Natural Environment Supplementary Materials

Background Data Collection and Analysis

Background documents and other applicable sources of information were consulted during the preparation of this report to identify natural heritage features for the Study Area, including the following:

- Land Information Ontario (LIO) database (MNRF 2022a)
- Halton Region Official Plan (Regional Municipality of Halton 2018)
- The Ecosystems of Ontario, Part 2: Ecodistricts (Wester et al. 2018)
- Forest Regions of Canada (Rowe 1972)

The information was compiled in a GIS database to support mapping and data query requirements of the natural heritage assessment.

The following technical documents were used to describe natural heritage features and assess their significance and sensitivity:

- The Provincial Policy Statement (PPS) (MMAH 2020)
- The Greenbelt Plan (MMAH 2017)
- The Greenbelt Plan 2005 Technical Definitions and Criteria for Key Natural Heritage Features in the Natural Heritage System of the Protected Countryside Technical Paper (MNR 2012)
- Halton Region Official Plan (Interim Office Consolidation, November 4, 2022)
- Credit River Watershed Natural Heritage System (CRWNHS) Final Technical Report (CVC 2015)
- The Significant Wildlife Habitat Technical Guide (MNR 2000) and Ecoregion Criteria Schedule for 6E (MNRF 2015)
- Natural Heritage Reference Manual for Natural Heritage Policies of the Provincial Policy Statement (MNR 2010)
- Significant Wildlife Habitat Mitigation Support Tool (MNR 2014)

For the potential occurrence of SAR or provincially rare species, the following sources were consulted for recent (1990-present) records in the vicinity of the Study Area:

- Natural Heritage Information Centre (NHIC) Biodiversity Explorer database (MNRF 2022b)
- Atlas of the Mammals of Ontario (Dobbyn 1994)
- Ontario Reptile and Amphibian Atlas (Ontario Nature 2019)
- Ontario Breeding Bird Atlas (Cadman et al. 2007)

- Fisheries and Oceans Canada (DFO) – Aquatic Species at Risk Map (DFO 2023)
- eBird 2022
- iNaturalist 2022
- Schedule 1 of the *Federal Species at Risk Act* (Environment and Climate Change Canada 2022)
- Species at Risk in Ontario List (MECP 2023)
- Mountainview-Delrex Natural Areas Inventory (CVC 2016)

The results of the record searches were used to guide field investigations, and to identify potential SAR and Species of Conservation Concern (SOCC) that have the potential to overlap with the Study Area. These resources generally do not note the exact locations of a species occurrence, with varying degrees of accuracy (e.g., 1 km² for NHIC and 10 km² for wildlife atlases). As such, they are used as an indicator of potential occurrence in the Study Area and not as confirmation of presence.

Approach and Methodology

Vegetation Survey Approach

Vegetation community assessments and botanical inventories were conducted on May 19, July 3, and September 3, 2020, in each community in the Study Area to capture spring, summer and fall vascular plant species **(Table 1, Appendix C)**.

The scope of the vegetation and botanical inventory fieldwork included the following:

- Mapping and lists of the dominant species in the canopy, sub-canopy, shrub, and ground layers. See **Exhibit 1, Appendix C**.
- Tree size class summary. **See Table 2, Appendix C**.
- Detailed vascular plant species list. See **Table 3, Appendix C**.
- Vegetation communities and botanical species were based on a vascular plant species list provided by the Natural Heritage Information Centre (MNRF 2020). Identification of potentially sensitive native plant species was based on their assigned coefficient of conservatism (CC) value, as determined by Oldham et al. (1995).

Fish and Aquatic Habitat Survey Approach

A fish habitat assessment was completed on May 25, 2020, for the tributary to Levi's Creek to document physical habitat characteristics and in-situ water quality parameters. Assessments of potential headwater drainage features (HDFs) were completed following the *Evaluation, Classification and Management of Headwater Drainage Features* (HDF Guidelines) (TRCA/CVC 2014), which consisted of three site visits on April 24, May 25, and July 3, 2020. The presence of two HDFs identified confirmed during field investigations and are referred to as HDF-1 and HDF-2. Results of the field investigations and classifications can be found in **Exhibit 2 and 3, Appendix C.**

Aquatic habitat assessments and observations included:

- In-stream cover
- Bank stability
- Substrate
- Stream dimensions
- Morphology
- Riparian conditions
- Assessment of fish habitat potential

The presence of seasonal or permanent barriers to fish passage was also noted. The mapped tributary to Silver Creek was not assessed for fish habitat, as field investigations determined there was no direct connectivity to Silver Creek. The fish survey was completed using backpack electrofishing in the pool area immediately east of Tenth Line. Fish were captured, identified, enumerated, and released back at the site of capture.

Silver Creek was not included in the field investigation, as it is located beyond the footprint of the alternatives considered.

Wildlife Survey Approach

Field investigations were undertaken by Stantec ecologists in 2020 to document existing conditions within the Study Area and provide an assessment of significance (**Exhibit 4, Appendix C**). Terrestrial field investigations included a three-season botanical inventory, vegetation community assessment, a butternut health assessment, a woodland plot assessment, a woodland delineation, a bat tree roost survey, a bat acoustic survey, amphibian surveys, breeding bird surveys and a wildlife habitat assessment. Survey dates in 2020 were:

- Breeding Bird Survey – June 8 and 24, 2020
- Breeding Amphibians Survey –April, May, and June, 2020
- Bat Maternity Tree Roost Surveys – April 24, 2020
- Bat Acoustic Monitoring Surveys – Between June 17 to July 2, 2020

Additional detail on these surveys is provided in following sections.

Breeding Bird Surveys

Two breeding bird surveys were conducted. Surveys consisted of 10-minute stationary point counts that targeted natural vegetation features, hay fields and pastures. A conservative approach to determining breeding status was taken; all birds seen or heard in appropriate habitat during the breeding season were assumed to be breeding except in the case where habitat was confirmed to be absent. Thirty-one bird species were recorded during the breeding bird surveys (**Table 4, Appendix C**), all of which were presumed to be breeding, with exception of two species due to the absence of specialized breeding habitat features.

Amphibians

Two stations were surveyed in April, May, and June as per the Marsh Monitoring Program (Bird Studies Canada 2009). The distance and direction for each individual or chorus detected was estimated and recorded. There was very limited standing water in the wetland pockets located in the agricultural field north of 10 Side Road. Suitable habitat was limited to a vernal pool at the bottom of the slope in the Silver Creek Valley and ponding areas where the tributary to Levi's Creek intersects with Tenth Line. No amphibians were recorded during any of the surveys that targeted the vernal pool (Station AMP01). Four species of amphibians were recorded in low abundance during surveys that targeted the tributary to Levi's Creek (AMP02). Results of the surveys are summarized in **Table 5, Appendix C.**

Bat and Bat Habitat Surveys

Bat Maternity Tree Roost Surveys

Treed communities within the Study Area were assessed during leaf-off season to determine their suitability to support bat maternity roost habitat. The best candidate trees for maternity colonies are likely to contain several characteristics which include:

- Height – where trees are tallest in the stand
- Diameter – where trees have a large DBH
- Loose/peeling bark – where trees have a large amount of peeling/loose bark
- Cavity height – where cavity height is high on the tree (>10 m high)
- Open canopy – located in an area of open canopy for accessibility in and out of tree
- Decay – where the tree exhibits early stages of decay

Surveys focused on all trees that were > 10 cm in DBH in the Study Area.

The following data were also recorded for any trees over 10 cm DBH that had cavities or a large amount of peeling bark:

- GPS location
- Tree species
- DBH
- Tree height
- Cavity height

In addition to exhibiting cavities and/or a large amount of peeling bark, the identified trees displayed one or more of the following characteristics that are preferred by bats: high cavities, large diameters, tall trees, early stages of decay and open canopies. **Table 6, Appendix C** details the potential bat maternity roost trees observed and **Table 7, Appendix C** lists suitability criteria of these trees.

Bat Acoustic Monitoring Surveys

The bat detectors recorded individual bat calls from 30 minutes before sunset to 30 minutes before sunrise. The bat acoustic detectors were deployed in the field between June 17 to July 2, 2020, to capture ten warm/mild nights (i.e., ambient temperature >10°C) with low wind and no precipitation as required by MNRF (2017) protocols. Data for the 10 selected dates was analyzed using Kaleidoscope Pro software by Wildlife Acoustics. A qualified biologist evaluated the identification of each bat call, by visually assessing the call file spectrographs to identify if the frequency range and shape were consistent with the species assigned by the software. The results of the bat acoustic surveys are summarized by station and species **in Table 8, Appendix C.**

Wildlife Habitat Assessment & Incidental Wildlife Observations

Wildlife habitat assessments were completed and focused on the identification of wildlife habitat features, specifically Significant Wildlife Habitat (SWH) features as outlined in the MNRF's Criteria Schedules for Ecoregion 6E (MNRF 2015). When encountered, these features were identified, recorded, and assessed for significance. Wildlife habitat suitability assessments were also completed for SAR that may occur in the area, including species identified in the NHIC database and Ontario wildlife atlases during the literature review process.

Species recorded as incidental observations included Cabbage White, Green Frog, Northern Leopard Frog, Canada Goose, Swainson's Thrush, Belted Kingfisher, Coyote, Eastern Cottontail, Eastern Chipmunk, Grey Squirrel, Red Squirrel, and White-tailed Deer. These species have been included in the Wildlife Species List in **Table 4, Appendix C**. All incidental species observed are common and secure in Ontario and are not SAR or SOCC.

Species at Risk (SAR)

A list of potential SAR that could occur in the Study Area was generated using the following criteria:

- Records of the species in the Study Area from background sources listed in Section 3.1.1
- SAR with ranges that overlap with the Study Area
- The presence of suitable habitat in the Study Area

The presence of SAR was determined using targeted surveys for vegetation, breeding birds, bats, and amphibians. For other species, habitat assessments were conducted to determine their likelihood of occurrence. Six SAR and/or their habitat were identified as confirmed or potentially present in the Study Area. The detailed SAR habitat assessment is provided in **Exhibit 4, Appendix C** and SAR and/or SAR habitat confirmed in the Study Area are summarized below.

- Three SAR Bats: Little Brown Myotis, Northern Myotis, Tri-colored Myotis (endangered) – Little Brown Myotis was recorded at all Bat Monitoring Stations. Little Brown Myotis was the most abundant SAR Bat recorded.
- Butternut (endangered) – Six butternuts were identified. A Butternut Health Assessment was completed by a qualified Butternut Health Assessor in conformance with the ESA for each, and they were all determined to be non-retainable.
- American Eel (endangered) – There are records of American Eel in Silver Creek immediately north of the Study Area (2014 data identified by MECP). As there are no anticipated impacts to Silver Creek, there is no anticipated impact to American Eel or their habitat.
- Redside Dace (endangered) – DFO SAR maps identify records of Redside Dace in Silver Creek upstream and downstream of the Study Area. Consultations with MECP confirmed that the reach of Silver Creek within the Study Area is not Redside Dace habitat. The tributary to Levi's Creek in the southwest corner of the Study Area was identified by MECP as Contributing Habitat.

Land Information

Significant Wetlands

Five unevaluated wetlands are identified on MNRF mapping in the large agricultural field north of 10 Side Road. Three of these unevaluated wetlands (MAMM1-2a, MAMM1-2b, and MAMM1-2c) were identified during field investigations. The Aurora District MNRF prepared evaluation criteria (undated) for determining whether wetlands under 0.5 ha were used as a guideline to determine whether the three wetlands provide important ecological benefit to qualify the feature as part of the Hungry Hollow Provincially Significant Wetland (PSW) (**Table 10, Appendix C)**

Based on the results of the evaluation, none of the criteria were fully met. One or more wetland criteria are required to be met to consider the wetlands for complexing, and because none of the criteria were fully met, the three wetlands are not considered as part of the Hungry Hollow PSW.

Significant Woodlands

The woodlands (FOMM2, FOMM3-3 and SWDM4-1) along the Silver Creek Corridor are identified as High Functioning and Supporting Woodlands, and the woodlands in the north and east sections of the Study Area (FODM7-4, FOCM6 and WODM4-4a and WODM4-4b) are identified as Supporting Woodlands. The woodland communities that comprise the High Functioning and Supporting were assessed using the criteria in **Table 11, Appendix C.**

Based on the criteria, the woodland comprised of the FOMM2, FOMM3-3, and SWDM4-1 communities along the Silver Creek Corridor; and FODM7-4, FOCM6, WODM4-4a, and WODM4-4b communities in the north and east sections of the Study Area are considered Significant Woodland. The Significant Woodland also overlaps with the Hungry Hollow PSW, the Georgetown Credit Valley Life Science ANSI, and the Russell's Hill's of Pines woodlot (that is being considered for designation as a cultural heritage feature), which helps to support the case for designation as a Significant Woodland.

Significant Valleylands

High Functioning Significant Valleylands were identified along the Silver Creek Corridor and from the top of slope at the edge of the agricultural field to the north side of the Credit River (shown on **Exhibit 5, Appendix C**). These valleylands will be considered as significant for the purposes of this report.

Significant Wildlife Habitat

Wildlife habitat includes habitat for SOCC and the four categories of Significant Wildlife Habitat:

- Seasonal Concentration Areas
- Rare Vegetation Communities or Specialized Habitats for Wildlife
- Habitat for SOCC
- Animal Movement Corridors

A full description of the evaluation of specific types of wildlife habitat is provided in **Table 12, Appendix C**.

Background Review

A scoping meeting was held with Halton Region and CVC staff on March 4, 2020, to discuss the proposed natural environment field program to support the Natural Environment Report for the Project. A natural heritage information request was submitted to MNRF and MECP on March 19, 2020, for natural heritage information for the Study Area to supplement the preliminary background review. The following information was requested:

- Natural Heritage Features
- Natural Hazards Features
- Fish/Mussel data
- Benthic Sampling Records
- Terrestrial SAR data
- Aquatic SAR data
- CVC Owned Lands data
- Watercourse thermal regime and flow regime
- Special habitat features (e.g., groundwater upwelling, spawning areas)
- In-water construction timing window
- MNRF fisheries management objectives, if applicable

The MNRF provided a response referring to unevaluated wetlands in the Study Area that should be inventoried, surveyed, and considered for possible inclusion in adjacent Provincially Significant Wetlands. The MECP did not provide additional natural heritage information for the project, although details were provided relating to Redside Dace and Canada Warbler observations in the Study Area.

Designated Natural Areas

Natural heritage mapping on the MNRF's Land Information Ontario Website (MNRF 2022a) identifies the Hungry Hollow PSW and Georgetown Credit Valley Life Science Area of Natural and Scientific Interest (ANSI) along the Silver Creek Corridor. The Churchville-Norval PSW Complex is identified along the Credit River north of Highway 7 and the Levi's Creek PSW Complex is identified along the tributary to Levi's Creek. Five unevaluated wetlands are identified on MNRF mapping in the large agricultural field north of 10 Side Road. Additional designated natural areas identified during the background review include:

- CVC regulated features (Ontario Regulation 160/06), including floodplain associated with Silver Creek, the Credit River, and a tributary to Levi's Creek.
- Key features within the Greenbelt and Regional Natural Heritage Systems identified in Region of Halton Official Plan include: the Silver Creek Corridor, the Levi Creek Corridor, and the woodlands on the north and east sections of the Study Area. Enhancement Areas, Linkages and Buffers are also identified along the southern edge of the key features.

- The woodlands on the northern border of the Study Area and the Silver Creek Corridor are identified as part of the Greenbelt Area in the Growth Plan for the Greater Golden Horseshoe (Province of Ontario 2019) and Protected Countryside in the Greenbelt Plan.
- The Credit River Watershed Natural Heritage System (CRWNHS) Final Technical Report (CVC 2015) identifies High Functioning Significant Valleylands along the Silver Creek Corridor and from the top of slope at the edge of the agricultural field to the north side of the Credit River. The woodlands in the Study Area are identified in the CRWNHS Final Technical Report as High Functioning and Supporting Woodlands.
- The Russell's Hills of Pines overlaps with the FOCM6-1. This feature was recommended for designation as a cultural heritage feature in the Town of Halton Hills in a report from Rukshan de Silva to the Community Affairs Committee of the Town of Halton Hills on April 27, 2017.

Terrestrial SAR and SOCC

Records of SAR and SOCC identified during the background review are presented in **Table 9 and Table 13, Appendix C.** Other species which may be present based on range overlap (MECP 2023) and general habitat availability include: Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis and Tri-colored Bat.

The Credit River West Branch (Silver Creek) within the Study Area is a permanent, coolwater, fish-bearing river (CVC 2016). According to the LIO database, Silver Creek has a coldwater thermal regime (MNRF 2022a). The Study Area also contains a permanent, warmwater Tributary to Levi's Creek and a Tributary to Silver Creek that has a permanent flow regime and a coldwater thermal regime (MNRF 2022a) (Figure 5).

The CVC Natural Areas Inventory (NAI) identified 23 fish species in or connected to watercourses in the Study Area within the Mountainview-Delrex NAI Area (CVC 2016). A detailed species list is not included in the Mountainview-Delrex information summary. There are no historical fish sampling locations within the Study Area (MNRF 2022a). The following fish species were documented in Silver Creek in 2018 near the confluence with the unnamed tributary to Silver Creek: Blacknose Dace, Brown Trout, Longnose Dace, Mottled Sculpin, Rainbow Trout, and White Sucker (MNRF 2022a).

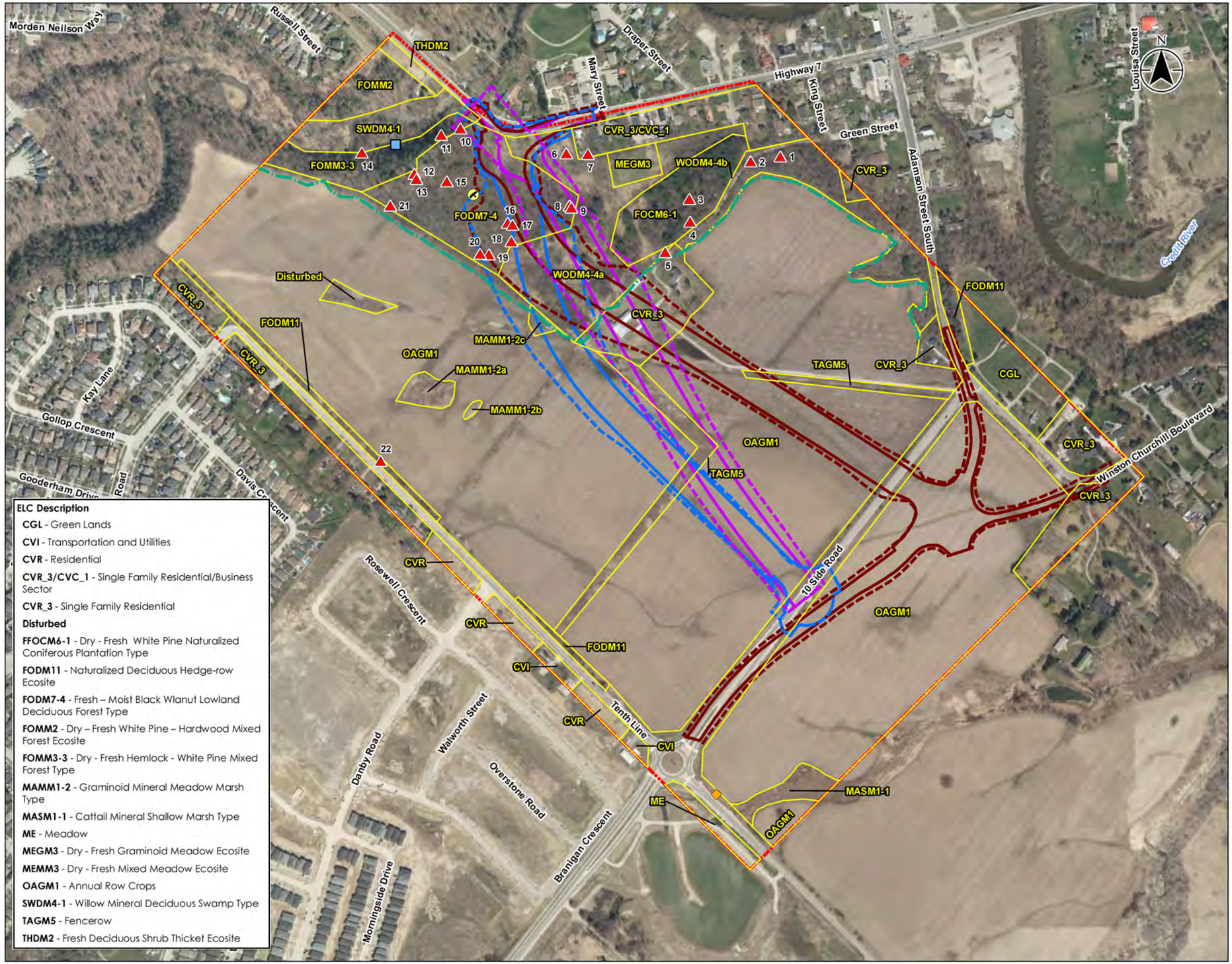
Aquatic SAR

A background review was completed to identify aquatic SAR or rare species in or within the vicinity of the Study Area.There are no records of aquatic SAR within the Study Area; however, there are records of Redside Dace (*Clinostomus elongatus*) in Silver Creek approximately 3 km upstream of the Study Area, and in Levi's Creek approximately 2.5 km downstream of the Study Area (DFO 2023). With respect to Redside Dace, MECP provided the following information (MECP 2020):

- The segment of Silver Creek within the Study Area, including its tributaries, are not regulated Redside Dace Habitat
- The tributary to Levi's Creek in the southwest corner of the Study Area is Contributing Habitat.

MECP also advised of an observation of American Eel (*Anguilla rostrata*) in Silver Creek immediately north of the Study Area in 2014 (MECP 2020).

Table of Contents for Exhibits and Tables



ELC Description

CGL - Green Lands

CVI - Transportation and Utilities

CVR - Residential

CVR_3/CVC_1 - Single Family Residential/Business Sector

CVR_3 - Single Family Residential

Disturbed

FFOCM6-1 - Dry - Fresh White Pine Naturalized Coniferous Plantation Type

FODM11 - Naturalized Deciduous Hedge-row Ecosite

FODM7-4 - Fresh – Moist Black Wlanut Lowland Deciduous Forest Type

FOMM2 - Dry – Fresh White Pine – Hardwood Mixed Forest Ecosite

FOMM3-3 - Dry - Fresh Hemlock - White Pine Mixed Forest Type

MAMM1-2 - Graminoid Mineral Meadow Marsh Type

MASM1-1 - Cattail Mineral Shallow Marsh Type

ME - Meadow

MEGM3 - Dry - Fresh Graminoid Meadow Ecosite

MEMM3 - Dry - Fresh Mixed Meadow Ecosite

OAGM1 - Annual Row Crops

SWDM4-1 - Willow Mineral Deciduous Swamp Type

TAGM5 - Fencerow

THDM2 - Fresh Deciduous Shrub Thicket Ecosite

Stantec

Legend

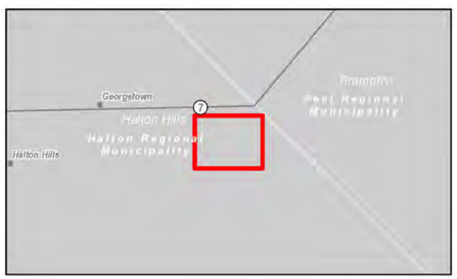
- Study Area
- Preliminary Preferred ROW Limits (Alignment B3)
- Preliminary Preferred Grading Limits (Alignment B3)
- Alignment B1 ROW Limts
- Alignment B1 Grading Limits
- Alignment B2 ROW Limits
- Alignment B2 Grading Limits
- Eastern Wood-Pewee
- Chimney Crayfish
- Vernal Pool
- Potential Bat Maternity Roost Tree
- Woodland Boundary (dripline staked by Halton Region on September 12, 2020)
- ELC Area

0 300 Metres

1:5,500 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2019.



Project Location
Municipality of Halton, ON

165010598 REV4
Prepared by BCC on 2024-02-20
Technical Review by ABC on yyyy-mm-dd
Independent Review by ABC on yyyy-mm-dd

Client/Project
REGIONAL MUNICIPALITY OF HALTON
NORVAL WEST BYPASS
ENVIRONMENTAL IMPACT ASSESSMENT

Figure No.
4

Title
Ecological Land Classification and Terrestrial Survey Results

Table 1: Ecological Land Classification Vegetation Communities in the Study Area

ELC Type	ELC Code	ELC Description	ELC Details
Forest	FOCM6-1	Dry – Fresh White Pine Naturalized Coniferous Plantation Type	The FOCM6 community, in part, represents the Russell's Hills of Pines Woodland that is being considered for a potential heritage status. This community is comprised mostly of mid-aged planted white pine, and it occurs on the valley slope between the main agricultural field and Highway 7. Trees are more mature, and vegetation is more naturalized at the west end of the feature. White pine dominates the canopy. Black cherry, trembling aspen, white elm, green ash, and sugar maple are occasional associates in the canopy and understory layers. The shrub and ground layers are denser at the west end of the feature, with an abundance of chokecherry, common buckthorn, garlic mustard, avens species and enchanter's nightshade.
	FODM7-4	Fresh – Moist Black Walnut Lowland Deciduous Forest Ecosite	The FODM7-4 community represents a mature black walnut forest that overlaps, in part, with the Georgetown Credit Valley Life Science ANSI. This community is located on the valley slope between the main agricultural field and Highway 7. The canopy is dominated by black walnut, with sugar maple, white pine, American basswood, and trembling aspen as associates in the canopy, and an abundance of sugar maple and green ash in the understory. The relatively dense shrub layer is dominated by chokecherry, green ash, sugar maple and common buckthorn, and the equally dense ground cover is dominated by Virginia creeper, white avens and enchanter's nightshade.
	FOMM2	Dry – Fresh White Pine – Hardwood Mixed Forest Ecosite	The FOMM2 community represents a mixed forest community on the north side of Silver Creek comprised of white pine, red oak, and sugar maple in the canopy.
	FOMM3-3	Dry – Fresh Hemlock – White Pine Mixed Forest Type	The FOMM3-3 community represents a mature forest along the top of slope of the Silver Creek Valley. The canopy is comprised of sugar maple, eastern hemlock, white pine, and black cherry. Shrub and ground cover is sparse in this community.
Woodland	WODM4-4	Dry – Fresh Black Walnut Deciduous Woodland Type	The WODM4-4a community represents a relatively large open woodland located north of the farmhouse on the valley slope and on tablelands at the bottom of the slope. The canopy is dominated by black walnut, with occasional trembling aspen, white elm, and green ash. The understory is comprised of Manitoba maple, trembling aspen, and green ash. Ground cover is dominated by garlic mustard, grasses, yellow avens and enchanter's nightshade. The WODM4-4b community occurs along the northern edge of the Study Area east of the WODM4-4a woodland. Vegetation cover is comprised of black walnut, white pine, and Manitoba maple. Common buckthorn is abundant in the shrub layer, and grasses dominate the ground layer.
Thicket	THDM2	Dry – Fresh Deciduous Shrub Thicket Ecosite	The THDM2 community represents a native deciduous regeneration thicket comprised of restoration plantings and a staghorn sumac thicket. The two community types were lumped together due to their small size. The community is located along the roadside on the south side of Highway 7, immediately west of Silver Creek.
Meadow	ME	Meadow	The ME community represents a linear area of cultural meadow along Tenth Line south of 10 Side Road.
	MEGM3	Dry – Fresh Graminoid Meadow Ecosite	The MEGM3 community represents a graminoid meadow immediately south of the businesses and residences along Highway 7. The center of the meadow is mown periodically, and the edges are beginning to succeed with black walnut saplings.
Wetland	MAMM1-2	Cattail Graminoid Mineral Meadow Marsh Type	The MAMM1-2 community represents three meadow marshes located in the main agricultural field north of 10 Side Road. Each feature is dominated by narrow-leaved cattail and there was little to no standing water observed. MAMM1-2a is the largest of the three. Vegetation is comprised of narrow-leaved cattail with an abundance of purple loosestrife and climbing nightshade. Missouri willow and red-osier dogwood are also present in the shrub layer. MAMM1-2b is a tiny wetland inclusion adjacent to the MAMM1-2a wetland. MAMM1-2c is located directly adjacent to the WODM4-4a woodland at the top of the slope.
	MASM1-1	Cattail Mineral Shallow Marsh Type	The MASM1-1 community represents a shallow marsh along the tributary to Levi's Creek. The wetland is part of the Levi's Creek PSW Complex, and it is dominated by narrow-leaved cattail, with an abundance of reed canary grass.
	SWDM4-1	Willow Mineral Deciduous Swamp Type	The SWDM4-1 community represents a deciduous swamp at the bottom of the valley slope along Silver Creek. The canopy is dominated by crack willow, with an abundance of black walnut, white elm, and Manitoba maple. Manitoba maple dominates the understory. The ground layer has an abundance of highly invasive goutweed and garlic mustard. Ostrich fern is also present in high abundance in the ground layer.
Cultural	FODM11	Naturalized Deciduous Hedgerow	The FODM11 community represents planted deciduous hedgerows that have naturalized along the edge of the agricultural field along Tenth Line, north of 10 Side Road.
	TAGM5	Fencerow	The TAGM5 community represents highly disturbed fencerow features where agricultural debris has been stockpiled. Vegetation is dominated by wild red raspberry. The TAGM5 community along the farmhouse driveway is also comprised of staghorn sumac and trembling aspen saplings.
Agricultural	OAGM1	Annual Row Crops	The OAGM1 community represents active agricultural lands planted with wheat in 2020.

ELC Type	ELC Code	ELC Description	ELC Details
Constructed	CGL	Green Lands	The CGL community represents a cemetery on the north side of the intersection of Winston Churchill Boulevard and 10 Side Road.
	CVC_1	Business Sector	The CVC_1 community represents local businesses along Highway 7 in the Hamlet of Norval.
	CVI	Transportation and Utilities	The CVI community represents utility buildings on the south side of Tenth Line and north of 10 Side Road.
	CVR	Residential	The CVR community represents lands cleared for residential development on the south side of Tenth Line and north of 10 Side Road.
	CVR_3	Single Family Residential	The CVR_3 community represents the farmhouse and barn in the center of the Study Area and multiple single-family residences along the edges of the Study Area.

Table 2 - Tree Analysis

BHA Tree Analysis (version: December 2013)

This table is to be completed by a designated Butternut Health Assessor (BHA).

BHA Report #	3	Assessment Date(s)	25-Aug-20	Total # Butternut Trees in BHA Report	6
BHA ID #	633	BHA Name	Kayla Ellis		
Landowner / Client Name			Jeffery Reid		
Property Location			1649 10Side Road, Georgetown		

input field data										automatic calculations from field data						Categories: 1: non-retainable, 2: retainable, 3: archivable				
			# bole cankers				# root flare (RF) cankers													
Tree #	Live Crown %	Tree dbh (cm)	sooty (S) (will be assigned 2.5 cm per canker)		open (O) (will be assigned 5 cm per canker)				<40 m from cankered tree? (Y or N)	Circ. (cm) = Pi x dbh	total bole canker width (sooty x 2.5 + open x 5)	total RF canker width (sooty x 2.5 + open x 5)	bole canker % of circ.	RF canker % of circ.	total bole & root canker % of 2xCirc	LC% >/= 50 & BC% = 0	LC% >70 & BRC % <20	LC% >70 & BC % <20	Preliminary tree call	FINAL TREE CALL a Cat 2, dbh>20cm <40m from a Cat 1
			S <2 m	S >2 m	O <2 m	O >2 m	RF S	RF O		Circ (cm)	BC (cm)	RC (cm)	BC%	RC%	BRC%					
11	75	26	0	0	4	3	1	3	n	81.64	35.0	17.5	**42.9**	**21.4**	**32.2**	1	1	1	**1**	**1**
10	60	31	7	1	1	4	1	3	n	97.34	45.0	17.5	**46.2**	**18.0**	**32.1**	1	1	1	**1**	**1**
6	30	25	9	0	4	0	0	0	n	78.5	42.5	0.0	**54.1**	**0.0**	**27.1**	1	1	1	**1**	**1**
1	10	43	9	0	5	0	0	8	n	135	47.5	40.0	**35.2**	**29.6**	**32.4**	1	1	1	**1**	**1**
2	0	31							n	97.34	0.0	0.0	**0.0**	**0.0**	**0.0**	1	1	1	**1**	**1**
3	0	70							n	219.8	0.0	0.0	**0.0**	**0.0**	**0.0**	1	1	1	**1**	**1**

Table 2 - Detailed Vascular Plant Species List

Vascular Plant Species Recorded During Field Investigations

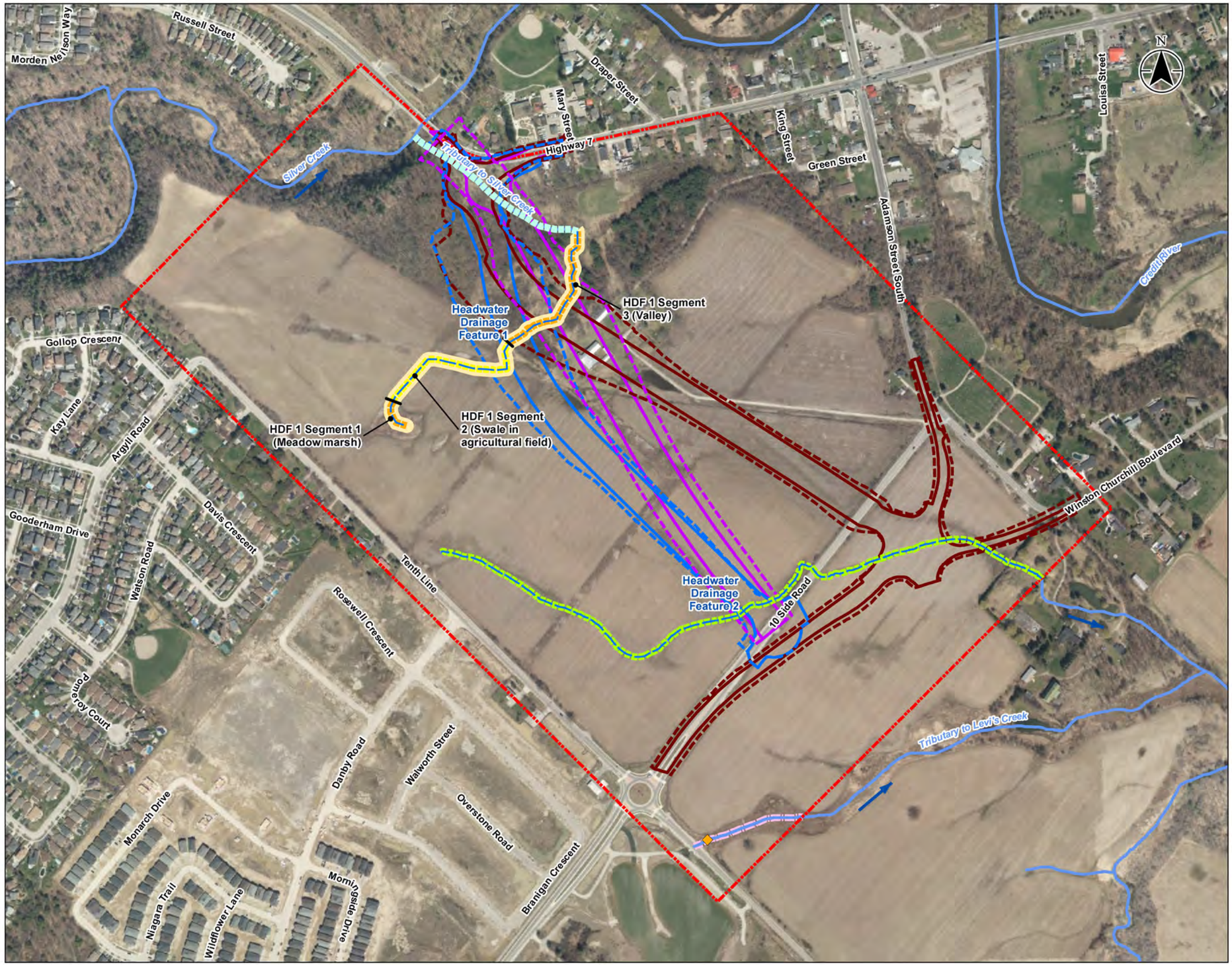
SCIENTIFIC NAME	COMMON NAME	PROVINCIAL STATUS (S-RANK)	SARO STATUS	COSEWIC STATUS	COEFFICIENT OF CONSERVATISM (C VALUE)	COEFFICIENT OF WETNESS
PTERIDOPHYTES (Ferns and Allies)						
Dryopteris carthusiana	Spinulose Wood Fern	S5			5	-3
Equisetum arvense	Field Horsetail	S5			0	0
Matteuccia struthiopteris	Ostrich Fern	S5			5	0
Onoclea sensibilis	Sensitive Fern	S5			4	-3
GYMNOSPERMS (Conifers)						
Juniperus virginiana	Eastern Red Cedar	S5			4	3
Picea abies	Norway Spruce	SE3				5
Picea glauca	White Spruce	S5			6	3
Pinus strobus	Eastern White Pine	S5			4	3
Pinus sylvestris	Scots Pine	SE5				3
Thuja occidentalis	Eastern White Cedar	S5			4	-3
Tsuga canadensis	Eastern Hemlock	S5			7	3
ANGIOSPERMS (Dicots)						
Acer negundo	Manitoba Maple	S5			0	0
Acer platanoides	Norway Maple	SE5				5
Acer saccharum	Sugar Maple	S5			4	3
Aegopodium podagraria	Goutweed	SE5				0
Ageratina altissima	White Snakeroot	S5			5	3
Agrimonia gryposepala	Hooked Agrimony	S5			2	3
Alliaria petiolata	Garlic Mustard	SE5				0
Ambrosia artemisiifolia	Common Ragweed	S5			0	3
Amelanchier sp.	Serviceberry species	SNA				
Anemonastrum canadense	Canada Anemone	S5			3	-3
Arctium minus	Common Burdock	SE5				3
Asclepias syriaca	Common Milkweed	S5			0	5
Betula papyrifera	Paper Birch	S5			2	3
Carduus nutans	Nodding Thistle	SE5				3
Carya cordiformis	Bitternut Hickory	S5			6	0
Cerastium fontanum	Common Mouse-ear Chickweed	SE5				3
Chelidonium majus	Greater Celandine	SE5				5
Chenopodium album	Common Lamb's-quarters	SE5				3
Cichorium intybus	Wild Chicory	SE5				5
Circaea canadensis	Broad-leaved Enchanter's Nightshade	S5			2	3
Cirsium arvense	Canada Thistle	SE5				3
Cirsium vulgare	Bull Thistle	SE5				3
Convolvulus arvensis	Field Bindweed	SE5				5
Cornus alternifolia	Alternate-leaved Dogwood	S5			6	3

SCIENTIFIC NAME	COMMON NAME	PROVINCIAL STATUS (S-RANK)	SARO STATUS	COSEWIC STATUS	COEFFICIENT OF CONSERVATISM (C VALUE)	COEFFICIENT OF WETNESS
Cornus sericea	Red-osier Dogwood	S5			2	-3
Crataegus sp.	Hawthorn species	SNA				
Daucus carota	Wild Carrot	SE5				5
Dianthus armeria	Deptford Pink	SE5				5
Dipsacus fullonum	Common Teasel	SE5				3
Echinocystis lobata	Wild Cucumber	S5			3	-3
Epilobium sp.	Willowherb species	SNA				
Erigeron annuus	Annual Fleabane	S5			0	3
Erigeron canadensis	Canada Horseweed	S5			0	3
Erigeron philadelphicus	Philadelphia Fleabane	S5			1	-3
Eutrochium maculatum	Spotted Joe Pye Weed	S5			3	-5
Fagus grandifolia	American Beech	S4			6	3
Fragaria vesca	Woodland Strawberry	S5			4	3
Fragaria virginiana	Wild Strawberry	S5			2	3
Fraxinus pennsylvanica	Red Ash	S4			3	-3
Galium aparine	Common Bedstraw	S5			4	3
Galium asprellum	Rough Bedstraw	S5			6	-5
Geranium robertianum	Herb-Robert	S5			2	3
Geum aleppicum	Yellow Avens	S5			2	0
Geum canadense	Canada Avens	S5			3	0
Glechoma hederacea	Ground-ivy	SE5				3
Hackelia virginiana	Virginia Stickseed	S5			5	3
Hesperis matronalis	Dame's Rocket	SE5				3
Hieracium sp.	Hawkweed species	SE				
Hydrophyllum virginianum	Virginia Waterleaf	S5			6	0
Hypericum perforatum	Common St. John's-wort	SE5				5
Impatiens capensis	Spotted Jewelweed	S5			4	-3
Inula helenium	Elecampane	SE5				3
Juglans cinerea	Butternut	S2?	END	END	6	3
Juglans nigra	Black Walnut	S4?			5	3
Laportea canadensis	Canada Wood Nettle	S5			6	-3
Lapsana communis	Common Nipplewort	SE5				3
Leonurus cardiaca	Common Motherwort	SE5				5
Leucanthemum vulgare	Oxeye Daisy	SE5				5
Lonicera tatarica	Tatarian Honeysuckle	SE5				3
Lotus corniculatus	Garden Bird's-foot Trefoil	SE5				3
Lysimachia arvensis	Scarlet Pimpernel	SE4				3
Lysimachia ciliata	Fringed Yellow Loosestrife	S5			4	-3
Lythrum salicaria	Purple Loosestrife	SE5				-5
Malus pumila	Common Apple	SE4				5

SCIENTIFIC NAME	COMMON NAME	PROVINCIAL STATUS (S-RANK)	SARO STATUS	COSEWIC STATUS	COEFFICIENT OF CONSERVATISM (C VALUE)	COEFFICIENT OF WETNESS
Matricaria chamomilla	Wild Chamomile	SE3				5
Medicago lupulina	Black Medick	SE5				3
Myosotis arvensis	Field Forget-me-not	SE4				3
Nepeta cataria	Catnip	SE5				3
Oxalis stricta	Upright Yellow Wood-sorrel	S5			0	3
Parthenocissus quinquefolia	Virginia Creeper	S4?			6	3
Podophyllum peltatum	May-apple	S5			5	3
Populus tremuloides	Trembling Aspen	S5			2	0
Potentilla recta	Sulphur Cinquefoil	SE5				5
Prunella vulgaris	Common Self-heal	S5			0	0
Prunus serotina	Black Cherry	S5			3	3
Prunus virginiana	Chokecherry	S5			2	3
Quercus rubra	Northern Red Oak	S5			6	3
Ranunculus acris	Common Buttercup	SE5				0
Ranunculus recurvatus	Hooked Buttercup	S5			4	-3
Rhamnus cathartica	European Buckthorn	SE5				0
Rhus typhina	Staghorn Sumac	S5			1	3
Ribes cynosbati	Eastern Prickly Gooseberry	S5			4	3
Rorippa sp.	Mustard species	SE				
Rosa sp.	Rose species	SNA				
Rubus idaeus	Red Raspberry	S5			2	3
Rubus occidentalis	Black Raspberry	S5			2	5
Salix eriocephala	Cottony Willow	S5			4	-3
Salix euxina	Crack Willow	SE				0
Salix sp.	Willow species	SNA				
Sambucus racemosa	Red Elderberry	S5			5	3
Sanguinaria canadensis	Bloodroot	S5			5	3
Silene latifolia	White Campion	SE5				5
Solanum dulcamara	Bittersweet Nightshade	SE5				0
Solidago canadensis	Canada Goldenrod	S5			1	3
Solidago flexicaulis	Zigzag Goldenrod	S5			6	3
Symphyotrichum lanceolatum	Panicled Aster	S5			3	-3
Symphyotrichum lateriflorum	Calico Aster	S5			3	0
Taraxacum officinale	Common Dandelion	SE5				3
Thalictrum pubescens	Tall Meadow-rue	S5			5	-3
Thlaspi arvense	Field Pennycress	SE5				5
Tilia americana	Basswood	S5			4	3
Trifolium hybridum	Alsike Clover	SE5				3
Tussilago farfara	Coltsfoot	SE5				3
Ulmus americana	White Elm	S5			3	-3

SCIENTIFIC NAME	COMMON NAME	PROVINCIAL STATUS (S-RANK)	SARO STATUS	COSEWIC STATUS	COEFFICIENT OF CONSERVATISM (C VALUE)	COEFFICIENT OF WETNESS
Urtica dioica	Stinging Nettle	S5			2	0
Verbascum thapsus	Common Mullein	SE5				5
Veronica officinalis	Common Speedwell	SE5				5
Viburnum opulus	Cranberry Viburnum	S5			5	-3
Vicia cracca	Tufted Vetch	SE5				5
Viola arvensis	European Field Pansy	SE4				5
Viola sp.	Violet species	SNA				
Vitis riparia	Riverbank Grape	S5			0	0
ANGIOSPERMS (Monocots)						
Arisaema triphyllum	Jack-in-the-pulpit	S5			5	-3
Asparagus officinalis	Garden Asparagus	SE5				3
Convallaria majalis	European Lily-of-the-valley	SE5				5
Dactylis glomerata	Orchard Grass	SE5				3
Elymus sp.	Rye species	SNA				
Epipactis helleborine	Broad-leaved Helleborine	SE5				3
Erythronium americanum	Yellow Trout-lily	S5			5	5
Hemerocallis fulva	Orange Daylily	SE5				5
Juncus sp.	Rush species	SNA				
Leersia oryzoides	Rice Cutgrass	S5			3	-5
Lilium michiganense	Michigan Lily	S4			7	-3
Phalaris arundinacea	Reed Canarygrass	S5			0	-3
Phleum pratense	Common Timothy	SE5				3
Poa pratensis	Kentucky Bluegrass	S5			0	3
Scirpus atrovirens	Dark-green Bulrush	S5			3	-5
Streptopus lanceolatus	Rose Twisted-stalk	S5			7	3
Trillium grandiflorum	White Trillium	S5			5	3
Typha angustifolia	Narrow-leaved Cattail	SE5				-5

FLORISTIC SUMMARY	TOTAL
Total Species	138
Native Species (S1-S5)	74
Introduced (exotic) species (SE)	56
Identified to Genus only (SNA)	8
Species at Risk in Ontario (END, THR or SC)	1
Rare in Ontario (S1, S2 or S3)	1
Uncommon to common in Ontario (S4)	5
Common to very common in Ontario (S5)	68
Highly sensitive plant species with C value greater than 7	0



Stantec

Legend

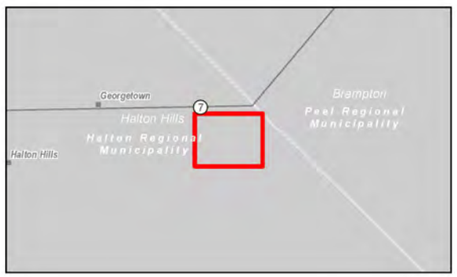
- Study Area
- Preliminary Preferred ROW Limits (Alignment B3)
- Preliminary Preferred Grading Limits (Alignment B3)
- Alignment B1 ROW Limts
- Alignment B1 Grading Limits
- Alignment B2 ROW Limits
- Alignment B2 Grading Limits
- Fishing Station
- Watercourse (Permanent) (Source: NDMNRF 2022a)
- Flow Direction
- Fish Habitat Survey Location
- Headwater Drainage Feature (Source: Stantec 2020)
- Conservation
- Mitigation
- No Mitigation Required
- No Visible Feature
- REgulated by CVC (CVC 2023)

0 300 Metres

1:5,500 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2022.



Project Location
Municipality of Halton, ON

165010598 REV4
Prepared by BCC on 2024-06-07
Technical Review by ABC on yyyy-mm-dd
Independent Review by ABC on yyyy-mm-dd

Client/Project
REGIONAL MUNICIPALITY OF HALTON
NORVAL WEST BYPASS
ENVIRONMENTAL IMPACT ASSESSMENT

Figure No.
6

Title
Fish Habitat and Headwaters Assessment

Photo 1: HDF-1 Segment 2, facing Segment 1 to south (upstream) – first visit (April 24, 2020).

Photo 2: HDF-1 Segment 2 facing north (downstream) – first visit (April 24, 2020).

Photo 3: HDF-1 Segment 2 facing Segment 1 to south (upstream) – second visit (May 25, 2020).

Photo 4: HDF-1 Segment 2 facing north (downstream) – second visit (May 25, 2020).

Photo 5: HDF-1 Segment 3 facing north (downstream) – first visit (April 24, 2020).

Photo 6: HDF-1 Segment 3 facing south (upstream) – first visit (April 24, 2020).

Photo 7: HDF-1 Segment 3 facing north (downstream) – second visit (May 25, 2020).

Photo 8: HDF-1 Segment 3 facing south (upstream) – second visit (May 25, 2020).

Photo 9: HDF-1 Segment 3 facing north (downstream) – third visit (July 3, 2020).

Photo 10:HDF-1 Segment 3 facing south (upstream) – third visit (July 3, 2020).

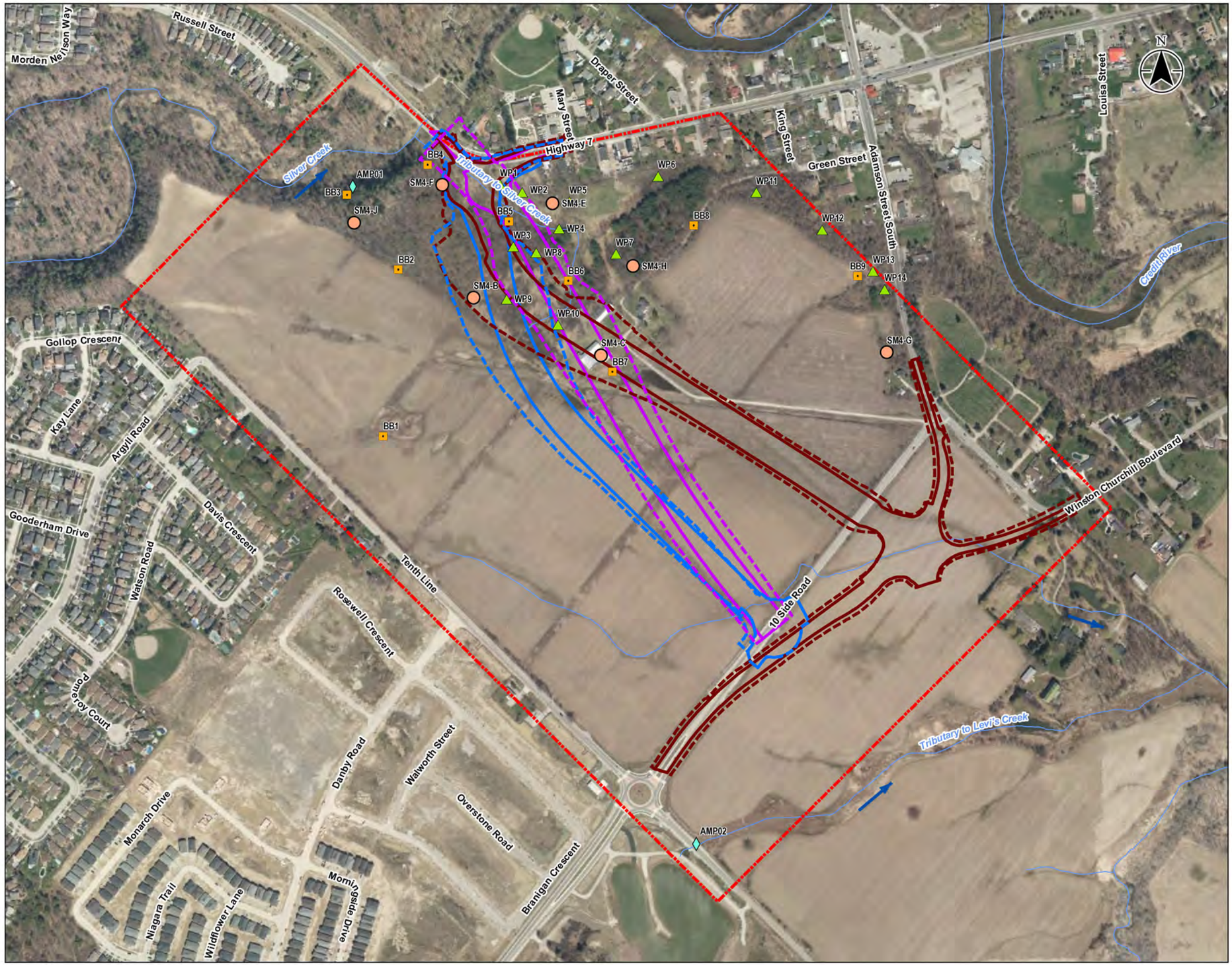
Photo 11: HDF-2 facing west (downstream) – first visit (April 24, 2020).

Photo 12: HDF-2 facing east (upstream) – first visit (April 24, 2020).

Photo 13: Tributary to Levi's Creek, west of Tenth Line, facing southwest (upstream).

Photo 14: Tributary to Levi's Creek, east of Tenth Line, facing east (downstream).

Photo 15: Tributary to Levi's Creek, east of Tenth Line, culvert outlet facing south.



Stantec

Legend

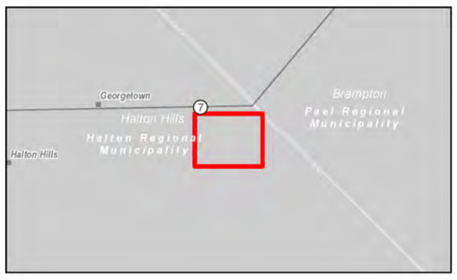
- Study Area
- Preliminary Preferred ROW Limits (Alignment B3)
- Preliminary Preferred Grading Limits (Alignment B3)
- Alignment B1 ROW Limts
- Alignment B1 Grading Limits
- Alignment B2 ROW Limits
- Alignment B2 Grading Limits
- Watercourse (Permanent)
- Flow Direction
- Breeding Bird Point Count Location
- Bat Acoustic Monitoring Location
- Amphibian Call Station
- Woodland Plot

0 300 Metres

1:5,500 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2019.



Project Location
Municipality of Halton, ON

165010598 REV4
Prepared by BCC on 2024-02-20
Technical Review by ABC on yyyy-mm-dd
Independent Review by ABC on yyyy-mm-dd

Client/Project
REGIONAL MUNICIPALITY OF HALTON
NORVAL WEST BYPASS
ENVIRONMENTAL IMPACT ASSESSMENT

Figure No.
3

Title
Terrestrial Survey Locations

Table 4 - Wildlife Recorded During Field Investigation

Wildlife Recorded During Field Investigations					
COMMON NAME	*SCIENTIFIC NAME*	ONTARIO STATUS	SARO	SARA	NOTES
BUTTERFLIES					
Cabbage White	*Pieris rapae*	SNA			
AMPHIBIANS					
American Toad	*Anaxyrus americanus*	S5			
Tetraploid Gray Treefrog	*Hyla versicolor*	S5			
Spring Peeper	*Pseudacris crucifer*	S5			
Northern Green Frog	*Lithobates clamitans*	S5			
Northern Leopard Frog	*Lithobates pipiens*	S5	NAR	NAR	
BIRDS					
Canada Goose	*Branta canadensis*	S5			non-breeding
Mourning Dove	*Zenaida macroura*	S5			
Killdeer	*Charadrius vociferus*	S5B, S5N			
Spotted Sandpiper	*Actitis macularia*	S5			
Great Blue Heron	*Ardea herodias*	S5			non-breeding
Turkey Vulture	*Cathartes aura*	S5B			non-breeding
Belted Kingfisher	*Megaceryle alcyon*	S4B			non-breeding
Red-bellied Woodpecker	*Melanerpes carolinus*	S4			
Downy Woodpecker	*Dryobates pubescens*	S5			
Northern Flicker	*Colaptes auratus*	S4B			
Eastern Wood-Pewee	*Contopus virens*	S4B	SC	SC	
Eastern Phoebe	*Sayornis phoebe*	S5B			
Great Crested Flycatcher	*Myiarchus crinitus*	S4B			
Eastern Kingbird	*Tyrannus tyrannus*	S4B			
Warbling Vireo	*Vireo gilvus*	S5B			
Red-eyed Vireo	*Vireo olivaceus*	S5B			
Blue Jay	*Cyanocitta cristata*	S5			
American Crow	*Corvus brachyrhynchos*	S5B			
Barn Swallow	*Hirundo rustica*	S4B			
Black-capped Chickadee	*Poecile atricapillus*	S5			
White-breasted Nuthatch	*Sitta carolinensis*	S5			
House Wren	*Troglodytes aedon*	S5B			
Swainson's Thrush	*Catharus ustulatus*	S4B			non-breeding
American Robin	*Turdus migratorius*	S5B			
Gray Catbird	*Dumetella carolinensis*	S4B			
European Starling	*Sturnus vulgaris*	SNA			
House Sparrow	*Passer domesticus*	SNA			
American Goldfinch	*Spinus tristis*	S5B			
Song Sparrow	*Melospiza melodia*	S5B			
Swamp Sparrow	*Melospiza georgiana*	S5B			
Baltimore Oriole	*Icterus galbula*	S4B			
Red-winged Blackbird	*Agelaius phoeniceus*	S4			
Common Grackle	*Quiscalus quiscula*	S5B			
Northern Cardinal	*Cardinalis cardinalis*	S5			
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	S4B			
Indigo Bunting	*Passerina cyanea*	S4B			
MAMMALS					
Small-footed Myotis	*Myotis leibii*	S2S3	END		
Little Brown Myotis	*Myotis lucifugus*	S4	END	END	
Silver-haired Bat	*Lasionycteris noctivagans*	S4			
Tri-colored Bat	*Perimyotis subflavus*	S3?	END	END	
Red Bat	*Lasiurus borealis*	S4			
Big Brown Bat	*Eptesicus fuscus*	S5			
Hoary Bat	*Lasiurus cinereus*	S4			
Eastern Cottontail	*Sylvilagus floridanus*	S5			
Eastern Chipmunk	*Tamias striatus*	S5			
Grey Squirrel	*Sciurus carolinensis*	S5			
Red Squirrel	*Tamiasciurus hudsonicus*	S5			
Coyote	*Canis latrans*	S5			
White-tailed Deer	*Odocoileus virginianus*	S5			

SUMMARY	
Total Butterflies:	*1*
Total Amphibians:	
Total Reptiles:	
Total Birds:	*37*
Total Breeding Birds:	
Total Mammals:	
Explanation of Status and Acronymns	
COSSARO: Committee on the Status of Species at Risk in Ontario	
COSEWIC: Committee on the Status of Endangered Wildlife in Canada	
S1: Critically Imperiled—Critically imperiled in the province (often 5 or fewer occurrences)	
S2: Imperiled—Imperiled in the province, very few populations (often 20 or fewer),	
S3: Vulnerable—Vulnerable in the province, relatively few populations (often 80 or fewer)	
S4: Apparently Secure—Uncommon but not rare	
S5: Secure—Common, widespread, and abundant in the province	
SX: Presumed extirpated	
SH: Possibly Extirpated (Historical)	
SNR: Unranked	
SU: Unrankable—Currently unrankable due to lack of information	
SNA: Not applicable—A conservation status rank is not applicable because the species is not a suitable target for conservation activities.	
S#S#: Range Rank—A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species	
S#B- Breeding status rank	
S#N- Non Breeding status rank	
?: Indicates uncertainty in the assigned rank	
END: Endangered	
THR: Threatened	
SC: Special Concern	
NAR: Not At Risk	
LATEST STATUS UPDATE	
Odonata: Sept 2020	
Butterflies: Sept 2020	
Bumble Bees: Sept 2020	
Other Arthropods: Sept 2020	
Terrestrial Molluscs: Sept 2020	
Amphibans: Sept 2020	
Reptiles: Sept 2020	
Birds: Sept 2020	
Mammals: Sept 2020	
S and G ranks and explanations: December 2011	
NOTE	
All rankings for birds refer to breeding birds unless the ranking is followed by N	
REFERENCES	
COSSARO Status	
Endangered Species Act, 2007 (Bill 184). Species at Risk in Ontario List.	
COSEWIC Status	
COSEWIC. 2007. Canadian Species at Risk. Committee on the Status of Endangered Wildlife in Canada.	

Table 5 – Amphibian Survey Results

Station	Date	Species				Notes
		AMTO	GRFR	GRTR	SPPE	
AMP01 (vernal pool)	April 2020					No calls recorded
	May 2020					No calls recorded
	June 2020					No calls recorded
AMP02 (Tributary to Levi's Creek)	April 2020					No calls recorded, but an abundance of GRFR tadpoles were observed
	May 2020	1-1, 2-5*			1-1*	
	June 2020		1-3	1-1*		

* Denotes that the call was recorded > 100m from the amphibian survey station

Table 6 - Potential Bat Maternity Roost Trees Observed

Tree #	Species	Approximate DBH (cm)	Estimated Tree Height (m)	Estimated Cavity Height (m)
1	Snag	50	13	12
2	White Ash	90	22	12
3	Snag	80	20	Not Recorded
4	Snag	15	10	4
5	Manitoba Maple	40, 30	12	6
6	Snag	45, 45, 40	13	9
7	Black Walnut	50	16	10
8	White Pine	45	24	Not Recorded
9	White Pine	100, 70	28	Not Recorded
10	Snag	50	12	10
11	Snag	60	12	5
12	Snag	60	5	2
13	Snag	Not Recorded	6	6
14	Sugar Maple	65	24	15
15	White Pine	75	25	20
16	Black Walnut	75	25	11
17	White Pine	70	28	14
18	Snag	50	18	12
19	Black Walnut	70	22	8
20	White Pine	65	22	4
21	Snag	75	10	9
22	Red Oak	50	18	15

Table 7 – Potential Bat Maternity Roost Tree Suitability Criteria

Tree #	One of tallest trees in community	Exhibits cavities/ crevices/ scars/ woodpecker holes	Largest DBH in community	Cavity or crevice is high up in tree (>10m)	Within highest density or cluster of cavity trees	Large amount of loose, peeling bark	Open canopy	Early stages of decay (class 1-3)	Number of Suitability Criteria met
1		X		X			X		3
2	X	X	X	X				X	5
3			X			X	X		3
4		X							1
5		X				X	X	X	4
6						X	X		2
7		X		X			X		3
8						X		X	2
9	X		X			X	X	X	5
10		X							1
11		X							1
12		X							1
13		X							1
14		X		X		X		X	4
15			X			X		X	3
16	X	X	X	X					4
17	X	X	X						3
18		X		X					2
19	X	X	X						3
20	X	X							2
21		X					X		2
22	X	X	X	X		X	X	X	7

Table 8 - Bat Acoustic Survey Results

Bat Monitoring Station	Big Brown Bat	Eastern Red Bat	Hoary Bat	Silver-haired bat	Species at Risk					No ID	Total Bat Calls per Station
					Little Brown Myotis	Northern Myotis	Tricolored Bat	Small-footed bat	Myotis sp.		
SM4-B	529	15	75	272	55	0	24	0	0	1045	2015
SM4-C	90	19	483	51	297	0	0	4	0	735	1679
SM4-E	249	6	330	128	15	0	2	0	0	284	1014
SM4-F	325	23	252	204	109	0	30	0	0	613	1556
SM4-G	120	5	83	79	6	0	0	0	0	245	538
SM4-H	134	35	173	60	185	0	4	20	0	247	858
SM4-J	64	3	92	31	1638	0	7	0	2	608	2445
Total Bat Calls per Species	1511	106	1488	825	2305	0	67	24	2	3777	10105

Table 9 - Species at Risk Habitat Assessment

Group	Common Name	Scientific Name	Provincial Status (S-rank)	SARO Status	SARA Status	Source	Habitat Description	Potential for habitat in the Study Area (Y/N)
Birds	Bank Swallow	*Riparia riparia*	S4B	THR	THR	eBird 2022, iNaturalist 2022	Nests in a wide variety of naturally and anthropogenically created vertical banks, which often erode and change over time including aggregate pits and the shores of large lakes and rivers (COSEWIC 2013a).	N: No exposed eroding banks in the Study Area to support Bank Swallow.
Birds	Bobolink	*Dolichonyx oryzivorus*	S4B	THR	THR	MNRF 2022b, Cadman et. al. 2007, eBird 2022	The Bobolink is generally referred to as a "grassland species". It nests primarily in forage crops with a mixture of grasses and broad-leaved forbs, predominantly hayfields and pastures. Preferred ground cover species include grasses such as Timothy and Kentucky bluegrass and forbs such as clover and dandelion (COSEWIC 2010).	N: No large grasslands in the Study Area to support Bobolink.
Birds	Chimney Swift	*Chaetura pelagica*	S4B, S4N	THR	THR	Cadman et. al. 2007, eBird 2022, iNaturalist 2022	Chimney Swift uses chimneys for roosting and breeding, and less commonly, nest in large hollow trees (Cadman et al. 2007).	N: No suitable chimney structures in the Study Area to support preferred breeding habitat for Chimney Swift. Forests and isolated trees in the Study Area are unlikely to be used do to the proximity of anthropogenic structures in adjacent urbanized areas.
Birds	Eastern Meadowlark	*Sturnella magna*	S4B	THR	THR	MNRF 2022b, Cadman et. al. 2007	Meadowlarks are ground nesting birds (Harrison 1975), which are often associated with human-modified habitats where they sing from prominent perches such as roadside wires, trees, and fenceposts. As a grassland species the Eastern Meadowlark typically occurs in meadows, hayfields and pastures. However, it will utilize a wider range of habitat than most grassland species, including mown lawn (e.g. golf course, parks), wooded city ravines, young conifer plantations and orchards (Peck and James 1983). The Eastern Meadowlark is generally tolerant of habitat with early succession of trees or shrubs. As with other grassland species, current threats are primarily the result of expanding urbanization and intensive farming practices (Cadman et al. 2007).	N: No suitable grasslands or meadows in the Study Area to support Eastern Meadowlark.

Group	Common Name	Scientific Name	Provincial Status (S-rank)	SARO Status	SARA Status	Source	Habitat Description	Potential for habitat in the Study Area (Y/N)
Birds	Eastern Whip-poor-will	*Antrostomus vociferus*	*S4B*	THR	THR	Cadman et. al. 2007	Favours open woodlands with frequent clearings. Its preferred nesting sites contain shaded leaf litter or pine needles and generally occur along wooded edges or in clearings without any herbaceous growth (Cadman et al. 1987). The species is considered to be area-sensitive, preferring 100 hectares of suitable habitat for breeding.	N: The woodlands in the Study Area are not large enough to provide habitat for this area-sensitive species.
Birds	Red-headed Woodpecker	*Melanerpes erythrocephalus*	*S4B*	END	END	Cadman et. al. 2007	Generally prefer open oak and beech forests, grasslands, forest edges, orchards, pastures, riparian forests, roadsides, urban parks, golf courses, cemeteries, as well as along beaver ponds and brooks.	N: Suitable habitat is present in the Study Area; however, Red-headed Woodpecker was not observed during field investigations.
Mammals	Eastern Small-footed Myotis	*Myotis leibii*	S2S3	END	Not listed	MECP 2022	Overwintering habitat: Caves and mines that remain above 0 degrees Celsuis; Maternal 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.	**Y: Confirmed during the bat acoustic survey at SM4-H in the FOCM6 forest community.**
Mammals	Little Brown Myotis	*Myotis lucifugus*	S4	END	END	MECP 2022	Overwintering habitat: Caves and mines that remain above 0 degrees Celsius; Maternal Roosts: Often associated with buildings (attics, barns etc.). Occasionally found in trees (25-44 cm dbh).	**Y: Confirmed during the bat acoustic survey at all stations.**
Mammals	Northern Myotis	*Myotis septentrionalis*	S3?	END	END	MECP 2022	Overwintering habitat: Caves and mines that remain above 0 degrees Celsius; Maternal Roosts: Often asssociated with cavities of large diameter trees (25-44 cm dbh). Occasionally found in structures (attics, barns etc.)	N: There were no Northern Myotis calls recorded at any of the bat monitoring stations during the bat acoustic surveys.
Mammals	Tri-colored Bat	*Perimyotis subflavus*	S3?	END	END	MECP 2022	The Tri-coloured Bat roosts in colonies in tree cavities (COSEWIC 2013b) in a wide variety of deciduous and coniferous forest stands. It it is strongly associated with forest watercourses and streamside vegetation (COSEWIC 2013b).	**Y: Confirmed during the bat acoustic survey at all stations with exception of SM4-C and SM4-G.**
Plants	Black Ash	*Fraxinus nigra*	S4	END	THR-NS	MNRF 2022	Occurs as a pure stand or in mixed stands with black spruce, balsam fir, eastern white-cedar, speckled alder, red maple, and silver maple; tolerates standing water, intolerant of shade. (Farrar 1995).	N: Black Ash was not observed during field investigations.

Group	Common Name	Scientific Name	Provincial Status (S-rank)	SARO Status	SARA Status	Source	Habitat Description	Potential for habitat in the Study Area (Y/N)
Plants	Butternut	*Juglans cinerea*	S3?	END	END	MECP 2022	Generally grows 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 also found, though seldomly, 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	**Y: Six Butternuts were recorded in the Study Area during terrestrial field investigations.**

Definitions:
SCIENTIFIC NAME: The scientific name as published by the Natural Heritage Information Centre
COMMON NAME: The common English name as published by the Natural Heritage Information Centre
S RANK: Subnational Rank; the provincial conservation status
SARO STATUS: Species at Risk in Ontario as defined by the Endangered Species Act, 2007
SARA STATUS: Federal status as defined by the Species at Risk Act

Endangered Species Act and Species at Risk Act Acronyms:
END: Endangered
THR: Threatened
SC: Special Concern
NAR: Not at Risk
END/THR followed by NS: Ranked by COSEWIC, but not listed on SARA Schedule 1

Subnational Rankings (S RANK):
SNR: Unranked
SU: Unrankable – Currently unrankable due to lack of information
SNA: Not applicable – A conservation status rank is not applicable because the species is not a suitable target for conservation activities
S#S#: Range Rank – A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species
?: Indicates uncertainty in the assigned rank
S1: Critically Imperiled – Critically imperiled in the province (often 5 or fewer occurrences)
S2: Imperiled – Imperiled in the province, very few populations (often 20 or fewer),
S3: Vulnerable – Vulnerable in the province, relatively few populations (often 80 or fewer)
S4: Apparently Secure – Uncommon but not rare
S5: Secure – Common, widespread, and abundant in the province
SX: Presumed extirpated
SH: Possibly Extirpated (Historical)
SE: Exotic in Ontario - Numeric range rank of 1 through 5 indicates abundance with 1 as the least abundant and 5 as the most

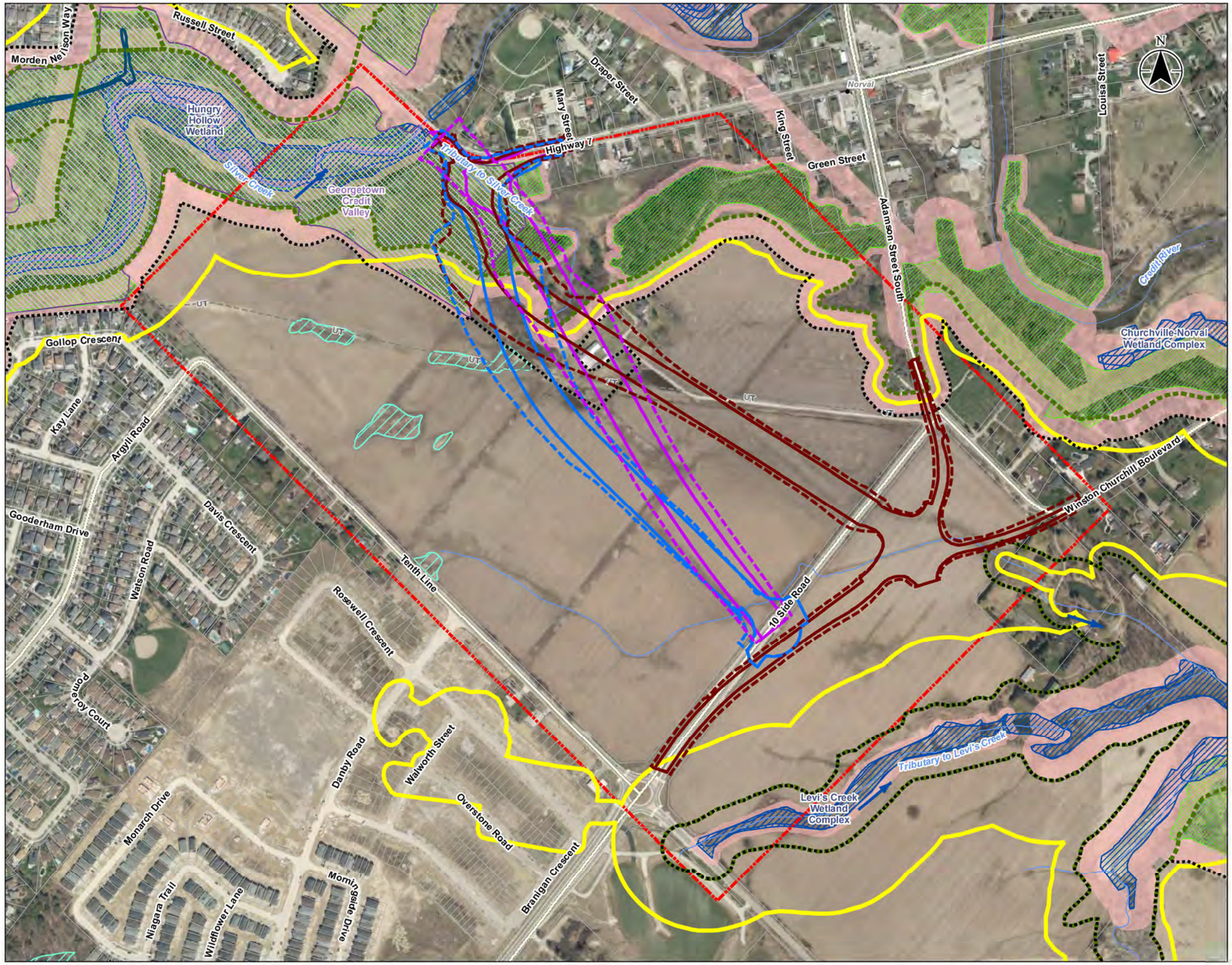
Table 10 – Aurora District MNRF Evaluation Criteria for Assessing Wetlands for Complexing

Wetland Criteria	Wetland Criteria met? (Y/N)		
	MAMM1-2a	MAMM1-2b	MAMM1-2c
1. Wetland occurs in site districts where wetlands are very rare or rare.	N	N	N
2. Wetland type is not well represented elsewhere in a wetland complex, covering 10% or less of the total wetland area.	N	N	N
3. Wetland sustains significant species/communities.	N	N	N
4. Wetland functions as amphibian breeding areas.	N	N	N
5. Wetland functions as migratory waterfowl stopover, summer feeding or waterfowl breeding areas.	N	N	N
6. Wetland is a headwater source areas or contributes base flows to watercourses.	Negligible	N	Negligible
7. Wetland is hydrologically connected to larger wetlands.	N	N	N
8. Wetland provides intervening wetland habitat between larger wetlands thereby acting as wildlife stepping stones.	N	N	N
9. Wetland is part of a larger wetland divided by a road, driveway, trail, or utility corridor.	N	N	N
10. Wetland is a kettle wetland, an uncommon wetland, restricted to moraines.	N	N	N
11. Wetlands occurs along corridors.	N	N	N

Table 11 – Halton Region Significant Woodlands Criteria

Halton Region Significant Woodlands Criteria		Significant Woodland Criteria met?
1.	the Woodland contains forest patches over 99 years old	Yes – Older forest patches occur in the FOMM3-3 and FOMM2 communities in the Silver Creek Corridor, including mature white pine, hemlock and sugar maple that may be older than 99 years.
2.	the patch size of the Woodland is 2 ha or larger if it is located in the Urban Area, or 4 ha or larger if it is located outside the Urban Area but below the Escarpment Brow, or 10 ha or larger if it is located outside the Urban Area but above the Escarpment Brow	Yes - The approximate area of contiguous woodland habitat in the Study Area is approximately 13 ha.
3.	the Woodland has an interior core area of 4 ha or larger, measured 100m from the edge	No – There are no interior core areas in the woodland.
4.	the Woodland is wholly or partially within 50 m of a major creek or certain headwater creek or within 150m of the Escarpment Brow	Yes – Silver Creek flows through the woodland.

Exhibit 5 - Designated Natural Heritage Features



Stantec

Legend

- Study Area
- Preliminary Preferred ROW Limits (Alignment B3)
- Preliminary Preferred Grading Limits (Alignment B3)
- Alignment B1 ROW Limts
- Alignment B1 Grading Limits
- Alignment B2 ROW Limits
- Alignment B2 Grading Limits
- Unknown Transmission Line
- Watercourse (Permanent)
- Flow Direction
- Wetland, Provincially Significant
- Wetland, Unevaluated
- ANSI, Life Science
- Waterbody
- Property Boundary
- Estimated Flood Plain (CVC)
- Regulation Limit (CVC)
- Credit River Watershed Natural Heritage System (CRWNHS)
- Potential Significant Valleyland (CVC, 2015)
- Provincially Significant Wetland – CVC Boundary (as per LIO data)
- Candidate Significant Woodland (CVC, 2015)
- Regional Natural Heritage System Buffers

0 0.3 km

1:5,500 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2019.

Greenbelt Natural Heritage System

Project Location
Municipality of Halton, ON

165010598 REV4
Prepared by BCC on 2024-02-20
Technical Review by ABC on yyyy-mm-dd
Independent Review by ABC on yyyy-mm-dd

Client/Project
REGIONAL MUNICIPALITY OF HALTON
NORVAL WEST BYPASS
ENVIRONMENTAL IMPACT ASSESSMENT

Figure No.
2

Title
Designated Natural Heritage Features

Table 12 - Significant Wildlife Habitat Assessment

Candidate Wildlife Habitat	Criteria	Methods	Candidate Habitat Present in the Study Area?
Seasonal Concentration Areas			
Waterfowl Stopover and Staging Area (Terrestrial)	Fields with sheet water or utilized by tundra swans during spring (mid-March to May), or annual spring melt water flooding found in any of the following Community Types: Meadow (ME), Thicket (TH). Agricultural fields with waste grains are commonly used by waterfowl, and these are not considered SWH unless used by Tundra swans in the Long Point, Rondeau, Lake St. Clair, Grand Bend and Point Pelee Areas.	ELC surveys and wildlife habitat assessments were used to assess features within the Study Area that may support waterfowl stopover and staging areas (terrestrial).	Absent. There were no large areas of meadow or thicket in the Study Area. There was no water observed pooling in agricultural fields in the Study Area during spring field investigations.
Waterfowl Stopover and Staging Area (Aquatic)	The following Community Types: Meadow Marsh (MAM), Shallow Marsh (MAS), Shallow Aquatic (SA), Deciduous Swamp (SWD). Ponds, marshes, lakes, bays, coastal inlets, and watercourses used during migration. The combined area of the ELC ecosites and a 100 m radius area is the SWH. Sewage treatment ponds and storm water ponds do not qualify as a SWH; however, a reservoir managed as a large wetland or pond/lake does qualify.	ELC surveys and wildlife habitat assessments were used to assess features within the Study Area that may support waterfowl stopover and staging areas (aquatic).	Absent. Wetlands in the Study Area are not of sufficient size to support SWH for waterfowl stopover and staging areas. Silver Creek is shallow and fast-moving and unlikely to provide suitable habitat to support SWH for waterfowl stopover and staging areas (aquatic). The were no congregations of waterfowl observed during field investigations.
Shorebird Migratory Stopover Area	Shorelines of lakes, rivers and wetlands, including beach areas, bars and seasonally flooded, muddy and un-vegetated shoreline habitats. Great Lakes coastal shorelines, including groynes and other forms of amour rock lakeshores, are extremely important for migratory shorebirds in May to mid-June and early July to October. Sewage treatment ponds and storm water ponds do not qualify as a significant wildlife habitat. The following community types: Meadow Marsh (MAM), shoreline (SH), or Sand Dune (SB).	ELC surveys and wildlife habitat assessments were used to assess features within the Study Area that may support migratory shorebirds.	Absent. There were no areas of exposed muddy shoreline habitat observed in the Study Area along Silver Creek during field investigations.
Raptor Wintering Area	At least one of the following Forest Community Types: Deciduous Forest (FOD), Mixed Forest (FOM) or Coniferous Forest (FOC), in combination with one of the following Upland Community Types: Meadow (ME), Thicket (TH), Savannah (SV), Woodland (WOD) (<60% cover) that are >20 ha and provide roosting, foraging and resting habitats for wintering raptors. Upland habitat (ME, TH, SV, WOD), must represent at least 15 ha of the 20 ha minimum size.	ELC surveys and GIS analysis were used to assess features within the Study Area that may support wintering raptors.	Absent. Upland habitat in the Study Area is not of sufficient size to support SWH for raptor wintering areas.

Candidate Wildlife Habitat	Criteria	Methods	Candidate Habitat Present in the Study Area?
Bat Hibernacula	Hibernacula may be found in caves, mine shafts, underground foundations and karsts. May be found in these Community Types: Crevice (CCR), Cave (CCA).	ELC surveys and wildlife habitat assessments were used to assess features within the Study Area that may support bat hibernacula.	Absent. There were no candidate bat hibernacula features observed in the Study Area during field investigations.
Bat Maternity Colonies	Maternity colonies considered significant wildlife habitat are found in forested ecosites. Either of the following Community Types: Deciduous Forest (FOD), Mixed Forest (FOM), Coniferous Forest (FOC), Deciduous Swamp (SWD), Mixed Forest (SWM) and Coniferous Forest (SWC) that have wildlife trees >10 cm diameter at breast height (dbh). Maternity colonies can be found in tree cavities, vegetation and often in buildings (buildings are not considered to be SWH). Female Bats prefer wildlife tree (snags) in early stages of decay, class 1-3 or class 1 or 2. Northern Myotis prefer contiguous tracts of older forest cover for foraging and roosting in snags and trees. Silver-haired Bats prefer older mixed or deciduous forest and form maternity colonies in tree cavities and small hollows. Older forest areas with at least 21 snags/ha are preferred.	ELC surveys and bat tree roost surveys were used to assess features within the Study Area that may support bat maternity colonies.	**Candidate. Sixteen potential bat roost trees were identified in the FOCM6, FODM7-4 and FOMM3-3 forest communities in the Study Area during field investigations.**
Turtle Wintering Areas	Snapping and Midland Painted turtles utilize ELC community classes: Swamp (SW), Marsh (MA) and Open Water (OA). Shallow water (SA), Open Fen (FEO) and Open Bog (BOO). Northern Map turtle- open water areas such as deeper rivers or streams and lakes can also be used as over-wintering habitat. Water has to be deep enough not to freeze and have soft mud substrate. Over-wintering sites are permanent water bodies, large wetlands, and bogs or fens with adequate dissolved oxygen.	ELC surveys and wildlife habitat assessments were used to assess features within the Study Area that may support areas of permanent standing water but not deep enough to freeze.	Absent. Wetlands in the Study Area do not have permanent standing water to support turtle wintering areas. Silver Creek is shallow and fast-moving and unlikely to provide habitat for turtle wintering areas.

Candidate Wildlife Habitat	Criteria	Methods	Candidate Habitat Present in the Study Area?
Snake Hibernacula	Hibernation occurs in sites located below frost lines in burrows, rock crevices, broken and fissured rock and other natural features. Wetlands can also be important over-wintering habitat in 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. Any ecosite in southern Ontario other than very wet ones may provide habitat. The following Community Types may be directly related to snake hibernacula: Talus (TA), Rock Barren (RB), Crevice (CCR), Cave (CCA), and Alvar (RBOA1, RBSA1, RBTA1).	ELC surveys and wildlife habitat assessments were used to assess features within the Study Area that may support snake hibernacula.	**Candidate: The silo, barn and farmhouse foundations have the potential to provide suitable snake hibernacula.**
Colonial-Nesting Bird Breeding Habitat (Bank and Cliff)	Eroding banks, sandy hills, borrow pits, steep slopes, sand piles, cliff faces, bridge abutments, silos, or barns found in any of the following Community Types: Meadow (ME), Thicket (TH), Bluff (BL), Cliff (CL). Does not include man-made structures (bridges or buildings) or recently (2 years) disturbed soil areas, such as berms, embankments, soil or aggregate stockpiles. Does not include a licensed/permitted Mineral Aggregate Operation.	ELC surveys and wildlife habitat assessments were used to assess features within the Study Area that may support colonial bird breeding habitat.	Absent. There were no eroding banks or cliff faces identified in the Study Area during field investigations, and there was no evidence of colonial nesting breeding birds observed on the silo or barn.
Colonial-Nesting Bird Breeding Habitat (Tree/Shrubs)	Identification of stick nests in any of the following Community Types: Mixed Swamp (SWM), Deciduous Swamp (SWD), Treed Fen (FET). The edge of the colony and a minimum 300 m area of habitat or extent of the Forest Ecosite containing the colony or any island <15.0 ha with a colony is the SWH. Nests in live or dead standing trees in wetlands, lakes, islands, and peninsulas. Shrubs and occasionally emergent vegetation may also be used.	ELC surveys and wildlife habitat assessments were used to assess features within the Study Area that may support colonial bird breeding habitat (Trees/Shrubs).	Absent. There were no colonies of breeding birds identified in the tree and/or shrub communities in the Study Area during field investigations.
Colonial-Nesting Bird Breeding Habitat (Ground)	Any rocky island or peninsula within a lake or large river. For Brewer's Blackbird close proximity to watercourses in open fields or pastures with scattered trees or shrubs found in any of the following Community Types: Meadow Marsh (MAM1-6), Shallow Marsh (MAS1-3), Meadow (ME), Thicket (TH), Savannah (SV).	ELC surveys and wildlife habitat assessments were used to assess features within the Study Area that may support colonial bird breeding habitat (Ground).	Absent. There were no colonies of ground nesting breeding birds identified in the Study Area during field investigations.
Migratory Butterfly Stopover Areas	Located within 5 km of Lake Ontario. A combination of ELC communities, one from each land class is required: Field (ME, TH) and Forest (FOC, FOM, FOD). Minimum of 10 ha in size with a combination of field and forest habitat present.	ELC surveys and GIS analysis were used to assess features within the Study Area that may support migratory butterfly stopover areas.	Absent. The Study Area is greater than 5 km from Lake Ontario.

Candidate Wildlife Habitat	Criteria	Methods	Candidate Habitat Present in the Study Area?
Landbird Migratory Stopover Areas	The following community types: Forest (FOD, FOM, FOC) or Swamp (SWC, SWM, SWD). Woodlots must be >10 ha in size and within 5 km of Lake Ontario – woodlands within 2 km of Lake Ontario are more significant.	ELC surveys and GIS analysis were used to assess features within the Study Area that may support landbird migratory stopover areas.	Absent. The Study Area is greater than 5 km from Lake Ontario.
Deer Winter Congregation/Yarding Areas	Woodlots typically >100 ha in size unless determined by the MNR as significant. (If large woodlots are rare in a planning area >50 ha). All forested ecosites within Community Series: FOC, FOM, FOD, SWC, SWM, SWD. Conifer plantations much smaller than 50 ha may also be used.	No studies required as the NDMNRF delineates this habitat.	Absent. There were no deer winter congregation/yarding areas identified in the Study Area by the NDMNRF.
Rare Vegetation Communities			
Cliffs and Talus Slopes	A Cliff is vertical to near vertical bedrock >3 m in height. A Talus Slope is rock rubble at the base of a cliff made up of coarse rocky debris. Any ELC Ecosite within Community Series: TAO, TAS, TAT, CLO, CLS, CLT. Most cliff and talus slopes occur along the Niagara Escarpment.	ELC surveys were used to assess features within the Study Area that would be considered cliffs or talus slopes.	Absent.
Sand Barrens	Sand barrens typically are exposed sand, generally sparsely vegetated and cause by lack of moisture, periodic fires and erosion. Vegetation can vary from patchy and barren to tree covered but less than 60%. Any of the following Community Types: SBO1 (Open Sand Barren Ecosite), SBS1 (Shrub Sand Barren Ecosite), SBT1 (Treed Sand Barren Ecosite).	ELC surveys were used to assess features within the Study Area that would be considered to be sand barrens.	Absent.
Alvars	An alvar is typically a level, mostly unfractured calcareous bedrock feature with a mosaic of rock pavements and bedrock overlain by a thin veneer of soil. Vegetation cover varies from sparse lichen-moss associations to grasslands and shrublands and comprising a number of characteristic or indicator plant. Undisturbed alvars can be phyto- and zoogeographically diverse, supporting many uncommon or are relict plant and animal species. Vegetation cover varies from patchy to barren with a less than 60% tree cover. Any of the following Community Types: ALO1(Open Alvar Rock Barren Ecosite), ALS1 (Alvar Shrub Rock Barren Ecosite), ALT1 (Treed Alvar Rock Barren Ecosite), FOC1 (Dry-Fresh Pine Coniferous Forest), FOC2 (Dry-Fresh Cedar Coniferous Forest), CUM2 (Bedrock Cultural Meadow), CUS2 (Bedrock Cultural Savannah), CUT2-1 (Common Juniper Cultural Alvar Thicket), or CUW2	ELC surveys were used to assess features within the Study Area that would be considered to be alvar communities.	Absent.

Candidate Wildlife Habitat	Criteria	Methods	Candidate Habitat Present in the Study Area?
	(Bedrock Cultural Woodland). An Alvar site >0.5 ha in size.		
Old-growth Forest	Old-growth forests tend to be relatively undisturbed, structurally complex, and contain a wide variety of trees and shrubs in various age classes. These habitats usually support a high diversity of wildlife species. No minimum size criteria t in any of the following Community Types: FOD (Deciduous Forest), FOM (Mixed Forest), FOC (Coniferous Forest). Forests greater than 120 years old and with no historical forestry management was the main criteria when surveying for old-growth forests.	ELC surveys were used to assess features within the Study Area that would be considered to be old-growth forest communities.	Absent.
Savannahs	A Savannah is a tallgrass prairie habitat that has tree cover between 25 – 60%. In Ecoregion 6E, known Tallgrass Prairie and savannah remnants are scattered between Lake Huron and Lake Erie, near Lake St. Clair, north of and along the Lake Erie shoreline, in Brantford and in the Toronto area (north of Lake Ontario). Any of the following Community Types: TPS1 (Dry-Fresh Tallgrass Mixed Savannah Ecosite), TPS2 (Fresh-Moist Tallgrass Deciduous Savannah Ecosite), TPW1 (Dry-Fresh Black Oak Tallgrass Deciduous Woodland Ecosite), TPW2 (Fresh-Moist Tallgrass Deciduous Woodland Ecosite), CUS2 (Bedrock Cultural Savannah Ecosite).	ELC surveys were used to assess features within the Study Area that would be considered to be savannah communities.	Absent.
Tall-grass Prairies	A Tallgrass Prairie has ground cover dominated by prairie grasses. An open Tallgrass Prairie habitat has <25% tree cover. In Ecoregion 6E, known Tallgrass Prairie and savannah remnants are scattered between Lake Huron and Lake Erie, near Lake St. Clair, north of and along the Lake Erie shoreline, in Brantford and in the Toronto area (north of Lake Ontario). Any of the following Community Types: TPO1 (Dry Tallgrass Prairie Ecosite), TPO2 (Fresh-Moist Tallgrass Prairie Ecosite).	ELC surveys were used to assess features within the Study Area that would be considered to be tall-grass communities.	Absent.
Other Rare Vegetation Communities	Provincially Rare S1, S2 and S3 vegetation communities are listed in Appendix M of the SWHTG.	ELC surveys were used to assess features within the Study Area that would be considered to be other rare vegetation communities.	**Confirmed. The FODM7-4 forest community is provincially ranked as S2S3.**

Candidate Wildlife Habitat	Criteria	Methods	Candidate Habitat Present in the Study Area?
Specialized Habitat for Wildlife			
Waterfowl Nesting Area	All upland habitats located adjacent to these wetland ELC Ecosites are Candidate SWH: MAS1, MAS2, MAS3, SAS1, SAM1, SAF1, MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SWT1, SWT2, SWD1, SWD2, SWD3, SWD4. Note: includes adjacency to Provincially Significant Wetlands.	ELC surveys were used to assess features within the Study Area that may support nesting waterfowl. Habitats adjacent to wetlands without standing water were not considered candidate SWH.	Absent. The MAMM1-2 wetlands lack standing water and are therefore unsuitable to support SWH for nesting waterfowl. The MASM1-1 wetland is surrounded by active agriculture which is unsuitable to support SWH for nesting waterfowl. The SWDM4-1 wetland adjacent to Silver Creek is positioned at the bottom of the valley, and the adjacent sloped upland habitat is unlikely to support SWH for nesting waterfowl.
Bald Eagle and Osprey nesting, Foraging, and Perching Habitat	Nests are associated with lakes, ponds, rivers or wetlands along forested shorelines, islands, or on structures over water. Nests located on man-made objects are not to be included as SWH (e.g., telephone poles and constructed nesting platforms). ELC Forest Community Series: FOD, FOM, FOC, SWD, SWM and SWC directly adjacent to riparian areas – rivers, lakes, ponds and wetlands.	ELC surveys and wildlife habitat assessments were used to assess features within the Study Area that may support nesting, foraging and perching habitat for large raptors.	Absent. There were no large stick nests observed in the Study Area during field investigations.
Woodland Raptor Nesting Habitat	All natural or conifer plantation woodland/forest stands combined >30 ha and with >4 ha of interior habitat. Interior habitat determined with a 200 m buffer. Stick nests found in a variety of intermediate-aged to mature conifer, deciduous or mixed forests within tops or crotches of trees. Species such as Coopers hawk nest along forest edges sometimes on peninsulas or small off-shore islands. May be found in all forested ELC Ecosites. May also be found in SWC, SWM, SWD and CUP3.	ELC surveys, wildlife habitat assessments and GIS analysis were used to assess features within the Study Area that may support nesting habitat for woodland raptors.	Absent. There was no interior woodland/forest habitat identified in the Study Area to support SWH for woodland raptor nesting.
Turtle Nesting Areas	Exposed mineral soil (sand or gravel) areas adjacent (<100 m) or within the following ELC Ecosites: MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SAS1, SAM1, SAF1, BOO1, FEO1. Best nesting habitat for turtles is close to water, away from roads and sites less prone to loss of eggs by predation from skunks, raccoons or other animals. For an area to function as a turtle-nesting area, it must provide sand and gravel that turtles are able to dig in and are located in open, sunny areas. Nesting areas	ELC surveys, wildlife habitat assessments and GIS analysis were used to assess features within the Study Area that may support turtle nesting areas.	Absent. There were no suitable natural areas of exposed mineral soil for turtle nesting observed in the Study Area.

Candidate Wildlife Habitat	Criteria	Methods	Candidate Habitat Present in the Study Area?
	on the sides of municipal or provincial road embankments and shoulders are not SWH. Sand and gravel beaches adjacent to undisturbed shallow weedy areas of marshes, lakes, and rivers are most frequently used.		
Seeps and Springs	Seeps/Springs are areas where ground water comes to the surface. Often they are found within headwater areas within forested habitats. Any forested Ecosite within the headwater areas of a stream could have seeps/springs. Any forested area (with <25% meadow/field/pasture) within the headwaters of a stream or river system.	ELC surveys were used to assess features within the Study Area that may support seeps/springs.	Absent. There were no seeps/springs identified in the Study Area during field investigations.
Amphibian Breeding Habitat (Woodland)	All Ecosites associated with these ELC Community Series; FOC, FOM, FOD, SWC, SWM, SWD. Presence of a wetland, lake, or pond within or adjacent (within 120 m) to a woodland (no minimum size). Some small wetlands may not be mapped and may be important breeding pools for amphibians. Woodlands with permanent ponds or those containing water in most years until mid-July are more likely to be used as breeding habitat.	ELC surveys and amphibian surveys were used to assess features within the Study Area that may support woodland breeding amphibians.	Absent. Amphibian call levels recorded during field investigations do not meet the SWH criteria to qualify as significant.
Amphibian Breeding Habitat (Wetland)	ELC Community Classes SW, MA, FE, BO, OA and SA. Wetland areas >120 m from woodland habitats. Wetlands and pools (including vernal pools) >500 m^2 (about 25 m diameter) supporting high species diversity are significant; some small or ephemeral habitats may not be identified on MNR mapping and could be important amphibian breeding habitats. Presence of shrubs and logs increase significance of pond for some amphibian species because of available structure for calling, foraging, escape and concealment from predators. Bullfrogs require permanent water bodies with abundant emergent vegetation.	ELC surveys were used to assess features within the Study Area that may support wetland breeding amphibians.	Absent. Amphibian call levels recorded during field investigations do not meet the SWH criteria to qualify as significant.
Species of Conservation Concern			
Marsh Bird Breeding Habitat	All wetland habitats with shallow water and emergent aquatic vegetation. May include any of the following Community Types: Meadow Marsh (MAM), Shallow Aquatic (SA), Open Bog (BOO), Open Fen (FEO), or for Green Heron: Swamp (SW), Marsh (MA) and Meadow (ME) Community Types.	ELC surveys were used to identify marshes with shallow water and emergent vegetation that may support marsh breeding birds.	Absent. Wetlands are not of sufficient size and lack adequate standing water to support congregations of marsh breeding birds.

Candidate Wildlife Habitat	Criteria	Methods	Candidate Habitat Present in the Study Area?
Woodland Area-sensitive Bird Breeding Habitat	Habitats >30ha where interior forest is present (at least 200 m from the forest edge); typically >60 years old. These include any of the following Community Types: Forest (FO), Treed Swamp (SW).	ELC surveys and GIS analysis were used to determine whether woodlots that occurred within the Study Area that were >30 ha with interior habitat present (>200 m from edge).	Absent. There is no interior woodland/forest habitat in the Study Area to support SWH for woodland area-sensitive breeding birds.
Open Country Bird Breeding Habitat	Grassland areas > 30 ha, not Class 1 or Class 2 agricultural lands, with no row-cropping or hay or livestock pasturing in the last 5 years, in the following Community Type: Meadow (ME).	ELC surveys and GIS analysis were used to identify grassland communities within the Study Area that may support area-sensitive breeding birds.	Absent. There are no meadows > 30 ha in the Study Area to support SWH for open country breeding birds.
Shrub/Early Successional Bird Breeding Habitat	Old field areas succeeding to shrub and thicket habitats >10 ha, not Class 1 or Class 2 agricultural lands, with no row-cropping or intensive hay or livestock pasturing in the last 5 years, in the following Community Types: Thickets (TH), Savannahs or Woodlands (WOD).	ELC surveys and GIS analysis were used to identify large communities that may support shrub/early successional breeding birds.	Absent. There are no thickets or woodlands > 10 ha in the Study Area to support SWH for shrub/early successional breeding birds.
Terrestrial Crayfish	Meadow marshes and edges of shallow marshes (no minimum size). Vegetation communities include MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, MAS1, MAS2, MAS3. Construct burrows in marshes, mudflats, meadows. Can be found far from water.	ELC surveys and wildlife habitat assessments were used to identify shallow marsh and meadow marsh communities that may support Terrestrial Crayfish within the Study Area.	**Confirmed. Crayfish chimneys were observed in the Study Area during field investigations at the Levi's Creek crossing at Tenth Line.**
Special Concern and Rare Wildlife Species	All special concern and provincially rare (S1-S3, SH) plant and animal species (SOCC) within potential to occur in the Study Area.	ELC surveys and wildlife surveys were used to identify suitable habitat for each potential SOCC listed in **Appendix C-2**.	**Confirmed. Eastern Wood-pewee was observed in the FODM7-4 woodland in the Study Area during field investigations.** **Candidate. Potential habitat was identified in the Study Area for Monarch, Snapping Turtle and Midland Painted Turtle.**

Candidate Wildlife Habitat	Criteria	Methods	Candidate Habitat Present in the Study Area?
Animal Movement Corridors			
Amphibian Movement Corridor	Corridors may be found in all ecosites associated with water. Determined based on identifying significant amphibian breeding habitat (wetland).	Identified after Amphibian Breeding Habitat is confirmed. Movement corridors should be considered when amphibian breeding habitat is confirmed as SWH from Amphibian Breeding Habitat.	Absent. Significant amphibian breeding habitat was absent from the Study Area.
Deer Movement Corridor	Corridors may be found in all forested ecosites.	Movement corridor must be determined when Deer Wintering Habitat is confirmed as SWH by the NDMNRF.	Absent. Deering wintering habitat was not identified in the Study Area by the NDMNRF.

Table 13 - Species of Conservation Concern Habitat Assessment

Group	Common Name	Scientific Name	Provincial Status (S-rank)	SARO Status	SARA Status	Source	Habitat Description	Potential Habitat in the Study Area
Birds	Bald Eagle	*Haliaeetus leucocephalus*	S4B, S2N	SC	NAR	eBird 2022, iNaturalist 2022	Almost always nests near water, usually on large lakes. Large stick nests are placed in trees located within mature woodlots. They usually prefer 250 ha of mature forest for breeding, however, along Lake Erie, where the lake provides a valuable food source, the eagles will nest in smaller woodlots or even single trees (Sandilands 2005).	N: No large stick nests observed in the Study Area.
Birds	Canada Warbler	*Cardellina canadensis*	S4B	SC	THR	eBird 2022, iNaturalist 2022 MECP 2020	Found in wet deciduous, coniferous and mixed forests, in riparian shrub forests, regenerating stands and in old-growth forest (COSEWIC 2008).	N: The forest communities in the Study Area have the potential to support breeding habitat for Canada Warbler; however, Canada Warbler was not observed during field investigations.
Birds	Caspian Tern	*Hydroprogne caspia*	*S3B*	-	-	eBird 2022, iNaturalist 2022	Generally nests in colonies and prefers sparsely vegetated flat rocky islands, beaches, and sandy shores of James Bay and the Great Lakes in Ontario. It usually nests on the more elevated areas of islands and it often found nesting with Ring-billed Gulls (Cadman et al. 2007)	N: No suitable nesting habitat for Caspian Tern in the Study Area.
Birds	Common Nighthawk	*Chordeiles minor*	S4B	SC	THR	Cadman et. al. 2007, eBird 2022	Generally prefer open, vegetation- free habitats, including dunes, beaches, recently harvested forests, burnt-over areas, logged areas, rocky outcrops, rocky barrens, grasslands, pastures, peat bogs, marshes, lakeshores, and river banks. This species also inhabits mixed and coniferous forests. Can also be found in urban areas (nest on flat roof-tops).	N: Open areas are limited to active agricultural lands, linear meadow habitat along roadsides and edges of agricultural fields, and woodland openings. These areas are well-vegetated with grasses and forb species, and unlikely to support Common Nighthawk.
Birds	Eastern Wood-Pewee	*Contopus virens*	S4B	SC	SC	MNRF 2022b, Cadman et. al. 2007, eBird 2022, CVC 2016	Associated with deciduous and mixed forests. Within mature and intermediate age stands it prefers areas with little understory vegetation as well as forest clearings and edges.	**Y: Eastern Wood-Pewee was confirmed in FODM7-4 forest in the Study Area during field investigations.**
Birds	Grasshopper Sparrow	*Ammodramus savannarum*	S4B	SC	SC	Cadman et. al. 2007	Prefers short, sparse grass with patches of exposed ground in rough or unimproved pastures and in drier, sparsely vegetated grasslands at least 30 ha in size (Cadman et al. 2007).	N: No large grasslands in the Study Area to support Grasshopper Sparrow.
Birds	Great Egret	*Ardea alba*	*S2B*	-	-	eBird 2022	Lives in wetlands and nests in colonies in trees or shrubs. Forages in swamps, marshes and ponds, and along shorelines of streams, rivers and lakes (Cornell University 2019).	N: No colonies of stick nests in the Study Area.
Birds	Peregrine Falcon	*Falco peregrinus*	S3B	SC	SC	eBird 2022, iNaturalist 2022	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.	N: No tall buildings or natural cliff habitat in the Study Area.
Birds	Wood Thrush	*Hylocichla mustelina*	S4B	SC	THR	MNRF 2022b, Cadman et. al. 2007	Nests 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.	N: The forest communities in the Study Area have the potential to support breeding habitat for Wood Thrush; however, Wood Thrush was not observed during field investigations.
Reptiles	Midland Painted Turtle	*Chrysemys picta marginata*	S4	NAR	SC	MNRF 2022b, Ontario Nature 2019, iNaturalist	Painted turtles inhabit waterbodies, such as ponds, marshes, lakes and slow-moving creeks, that have a soft bottom and provide abundant basking sites and aquatic vegetation. These turtles often bask on shorelines or on logs and rocks that protrude from the water. The midland painted turtle hibernates on the bottom of waterbodies.	**Y: Silver Creek and Levi's Creek have the potential to act as movement corridors for Midland Painted Turtle. Silver Creek is shallow and fast-moving and unlikely to provide turtle overwintering habitat. Deeper pooling areas in Levi's Creek at Tenth Line have a low potential to support overwintering turtles since are more likely to overwinter in the adjacent stormwater management pond.**

Group	Common Name	Scientific Name	Provincial Status (S-rank)	SARO Status	SARA Status	Source	Habitat Description	Potential Habitat in the Study Area
Reptiles	Snapping Turtle	*Chelydra serpentina*	S3	SC	SC	MNRF 2022b, Ontario Nature 2019, iNaturalist 2022	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.	**Y: Silver Creek and Levi's Creek have the potential to act as movement corridors for Snapping Turtle. Silver Creek is shallow and fast-moving and unlikely to provide turtle overwintering habitat. Deeper pooling areas in Levi's Creek at Tenth Line have a low potential to support overwintering turtles since turtles are more likely to overwinter in the adjacent stormwater management pond.**
Insects	Monarch	*Danaus plexippus*	S4B, S2N	SC	END	Macnaughton et al. 2022, iNaturalist 2022, CVC 2016	Exist primarily wherever milkweed and wildflowers exist; abandoned farmland, along roadsides, and other open spaces	**Y: There were no areas with an abundance of common milkweed observed in the Study Area; however foraging habitat occurs along roadsides, edges of the agricultural field and open areas within woodlands. Monarch was not observed in the Study Area during field investigations.**
Plants	Large Toothwort	*Cardamine maxima*	S3	-	-	CVC 2016	Occurs in rich deciduous forests, often along streams (Reznicek 2011).	N: The FODM7-4, FOMM3 and SWDM4-1 communities along silver creek have the potential to support this species; however, Large Toothwort was not observed in the Study Area during field investigations.

Definitions:
SCIENTIFIC NAME: The scientific name as published by the Natural Heritage Information Centre
COMMON NAME: The common English name as published by the Natural Heritage Information Centre
S RANK: Subnational Rank; the provincial conservation status
SARO STATUS: Species at Risk in Ontario as defined by the Endangered Species Act, 2007
SARA STATUS: Federal status as defined by the Species at Risk Act

Endangered Species Act and Species at Risk Act Acronyms:
END: Endangered
THR: Threatened
SC: Special Concern
NAR: Not at Risk
END/THR followed by NS: Ranked by COSEWIC, but not listed on SARA Schedule 1

Subnational Rankings (S RANK):
SNR: Unranked
SU: Unrankable – Currently unrankable due to lack of information
SNA: Not applicable – A conservation status rank is not applicable because the species is not a suitable target for conservation activities
S#S#: Range Rank – A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species
?: Indicates uncertainty in the assigned rank
S1: Critically Imperiled – Critically imperiled in the province (often 5 or fewer occurrences)
S2: Imperiled – Imperiled in the province, very few populations (often 20 or fewer),
S3: Vulnerable – Vulnerable in the province, relatively few populations (often 80 or fewer)
S4: Apparently Secure – Uncommon but not rare
S5: Secure – Common, widespread, and abundant in the province
SX: Presumed extirpated
SH: Possibly Extirpated (Historical)
SE: Exotic in Ontario - Numeric range rank of 1 through 5 indicates abundance with 1 as the least abundant and 5 as the most