (OBBA 2018). However, because it covers a larger area with a broader range of habitat types, a number of the species recorded from Square 17PNH98 are unlikely to occur within the Study Areas. COLE biologists also obtained records from eBird Canada, a database maintained by Bird Studies Canada (eBird 2018). The "hotspot" nearest the Study Areas for which the eBird database has records is the Eramosa Karst Conservation Area. A total of 141 bird species have been recorded at Eramosa Karst Conservation Area.

COLE biologists completed breeding bird surveys on June 18 and 26 and July 4, 2018 at 13 point count stations within the Study Areas (**Figure 2-1**). During these surveys, COLE biologists recorded a total of 40 bird species, including one identified only to genus (**Table 3.2**). Of these 40 species, two are SAR: Barn Swallow (*Hirundo rustica*) and Eastern Wood-pewee (*Contopus virens*). The former was observed foraging over 12 of the 13 point count stations, while the latter was detected incidentally along Golf Club Road (**Figure 3-8**). The two SAR bird species appear to be breeding outside of the Study Areas as they do not provide suitable breeding habitat for these species. However, it should be noted that there is a suspected nesting colony of Barn Swallows on the property located between Study Area A and Study Area B (**Figure 3-8**).

Table 3.2 lists breeding birds recorded by COLE during the 2018 breeding bird surveys. **Table 3.2** also lists breeding birds recorded by AECOM (2017) and Aquafor Beech (2018).

HIGHLAND ROAD WEST
HIGHLAND ROAD EAST
PRITCHARD ROAD
UPPER MOUNT ALBION ROAD
UPPER CENTENNIAL PARKWAY
DARTNALL ROAD
RYMAL ROAD EAST
GLOVER ROAD
TRINITY CHURCH ROAD
FLETCHER ROAD
REGIONAL ROAD 56
1ST ROAD EAST
REGIO

A
B
C
D
E
G

PS Site 1
PS Site 2
PS Site 3
EWSF Site 1
EWSF Site 2
EWSF Site 3
EWSF Site 4

1
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11
12
13

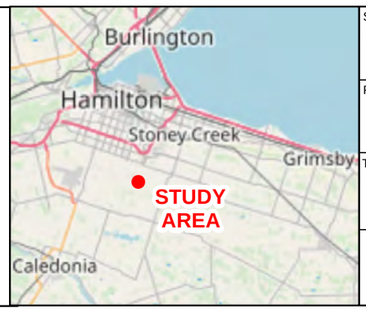
N

595500 4783000 596000 596500 597000 597500 598000 598500 599000 4782000 599500 600000 600500
595000 4782500 4782000 4781500 594500 4781000 4780500
4781500 4781000 4780500 4780000 4779000 600000
594500 595000 595500 596000 596500 597000 4779500 597500 598000 598500 4779000 599000 599500

LEGEND

- Study Areas
- Alternative Options
- Breeding Bird Stations
- **Eastern Wood-pewee Observation**
- **Barn Swallow Observation**
- **Suspected Barn Swallow Nesting Location**

Source: 2016 Orthophotography by
© First Base Solutions Inc.



SCALE
0 115 230 460 690 920
Meters

PROJECT
Pressure District 7 Elevated Water Storage Facility (EWSF) and Pumping Station (PS) Municipal Class EA

TITLE
Locations of Species at Risk (SAR) Bird Observations

	DATE: 08/14/2018		PROJECT: WM16-0435
	GIS	MM	**Figure 2-8**
	DESIGN		
	CHECK	CP	

Table 3.2 Bird Species Recorded from Study Areas and Adjacent Lands

Species Name		Results of COLE Breeding Bird Surveys Completed in 2018				Other Sources of Observation				Status			
Common Name	Scientific Name	Observed	Point Count Station(s)	Highest Breeding Evidence	Comments	OBBA Square 17NH98	eBird Eramosa Karst CA	Aquafor Beech (2018)	AECOM (2017)	SARA	SARO	S-Rank	Local Status
Gull sp.		X	1, 2, 3, 4, 5, 6, 7, 8, 11, 12	X	F/O		X			-	-	-	-
Cooper's Hawk	*Accipiter cooperii*					CONF	X			-	-	S4	U
Northern Goshawk	*Accipiter gentilis*					CONF				-	-	S4	R
Sharp-shinned Hawk	*Accipiter striatus*					CONF	X			-	-	S5	R
Spotted Sandpiper	*Actitis macularius*	X	1, 6, 8, 9	PROB		CONF	X	X	X	-	-	S5	C
Red-winged Blackbird	*Agelaius phoeniceus*	X	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13	PROB		CONF	X	X	X	-	-	S4	C
Wood Duck	*Aix sponsa*					PROB				-	-	S5	U
Mallard	*Anas platyrhynchos*	X	11, 13	X	F/O	CONG	X		X	-	-	S5	C
Ruby-throated Hummingbird	*Archilochus colubris*					POSS	X			-	-	S5B	U
Great Blue Heron	*Ardea herodias*	X	1, 13	X	F/O		X		X	-	-	S4B	U
Long-eared Owl	*Asio otus*					PROB	X			-	-	S4	R
Tufted Titmouse	*Baeolophus bicolor*					POSS				-	-	S4	R
Cedar Waxwing	*Bombycilla cedrorum*	X	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12	PROB		CONF	X	X	X	-	-	S5B	C
Canada Goose	*Branta canadensis*					CONF	X			-	-	S5	C
Great Horned Owl	*Bubo virginianus*					PROB	X			-	-	S4	U
Red-tailed Hawk	*Buteo jamaicensis*	X	1, 7, 8	X	F/O	CONF	X	X	X	-	-	S5	C
Green Heron	*Butorides virescens*					CONF				-	-	S4B	U
Northern Cardinal	*Cardinalis cardinalis*	X	1, 3, 5, 6, 7, 8, 9, 10, 12	PROB		CONF	X	X	X	-	-	S5	C
American Goldfinch	*Carduelis tristis*	X	1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13	CONF		CONF	X		X	-	-	S5B	C
House Finch	*Carpodacus mexicanus*					CONF	X			-	-	SNA	E

Species Name		Results of COLE Breeding Bird Surveys Completed in 2018				Other Sources of Observation				Status			
Common Name	Scientific Name	Observed	Point Count Station(s)	Highest Breeding Evidence	Comments	OBBA Square 17NH98	eBird Eramosa Karst CA	Aquafor Beech (2018)	AECOM (2017)	SARA	SARO	S-Rank	Local Status
Turkey Vulture	*Cathartes aura*	X	1, 9, 10, 11, 13	X	F/O	CONF	X			-	-	S5B	C
Veery	*Catharus fuscescens*					PROB	X			-	-	S4B	C
Chimney Swift	*Chaetura pelagica*					CONF	X			THR	THR	S4B,S4N	U
Killdeer	*Charadrius vociferus*	X	1, 2, 3, 4, 5, 6, 8, 9, 11, 12	PROB		CONF	X		X	-	-	S5B,S5N	C
Common Nighthawk	*Chordeiles minor*					CONF	X			-	-	S4B	R
Sedge Wren	*Cistothorus platensis*					PROB				-	-	S4B	R
Yellow-billed Cuckoo	*Coccyzus americanus*					POSS	X			-	-	S4B	R
Black-billed Cuckoo	*Coccyzus erythropthalmus*					CONF	X			-	-	S5B	U
Northern Flicker	*Colaptes auratus*					CONF	X	X	X	-	-	S4B	C
Rock Pigeon	*Columba livia*	X	2, 3, 7, 8, 9	PROB		CONF	X		X	-	-	SNA	E
Eastern Wood-pewee	*Contopus virens*	X		POSS	I	PROB	X	X		-	SC	S4B	C
American Crow	*Corvus brachyrhynchos*	X	5, 6, 8, 9, 10, 11, 12, 13	POSS		CONF	X	X		-	-	S5B	C
Blue Jay	*Cyanocitta cristata*	X	1, 2, 3, 5, 6, 12, 13	CONF		CONF	X	X	X	-	-	S5	C
Bobolink	*Dolichonyx oryzivorus*					PROB	X			THR	THR	S4B	C
Gray Catbird	*Dumetella carolinensis*	X	2, 9	PROB		CONF	X	X	X	-	-	S4B	C
Least Flycatcher	*Empidonax minimus*					PROB	X			-	-	S4B	U
Willow Flycatcher	*Empidonax traillii*	X	1, 9	PROB		PROB	X	X	X	-	-	S5B	C
Alder Flycatcher	*Empidonax virescens*								X			S5B	U
Horned Lark	*Eremophila alpestris*	X	1, 3, 4, 5, 9, 10	CONF		PROB	X		X	-	-	S5B	C
Peregrine Falcon	*Falco peregrinus*					CONF	X			-	-	S3B	R
American Kestrel	*Falco sparverius*	X	1, 9	X	F/O	CONF	X			-	-	S4	U
Common Yellowthroat	*Geothlypis trichas*					CONF	X	X	X	-	-	S5B	C

Species Name		Results of COLE Breeding Bird Surveys Completed in 2018				Other Sources of Observation				Status			
Common Name	Scientific Name	Observed	Point Count Station(s)	Highest Breeding Evidence	Comments	OBBA Square 17NH98	eBird Eramosa Karst CA	Aquafor Beech (2018)	AECOM (2017)	SARA	SARO	S-Rank	Local Status
Barn Swallow	*Hirundo rustica*	X	1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13	X	POTENTIAL COLONY ON ADJACENT LANDS	CONF	X		X	THR	THR	S4B	C
Wood Thrush	*Hylocichla mustelina*					CONF	X			-	SC	S4B	U
Baltimore Oriole	*Icterus galbula*	X	3	POSS		CONF	X	X	X	-	-	S4B	C
Orchard Oriole	*Icterus spurius*					PROB	X			-	-	S4B	U
Herring Gull	*Larus argentatus*	X	11	X	F/O		X			-	-	S5B,S4N	U
Ring-billed Gull	*Larus delawarensis*	X	1, 2, 3, 4, 10, 12, 13	POSS			X	X	X	-	-	S5B,S4N	C
Eastern Screech-Owl	*Megascops asio*					PROB				-	-	S4	C
Wild Turkey	*Meleagris gallopavo*	X		POSS	I	CONF	X	X	X	-	-	S5	E
Swamp Sparrow	*Melospiza georgiana*					CONF				-	-	S5B	C
Song Sparrow	*Melospiza melodia*	X	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13	PROB		CONF	X	X	X	-	-	S5B	C
Northern Mockingbird	*Mimus polyglottos*					CONF	X			-	-	S4	U
Brown-headed Cowbird	*Molothrus ater*	X	1, 7, 11, 13	POSS		CONF	X	X	X	-	-	S4B	C
Great Crested Flycatcher	*Myiarchus crinitus*					PROB	X		X	-	-	S4B	C
Osprey	*Pandion haliaetus*								X			S5B	R
House Sparrow	*Passer domesticus*	X	2, 3, 4, 5, 6, 7, 10, 11, 12, 13	PROB		CONF	X		X	-	-	SNA	E
Savannah Sparrow	*Passerculus sandwichensis*	X	1, 2, 6, 8, 9, 11, 12, 13	PROB		CONF	X	X	X	-	-	S4B	C
Indigo Bunting	*Passerina cyanea*	X	1, 9	POSS		CONF	X		X	-	-	S4B	C
Cliff Swallow	*Petrochelidon pyrrhonota*								X			S4B	U
Ring-necked Pheasant	*Phasianus colchicus*					PROB	X			-	-	SNA	E

Species Name		Results of COLE Breeding Bird Surveys Completed in 2018				Other Sources of Observation				Status			
Common Name	Scientific Name	Observed	Point Count Station(s)	Highest Breeding Evidence	Comments	OBBA Square 17NH98	eBird Eramosa Karst CA	Aquafor Beech (2018)	AECOM (2017)	SARA	SARO	S-Rank	Local Status
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	X	1	POSS		PROB	X			-	-	S4B	C
Downy Woodpecker	*Picoides pubescens*					CONF	X		X	-	-	S5	C
Hairy Woodpecker	*Picoides villosus*	X	4	POSS		PROB	X			-	-	S5	C
Scarlet Tanager	*Piranga olivacea*					POSS	X			-	-	S4B	U
Black-capped Chickadee	*Poecile atricapillus*	X	12	PROB		CONF	X	X	X	-	-	S5	C
Blue-gray Gnatcatcher	*Polioptila caerulea*					POSS	X			-	-	S4B	U
Vesper Sparrow	*Pooecetes gramineus*					POSS	X	X		-	-	S4B	U
Purple Martin	*Progne subis*					POSS				-	-	S4B	U
Common Grackle	*Quiscalus quiscula*	X	1, 2, 3, 4, 5, 6, 7, 13	PROB		CONF	X	X	X	-	-	S5B	C
Bank Swallow	*Riparia riparia*								X			S4B	C
Eastern Phoebe	*Sayornis phoebe*	X	6	POSS		CONF	X		X	-	-	S5B	U
American Woodcock	*Scolopax minor*					PROB	X			-	-	S4B	C
Ovenbird	*Seiurus aurocapilla*					POSS	X	X		-	-	S4B	C
Chestnut-sided Warbler	*Setophaga pensylvanica*					POSS				-	-	S5B	U
Yellow Warbler	*Setophaga petechia*					CONF	X	X		-	-	S5B	C
American Redstart	*Setophaga ruticilla*					POSS	X			-	-	S5B	C
Red-Breasted Nuthatch	*Sitta canadensis*					PROB				-	-	S5	U
White-breasted Nuthatch	*Sitta carolinensis*	X		POSS	I	CONF	X			-	-	S5	C
Chipping Sparrow	*Spizella passerina*	X	2, 4, 6, 8, 10, 11	POSS		CONF	X	X	X	-	-	S5B	C
Field Sparrow	*Spizella pusilla*					CONF	X		X	-	-	S4B	C
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*					CONF	X		X	-	-	S4B	U
Eastern Meadowlark	*Sturnella magna*					PROB	X			-	THR	S4B	C

Species Name		Results of COLE Breeding Bird Surveys Completed in 2018				Other Sources of Observation				Status			
Common Name	Scientific Name	Observed	Point Count Station(s)	Highest Breeding Evidence	Comments	OBBA Square 17NH98	eBird Eramosa Karst CA	Aquafor Beech (2018)	AECOM (2017)	SARA	SARO	S-Rank	Local Status
European Starling	*Sturnus vulgaris*	X	1, 2, 3, 5, 6, 7, 8, 10, 11	PROB		CONF	X	X	X	-	-	SNA	E
Tree Swallow	*Tachycineta bicolor*					CONF	X	X	X	-	-	S4B	C
Carolina Wren	*Thryothorus ludovicianus*					PROB	X			-	-	S4	U
Brown Thrasher	*Toxostoma rufum*	X	7	POSS		PROB	X			-	-	S4B	U
House Wren	*Troglodytes aedon*					CONF	X	X	X	-	-	S5B	C
American Robin	*Turdus migratorius*	X	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13	CONF		CONF	X	X	X	-	-	S5B	C
Eastern Kingbird	*Tyrannus tyrannus*					CONF	X		X	-	-	S4B	C
Blue-winged Warbler	*Vermivora cyanoptera*					POSS	X			-	-	S4B	U
Warbling Vireo	*Vireo gilvus*					PROB	X	X	X	-	-	S5B	C
Red-eyed Vireo	*Vireo olivaceus*					PROB	X	X		-	-	S5B	C
Mourning Dove	*Zenaida macroura*	X	1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13	PROB		CONF	X	X	X	-	-	S5	C

Legend:

- = not listed
X = observed
F/O = flyover
I = incidental

Breeding Evidence:
CONF = confirmed
PROB = probable
POSS = possible

SARA/SARO Status:
THR = threatened
SC = special concern

S-Rank (NHIC 2017b):
S4 = apparently secure
S5 = secure
SNA = not applicable
B = for a migratory species, applies to the breeding population in the province
N = for a migratory species, applies to the non-breeding population in the province

Hamilton NAI (HCA 2014)
C = Common
U = Uncommon
R = Rare
E = Exotic

3.3.2 Significant Wildlife Habitat

Table 3.3 presents COLE's assessment of the occurrence of SWH potentially present within the Study Areas. The Study Areas are dominated by lands under cultivation and culturally influenced vegetation communities, and their potential to function as SWH is further constrained by adjacent urban land uses. While many of the ELC units within the Study Areas contain features that may function as wildlife habitat, few of these features meet the criteria of SWH as defined by the MNR (2000) and/or MNRF (2015).

Table 3.3 Assessment of the Occurrence of Candidate Significant Wildlife Habitat (SWH) Within the Study Areas

Type of SWH Potentially Present	Identification Criteria (MNRF 2015)	Comments
Bat Hibernacula	Hibernacula may be found in caves, mine shafts, underground foundations and areas of karst.	**Potentially Present.** The locations of bat hibernacula are poorly known (MNRF 2015). Areas of karst are present within the City of Hamilton; the Eramosa Karst Earth Science ANSI is located within 5 km of all seven study areas and Aquafor Beech (2018) identifies a sinkhole immediately east of Trinity Church Road, approximately 600 m north of Study Area D. Karst with the potential to support bat hibernacula is unlikely to be present within portions of the study areas under active cultivation but could be present in other portions of the study areas (*e.g.*, hedgerows, woodland).
Bat Maternity Colony	Bat maternity colonies can be found in buildings, tree cavities, and vegetation; however, buildings are not considered SWH. SWH consists of mature deciduous or mixed forest or swamp stands with over 10/ha large diameter (> 25 cm dbh). Maternity colonies with confirmed use by over 10 Big Brown Bats (*Eptesicus fuscus*) or over six adult female Silver-haired Bats (*Lasionycteris noctivagans*) are considered SWH.	**Potentially Present.** Study Area B includes a portion of a mature deciduous forest community (ELC Unit B4) that includes large diameter (> 25 cm dbh) deciduous trees with characteristics (*i.e.*, cavities, crevices and/or peeling bark) suitable for supporting bat maternity colonies.
Reptile Hibernaculum	Snakes hibernate in sites located below the frost line such as burrows, rock crevices and other natural or naturalized locations. Areas of broken and fissured rock are particularly valuable. Wetlands can also be important overwintering habitat and may include conifer or shrub swamps and swales, poor fens, or depressions in bedrock terrain with sparse trees or shrubs with sphagnum moss or sedge hummock ground cover.	**Potentially Present.** No readily apparent areas of broken and fissured rock occur within the study areas and snake hibernacula are unlikely to persist in lands under cultivation. Anthropogenic features located beyond the study areas (*e.g.*, building foundations) have some potential to function as snake hibernacula but, if present, snake hibernacula most likely consist of natural features (*e.g.*, animal burrows, ant mounds) located within those portions of the study areas that are naturally vegetated.
Amphibian Woodland Breeding Habitat	Amphibian woodland breeding habitat consists of wetland, pond, or woodland pool habitat (including vernal pools) over 500 m^2 within or adjacent (within 120 m) to a woodland. Woodlands with permanent ponds or those containing water in most years until mid-July are more likely to be used as breeding habitat. Significant sites are those used by breeding populations of amphibians of the species and in the numbers specified by MNRF (2015).	**Potentially Present.** Aquafor Beech (2018) identifies ELC Unit B4 as candidate Significant Wildlife Habitat due to its function as amphibian woodland breeding habitat. ELC Unit A5 also has the potential to function as amphibian woodland breeding habitat.
Amphibian Wetland Breeding Habitat	Amphibian wetland breeding habitat consists of wetlands over 500 m^2 typically located more than 120 m from woodlands. Significant sites are those used by breeding populations of amphibians of the species and in the numbers specified by MNRF (2015).	**Potentially Present.** Study Area B and Study Area E include wetlands over 500 m^2 located more than 120 m from woodlands (*i.e.*, ELC Unit B2 and ELC Unit E3, respectively).
Marsh Bird Breeding Habitat	Marsh bird breeding habitat consists of wetlands with shallow water and emergent aquatic vegetation. Significant sites are those used by breeding populations of birds of the species and in the numbers specified by MNRF (2015).	**Not Present.** Small remnant wetlands are located in Study Area A, Study Area B and Study Area E (*i.e.*, ELC Unit A5, ELC Unit B2 and ELC Unit E3, respectively). However, none of these wetlands support breeding populations of birds of the species specified by MNRF (2015).
Amphibian Movement Corridor	Amphibian movement corridors should consist of native vegetation, with several layers of vegetation. Corridors should be unbroken by roads, waterways or waterbodies. Undeveloped areas are considered most significant by MNRF. These corridors should consist of at least 15 m of vegetation on both sides of a waterway or woodland habitat up to 200 m wide with gaps < 20 m wide. Corridors are identified based on the identification of significant amphibian breeding habitat.	**Not Present.** Few naturally vegetated, unbroken corridors of native vegetation are associated with the candidate significant amphibian breeding habitat identified above. Where present, these vegetation communities (*e.g.*, ELC Unit A1, ELC Unit E7) likely function as habitat rather than movement corridors *per se*.
Special Concern and Rare Wildlife Habitat	All Special Concern and Provincially Rare (S1 – S3, SH) plant and animal species. The area of the habitat to the finest ELC scale that protects the habitat form and function is the SWH.	**Present.** COLE biologists observed several Monarch (*Danaus plexippus*) in ELC Unit B1. Aquafor Beech (2018) identifies the woodland that includes ELC Unit B4 as potential habitat for Woodland Vole (*Microtis pinetorum*). Both species are designated Special Concern under the *Endangered Species Act (2007)*.

3.4 Species at Risk

To identify SARO-listed species potentially present in the Study Areas, COLE biologists consulted MNRF Management Biologist David Denyes, the NHIC database, the Atlas of the Breeding Birds of Ontario (OBBA 2018), eBird (2018), and Aquafor Beech (2018):

- MNRF Management Biologist, David Deynes, indicated that MNRF has records of 64 SAR known to occur in the City of Hamilton (MNRF 2018).
- The NHIC database has records from fourteen 1 km x 1 km Grid Squares that encompass the Study Areas. All SAR records in the NHIC database are historical (over 25 years old), and as such were not included in the SAR screening table.
- The Atlas of the Breeding Birds of Ontario has records of eight SAR from the 10 km x 10 km Grid Square that encompasses the study areas (17NH98). These records include Peregrine Falcon, Common Nighthawk, Chimney Swift, Eastern Wood-pewee, Barn Swallow, Wood Thrush, Bobolink, and Eastern Meadowlark (OBBA 2018).
- At a more local scale, the Elfrida Subwatershed Study identifies two SAR in the vicinity of the Study Areas: Eastern Wood-pewee and Monarch (Aquafor Beech 2018).

Table 3.4 identifies the potential for each of the 64 SAR previously recorded in the City of Hamilton to occur within one or more of the Study Areas as assessed by COLE.

Table 3.4 Assessment of the Occurrence of SARO-designated Species within the Study Areas

Taxon	SARO Status	Scientific Name	Common Name	Occurrence Category [1]	Comments[2]
Plants	Endangered	*Castanea dentata*	American Chestnut	5 – Absent	Found in deciduous forest communities; this tree prefers arid forests with acid and sandy soils.
		Frasera caroliniensis	American Columbo	3 – Absent	Most commonly associated with open deciduous forested slopes, thickets and clearings; grows in a variety of relatively stable habitats as well as on a wide variety of soils.
		Panax quinquefolius	American Ginseng	5 – Absent	Grow in rich, moist, undisturbed and relatively mature deciduous woods in areas of neutral soil (such as over limestone or marble bedrock).
		Juglans cinerea	Butternut	3 – Absent	Generally grow in rich, moist, and well-drained soils often found along streams. It may also be found on well-drained gravel sites, especially those made up of limestone. It is seldom found on dry, rocky and sterile soils. In Ontario, the Butternut generally grows alone or in small groups in deciduous forests as well as in hedgerows.
		Betula lenta	Cherry Birch	3 – Absent	Generally grow in moist, well- drained soils, but it is also found on coarse-textured or rocky shallow soils.
		Cornus florida	Eastern Flowering Dogwood	3 – Absent	Generally grow in deciduous and mixed forests or forest edges, in the drier areas of its habitat, although it is occasionally found in slightly moist environments.
		Trichophorum planifolium	Few-flowered Club-rush	5 – Absent	Generally found in Dry Fresh Oak deciduous forests and Dry Fresh Oak-Maple-Hickory deciduous forests. In Ontario, the species is only found on Royal Botanical Gardens property.
		Pycnanthemum incanum	Hoary Mountain-mint	5 – Absent	Dry sites such as Oak savannas and prairies.
		Morus rubra	Red Mulberry	3 – Absent	Generally grow in moist forest habitats. In Ontario, these include slopes and ravines of the Niagara Escarpment, and sand spits and bottom lands. Can grow in open areas such as hydro corridors.
	Threatened	*Eurybia divaricata*	White Wood Aster	3 – Absent	Generally grow in open, dry, deciduous forests. It has been suggested that this species may benefit from some disturbance, as it often grows along trails.
	Special Concern	*Phegopteris hexagonoptera*	Broad Beech Fern	5 – Absent	Generally inhabit shady areas of beech and maple forests where the soil is moist or wet.
		Arisaema dracontium	Green Dragon	5 – Absent	Generally grow in damp deciduous forests and along streams.
Bryophyte	Endangered	*Bryoandersonia illecebra*	Spoon-leaved Moss	3 – Absent	Generally found in deciduous forests, on soil that is in or near flat, low-lying, seasonally wet areas.
Fish	Endangered	*Anguilla rostrata*	American Eel	4 – Absent	All fresh water, estuaries, and coastal marine waters that are accessible to the Atlantic Ocean.
		Clinostomus elongatus	Redside Dace	4 – Absent	Generally found in pools and slow-moving areas of small headwater streams with a moderate to high gradient.
	Threatened	*Notropis photogenis*	Silver Shiner	4 – Absent	Generally prefer moderate to large, deep, relatively clear streams with swift currents, and moderate to high gradients.
	Special Concern	*Lepomis peltastes*	Northern Sunfish	4 – Absent	Shallow vegetated areas of quiet, slow flowing rivers and streams, as well as warm lakes and ponds with sandy banks or rocky bottoms.
		Esox americanus vermiculatus	Grass Pickerel	4 – Absent	Generally occur in wetlands with warm, shallow water and an abundance of aquatic plants, including the St. Lawrence River, Lake Ontario, Lake Erie, and Lake Huron.

Taxon	SARO Status	Scientific Name	Common Name	Occurrence Category [1]	Comments[2]
Molluscs	Endangered	*Taxolasma parvum*	Lilliput	4 – Absent	Found in a variety of habitats including small to large rivers, wetlands, shallows of lakes, ponds, and reservoirs. They are common in soft substrates with over 50% of the substrate type comprised of sand and a mud/muck/silt combination. Typically occur with or near Green Sunfish, Bluegill, White Crappie, and Johnny Darter.
	Special Concern	*Ligumia nasuta*	Eastern Pond Mussel	4 – Absent	Generally inhabit sheltered areas of lakes or slow streams in substrates of fine sand and mud.
		Villosa iris	Rainbow	4 – Absent	Most abundant in shallow, well oxygenated reaches of small- to medium-sized rivers and sometimes lakes, on substrates of cobble, gravel, sand, and occasionally mud.
Birds	Endangered	*Empidonax virescens*	Acadian Flycatcher	5 – Absent	Generally require large areas of mature, undisturbed forest. Avoids the forest edge and is often found in well wooded swamps and ravines.
		Tyto alba	Barn Owl	5 – Absent	Generally prefer low-elevation, open country. Often associated with agricultural lands, especially pasture. Nests are located in buildings, hollow trees, and cavities in cliffs.
		Ammodramus henslowii	Henslow's Sparrow	5 – Absent	Generally found in old fields, pastures, and wet meadows. They prefer areas with dense, tall grasses and thatch, or decaying plant material
		Rallus elegans	King Rail	5 – Absent	Generally require large marshes with open shallow water that merges with shrubby areas.
		Protonotaria citrea	Prothonatary Warbler	5 – Absent	Generally found in the dead trees of flooded woodlands or deciduous swamp forests in the Carolinian Zone.
		Icteria virens	Yellow-breasted Chat	5 – Absent	Generally prefer dense thickets around wood edges, riparian areas, and in overgrown clearings.
	Threatened	*Riparia riparia*	Bank Swallow	5 – Absent	Nest in a wide variety of natural and anthropogenic vertical banks, which often erode and change over time (*e.g.*, aggregate pits and the shores of large lakes and rivers).
		Hirundo rustica	Barn Swallow	1 – Present	Prefer farmland, lake / river shorelines, wooded clearings, urban populated areas, rocky cliffs, and wetlands. They nest inside or outside buildings, under bridges and in road culverts, on rock faces, and in caves.
		Dolichonyx oryzivorus	Bobolink	3 – Absent	Generally prefer open grasslands and hay fields. In migration and in winter they use freshwater marshes and grasslands.
		Setophaga cerulea	Cerulean Warbler	5 – Absent	Generally found in mature deciduous forests with an open understorey. They also nests in older, second-growth deciduous forests.
		Chaetura pelagica	Chimney Swift	5 – Absent	Coniferous and usually wet forest types, all with a well-developed, dense shrub layer. Most are now found in urban areas in large, uncapped chimneys.
		Sturnella magna	Eastern Meadowlark	3 – Absent	Generally prefer grassy pastures, meadows, and hay fields. Nests are always on the ground and usually hidden in grass clumps.
		Caprimlugus vociferus	Eastern Whip-poor-will	5 – Absent	Generally prefer semi-open deciduous forests or patchy forests with clearings or areas with little ground cover. In winter they occupy primarily mixed woods near open areas.
		Ixobrychus exilis	Least Bittern	5 – Absent	Generally located near pools of open water in relatively large marshes and swamps that are dominated by cattail and other robust emergent plants.

Taxon	SARO Status	Scientific Name	Common Name	Occurrence Category [1]	Comments[2]
Birds		*Seiurus motacilla*	Louisiana Waterthrush	5 – Absent	Generally inhabit mature forests along steeply sloped ravines adjacent to running water. It prefers clear, cold streams and densely wooded swamps.
	Special Concern	*Haliaeetus leucocephalus*	Bald Eagle	5 – Absent	Prefer deciduous and mixed-deciduous forest and habitat close to water bodies such as lakes and rivers. They roost in super-canopy trees such as Pine.
		Chlidonias niger	Black Tern	5 – Absent	Generally prefer freshwater marshes and wetlands, nesting either on floating material in a marsh or on the ground very close to water.
		Cardellina canadensis	Canada Warbler	5 – Absent	Generally prefer wet coniferous, deciduous, and mixed forest types, with a dense shrub layer. Nests on the ground, on logs or hummocks, and uses dense shrub layer to conceal the nest.
		Chordeiles minor	Common Nighthawk	3 – Absent	Generally prefer open habitats, including dunes, beaches, recently harvested forests, burnt-over areas, logged areas, rocky outcrops, rocky barrens, grasslands, pastures, peat bogs, marshes, lakeshores, and river banks. This species also inhabits mixed and coniferous forests. Can also be found in urban areas, nesting on flat roof-tops.
		Contopus virens	Eastern Wood-Pewee	1 – Present	Associated with deciduous and mixed forests, within mature and intermediate age stands. They prefer areas with little understory vegetation as well as forest clearings and edges.
		Vermivora chrysoptera	Golden-winged Warbler	3 – Absent	Generally prefer areas of early successional vegetation. Found primarily on field edges, hydro or utility right-of-ways, or recently logged areas.
		Falco peregrinus	Peregrine Falcon	5 – Absent	Generally nest on tall, steep cliff ledges adjacent to large waterbodies. Some birds adapt to urban environments and nest on ledges of tall buildings, even in densely populated downtown areas.
		Melanerpes erythrocephalus	Red-headed Woodpecker	3 – Absent	Generally prefer open Oak and Beech forests, grasslands, forest edges, orchards, pastures, riparian forests, roadsides, urban parks, golf courses, cemeteries, and along beaver ponds and brooks.
		Asio flammeus	Short-eared Owl	3 – Absent	Generally prefer a wide variety of open habitats, including grasslands, peat bogs, marshes, sand-sage concentrations, old pastures, and agricultural fields.
		Hylocichla mustelina	Wood Thrush	5 – Absent	Nest mainly in second-growth and mature deciduous and mixed forests with saplings and well-developed understory layers. Prefers large forest mosaics, but may also nest in small forest fragments.

Taxon	SARO Status	Scientific Name	Common Name	Occurrence Category [1]	Comments[2]
Mammals	Endangered	*Taxidea taxus*	American Badger	2 – Potentially Present	Generally prefers open habitats, whether natural (*e.g.*, grasslands) or anthropogenic, such as agricultural fields, road right-of-ways, and golf courses.
		Myotis leibii	Eastern Small-footed Mytosis	2 – Potentially Present	Overwintering habitat includes caves and mines that remain above 0 ˚C. Maternity roosts primarily under loose rocks on exposed rock outcrops, crevices, and cliffs, and occasionally in buildings, under bridges and highway overpasses, and under tree bark.
		Myotis lucifugus	Little Brown Myotis	2 – Potentially Present	Overwintering habitat includes caves and mines that remain above 0 ˚C. Maternity roosts often associated with buildings (*e.g.*, attics, barns). Occasionally found in trees 25 – 44 cm dbh.
		Myotis septentrionalis	Northern Myotis	2 – Potentially Present	Overwintering habitat includes caves and mines that remain above 0 ˚C. Maternity roosts often associated with cavities of large diameter trees 25 cm – 44 cm dbh. Occasionally found in structures (*e.g.*, attics, barns).
		Perimyotis subflavus	Tri-colored Bat	2 – Potentially Present	Overwintering habitat includes caves and mines that remain above 0 ˚C. Maternity roosts can be in tree trunks or dead clusters of tree leaves or arboreal lichens. May also use barns or similar structures.
	Special Concern	*Microtus pinetorum*	Woodland Vole	2 – Potentially Present	Generally associated with deciduous forests in areas of soft, friable, often sandy soil beneath deep humus where it can burrow easily.
Reptiles	Endangered	*Apalone spinifera*	Spiny Softshell	4 – Absent	Generally prefer marshy creeks, swift-flowing rivers, lakes, impoundments, bays, marshy lagoons, ditches, and ponds near rivers.
	Threatened	*Emydoidea blandingii*	Blanding's Turtle	4 – Absent	Generally occur in freshwater lakes, permanent or temporary pools, slow-flowing streams, marshes and swamps. They prefer shallow water that is rich in nutrients, organic soil and dense vegetation. Adults are generally found in open or partially vegetated sites, and juveniles prefer areas that contain thick aquatic vegetation including sphagnum, water lilies and algae. They dig their nest in a variety of loose substrates, including sand, organic soil, gravel and cobblestone. Overwintering occurs in permanent pools that average about one metre in depth, or in slow-flowing streams.
		Heterodon platirhinos	Eastern Hog-nosed Snake	4 – Absent	Generally prefer habitats with sandy, well-drained soil and open vegetative cover, such as open woods, brushland, fields, forest edges and disturbed sites. The species is often found near water.
	Special Concern	*Sternotherus odoratus*	Eastern Musk Turtle	4 – Absent	Generally prefer shallow, slow-moving water where it typically walks along the bottom rather than swimming.
		Thamnophis sauritus	Eastern Ribbonsnake	4 – Absent	Generally occur along the edges of shallow ponds, streams, marshes, swamps, or bogs bordered by dense vegetation that provides cover. Abundant exposure to sunlight is also required, and adjacent upland areas may be used for nesting.
		Graptemys geographica	Northern Map Turtle	4 – Absent	Generally inhabit both lakes and rivers, showing a preference for slow moving currents, muddy bottoms, and abundant aquatic vegetation. These turtles need suitable basking sites, such as rocks and logs, and exposure to the sun for at least part of the day.
		Chelydra serpentina	Snapping Turtle	4 – Absent	Generally inhabit shallow waters where they can hide under the soft mud and leaf litter. Nesting sites usually occur on gravely or sandy areas along streams. Snapping Turtles often take advantage of man-made structures for nest sites, including roads (especially gravel shoulders), dams, and aggregate pits.
Amphibians	Endangered	*Ambystoma jeffersonianum*	Jefferson Salamander	3 – Absent	Inhabits deciduous and mixed deciduous forests with suitable breeding areas generally consisting of ephemeral (temporary) bodies of water that are fed by spring runoff, groundwater, or springs.
		Ambystoma laterale - jeffersonianum	Unisexual Ambystoma Jefferson Salamander	3 – Absent	Inhabits deciduous and mixed deciduous forests with suitable breeding areas generally consisting of ephemeral (temporary) bodies of water that are fed by spring runoff, groundwater, or springs.

Taxon	SARO Status	Scientific Name	Common Name	Occurrence Category [1]	Comments[2]
Insects	Endangered	*Erynnis martialis*	Mottled Duskywing	4 – Absent	Generally inhabit a range of grassland, shrubland, and savanna habitats that contain well drained soils and the presence of its host plants Prairie Redroot (*Ceanothus herbaceus*) or New Jersey Tea (*Ceanothus americanus*).
	Special Concern	*Danaus plexippus*	Monarch Butterfly	1 – Present	Exist primarily wherever milkweed and wildflowers exist; abandoned farmland, along roadsides, and other open spaces.
		Pieris virginiensis	West Virginia White	4 – Absent	Generally prefer moist, deciduous woodlands. The larvae feed only on the leaves of the two-leaved toothwort (*Cardamine diphylla*), which is a small, spring-blooming herbaceous plant.

1. Unless otherwise noted, "habitat" for the purposes of the *Endangered Species Act, 2007* is defined as an area on which a species of animal, plant, or other organism depends, directly or indirectly, to carry on its life processes, including reproduction, rearing, hibernation, migration or feeding, and includes places that are used by members of the species as dens, nests, hibernacula or other residences.
2. Habitat Description from Hamilton Species at Risk Table provided by MNRF on August 16, 2018.

Occurrence Category:

Category 1: Present – The species has been recorded from one or more of the Study Areas.

Category 2: Potentially Present – Potentially suitable habitat is present within one or more of the Study Areas but no individuals were observed incidentally.

Category 3: Absent – The species does not occur in any of the Study Areas; potentially suitable habitat is present but no specimens were observed during surveys completed per generally accepted and/or MNRF-specified protocols.

Category 4: Absent – The species does not occur in any of the Study Areas; potentially suitable habitat is not present.

Category 5: Absent – The species does not occur in any of the Study Areas; potentially suitable habitat is not present and no specimens were observed during surveys completed per generally accepted and/or MNRF-specified protocols.

4 Assessment of Alternative Options

Table 4.1 describes for the alternative EWSF sites the potential impacts of development on the terrestrial and aquatic environment. Construction of the proposed EWSF within any of the five alternative EWSF sites has some potential to impact the environment. EWSF Site 3 and EWSF Site 5 have the least potential for impact, but in all cases potential impacts can be avoided or mitigated. **Table 4.2** describes for the alternative PS sites the potential impacts of development on the terrestrial and aquatic environment. Construction of the proposed PS within any of the three alternative PS sites has some potential to impact the environment. PS Site 3 has the least potential for impact, but in all cases potential impacts can be avoided or mitigated.

Table 4.1 Assessment of Alternative Elevated Water Storage Facility (EWSF) Sites

Evaluation Criteria		Alternative Elevated Water Storage Facility (EWSF) Sites				
		EWSF Site 1	EWSF Site 2	EWSF Site 3	EWSF Site 4	EWSF Site 5
Terrestrial Environment	Potential impacts within Alternative Options	• Site access may require tree removal along Fletcher Road. An Arborist Report will be required if this site is selected. • Barn Swallow were observed foraging over EWSF Site 1. No impacts are anticipated to foraging Barn Swallow.	• Site access may require tree removal along Fletcher Road. An Arborist Report will be required if this site is selected. • Barn Swallow were observed foraging over EWSF Site 2. No impacts are anticipated to foraging Barn Swallow.	• Site access may require tree removal from the hedgerows bordering EWSF Site 3 to the north and south and/or along Trinity Church Road. An Arborist Report will be required if this site is selected. • Barn Swallow were observed foraging over EWSF Site 3. No impacts are anticipated to foraging Barn Swallow. • Hawthorn was identified within ELC Unit D8, but could not be identified to species due to a lack of key identifying features; thus, the local status (*i.e.*, locally uncommon or rare) could not be determined. If this site is selected and the proposed site plan requires hedgerow removal, a spring botanical survey should be completed to identify the species.	• No potential impacts.	• Site access may require tree removal along Dickenson Road East. An Arborist Report will be required if this site is selected. • Tree removal has the potential to impact breeding birds, therefore any tree removals should be completed outside of the breeding bird timing window (March 15–August 31).
	Potential impacts within Adjacent Lands	• The Eramosa Karst Earth Science ANSI is located approximately 150 m north of EWSF Site 1. EWFS construction would have no impact on this ANSI.	• The Eramosa Karst Earth Science ANSI is located approximately 50 m north of EWSF Site 2. EWFS construction would have no impact on this ANSI.	• No potential impacts.	• A small wetland (ELC Unit E3) is present immediately north of EWSF Site 4. An Erosion and Sediment Control Plan will be required if this site is selected.	• No potential impacts.
Aquatic Environment	Potential impacts within Alternative Options	• Portions of two headwater drainage features of Hannon Creek run through EWSF Site 1. An Erosion and Sediment Control Plan will be required if this site is selected.	• Portions of three headwater drainage features of Hannon Creek run through EWSF Site 2. An Erosion and Sediment Control Plan will be required if this site is selected.	• None. No surface water features are present within EWSF Site 3.	• None. No surface water features are present within EWSF Site 4.	• None. No surface water features are present within EWSF Site 5.

Evaluation Criteria		Alternative Elevated Water Storage Facility (EWSF) Sites				
		EWSF Site 1	EWSF Site 2	EWSF Site 3	EWSF Site 4	EWSF Site 5
Aquatic Environment	Potential impacts within Adjacent Lands	• Portions of two headwater drainage features of Hannon Creek run through the lands adjacent to EWSF Site 1. An Erosion and Sediment Control Plan will be required if this site is selected.	• Portions of four headwater drainage features of Hannon Creek run through the lands adjacent to EWSF Site 2. An Erosion and Sediment Control Plan will be required if this site is selected.	• Portions of two headwater drainage features of Hannon Creek and three headwater drainage features of Twenty Mile Creek run through lands adjacent to EWSF Site 3. An Erosion and Sediment Control Plan will be required if this site is selected.	• Portions of three headwater drainage features of Hannon Creek run through lands adjacent to EWSF Site 4. These features contribute surface flow to a downstream "Core Area" of karst features, including a major sinkpoint located approximately 100 m south of Rymal Road East. If this site is selected, further assessment would be required to identify appropriate design measures to minimize impacts on karst features. • An Erosion and Sediment Control Plan will be required if this site is selected.	• None. No surface water features are present adjacent to EWSF Site 5.

Legend

	No potential impacts.
	Potential impacts can be avoided/mitigated.
	Potential impacts cannot be avoided/mitigated.

Table 4.2 Assessment of Alternative Pumping Station (PS) Sites

Evaluation Criteria		Alternative Pumping Station (PS) Sites		
		PS Site 1	**PS Site 2**	**PS Site 3**
Terrestrial Environment	Potential impacts within Alternative Options	• A small wetland (ELC Unit B2) is present within PS Site 1. This wetland contains Necklace Sedge, an uncommon species in the City of Hamilton. Wetlands and their 30 m buffers are protected under Hamilton's Official Plan. If construction is proposed within 50 m of this wetland, additional study is required to determine mitigation measures and whether the wetland buffer can be refined. If construction is proposed within 30 m of this wetland, a permit from NPCA will be required per Ontario Regulation 155/06. An Erosion and Sediment Control Plan will be required for this site. • Several Monarch were observed foraging within PS Site 1; candidate SWH includes ELC Units B1 and B2. Monarch foraging habitat is diverse, therefore construction within PS Site 1 would have negligible impacts on foraging Monarch. • Barn Swallow were observed foraging over PS Site 1. Potential impacts to foraging Barn Swallow would be proportional to the extent of removal of natural vegetation that supports insects, particularly ELC Unit B2. • Hawthorn was identified within ELC Unit B1, but could not be identified to species due to a lack of key identifying features; thus, the local status (*i.e.*, locally uncommon or rare) could not be determined. If this site is selected and the proposed site plan requires shrub removal, a spring botanical survey should be completed to identify the species.	• Barn Swallow were observed foraging over PS Site 2. Potential impacts to foraging Barn Swallow would be proportional to the extent of removal of natural vegetation that supports insects, particularly ELC Unit A5.	• PS Site 3 is located within an area identified by the Trinity West Secondary Plan as "Buried Eramosa Escarpment" – an area of karstic bedrock covered by shallow soil. If this site is selected, further assessment would be required to identify appropriate design measures to minimize impacts on karst features. • Tree removal may be required to accommodate the proposed PS. The Site contains trees with the potential to support bat maternity colonies. An Arborist Report and bat habitat assessment would be required if this site is selected.
	Potential impacts within Adjacent Lands	• A woodland (ELC Unit B4) is located 100 m to the east and a wetland (ELC Unit B5) is located 30 m to the south of PS Site 1. Aquafor Beech (2018) identifies the woodland as a potential ESA and a potential linkage feature. Construction of the PS within PS Site 1 would have negligible impacts on these features. An Erosion and Sediment Control Plan will be required if this site is selected. • Several Monarch were observed foraging within PS Site 1; potential SWH includes ELC Units B5, B6 and B9. Given the widespread occurrence of Milkweed, construction of the PS within PS Site 1 would have negligible impacts on foraging Monarch. • A colony of nesting Barn Swallows is thought to be located within the property located between PS Site 1 and PS Site 2. The removal of ELC Unit B2 could remove a source of mud for nest construction. Otherwise, construction of the PS within PS Site 1 would have negligible impacts on this Barn Swallow nesting habitat.	• A wetland (ELC Unit A5) is present approximately 100 m north of PS Site 2. An Erosion and Sediment Control Plan will be required if this site is selected. • A colony of nesting Barn Swallows is thought to be located within the property located between PS Site 1 and PS Site 2. Construction of the PS within PS Site 2 would have negligible impacts on this Barn Swallow nesting habitat.	• No potential impacts. Adjacent lands have been urbanized or are currently under development.

Evaluation Criteria		Alternative Pumping Station (PS) Sites		
		PS Site 1	PS Site 2	PS Site 3
Aquatic Environment	Potential impacts within Alternative Options	• None. No surface water features are present within PS Site 1.	• A portion of a headwater drainage feature of Stoney Creek runs through PS Site 2. An Erosion and Sediment Control Plan will be required if this site is selected.	• None. No surface water features are present within PS Site 3.
	Potential impacts within Adjacent Lands	• Portions of three headwater drainage features of Sinkhole Creek run through lands adjacent to PS Site 1. An Erosion and Sediment Control Plan will be required if this site is selected.	• A network of headwater drainage features of Stoney Creek extends through lands adjacent to PS Site 2. An Erosion and Sediment Control Plan will be required if this site is selected.	• No potential impacts. Adjacent lands have been urbanized or are currently under development. • A small, unmapped watercourse with two karst sinkpoints is located approximately 300 m north of PS Site 3. If this Site is selected, further assessment would be required to identify appropriate design measures to minimize impacts on karst features.

Legend

	No potential impacts.
	Potential impacts can be avoided/mitigated.
	Potential impacts cannot be avoided/mitigated.

5 Conclusions and Recommendations

COLE conducted a Natural Environment Assessment of seven Study Areas that encompass three Alternative Options for a potential Pumping Station (PS) and four Alternative Options for a potential Elevated Water Storage Facility (EWSF). The seven Study Areas are dominated by lands under cultivation and culturally influenced vegetation communities, and their potential to support significant and/or sensitive environmental features is further constrained by adjacent urban land uses. COLE notes the following:

- None of the Study Areas form part of the City of Hamilton's Natural Heritage System.
- The majority of the Alternative Options lack surface water features. Headwater drainage features are present within EWSF Site 1, EWSF Site 2 and PS Site 2.
- None of the vegetation communities categorized by ELC are considered sensitive and all 32 native plant species identified during the botanical inventory have an S-Rank of S4 (apparently secure) or S5 (secure). One of the 32 recorded native plant species is locally significant: Necklace Sedge, recorded from Study Area B, is considered uncommon in the City of Hamilton.
- All 35 native bird species recorded by COLE biologists during the breeding bird surveys have an S-Rank of S4/S4B (the species/breeding population in Ontario is apparently secure) or S5/S5B (the species/breeding population in Ontario is secure).
- Many of the ELC units within the Study Areas contain features that may function as wildlife habitat, but few of these features meet the criteria of SWH as defined by the MNR (2000) and/or MNRF (2015). ELC Units B1, B2 and B4 are considered candidate SWH due to the confirmed or potential presence of Species of Special Concern per the *Endangered Species Act (2007)*. Other types of SWH potentially present in one or more of the Study Areas include bat hibernacula, bat maternity colonies, reptile hibernacula and amphibian breeding habitat (woodland and wetland).
- The majority of the 64 SAR known to occur in the City of Hamilton are not present within the Study Areas—suitable habitat is not present and/or no specimens were observed during surveys completed per generally accepted protocols. Only two SAR were recorded from one or more of the Study Areas: Barn Swallow (Threatened) was recorded from Study Areas A, B, C and D; and Monarch (Special Concern) was recorded from Study Area B. Six other SAR are potentially present in one or more of the study areas, including American Badger, Woodland Vole, Little Brown Myotis, Eastern Small-footed Myotis, Northern Myotis and Tri-coloured Bat.

In the opinion of COLE, construction of the proposed PS and EWSF has limited potential to result in environmental impacts; this potential can be further reduced through the site design process. For example, potential impacts can be reduced by limiting, to the extent possible, the need for tree removal and grading adjacent to areas of retained natural vegetation. Nevertheless, COLE recommends the following mitigation measures:

(1) Complete Surveys to Assess Presence of SWH. If the preferred site for the PS and/or EWSF includes ELC units with the potential to support SWH, a qualified biologist should complete more detailed surveys per MNRF-approved protocols to assess the potential presence of bat hibernacula, bat maternity colonies, reptile hibernacula and amphibian breeding habitat (woodland and wetland).

(2) **Complete Surveys to Assess Presence of SAR.** If potentially suitable habitat is present within the preferred site for the PS and/or EWSF, a qualified biologist should complete surveys per MNRF-approved protocols to assess the potential presence of American Badger, Woodland Vole, Little Brown Myotis, Eastern Small-footed Myotis, Northern Myotis and Tri-coloured Bat.

(3) **Complete Karst Assessment.** If the preferred site for the PS and/or EWSF includes karst features and/or contributes surface flow to downstream areas of karst, a professional geoscientist with a demonstrated expertise in karst should complete a comprehensive assessment to identify appropriate design measures to minimize potential impacts to these features.

(4) **Prepare Erosion and Sediment Control (ESC) Plan for the Preferred Sites.** The ESC plan should identify protective measures (*e.g.*, silt fencing) and designate areas for hoarding and equipment storage during construction. To ensure compliance with its provisions, COLE recommends that the plan include a requirement for regular monitoring of ESC measures during construction by a qualified inspector.

(5) **Identify Wetland Buffers.** PS Site 1 includes a small Cattail marsh (ELC Unit B2) and EWSF Site 4 borders a Reed Canarygrass marsh (ELC Unit E3). Wetlands and their 30 m buffers are protected under Hamilton's Official Plan. If either of these Alternative Options is identified as a preferred site, further assessment is recommended to determine mitigation measures and potentially refine the wetland buffers. If construction is proposed within 30 m of these wetlands, a permit from HCA and/or NPCA may be required per Ontario Regulation 161/06 and/or Ontario Regulation 155/06. These requirements should be confirmed with HCA and/or NPCA.

(6) **Identify Unknown Hawthorn Species.** Hawthorn was identified within ELC Units B1 and D8, but could not be identified to species due to a lack of key identifying features; thus, the local status (*i.e.*, locally uncommon or rare) could not be determined. If either of these sites are selected and the proposed site plan requires shrub and/or hedgerow removal, a spring botanical survey should be completed to identify the species.

(7) **Prepare a Tree Protection Plan.** An ISA-certified arborist should inspect the preferred sites for the PS and EWSF and develop a Tree Protection Plan as required. If the proposed works require tree removal, the City of Hamilton should consider opportunities to compensate by replanting on site and/or planting trees elsewhere.

(8) **Implement Measures to Protect Breeding Birds.** The proposed works may require tree removal. To minimize the potential to impact breeding birds, any tree removal should be completed outside of the breeding bird timing window (March 15–August 31). If tree removal is proposed within this period, or if birds are suspected to be nesting outside of the timing window, a qualified biologist should perform a nesting survey within 48 hours of the proposed removal to ensure that no active nests are present.

(9) Implement Measures to Protect Bats. The proposed works may require the removal of one or more trees with the potential to support bat maternity colonies. To minimize the potential to impact bats, trees with cavities and/or loose bark should not be removed during the period when bat maternity colonies are active (April 1 – October 31). If removal is contemplated within this period, trees should first be assessed during the leaf-off period (November – April) per MNRF (2017) to determine their potential to function as bat habitat. If one or more trees are identified as having the potential to support bat maternity roosts, these trees should not be removed when bat maternity colonies (if present) are active. MNRF should also be consulted to determine whether proposed tree removal requires habitat compensation (*e.g.*, bat houses) per the *Endangered Species Act (2007)*.

In the opinion of COLE, implementation of the recommended mitigation measures will ensure that the construction of the PS and EWSF has negligible potential to result in environmental impacts.

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