

REGION OF PEEL

WASTEWATER CAPACITY IMPROVEMENTS IN CENTRAL MISSISSAUGA

APPENDIX 2-A

Natural Environment Reports



REGION OF PEEL

WASTEWATER CAPACITY IMPROVEMENTS IN CENTRAL MISSISSAUGA

Natural Environment Reports

Desktop



TECHNICAL MEMORANDUM

DATE December 10, 2020 **Project No.** 18112273

TO Chris Campbell, Infrastructure Planning, Partner

GM BluePlan Engineering Limited

FROM Gwendolyn Weeks

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DESKTOP ASSESSMENT OF NATURAL ENVIRONMENT CONSTRAINTS FOR THE CAPACITY EXPANSION OF THE CENTRAL MISSISSAUGA WASTEWATER SYSTEM. REGION OF PEEL. ONTARIO

1.0 INTRODUCTION

Golder Associates Ltd. (Golder) has been retained by GM BluePlan (GMBP) on behalf of the Region of Peel (the Region) to conduct natural environment studies as part of the schedule 'C' municipal class environmental assessment for the capacity expansion of the Central Mississauga wastewater system (the Project).

As part of the evaluation and selection of alternatives for the Project, a desktop assessment to identify potential natural environment constraints within the study area (as defined by GMBP) is required. The study area is shown on Figure 1 and is generally limited by Etobicoke Creek in the east, just west of Confederation Parkway in the west, just north of Highway 403 in the north, and just south of the Queen Elizabeth Way (QEW) highway in the south.

This desktop-level report is intended to provide a preliminary assessment of sensitive natural features or functions present or potentially present in the study area that may present constraints for the proposed Project. A Natural Environmental Report, including the results of field surveys and an impact assessment, will be compiled and submitted following the completion of field work to be completed at the location of the preferred alternative.

2.0 POLICY CONTEXT

Sensitive natural features considered for this Project include designated features (e.g., Provincially Significant Wetlands), species at risk (SAR), Toronto and Region Conservation Authority (TRCA) and Credit Valley Conservation (CVC) regulated areas, fish habitat, wildlife and significant wildlife habitat (SWH) as identified in the following Acts and policy documents:

- Provincial Policy Statement (PPS; MMAH 2014);
- Endangered Species Act, 2007 (ESA; Ontario 2007);
- Species at Risk Act (SARA; Canada 2002);
- Fisheries Act (Canada 1985);

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- Region of Peel Official Plan (Region of Peel 2016);
- Mississauga Plan and Mississauga Official Plan (City of Mississauga 2003, 2019);
- Parkway Belt West Plan (Ontario 1978);
- O. Reg. 166/06 Toronto and Region Conservation Authority: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses; and,
- O. Reg. 160/06 Credit Valley Conservation: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses.

3.0 METHODS

3.1 Background Review

The investigation of existing conditions in the study area included a background information search and literature review to gather data about the local area and provide context for the evaluation of the natural features. A number of resources were used, including:

- Ministry of Natural Resources and Forestry (MNRF) Natural Heritage Information Centre (NHIC) Biodiversity Explorer geographic query for information on SAR, S1-S3 species, and natural areas.
- Readily available MNRF mapping and existing studies. A data request was submitted to MNRF/Ministry of Environment, Conservation, and Parks (MECP) to obtain any additional information. A response from the Ministries has not yet been received.
- Information (including any watershed studies and wetland mapping) and mapping available through the TRCA and CVC.
- Species at risk (SAR) mapping to determine if the study area falls within the range for species regulated under the ESA.
- Land Information Ontario (LIO) geospatial data (MNRF 2019a).
- Species at Risk Public Registry (ECCC 2019).
- Species at Risk in Ontario (SARO) List (MNRF 2019b).
- Breeding Bird Atlas of Ontario (OBBA) (Cadman et al. 2007).
- Atlas of the Mammals of Ontario (Dobbyn 1994).
- Ontario Reptile and Amphibian Atlas (Ontario Nature 2019).
- Bat Conservation International (BCI) range maps (BCI 2019).
- Ontario Butterfly Atlas (Jones et al. 2019).
- eBird species maps (eBird 2019).
- MNRF LIO Aquatic Resources Area Layer (MNRF 2019c).



- Aquatic Species at Risk Maps (DFO 2019).
- Region of Peel Official Plan (Region of Peel 2016).
- Mississauga Plan and Mississauga Official Plan (City of Mississauga 2003, 2016).
- Parkway Belt West Plan (Ontario 1978).
- York, Peel, Durham, Toronto and The Conservation Authorities Moraine Coalition (YPDT-CAMC) Groundwater Program database (YPDT-CAMC 2019).
- Aerial imagery.

To develop an understanding of the drainage patterns, ecological communities and potential natural heritage features that may be affected by the Project, MNRF LIO data were used to create base layer mapping for the study area. A geographic query of the NHIC database was conducted to identify element occurrences of any natural heritage features, including wetlands, Areas of Natural and Scientific Interest (ANSI), life science sites, rare vegetation communities, rare species (i.e., species ranked S1-S3 by NHIC), species designated under the ESA or SARA, and other natural heritage features within the study area.

3.2 Species at Risk Screening

Species at risk considered for this report include those species listed in the ESA and SARA. An assessment was conducted to determine which SAR had potential habitat in the study area. A screening of all SAR which have the potential to be found in the vicinity of the study area was conducted first as a desktop exercise using the sources listed in Section 3.1. Species with ranges overlapping the study area, or recent occurrence records in the vicinity, were screened by comparing their habitat requirements to habitat conditions in the study area.

The potential for the species to occur was determined through a probability of occurrence. A ranking of low indicates no suitable habitat availability for that species in the study area and no specimens identified. Moderate probability indicates more potential for the species to occur, as suitable habitat appeared to be present in the study area, but no occurrence of the species has been recorded. Alternatively, a moderate probability could indicate an observation of a species, but there is no suitable habitat on the site or in the study area. High potential indicates a known species record in the study area and good quality habitat is present.

As part of future phases of this study, searches will be conducted during future field surveys for suitable habitats and signs of all SAR identified through the desktop screening. If the potential for the species to occur in the study area was moderate or high in the desktop screening, the screening will be refined based on the results of the field surveys (i.e., habitat assessment completed between May and September). Any habitat identified during ground-truthing or other field surveys with potential to provide suitable conditions for additional SAR not already identified through the desktop screening will also be assessed and recorded.

4.0 PRELIMINARY CONSTRAINTS ANALYSIS

The results from the background review, including significant environmental features, SAR, or other significant species in the study area, were used to identify potential constraints (timing windows, buffers/setbacks, etc.), and are summarized below.



4.1 Natural Areas

There are features that have been designated provincially or regionally based on their ecological importance and sensitivity, noted under various official plans (OPs) and associated schedules. These include provincially significant wetlands (PSW) and provincially significant Areas of Natural and Scientific Interest (ANSI), as shown on Figure 2. Designated sensitive features occurring in the study area are described below.

With the exception of PSWs, habitat for endangered and threatened species, fish habitat, and Core Areas of the Greenlands System as defined in the Region of Peel Official Plan, the City and Region may permit development of essential public uses of a linear nature (including utilities) within or adjacent to natural areas where the project is approved through the Municipal Class environmental assessment (EA) process (City of Mississauga 2016).

4.1.1 Areas of Natural and Scientific Interest (ANSI)

Areas of Natural and Scientific Interest are designated by the province according to standardized evaluation procedures. Areas of Natural and Scientific Interest are ranked by the MNRF as being either provincially or regionally significant.

There is one provincially significant life science ANSI within the study area (Figure 2): Cawthra Woods at the southern extent of the study area. This feature is characterized as a deciduous forest dominated by sugar maple (*Acer saccharum*) and other hardwoods such as American beech (*Fagus grandifolia*), red maple (*Acer rubrum*) and black cherry (*Prunus serotina*) (Mississauga 2018). The feature contains numerous wetland depressions, which are discussed in Section 4.1.2.

Where development is proposed within or adjacent to a provincially significant life science ANSI, an assessment must be completed to demonstrate that development will not adversely affect the feature or its ecological function, to the satisfaction of the City and appropriate conservation authority (City of Mississauga 2016, MMAH 2014).

4.1.2 Significant Wetlands

The MNRF designates PSWs. PSWs are determined based on a scientific point-based ranking system known as the Ontario Wetland Evaluation System (OWES). Wetlands are assessed based on a range of criteria, including biology, hydrology, societal value and special features (MNRF 2014).

Wetlands are dependent on surface water and groundwater on a seasonal or permanent basis to support their unique hydraulic and vegetation characteristics. Consequently, wetlands are sensitive to changes in hydrologic or hydrogeologic regimes. Such changes may impact the wetland hydroperiod or persistence of certain wetland types, such as bog or fen, with a low tolerance for water level fluctuations.

One PSW is mapped within the study area: Cawthra Woods Wetland Complex PSW (Figure 2) that is associated with the Cawthra Woods ANSI. In addition to the PSW, there are several unevaluated wetlands mapped in the study area (Figure 2).

Where development is proposed adjacent (i.e., within 120 m) to a PSW, an assessment must be completed to demonstrate that development will not adversely affect the feature or its ecological function. PSWs are provided higher levels of protection based on policies of the PPS. However, all wetland types (i.e., significant, non-significant, and unevaluated) are regulated by the local conservation authorities (i.e., TRCA and CVC) and require a permit for proposed works within 30 m of the wetlands in accordance with the *Conservation Authorities Act* and Ontario Regulation 160/06 (CVC 2010).



4.1.3 Significant Woodlands

Significant woodlands are areas which are: 1) ecologically important in terms of features such as species composition, age of trees and stand history; 2) functionally important due to their contribution to the broader landscape because of their location, size or due to the amount of forest cover in the planning area; or 3) economically important due to site quality, species composition, or past management history (MMAH 2014).

The City of Mississauga has identified significant woodlands in its jurisdiction under the Significant Natural Areas designation (City of Mississauga 2016 – OP Schedule 3; Figure 2), and they are defined as those woodlands that meet one or more of the following criteria:

- woodlands, excluding cultural savannahs, greater than or equal to four hectares;
- woodlands, excluding cultural woodlands and cultural savannahs, greater than or equal to two hectares and less than four hectares;
- any woodland greater than 0.5 hectares that:
 - i) supports old growth trees (greater than or equal to 100 years old);
 - ii) supports a significant linkage function as determined through an Environmental Impact Study approved by the City in consultation with the appropriate conservation authority;
 - iii) is located within 100 metres of another Significant Natural Area supporting a significant ecological relationship between the two features;
 - iv) is located within 30 metres of a watercourse or significant wetland; or,
 - v) supports significant species or communities.

These woodlands align with the Core Areas of the Greenlands System as mapped by the Region of Peel (2016).

Development and site alteration is prohibited within the Core Areas of the Greenlands System, except for minor development and essential infrastructure that is authorized under an environmental assessment process. In the event portions of the Core Areas are damaged or destroyed, the natural features in the area must be rehabilitated to restore ecological function (Region of Peel 2016).

4.1.4 Significant Valleylands

General guidelines for determining significance of valleylands are presented in the Natural Heritage Reference Manual (NHRM; MNR 2010). Recommended criteria for designating significant valleylands include prominence as a distinctive landform, degree of naturalness, importance of its ecological functions, restoration potential, and historical and cultural values.

According to the City of Mississauga (2016), significant valleylands are associated with the main branches, major tributaries and other tributaries and watercourse corridors draining directly to Lake Ontario including the Credit River, Etobicoke Creek, and Mimico Creek. These features are mapped as Significant Natural Areas and Natural Hazard Lands in the OP (OP Schedules 3 and 10) (Figure 2).

Where development is proposed or adjacent to a significant valleyland, an assessment must be completed to demonstrate that all reasonable alternatives have been considered and development will not adversely affect the



feature or its ecological function, to the satisfaction of the City and appropriate conservation authorities (City of Mississauga 2016). Vegetated setbacks may be required from the top of bank of significant valleylands and are determined on a case-by-case basis (City of Mississauga 2016). In addition, valleys and hazard lands are generally regulated by the TCRA / CVC and development within or adjacent to these features is subject to common permitting policies.

4.1.5 Significant Wildlife Habitat

Significant wildlife habitat (SWH) is one of the more complicated natural heritage features to identify and evaluate. SWH is evaluated and designated based on the criteria and guidelines contained in the NHRM (MNR 2010), as well as the Significant Wildlife Habitat Technical Guide (SWHTG) and the Significant Wildlife Habitat Mitigation Support Tool (SWHMiST) (MNR 2000 and MNRF 2014). There are four general types of SWH: seasonal concentration areas, migration corridors, rare or specialized habitats, and habitat for species of conservation concern (not including those listed as endangered or threatened under the ESA).

Significant wildlife habitat is typically identified on a site-specific basis and is therefore not often mapped at a landscape level in municipal OPs; however, according to the OP (City of Mississauga 2016), SWH in the City is generally encompassed within the Significant Natural Areas overlay (OP Schedule 3; Figure 2). Potential habitat for 16 species of conservation concern may be present in the study area (Appendix A).

The majority of natural cover in the study area is associated with surface water features, which represent linkages from Lake Ontario (south of the study area) to areas north of the study area. An east-west linkage feature is associated with the Parkway Belt West Plan Area (Figure 2), which is further discussed in Section 4.1.6.

Additional SWH may be present in the study area, but will need to be identified as part of future field investigations.

Where development is proposed within or adjacent (i.e., within 120 m) to SWH, an assessment must be completed to demonstrate that development will not adversely affect the feature or its ecological function.

4.1.6 Official Plan Designated Features

Several small linkages and one major east-west linkage are identified in the study area (Mississauga 2016 - OP Schedule 3; Figure 2). The major linkage is present along the Highway 403 / Eastgate Parkway corridor (Figure 2), and is associated with the Peel Parkway Belt West Plan Area, identified for separating and defining urban areas, linking urban areas with other areas, providing a land reserve for future linear facilities, and providing a system of linked open space and recreational facilities (City of Mississauga 2016).

The City also designates three other categories of natural heritage features (City of Mississauga 2016 - OP Schedule 3; Figure 2):

- Residential Woodlands: generally associated with older residential areas, with large lots that have mature trees forming a fairly continuous canopy and minimal native understorey due to the maintenance of lawns and landscaping.
- Natural Green Spaces: areas that meet one or more of the following criteria:
 - i) woodlands greater than 0.5 hectares that do not fulfill the requirements of a significant woodland;
 - ii) wetlands that do not fulfill the requirements of a significant wetland;



- iii) watercourses that do not fulfill the requirements of a significant valleyland, even if they are predominantly engineered; and,
- iv) all natural areas greater than 0.5 hectares that have vegetation that is uncommon in the City.
- Special Management Areas: lands adjacent to or near Significant Natural Areas or Natural Green Spaces that will be managed or restored to enhance and support the Significant Natural Area or Natural Green Space.

Development proposals and site alteration for lands within a Residential Woodland will have regard for how existing tree canopy and understorey are protected, enhanced, restored and expanded. Development and site alteration will not be permitted within or adjacent to Natural Green Spaces, Linkages and Special Management Areas unless it has been demonstrated that there will be no negative impact to the natural heritage features and their ecological functions and opportunities for their protection, restoration, enhancement and expansion have been identified (City of Mississauga 2016).

4.2 Species at Risk

Based on the desktop SAR screening, 23 species designated as special concern, threatened or endangered under the ESA or SARA were assessed to have moderate potential to occur within the study area (Appendix A). Of these, 13 are designated as threatened or endangered under the ESA and receive individual and habitat protection. The other species with moderate potential, as indicated in Appendix A, do not have regulatory protection under the ESA; however, habitat for these species must still be considered under the SWH criteria of the PPS in the impact assessment for the Class EA. Threatened or endangered species with moderate potential to occur in the study area include:

- Three birds Bank Swallow (*Riparia riparia*), Barn Swallow (*Hirundo rustica*), Chimney Swift (*Chaetura pelagica*)
- Four mammals (bats) Small-footed Myotis (*Myotis leibii*), Little Brown Myotis (*Myotis lucifugus*), Northern Myotis (*Myotis septentrionalis*), and Tri-colored Bat (*Perimyotis subflavus*)
- One amphibian Jefferson Salamander (*Ambystoma jeffersonianum*) including the associated hybrid polyploid population
- One reptile Blanding's Turtle (*Emydoidea blandingii*)
- Three fish American Eel (*Anguilla rostrata*), Lake Sturgeon (*Acipenser fulvescens*) and Redside Dace (*Clinostomus elongatus*)
- One vascular plant Butternut (Juglans cinerea)

The majority of potential suitable habitat for these SAR in the study area is concentrated in the PSW, watercourses and associated riparian habitat, and woodlands (Figure 2). Some species, such as Chimney Swift and Little Brown Myotis, may also use anthropogenic structures for habitat.

Further assessment for SAR and their habitats will be conducted during field surveys completed during the core growing season and active wildlife season for southern Ontario (i.e., May – September). Direct effects (i.e., removal of habitat or harm to individuals) and indirect effects (i.e., changes to habitat form or function) on



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SAR and/or SAR habitat will be considered in the Class EA. Where impacts cannot be avoided, consultation with the MECP may be required to determine if a permit or registration under the ESA is required.

4.3 Aquatic Features and Fish Habitat

4.3.1 Surface Water

Watercourses and waterbodies within the study area are components of the Credit River watershed (CVC 2011) and Etobicoke Creek watershed (TRCA 1998). There are several watercourses and waterbodies in the study area (Figure 2), including the following major surface water features:

- Kenollie Creek;
- Stavebank Creek:
- Mary Fix Creek;
- Cooksville Creek;
- Tributary to Cooksville Creek;
- Little Etobicoke Creek;
- Etobicoke/Lower Etobicoke Creek:
- Tributary to Etobicoke Creek;
- Applewood Creek;
- Elmcrest Creek; and,
- Renforth Creek.

The TRCA and CVC regulate watercourses, waterbodies and wetlands within their respective jurisdictional boundaries in the study area. Any development proposed within these features or their regulated limits will require authorization or a permit from these conservation authorities. Figure 3 depicts the regulated limits of the conservation authorities within the study area.

4.3.2 Fish Habitat

All major watercourses and waterbodies in the study area are considered warmwater features. Warmwater aquatic features are generally considered to be more robust and tolerant to external effects. Where the two larger watercourses in the study area, Cooksville Creek and Etobicoke Creek, flow into Lake Ontario downstream of the study area, the watercourses have a more coldwater/coolwater thermal regime. The thermal regime of these watercourses within the study area will be confirmed through MNRF correspondence.

There are numerous native and non-native fish species present in watercourses and waterbodies of the Credit River and Etobicoke Creek watersheds. In general, most of the Cooksville Creek watershed, a subwatershed of the Credit River watershed that spans roughly half of the study area, contains no fish upstream of the QEW highway (CVC 2011). However, fish caught in Cooksville Creek reaches downstream of the QEW highway included top predator coldwater species including migratory Rainbow Trout (*Oncorhynchus mykiss*) and Brown Trout (*Salmo trutta*) and warmwater species including White Sucker (*Catastomus commersonii*) and baitfish



(CVC 2011). Most fish in the Etobicoke Creek watershed are warmwater species such as Largemouth Bass (*Micropterus salmoides*) and White Bass (*Morone chrysops*), with records of Common Carp (*Cyprinus carpio*), an invasive species (TRCA 2018). As in Cooksville Creek, a few coldwater species are found near the mouth in Etobicoke Creek such as Chinook Salmon (*Oncorhynchus tshawytscha*) (TRCA 2018).

There are historical records of Redside Dace, a SAR designated as endangered federally and provincially, in watercourses in the study area. In addition, there are historical records of American Eel and Lake Sturgeon (Upper Great Lakes / Upper St. Lawrence population) in the Etobicoke Creek watershed (NHIC 2019).

Where development is proposed within or adjacent (i.e., within 30 m) to fish habitat, an assessment must be completed to demonstrate that development will not adversely affect the feature or its ecological function. In general, development should be designed to avoid or minimize adverse impacts to fish and fish habitat. Development and site alteration within fish habitat may be permitted in accordance with provincial and federal requirements. Buffers to protect against soil erosion and sediment impacts may be required for development and site alteration adjacent to watercourses (City of Mississauga 2016).

5.0 SUMMARY AND CONCLUSIONS

Based on the results of the natural environment screening assessment, there are locally and provincially important natural features within the study area. The desktop assessment has identified one PSW, unevaluated wetlands, one provincially significant ANSI, significant valleylands, significant woodlands, SWH and potential habitat for SAR. Additional features are protected under the OP, and waterbodies and watercourses are under the regulation of the TRCA and CVC. A summary of the identified features, recommended setbacks and other mitigation measures are provided in Table 1.

Natural features in the study area will be verified during field surveys, where possible, and assessed for potential impacts as part of the Class EA. These features should be considered in the assessment of potential effects associated with the siting of the Project and all associated temporary disturbance.



Table 1: Summary of Natural Heritage Constraints and Typical Setbacks

Natural Environment Feature	Responsible Agency ¹	Development Constraint	Setback ²	Setback Flexibility ³	Mitigation
Areas of Natural and Scientific Interest (ANSI) – life sciences	City of Mississauga, CVC and/or TRCA	Development within or adjacent (within 120 m) requires an environmental impact assessment or study	120 m	Negotiable	■ Must demonstrate no adverse impacts to feature or function and ensure feature is appropriately protected
Provincially Significant Wetlands (PSWs)	CVC and/or TRCA, MNRF	Development adjacent (within 120 m) requires an environmental impact assessment or study	30 m	Absolute	 No development permitted within the PSW Development adjacent to the PSW must demonstrate no adverse impacts to feature or function and ensure feature is appropriately protected Development proposed within regulated limits may require a permit from the CVC and/or TRCA
Other Wetlands	CVC and/or TRCA	Development within or adjacent (within 30 m) requires an environmental impact assessment or study	10 m	Absolute	 Must demonstrate no adverse impacts to feature or function and ensure feature is appropriately protected Development proposed within regulated limits may require a permit from the CVC and/or TRCA
Watercourses	CVC and/or TRCA	Development within or adjacent (within 30 m) requires an environmental impact assessment or study	10 m	Absolute	 Must demonstrate no adverse impacts to feature or function and ensure feature is appropriately protected Development proposed within regulated limits may require a permit from the CVC and/or TRCA
Significant Woodlands	City of Mississauga, CVC and/or TRCA	Development within or adjacent (within 120 m) requires an environmental impact assessment or study	10 m	Absolute	■ Must demonstrate no adverse impacts to feature or function and ensure feature is appropriately protected
Significant Valleylands	City of Mississauga, CVC and/or TRCA	Development within or adjacent (within120 m) requires an environmental impact assessment or study	10 m	Absolute	 Must demonstrate no adverse impacts to feature or function and ensure feature is appropriately protected Development proposed within regulated limits may require a permit from the CVC and/or TRCA
Significant Wildlife Habitat	City of Mississauga, CVC and/or TRCA	Development within or adjacent (within 120 m) requires an environmental impact assessment or study	120 m	Negotiable	■ Must demonstrate no adverse impacts to feature or function and ensure feature is appropriately protected
Habitat of Species at Risk - Endangered or Threatened Species	MECP	Development within or adjacent (within 120 m) requires an environmental impact assessment or study	120 m	Negotiable	 No development permitted within habitat for endangered or threatened species Must demonstrate no adverse impacts to species or its habitat If species or habitat will be impacted, permitting under the <i>Endangered Species Act, 2007</i> may be required
Fish Habitat	DFO	Development adjacent (within 30 m) requires an environmental impact assessment or study	10 m (warm/ coolwater) 15 m (coldwater)	Absolute	 Must demonstrate no adverse impacts to fish or fish habitat Setbacks adjacent to fish habitat will be determined by the impact assessment If fish or fish habitat will be impacted, permitting under the federal <i>Fisheries Act</i> may be required
Natural Green Spaces and Linkages ⁴	City of Mississauga	Development within or adjacent requires an environmental impact assessment or study	Varies ⁵	Negotiable	■ Must demonstrate no adverse impacts to feature or function and ensure feature is appropriately protected
Special Management Areas ⁴	City of Mississauga	N/A	None	N/A	■ Must be managed to support the nearby green space or natural heritage feature.
Residential Woodland ⁴	City of Mississauga	Development within may require a site development plan to address existing topography and drainage patterns, groundwater recharge, wildlife habitat, and green system linkages.	Varies ⁵	Negotiable	■ Must demonstrate how existing tree canopy and understory are protected, enhanced, restored, and expanded.

¹CVC = Credit Valley Conservation; DFO = Fisheries and Oceans Canada; MECP = Ministry of the Environment, Conservation, and Parks; MNRF = Ministry of Natural Resources and Forestry; TRCA = Toronto and Region Conservation Authority.

City of Mississauga Official Plan, 2016

CVC. 2010. Watershed Planning and Regulation Policies

MNR. 2010. Natural Heritage Reference Manual

⁵ Varies – setbacks are generally determined as part of an environmental impact study.



² Setbacks are recommended according to the following documents:

TRCA. 2014. The Living City Policies

³ Setback flexibility is defined as follows:

Negotiable – reduced setbacks may be negotiated with the responsible agency, typically through completion of an environmental impact study.

Absolute – setbacks are generally not subject to negotiation, except where the proponent obtains appropriate permits from the responsible agency. Permits may not be available for all features.

⁴ As defined in the City of Mississauga Official Plan, 2016.

6.0 CLOSURE

G. Weeks.

We trust this report meets your current needs. If you have any questions, please contact the undersigned.

Gwendolyn Weeks, HBSc Env

Ecologist

Heather Melcher, MSc Associate, Senior Ecologist

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GAW/HM/mp

Attachments: Figure 1: Preliminary Natural Environment Constraints

Figure 2: Significant Natural Features

Figure 3: Regulation Limits

Appendix A - Species at Risk Screening

https://golderassociates.sharepoint.com/sites/100160/deliverables/natural environment/desktop assessment report/final/18112273-tm-rev0-baseline natural features assessment report-10dec2020.docx



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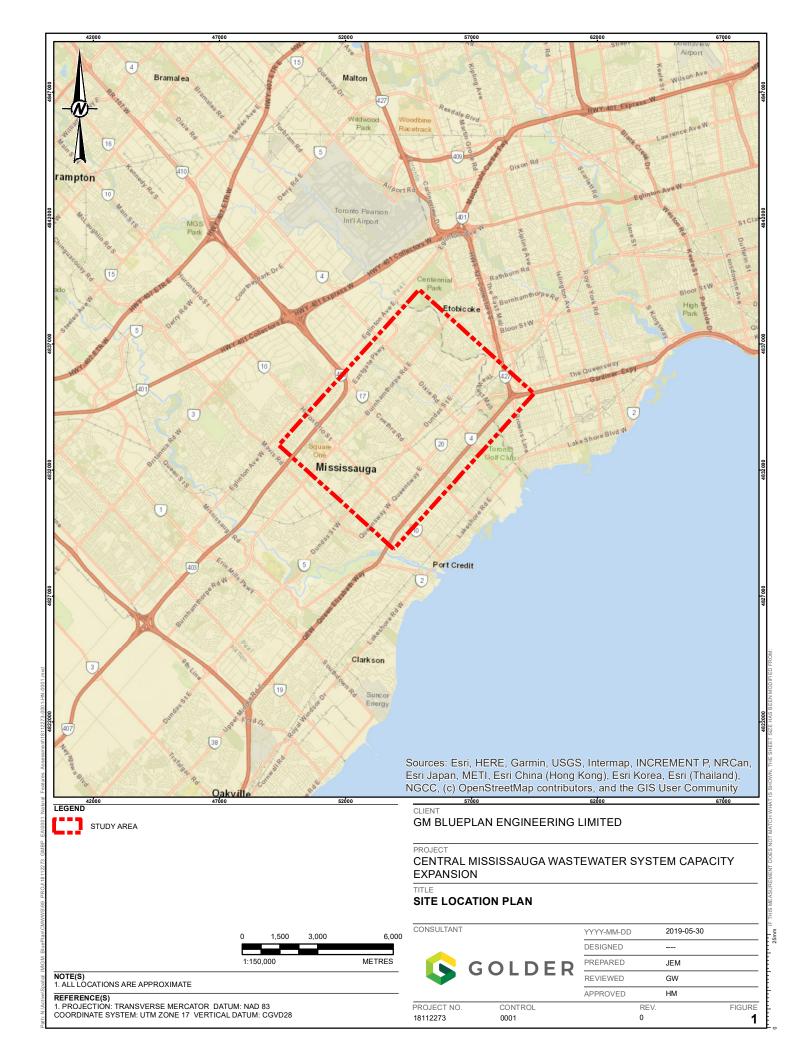


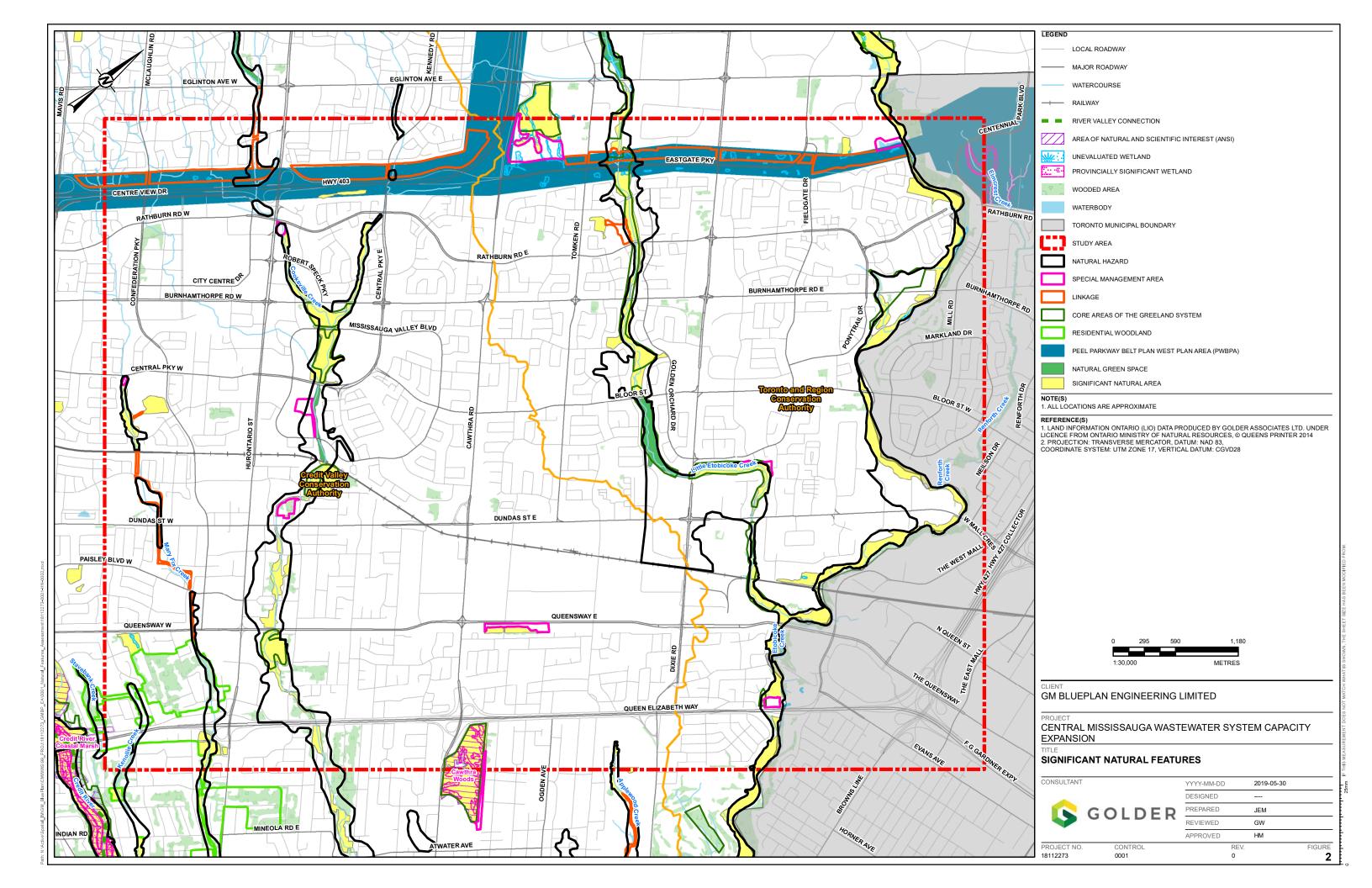
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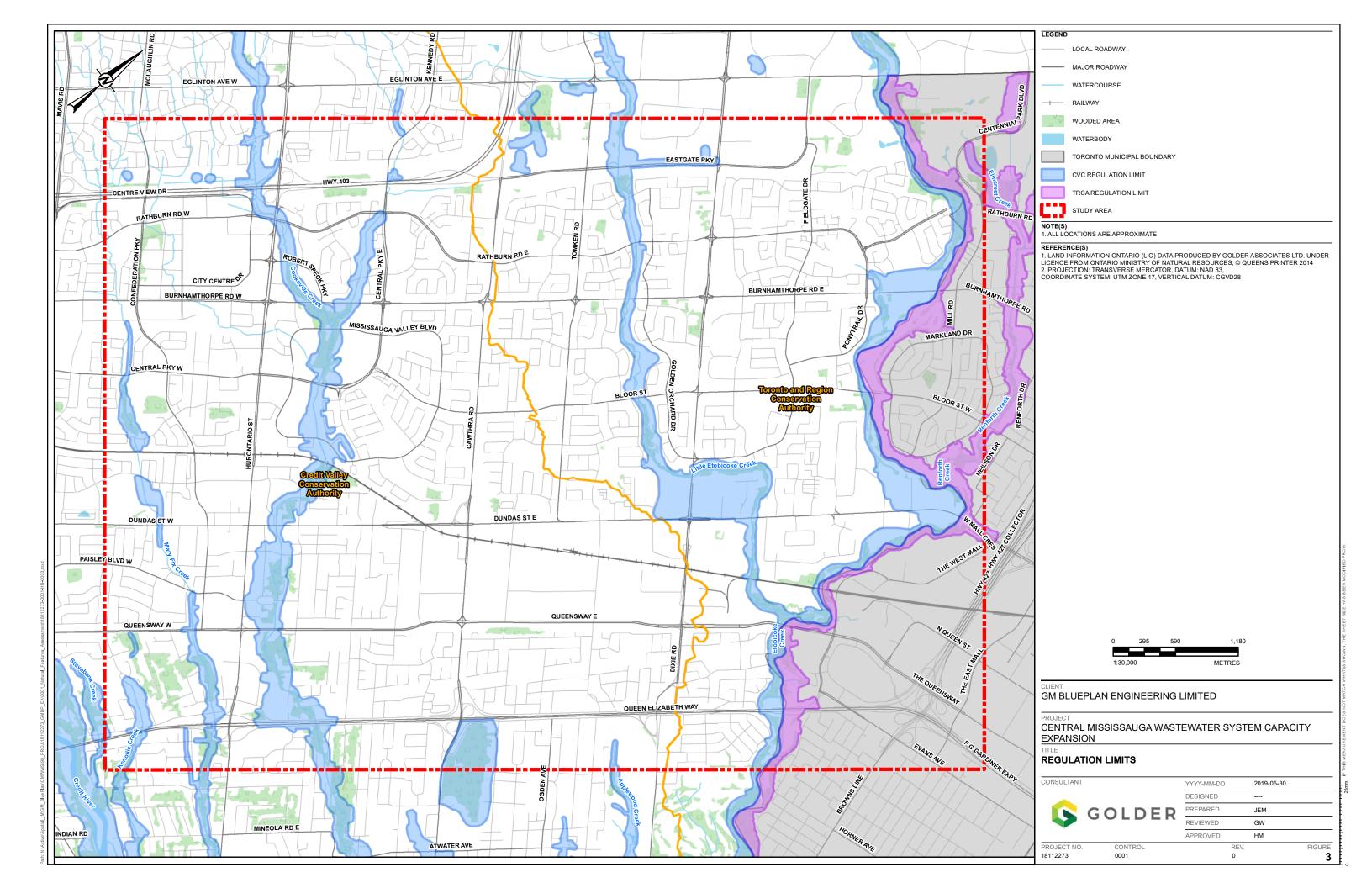
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FIGURES







APPENDIX A

Species at Risk Screening



Taxon	Common Name	Scientific Name	Endangered Species Act ¹	Species at Risk Act (Sch 1) ²	COSEWIC ³	Provincial (SRank) ⁴	Habitat Requirements ⁵	ESA Habitat Protection Provisions ⁶	Potential to Occur on Site or in the Study Area (Desktop)	Rationale for Potential to Occur on Site or in the Study Area (Desktop)
Amphibian	Jefferson salamander	Ambystoma jeffersonianum	END	END	END	S2	In Ontario, Jefferson salamander is found only in southern Ontario, along southern portions of the Niagara Escarpment and western portions of the Oak Ridges Moraine. Jefferson salamander prefers moist, well-drained deciduous and mixed forests with a closed canopy. It overwinters underground in mammal burrows and rock fissures, and moves to vernal pools and ephemeral wetlands in the early spring to breed. Breeding ponds are typically located in or near to forested habitats, and contain submerged debris (i.e. sticks, vegetation) for egg attachment sites. Ephemeral breeding pools need to have water until at least mid-summer (mid to late July) (Jefferson Salamander Recovery Team 2010).	Regulated In the geographic areas of: City of Hamilton; counties of Brant, Dufferin, Elgin, Grey, Haldimand, Norfolk, and Wellington; regional municipalities of Halton, Niagara, Peel, Waterloo and York Regulated Habitat: i. wetland, pond or vernal pool, or other temporary pool, being used or was used in previous five years, by jefferson salamander or jefferson dominated polyploidy ii. area within 300 m of wetland, pond or vernal or other temporary pool that provides suitable foraging, dispersal, migration or hibernation conditions iii. wetland, pond or vernal or other temporary pool that provides suitable breeding conditions, is within 1 km of an area described in i. and is connected to the area described in i. and an area described in iv. iv. an area providing suitable conditions for Jefferson salamander or Jefferson dominated polyploids to disperse and is within 1 km of an area described in i.	Moderate	The forests and wetlands in the study area may provide suitable habitat for Jefferson salamander. There are historical records of the species in the vicinity of the study area. Primarily associated with Cawthra Woods
Amphibian	Jefferson X Blue- spotted salamander, Jefferson genome dominates	Ambystoma hybrid pop. 1	_		_	S2	In Ontario, Jefferson x blue-spotted salamander prefers moist, well-drained deciduous and mixed forests with a closed canopy. It overwinters underground in mammal burrows and rock fissures, and moves to vernal pools and ephemeral wetlands in the early spring to breed. Breeding ponds are typically located in or near to forested habitats, and contain submerged debris (i.e. sticks, vegetation) for egg attachment sites. Ephemeral breeding pools need to have water until at least mid-summer (mid to late July) (Jefferson Salamander Recovery Team 2010).		Moderate	The forests and wetlands in the study area may provide suitable habitat for Jefferson X blue spotted salamander.
Amphibian	Western chorus frog - Great Lakes St. Lawrence / Canadian Shield population	Pseudacris triseriata	_	THR	THR	S 3	In Ontario, habitat of this amphibian species typically consists of marshes or wooded wetlands, particularly those with dense shrub layers and grasses, as this species is a poor climber. They will breed in almost any fishless pond including roadside ditches, gravel pits and flooded swales in meadows. This species hibernates in terrestrial habitats under rocks, dead trees or leaves, in loose soil or in animal		Moderate	The forests, wetlands, and roadside ditches in the study area may provide suitable habitat for western chorus frog.



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							burrows. During hibernation, this species is tolerant of flooding (Environment Canada 2015).			
Arthropod	Monarch	Danaus plexippus	SC	SC	END	S2N, S4B	In Ontario, monarch is found throughout the northern and southern regions of the province. This butterfly is found wherever there are milkweed (<i>Asclepias</i> spp.) plants for its caterpillars and wildflowers that supply a nectar source for adults. It is often found on abandoned farmland, meadows, open wetlands, prairies and roadsides, but also in city gardens and parks. Important staging areas during migration occur along the north shores of the Great Lakes (COSEWIC 2010).		Moderate	The roadside ditches and protected areas in the study area (i.e., Cawthra Woods) may support milkweed and provide suitable habitat for monarch. The study area is in close proximity to the northwest shore of Lake Ontario that could provide suitable staging areas for monarch.
Arthropod	West Virginia white	Pieris virginiensis	SC	_	_	S 3	In Ontario, west Virginia white is found primarily in the central and southern regions of the province. This butterfly lives in moist, mature, deciduous and mixed woodlands, and the caterpillars feed only on the leaves of toothwort (<i>Cardamine</i> spp.), which are small, springblooming plants of the forest floor. These woodland habitats are typically maple-beechbirch dominated. This species is associated with woodlands growing on calcaerous bedrock or thin soils over bedrock (Burke 2013).		Moderate	The woodlands in the study area may provide suitable habitat for West Virginia white.
Bird	Bank swallow	Riparia riparia	THR	THR	THR	S4B	In Ontario, bank swallow breeds in a variety of natural and anthropogenic habitats, including lake bluffs, stream and river banks, sand and gravel pits, and roadcuts. Nests are generally built in a vertical or near-vertical bank. Breeding sites are typically located near open foraging sites such as rivers, lakes, grasslands, agricultural fields, wetlands and riparian woods. Forested areas are generally avoided (Garrison 1999).	General (Draft) Category 1 – Breeding colony, including burrows and substrate between them Category 2 – Area within 50 m of the front of breeding colony face Category 3 – Area of suitable foraging habitat within 500 m of the outer edge of breeding colony	Moderate	The open habitats near rivers and wetlands in the study area may provide habitat for bank swallow, however suitable nesting habitat is likely limited. There are historical records of bank swallow in the vicinity of the study area.
Bird	Barn swallow	Hirundo rustica	THR	THR	THR	S4B	In Ontario, barn swallow breeds in areas that contain a suitable nesting structure, open areas for foraging, and a body of water. This species nests in human made structures including barns, buildings, sheds, bridges, and culverts. Preferred foraging habitat includes grassy fields, pastures, agricultural cropland, lake and river shorelines, cleared rights-of-way, and wetlands (COSEWIC 2011). Mud nests are fastened to vertical walls or built on a ledge underneath an overhang. Suitable nests from previous years are reused (Brown and Brown 1999).	General Category 1 – Nest Category 2 – Area within 5 m of the nest Category 3 – Area between 5-200 m of the nest	Moderate	Numerous structures suitable for nesting, such as bridges and culverts, are located within the study area. Wetlands and river shorelines that could provide suitable foraging habitat are available in the study area as well, although limited. There are historical observations of barn swallow in the vicinity of the study area.



Taxon	Common Name	Scientific Name	Endangered Species Act ¹	Species at Risk Act (Sch 1) ²	COSEWIC ³	Provincial (SRank) ⁴	Habitat Requirements⁵	ESA Habitat Protection Provisions ⁶	Potential to Occur on Site or in the Study Area (Desktop)	Rationale for Potential to Occur on Site or in the Study Area (Desktop)
Bird	Bobolink	Dolichonyx oryzivorus	THR	THR	THR	S4B	In Ontario, bobolink breeds in grasslands or graminoid dominated hayfields with tall vegetation (Gabhauer 2007). Bobolink prefers grassland habitat with a forb component and a moderate litter layer. They have low tolerance for presence of woody vegetation and are sensitive to frequent mowing within the breeding season. They are most abundant in established, but regularly maintained, hayfields, but also breed in lightly grazed pastures, old or fallow fields, cultural meadows and newly planted hayfields. Their nest is woven from grasses and forbs. It is built on the ground, in dense vegetation, usually under the cover of one or more forbs (Renfrew et al. 2015).	General Category 1 – Nest and area within 10 m of nest Category 2 – Area between 10 – 60 m of the nest or centre of approximated defended territory Category 3 - Area of continuous suitable habitat between 60 – 300 m of the nest or centre of approximated defended territory	Low	The study area lacks breeding habitat, such as hayfields or grasslands, suitable for this species.
Bird	Chimney swift	Chaetura pelagica	THR	THR	THR	S4B, S4N	In Ontario, chimney swift breeding habitat is varied and includes urban, suburban, rural and wooded sites. They are most commonly associated with towns and cities with large concentrations of chimneys. Preferred nesting sites are dark, sheltered spots with a vertical surface to which the bird can grip. Unused chimneys are the primary nesting and roosting structure, but other anthropogenic structures and large diameter cavity trees are also used (COSEWIC 2007).	General Category 1 – Human-made nest/roost, or natural nest/roost cavity and area within 90 m of natural cavity	Moderate	The study area contains large concentrations of buildings that likely include chimneys, the nesting structure preferred by this species.
Bird	Common nighthawk	Chordeiles minor	SC	THR	SC	S4B	In Ontario, these aerial foragers require areas with large open habitat. This includes farmland, open woodlands, clearcuts, burns, rock outcrops, alvars, bogs, fens, prairies, gravel pits and gravel rooftops in cities (Sandilands 2007).		Low	The study area lacks large areas of open habitat preferred by this species.
Bird	Eastern meadowlark	Sturnella magna	THR	THR	THR	S4B	In Ontario, eastern meadowlark breeds in pastures, hayfields, meadows and old fields. Eastern meadowlark prefers moderately tall grasslands with abundant litter cover, high grass proportion, and a forb component (Hull 2003). They prefer well drained sites or slopes, and sites with different cover layers (Roseberry and Klimstra 1970).	General Category 1 – Nest and area within 10 m of the nest Category 2 – Area between 10 – 100 m of the nest or centre of approximated defended territory Category 3 – Area of continuous suitable habitat between 100 – 300 m of the nest or centre of approximated defended territory	Low	The study area lacks suitable breeding habitat (i.e., pastures, hayfields, meadows) preferred by this species.
Bird	Eastern wood- pewee	Contopus virens	SC	SC	SC	S4B	In Ontario, eastern wood-pewee inhabits a wide variety of wooded upland and lowland habitats, including deciduous, coniferous, or mixed forests. It occurs most frequently in forests with some degree of openness. Intermediate-aged forests with a relatively sparse midstory are preferred. In younger forests with a relatively dense midstory, it tends to inhabit the edges.		Moderate	There are forests in the study area that may provide suitable breeding habitat, however the habitat is limited. There are historical records of the species in the vicinity of the study area.



Taxon	Common Name	Scientific Name	Endangered Species Act ¹	Species at Risk Act (Sch 1) ²	COSEWIC ³	Provincial (SRank) ⁴	Habitat Requirements⁵	ESA Habitat Protection Provisions ⁶	Potential to Occur on Site or in the Study Area (Desktop)	Rationale for Potential to Occur on Site or in the Study Area (Desktop)
							Also occurs in anthropogenic habitats providing an open forested aspect such as parks and suburban neighborhoods. Nest is constructed atop a horizontal branch, 1-2 m above the ground, in a wide variety of deciduous and coniferous trees (COSEWIC 2012).			
Bird	Henslow's sparrow	Ammodramus henslowii	END	END	END	SHB	In Ontario, Henslow's sparrow breeds in large grasslands with low disturbance, such as lightly grazed and ungrazed pastures, fallow hayfields, grassy swales in open farmland, and wet meadows. Preferred habitat contains tall, dense grass cover, typically over 30 cm high, with a high percentage of ground cover, and a thick mat of dead plant material. Henslow's sparrow generally avoids areas with emergent woody shrubs or trees, and fence lines. Areas of standing water or ephemerally wet patches appear to be important. This species breeds more frequently in patches of habitat greater than 30 ha and preferably greater than 100 ha (COSEWIC 2011).	General Category 1 – Nest or probable breeding occurrence and the area within 50 m Category 2 – Area of continuous suitable habitat outside of category 1	Low	The study area lacks suitable breeding habitat (i.e., large, undisturbed grasslands) preferred by this species.
Bird	Peregrine falcon (anatum/tundrius subspecies)	Falco peregrinus anatum/ tundrius	SC	SC	NAR	S3B	In Ontario, peregrine falcon breeds in areas containing suitable nesting locations and sufficient prey resources. Such habitat includes both natural locations containing cliff faces (heights of 50 - 200 m preferred) and also anthropogenic landscapes including urban centres containing tall buildings, open pit mines and quarries, and road cuts. Peregrine falcons nest on cliff ledges and crevices and building ledges. Nests consist of a simple scrape in the substrate (COSEWIC 2007).		High	The tall buildings in the study area may provide suitable nesting habitat for peregrine falcon. There are historical records of the species in the vicinity of the study area.
Bird	Red-necked grebe	Podiceps grisegena	NAR	_	NAR	S3B,S4N	Breeding distribution scattered across range in suitable waterbodies including shallow freshwater lakes, secluded bays and protected marshes, usually with some emergent vegetation, but also bogs, quiet river channels, large irrigation ditches and borrow pits. Mostly maritime in winter, but overwinters in small numbers around Lake Ontario (Stout and Nuechterlein 1999).		Low	The study area lacks suitable breeding habitat, such as quiet river channels, preferred by this species. The study area is located in proximity to Lake Ontario.



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Bird	Wood thrush	Hylocichla mustelina	SC	THR	THR	S4B	In Ontario, wood thrush breeds in moist, deciduous hardwood or mixed stands that are often previously disturbed, with a dense deciduous undergrowth and with tall trees for singing perches. This species selects nesting sites with the following characteristics: lower elevations with trees less than 16 m in height, a closed canopy cover (>70 %), a high variety of deciduous tree species, moderate subcanopy and shrub density, shade, fairly open forest floor, moist soil, and decaying leaf litter (COSEWIC 2012).		Moderate	The forests in the study area may provide suitable breeding habitat for this species. There are historical records of this species in the vicinity of the study area.
Fish	American Eel	Anguilla rostrata	END		THR	S1?	In Ontario, American Eel is native to the Lake Ontario, St. Lawrence River and Ottawa River watersheds. Their current distribution includes lakes Huron, Erie, and Superior and their tributaries. The Ottawa River population is considered extirpated. The preferred habitat of the American eel is cool water of lakes and streams with muddy or silty substrates in water temperatures between 16 and 19°C. The American Eel is a catadromous fish that lives in fresh water until sexual maturity then migrates to the Sargasso Sea to spawn (Burridge et al. 2010; Eakins 2016).	General (as of June 30, 2013)	Moderate	Etobicoke Creek may provide suitable habitat for American Eel. There are historical records of the species in the Etobicoke Creek watershed.
Fish	Deepwater Sculpin - Great Lakes / Western St. Lawrence population	Myoxocephalus thompsoni	_	SC	SC	S3?	In Ontario, Deepwater Sculpin are found in Lakes Huron, Ontario, and Superior, as well as in scattered inland lakes. This fish species prefers cold, deep water (usually between 60-150 m in lakes), with soft substrates. Spawning takes place year-round, but peaks in August and early September. Its lifespan is 7 years, with females maturing at 3 years and males at 2 years (DFO 2011).		Low	There are historical records of the species in the vicinity of the study area. The watercourses in the study area likely lack adequate depth preferred by this species.
Fish	Greater Redhorse	Moxostoma valenciennesi	_	_	_	S 3	In Ontario, Greater Redhorse are fond in the Upper St. Lawrence River, Ottawa River and Tributaries, Lake Champlain, tributaries of Lake Ontario, Lake Erie, Lake St. Clair and Huron, north to the Spanish River (W.B. Scott1983 and Eakins 2019). Habitat preferences include moderate to swift flowing medium to large rivers with coarse substrates and riffles for spawning, that occurs in late spring early summer at temperatures around 13 degrees Celsius (Eakins 2019 and Holm et al 2010). Cool bottom waters of runs and pools are used as foraging habitats (Holm et al. 2010).		Moderate	There are historical records of the species in the vicinity of the study area. The watercourses in the study area may provide suitable habitat preferred by this species.



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Fish	Lake Sturgeon - Great Lakes / Upper St. Lawrence population	Acipenser fulvescens	END		THR	S2	In Ontario, Lake Sturgeon, a large prehistoric freshwater fish, is found in all the Great Lakes and in all drainages of the Great Lakes and of Hudson Bay. This species typically inhabits highly productive shoal areas of large lakes and rivers. They are bottom dwellers, and prefer depths between 5-10 m and mud or gravel substrates. Small sturgeons are often found on gravelly shoals near the mouths of rivers. They spawn in depths of 0.5 to 4.5 m in areas of swift water or rapids. Where suitable spawning rivers are not available, such as in the lower Great Lakes, they are known to spawn in wave action over rocky ledges or around rocky islands (Golder 2011).	General	Moderate	Etobicoke Creek, located in the study area and in proximity to Lake Ontario, may provide suitable habitat for Lake Sturgeon. There are historical records of this species in the vicinity of the study area.
Fish	Redside Dace	Clinostomus elongatus	END	END	END	S2	In Ontario, Redside Dace, a small coolwater species common in the USA but less so in Canada, is found in tributaries of western Lake Ontario, Lake Erie, Lake Huron and Lake Simcoe. They are found in pools and slow-moving areas of small headwater streams with clear to turbid water. Overhanging grasses, shrubs, and undercut banks, are an important part of their habitat, as are instream boulders and large woody debris. Preferred substrates are variable and include silt, sand, gravel and boulders. Spawning occurs in shallow riffle areas (Redside Dace Recovery Team 2010).	Regulated In the geographic areas of: cities of Hamilton and Toronto; counties of Bruce, Grey, Huron, Simcoe, and Wellington; regional municipalities of Durham, Halton, Peel and York; townships of St. Joseph, Jocelyn and Hilton; and the village of Hilton Beach Regulated Habitat: i. any part of a stream or other watercourse currently being used by Redside Dace, or was used during previous 20 years by Redside Dace and that provides suitable conditions to carry out life processes ii. the area encompassing the meander belt width of the stream or watercourse described in i., and the vegetated area or agricultural lands within 30 m of the stream or watercourse iii. stream, permanent or intermittent headwater drainage feature, groundwater discharge area or wetland that augments or maintains baseflow, coarse sediment supply or surface water quality of a part of stream or other watercourse described in i., provided that stream or watercourse has an average bankfull width of 7.5 m or less In the geographic areas of: in the City of Hamilton, counties of Bruce, Grey, Huron, Simcoe, and Wellington, and the regional municipalities of Durham, Halton, Peel and York Regulated Habitat:	Moderate	The watercourses in the study area may provide suitable habitat for Redside Dace. There are historical records of the species in the vicinity of the study area.



Taxon	Common Name	Scientific Name	Endangered Species Act ¹	Species at Risk Act (Sch 1) ²	COSEWIC ³	Provincial (SRank) ⁴	Habitat Requirements ⁵	ESA Habitat Protection Provisions ⁶	Potential to Occur on Site or in the Study Area (Desktop)	Rationale for Potential to Occur on Site or in the Study Area (Desktop)
								iv. Any part of a stream or other watercourse used by a Redside Dace at any time in the past located in the same or adjacent sub-watershed as area identified in i. that provides suitable conditions for successful stream corridor rehabilitation and for natural recolonization of Redside Dace v. area encompassing the meander belt width of an area described in iv., and the vegetated area or agricultural lands within 30 m of an area described in iv. vi. stream, permanent or intermittent headwater drainage feature, groundwater discharge area or wetland that augments or maintains baseflow, coarse sediment supply or surface water quality of a part of stream or other watercourse described in iv., provided that stream or watercourse has an average bankfull width of 7.5 m or less.		
Fish	Shortnose Cisco	Coregonus reighardi	END	END	END	SH	In Ontario, Shortnose Cisco species was last reported in Georgian Bay in 1985 and Lake Ontario in 1964. It prefers clear, deep waters and water temperatures between 2 and 10°C (COSEWIC 2005).	General (as of June 30, 2013)	Low	There are historical records of the species in the vicinity of the study area. The watercourse in the study area likely lack sufficient depth and thermal regime preferred by this species.
Fish	Upper Great Lakes Kiyi	Coregonus kiyi kiyi	SC	SC	SC	S3	In Ontario, Kiyi occurs in Lake Superior. The Kiyi was last seen in Lake Ontario in 1964 and Lake Huron in 1973. It is a species of freshwater whitefish. The Kiyi is a coldwater species that prefers temperatures between 3.7 and 4.6°C and depths ranging from 35 to 200 m; however, it is rarely found in waters less than 108 m deep. Kiyi have been collected over lake bottoms of clay and mud substrates. Spawning generally occurs in the late fall at depths greater than 100 m (COSEWIC 2005).		Low	There are no suitable habitats meeting the required depths for this species in the study area.
Mammal	Eastern small- footed myotis	Myotis leibii	END	_	_	S2S3	This species is not known to roost within trees, but there is very little known about its roosting habits. The species generally roosts on the ground under rocks, in rock crevices, talus slopes and rock piles. It occasionally inhabits buildings. Areas near the entrances of caves or abandoned mines may be used for hibernaculum, where the conditions are drafty	General	Moderate	There may be suitable roosting sites, including structures, for this species in the study area. There are no known abandoned mine features in the vicinity of the study area that may provide



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							with low humidity, and may be subfreezing (Humphrey 2017)			hibernacula for this species.
Mammal	Little brown myotis	Myotis lucifugus	END	END	END	S 4	In Ontario, this specie's range is extensive and covers much of the province. It will roost in both natural and man-made structures. Roosting colonies require a number of large dead trees, in specific stages of decay and that project above the canopy in relatively open areas. May form nursery colonies in the attics of buildings within 1 km of water. Caves or abandoned mines may be used as hibernacula, but high humidity and stable above freezing temperatures are required (ECCC 2018).	General	Moderate	There may be suitable roosting trees and structures for this species in the study area. There are no known abandoned mine features in the vicinity of the study area that may provide hibernacula for this species.
Mammal	Northern myotis	Myotis septentrionalis	END	END	END	S 3	In Ontario, this species' range is extensive and covers much of the province. It will usually roost in hollows, crevices, and under loose bark of mature trees. Roosts may be established in the main trunk or a large branch of either living or dead trees. Caves or abandoned mines may be used as hibernacula, but high humidity and stable above freezing temperatures are required (ECCC 2018).	General	Moderate	There may be suitable roosting trees preferred by this species in the study area. There are no known abandoned mine features in the vicinity of the study area that may provide hibernacula for this species.
Mammal	Tri-colored bat	Perimyotis subflavus	END	END	END	\$3?	In Ontario, tri-colored bat may roost in foliage, in clumps of old leaves, hanging moss or squirrel nests. They are occasionally found in buildings although there are no records of this in Canada. They typically feed over aquatic areas with an affinity to large-bodied water and will likely roost in close proximity to these. Hibernation sites are found deep within caves or mines in areas of relatively warm temperatures. These bats have strong roost fidelity to their winter hibernation sites and may choose the exact same spot in a cave or mine from year to year (ECCC 2018).	General	Moderate	There may be suitable roosting habitat (i.e., squirrel nests) in the study area preferred by this species. The study area is located more than 2 km from Lake Ontario. There are no known abandoned mine features in the vicinity of the study area that may provide hibernacula for this species.
Reptile	Blanding's turtle - Great Lakes / St.Lawrence population	Emydoidea blandingii	THR	THR	END	S3	In Ontario, Blanding's turtle will use a range of aquatic habitats, but favor those with shallow, standing or slow-moving water, rich nutrient levels, organic substrates and abundant aquatic vegetation. They will use rivers, but prefer slow-moving currents and are likely only transients in this type of habitat. This species is known to travel great distances over land in the spring in order to reach nesting sites, which can include dry conifer or mixed forests, partially vegetated fields, and roadsides. Suitable nesting substrates include organic soils, sands, gravel and cobble. They hibernate underwater and	General Category 1 – Nest and area within 30 m or overwintering sites and area within 30 m Category 2 – Wetland complex (i.e. all suitable wetlands or waterbodies within 500 m of each other) that extends up to 2 km from occurrence, and the area within 30 m around those suitable wetlands or waterbodies Category 3 – Area between 30 – 250 m around suitable wetlands/waterbodies identified in category 2, within 2 km of an occurrence	Moderate	The wetlands, marshes, and roadsides in the study may provide suitable habitat for this species.



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							infrequently under debris close to water bodies (COSEWIC 2016).			
Reptile	Eastern ribbonsnake - Great Lakes population	Thamnophis sauritius	SC	SC	SC	S4	In Ontario, eastern ribbonsnake is semi-aquatic, and is rarely found far from shallow ponds, marshes, bogs, streams or swamps bordered by dense vegetation. They prefer sunny locations and bask in low shrub branches. Hibernation occurs in mammal burrows, rock fissures or even ant mounds (COSEWIC 2012).		Moderate	The marshes and wetlands in the study area may provide the dense vegetation preferred by this species.
Reptile	Midland painted turtle	Chrysemys picta marginata	_	_	SC	S4	In Ontario, painted turtles use waterbodies, such as ponds, marshes, lakes and slow-moving creeks, with a soft bottom and abundant basking sites and aquatic vegetation. This species hibernates on the bottom of waterbodies (Ontario Nature 2018).		Moderate	The marshes, wetlands, and waterbodies in the study area may provide suitable habitat for this species.
Reptile	Milksnake	Lampropeltis triangulum	NAR	SC	SC	S4	In Ontario, milksnake uses a wide range of habitats including prairies, pastures, hayfields, wetlands and various forest types, and is well-known in rural areas where it frequents older buildings. Proximity to water and cover enhances habitat suitability. Hibernation takes place in mammal burrows, hollow logs, gravel or soil banks, and old foundations (COSEWIC 2014).		Moderate	This species is a habitat generalist that uses manmade landscapes. The study area may provide suitable habitat.
Reptile	Northern map turtle	Graptemys geographica	SC	SC	SC	S 3	In Ontario, the northern map turtle prefers large waterbodies with slow-moving currents, soft substrates, and abundant aquatic vegetation. Ideal stretches of shoreline contain suitable basking sites, such as rocks and logs. Along Lakes Erie and Ontario, this species occurs in marsh habitat and undeveloped shorelines. It is also found in small to large rivers with slow to moderate flow. Hibernation takes place in soft substrates under deep water (COSEWIC 2012).		Low	The wetlands and waterbodies in the study area are not large enough for this species.
Reptile	Snapping turtle	Chelydra serpentina	SC	SC	SC	\$3	In Ontario, snapping turtle uses a wide range of waterbodies, but shows preference for areas with shallow, slow-moving water, soft substrates and dense aquatic vegetation. Hibernation takes place in soft substrates under water. Nesting sites consist of sand or gravel banks along waterways or roadways (COSEWIC 2008).		Moderate	The roadway embankments and wetlands in the study area may provide suitable nesting habitat for snapping turtle. There are historical records of this species in the vicinity of the study area.
Reptile	Stinkpot or Eastern musk turtle	Sternotherus odoratus	SC	THR	SC	S 3	In Ontario, eastern musk turtle is very rarely out of water and prefers permanent bodies of water that are shallow and clear, with little or no current and soft substrates with abundant organic materials. Abundant floating and		Moderate	The watercourses and wetlands in the study area may provide suitable habitat for Eastern musk turtle. There are historical



Taxon	Common Name	Scientific Name	Endangered Species Act ¹	Species at Risk Act (Sch 1) ²	COSEWIC ³	Provincial (SRank) ⁴	Habitat Requirements ⁵	Potent to Occ on Site ESA Habitat Protection Provisions ⁶ in the Study Area (Deskto	Rationale for Potential to Occur on Site or in the Study Area (Desktop)
							submerged vegetation is preferred. Hibernation occurs in soft substrates under water. Eggs are sometimes laid on open ground, or in shallow nests in decaying vegetation, shallow gravel or rock crevices (COSEWIC 2012).		records of this species in the vicinity of the study area.
Vascular Plant	Butternut	Juglans cinerea	END	END	END	S2?	In Ontario, butternut is found along stream banks, on wooded valley slopes, and in deciduous and mixed forests. It is commonly associated with beech, maple, oak and hickory (Voss and Reznicek 2012). Butternut prefers moist, fertile, well-drained soils, but can also be found in rocky limestone soils. This species is shade intolerant (Farrar 1995).	General (as of June 30, 2013) Modera	records of this species in the vicinity of the study area.
Vascular Plant	Clinton's clubrush	Trichophorum clintonii	_	_	_	S2S3	In Ontario, Clinton's clubrush grows in prairies, open woods, and rocky crevices along rivers (Oldham and Brinker 2009).	Modera	records of this species in the vicinity of the study area.
Vascular Plant	Field sedge	Carex conoidea	_	_	_	S 3	In Ontario, field sedge grows in prairies and along the shores of rivers and lakes (Oldham and Brinker 2009).	Modera	The shore of the watercourses in the study area may provide suitable habitat for this species. There are historical records of this species in the vicinity of the study area.
Vascular Plant	Harbinger-of- spring	Erigenia bulbosa	-	_	_	S2S3	In Ontario, harbinger-of-spring is an early ephemeral species that grows in rich, moist deciduous woodlands. It is often associated with flood plains, bottomlands and riverbanks (Oldham and Brinker 2009).	Low	Suitable mature undisturbed forest habitats are not likely present in the study area.
Vascular Plant	Virginia lungwort	Mertensia virginica	_	_	_	S3	Moist deciduous woods and thickets, usually on floodplains. Sometimes cultivated and some populations may have originated as garden escapes (Oldham and Brinker 2009).	Modera	This species may be present in moist woodlands and along floodplains in the study area.
Vascular Plant	White-haired panic grass	Dichanthelium ovale ssp. praecocius	_	_	_	S 3	In Ontario, white-haired panic grass grows in dry, open, sandy or rocky woodland borders, sand barrens, dunes, and dry prairies (Oldham and Brinker 2009; Reznicek et al. 2011).	Modera	The woodlands and sand barrens preferred by this species is limited in the



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² Species at Risk Act (SARA), 2002. Schedule 1 (Last amended 25 February 2019); Part 1 (Extirpated), Part 2 (Endangered), Part 3 (Threatened), Part 4 (Special Concern)

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

⁴ Global Ranks (GRANK) are Rarity Ranks assigned to a species based on their range-wide status. GRANKS are assigned by a group of consensus of Conservation Data Centres (CDCs), scientific experts and the Nature Conservancy. These ranks are not legal designations. G1 (Extremely Rare), G2 (Very Rare), G3 (Rare to uncommon), G4 (Common), G5 (Very Common), G5 (Very Common), G7 (Unranked), Q (Questionable), T (rank applies to subspecies or variety). Last assessed August 2011

⁵ Provincial Ranks (SRANK) are Rarity Ranks assigned to a species or ecological communities, by the Natural Heritage Information Centre (NHIC). These ranks are not legal designations. SRANKS are evaluated by NHIC on a continual basis and updated lists produced annually. SX (Presumed Extirpated), SH (Possibly Extirpated - Historical), S1 (Critically Imperiled), S2 (Imperiled), S3 (Vulnerable), S4 (Apparently Secure), SNA (Not Applicable), S4 (Apparently Secure), SNA (Not Apparently Secure), SNA

⁶ General Habitat Protection is applied when a species is newly listed as endangered or threatened on the SARO list under the ESA, 2007. The definition of general habitat applies to areas that a species currently depends on. These areas may include dens and nests, wetlands, forests and other areas essential for breeding, rearing, feeding, hibernation and migration. General habitat protection will also apply to all listed endangered or threatened species without a species-specific habitat regulation as of June 30, 2013 (ESA 2007, c.6, s.10 (2)). Regulated Habitat is species-specific habitat used as the legal description of that species habitat. Once a species-specific habitat regulation is created, it replaces general habitat protection. Refer to O.Reg 242/08 for full details regarding regulated habitat.

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REGION OF PEEL

WASTEWATER CAPACITY IMPROVEMENTS IN CENTRAL MISSISSAUGA

Natural Environment Reports

Short List Alternatives & Addendum



Shaft Site Numbering

Table 1 provides a summary of the changes in shaft numbering during the study from the shaft site evaluation ("Previous Shaft No.") to preferred design ("Final Shaft No.").

The Natural Environment – Short List Alternatives Report references the previous shaft numbering. The Environmental Study Report (Section 7 to Section 11) and Supporting Technical Studies completed on the preferred design reference the final shaft numbering.

Table 1: Shaft Site Number Updates

Alignment	Intersection	Previous Shaft No.	Final Shaft No.
Etobicoke Creek	Sherway Drive	14	1
Queensway East	Etobicoke Creek	13	2
Queensway East	Dixie Road	12	3
Queensway East	Stanfield Road	11	Screened out
Queensway East	Haines Road	10	Screened out
Queensway East	Cawthra Road	9	4
Queensway East	Tedlo Street	8	5
Queensway East	Hensall Street	8	6
Queensway East	Cliff Road	7	7
Queensway East	Camilla Road	6	Screened out
Queensway East	Cooksville Creek	6	8
Queensway East	Hurontario Street	5	9
Cawthra Road	Needham Lane	4	Screened out
Cawthra Road	Dundas Street East	3	10
Burnhamthorpe Road	Cawthra Road	2	11
Burnhamthorpe Road	Wilcox Road	2	Screened out
Burnhamthorpe Road	Central Parkway	1	12



TECHNICAL MEMORANDUM

EMAIL barbara bleho@golder.com

DATE December 11, 2020 **Project No.** 18112273

TO Chris Campbell, Infrastructure Planning, Partner GM BluePlan Engineering Limited (GM BluePlan)

Barbara Bleho and Heather Melcher

CC Sandra Anastasio (GM BluePlan), Jean-Marc Crew (Golder Associates Ltd.)

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FIELD VERIFICATION OF NATURAL ENVIRONMENT CONSTRAINTS AT SHORT-LIST ALTERNATIVES
FOR THE CAPACITY EXPANSION OF THE CENTRAL MISSISSAUGA WASTEWATER SYSTEM. REGION

FOR THE CAPACITY EXPANSION OF THE CENTRAL MISSISSAUGA WASTEWATER SYSTEM, REGION OF PEEL, ONTARIO

1.0 INTRODUCTION

FROM

Golder Associates Ltd. (Golder) has been retained by GM BluePlan (GMBP) on behalf of the Region of Peel (the Region) to conduct natural environment studies as part of the schedule 'C' municipal class environmental assessment for the capacity expansion of the Central Mississauga wastewater system (the Project).

General areas of interest (AOI) are being considered for shaft locations as part of the short list of alternative solutions for the Project (Figure 1). Remaining Project infrastructure will be located below ground and installed using trenchless methods.

To support selection of a preferred solution for the Project, Golder was tasked with field verifying the findings of the initial desktop assessment completed for the Project (Golder 2019), specifically where short-listed alternatives overlapped or were near sensitive natural features according to desktop mapping. The purpose of this technical memorandum is to document existing conditions including the presence of sensitive natural features in each AOI where field verification was completed. A Natural Environmental Report, including the results of detailed field surveys and an impact assessment, will be compiled and submitted following the completion of field work at the location of the preferred solution, once selected.

2.0 POLICY CONTEXT

Sensitive natural features considered for this Project include designated features (e.g., provincially significant wetlands), species at risk (SAR), Toronto and Region Conservation Authority (TRCA) and Credit Valley Conservation (CVC) regulated areas, fish habitat, wildlife and significant wildlife habitat (SWH) as identified in the following Acts and policy documents:

- Provincial Policy Statement (PPS; MMAH 2020);
- Endangered Species Act, 2007 (ESA; Ontario 2007);
- Species at Risk Act (SARA; Canada 2002);

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Project No. 18112273 December 11, 2020

- Fisheries Act (Canada 1985);
- Region of Peel Official Plan (Region of Peel 2016);
- Mississauga Plan and Mississauga Official Plan (City of Mississauga 2003, 2016);
- Parkway Belt West Plan (Ontario 1978);
- O. Reg. 166/06 Toronto and Region Conservation Authority: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses: and
- O. Reg. 160/06 Credit Valley Conservation: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses.

3.0 METHODS

3.1 Background Review and Desktop Species at Risk Screening

As part of the desktop assessment, a background information search and literature review were completed to gather data and provide context for the evaluation of natural features within the study area identified for the long-list of alternatives, that being an area generally limited by Etobicoke Creek in the east, just west of Confederation Parkway in the west, just north of Highway 403 in the north, and just south of the Queen Elizabeth Way (QEW) highway in the south¹. Also completed was a desktop SAR screening for species listed under the ESA and SARA. Species with ranges overlapping the study area, or with recent occurrence records in the vicinity, were screened by comparing their habitat requirements to habitat conditions in the study area. The potential for the species to occur in the study area was determined based on habitat availability and occurrence records. Refer to the desktop assessment report (Golder 2019) for further details.

3.2 Field Reconnaissance

A field reconnaissance was completed by two Golder biologists on October 4, 2019 to confirm existing conditions in five of the AOI that overlapped or were adjacent to sensitive natural features, those being the following AOI (Figure 1):

- Queensway East/Cooksville Creek (potential shaft locations 10A, 10B, 11A, 11B)
- Queensway East/Etobicoke Creek (potential shaft locations 01A, 01C, 02A, 02B)
- Sherway Drive/Etobicoke Creek (potential shaft locations 01B, 01D)
- QEW/Cooksville Creek (potential shaft location 25A)
- QEW/Cawthra Road (potential shaft locations 22A, 22B)

¹ The study area was subsequently increased to accommodate potential shaft locations 18A/18B to south of Atwater Avenue as depicted in Figure 1.



December 11, 2020

Although the AOI at Queensway East/Haines Road (potential shaft locations 05A, 05B) overlaps sensitive natural features according to desktop mapping (Figure 1), this AOI was not surveyed during the field reconnaissance. It was concluded from evaluation of desktop mapping and aerial imagery that a constraints analysis could be adequately completed from the desktop assessment alone.

Surveyors walked through each AOI where access was available, documenting general conditions and confirming presence of sensitive natural features identified through the desktop assessment (Golder 2019). Where access was unavailable, surveyors scanned the area from a vantage point, using binoculars if necessary. Searches were also conducted to document the presence or absence of suitable habitat for those species identified in the desktop SAR screening completed as part of the initial desktop assessment (Golder 2019).

The field reconnaissance also served to inform the need for further (targeted) survey work for the preferred solution once selected.

An additional field investigation was completed in the AOI at Queensway East/Etobicoke Creek and the AOI at Sherway Drive/Etobicoke Creek on October 14, 2020 to inventory the land cover (see addendum for additional details).

3.3 Constraints Analysis

The results from the field reconnaissance and the additional field investigation were used to refine the evaluation of natural environment constraints identified during the desktop assessment (Golder 2019). The SAR screening was also refined as needed.

4.0 EXISTING CONDITIONS

4.1 Area of Interest at Queensway East/Cooksville Creek

This AOI includes potential shaft locations 10A, 10B, 11A, and 11B and is centred on Queensway East to the east of Hurontario Street and at the intersection with Camilla Road and contains four potential shaft locations (Figure 2). The areas in the vicinity of locations 11A and 11B in particular were surveyed during the field reconnaissance given their overlap with sensitive natural features. Landcover on the north side of Queensway East consists of maintained grass, cultural meadow, and a paved public walking trail with footbridge over Cooksville Creek, which flows roughly north-south through the AOI including under Queensway East by way of road bridge. There is a dense stand of phragmites (*Phragmites australis*) between Queensway East and the walking trail. Phragmites is an invasive species commonly found along road allowances in southern Ontario. Cooksville Creek where it crosses the AOI is approximately 6 m wide with a run upstream of the bridge, riffle/run habitat downstream, and a cobble/silt/boulder/clay substrate. Vegetation along the banks of Cooksville Creek north and south of Queensway East consists of Manitoba maple (*Acer negundo*), common buckthorn (*Rhamnus cathartica*), silver maple (*Acer saccharinum*), staghorn sumac (*Rhus typhina*), cattail (*Typha* spp.), ash (*Fraxinus* spp.) and willow (*Salix* spp.). Representative photos are provided (Photos 1-4).





Photo 1: North side of Queensway East facing northeast along paved walking trail.



Photo 2: North side of Queensway East facing southwest along paved walking trail.



Photo 3: South side of Queensway East facing east from road bridge over Cooksville Creek.



Photo 4: South side of Queensway East facing south from road bridge over Cooksville Creek.

4.2 Area of Interest at Queensway East/Haines Road

This AOI includes potential shaft locations 05A and 05B and is located at the intersection of Queensway East and Haines Road (Figure 3). Landcover on the south side of Queensway East is mostly manicured grass along a recreational trail adjacent to a woodland area. Landcover on the north side of Queensway East is mostly industrial and commercial development (buildings and associated parking lots).

4.3 Area of Interest at Queensway East/Etobicoke Creek

This AOI includes potential shaft locations 01A, 01C, 02A, and 02B, and is located immediately north and south of Queensway East where it crosses Etobicoke Creek downstream of its convergence with Little Etobicoke Creek (Figure 4). Etobicoke Creek flows roughly northwest-southeast through the AOI. Where the creek crosses the AOI, it is approximately 10-15 m wide with riffle/run/pool habitat and substrate consisting of cobble/boulder/gravel and silt. The land slopes quite steeply towards the creek, forming a valley. The riparian vegetation on both sides of Etobicoke Creek consists of dense black walnut, staghorn sumac, Manitoba maple, and willow sp. The tributary of Little Etobicoke Creek at the northern portion of the AOI has steep vertical banks that could be suitable nesting habitat for bank swallow. Representative photos are provided (Photos 5-8).



Photo 5: Upstream of Queensway bridge on Etobicoke Creek facing tributary of Little Etobicoke Creek convergence and vertical bank.



Photo 6: Riparian vegetation along left bank of Etobicoke Creek upstream of Queensway bridge.



Photo 7: Riparian vegetation along right bank of Etobicoke Creek upstream of Queensway bridge.



Photo 8: Underside of Queensway bridge, which is likely too smooth for barn swallow nests.

4.4 Area of Interest at Sherway Drive/Etobicoke Creek

This AOI includes potential shaft locations 01B and 01D and is crossed by Sherway Drive where it becomes pedestrian access only in the south end (Figure 5). Etobicoke Creek flows roughly northwest-southeast through the AOI and flows below Sherway Drive by means of a footbridge. Where the creek crosses the AOI, it is approximately 10-15 m wide with riffle/run/pool habitat and substrate consisting of cobble/boulder/gravel and silt. Slope of land surrounding the creek flattens out in this portion of the creek compared to the relatively steep slopes observed farther north at the AOI at Queensway East/Etobicoke Creek (Section 4.3). The riparian vegetation on both sides of Etobicoke Creek consists of dense black walnut, staghorn sumac, Manitoba maple and willow sp. Three barn swallow (*Hirundo rustica*) nests were observed and to be in good condition under the pedestrian bridge on Sherway Drive, and the bridge foundation has cracks within the brick work that could provide habitat for snake hibernacula. Representative photos are provided (Photos 9-14).



Photo 9: Upstream of the pedestrian bridge on Sherway Drive facing upstream along Etobicoke Creek towards Queensway bridge.



Photo 10: Downstream of the pedestrian bridge on Sherway Drive facing upstream along Etobicoke Creek.



Photo 11: One of three barn swallow nests under the pedestrian bridge on Sherway Drive.



Photo 12: Under the pedestrian bridge on Sherway Drive facing right bank and multiple cracks in foundation that may support snake hibernacula.



Photo 13: Riparian vegetation along left bank of Etobicoke Creek downstream of the pedestrian bridge on Sherway Drive.



Photo 14: Riparian vegetation along right bank of Etobicoke Creek downstream of the pedestrian bridge on Sherway Drive.

4.5 Area of Interest at QEW/Cooksville Creek

This AOI includes potential shaft location 25A and is centred on the QEW and adjacent north and south service roads, which run northeast-southwest through the AOI (Figure 6). Residential buildings are present on the north and south sides of the roads and a community centre is present in the northwest corner of the AOI. Cooksville Creek flows roughly northwest-southeast through the AOI including under the QEW and service roads by way of road bridge. Cooksville Creek where it crosses the AOI is approximately 8 m wide and has a concrete paved substrate from the upstream portion of QEW to the southside of the QEW, with a vertical drop fish barrier



downstream where the concrete paved substrate discontinues. Vegetation to the north of the QEW / North Service Road consists of manicured grass, Manitoba maple, black walnut (*Juglans nigra*), common buckthorn, willow sp., Catalpa sp. and coniferous trees planted around apartment building. There was no public access from the sidewalk along South Service Road down to the creek. However, a visual scan from the bridge identified the same tree species as those north of the QEW / North Service Road, as well as a dense deciduous riparian understory. Representative photos are provided (Photos 15-18).



Photo 15: North side of North Service Road facing north from bridge.



Photo 16: North side of North Service Road facing east from bridge.



Photo 17: South side of QEW on South Service Road facing downstream along Cooksville Creek from bridge.



Photo 18: South side of QEW on South Service Road facing south of Cooksville Creek from bridge.

4.6 Area of Interest at QEW/Cawthra Road

This AOI includes potential shaft locations 22A and 22B and is centred on the QEW and Cawthra Road intersection (Figure 7). Landcover is mostly manicured grass with scattered trees. A stand of mature trees is contained within each of the cloverleaf on-ramps. Residential areas are present in the north and west corners of the AOI. Cawthra Woods, a deciduous forest with wetland depressions, is located approximately 70 m south of potential shaft location 22B, immediately south of South Service Road. According to the City of Mississauga Natural Areas Survey, the forest is dominated by sugar maple (*Acer saccharum*) and other hardwoods such as American beech (*Fagus grandifolia*), red maple (*Acer rubrum*) and black cherry (*Prunus serotina*) (City of Mississauga 2018). Representative photos are provided (Photos 19-24).



Photo 19: Facing into Cawthra Woods from sidewalk along South Service Road.



Photo 20: Facing into Cawthra Woods from sidewalk along South Service Road.



Photo 21: Facing north towards QEW from intersection of Cawthra Road and South Service Road.



Photo 22: Facing east towards Cawthra Woods from Cawthra Road.





Photo 23: Facing southeast towards westbound onramp to QEW from Cawthra Road.

Photo 24: Facing southeast towards eastbound onramp to QEW from Cawthra Road.

5.0 SENSITIVE NATURAL FEATURES

5.1 Areas of Natural and Scientific Interest

Areas of Natural and Scientific Interest (ANSI) are designated by the province according to standardized evaluation procedures. ANSI are ranked by the MNRF as being either provincially or regionally significant.

Cawthra Woods is designated as a provincially significant life science ANSI and is in the general vicinity of the AOI at QEW/Cawthra Road, but outside potential shaft locations 22A and 22B on the opposite side of the QEW highway and South Service Road (Figure 7). Where development is proposed within or adjacent to a provincially significant life science ANSI, an assessment must be completed to demonstrate that development will not adversely affect the feature or its ecological function, to the satisfaction of the City and appropriate conservation authority (City of Mississauga 2016; MMAH 2014), which in this case is the CVC.

5.2 Significant Wetlands

A wetland is determined to be a provincially significant wetland (PSW) by the MNRF using evaluation procedures established by the Province, as amended from time to time (MMAH 2014). Wetlands are evaluated for significance based on a range of criteria, including biology, hydrology, societal value and special features (MNRF 2019).

Cawthra Woods is designated as a PSW and is in the general vicinity of the AOI at QEW/Cawthra Road, but outside potential shaft locations 22A and 22B on the opposite side of the QEW highway and South Service Road (Figure 7). In accordance with the Natural Heritage Reference Manual (MNR 2010) and Section 6.3.29 of the Mississauga OP (City of Mississauga 2016), development or site alteration within 120 m of a PSW must be demonstrated through an environmental impact assessment to have no negative impacts on the feature or its ecological functions. In addition, wetlands regardless of provincial significance are regulated by the local conservation authority (in this case, CVC) and development within or adjacent to these features is subject to common permitting policies (CVC 2010).



There is an unevaluated wetland in the general vicinity of the AOI at Sherway Drive/Etobicoke Creek but outside the nearest potential shaft location 01B on the opposite side of Etobicoke Creek (Figure 5). Wetlands regardless of provincial significance are regulated by the local conservation authority (in this case, TRCA) and development within or adjacent to these features is subject to common permitting policies (TRCA 2008).

5.3 Significant Woodlands

Significant woodlands are areas which are: 1) ecologically important in terms of features such as species composition, age of trees and stand history; 2) functionally important due to their contribution to the broader landscape because of their location, size or due to the amount of forest cover in the planning area; or 3) economically important due to site quality, species composition, or past management history (MMAH 2014).

The City of Mississauga has identified significant woodlands in its jurisdiction under the Significant Natural Areas designation (City of Mississauga 2016 – OP Schedule 3). Significant Natural Areas are present within or in the general vicinity of all six AOI and overlap woodland areas, suggesting significance, but overlap potential shaft locations only in AOI at Queensway East/Cooksville Creek (locations 11A and 11B), Queensway East/Haines Road (location 05A) and Sherway Drive/Etobicoke Creek (location 01D) (Figures 2 to 7). Where development is proposed in or adjacent to a significant woodland, an assessment must be completed to demonstrate that all reasonable alternatives have been considered and development will not adversely affect the feature or its ecological function, to the satisfaction of the City (City of Mississauga 2016). Vegetated setbacks may be required from the woodland dripline of significant woodlands and are determined on a case-by-case basis (City of Mississauga 2016).

Significant woodlands are contained within the Core Areas designation of the Greenlands System as mapped by the Region of Peel (2016). Core Areas of the Greenlands System are present within or in the general vicinity of AOI at Queensway East/Cooksville Creek, Queensway East/Etobicoke Creek, and QEW/Cawthra Road, but overlap only one potential shaft location, 11B in the AOI at Queensway East/Cooksville Creek (Figures 2, 4, and 7). Development and site alteration is prohibited within the Core Areas of the Greenlands System, except for minor development and essential infrastructure that is authorized under an environmental assessment process. In the event portions of the Core Areas are damaged or destroyed, the natural features in the area must be rehabilitated to restore ecological function (Region of Peel 2016).

5.4 Significant Valleylands

General guidelines for determining significance of valleylands are presented in the Natural Heritage Reference Manual (NHRM; MNR 2010). Recommended criteria for designating significant valleylands include prominence as a distinctive landform, degree of naturalness, importance of its ecological functions, restoration potential, and historical and cultural values.

According to the City of Mississauga (2016), significant valleylands are associated with the main branches, major tributaries and other tributaries and watercourse corridors draining directly to Lake Ontario including the Credit River, Etobicoke Creek, and Mimico Creek. These features are included in the Natural Hazard Lands designation in the OP but are also designated as Sensitive Natural Areas (City of Mississauga 2016 – OP Schedules 3 and 10). Natural Hazard Lands are present within or in the general vicinity of four AOI as follows:

- AOI at Queensway East/Cooksville Creek overlap with potential shaft locations 11A and 11B (Figure 2)
- AOI at Queensway East/Etobicoke Creek no overlap with potential shaft locations 02A and 02B (Figure 4)



- AOI at Sherway Drive/Etobicoke Creek overlap with potential shaft location 01D (Figure 5)
- AOI at QEW/Cooksville Creek overlap with potential shaft location 25A (Figure 6)

Where development is proposed in or adjacent to a significant valleyland, an assessment must be completed to demonstrate that all reasonable alternatives have been considered and development will not adversely affect the feature or its ecological function, to the satisfaction of the City and appropriate conservation authorities (City of Mississauga 2016). Vegetated setbacks may be required from the top of bank of significant valleylands and are determined on a case-by-case basis (City of Mississauga 2016). In addition, valleys and hazard lands are generally regulated by the local conservation authority (in this case, CVC or TCRA) and development within or adjacent to these features is subject to common permitting policies (CVC 2010; TRCA 2008).

5.5 Habitat for Endangered and Threatened Species

The MECP designates "significant" or critical habitat that is necessary for the maintenance, survival, and/or recovery of naturally occurring or reintroduced populations of species designated as endangered or threatened under the ESA, and where those areas of occurrence are occupied or habitually occupied by the species during all or any part(s) of their life cycles. Potential as habitat for endangered or threatened species is provided in Table 1 and discussed by AOI below. Only species with moderate or high potential are discussed. A full evaluation of habitat potential for SAR and description of habitat preferences is provided in the SAR screening (Appendix A).



Table 1: Endangered and Threatened Species with Moderate or High Potential to Occur in or near Areas of Interest

Common Name	Scientific Name	ESA ¹	Potential to Occur in or near AOI ²	Rationale for Potential to Occur in or near AOI
Jefferson salamander	Ambystoma jeffersonianum	END	Moderate AOI at QEW/Cawthra Road	Wetland depressions in Cawthra Woods could provide suitable breeding habitat. The last known occurrence of Jefferson salamander in the Cawthra Woods was in April of 2000.
Bank swallow	Riparia riparia	THR	Moderate AOI at Queensway East/Etobicoke Creek	The steep vertical banks observed in the field along Etobicoke Creek could provide suitable nesting habitat.
Barn swallow	Hirundo rustica	THR	High AOI at Sherway Drive/Etobicoke Creek	Barn swallow nests were observed on the AOI at Sherway Drive/Etobicoke Creek footbridge.
			Moderate AOI at Queensway East/Cooksville Creek AOI at Queensway East/Etobicoke Creek AOI at QEW/Cooksville Creek AOI at QEW/Cawthra Road	Bridges within other AOI could provide suitable nesting habitat.
American eel	Anguilla rostrata	END	Moderate AOI at Queensway East/Etobicoke Creek AOI at Sherway Drive/Etobicoke Creek	Etobicoke Creek may provide suitable habitat. There are historical records of the species in the Etobicoke Creek watershed.
Eastern small-footed myotis	Myotis leibii	END	Moderate AOI at Queensway East/Cooksville Creek AOI at Queensway East/Etobicoke Creek AOI at Sherway Drive/Etobicoke Creek AOI at QEW/Cooksville Creek	The specified AOI could provide the suitable roosting habitat required by this species.
Little brown myotis	Myotis lucifugus	END	Moderate AOI at Queensway East/Cooksville Creek AOI at Queensway East/Haines Road AOI at Queensway East/Etobicoke Creek AOI at Sherway Drive/Etobicoke Creek AOI at QEW/Cooksville Creek AOI at QEW/Cawthra Road	The AOI could provide the suitable roosting habitat required by this species.

Table 1: Endangered and Threatened Species with Moderate or High Potential to Occur in or near Areas of Interest

Common Name	Scientific Name	ESA ¹	Potential to Occur in or near AOI ²	Rationale for Potential to Occur in or near AOI
Northern myotis	Myotis septentrionalis	END	Moderate AOI at Queensway East/Cooksville Creek AOI at Queensway East/Haines Road AOI at Queensway East/Etobicoke Creek AOI at Sherway Drive/Etobicoke Creek AOI at QEW/Cooksville Creek AOI at QEW/Cawthra Road	The AOI could provide the suitable roosting habitat required by this species.
Tri-colored bat	Perimyotis subflavus	END	Moderate AOI at Queensway East/Cooksville Creek AOI at Queensway East/Haines Road AOI at Queensway East/Etobicoke Creek AOI at Sherway Drive/Etobicoke Creek AOI at QEW/Cooksville Creek AOI at QEW/Cawthra Road	The AOI could provide the suitable roosting habitat required by this species.
Butternut	Juglans cinerea	END	Moderate AOI at Queensway East/Cooksville Creek AOI at Queensway East/Haines Road AOI at Queensway East/Etobicoke Creek AOI at Sherway Drive/Etobicoke Creek AOI at QEW/Cooksville Creek AOI at QEW/Cawthra Road	The AOI could provide the stream banks, wooded valley slopes and deciduous or mixed forest preferred by this species.

¹ Endangered Species Act (ESA), 2007 (O.Reg 242/08 last amended 29 June 2020 as O.Reg 328/20). Species at Risk in Ontario List, 2007 (O.Reg 230/08 last amended 1 Aug 2018 as O. Reg 404/18, s. 1.); Schedule 1 (Extirpated - EXP), Schedule 2 (Endangered - END), Schedule 3 (Threatened - THR), Schedule 4 (Special Concern - SC)

² Areas of interest (AOI) are only listed where habitat potential is moderate or high. It can be assumed that there is low potential for habitat for the species in the remaining AOI.

5.5.1 Area of Interest at Queensway East/Cooksville Creek

The road and foot bridges could provide nesting habitat for barn swallow. The woodlands could support butternut (*Juglans cinerea*) and tree-roosting SAR bats. Woodlands overlap with potential shaft locations 11A and 11B.

5.5.2 Area of Interest at Queensway East/Haines Road

The woodlands could support butternut and tree-roosting SAR bats. The woodlands do not overlap with either potential shaft location but are in close proximity.

5.5.3 Area of Interest at Queensway East/Etobicoke Creek

Steep slopes along Etobicoke Creek could support bank swallow nests and the Queensway East bridge over the creek could support barn swallow nests. The surrounding dense deciduous forest and rock piles along the Etobicoke Creek shoreline could provide suitable habitat for SAR bats and butternut. The creek itself may support American eel (*Anguilla rostrata*), which has been observed historically in the Etobicoke Creek watershed. These features do not overlap with any potential shaft location but are in close proximity.

5.5.4 Area of Interest at Sherway Drive/Etobicoke Creek

The pedestrian bridge supports barn swallow nests; three nests were observed on the bridge during the field reconnaissance. The dense deciduous forest and rock piles along the Etobicoke Creek shoreline could provide suitable habitat for SAR bats and butternut. The creek itself may support American eel, which has been observed historically in the Etobicoke Creek watershed. These features overlap with both potential shaft locations or are in close proximity.

5.5.5 Area of Interest at QEW/Cooksville Creek

The QEW highway bridge over Cooksville Creek could provide nesting habitat for barn swallow. The surrounding dense deciduous forest, large boulders and cobble along the shoreline of the creek could provide suitable habitat for SAR bats and butternut. These features do not overlap with the potential shaft location but are in close proximity.

5.5.6 Area of Interest at QEW/Cawthra Road

Cawthra Woods could provide habitat for SAR bats and butternut. Wetland depressions within Cawthra Woods could provide breeding and overwintering habitat for Jefferson salamander (*Ambystoma jeffersonianum*), which has been observed historically in the forest. Cawthra Woods does not overlap with either potential shaft location and is on the other side of the QEW highway and South Service Road from the locations. The Cawthra Road overpass could provide nesting habitat for barn swallow. This feature is in close proximity to potential shaft location 22B.

5.6 Significant Wildlife Habitat

There are four general categories of significant wildlife habitat (SWH): seasonal concentration areas; rare vegetation communities or specialized habitat for wildlife; habitat for species of conservation concern; and animal movement corridors. Each category is further broken down into specialized habitat types. The NHRM includes criteria and guidelines for designating SWH. There are two other documents, the Significant Wildlife Habitat Technical Guide (SWHTG) and the Significant Wildlife Habitat Mitigation Support Tool (SWHMiST) (MNR 2000 and MNRF 2014), that can be used to help decide what areas and features should be considered significant



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wildlife habitat. These documents were used as reference material for this study. SWH should be evaluated in the context of the entire planning authority's jurisdiction, and only the best examples are considered significant.

Significant wildlife habitat is typically identified on a site-specific basis and is therefore not often mapped at a landscape level in municipal OPs; however, according to the OP (City of Mississauga 2016), SWH in the City is generally encompassed within the Significant Natural Areas overlay (OP Schedule 3; Figure 1). Where development is proposed within or adjacent (i.e., within 120 m) to SWH, an assessment must be completed to demonstrate that development will not adversely affect the feature or its ecological function.

Potential for SWH is provided in Table 2 and discussed by AOI below. Only SWH types with potential to occur in AOI are discussed.



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Table 2: Significant Wildlife Habitat with Potential to Occur in or near Areas of Interest

Significant Wildlife Habitat General Category	Specialized Habitat Type	Potential in or near AOI ¹	Rationale for Potential in or near AOI
Seasonal Concentration Areas	Bat maternity colonies	■ Queensway East/Cooksville Creek	Woodlands in the AOI could provide suitable roosting habitat.
		Queensway East/Haines Road	
		Queensway East/Etobicoke Creek	
		■ Sherway Drive/Etobicoke Creek	
		■ QEW/Cooksville Creek	
		■ QEW/Cawthra Road	
	Reptile hibernacula	Queensway East/Cooksville Creek	There are suitable features (e.g., rock piles, bridge foundations) to support reptile hibernacula.
		Queensway East/Etobicoke Creek	loundations) to support reptile hibernactia.
		■ Sherway Drive/Etobicoke Creek	
		■ QEW/Cooksville Creek	
	Colonially-nesting bird breeding habitat (bank and cliff)	■ Queensway East/Etobicoke Creek	The steep vertical banks observed in the field along Etobicoke Creek could provide suitable nesting habitat.
Rare Vegetation Communities	Other rare vegetation communities (communities	Queensway East/Cooksville Creek	Woodland areas that are relatively undisturbed may contain rare communities. Requires field verification
	assigned a provincial	Queensway East/Haines Road	to exclude.
	conservation rank of S1 to S3)	Queensway East/Etobicoke Creek	
		■ Sherway Drive/Etobicoke Creek	
		■ QEW/Cooksville Creek	
		■ QEW/Cawthra Road	
Specialized Habitat for Wildlife	Amphibian breeding habitat (woodlands)	■ QEW/Cawthra Road	Wetland depressions in Cawthra Woods could provide suitable breeding habitat.
Habitat for Species of Conservation Concern	Habitat of special concern	Queensway East/Cooksville Creek	Monarch
Conservation Concern	and rare wildlife species	Queensway East/Haines Road	West Virginia white Yellow-banded bumble bee
		Queensway East/Etobicoke Creek	Eastern wood-pewee Wood thrush
		■ Sherway Drive/Etobicoke Creek	Eastern ribbonsnake

Table 2: Significant Wildlife Habitat with Potential to Occur in or near Areas of Interest

Significant Wildlife Habitat General Category	Specialized Habitat Type	Potential in or near AOI¹	Rationale for Potential in or near AOI		
		■ QEW/Cooksville Creek	Snapping turtle		
		■ QEW/Cawthra Road			
Animal Movement Corridors	General	Queensway East/Cooksville Creek	River corridors offer movement opportunities for various species of wildlife.		
		Queensway East/Etobicoke Creek	various species of wildlife.		
		■ Sherway Drive/Etobicoke Creek			
		■ QEW/Cooksville Creek			

¹ Areas of interest (AOI) are only listed where there is potential occurrence of significant wildlife habitat. Remaining AOI can be assumed to lack potential.

5.6.1 Area of Interest at Queensway East/Cooksville Creek

The cultural meadow on the north side of Queensway East could provide foraging habitat for monarch (*Danaus plexippus*) and yellow-banded bumblebee (*Bombus affinis*). Woodlands along Cooksville Creek could provide nesting habitat for eastern wood-pewee (*Contopus virens*) and wood thrush (*Hylocichla mustelina*), bat maternity roost habitat, summer habitat for eastern ribbonsnake (*Thamnophis sauritius*), and habitat for West Virginia white (*Pieris virginiensis*). Rip-rap along the shoreline of the creek could support snake hibernacula. The creek and bordering vegetation may act as a movement corridor for various animals. Rare vegetation communities could be present in the woodlands. These features overlap with potential shaft locations 11A and 11B.

5.6.2 Area of Interest at Queensway East/Haines Road

The woodlands could provide nesting habitat for eastern wood-pewee and wood thrush, habitat for West Virginia white, and bat maternity roost habitat. Rare vegetation communities could be present in the woodlands. The woodlands do not overlap with either potential shaft location but are in close proximity.

5.6.3 Area of Interest at Queensway East/Etobicoke Creek

The cultural meadow on the north and south sides of Queensway East could provide foraging habitat for monarch and yellow-banded bumblebee. Woodlands along Etobicoke Creek could provide nesting habitat for eastern wood-pewee and wood thrush, bat maternity roost habitat, summer habitat for eastern ribbonsnake, and habitat for West Virginia white. Large boulders and cobble along the shoreline of the creek could support snake hibernacula. The steep vertical banks along the creek could provide nesting habitat for swallows. The creek and bordering vegetation may act as a movement corridor for various animals. Rare vegetation communities could be present in the woodlands. The cultural meadow overlaps with potential shaft locations 01A and 02A. The remaining features do not overlap with any potential shaft location but are in close proximity.

5.6.4 Area of Interest at Sherway Drive/Etobicoke Creek

Woodlands along Etobicoke Creek could provide nesting habitat for eastern wood-pewee and wood thrush, bat maternity roost habitat, summer habitat for eastern ribbonsnake, and habitat for West Virginia white. Large boulders and cobble along the shoreline of the creek could support snake hibernacula. The creek and bordering vegetation may act as a movement corridor for various animals. Rare vegetation communities could be present in the woodlands. These features overlap with potential shaft location 01D and is in close proximity to 01B.

5.6.5 Area of Interest at QEW/Cooksville Creek

Woodlands along Cooksville Creek could provide nesting habitat for eastern wood-pewee and wood thrush, bat maternity roost habitat, summer habitat for eastern ribbonsnake, and habitat for West Virginia white. Large boulders and cobble along the shoreline of the creek could support snake hibernacula. The creek and bordering vegetation may act as a movement corridor for various animals. Rare vegetation communities could be present in the woodlands. These features do not overlap with the potential shaft location but are in close proximity.

5.6.6 Area of Interest at QEW/Cawthra Road

Cawthra Woods could provide nesting habitat for eastern wood-pewee and wood thrush, bat maternity roost habitat, and habitat for West Virginia white. Wetland depressions in Cawthra Woods could provide suitable summer habitat for snapping turtle (*Chelydra serpentina*) and eastern ribbonsnake, and breeding habitat for amphibians. Rare vegetation communities could be present in Cawthra Woods. Cawthra Woods does not overlap



with either potential shaft location and is on the other side of the QEW highway and South Service Road from the locations.

5.7 Surface Water Features

Watercourses that cross the AOI are within the Credit River watershed (CVC 2011) and Etobicoke Creek watershed (TRCA 1998). The following watercourses cross the AOI:

- Cooksville Creek AOI at Queensway East/Cooksville Creek and AOI at QEW/Cooksville Creek
- Etobicoke Creek AOI at Queensway East/Etobicoke Creek and AOI at Sherway Drive/Etobicoke Creek
- Little Etobicoke Creek (Tributary to Etobicoke Creek) AOI at Queensway East/Etobicoke Creek

The TRCA and CVC regulate watercourses, waterbodies, and wetlands within their respective jurisdictional boundaries. Any development proposed within these features or their regulation limits will require authorization or a permit from the respective conservation authority.

5.8 Fish Habitat

All watercourses crossing the AOI are considered warmwater features. Warmwater aquatic features are generally considered to be more robust and tolerant to external effects. Where the two larger watercourses in the study area, Cooksville Creek and Etobicoke Creek, flow into Lake Ontario downstream of the study area, the watercourses have a more coldwater/coolwater thermal regime. The thermal regime of these watercourses within the study area will be confirmed through MNRF correspondence.

There are numerous native and non-native fish species present in watercourses and waterbodies of the Credit River and Etobicoke Creek watersheds. In general, most of the Cooksville Creek watershed, a subwatershed of the Credit River watershed, contains no fish upstream of the QEW highway (CVC 2011). However, fish caught in Cooksville Creek reaches downstream of the QEW highway included top predator coldwater species including migratory rainbow trout (*Oncorhynchus mykiss*) and brown trout (*Salmo trutta*) and warmwater species including white sucker (*Catastomus commersonii*) and baitfish (CVC 2011). Most fish in the Etobicoke Creek watershed are warmwater species such as largemouth bass (*Micropterus salmoides*) and white bass (*Morone chrysops*), with records of common carp (*Cyprinus carpio*), an invasive species (TRCA 2018). As in Cooksville Creek, a few coldwater species are found near the mouth in Etobicoke Creek such as Chinook salmon (*Oncorhynchus tshawytscha*) (TRCA 2018).

There are historical records of redside dace (*Clinostomus elongatus*), a SAR designated as endangered federally and provincially, in watercourses in the study area. In addition, there are historical records of American eel and lake sturgeon (Upper Great Lakes / Upper St. Lawrence population) in the Etobicoke Creek watershed (NHIC 2019). Based on correspondence with the MECP, there is no known habitat for redside dace in any of the AOI or the study area used for the desktop assessment, but some of the watercourses may have the potential to support American eel (A. McAllister, MECP 2019 pers. comm.).

Where development is proposed within or adjacent (i.e., within 30 m) to fish habitat, an assessment must be completed to demonstrate that development will not adversely affect the feature or its ecological function. In general, development should be designed to avoid or minimize adverse impacts to fish and fish habitat. Development and site alteration within fish habitat may be permitted in accordance with provincial and federal



requirements. Buffers to protect against soil erosion and sediment impacts may be required for development and site alteration adjacent to watercourses (City of Mississauga 2016).

5.9 Official Plan Designated Features

5.9.1 Natural Green Spaces

According to the Mississauga OP (City of Mississauga 2016), natural green spaces are areas that meet one or more of the following criteria:

- Woodlands greater than 0.5 hectares that do not fulfill the requirements of a significant woodland.
- Wetlands that do not fulfill the requirements of a significant wetland.
- Watercourses that do not fulfill the requirements of a significant valleyland, even if they are predominantly engineered.
- All natural areas greater than 0.5 hectares that have vegetation that is uncommon in the City.

Natural green spaces are mapped on Schedule 3 of the Mississauga OP (City of Mississauga 2016). There are no natural green spaces in any of the AOI.

5.9.2 Special Management Areas

Special management areas represent lands adjacent to or near Significant Natural Areas or natural green spaces that will be managed or restored to enhance and support the Significant Natural Area or natural green space. Special management areas are mapped on Schedule 3 of the Mississauga OP (City of Mississauga 2016). There is a special management area in AOI at Queensway East/Haines Road and overlaps potential shaft location 05A (Figure 3).

Development and site alteration will not be permitted within or adjacent to special management areas unless it has been demonstrated that there will be no negative impact to the natural heritage features and their ecological functions and opportunities for their protection, restoration, enhancement and expansion have been identified (City of Mississauga 2016).

5.9.3 Residential Woodlands

Residential woodlands are generally associated with older residential areas, with large lots that have mature trees forming a fairly continuous canopy and minimal native understorey due to the maintenance of lawns and landscaping. Residential woodlands are mapped on Schedule 3 of the Mississauga OP (City of Mississauga 2016). There are no residential woodlands in any of the AOI.

5.9.4 Linkages

Linkages are areas that support ecological functions of Significant Natural Areas and natural green spaces by connecting important features within the natural heritage system and urban forest (City of Mississauga 2016). They are recognized as important to the maintenance of biodiversity, but do not meet the criteria of Significant Natural Areas, natural green spaces, special management areas, or residential woodlands. Linkages are mapped on Schedule 3 of the Mississauga OP (City of Mississauga 2016). There are no linkages in any of the AOI.



6.0 SUMMARY AND RECOMMENDATIONS

Based on the results of the natural environment desktop assessment and field reconnaissance, there are sensitive natural features at all five AOI. These features represent potential constraints to development that require assessment. A summary of the identified sensitive natural features, recommended setbacks, and other mitigation measures are provided in Table 3.

Additional field surveys will be required at the location of the preferred solution, once selected. Recommended surveys for each AOI are identified in Table 4.



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Table 3: Summary of Natural Heritage Constraints and Typical Setbacks

Natural Environment Feature	Responsible Agency ¹	Development Constraint	Setback ²	Area of Interest	Setback Flexibility ³	Mitigation
Areas of Natural and Scientific Interest (ANSI) – life sciences	City of Mississauga, CVC	Development within or adjacent (within 120 m) requires an environmental impact assessment or study	120 m	■ QEW/Cawthra Road (22B)	Negotiable	Must demonstrate no adverse impacts to feature or function and ensure feature is appropriately protected
Provincially Significant Wetlands (PSW)	CVC, MNRF	Development adjacent (within 120 m) requires an environmental impact assessment or study	30 m	■ QEW/Cawthra Road (22B)	Absolute	 No development permitted within the PSW Development adjacent to the PSW must demonstrate no adverse impacts to feature or function and ensure feature is appropriately protected Development proposed within regulated limits may require a permit from the CVC and/or TRCA
Other Wetlands	CVC and/or TRCA	Development within or adjacent (within 30 m) requires an environmental impact assessment or study	10 m	■ Sherway Drive/Etobicoke Creek (01B)	Absolute	 Must demonstrate no adverse impacts to feature or function and ensure feature is appropriately protected Development proposed within regulated limits may require a permit from the CVC and/or TRCA
Watercourses	CVC and/or TRCA	Development within or adjacent (within 30 m) requires an environmental impact assessment or study	10 m	 Queensway East/Cooksville Creek (10A, 10B, 11A, 11B) Queensway East/Etobicoke Creek (01A, 01C, 02A, 02B) Sherway Drive/Etobicoke Creek (01B, 01D) QEW/Cooksville Creek (25A) 	Absolute	 Must demonstrate no adverse impacts to feature or function and ensure feature is appropriately protected Development proposed within regulated limits may require a permit from the CVC and/or TRCA
Significant Woodlands	City of Mississauga, CVC and/or TRCA	Development within or adjacent (within 120 m) requires an environmental impact assessment or study	10 m	 Queensway East/Cooksville Creek (10A, 10B, 11A, 11B) Queensway East/Haines Road (05A, 05B) Queensway East/Etobicoke Creek (01A, 01C, 02A, 02B) Sherway Drive/Etobicoke Creek (01B, 01D) QEW/Cooksville Creek (25A) QEW/Cawthra Road (22B) 	Absolute	 Must demonstrate no adverse impacts to feature or function and ensure feature is appropriately protected
Significant Valleylands	City of Mississauga, TRCA	Development within or adjacent (within120 m) requires an environmental impact assessment or study	10 m	 Queensway East/Cooksville Creek (10A, 10B, 11A, 11B) Queensway East/Etobicoke Creek (01A, 01C, 02A, 02B) Sherway Drive/Etobicoke Creek (01B, 01D) QEW/Cooksville Creek (25A) 	Absolute	 Must demonstrate no adverse impacts to feature or function and ensure feature is appropriately protected Development proposed within regulated limits may require a permit from the CVC and/or TRCA
Significant Wildlife Habitat	City of Mississauga, CVC and/or TRCA	Development within or adjacent (within 120 m) requires an environmental impact assessment or study	120 m	 Queensway East/Cooksville Creek (10A, 10B, 11A, 11B) Queensway East/Haines Road (05A, 05B) Queensway East/Etobicoke Creek (01A, 01C, 02A, 02B) Sherway Drive/Etobicoke Creek (01B, 01D) QEW/Cooksville Creek (25A) QEW/Cawthra Road (22A, 22B) 	Negotiable	Must demonstrate no adverse impacts to feature or function and ensure feature is appropriately protected

Table 3: Summary of Natural Heritage Constraints and Typical Setbacks

Natural Environment Feature	Responsible Agency ¹	Development Constraint	Setback ²	Area of Interest	Setback Flexibility ³	Mitigation
Habitat of Species at Risk - Endangered or Threatened Species	MECP	Development within or adjacent (within 120 m) requires an environmental impact assessment or study	120 m	 Queensway East/Cooksville Creek (10A, 10B, 11A, 11B) Queensway East/Haines Road (05A, 05B) Queensway East/Etobicoke Creek (01A, 01C, 02A, 02B) Sherway Drive/Etobicoke Creek (01B, 01D) QEW/Cooksville Creek (25A) QEW/Cawthra Road (22B) 	Negotiable	 No development permitted within habitat for endangered or threatened species Must demonstrate no adverse impacts to species or its habitat If species or habitat will be impacted, permitting under the <i>Endangered Species Act</i>, 2007 may be required
Fish Habitat	DFO	Development adjacent (within 30 m) requires an environmental impact assessment or study	10 m (warm/ coolwater) 15 m (coldwater)	 Queensway East/Cooksville Creek (10A, 10B, 11A, 11B) Queensway East/Etobicoke Creek (01A, 01C, 02A, 02B) Sherway Drive/Etobicoke Creek (01B, 01D) QEW/Cooksville Creek (25A) 	Absolute	 Must demonstrate no adverse impacts to fish or fish habitat Setbacks adjacent to fish habitat will be determined by the impact assessment If fish or fish habitat will be impacted, permitting under the federal Fisheries Act may be required
Natural Green Spaces and Linkages ⁴	City of Mississauga	Development within or adjacent requires an environmental impact assessment or study	Varies ⁵	N/A	Negotiable	Must demonstrate no adverse impacts to feature or function and ensure feature is appropriately protected
Special Management Areas ⁴	City of Mississauga	N/A	None	■ Queensway East/Haines Road (05A)	N/A	Must be managed to support the nearby green space or natural heritage feature.
Residential Woodland ⁴	City of Mississauga	Development within may require a site development plan to address existing topography and drainage patterns, groundwater recharge, wildlife habitat, and green system linkages.	Varies ⁵	N/A	Negotiable	Must demonstrate how existing tree canopy and understory are protected, enhanced, restored, and expanded.

¹CVC = Credit Valley Conservation; DFO = Fisheries and Oceans Canada; MECP = Ministry of the Environment, Conservation, and Parks; MNRF = Ministry of Natural Resources and Forestry; TRCA = Toronto and Region Conservation Authority.

² Setbacks are recommended according to the following documents:

City of Mississauga Official Plan, 2016

CVC. 2010. Watershed Planning and Regulation Policies MNR. 2010. Natural Heritage Reference Manual

TRCA. 2014. The Living City Policies ³ Setback flexibility is defined as follows:

Negotiable – reduced setbacks may be negotiated with the responsible agency, typically through completion of an environmental impact study.

Absolute – setbacks are generally not subject to negotiation, except where the proponent obtains appropriate permits from the responsible agency. Permits may not be available for all features.

⁴As defined in the City of Mississauga Official Plan, 2016.

⁵ Varies – setbacks are generally determined as part of an environmental impact study.

Table 4: Recommended Additional Field Surveys at Areas of Interest

Survey Type	Area of Interest
Ecological land classification and botanical inventory	all AOI
Breeding bird surveys	AOI at Queensway East/Cooksville Creek (11A, 11B); AOI at Sherway Drive/Etobicoke Creek; AOI at Queensway East/Etobicoke Creek
Amphibian call count surveys	AOI at Sherway Drive/Etobicoke Creek
Fish habitat assessment and community inventory	AOI at Queensway East/Cooksville Creek (11A, 11B); AOI at Queensway East/Etobicoke Creek; AOI at Sherway Drive/Etobicoke Creek; AOI at QEW/Cooksville Creek
Bat habitat assessment	AOI at Queensway East/Cooksville Creek (11A, 11B); AOI at Sherway Drive/Etobicoke Creek; AOI at Queensway East/Etobicoke Creek
Benthic invertebrate community survey	AOI at Queensway East/Cooksville Creek (11A, 11B); AOI at Queensway East/Etobicoke Creek; AOI at Sherway Drive/Etobicoke Creek; AOI at QEW/Cooksville Creek
General wildlife and habitat assessment ¹	all AOI

¹ Including swallow nest investigation where suitable habitat is present.

7.0 LIMITATIONS

The results of this report are based on information available to Golder at the time of the review, and the status of species listed in the noted Acts and Regulations effective as of the date of this technical memo. Limited field investigations by a qualified biologist have been conducted to confirm the presence of significant features or habitat, and the review may be subject to limitations associated with base mapping and other publicly available information used. Conclusions of this report are based on a desktop assessment and high-level field reconnaissance conduced outside survey timing windows for most species. Further assessment for SAR and their habitats will be conducted during field surveys completed during the core growing season and active wildlife season for southern Ontario (i.e., May – September) once the preferred solution is selected. Additional surveys may be required to confirm habitat use and/or delineate feature boundaries for setback measurements.

8.0 CLOSURE

We trust this report meets your current needs. If you have any further questions regarding this report, please contact the undersigned.

GOLDER ASSOCIATES LTD

Barbara Bleho, MNRM, RPBio

Barbara Blelo

Ecologist

Heather Melcher, MSc Principal, Senior Ecologist

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BB/HM/wlm/mp

Attachments: Figures 1 to 7

Appendix A: SAR Screening

https://golderassociates.sharepoint.com/sites/100160/deliverables/natural environment/2_field memo short list/3_revised/gal-18112273-tm-reva-cmws short list natural env-11dec2020.docx



References

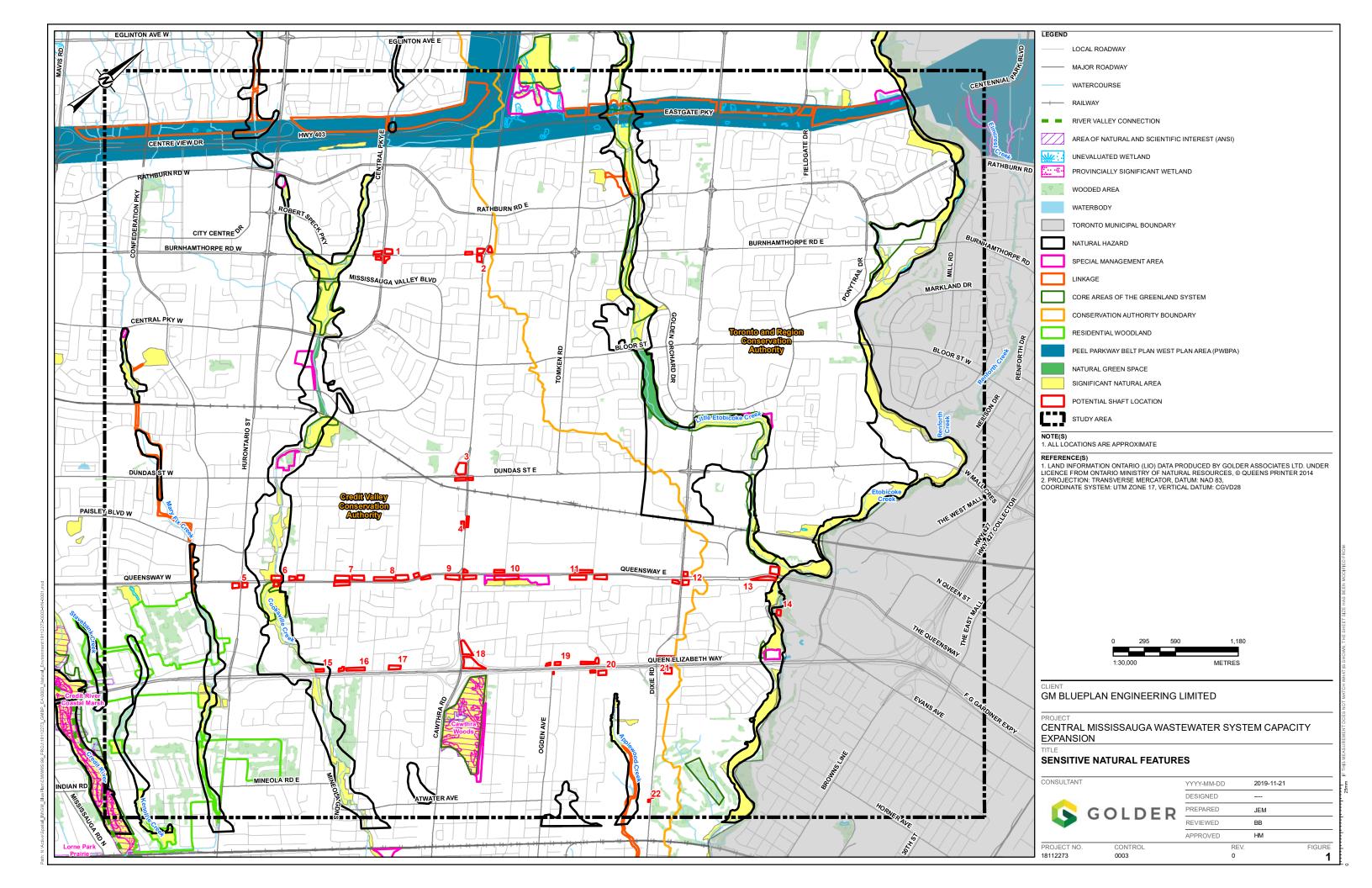
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FIGURES

Project No. 18112273

December 11, 2020







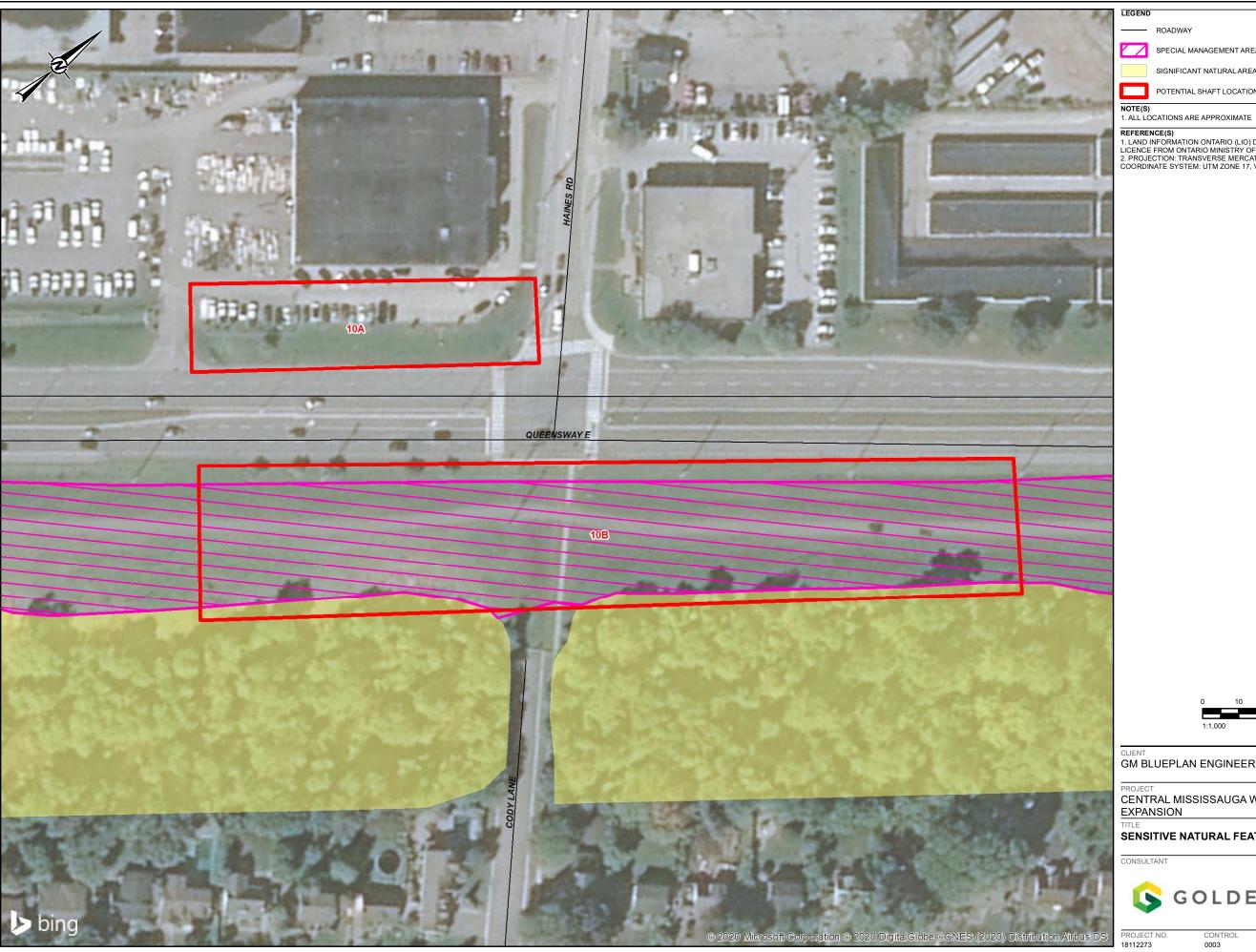
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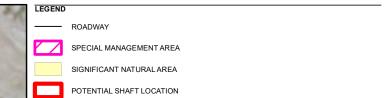
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COORDINATE SYSTEM: UTM ZONE 17, VERTICAL DATUM: CGVD28

CENTRAL MISSISSAUGA WASTEWATER SYSTEM CAPACITY

SENSITIVE NATURAL FEATURES IN AREA OF INTEREST #6

2019-11-21 YYYY-MM-DD DESIGNED PREPARED REVIEWED GOLDER APPROVED НМ





REFERENCE(S)

1. LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2014
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COORDINATE SYSTEM: UTM ZONE 17, VERTICAL DATUM: CGVD28

CLIENT
GM BLUEPLAN ENGINEERING LIMITED

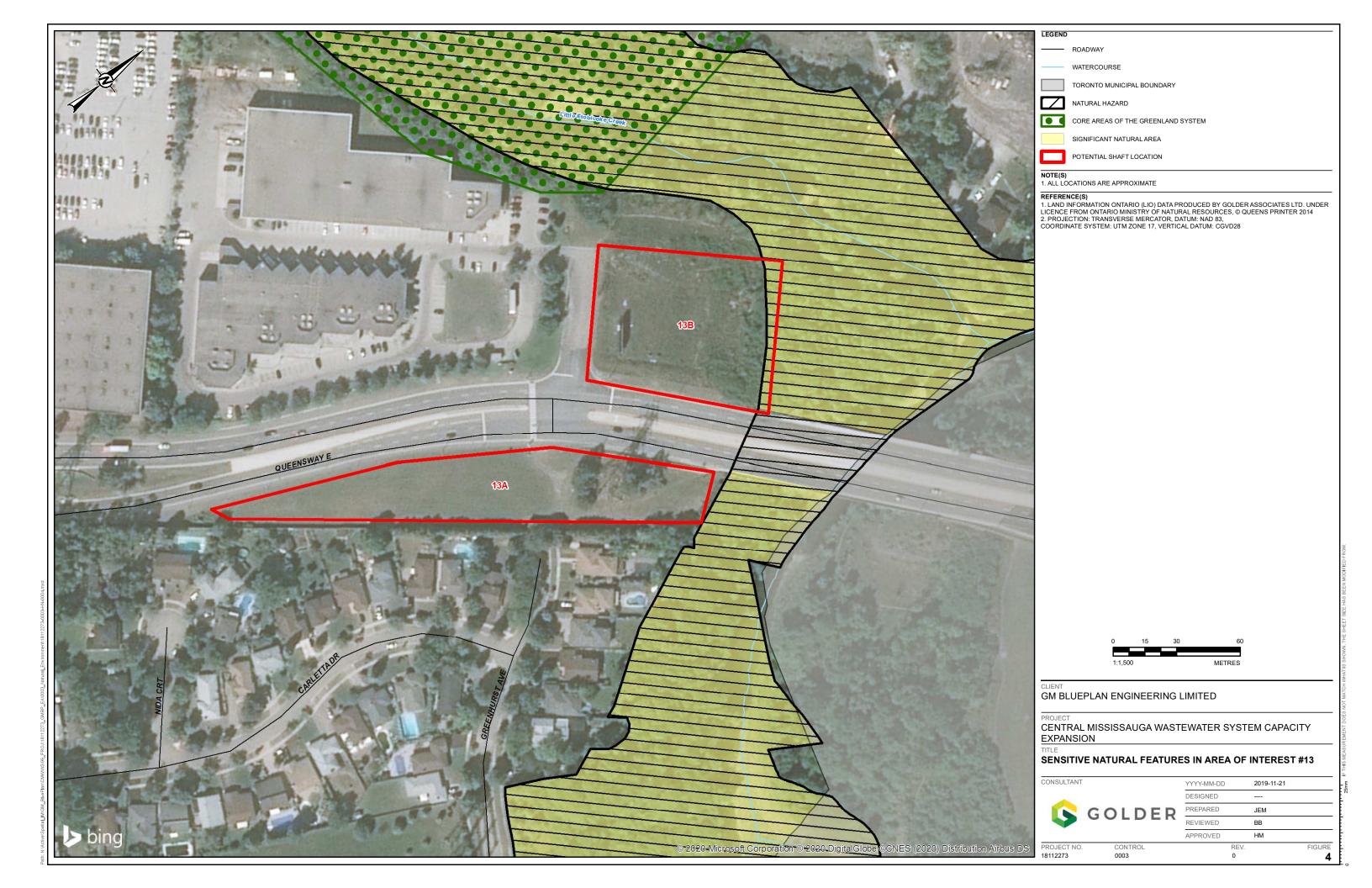
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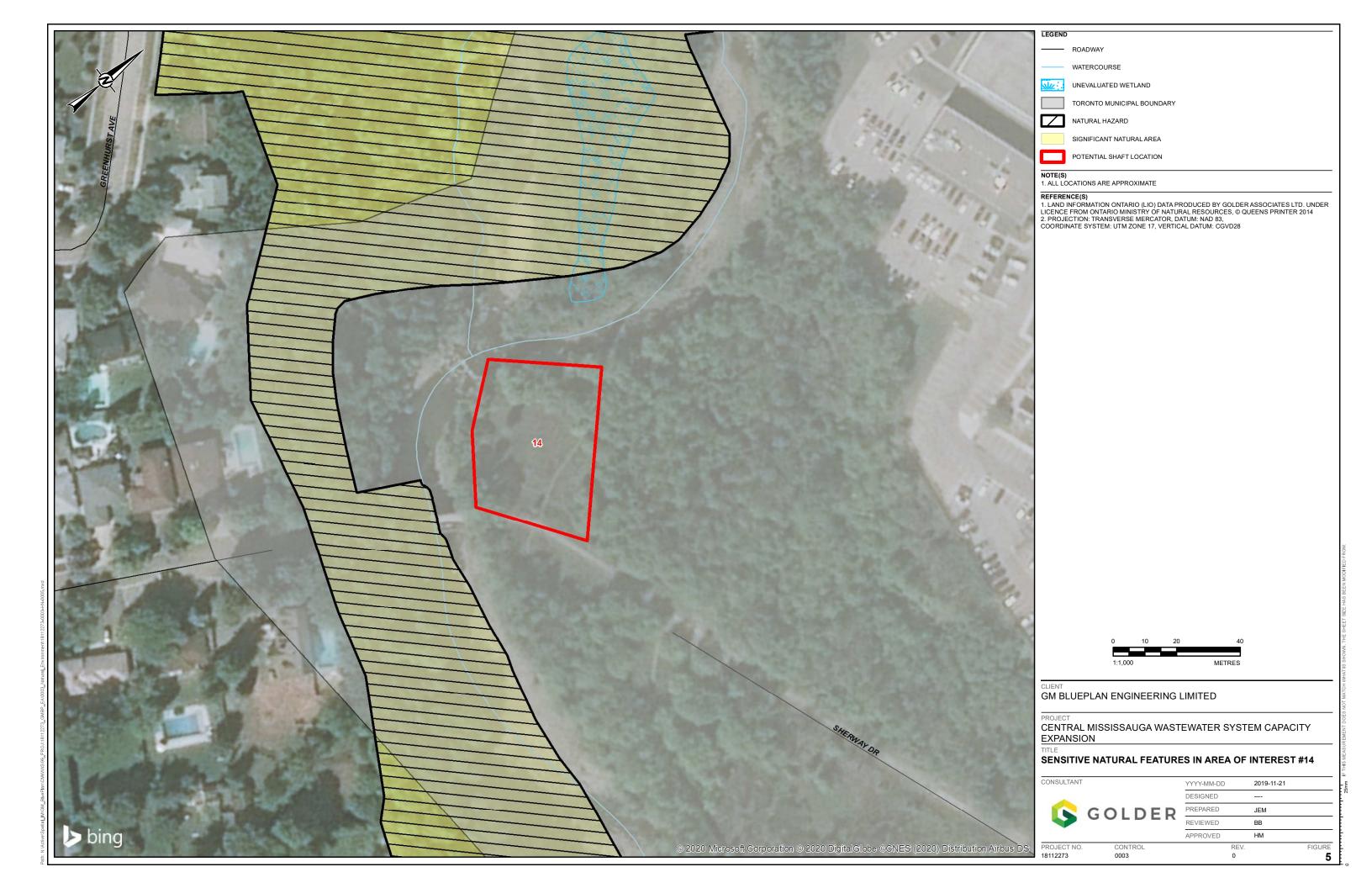
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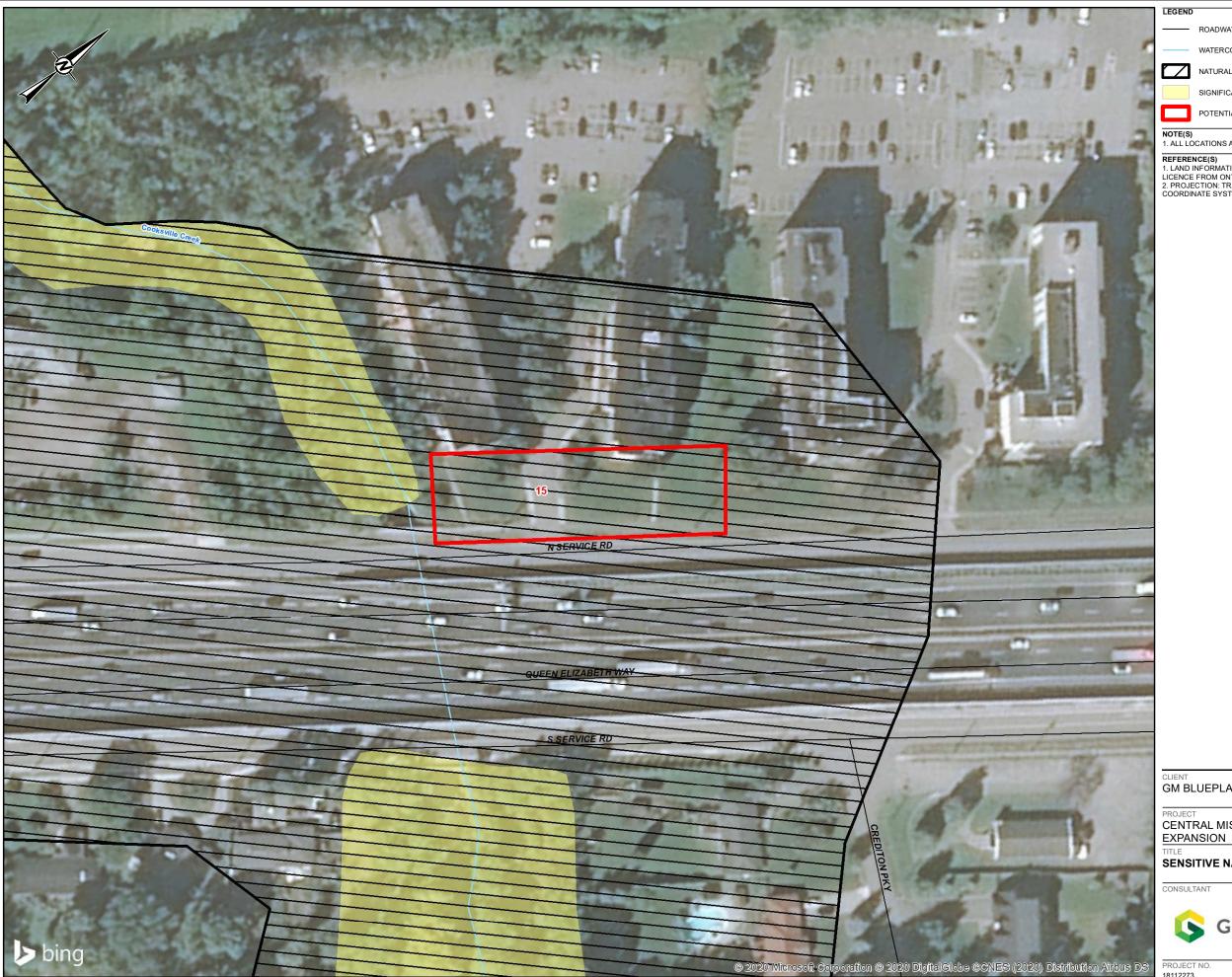
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PREPARED	JEM
REVIEWED	BB
APPROVED	НМ

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NOTE(S)
1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2014
2. PROJECTION: TRANSVERSE MERCATOR, DATUM: NAD 83,
COORDINATE SYSTEM: UTM ZONE 17, VERTICAL DATUM: CGVD28

CLIENT
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CENTRAL MISSISSAUGA WASTEWATER SYSTEM CAPACITY

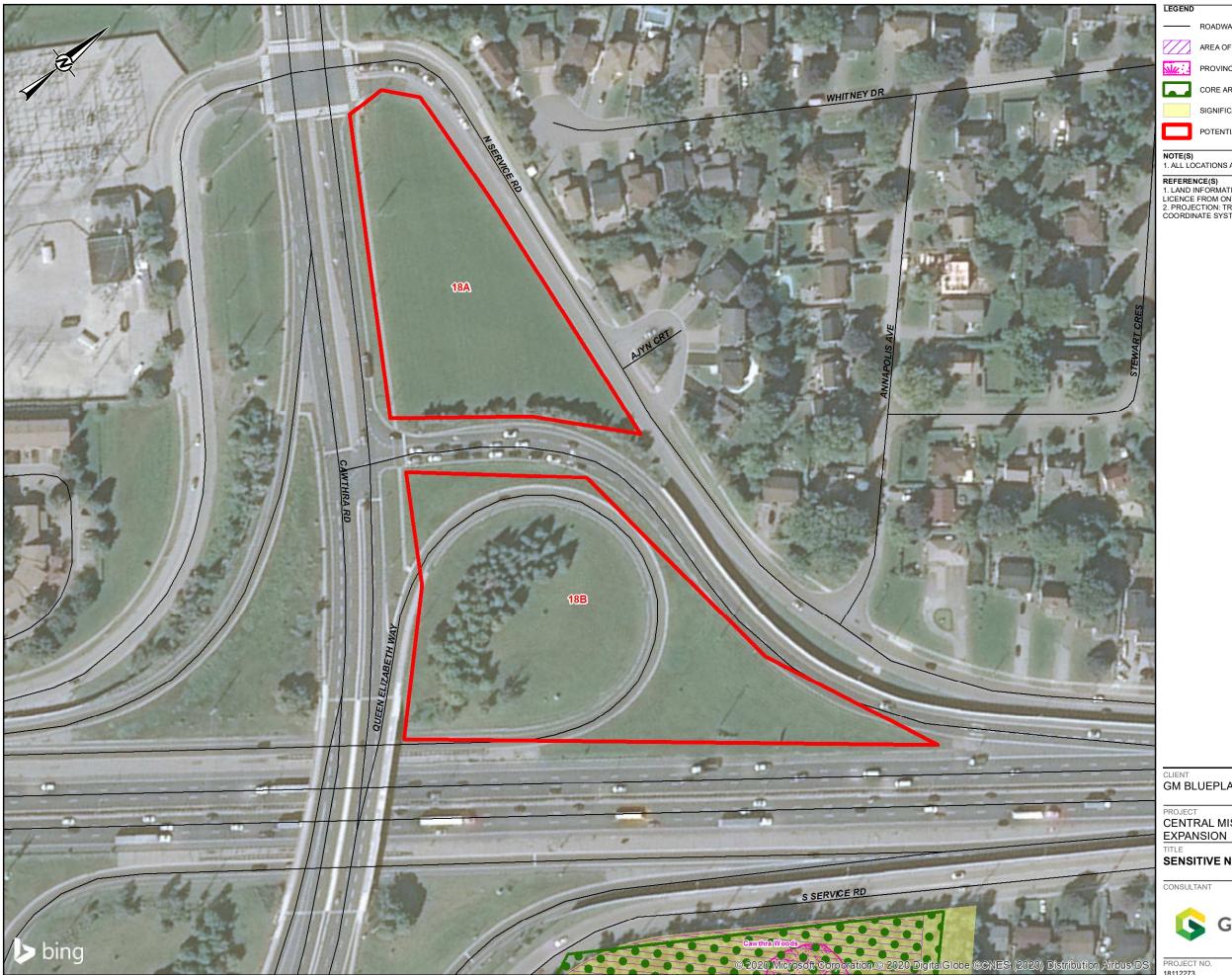
SENSITIVE NATURAL FEATURES IN AREA OF INTEREST #15

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FIGURE

6

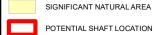


AREA OF NATURAL AND SCIENTIFIC INTEREST (ANSI)

PROVINCIALLY SIGNIFICANT WETLAND



CORE AREAS OF THE GREELAND SYSTEM



POTENTIAL SHAFT LOCATION

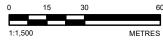
NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

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2. PROJECTION: TRANSVERSE MERCATOR, DATUM: NAD 83,
COORDINATE SYSTEM: UTM ZONE 17, VERTICAL DATUM: CGVD28



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PROJECT
CENTRAL MISSISSAUGA WASTEWATER SYSTEM CAPACITY

SENSITIVE NATURAL FEATURES IN AREA OF INTEREST #18

GOLDER

YYYY-MM-DD	2019-11-21
DESIGNED	
PREPARED	JEM
REVIEWED	BB
APPROVED	НМ

FIGURE 7

APPENDIX A

Project No. 18112273

December 11, 2020

SAR Screening



APPENDIX A – Species at Risk Screening

Taxon	Common Name	Scientific Name	ESA ¹	SARA ²	COSEWIC ³	Provincial (SRank) ⁴	Habitat Requirements⁵	ESA Habitat Protection Provisions ⁶	Potential to Occur within or near AOI ⁷	Rationale for Potential to Occur within or near AOI
Amphibian	Jefferson salamander	Ambystoma jeffersonianum	END	END	END	S2	In Ontario, Jefferson salamander is found only in southern Ontario, along southern portions of the Niagara Escarpment and western portions of the Oak Ridges Moraine. Jefferson salamander prefers moist, well-drained deciduous and mixed forests with a closed canopy. It overwinters underground in mammal burrows and rock fissures, and moves to vernal pools and ephemeral wetlands in the early spring to breed. Breeding ponds are typically located in or near to forested habitats, and contain submerged debris (i.e. sticks, vegetation) for egg attachment sites. Ephemeral breeding pools need to have water until at least mid-summer (mid to late July) (Jefferson Salamander Recovery Team 2010).	Regulated In the geographic areas of: City of Hamilton; counties of Brant, Dufferin, Elgin, Grey, Haldimand, Norfolk, and Wellington; regional municipalities of Halton, Niagara, Peel, Waterloo and York Regulated Habitat: i. wetland, pond or vernal pool, or other temporary pool, being used or was used in previous five years, by Jefferson salamander or Jefferson dominated polyploidy ii. area within 300 m of wetland, pond or vernal or other temporary pool that provides suitable foraging, dispersal, migration or hibernation conditions iii. wetland, pond or vernal or other temporary pool that provides suitable breeding conditions, is within 1 km of an area described in i. and is connected to the area described in iv. iv. an area providing suitable conditions for Jefferson salamander or Jefferson dominated polyploids to disperse and is within 1 km of an area described in i	Moderate -AOI at QEW/Cawthra Road	Wetland depressions in Cawthra Woods could provide suitable breeding habitat. The last known occurrence was April of 2000 in the Cawthra Woods.
Amphibian	Western chorus frog - Great Lakes St. Lawrence / Canadian Shield population	Pseudacris triseriata	_	THR	THR	\$3	In Ontario, habitat of this amphibian species typically consists of marshes or wooded wetlands, particularly those with dense shrub layers and grasses, as this species is a poor climber. They will breed in almost any fishless pond including roadside ditches, gravel pits and flooded swales in meadows. This species hibernates in terrestrial habitats under rocks, dead trees or leaves, in loose soil or in animal burrows. During hibernation, this species is tolerant of flooding (Environment Canada 2015).		Low	There are no recent occurrences within the AOI and no suitable habitat observed during field reconnaissance.



Taxon	Common Name	Scientific Name	ESA ¹	SARA ²	COSEWIC ³	Provincial (SRank) ⁴	Habitat Requirements ⁵	ESA Habitat Protection Provisions ⁶	Potential to Occur within or near AOI ⁷	Rationale for Potential to Occur within or near AOI
Arthropod	Monarch	Danaus plexippus	SC	SC	END	S2N, S4B	In Ontario, monarch is found throughout the northern and southern regions of the province. This butterfly is found wherever there are milkweed (<i>Asclepias</i> spp.) plants for its caterpillars and wildflowers that supply a nectar source for adults. It is often found on abandoned farmland, meadows, open wetlands, prairies and roadsides, but also in city gardens and parks. Important staging areas during migration occur along the north shores of the Great Lakes (COSEWIC 2010).		Moderate -AOI at Queensway East/Cooksville Creek -AOI at Queensway East/Etobicoke Creek -AOI at Sherway Drive/Etobicoke Creek -AOI at QEW/Cawthra Road	The specified AOI could provide the habitat for milkweed to grow. AOI at Queensway East/Haines Road is manicured grass.
Arthropod	West Virginia white	Pieris virginiensis	SC	_		\$3	In Ontario, west Virginia white is found primarily in the central and southern regions of the province. This butterfly lives in moist, mature, deciduous and mixed woodlands, and the caterpillars feed only on the leaves of toothwort (<i>Cardamine</i> spp.), which are small, springblooming plants of the forest floor. These woodland habitats are typically maple-beech-birch dominated. This species is associated with woodlands growing on calcaerous bedrock or thin soils over bedrock (Burke 2013).		Moderate -AOI at Queensway East/Etobicoke Creek -AOI at Sherway Drive/Etobicoke Creek	The specified AOI could provide the suitable woodland habitat needed.
Arthropod	Yellow-banded bumble bee	Bombus affinis	SC	SC	SC	S2	Yellow-banded bumblebee is a forage and habitat generalist, occupying open woodlands, meadows, grasslands, farmlands and urban parks, and taking nectar from various flowering plants (COSEWIC 2015). It is an early emerging species, making it likely an important pollinator of early blooming wild flowering plants (e.g. wild blueberry) and agricultural crops (e.g., apple). Nest sites are often in abandoned rodent burrows in old fields and queens overwinter by burrowing into loose soil or rotting trees (COSEWIC 2015).		Moderate -AOI at Queensway East/Cooksville Creek -AOI at Queensway East/Etobicoke Creek -AOI at Sherway Drive/Etobicoke Creek -AOI at QEW/Cooksville Creek AOI at QEW/Cawthra Road	The specified AOI sites could provide the habitat required. AOI at Queensway East/Haines Road is manicured grass.



Taxon	Common Name	Scientific Name	ESA ¹	SARA ²	COSEWIC ³	Provincial (SRank) ⁴		ESA Habitat Protection Provisions ⁶	Potential to Occur within or near AOI ⁷	Rationale for Potential to Occur within or near AOI
Bird	Bank swallow	Riparia riparia	THR	THR	THR	S4B	variety of natural and anthropogenic habitats, including lake bluffs, stream and river banks, sand and gravel pits, and roadcuts. Nests are generally built in a vertical or nearvertical bank. Breeding sites are typically located near open foraging	General (Draft) Category 1 – Breeding colony, including burrows and substrate between them Category 2 – Area within 50 m of the front of breeding colony face Category 3 – Area of suitable foraging habitat within 500 m of the outer edge of breeding colony	Moderate -AOI at Queensway East/Etobicoke Creek	The steep vertical banks observed in the field along Etobicoke creek could provide suitable nesting habitat.
Bird	Barn swallow	Hirundo rustica	THR	THR	THR	S4B	areas that contain a suitable nesting structure, open areas for foraging, and a body of water. This species nests in human made structures	General Category 1 – Nest Category 2 – Area within 5 m of the nest Category 3 – Area between 5-200 m of the nest	High -AOI at Sherway Drive/Etobicoke Creek Moderate -AOI at Queensway East/Cooksville Creek -AOI at Queensway East/Etobicoke Creek -AOI at QEW/Cooksville Creek -AOI at QEW/Cawthra Road	Barn swallow nests were observed on the AOI at Sherway Drive/Etobicoke Creek footbridge. Bridges within other AOI could provide suitable nesting habitat.
Bird	Bobolink	Dolichonyx oryzivorus	THR	THR	THR	S4B	In Ontario, bobolink breeds in grasslands or graminoid dominated hayfields with tall vegetation (Gabhauer 2007). Bobolink prefers grassland habitat with a forb component and a moderate litter layer. They have low tolerance for presence of woody vegetation and are sensitive to frequent mowing	General Category 1 – Nest and area within 10 m of nest Category 2 – Area between 10 – 60 m of the nest or centre of approximated defended territory Category 3 - Area of continuous suitable habitat between 60 – 300 m of the nest or centre of approximated defended territory	Low	The AOI lack suitable breeding habitat, such as hayfields or cultural meadows with appropriate vegetative characteristics.



Taxon	Common Name	Scientific Name	ESA ¹	SARA ²	COSEWIC ³	Provincial (SRank) ⁴	Habitat Requirements ⁵	ESA Habitat Protection Provisions ⁶	Potential to Occur within or near AOI ⁷	Rationale for Potential to Occur within or near AOI
Bird	Chimney swift	Chaetura pelagica	THR	THR	THR	S4B, S4N	In Ontario, chimney swift breeding habitat is varied and includes urban, suburban, rural and wooded sites. They are most commonly associated with towns and cities with large concentrations of chimneys. Preferred nesting sites are dark, sheltered spots with a vertical surface to which the bird can grip. Unused chimneys are the primary nesting and roosting structure, but other anthropogenic structures and large diameter cavity trees are also used (COSEWIC 2007).	General Category 1 – Human-made nest/roost, or natural nest/roost cavity and area within 90 m of natural cavity	Low	The AOI lack the suitable chimney structures preferred for nesting and roosting.
Bird	Common nighthawk	Chordeiles minor	SC	THR	SC	S4B	In Ontario, these aerial foragers require areas with large open habitat. This includes farmland, open woodlands, clearcuts, burns, rock outcrops, alvars, bogs, fens, prairies, gravel pits and gravel rooftops in cities (Sandilands 2007).		Low	The AOI lack large areas of open habitat preferred by this species.
Bird	Eastern meadowlark	Sturnella magna	THR	THR	THR	S4B	In Ontario, eastern meadowlark breeds in pastures, hayfields, meadows and old fields. Eastern meadowlark prefers moderately tall grasslands with abundant litter cover, high grass proportion, and a forb component (Hull 2003). They prefer well drained sites or slopes, and sites with different cover layers (Roseberry and Klimstra 1970).	General Category 1 – Nest and area within 10 m of the nest Category 2 – Area between 10 – 100 m of the nest or centre of approximated defended territory Category 3 – Area of continuous suitable habitat between 100 – 300 m of the nest or centre of approximated defended territory	Low	The AOI lack suitable breeding habitat, such as hayfields or cultural meadows with appropriate vegetative characteristics.
Bird	Eastern wood-pewee	Contopus virens	SC	SC	SC	S4B	In Ontario, eastern wood-pewee inhabits a wide variety of wooded upland and lowland habitats, including deciduous, coniferous, or mixed forests. It occurs most frequently in forests with some degree of openness. Intermediateaged forests with a relatively sparse midstory are preferred. In younger forests with a relatively dense midstory, it tends to inhabit the edges. Also occurs in anthropogenic habitats providing an open forested aspect such as parks and suburban neighborhoods. Nest is constructed atop a horizontal branch, 1-2 m above the ground, in a wide variety of deciduous and coniferous trees (COSEWIC 2012).		Moderate -AOI at Queensway East/Cooksville Creek -AOI at Queensway East/Haines Road -AOI at Queensway East/Etobicoke Creek -AOI at Sherway Drive/Etobicoke Creek -AOI at QEW/Cooksville Creek -AOI at QEW/Cawthra Road	Woodlands in the specified AOI could provide the forest edge habitat preferred by this species.



Taxon	Common Name	Scientific Name	ESA ¹	SARA ²	COSEWIC ³	Provincial (SRank) ⁴	Habitat Requirements ⁵	ESA Habitat Protection Provisions ⁶	Potential to Occur within or near AOI ⁷	Rationale for Potential to Occur within or near AOI
Bird	Henslow's sparrow	Ammodramus henslowii	END	END	END	SHB	In Ontario, Henslow's sparrow breeds in large grasslands with low disturbance, such as lightly grazed and ungrazed pastures, fallow hayfields, grassy swales in open farmland, and wet meadows. Preferred habitat contains tall, dense grass cover, typically over 30 cm high, with a high percentage of ground cover, and a thick mat of dead plant material. Henslow's sparrow generally avoids areas with emergent woody shrubs or trees, and fence lines. Areas of standing water or ephemerally wet patches appear to be important. This species breeds more frequently in patches of habitat greater than 30 ha and preferably greater than 100 ha (COSEWIC 2011).	General Category 1 – Nest or probable breeding occurrence and the area within 50 m Category 2 – Area of continuous suitable habitat outside of category 1	Low	The AOI lack suitable breeding habitat (i.e., large, undisturbed grasslands) preferred by this species.
Bird	Peregrine falcon (anatum/tundrius subspecies)	Falco peregrinus anatum/ tundrius	SC	SC	NAR	S3B	In Ontario, peregrine falcon breeds in areas containing suitable nesting locations and sufficient prey resources. Such habitat includes both natural locations containing cliff faces (heights of 50 - 200 m preferred) and also anthropogenic landscapes including urban centres containing tall buildings, open pit mines and quarries, and road cuts. Peregrine falcons nest on cliff ledges and crevices and building ledges. Nests consist of a simple scrape in the substrate (COSEWIC 2007).		Low	The AOI lack buildings or cliffs suitable for nesting.
Bird	Wood thrush	Hylocichla mustelina	SC	THR	THR	S4B	In Ontario, wood thrush breeds in moist, deciduous hardwood or mixed stands that are often previously disturbed, with a dense deciduous undergrowth and with tall trees for singing perches. This species selects nesting sites with the following characteristics: lower elevations with trees less than 16 m in height, a closed canopy cover (>70 %), a high variety of deciduous tree species, moderate subcanopy and shrub density, shade, fairly open forest floor, moist soil, and decaying leaf litter (COSEWIC 2012).		Moderate -AOI at Queensway East/Cooksville Creek -AOI at Queensway East/Haines Road -AOI at Queensway East/Etobicoke Creek -AOI at Sherway Drive/Etobicoke Creek -AOI at QEW/Cooksville Creek -AOI at QEW/Cawthra Road	The forests in the AOI could provide suitable breeding habitat. There are historical records of this species in the study area.



Taxon	Common Name	Scientific Name	ESA ¹	SARA ²	COSEWIC ³	Provincial (SRank) ⁴	Habitat Requirements⁵	ESA Habitat Protection Provisions ⁶	Potential to Occur within or near AOI ⁷	Rationale for Potential to Occur within or near AOI
Fish	American Eel	Anguilla rostrata	END	_	THR	S1?	In Ontario, American Eel is native to the Lake Ontario, St. Lawrence River and Ottawa River watersheds. Their current distribution includes lakes Huron, Erie, and Superior and their tributaries. The Ottawa River population is considered extirpated. The preferred habitat of the American eel is cool water of lakes and streams with muddy or silty substrates in water temperatures between 16 and 19°C. The American Eel is a catadromous fish that lives in fresh water until sexual maturity then migrates to the Sargasso Sea to spawn (Burridge et al. 2010; Eakins 2016).	General (as of June 30, 2013)	Moderate -AOI at Queensway East/Etobicoke Creek -AOI at Sherway Drive/Etobicoke Creek	Etobicoke Creek may provide suitable habitat. There are historical records of the species in the Etobicoke Creek watershed.
Fish	Deepwater Sculpin - Great Lakes / Western St. Lawrence population	Myoxocephalus thompsoni		SC	SC	S3?	In Ontario, Deepwater Sculpin are found in Lakes Huron, Ontario, and Superior, as well as in scattered inland lakes. This fish species prefers cold, deep water (usually between 60-150 m in lakes), with soft substrates. Spawning takes place year-round, but peaks in August and early September. Its lifespan is 7 years, with females maturing at 3 years and males at 2 years (DFO 2011).		Low	The AOI lack the suitable lake habitat required by this species.
Fish	Lake Sturgeon - Great Lakes / Upper St. Lawrence population	Acipenser fulvescens	END	_	THR	S2	In Ontario, Lake Sturgeon, a large prehistoric freshwater fish, is found in all the Great Lakes and in all drainages of the Great Lakes and of Hudson Bay. This species typically inhabits highly productive shoal areas of large lakes and rivers. They are bottom dwellers, and prefer depths between 5-10 m and mud or gravel substrates. Small sturgeons are often found on gravelly shoals near the mouths of rivers. They spawn in depths of 0.5 to 4.5 m in areas of swift water or rapids. Where suitable spawning rivers are not available, such as in the lower Great Lakes, they are known to spawn in wave action over rocky ledges or around rocky islands (Golder 2011).	General	Low	The AOI lack the suitable lake habitat required by this species.



Taxon	Common Name	Scientific Name	ESA ¹	SARA ²	COSEWIC ³	Provincial (SRank) ⁴	Habitat Requirements ⁵	ESA Habitat Protection Provisions ⁶	Potential to Occur within or near AOI ⁷	Rationale for Potential to Occur within or near AOI
Fish	Redside Dace	Clinostomus elongatus	END	END	END	S2	In Ontario, Redside Dace, a small coolwater species common in the USA but less so in Canada, is found in tributaries of western Lake Ontario, Lake Erie, Lake Huron and Lake Simcoe. They are found in pools and slow-moving areas of small headwater streams with clear to turbid water. Overhanging grasses, shrubs, and undercut banks, are an important part of their habitat, as are instream boulders and large woody debris. Preferred substrates are variable and include silt, sand, gravel and boulders. Spawning occurs in shallow riffle areas (Redside Dace Recovery Team 2010).	Regulated In the geographic areas of: cities of Hamilton and Toronto; counties of Bruce, Grey, Huron, Simcoe, and Wellington; regional municipalities of Durham, Halton, Peel and York; townships of St. Joseph, Jocelyn and Hilton; and the village of Hilton Beach Regulated Habitat: i. any part of a stream or other watercourse currently being used by Redside Dace, or was used during previous 20 years by Redside Dace and that provides suitable conditions to carry out life processes ii. the area encompassing the meander belt width of the stream or watercourse described in i., and the vegetated area or agricultural lands within 30 m of the stream or watercourse	Low	The AOI lack the suitable cool water headwaters required by this species.



Taxon	Common Name	Scientific Name	ESA ¹	SARA ²	COSEWIC ³	Provincial (SRank) ⁴	Habitat Requirements⁵	ESA Habitat Protection Provisions ⁶	Potential to Occur within or near AOI ⁷	Rationale for Potential to Occur within or near AOI
Fish (cont'd)								iii. stream, permanent or		
	(cont'd							intermittent headwater drainage		
								feature, groundwater discharge		
								area or wetland that augments or maintains baseflow, coarse		
								sediment supply or surface water		
								quality of a part of stream or other		
								watercourse described in i.,		
								provided that stream or		
								watercourse has an average		
								bankfull width of 7.5 m or less		
								In the geographic areas of: in the		
								City of Hamilton, counties of		
								Bruce, Grey, Huron, Simcoe, and		
								Wellington, and the regional		
								municipalities of Durham, Halton,		
								Peel and York		
								Regulated Habitat:		
								iv. Any part of a stream or other watercourse used by a Redside		
								Dace at any time in the past		
								located in the same or adjacent		
								sub-watershed as area identified		
								in i. that provides suitable		
								conditions for successful stream		
								corridor rehabilitation and for		
								natural recolonization of Redside		
								Dace		
								v. area encompassing the		
								meander belt width of an area		
								described in iv., and the		
								vegetated area or agricultural		
								lands within 30 m of an area described in iv.		
								vi. stream, permanent or intermittent headwater drainage		
								feature, groundwater discharge		
								area or wetland that augments or		
								maintains baseflow, coarse		
								sediment supply or surface water		
								quality of a part of stream or other		
								watercourse described in iv.,		
								provided that stream or		
								watercourse has an average		
								bankfull width of 7.5 m or less.		



Taxon	Common Name	Scientific Name	ESA ¹	SARA ²	COSEWIC ³	Provincial (SRank) ⁴	Habitat Requirements⁵	ESA Habitat Protection Provisions ⁶	Potential to Occur within or near AOI ⁷	Rationale for Potential to Occur within or near AOI
Fish	Shortnose Cisco	Coregonus reighardi	END	END	END	SH	In Ontario, Shortnose Cisco species was last reported in Georgian Bay in 1985 and Lake Ontario in 1964. It prefers clear, deep waters and water temperatures between 2 and 10°C (COSEWIC 2005).	General (as of June 30, 2013)	Low	The AOI lack the suitable deep cool water required by this species.
Fish	Upper Great Lakes Kiyi	Coregonus kiyi kiyi	SC	SC	SC	S3	In Ontario, Kiyi occurs in Lake Superior. The Kiyi was last seen in Lake Ontario in 1964 and Lake Huron in 1973. It is a species of freshwater whitefish. The Kiyi is a coldwater species that prefers temperatures between 3.7 and 4.6°C and depths ranging from 35 to 200 m; however, it is rarely found in waters less than 108 m deep. Kiyi have been collected over lake bottoms of clay and mud substrates. Spawning generally occurs in the late fall at depths greater than 100 m (COSEWIC 2005).		Low	The AOI lack the suitable deep cool water required by this species.
Mammal	Eastern small-footed myotis	Myotis leibii	END	_	_	S2S3	This species is not known to roost within trees, but there is very little known about its roosting habits. The species generally roosts on the ground under rocks, in rock crevices, talus slopes and rock piles. It occasionally inhabits buildings. Areas near the entrances of caves or abandoned mines may be used as hibernacula, where the conditions are drafty with low humidity, and may be subfreezing (Humphrey 2017)	General	Moderate -AOI at Queensway East/Cooksville Creek -AOI at Queensway East/Etobicoke Creek -AOI at Sherway Drive/Etobicoke Creek -AOI at QEW/Cooksville Creek	The specified AOI could provide the suitable roosting habitat required by this species.
Mammal	Little brown myotis	Myotis lucifugus	END	END	END	S4	In Ontario, this species' range is extensive and covers much of the province. It will roost in both natural and man-made structures. Roosting colonies require a number of large dead trees, in specific stages of decay and that project above the canopy in relatively open areas. May form nursery colonies in the attics of buildings within 1 km of water. Caves or abandoned mines may be used as hibernacula, but high humidity and stable above freezing temperatures are required (ECCC 2018).	General	Moderate -AOI at Queensway East/Cooksville Creek -AOI at Queensway East/Haines Road -AOI at Queensway East/Etobicoke Creek -AOI at Sherway Drive/Etobicoke Creek -AOI at QEW/Cooksville Creek -AOI at QEW/Cawthra Road	The AOI could provide the suitable roosting habitat required by this species.



Taxon	Common Name	Scientific Name	ESA ¹	SARA ²	COSEWIC ³	Provincial (SRank) ⁴	Habitat Requirements ⁵	ESA Habitat Protection Provisions ⁶	Potential to Occur within or near AOI ⁷	Rationale for Potential to Occur within or near AOI
Mammal	Northern myotis	Myotis septentrionalis	END	END	END	\$3	In Ontario, this species' range is extensive and covers much of the province. It will usually roost in hollows, crevices, and under loose bark of mature trees. Roosts may be established in the main trunk or a large branch of either living or dead trees. Caves or abandoned mines may be used as hibernacula, but high humidity and stable above freezing temperatures are required (ECCC 2018).	General	Moderate -AOI at Queensway East/Cooksville Creek -AOI at Queensway East/Haines Road -AOI at Queensway East/Etobicoke Creek -AOI at Sherway Drive/Etobicoke Creek -AOI at QEW/Cooksville Creek -AOI at QEW/Cawthra Road	The AOI could provide the suitable roosting habitat required by this species.
Mammal	Tri-colored bat	Perimyotis subflavus	END	END	END	S3?	In Ontario, tri-colored bat may roost in foliage, in clumps of old leaves, hanging moss or squirrel nests. They are occasionally found in buildings although there are no records of this in Canada. They typically feed over aquatic areas with an affinity to large-bodied water and will likely roost in close proximity to these. Hibernation sites are found deep within caves or mines in areas of relatively warm temperatures. These bats have strong roost fidelity to their winter hibernation sites and may choose the exact same spot in a cave or mine from year to year (ECCC 2018).	General	Moderate -AOI at Queensway East/Cooksville Creek -AOI at Queensway East/Haines Road -AOI at Queensway East/Etobicoke Creek -AOI at Sherway Drive/Etobicoke Creek -AOI at QEW/Cooksville Creek -AOI at QEW/Cawthra Road	The AOI could provide the suitable roosting habitat required by this species.
Reptile	Blanding's turtle - Great Lakes / St. Lawrence population	Emydoidea blandingii	THR	THR	END	S3	In Ontario, Blanding's turtle will use a range of aquatic habitats, but favor those with shallow, standing or slow-moving water, rich nutrient levels, organic substrates and abundant aquatic vegetation. They will use rivers, but prefer slow-moving currents and are likely only transients in this type of habitat. This species is known to travel great distances over land in the spring in order to reach nesting sites, which can include dry conifer or mixed forests, partially vegetated fields, and roadsides. Suitable nesting substrates include organic soils, sands, gravel and cobble. They hibernate underwater and infrequently under debris close to water bodies (COSEWIC 2016).	General Category 1 – Nest and area within 30 m or overwintering sites and area within 30 m Category 2 – Wetland complex (i.e. all suitable wetlands or waterbodies within 500 m of each other) that extends up to 2 km from occurrence, and the area within 30 m around those suitable wetlands or waterbodies Category 3 – Area between 30 – 250 m around suitable wetlands/waterbodies identified in category 2, within 2 km of an occurrence	Low	The AOI lack the standing or slow-moving water and abundant vegetation required by this species.



Taxon	Common Name	Scientific Name	ESA ¹	SARA ²	COSEWIC ³	Provincial (SRank) ⁴	Habitat Requirements⁵	ESA Habitat Protection Provisions ⁶	Potential to Occur within or near AOI ⁷	Rationale for Potential to Occur within or near AOI
Reptile	Eastern ribbonsnake - Great Lakes population	Thamnophis sauritius	SC	SC	SC	S4	In Ontario, eastern ribbonsnake is semi-aquatic, and is rarely found far from shallow ponds, marshes, bogs, streams or swamps bordered by dense vegetation. They prefer sunny locations and bask in low shrub branches. Hibernation occurs in mammal burrows, rock fissures or even ant mounds (COSEWIC 2012).		Low -AOI at Queensway East/Cooksville Creek -AOI at Queensway East/Etobicoke Creek -AOI at Sherway Drive/Etobicoke Creek -AOI at QEW/Cooksville Creek	The specified AOI could provide the suitable habitat required by this species.
Reptile	Midland painted turtle	Chrysemys picta marginata	_	_	SC	S4	In Ontario, painted turtles use waterbodies, such as ponds, marshes, lakes and slow-moving creeks, with a soft bottom and abundant basking sites and aquatic vegetation. This species hibernates on the bottom of waterbodies (Ontario Nature 2018).		Low	The AOI lack slow-moving creeks with soft substrate required by this species.
Reptile	Milksnake	Lampropeltis triangulum	NAR	SC	SC	S4	In Ontario, milksnake uses a wide range of habitats including prairies, pastures, hayfields, wetlands and various forest types, and is well-known in rural areas where it frequents older buildings. Proximity to water and cover enhances habitat suitability. Hibernation takes place in mammal burrows, hollow logs, gravel or soil banks, and old foundations (COSEWIC 2014).		Moderate -AOI at Queensway East/Cooksville Creek -AOI at Queensway East/Etobicoke Creek -AOI at Sherway Drive/Etobicoke Creek -AOI at QEW/Cooksville Creek	The specified AOI could provide the forest and proximity to water and hibernation habitat required by this species.
Reptile	Northern map turtle	Graptemys geographica	SC	SC	SC	S3	In Ontario, the northern map turtle prefers large waterbodies with slow-moving currents, soft substrates, and abundant aquatic vegetation. Ideal stretches of shoreline contain suitable basking sites, such as rocks and logs. Along Lakes Erie and Ontario, this species occurs in marsh habitat and undeveloped shorelines. It is also found in small to large rivers with slow to moderate flow. Hibernation takes place in soft substrates under deep water (COSEWIC 2012).		Low	The AOI lack waterbodies with soft substrates and abundant aquatic vegetation required by this species.



Taxon	Common Name	Scientific Name	ESA ¹	SARA ²	COSEWIC ³	Provincial (SRank) ⁴	Habitat Requirements⁵	ESA Habitat Protection Provisions ⁶	Potential to Occur within or near AOI ⁷	Rationale for Potential to Occur within or near AOI
Reptile	Snapping turtle	Chelydra serpentina	SC	SC	SC	S3	In Ontario, snapping turtle uses a wide range of waterbodies, but shows preference for areas with shallow, slow-moving water, soft substrates and dense aquatic vegetation. Hibernation takes place in soft substrates under water. Nesting sites consist of sand or gravel banks along waterways or roadways (COSEWIC 2008).		Moderate -AOI at Queensway East/Cooksville Creek -AOI at Queensway East/Etobicoke Creek -AOI at Sherway Drive/Etobicoke Creek -AOI at QEW/Cooksville Creek	The AOI may not provide the soft substrate and dense aquatic vegetation preferred by this species, but there have been occurrences of the species in the study area.
Reptile	Stinkpot or Eastern musk turtle	Sternotherus odoratus	SC	THR	SC	S3	In Ontario, eastern musk turtle is very rarely out of water and prefers permanent bodies of water that are shallow and clear, with little or no current and soft substrates with abundant organic materials. Abundant floating and submerged vegetation is preferred. Hibernation occurs in soft substrates under water. Eggs are sometimes laid on open ground, or in shallow nests in decaying vegetation, shallow gravel or rock crevices (COSEWIC 2012).		Low	The AOI lack waterbodies with little to no flow and abundant aquatic vegetation preferred by this species.
Vascular Plant	Butternut	Juglans cinerea	END	END	END	S2?	In Ontario, butternut is found along stream banks, on wooded valley slopes, and in deciduous and mixed forests. It is commonly associated with beech, maple, oak and hickory (Voss and Reznicek 2012). Butternut prefers moist, fertile, well-drained soils, but can also be found in rocky limestone soils. This species is shade intolerant (Farrar 1995).	General (as of June 30, 2013)	Moderate -AOI at Queensway East/Cooksville Creek -AOI at Queensway East/Haines Road -AOI at Queensway East/Etobicoke Creek -AOI at Sherway Drive/Etobicoke Creek -AOI at QEW/Cooksville Creek -AOI at QEW/Cawthra Road	The AOI could provide the stream banks, wooded valley slopes and deciduous or mixed forest preferred by this species.

¹ Endangered Species Act (ESA), 2007 (O.Reg 242/08 last amended 27 March 2018 as O.Reg 219/18). Species at Risk in Ontario List, 2007 (O.Reg 230/08 last amended 1 Aug 2018 as O. Reg 404/18, s. 1.); Schedule 1 (Extirpated - EXP), Schedule 2 (Endangered - END), Schedule 3 (Threatened - THR), Schedule 4 (Special Concern - SC)



² Species at Risk Act (SARA), 2002. Schedule 1 (Last amended 25 January 2020); Part 1 (Extirpated), Part 2 (Endangered), Part 3 (Threatened), Part 4 (Special Concern)

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

⁴ Global Ranks (GRANK) are Rarity Ranks assigned to a species based on their range-wide status. GRANKS are assigned by a group of conservation Data Centres (CDCs), scientific experts and the Nature Conservancy. These ranks are not legal designations. G1 (Extremely Rare), G2 (Very Rare), G3 (Rare to uncommon), G4 (Common), G5 (Very Common), G4 (Common), G5 (Very Common), G7 (Unranked), Q (Questionable), T (rank applies to subspecies or variety). Last assessed August 2011

⁵ Provincial Ranks (SRANK) are Rarity Ranks assigned to a species or ecological communities, by the Natural Heritage Information Centre (NHIC). These ranks are not legal designations. SRANKS are evaluated by NHIC on a continual basis and updated lists produced annually. SX (Presumed Extirpated), SH (Possibly Extirpated - Historical), S1 (Critically Imperiled), S2 (Imperiled), S3 (Vulnerable), S4 (Apparently Secure), S5 (Secure), SNA (Not Applicable), S4 (Range Rank), S7 (Not ranked yet), SAB (Breeding Accident), SAN (Non-breeding Accident), SX (Apparently Extirpated). Last assessed November 2017.

⁶ General Habitat Protection is applied when a species is newly listed as endangered or threatened on the SARO list under the ESA, 2007. The definition of general habitat applies to areas that a species currently depends on. These areas may include dens and nests, wetlands, forests and other areas essential for breeding, rearing, feeding, hibernation and migration. General habitat protection will also apply to all listed endangered or threatened species without a species-specific habitat regulation as of June 30, 2013 (ESA 2007, c.6, s.10 (2)). Regulated Habitat is species-specific habitat used as the legal description of that species habitat. Once a species-specific habitat regulation is created, it replaces general habitat protection. Refer to O.Reg 242/08 for full details regulated habitat.

⁷ Areas of interest (AOI) are only listed where habitat potential is moderate or high. Remaining AOI can be assumed to have low habitat potential.

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TECHNICAL MEMORANDUM

DATE April 12, 2021

TO Chris Campbell, Infrastructure Planning, Partner

GM BluePlan Engineering Limited (GM BluePlan)

CC Jean-Marc Crew

FROM Danielle Radu and Heather Melcher

EMAIL heather_melcher@golder.com

COMPARISON OF SITE CONDITIONS AT TWO SHAFT ALTERNATIVES FOR THE CAPACITY EXPANSION OF THE CENTRAL MISSISSAUGA WASTEWATER SYSTEM, REGION OF PEEL, ONTARIO

1.0 INTRODUCTION

Golder Associates Ltd. (Golder) has been retained by GM BluePlan (GMBP) on behalf of the Region of Peel (the Region) to conduct natural environment studies as part of the schedule 'C' municipal class environmental assessment (MCEA) for the capacity expansion of the Central Mississauga wastewater system (the Project).

The Project proposes constructing a new trunk sewer along the Queensway East (Peel Region Road 20), connecting to the existing East Trunk Sewer at Etobicoke Creek. Through assessment of this area and consultation with the Toronto and Region Conservation Authority (TRCA), GMBP has identified a short list of five potential connection shaft alternatives, referred to as sites 01A, 01B, 01C, 01D, and 01E.

GMBP's alternatives analysis for the MCEA assesses short-listed alternatives through six evaluation criteria: technical constructability, technical flexibility, environmental, socio-economic / cultural, financial, and legal / jurisdictional. GMBP applied the technical constructability and technical flexibility criteria to the connection shaft alternatives in the area, which concluded that sites 01A, 01C, and 01E were not viable alternatives to carry forward in the MCEA. To consider the environmental considerations of the remaining potential shaft alternatives (sites 01B and 01D), Golder undertook natural environment field investigations at the sites (Figure 1). The purpose of this technical memorandum is to document the results of Golder's natural environment field investigations, including the presence of sensitive natural features, at sites 01B and 01D. A Natural Environmental Report, including the results of detailed field surveys and an impact assessment, will be compiled and submitted following the completion of field work at the location of the preferred solution, once selected.

2.0 METHODS

2.1 Terrestrial Environment

An initial field reconnaissance of short-listed alternatives was completed in fall 2019 and included an area roughly corresponding to the east portion of site 01B and herein referred to as the field investigation area (Golder 2020; Figure 1). Further field investigations were completed on October 14, 2020 in the field investigation area at site 01B and at site 01D to inventory the land cover, including classification and delineation of plant communities and a botanical inventory (Figure 1).

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Plant communities were first delineated at a desktop level using high resolution aerial imagery, then field verified (where accessible) using the Ecological Land Classification (ELC) system for southern Ontario (Lee et al. 1998). These inventories were carried out by systematically traversing the site and documenting observed species and communities. Information on dominant plant species and plant community structure and composition collected in the field was used to better define and refine the plant community polygons first delineated at the desktop level.

The botanical inventory included area searches in all naturally occurring habitats. The searches were conducted by systematically walking through the site in a meandering fashion, generally paralleling the principal (long) axis of a natural area, where feasible, and examining the full width of the area. Lists of the dominant plant species identified during all the field investigations were compiled. Due to the timing of the site reconnaissance outside of the core growing season (i.e., May-September), the species list is not exhaustive.

A preliminary tree screening report completed by GMBP (2021) for site 01B was used to supplement Golder's field data, specifically in the west portion of site 01B, to the west of Etobicoke Creek. The field assessment was completed on November 13, 2020 and included identification of tree species, diameter at breast height (DBH) and overall condition in both the east and west portions of site 01B (GMBP 2021).

Golder also participated in an agency site visit to both portions of site 01B and to site 01D on September 11, 2020 and documented general existing conditions at that time.

2.2 Aquatic Environment

A fish habitat assessment was conducted on November 4, 2020 to characterize aquatic features and potential fish habitat in Etobicoke Creek. The area of assessment extended approximately 1 km from the Queen Elizabeth Way to 14 m north of the Queensway East, including the areas immediately adjacent to sites 01B and 01D (Figure 1). Fish habitat characteristics were documented, including the following:

- channel habitat morphology type (riffle, run, pool, flat, etc.)
- flow regime
- representative bankfull widths, wetted widths and water depths
- substrate composition (i.e., silt, sand, gravel, cobble, boulder)
- type and amount of instream and over head cover (i.e., riparian vegetation, substrate, depth/turbulence etc.)
- bank shape and stability
- location of potential obstacles and barriers to fish passage
- evidence of sensitive features present (e.g., watercress, groundwater seepage/springs, or iron staining).
- description of pollution point sources and/or existing infrastructure present
- type and amount of aquatic macrophyte growth
- type and amount of riparian cover and surrounding land use
- in-situ water quality information including temperature, pH and conductivity
- digital photographs of both typical and sensitive features



A fish community survey was conducted to identify fish species present in Etobicoke Creek in the vicinity of the sites. The fish community survey was conducted using primarily backpack electrofishing (1,436 seconds) and minnow traps (15 trap hours). Captured fish were enumerated, identified to species, measured, weighed, and life stage was noted. All fish were released alive near their capture location. Golder obtained a Ministry of Natural Resources and Forestry (MNRF) Licence to Collect Fish for Scientific Purposes and Licence conditions were followed. To fulfill the conditions of the licence, a mandatory report was completed and submitted to the MNRF on December 14, 2020.

Substrate particle count surveys were conducted to collect information on benthic invertebrate habitat. Randomly selected substrate particles were collected while the sampler was looking away to decrease potential bias during selection. The randomly selected particles were measured along the median axis, which represents the intermediate width of the particle. If the median axis of the material was between 2 mm and 1,000 mm, the measurement was recorded on the field datasheet. Observations on the types of potential benthic invertebrate habitats present in the watercourses were noted (i.e., erosional/ depositional sites, highly vegetated, etc.). Any benthic invertebrates observed while conducting the particle counts were recorded.

2.3 Species at Risk Screening

A desktop species at risk (SAR) screening was completed for short-listed alternatives and included both sites 01B (east portion only) and 01D (Golder 2020). The desktop SAR screening was used to determine which species listed under the *Endangered Species Act, 2007* (ESA; Ontario 2007) and the *Species at Risk Act* (SARA; Canada 2002) have potential habitat on the sites. During the field investigation on October 14, 2020, the suitability of habitat for SAR that had been identified in the desktop SAR screening was assessed. All observations of SAR (including sign) were recorded. Any habitat identified to have potential to provide suitable conditions for additional SAR not already identified through the desktop screening was also assessed and recorded. Because the field investigation was completed outside of the core growing season and outside of the key period for wildlife activity, only habitat suitability could be assessed, and therefore the assessment was conservative. A refined SAR screening specific to sites 01B (both portions) and 01D is provided in Appendix A and reflects both the earlier desktop assessment and field investigations completed by Golder as well as a review of results from the preliminary tree screening report (GMBP 2021).

3.0 RESULTS

3.1 Site 01B

3.1.1 Terrestrial Environment

The majority of the field investigation area at site 01B was characterized by a disturbed, forb-dominated cultural meadow (CUM) with species such as wild carrot (*Daucus carota*), red clover (*Trifolium pratense*), ragweed (*Ambrosia artemisiifolia*), common dandelion (*Taraxacum officinale*), and chicory (*Cichorium intybus*). Trees were sparsely distributed along the perimeter of the meadow and were dominated by Siberian elm (*Ulmus pumila*), which is an invasive species known to aggressively spread throughout disturbed sites. The northern portion of the field investigation area was characterized by a green ash (*Fraxinus pennsylvanica*) deciduous forest (FOD) with a moderate canopy cover (approximately 70%) and trees with DBH up to 30 cm.



The field investigation area was observed to have a high level of pedestrian traffic due to its location between Sherway Drive and Etobicoke Creek. As a result, the soil was noted to be compacted, and plants were observed to be trampled and short particularly throughout the cultural meadow. Furthermore, the bark of the green ash trees in field investigation area was found to have exit holes characteristic of an emerald ash borer (*Agrilus pianipennis*; EAB) infestation, and Norway maple (*Acer platanoides*) trees in field investigation area were observed to have tar spot fungus on their leaves.

A total of 31 vascular plant species were identified during the field investigation (Table 1). Of these, 45% are native species and 52% are non-native species, which is consistent with the disturbed and anthropogenically-influenced nature of the plant communities in field investigation area. The remaining 3% (one plant) could not be identified to the species level due to seasonal timing (i.e., not flowering) and high rates of hybridization. All of the plant species identified during the field investigation are secure and common, widespread and abundant in Ontario and globally (S4 or S5; G5) or are unranked alien species (SNA; GNR).

Table 1: Vascular Plants Observed in the Field Investigation Area at Site 01B

Common Name	Scientific Name	Origin ^(a)	S Rank ^(b)	G Rank ^(b)	ESA ^(c)
Trees (9 taxa)					
Apple	Malus pumila	1	SNA	G5	_
Balsam Fir	Abies balsamea	N	S5	G5	_
Eastern White Cedar	Thuja occidentalis	N	S5	G5	_
Green Ash	Fraxinus pennsylvanica	N	S4	G5	_
Manitoba Maple	Acer negundo	(N)	S5	G5	_
Norway Maple	Acer platanoides	1	SNA	GNR	_
Siberian Elm	Ulmus pumila	1	SNA	GNR	_
Trembling Aspen	Populus tremuloides	N	S5	G5	_
White Mulberry	Morus alba	1	SNA	G?	_
Small trees, shrubs and wo	ody vines (6 taxa)				
Dog Strangling Vine	Vincetoxicum rossicum	1	SNA	GNR	_
Honeysuckle	Lonicera sp.	1	_	_	_
Red-osier Dogwood	Cornus sericea	N	S5	G5	_
Riverbank Grape	Vitis riparia	N	S5	G5	_
Staghorn Sumac	Rhus typhina	N	S5	G5	_
Winged Euonymus	Euonymus alatus	I	_	_	_



Common Name	Scientific Name	Origin ^(a)	S Rank ^(b)	G Rank ^(b)	ESA ^(c)
Graminoids (2 taxa)					
Common Timothy	Phleum pratense	1	SNA	GNR	_
Reed Canary Grass	Phalaris arundinacea	N	S5	G5	_
Forbs (14 taxa)					
Calico Aster	Symphyotrichum lateriflorum	N	S5	G5T?	_
Canada Goldenrod	Solidago canadensis	N	S5	G5T5	_
Chicory	Cichorium intybus	I	SNA	GNR	_
Common Dandelion	Taraxacum officinale	I	SNA	G5	_
Common Milkweed	Asclepias syriaca	N	S5	G5	_
Common Mullein	Verbascum thapsus	I	SNA	GNR	_
Common Tansy	Tanacetum vulgare	I	SNA	GNR	_
Cow-vetch	Vicia cracca	I	SNA	GNR	_
Giant Burdock	Arctium lappa	I	SNA	GNR	_
Ragweed	Ambrosia artemisiifolia	N	S5	G5	_
Red Clover	Trifolium pratense	1	SNA	GNR	_
Rough Cocklebur	Xanthium strumarium	N	S5	G5	
Sunflower	Helianthus sp.	_	_	_	_
Wild Carrot	Daucus carota	I	SNA	GNR	

- (a) Origin: N = Native; (N) = Native but not in study area region; I = Introduced.
- (b) Conservation ranks based upon determinations made by the Natural Heritage Information Centre (2017). G = Global; S = Provincial; Ranks 1-3 are considered imperiled or rare; Ranks 4 and 5 are considered secure; ? = rank uncertain; NA = Not applicable [used mainly for abundance of non-natives; NR = Not ranked [used mainly for non-natives]; T = sub-specific taxon (taxa) present in the province.
- (c) Endangered Species Act (ESA), 2007 (O.Reg 242/08 last amended 1 April 2021 as O.Reg 228/21). Species at Risk in Ontario List, 2007 (O.Reg 230/08 last amended 1 Aug 2018 as O. Reg 404/18, s. 1.) END= Endangered; SC = Special Concern; THR = Threatened; = not listed.

Based on the preliminary tree screening report (GMBP 2021) and general observations by Golder during the agency site visit, the west portion of site 01B was characterized as a wooded area containing unsanctioned walking trails. Ash species were the most common species, accounting for about 44% of trees identified, and most were assessed to be in poor condition likely attributable to EAB infestation. Basswood (*Tilia americana*) was also common at about 28% representation. Tree DBH ranged from recruitment size in the understorey (<15 cm DBH) up to about 50 cm, with the majority of trees at less than 15 cm DBH. Plant community (ELC) mapping combined with visual inspection from adjacent areas classified the west portion of site 01B as deciduous forest



(FOD) (Figure 1). The documented tree composition (GMBP 2021) suggests a fresh-moist lowland deciduous forest (FOD7) community.

The meadow in the east portion of the site was assessed to have moderate potential to provide suitable breeding habitat for monarch (*Danaus plexippus*) due to the presence of milkweed host plants, as well as suitable foraging habitat for yellow-banded bumblebee (*Bombus affinis*). The forest bordering the meadow to the north and within the field investigation area was assessed to have moderate potential to provide suitable nesting habitat for eastern wood-pewee (*Contopus virens*) but is likely too open and disturbed to provide habitat for other forest-dwelling SAR.

The woodland in the west portion of site 01B may provide habitat for forest-dwelling SAR such as wood thrush (*Hylocichla mustelina*) and tree-roosting bats (northern myotis [*Myotis septentrionalis*], little brown myotis [*Myotis lucifugus*], tri-colored bat [*Perimyotis subflavus*]), though it appears to be relatively young, reducing habitat opportunities for these species that prefer mature forest.

Etobicoke Creek may provide pockets of habitat for snapping turtle (*Chelydra serpentina*) and the creek banks may provide nesting habitat for bank swallow (*Riparia riparia*) and roosting habitat for eastern small-footed myotis (*Myotis leibii*). Barn swallow (*Hirundo rustica*) nests were observed on the Sherway Drive footbridge crossing Etobicoke Creek in the vicinity of the site and adults may use open areas of the site for foraging.

Of the SAR with potential to occur on the site or vicinity, all four bat species, bank swallow and barn swallow are listed as threatened or endangered under the ESA.

3.1.2 Aquatic Environment

Etobicoke Creek adjacent to site 01B has a warmwater thermal regime and supports a warm/coolwater fish community consisting of native and non-native fish species. In-situ water quality recorded in Etobicoke Creek at the time of the survey measured water temperature at 10.8 °C, pH:7.22, and conductivity 2.28 mS.

Etobicoke Creek supports a range of life history events including specialized habitats such as spawning areas, migratory routes and habitats for Coho Salmon (*Oncorhynchus kisutch*). One aquatic SAR was identified as having moderate potential to occur within Etobicoke Creek, American Eel (*Anguilla rostrata*), which is listed as endangered under the ESA (Appendix A). Historical records of Redside Dace (*Clinostomus elongatus* [last observation 1960]) and Lake Sturgeon (*Acipenser fulvescens* [last observation 1937]) exist for Etobicoke Creek, but potential occurrence in the creek was ranked as low due to lack of suitable habitat and/or lack of recent observation records (Appendix A).

Forty-one fish were captured during the electrofishing effort. No fish were captured in the minnow traps. Fish species captured during the electrofishing effort were Blacknose Dace (*Rhinichthys atratulus*), Lake Chub (*Couesius plumbeus*), and Longnose Dace (*Rhinichthys cataractae*), none of which are SAR.

The aquatic habitat conditions bisecting site 01B included a pool of moderate depth (not suitable for overwintering) and rapids habitat types (Table 2). Substrate in the pool areas was dominated by fines with cobble, gravel, sand and trace amounts of boulder. Bankfull width was 18 m, and wetted width was 10 m at the time of the survey. Mean wetted depth was 0.7 m, with a mean bankfull depth of 1.3 m. Bank stability was moderate to high. Banks were 70% to 80% vegetated with grasses and trees. In-stream cover for fish was moderate, consisting of woody debris and floating-leaved aquatic vegetation.



Table 2: Fish Habitat Features at Site 01B

Channel Unit	Mean Bankfull width (m)	Mean Wetted Width (m)	Mean Bankfull Depth (m)	Mean Wetted Depth (m)	Substrate Type (%)	Bank Stability		Bank Height (m)				Overhead Cover (%)	Instream Cover (%)
						LDB	RDB	LDB	RBD	LDB	RDB		
PL	18.0	10.0	1.3	0.7	Fi 40, Co 20, Gr 20, Sa 15, Bo 5	Moderate	High	0.6	1.2	Gf 50, Tr	50	0	WD 40, AV 20
RA	21.5	5.5	NA	0.3	Co 50, B0 30, Gr 10, Sa 10	Moderate	Moderate	1.7	2.1	Gf 100	Gf 50, Tr 50	0	AV 10

Notes:

PL = Pool, RA = rapids, NA = not available, Fi = fines, Co = cobble, Gr = gravel, Sa = sand, Bo = boulder, LDB = left downstream bank, RDB = right downstream bank, Gf = grasses, Tr = trees, WD = woody debris, AV = aquatic vegetation



There is potential for the pool to provide feeding, rearing and nursery habitat and the reach to provide migratory routes for the fish species with potential to occur in the creek. Since the substrates are dominated by fine material, there is potentially suitable habitat present for American Eel, which is listed as endangered under the ESA (Appendix A).

Substrate in the rapid areas was dominated by cobble and boulder with sparse sand and gravel. Wetted depth averaged 0.3 m. Bankfull depth could not be measured. Mean bankfull width was 21.5 m and mean wetted with was 5.5 m. Bank stability was moderate. Banks were 30% vegetated with grasses on the left downstream bank, and 100% vegetated with grasses and trees on the right downstream bank. In-stream cover for fish was low. The rapid habitat could potentially provide spawning habitat for Walleye and White Sucker, as well as migratory routes for all fish with potential to occur.

The average substrate particle size based on the particle count surveys at this station was 16.3 cm. Based on the substrate types present, site 01B is likely to support both erosional and depositional benthic invertebrate communities¹. No invertebrates were observed within the area of the creek at the site during the surveys.

3.2 Site 01D

3.2.1 Terrestrial Environment

Site 01D was characterized by a fresh-moist sugar maple-lowland ash deciduous forest (FOD6-1) dominated by sugar maple (*Acer saccharum*) and green ash in the canopy, with black walnut (*Juglans nigra*), beech (*Fagus grandifolia*), basswood (*Tilia americana*), and white elm (*Ulmus americana*) associates. The canopy cover was dense (>90%) with the exception of a small area of standing dead ash trees to the south of the site. There were abundant mature trees throughout this forest, with a DBH of up to approximately 50 cm. The understorey was dominated by red raspberry (*Rubus idaeus*) and invasive honeysuckle (*Lonicera sp.*), and the ground was covered by a thick layer of sugar maple leaves, with species such as Canada goldenrod (*Solidago canadensis*), white snakeroot (*Ageratina altissima*), zig-zag goldenrod (*Solidago flexicaulis*), wood avens (*Geum urbanum*), and goutweed (*Aegopodium podagraria*).

This site had restricted accessibility to pedestrians due to its location between fenced residential properties to the south and Etobicoke Creek to the north. In effect, there was a low level of soil compaction, as well as abundant downed woody debris throughout the forest. The bark of the green ash trees on and surrounding the site was found to have similar evidence of emerald ash borer infestation, and tar spot fungus was observed on the leaves of sugar maple trees.

A total of 30 vascular plant species were identified during the field investigation (Table 3). Of these, 70% are native species and 30% are non-native species. All of the plant species identified during the field investigation are secure and common, widespread and abundant in Ontario and globally (S4 or S5; G5) or are unranked alien species (SNA; GNR).

¹ Erosional sites are areas where faster water velocities have eroded away finer sediments, such as riffles, rapids, and runs. Substrates in these areas are typically coarser, such as boulder, cobble, gravel or hard-packed clay. Depositional sites occur in areas where the current velocity slows, such as flats, pools, and backwaters, which allows sediments transported from erosional sites to settle out and accumulate. The benthic invertebrate communities will differ between these habitat types, and different sampling techniques are required to effectively sample each type



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Table 3: Vascular Plants Observed on Site 01D

Scientific Name	Common Name	Origin ^(a)	S Rank ^(b)	G Rank ^(b)	ESA(c)
Trees (8 taxa)					
Basswood	Tilia americana	N	S5	G5	_
Beech	Fagus grandifolia	N	S4	G5	_
Black Walnut	Juglans nigra	(N)	S4	G5	_
Green Ash	Fraxinus pennsylvanica	N	S4	G5	_
Manitoba Maple	Acer negundo	(N)	S5	G5	_
Sugar Maple	Acer saccharum	N	S5	G5	_
White Elm	Ulmus americana	N	S5	G5?	_
White Oak	Quercus alba	N	S5	G5	_
Small trees, shrubs and wood	y vines (6 taxa)				
Choke Cherry	Prunus virginiana	N	S5	G5	_
Common Buckthorn	Rhamnus cathartica	1	SNA	GNR	_
Common Red Raspberry	Rubus idaeus	N	S5	G5	_
Honeysuckle	Lonicera sp.	1	_	_	_
Riverbank Grape	Vitis riparia	N	S5	G5	_
Virginia Creeper	Parthenocissus inserta	N	S5	G5	_
Graminoids (8 taxa)					,
Reed Canary Grass	Phalaris arundinacea	N	S5	G5	_
Broad-leaved Cattail	Typha latifolia	N	S5	G5	_
Narrow-leaved Cattail	Typha angustifolia	1	SNA	G5	_
Torrey's Rush	Juncus torreyi	N	S5	G5	_
Smooth Twig-rush	Cladium mariscoides	N	S5	G5	_
Downy Brome (Cheatgrass)	Bromus tectorum	I	SNA	GNR	_
Common Timothy	Phleum pratense	I	SNA	GNR	_
Dark-green Bulrush	Scirpus atrovirens	N	S5	G5	_
Forbs (8 taxa)				, 	



Scientific Name	Common Name	Origin ^(a)	S Rank ^(b)	G Rank ^(b)	ESA ^(c)
Butterfly Weed	Asclepias tuberosa	N	S4	G5?	_
Canada Goldenrod	Solidago canadensis	N	S5	G5T5	_
Celandine	Chelidonium majus	1	SNA	GNR	_
Goutweed	Aegopodium podagraria	1	SNA	GNR	_
Ground-ivy	Glechoma hederacea	I	SNA	GNR	_
Wood Avens	Geum urbanum	1	SNA	G5	_
White Snakeroot	Ageratina altissima (Eupatorium)	N	S5	G5T5	_
Zig-zag Goldenrod	Solidago flexicaulis	N	S5	G5	_

- (a) Origin: N = Native; (N) = Native but not in study area region; I = Introduced.
- (b) Conservation ranks based upon determinations made by the Natural Heritage Information Centre (2017). G = Global; S = Provincial; Ranks 1-3 are considered imperiled or rare; Ranks 4 and 5 are considered secure; ? = rank uncertain; NA = Not applicable [used mainly for abundance of non-natives; NR = Not ranked [used mainly for non-natives]; T = sub-specific taxon (taxa) present in the province.
- (c) Endangered Species Act (ESA), 2007 (O.Reg 242/08 last amended 1 April 2021 as O.Reg 228/21). Species at Risk in Ontario List, 2007 (O.Reg 230/08 last amended 1 Aug 2018 as O. Reg 404/18, s. 1.) END= Endangered; SC = Special Concern; THR = Threatened; = not listed.

The forest on the site was assessed to have moderate potential to provide suitable nesting habitat for eastern wood-pewee and wood thrush (*Hylocichla mustelina*), roosting habitat for tree-roosting bats (northern myotis, little brown myotis, tri-colored bat), and habitat for West Virginia white (*Pieris virginiensis*) and yellow-banded bumblebee, though the forest canopy may be too closed to be suitable for the bumblebee.

Etobicoke Creek in the vicinity of the site may provide pockets of habitat for snapping turtle and the creek banks may provide nesting habitat for bank swallow and roosting habitat for eastern small-footed myotis.

Of the SAR with potential to occur on the site or vicinity, all four bat species and bank swallow are listed as threatened or endangered under the ESA.

3.2.2 Aquatic Environment

General conclusions about the fish community in Etobicoke Creek noted for site 01B above (Section 3.1.2) are applicable to site 01D.

The fish habitat conditions adjacent to site 01D consisted of a flat habitat morphology type (Table 4). The substrate was comprised of organics, cobble and gravel with trace amounts of sand. The bankfull width was 12 m, and the wetted width was 8 m at the time of the survey. The mean wetted depth was 1.1 m, with a mean bankfull depth of 1.6 m. Bank stability was high and banks were 70% vegetated with grasses and shrubs. Overall, instream habitat availability for fish was low, and consisted of woody debris and sparse floating-leaved aquatic vegetation.



Table 4: Fish Habitat Features at Site 01D

Channel Unit	Mean Bankfull width	Mean Wetted Width	Mean Bankfull Depth	Mean Wetted Depth	Substrate Type (%)	Bank Stabili		_			an ition (%)	Overhead Cover (%)	Instream Cover (%)
	(m)	(m)	(m)	(m)		LDB	RDB	LDB	RBD	LDB	RDB		
FL	12.0	8.0	1.6	1.1	Co 30, Gr 30, Or 30, Sa 10	High	High	0.5	2.5	Gf 50,	Sh 50	5	WD 40, AV 10

Notes:

FL = flat, Or = organics, Co = cobble, Gr = gravel, Sa = sand, LDB = left downstream bank, RDB = right downstream bank, Gf = grasses/forbs, Sh = srubs, WD = woody debris, AV = aquatic vegetation



There is potential for the flat to provide feeding, rearing, nursery habitat, and migratory routes for the majority of the fish species with potential to occur in the creek. Since the substrates are contain moderate proportions of fine material, there is potentially suitable habitat present for American Eel, which is listed as endangered under the ESA (Appendix A). The flat also has sufficient depth to provide overwintering habitat for fish.

The average substrate particle size based on the particle count surveys at this station was 15.2 cm. Based on the substrate types present, site 01D is likely to support primarily depositional benthic invertebrate communities. No invertebrates were observed within the area of the creek adjacent to the site during the survey.

4.0 SUMMARY AND CONCLUSIONS

The east portion of site 01B is largely characterized as a highly disturbed cultural meadow (CUM) with compacted soil due to pedestrian traffic. The majority of plants in this portion of the site are non-native species, including Siberian elm, which is found along the perimeter of the meadow and is highly invasive. The deciduous forest to the north of the meadow lacks mature trees, and exhibits a high amount of human disturbance, as well as signs of the invasive emerald ash borer and tar spot fungus. The west portion of site 01B is characterized as deciduous forest suggestive of a fresh-moist lowland deciduous forest (FOD7) community based on tree composition documented during the preliminary tree screening (GMBP 2021). Some human disturbance was noted in the form of unsanctioned walking trails, and most of the trees were at recruitment size (<15 cm DBH). Poor condition of ash trees likely from emerald ash borer infestation was similarly noted in the west portion of the site.

The east portion of the site was assessed to have low potential to provide suitable habitat for most SAR, and particularly those listed as threatened or endangered under the ESA. The west portion of the site though forested appears to be relatively young, reducing habitat potential for several SAR that prefer more mature forest structure, and particularly the three species of tree-roosting bats listed as endangered under the ESA (northern myotis, little brown myotis, tri-colored bat).

Aquatic habitat adjacent to site 01B includes pool and rapids. Substrates are dominated by coarse materials (cobble). Riverbanks are moderately stable and largely vegetated. Instream cover for fish is low to moderate. There is potential feeding, rearing and nursery habitat and migratory routes for the majority of the fish species with potential to occur, as well as spawning potential for Walleye and White Sucker and potentially suitable habitat for American Eel, which is listed as endangered under the ESA (Appendix A).

Site 01D is characterized as a fresh-moist sugar maple - lowland ash deciduous forest (FOD6-1) with a relatively low amount of human disturbance due to the limited accessibility of the site. In contrast to site 01B, the majority of species observed on the site are native to Ontario, and no non-native tree species were observed on the site. Although there were signs of emerald ash borer and tar spot fungus, the forest has a closed tree canopy and a high amount of downed woody debris to provide a higher quality of wildlife habitat compared to site 01B, including for the three species of tree-roosting bats listed as endangered under the ESA (northern myotis, little brown myotis, tri-colored bat).

The aquatic habitat conditions adjacent to site 01D consist of flat, with substrates comprised of organics, cobble and gravel with trace amounts of sand. Banks are stable and largely vegetated. Overall, availability of instream habitat for fish is low. There is potential for the flat to provide nursery habitat and migratory routes for the majority of the fish species with potential to occur. Since the substrates are dominated by fine material, there is potentially



suitable habitat present for American Eel. The flat also has sufficient depth to provide overwintering habitat for fish.

Based on these findings, from a terrestrial standpoint, site 01B is the preferred site because of the reduced quality of the forest habitat on the site and potential to support SAR, particularly tree-roosting bats listed as endangered under the ESA (little brown myotis, northern myotis, tri-colored bat). Although selection of site 01B would result in the disturbance of riparian habitat that may provide nesting opportunities for bank swallow and roosting opportunities for eastern small-footed myotis, listed as threatened and endangered under the ESA, respectively, the disturbance would be temporary in nature and habitat more readily restorable in the short-term.

From an aquatic standpoint, site 01D is the preferred site as in-water work can be avoided and the site is located approximately 20 m from the creek maintaining an undisturbed buffer area, thus reducing potential impacts to fish and fish habitats compared to site 01B.

5.0 CLOSURE

We trust this report meets your current needs. If you have any further questions regarding this report, please contact the undersigned.

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Attachments: Figure 1: Ecological Land Classification

Appendix A: SAR Screening

https://golderassociates.sharepoint.com/sites/100160/deliverables/natural environment/field memo short list/6_revised addendum/18112273_tm_rev0_12apr2021_gmbp_cmws_ne_addendum_sites_1b_1d.docx



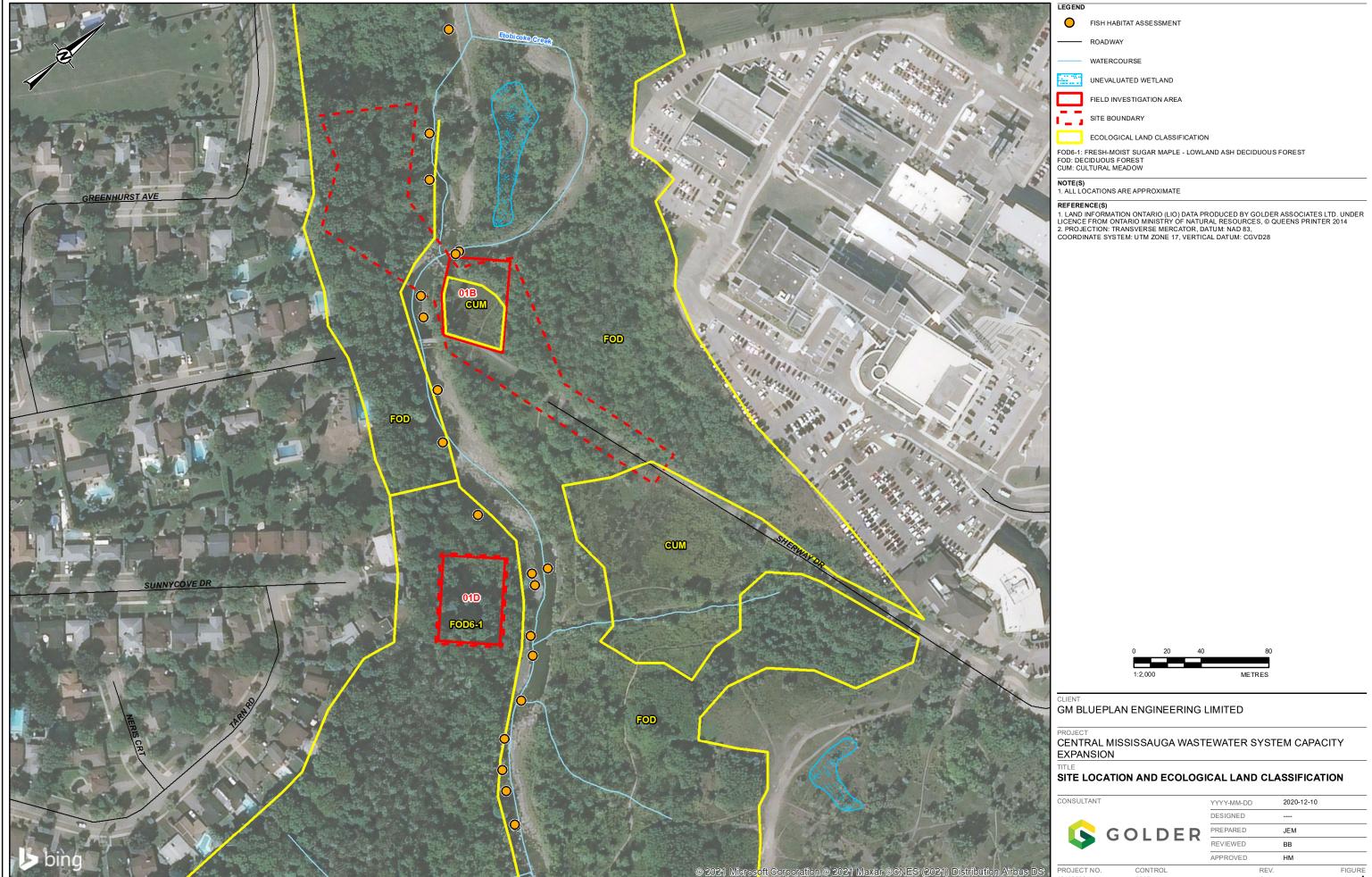
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Figure





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APPENDIX A

SAR Screening



Taxon	Common Name	Scientific Name	ESA ¹	SARA ²	COSEWIC ³	Provincial (SRank) ⁴	Habitat Requirements ⁵	ESA Habitat Protection Provisions ⁶	Potential to Occur within or near Site 01B	Potential to Occur within or near Site 01D
Amphibian	Jefferson salamander	Ambystoma jeffersonianum	END	END	END	S2	In Ontario, Jefferson salamander is found only in southern Ontario, along southern portions of the Niagara Escarpment and western portions of the Oak Ridges Moraine. Jefferson salamander prefers moist, well-drained deciduous and mixed forests with a closed canopy. It overwinters underground in mammal burrows and rock fissures, and moves to vernal pools and ephemeral wetlands in the early spring to breed. Breeding ponds are typically located in or near to forested habitats, and contain submerged debris (i.e. sticks, vegetation) for egg attachment sites. Ephemeral breeding pools need to have water until at least mid-summer (mid to late July) (Jefferson Salamander Recovery Team 2010).	Regulated In the geographic areas of: City of Hamilton; counties of Brant, Dufferin, Elgin, Grey, Haldimand, Norfolk, and Wellington; regional municipalities of Halton, Niagara, Peel, Waterloo and York Regulated Habitat: i. wetland, pond or vernal pool, or other temporary pool, being used or was used in previous five years, by Jefferson salamander or Jefferson dominated polyploidy ii. area within 300 m of wetland, pond or vernal or other temporary pool that provides suitable foraging, dispersal, migration or hibernation conditions iii. wetland, pond or vernal or other temporary pool that provides suitable breeding conditions, is within 1 km of an area described in i. and is connected to the area described in i. and an area described in iv. iv. an area providing suitable conditions for Jefferson salamander or Jefferson dominated polyploids to disperse and is within 1 km of an area described in i	No recent occurrences or suitable habitat based on desktop assessment and field investigations.	No recent occurrences or suitable habitat based on desktop assessment and field investigations.
Amphibian	Western chorus frog - Great Lakes St. Lawrence / Canadian Shield population	Pseudacris triseriata		THR	THR	S3	In Ontario, habitat of this amphibian species typically consists of marshes or wooded wetlands, particularly those with dense shrub layers and grasses, as this species is a poor climber. They will breed in almost any fishless pond including roadside ditches, gravel pits and flooded swales in meadows. This species hibernates in terrestrial habitats under rocks, dead trees or leaves, in loose soil or in animal burrows. During hibernation, this species is tolerant of flooding (Environment Canada 2015).		No recent occurrences or suitable habitat based on desktop assessment and field investigations.	No recent occurrences or suitable habitat based on desktop assessment and field investigations.



Taxon	Common Name	Scientific Name	ESA ¹	SARA ²	COSEWIC ³	Provincial (SRank) ⁴	Habitat Requirements ⁵	ESA Habitat Protection Provisions ⁶	Potential to Occur within or near Site 01B	Potential to Occur within or near Site 01D
Arthropod	Monarch	Danaus plexippus	SC	SC	END	S2N, S4B	In Ontario, monarch is found throughout the northern and southern regions of the province. This butterfly is found wherever there are milkweed (<i>Asclepias</i> spp.) plants for its caterpillars and wildflowers that supply a nectar source for adults. It is often found on abandoned farmland, meadows, open wetlands, prairies and roadsides, but also in city gardens and parks. Important staging areas during migration occur along the north shores of the Great Lakes (COSEWIC 2010).		Moderate Cultural meadow in the east portion of the site contains milkweed and potential nectar sources.	Forested cover at the site is unsuitable habitat for this species.
Arthropod	West Virginia white	Pieris virginiensis	SC			\$3	In Ontario, West Virginia white is found primarily in the central and southern regions of the province. This butterfly lives in moist, mature, deciduous and mixed woodlands, and the caterpillars feed only on the leaves of toothwort (<i>Cardamine</i> spp.), which are small, springblooming plants of the forest floor. These woodland habitats are typically maple-beech-birch dominated. This species is associated with woodlands growing on calcareous bedrock or thin soils over bedrock (Burke 2013).		Low Woodland habitat on the site is not in mature forest structural stage preferred by this species.	Moderate The site could provide the suitable woodland habitat needed.
Arthropod	Yellow-banded bumble bee	Bombus affinis	SC	SC	SC	S2	Yellow-banded bumblebee is a forage and habitat generalist, occupying open woodlands, meadows, grasslands, farmlands and urban parks, and taking nectar from various flowering plants (COSEWIC 2015). It is an early emerging species, making it likely an important pollinator of early blooming wild flowering plants (e.g. wild blueberry) and agricultural crops (e.g., apple). Nest sites are often in abandoned rodent burrows in old fields and queens overwinter by burrowing into loose soil or rotting trees (COSEWIC 2015).		Moderate The site could provide suitable woodland and meadow habitat.	Moderate The site could provide suitable woodland habitat.



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Bird	Bank swallow	Riparia riparia	THR	THR	THR	S4B	In Ontario, bank swallow breeds in a variety of natural and anthropogenic habitats, including lake bluffs, stream and river banks, sand and gravel pits, and roadcuts. Nests are generally built in a vertical or nearvertical bank. Breeding sites are typically located near open foraging sites such as rivers, lakes, grasslands, agricultural fields, wetlands and riparian woods. Forested areas are generally avoided (Garrison 1999).	General (Draft) Category 1 – Breeding colony, including burrows and substrate between them Category 2 – Area within 50 m of the front of breeding colony face Category 3 – Area of suitable foraging habitat within 500 m of the outer edge of breeding colony	Moderate The steep vertical banks observed in the field along Etobicoke creek could provide suitable nesting habitat.	Moderate The steep vertical banks observed in the field along Etobicoke creek could provide suitable nesting habitat.
Bird	Barn swallow	Hirundo rustica	THR	THR	THR	S4B	In Ontario, barn swallow breeds in areas that contain a suitable nesting structure, open areas for foraging, and a body of water. This species nests in human made structures including barns, buildings, sheds, bridges, and culverts. Preferred foraging habitat includes grassy fields, pastures, agricultural cropland, lake and river shorelines, cleared rights-of-way, and wetlands (COSEWIC 2011). Mud nests are fastened to vertical walls or built on a ledge underneath an overhang. Suitable nests from previous years are reused (Brown and Brown 1999).	General Category 1 – Nest Category 2 – Area within 5 m of the nest Category 3 – Area between 5-200 m of the nest	High Barn swallow nests were observed on Sherway Drive/Etobicoke Creek footbridge.	Forested cover at the site is unsuitable habitat for this species.
Bird	Bobolink	Dolichonyx oryzivorus	THR	THR	THR	S4B	In Ontario, bobolink breeds in grasslands or graminoid dominated hayfields with tall vegetation (Gabhauer 2007). Bobolink prefers grassland habitat with a forb component and a moderate litter layer. They have low tolerance for presence of woody vegetation and are sensitive to frequent mowing within the breeding season. They are most abundant in established, but regularly maintained, hayfields, but also breed in lightly grazed pastures, old or fallow fields, cultural meadows and newly planted hayfields. Their nest is woven from grasses and forbs. It is built on the ground, in dense vegetation, usually under the cover of one or more forbs (Renfrew et al. 2015).	General Category 1 – Nest and area within 10 m of nest Category 2 – Area between 10 – 60 m of the nest or centre of approximated defended territory Category 3 - Area of continuous suitable habitat between 60 – 300 m of the nest or centre of approximated defended territory	Forested cover at the site is unsuitable habitat for this species, and the cultural meadow in the east portion has unsuitable microhabitat.	Forested cover at the site is unsuitable habitat for this species.



Taxon	Common Name	Scientific Name	ESA ¹	SARA ²	COSEWIC ³	Provincial (SRank) ⁴	Habitat Requirements⁵	ESA Habitat Protection Provisions ⁶	Potential to Occur within or near Site 01B	Potential to Occur within or near Site 01D
Bird	Chimney swift	Chaetura pelagica	THR	THR	THR	S4B, S4N	In Ontario, chimney swift breeding habitat is varied and includes urban, suburban, rural and wooded sites. They are most commonly associated with towns and cities with large concentrations of chimneys. Preferred nesting sites are dark, sheltered spots with a vertical surface to which the bird can grip. Unused chimneys are the primary nesting and roosting structure, but other anthropogenic structures and large diameter cavity trees are also used (COSEWIC 2007).	General Category 1 – Human-made nest/roost, or natural nest/roost cavity and area within 90 m of natural cavity	Low The site lacks the suitable chimney structures preferred for nesting and roosting.	The site lacks the suitable chimney structures preferred for nesting and roosting.
Bird	Common nighthawk	Chordeiles minor	SC	THR	SC	S4B	In Ontario, these aerial foragers require areas with large open habitat. This includes farmland, open woodlands, clearcuts, burns, rock outcrops, alvars, bogs, fens, prairies, gravel pits and gravel rooftops in cities (Sandilands 2007).		Low The site lacks large areas of open habitat preferred by this species.	The site lacks large areas of open habitat preferred by this species.
Bird	Eastern meadowlark	Sturnella magna	THR	THR	THR	S4B	In Ontario, eastern meadowlark breeds in pastures, hayfields, meadows and old fields. Eastern meadowlark prefers moderately tall grasslands with abundant litter cover, high grass proportion, and a forb component (Hull 2003). They prefer well drained sites or slopes, and sites with different cover layers (Roseberry and Klimstra 1970).	General Category 1 – Nest and area within 10 m of the nest Category 2 – Area between 10 – 100 m of the nest or centre of approximated defended territory Category 3 – Area of continuous suitable habitat between 100 – 300 m of the nest or centre of approximated defended territory	Forested cover at the site is unsuitable habitat for this species, and the cultural meadow in the east portion has unsuitable microhabitat.	Forested cover at the site is unsuitable habitat for this species.
Bird	Eastern wood-pewee	Contopus virens	SC	SC	SC	S4B	In Ontario, eastern wood-pewee inhabits a wide variety of wooded upland and lowland habitats, including deciduous, coniferous, or mixed forests. It occurs most frequently in forests with some degree of openness. Intermediateaged forests with a relatively sparse midstory are preferred. In younger forests with a relatively dense midstory, it tends to inhabit the edges. Also occurs in anthropogenic habitats providing an open forested aspect such as parks and suburban neighborhoods. Nest is constructed atop a horizontal branch, 1-2 m above the ground, in a wide variety of deciduous and coniferous trees (COSEWIC 2012).		Moderate Woodland at the site in proximity to river and meadow could provide the forest edge habitat preferred by this species.	Moderate Woodland at the site in proximity to river could provide the forest edge habitat preferred by this species.



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Bird	Henslow's sparrow	Ammodramus henslowii	END	END	END	SHB	In Ontario, Henslow's sparrow breeds in large grasslands with low disturbance, such as lightly grazed and ungrazed pastures, fallow hayfields, grassy swales in open farmland, and wet meadows. Preferred habitat contains tall, dense grass cover, typically over 30 cm high, with a high percentage of ground cover, and a thick mat of dead plant material. Henslow's sparrow generally avoids areas with emergent woody shrubs or trees, and fence lines. Areas of standing water or ephemerally wet patches appear to be important. This species breeds more frequently in patches of habitat greater than 30 ha and preferably greater than 100 ha (COSEWIC 2011).	General Category 1 – Nest or probable breeding occurrence and the area within 50 m Category 2 – Area of continuous suitable habitat outside of category 1	The site lacks suitable breeding habitat (i.e., large, undisturbed grasslands) preferred by this species.	The site lacks suitable breeding habitat (i.e., large, undisturbed grasslands) preferred by this species.
Bird	Peregrine falcon (anatum/tundrius subspecies)	Falco peregrinus anatum/ tundrius	SC	SC	NAR	S3B	In Ontario, peregrine falcon breeds in areas containing suitable nesting locations and sufficient prey resources. Such habitat includes both natural locations containing cliff faces (heights of 50 - 200 m preferred) and also anthropogenic landscapes including urban centres containing tall buildings, open pit mines and quarries, and road cuts. Peregrine falcons nest on cliff ledges and crevices and building ledges. Nests consist of a simple scrape in the substrate (COSEWIC 2007).		Low The site lacks buildings or cliffs suitable for nesting.	Low The site lacks buildings or cliffs suitable for nesting.
Bird	Wood thrush	Hylocichla mustelina	SC	THR	THR	S4B	In Ontario, wood thrush breeds in moist, deciduous hardwood or mixed stands that are often previously disturbed, with a dense deciduous undergrowth and with tall trees for singing perches. This species selects nesting sites with the following characteristics: lower elevations with trees less than 16 m in height, a closed canopy cover (>70 %), a high variety of deciduous tree species, moderate subcanopy and shrub density, shade, fairly open forest floor, moist soil, and decaying leaf litter (COSEWIC 2012).		Moderate Woodland on the site could provide suitable breeding habitat. There are historical records of this species in the study area.	Moderate Woodland on the site could provide suitable breeding habitat. There are historical records of this species in the study area.



Taxon	Common Name	Scientific Name	ESA ¹	SARA ²	COSEWIC ³	Provincial (SRank) ⁴	Habitat Requirements⁵	ESA Habitat Protection Provisions ⁶	Potential to Occur within or near Site 01B	Potential to Occur within or near Site 01D
Fish	American Eel	Anguilla rostrata	END		THR	S1?	In Ontario, American Eel is native to the Lake Ontario, St. Lawrence River and Ottawa River watersheds. Their current distribution includes lakes Huron, Erie, and Superior and their tributaries. The Ottawa River population is considered extirpated. The preferred habitat of the American eel is cool water of lakes and streams with muddy or silty substrates in water temperatures between 16 and 19°C. The American Eel is a catadromous fish that lives in fresh water until sexual maturity then migrates to the Sargasso Sea to spawn (Burridge et al. 2010; Eakins 2016).	General (as of June 30, 2013)	Moderate Etobicoke Creek may provide suitable habitat. There are historical records of the species in the Etobicoke Creek watershed.	Moderate Etobicoke Creek may provide suitable habitat. There are historical records of the species in the Etobicoke Creek watershed.
Fish	Deepwater Sculpin - Great Lakes / Western St. Lawrence population	Myoxocephalus thompsoni	_	SC	SC	\$3?	In Ontario, Deepwater Sculpin are found in Lakes Huron, Ontario, and Superior, as well as in scattered inland lakes. This fish species prefers cold, deep water (usually between 60-150 m in lakes), with soft substrates. Spawning takes place year-round, but peaks in August and early September. Its lifespan is 7 years, with females maturing at 3 years and males at 2 years (DFO 2011).		Low The site lacks the suitable lake habitat required by this species.	Low The site lacks the suitable lake habitat required by this species
Fish	Lake Sturgeon - Great Lakes / Upper St. Lawrence population	Acipenser fulvescens	END	_	THR	S2	In Ontario, Lake Sturgeon, a large prehistoric freshwater fish, is found in all the Great Lakes and in all drainages of the Great Lakes and of Hudson Bay. This species typically inhabits highly productive shoal areas of large lakes and rivers. They are bottom dwellers, and prefer depths between 5-10 m and mud or gravel substrates. Small sturgeons are often found on gravelly shoals near the mouths of rivers. They spawn in depths of 0.5 to 4.5 m in areas of swift water or rapids. Where suitable spawning rivers are not available, such as in the lower Great Lakes, they are known to spawn in wave action over rocky ledges or around rocky islands (Golder 2011).	General	Historical records of the species in the Etobicoke Creek watershed are greater than 50 years old.	Historical records of the species in the Etobicoke Creek watershed are greater than 50 years old.



Тахо	Common Name	Scientific Name	ESA ¹	SARA ²	COSEWIC ³	Provincial (SRank) ⁴	Habitat Requirements ⁵	ESA Habitat Protection Provisions ⁶	Potential to Occur within or near Site 01B	Potential to Occur within or near Site 01D
Fish	Redside Dace	Clinostomus elongatus	END	END	END	S2	In Ontario, Redside Dace, a small coolwater species common in the USA but less so in Canada, is found in tributaries of western Lake Ontario, Lake Erie, Lake Huron and Lake Simcoe. They are found in pools and slow-moving areas of small headwater streams with clear to turbid water. Overhanging grasses, shrubs, and undercut banks, are an important part of their habitat, as are instream boulders and large woody debris. Preferred substrates are variable and include silt, sand, gravel and boulders. Spawning occurs in shallow riffle areas (Redside Dace Recovery Team 2010).	Regulated In the geographic areas of: cities of Hamilton and Toronto; counties of Bruce, Grey, Huron, Simcoe, and Wellington; regional municipalities of Durham, Halton, Peel and York; townships of St. Joseph, Jocelyn and Hilton; and the village of Hilton Beach Regulated Habitat: i. any part of a stream or other watercourse currently being used by Redside Dace, or was used during previous 20 years by Redside Dace and that provides suitable conditions to carry out life processes ii. the area encompassing the meander belt width of the stream or watercourse described in i., and the vegetated area or agricultural lands within 30 m of the stream or watercourse	Low Historical records of the species in the Etobicoke Creek watershed are greater than 50 years old.	Low Historical records of the species in the Etobicoke Creek watershed are greater than 50 years old.



Taxon	Common Name	Scientific Name	ESA ¹	SARA ²	COSEWIC ³	Provincial (SRank) ⁴ Habitat Requir		Potential to Occur within or near Site 01B	Potential to Occur within or near Site 01D
Fish (cont'd)	Redside Dace (cont'd						iii. stream, permanent or intermittent headwater drainage feature, groundwater discharge area or wetland that augments or maintains baseflow, coarse sediment supply or surface water quality of a part of stream or other watercourse described in i., provided that stream or watercourse has an average bankfull width of 7.5 m or less In the geographic areas of: in the City of Hamilton, counties of Bruce, Grey, Huron, Simcoe, and Wellington, and the regional municipalities of Durham, Halton, Peel and York Regulated Habitat: iv. Any part of a stream or other watercourse used by a Redside Dace at any time in the past located in the same or adjacent sub-watershed as area identified in i. that provides suitable conditions for successful stream corridor rehabilitation and for natural recolonization of Redside Dace v. area encompassing the meander belt width of an area described in iv., and the vegetated area or agricultural lands within 30 m of an area described in iv. vi. stream, permanent or intermittent headwater drainage feature, groundwater discharge area or wetland that augments or maintains baseflow, coarse sediment supply or surface water quality of a part of stream or other watercourse described in iv., provided that stream or watercourse has an average		
							bankfull width of 7.5 m or less.		



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Fish	River Redhorse	Moxostoma carinatum	SC	SC	SC	S2	In Ontario, river redhorse is known to occur in the Mississippi River, Ottawa River, Madawaska River, Grand River, Trent River, and Thames River systems. They inhabit moderate to large rivers. The majority of their time is spent in pool habitats with slow-moving water and abundant vegetation. Spawning occurs in areas of shallow, moderate to fast-flowing waters in riffle-run habitats with coarse substrates of gravel and cobble (DFO 2019).		Low Historical records of the species in the Etobicoke Creek watershed are greater than 50 years old.	Low Historical records of the species in the Etobicoke Creek watershed are greater than 50 years old.
Fish	Shortnose Cisco	Coregonus reighardi	END	END	END	SH	In Ontario, Shortnose Cisco species was last reported in Georgian Bay in 1985 and Lake Ontario in 1964. It prefers clear, deep waters and water temperatures between 2 and 10°C (COSEWIC 2005).	General (as of June 30, 2013)	Low The site lacks the suitable lake habitats required by this species.	The site lacks the suitable lake habitats required by this species.
Fish	Upper Great Lakes Kiyi	Coregonus kiyi kiyi	SC	SC	SC	\$3	In Ontario, Kiyi occurs in Lake Superior. The Kiyi was last seen in Lake Ontario in 1964 and Lake Huron in 1973. It is a species of freshwater whitefish. The Kiyi is a coldwater species that prefers temperatures between 3.7 and 4.6°C and depths ranging from 35 to 200 m; however, it is rarely found in waters less than 108 m deep. Kiyi have been collected over lake bottoms of clay and mud substrates. Spawning generally occurs in the late fall at depths greater than 100 m (COSEWIC 2005).		Low The site lacks the suitable lake habitats required by this species.	The site lacks the suitable lake habitats required by this species.



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Mammal	Eastern small-footed myotis	Myotis leibii	END	_	_	S2S3	This species is not known to roost within trees, but there is very little known about its roosting habits. The species generally roosts on the ground under rocks, in rock crevices, talus slopes and rock piles. It occasionally inhabits buildings. Areas near the entrances of caves or abandoned mines may be used as hibernacula, where the conditions are drafty with low humidity, and may be subfreezing (Humphrey 2017)	General	Moderate Rocky areas along the creek bank on the site and vicinity could provide the suitable roosting habitat required by this species.	Moderate Rocky areas along the creek bank in the site vicinity could provide the suitable roosting habitat required by this species.
Mammal	Little brown myotis	Myotis lucifugus	END	END	END	S4	In Ontario, this species' range is extensive and covers much of the province. It will roost in both natural and man-made structures. Roosting colonies require a number of large dead trees, in specific stages of decay and that project above the canopy in relatively open areas. May form nursery colonies in the attics of buildings within 1 km of water. Caves or abandoned mines may be used as hibernacula, but high humidity and stable above freezing temperatures are required (ECCC 2018).	General	Moderate Woodland on the site could provide the suitable roosting habitat required by this species.	Moderate Woodland on the site could provide the suitable roosting habitat required by this species.
Mammal	Northern myotis	Myotis septentrionalis	END	END	END	S3	In Ontario, this species' range is extensive and covers much of the province. It will usually roost in hollows, crevices, and under loose bark of mature trees. Roosts may be established in the main trunk or a large branch of either living or dead trees. Caves or abandoned mines may be used as hibernacula, but high humidity and stable above freezing temperatures are required (ECCC 2018).	General	Moderate Woodland on the site could provide the suitable roosting habitat required by this species.	Moderate Woodland on the site could provide the suitable roosting habitat required by this species.



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Mammal	Tri-colored bat	Perimyotis subflavus	END	END	END	\$3?	In Ontario, tri-colored bat may roost in foliage, in clumps of old leaves, hanging moss or squirrel nests. They are occasionally found in buildings although there are no records of this in Canada. They typically feed over aquatic areas with an affinity to large-bodied water and will likely roost in close proximity to these. Hibernation sites are found deep within caves or mines in areas of relatively warm temperatures. These bats have strong roost fidelity to their winter hibernation sites and may choose the exact same spot in a cave or mine from year to year (ECCC 2018).	General	Moderate Woodland on the site could provide the suitable roosting habitat required by this species.	Moderate Woodland on the site could provide the suitable roosting habitat required by this species.
Reptile	Blanding's turtle - Great Lakes / St. Lawrence population	Emydoidea blandingii	THR	THR	END	\$3	In Ontario, Blanding's turtle will use a range of aquatic habitats, but favor those with shallow, standing or slow-moving water, rich nutrient levels, organic substrates and abundant aquatic vegetation. They will use rivers, but prefer slow-moving currents and are likely only transients in this type of habitat. This species is known to travel great distances over land in the spring in order to reach nesting sites, which can include dry conifer or mixed forests, partially vegetated fields, and roadsides. Suitable nesting substrates include organic soils, sands, gravel and cobble. They hibernate underwater and infrequently under debris close to water bodies (COSEWIC 2016).	General Category 1 – Nest and area within 30 m or overwintering sites and area within 30 m Category 2 – Wetland complex (i.e. all suitable wetlands or waterbodies within 500 m of each other) that extends up to 2 km from occurrence, and the area within 30 m around those suitable wetlands or waterbodies Category 3 – Area between 30 – 250 m around suitable wetlands/waterbodies identified in category 2, within 2 km of an occurrence	The site lacks the standing or slow-moving water and abundant vegetation required by this species.	The site lacks the standing or slow-moving water and abundant vegetation required by this species.



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Reptile	Eastern ribbonsnake - Great Lakes population	Thamnophis sauritius	SC	SC	SC	S4	In Ontario, eastern ribbonsnake is semi-aquatic, and is rarely found far from shallow ponds, marshes, bogs, streams or swamps bordered by dense vegetation. They prefer sunny locations and bask in low shrub branches. Hibernation occurs in mammal burrows, rock fissures or even ant mounds (COSEWIC 2012).		Low Despite potentially suitable habitat in the site vicinity, the species was last observed in the vicinity of the study area in 1969 and the urbanized environment around the site further reduces likelihood of occurrence.	Low Despite potentially suitable habitat in the site vicinity, the species was last observed in the vicinity of the study area in 1969 and the urbanized environment around the site further reduces likelihood of occurrence.
Reptile	Midland painted turtle	Chrysemys picta marginata	_	_	SC	S4	In Ontario, painted turtles use waterbodies, such as ponds, marshes, lakes and slow-moving creeks, with a soft bottom and abundant basking sites and aquatic vegetation. This species hibernates on the bottom of waterbodies (Ontario Nature 2018).		Low The site lacks slow-moving creeks with soft substrate required by this species.	The site lacks slow-moving creeks with soft substrate required by this species.
Reptile	Milksnake	Lampropeltis triangulum	NAR	SC	SC	S4	In Ontario, milksnake uses a wide range of habitats including prairies, pastures, hayfields, wetlands and various forest types, and is well-known in rural areas where it frequents older buildings. Proximity to water and cover enhances habitat suitability. Hibernation takes place in mammal burrows, hollow logs, gravel or soil banks, and old foundations (COSEWIC 2014).		Moderate The site could provide the forest and proximity to water and hibernation habitat required by this species.	Moderate The site could provide the forest and proximity to water and hibernation habitat required by this species.
Reptile	Northern map turtle	Graptemys geographica	SC	SC	SC	\$3	In Ontario, the northern map turtle prefers large waterbodies with slow-moving currents, soft substrates, and abundant aquatic vegetation. Ideal stretches of shoreline contain suitable basking sites, such as rocks and logs. Along Lakes Erie and Ontario, this species occurs in marsh habitat and undeveloped shorelines. It is also found in small to large rivers with slow to moderate flow. Hibernation takes place in soft substrates under deep water (COSEWIC 2012).		Low The site lacks waterbodies with soft substrates and abundant aquatic vegetation required by this species.	The site lacks waterbodies with soft substrates and abundant aquatic vegetation required by this species.



Taxon	Common Name	Scientific Name	ESA ¹	SARA ²	COSEWIC ³	Provincial (SRank) ⁴	Habitat Requirements ⁵	ESA Habitat Protection Provisions ⁶	Potential to Occur within or near Site 01B	Potential to Occur within or near Site 01D
Reptile	Snapping turtle	Chelydra serpentina	SC	SC	SC	S3	In Ontario, snapping turtle uses a wide range of waterbodies, but shows preference for areas with shallow, slow-moving water, soft substrates and dense aquatic vegetation. Hibernation takes place in soft substrates under water. Nesting sites consist of sand or gravel banks along waterways or roadways (COSEWIC 2008).		Moderate The site may not provide the soft substrate and dense aquatic vegetation preferred by this species, but there have been occurrences of the species in the study area.	Moderate The site may not provide the soft substrate and dense aquatic vegetation preferred by this species, but there have been occurrences of the species in the study area.
Reptile	Stinkpot or Eastern musk turtle	Sternotherus odoratus	SC	THR	SC	S3	In Ontario, eastern musk turtle is very rarely out of water and prefers permanent bodies of water that are shallow and clear, with little or no current and soft substrates with abundant organic materials. Abundant floating and submerged vegetation is preferred. Hibernation occurs in soft substrates under water. Eggs are sometimes laid on open ground, or in shallow nests in decaying vegetation, shallow gravel or rock crevices (COSEWIC 2012).		Low The site lacks waterbodies with little to no flow and abundant aquatic vegetation preferred by this species.	Low The site lacks waterbodies with little to no flow and abundant aquatic vegetation preferred by this species.
Vascular Plant	Butternut	Juglans cinerea	END	END	END	S2?	In Ontario, butternut is found along stream banks, on wooded valley slopes, and in deciduous and mixed forests. It is commonly associated with beech, maple, oak and hickory (Voss and Reznicek 2012). Butternut prefers moist, fertile, well-drained soils, but can also be found in rocky limestone soils. This species is shade intolerant (Farrar 1995).	General (as of June 30, 2013)	Low The site could provide the stream banks, wooded valley slopes and deciduous or mixed forest preferred by this species, but the species was not observed during field investigations.	The site could provide the stream banks, wooded valley slopes and deciduous or mixed forest preferred by this species, but the species was not observed during field investigations.

¹ Endangered Species Act (ESA), 2007 (O.Reg 242/08 last amended 1 April 2021 as O.Reg 228/21). Species at Risk in Ontario List, 2007 (O.Reg 230/08 last amended 1 Aug 2018 as O. Reg 404/18, s. 1.); Schedule 1 (Extirpated - EXP), Schedule 2 (Endangered - END), Schedule 3 (Threatened - THR), Schedule 4 (Special Concern - SC)

⁶ General Habitat Protection is applied when a species is newly listed as endangered or threatened on the SARO list under the ESA, 2007. The definition of general habitat applies to areas that a species currently depends on. These areas may include dens and nests, wetlands, forests and other areas essential for breeding, rearing, feeding, hibernation and migration. General habitat protection will also apply to all listed endangered or threatened species without a species-specific habitat regulation as of June 30, 2013 (ESA 2007, c.6, s.10 (2)). Regulated Habitat is species-specific habitat used as the legal description of that species habitat. Once a species-specific habitat regulation is created, it replaces general habitat protection. Refer to O.Reg 242/08 for full details regarding regulated habitat.



² Species at Risk Act (SARA), 2002. Schedule 1 (Last amended 6 October 2020); Part 1 (Extirpated), Part 2 (Endangered), Part 3 (Threatened), Part 4 (Special Concern)

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

⁴ Global Ranks (GRANK) are Rarity Ranks assigned to a species based on their range-wide status. GRANKS are assigned by a group of consensus of Conservation Data Centres (CDCs), scientific experts and the Nature Conservancy. These ranks are not legal designations. G1 (Extremely Rare), G2 (Very Rare), G3 (Rare to uncommon), G4 (Common), G5 (Very Common), G6 (Very Common), G7 (Unranked), Q (Questionable), T (rank applies to subspecies or variety). Last assessed August 2011

⁵ Provincial Ranks (SRANK) are Rarity Ranks assigned to a species or ecological communities, by the Natural Heritage Information Centre (NHIC). These ranks are not legal designations. SRANKS are evaluated by NHIC on a continual basis and updated lists produced annually. SX (Presumed Extirpated), SH (Possibly Extirpated - Historical), S1 (Critically Imperiled), S2 (Imperiled), S3 (Vulnerable), S4 (Apparently Secure), S5 (Secure), SNA (Not Applicable), S4 (Range Rank), S7 (Not ranked yet), SAB (Breeding Accident), SAN (Non-breeding Accident), SX (Apparently Extirpated). Last assessed November 2017.

⁷ Areas of interest (AOI) are only listed where habitat potential is moderate or high. Remaining AOI can be assumed to have low habitat potential.

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REGION OF PEEL

WASTEWATER CAPACITY IMPROVEMENTS IN CENTRAL MISSISSAUGA

Natural Environment Reports

Preferred Solution



TECHNICAL MEMORANDUM

DATE January 28, 2022 **Project No.** 18112273

TO Chris Campbell, Infrastructure Planning, Partner

GM BluePlan Engineering Limited

FROM Barbara Bleho, Heather Melcher

EMAIL barbara_bleho@golder.com heather_melcher@golder.com

NATURAL FEATURES ASSESSMENT FOR THE CAPACITY EXPANSION OF THE CENTRAL MISSISSAUGA WASTEWATER SYSTEM, REGION OF PEEL, ONTARIO

1.0 INTRODUCTION

Golder Associates Ltd. (Golder), a member of WSP, was retained by GM BluePlan (GMBP) on behalf of the Region of Peel (the Region) to complete a natural environment assessment to accompany a Schedule C Municipal Class Environmental Assessment (EA) for the capacity expansion of the Central Mississauga wastewater system (the Project) in the City of Mississauga, Ontario.

The Project proposes trunk sanitary sewer and ancillary local sewer upgrades to address significant growth forecasted for the Central Mississauga area over the next 20+ years. As such, the Region requires a Schedule C Class EA to assess potential sites for the proposed sanitary sewers. Most of the Project infrastructure will be located below ground and installed using trenchless methods. However, some above-ground disturbance is required at shaft locations, including easements and work compounds required for laydown areas and equipment maneuvering. The shaft locations and associated easements and compounds are collectively referred to as sites in this report. Twelve sites have been identified for the preferred design of the Project (Figure 1). For the purposes of this report, a 120-m area around each site represents the study area for that site. Some sites are close together, so study areas overlap.

The purpose of this report is to characterize existing conditions on the sites and in the study areas, assess potential environmental impacts of the preferred design of the Project on environmental features and functions on the sites and in the study areas, and recommend appropriate mitigation measures to avoid or minimize impacts, where possible.

2.0 POLICY CONTEXT

Various land use and natural environment regulations and policies must be considered as part of the Class EA process to identify potential natural heritage constraints. Identification of significant natural heritage features was determined through the following regulations and policies:

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- Provincial Policy Statement, 2020 (PPS; MMAH 2020a)
- A Place to Grow: Growth Plan for the Greater Golden Horseshoe (MMAH 2020b)
- Greenbelt Plan (Ontario 2017)
- Region of Peel Official Plan (Region of Peel 2021)
- Mississauga Plan and Mississauga Official Plan (City of Mississauga 2003, 2021)
- Parkway Belt West Plan (Ontario 1978)
- O. Reg. 166/06 Toronto and Region Conservation Authority: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses
- O. Reg. 160/06 Credit Valley Conservation: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses
- Endangered Species Act, 2007 (ESA; Ontario 2007)
- Species at Risk Act (SARA; Canada 2002)
- Fisheries Act (Canada 1985)
- Migratory Birds Convention Act, 1994 (MBCA; Canada 1994)
- Fish and Wildlife Conservation Act, 1997 (FWCA; Ontario 1997)

An overview of the above noted legislation and policy documents are discussed in sections 2.1 to 2.8.

2.1 Provincial Policy Statement

The Provincial Policy Statement (PPS) is issued under Section 3 of the Planning Act.

The natural heritage policies of the PPS indicate that:

- 2.1.1 Natural features and areas shall be protected for the long-term.
- 2.1.2 The diversity and connectivity of natural features in an area, and the long-term ecological function and biodiversity of natural heritage systems, should be maintained, restored or, where possible, improved, recognizing linkages between and among natural heritage features and areas, surface water features and ground water features.
- 2.1.3 Natural heritage systems shall be identified in Ecoregions 6E and 7E, recognizing that natural heritage systems will vary in size and form in settlement areas, rural areas, and prime agricultural areas.
- 2.1.4 Development and site alteration shall not be permitted in:
 - a) significant wetlands in Ecoregions 5E, 6E and 7E; and
 - b) significant coastal wetlands.



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- 2.1.5 Unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions, development and site alteration shall not be permitted in:
 - a) significant wetlands in the Canadian Shield north of Ecoregions 5E, 6E and 7E;
 - b) significant woodlands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River);
 - significant valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River);
 - d) significant wildlife habitat;
 - e) significant areas of natural and scientific interest; and
 - f) coastal wetlands in Ecoregions 5E, 6E and 7E that are not subject to policy 2.1.4(b).
- 2.1.6 Development and site alteration shall not be permitted in fish habitat except in accordance with provincial and federal requirements.
- 2.1.7 Development and site alteration shall not be permitted in habitat of endangered species and threatened species, except in accordance with provincial and federal requirements.
- 2.1.8 Development and site alteration shall not be permitted on adjacent lands to the natural heritage features and areas identified in policies 2.1.3, 2.1.4 and 2.1.5 unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions.

2.2 Provincial Plans

2.2.1 A Place to Grow: Growth Plan for the Greater Golden Horseshoe

The Growth Plan for the Greater Golden Horseshoe was issued under the *Places to Grow Act, 2005* (MMAH 2020b). The Growth Plan is intended, in coordination with other provincial plans, to establish a unique land use planning framework for the Greater Golder Horseshoe that supports the achievement of complete communities, a thriving economy, clean and healthy environment and social equity (MMAH 2020b). A Natural Heritage System (NHS) for the Greater Golder Horseshoe has been mapped under the Growth Plan to support planning for the protection of the region's natural heritage and biodiversity. However, the provincial mapping does not apply until it has been implemented in the applicable municipal official plan(s).

The sites are not within the Growth Plan NHS. Outside of the Growth Plan NHS, the municipality protects other natural heritage features consistent with the PPS (MMAH 2020b).

2.2.2 Greenbelt Plan

To regulate land development and focus population growth within the Greater Golden Horseshoe of southern Ontario, the provincial government has established a special land use planning area through all or portions of the municipalities that occupy the west end of Lake Ontario, from the Regional Municipality of Niagara to the Regional Municipality of Durham. This special planning area is known as the Greenbelt Planning Area and land use designations and the various policies that govern proposed development within this area have been established by the Greenbelt Plan (Ontario 2017a). The Greenbelt Plan builds upon the policy foundation of the PPS to



address environmental considerations specific to the target region and takes precedence over the policies of the PPS on lands where the plan applies. The purpose of the Greenbelt Plan is to focus population growth in designated Settlement Areas, to foster continued agriculture in designated Protected Countryside and to ensure on-going protection of natural environment features in the designated natural heritage system (Ontario 2017a).

Etobicoke Creek and its adjacent lands, which overlap Site 1 and Site 2, are within the Urban River Valley designation of the Greenbelt Plan. This designation applies to areas where the Greenbelt occupies river valleys in an urban context. Only publicly owned lands are subject to the policies of the Urban River Valley designation. All existing, expanded, or new infrastructure which receives approval is permitted provided it supports the needs of settlement areas or serves the significant growth expected in southern Ontario and supports the goals of the Greenbelt Plan.

2.3 Municipal Official Plans

The sites are within the municipal jurisdictions of the City of Mississauga (the City) and the Region of Peel (the Region) and are therefore subject to the policies of the official plans (OP) developed by these municipalities. Municipal policies may be more restrictive than provincial plans so long as they do not conflict with the policies of the provincial plans. Where there is conflict between the regional and local OPs, the more restrictive policies apply.

2.3.1 City of Mississauga

The City's NHS is shown on Schedule 3 of the OP (City of Mississauga 2021), which includes Significant Natural Areas and Natural Green Spaces, Special Management Areas, Linkages, and Residential Woodlands. Portions of the Etobicoke Creek and Cooksville Creek valleylands that overlap the western portion of Site 1, the eastern portion of Site 2, and the central portion of Site 8, are mapped as Significant Natural Areas (Figures 3A, 3B, 3G). Development within or adjacent to a Significant Natural Area will not be permitted unless all reasonable alternatives have been considered and any negative impacts minimized. Uses are limited to conservation, flood and/or erosion control, passive recreation, and essential infrastructure. There are no Natural Green Spaces, Special Management Areas, Linkages, and Residential Woodlands overlapping the sites.

2.3.2 Region of Peel

According to Schedule A of the Region's OP (Region of Peel 2021), there are no areas designated as Core Areas of the Greenlands System in Peel overlapping the sites, though there is overlap with the study area for Site 2 (Figure 3A). Development or site alteration in Core Areas of the Greenlands System is generally prohibited, but some exceptions are identified in section 2.3.2.6 of the Region OP. Essential infrastructure is exempted where an environmental assessment has demonstrated potential impacts are adequately mitigated. (Figures 3A-J). Off-site, the northern portion of the study area outside of Site 2 (Figure 3B), and the southern portion of the study area outside of Site 8 (Figure 3G) are mapped as Core Areas of the Greenlands System.

Development and site alteration is prohibited within the Core Areas of the Greenlands System, except for minor development and essential infrastructure that is authorized under an environmental assessment process. In the event portions of the Core Areas are damaged or destroyed, the natural features in the area must be rehabilitated to restore ecological function (Region of Peel 2021).



2.4 Conservation Authorities

Sites 1 - 3 are located within the jurisdiction of the Toronto and Region Conservation Authority (TRCA), while Sites 4 - 12 are located within the jurisdiction of the Credit Valley Conservation (CVC).

Any development or activities proposed within the regulation limit as governed by O. Reg 160/06 CVC and O. Reg. 166/06 TRCA: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses under the *Conservation Authorities Act* (Ontario 1990) may require a permit. According to available mapping (CVC 2021; TRCA 2021), Site 1 and Site 2 are within the TRCA regulated limit associated with Etobicoke Creek, and Site 8 is within the CVC regulated limit associated with Cooksville Creek. Permits from the TRCA and the CVC will be required for the proposed development.

The TRCA's Living City Policies (TRCA 2014) also recommends minimum setbacks for development adjacent to natural features including significant valleys. However, alternative setbacks may also be considered in urbanized areas of the watershed as recommended by appropriate studies (e.g., natural heritage assessment) (TRCA 2014).

2.5 Fisheries Act

The purpose of the *Fisheries Act* (Canada 1985) is to maintain healthy, sustainable and productive Canadian fisheries through the prevention of pollution and the protection of fish and their habitat. All projects undertaking inwater or near-water work must comply with the provisions of the *Fisheries Act*.

All projects where work is being proposed that cannot avoid impacts to fish or fish habitat require a Fisheries and Oceans Canada (DFO) project review (DFO 2019). If it is determined through the DFO review process that the project will result in death of fish or harmful alteration, disruption or destruction (HADD) of fish habitat, an authorization is required under the *Fisheries Act*. This includes projects that have the potential to obstruct fish passage or affect flows.

Proponents of projects requiring a *Fisheries Act* Authorization are required to also submit a Habitat Offsetting Plan, which provides details of how the death of fish and/or HADD of fish habitat will be offset, and outlines associated costs and monitoring commitments. Proponents also have a duty to notify DFO of any unforeseen activities during the project that cause harm to fish or fish habitat, and outline the steps taken to address them.

2.6 Migratory Birds Convention Act

Most birds in Canada are protected by the federal MBCA, which prohibits the disturbance or destruction of migratory birds, their eggs and nests on all lands in Canada from harm and exploitation, even incidentally. The MBCA also prohibits hunting, trafficking, and commercialization of migratory birds, their eggs or nests.

There are currently no permits available to exempt development, such as the Project. Environment and Climate Change Canada (ECCC) advises that proponents schedule activities outside of the migratory bird nesting season to avoid incidental take. Proponents can apply for a damage or danger permit to remove or actively deter migratory birds from structures if it can be clearly demonstrated that the bird activity is causing damage to the structure or poses a health and safety concern for people (e.g., large nesting gull colonies generating waste in public places).



2.7 Fish and Wildlife Conservation Act

The FWCA governs the protection, ownership and possession, sale, trafficking, hunting, trapping and fishing of wildlife. It protects species and their habitats from damage or destruction, outside the context of hunting, trapping, or fishing, including for furbearer dens (occupied or un-occupied); beaver dams or lodges (unless to protect personal property); and the destruction or removal of a bird nest or eggs (some nuisance species are exempt and excludes migratory birds protected by the MBCA).

2.8 Species at Risk

2.8.1 Species at Risk Act

At a federal level, species at risk (SAR) designations for species occurring in Canada are initially determined by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). If approved by the federal Minister of the Environment and Climate Change, species are added to the federal List of Wildlife Species at Risk (Canada 2002).

It is prohibited to kill, harm, harass, capture, possess, collect, buy, sell, or trade individuals, as well as damage or destroy the residence of a species listed as extirpated, endangered or threatened on Schedule 1 of SARA. Furthermore, species that are included on Schedule 1 as extirpated, endangered, or threatened are afforded protection of species-specific critical habitat on federal lands once critical habitat is defined in a recovery strategy. Any alterations to critical habitat on federal lands require a permit under Section 73(3) of SARA.

Although species listed as special concern are not afforded the same degree of legal protection, Section 65 of SARA requires that a management plan be developed that includes measures for the conservation of the species and their habitats, and it is expected that federal landowners will implement these measures on their lands.

On private or provincially-owned lands, only migratory birds and aquatic species listed as endangered, threatened, or extirpated are protected under SARA, and critical habitat protection on non-federal lands is afforded only to aquatic species, unless ordered by the Governor in Council.

2.8.2 Endangered Species Act

SAR designations for species in Ontario are initially determined by the Committee on the Status of Species at Risk in Ontario (COSSARO). If approved by the provincial Minister of Environment, Conservation and Parks, species are added to the ESA.

Subsection 9(1) of the ESA prohibits the killing, harming, or harassing of species identified as 'endangered' or 'threatened' in the various schedules to the Act. Subsection 10(1) (a) of the ESA states that "No person shall damage or destroy the habitat of a species that is listed on the Species at Risk in Ontario (SARO) list as an endangered or threatened species". As of June 30, 2008, the SARO list is contained in Ontario Regulation (O. Reg.) 230/08.

The ESA also provides general habitat protection to all species listed as threatened or endangered under the Act. Species-specific habitat protection is only afforded to those species for which a habitat regulation has been prepared and passed into law as a regulation of the ESA. The ESA has a permitting process to allow alterations to the habitats of protected species. In addition, the ESA allows for a registration approach for projects meeting specific conditions.



3.0 DESCRIPTION OF THE PROPOSED DEVELOPMENT

The preferred Project alignments, supporting shaft locations, and associated easements and work compounds are shown on Figure 1. The preferred alignments have been refined to four subsections: Etobicoke Creek (Sherway Drive to Queensway East); Queensway (Etobicoke Creek to Hurontario); Cawthra Road (Queensway East to Dundas Street East); and Burnhamthorpe (Cawthra Road to Central Parkway). The preferred alignments will be primarily constructed by tunnel boring machine (TBM) at a depth of between 8 m and 20 m below grade and within the municipal rights-of-way. Open cut construction will be used for connections to existing sewers at Cooksville Creek, Cliff Road, Hensall Street, Tedlo Street, and Dixie Road. There is also a small (approximately 60 m) section of open cut alignment proposed through Etobicoke Creek. The Cooksville Creek crossing will be via tunnelling.

4.0 METHODS

4.1 Background Review

The investigation of existing conditions in each study area included a background information search and literature review to gather data about the local area and provide context for the evaluation of the natural features. A number of resources were used, including:

- Natural Heritage Information Centre (NHIC) database, maintained by the Ministry of Northern Development,
 Mines, Natural Resources and Forestry (MNDMNRF) (NHIC 2021)
- Land Information Ontario (LIO) geospatial data (MNDMNRF 2021a)
- Species at Risk Public Registry (ECCC 2021a)
- Species at Risk in Ontario (SARO) List (MECP 2021)
- Breeding Bird Atlas of Ontario (OBBA) (Cadman et al. 2007)
- Atlas of the Mammals of Ontario (Dobbyn 1994)
- Ontario Reptile and Amphibian Atlas (Ontario Nature 2021)
- Bat Conservation International (BCI) range maps (BCI 2021)
- Ontario Butterfly Atlas (Jones et al. 2021)
- eBird species maps (eBird 2021)
- iNaturalist occurrence maps (iNaturalist 2021)
- MNDMNRF LIO Aquatic Resources Area Layer (MNDMNRF 2021b)
- MNDMNRF Fish On-Line (MNDMNRF 2021c)
- DFO Aquatic SAR Maps (DFO 2021a)
- Vascular Plants at Risk in Ontario (Leslie 2018)
- Region of Peel Official Plan (Region of Peel 2021)



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- Mississauga Plan and Mississauga Official Plan (City of Mississauga 2003, 2021)
- Parkway Belt West Plan (Ontario 1978)
- York, Peel, Durham, Toronto and The Conservation Authorities Moraine Coalition (YPDT-CAMC) Groundwater Program database (YPDT-CAMC 2019)
- Watershed reports (TRCA 2006a,b; CVC 2011; Aguafor Beech 2012)
- Existing aerial photography

To develop an understanding of the ecological communities, wildlife habitat and potential natural heritage features in each study area, MNDMNRF LIO data were used to create base layer mapping for the study area. A geographic query of the NHIC database was conducted to identify element occurrences of any natural heritage features, including wetlands, ANSI, rare plant communities, provincially rare species (ranked S1-S3 by the NHIC) and other natural heritage features within 1 km of each site.

4.2 Species at Risk Screening

Species at risk considered for this report include those species listed in the ESA and SARA. An assessment was conducted to determine which SAR had potential habitat in each study area. A screening of all SAR which have the potential to be found in the vicinity of the study area was conducted first as a desktop exercise using the sources listed in Section 4.1. Species with ranges overlapping the study area, or recent occurrence records in the vicinity, were screened by comparing their habitat requirements to habitat conditions in the study area.

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

Searches were conducted during all field surveys for suitable habitats and signs of all SAR identified through the desktop screening. If the potential for the species to occur in the study area was moderate or high, the screening was refined based on the results of the field surveys. Any habitat identified during the field surveys with potential to provide suitable conditions for additional SAR not already identified through the desktop screening was also assessed and recorded. All probability ratings were updated based on the results of the field surveys.

4.3 Field Surveys

The habitats and communities on or in the vicinity of the sites were characterized through field surveys. Survey intensity was focused on those sites where sensitive natural heritage features or designated natural areas were identified through desktop assessment (i.e., Sites 1, 2, and 8). During all surveys, area searches were conducted and additional incidental wildlife, plant, and habitat observations were recorded. Searches were also conducted to document the presence or absence of suitable habitat, based on habitat preferences, for those species identified in the desktop SAR screening described above. The dates when field surveys were conducted are provided in Table 1. The following sections outline the methods used for each of the field surveys.



Table 1: Summary of Field Surveys Conducted for the Project

Date	Type of Survey	Sites
October 4, 2019	Field Reconnaissance	Sites 1, 2, 8
April 29, 2020	Bat Habitat Assessment, Amphibian Call Count (ACC) Survey, General Wildlife Survey	Sites 1, 2, 8 ^a
June 11, 2020	Breeding Bird Survey (BBS), General Wildlife Survey	Sites 1, 2, 8
June 30, 2020	BBS, General Wildlife Survey	Sites 1, 2, 8
October 14-15, 2020	Ecological Land Classification (ELC), Botanical Inventory, General Wildlife Survey	All sites ^b
November 5-6, 2020	Fish Habitat Assessment and Community Sampling	Sites 1, 2, 8

^a ACC survey completed at Site 1 only.

4.3.1 Field Reconnaissance

A field reconnaissance was completed by two Golder biologists on October 4, 2019 to confirm existing conditions at short-listed Project alternatives (potential shaft locations) that overlapped or were adjacent to sensitive natural features. Sites 1, 2, and 8 were included in the short list of alternatives.

Surveyors walked through each potential shaft location (area of interest) where access was available, documenting general conditions and confirming presence of sensitive natural features identified through an initial desktop assessment (Golder 2019). Where access was unavailable, surveyors scanned the area from a vantage point, using binoculars if necessary. Searches were also conducted to document the presence or absence of suitable habitat for those species identified in the desktop SAR screening completed as part of the initial desktop assessment (Golder 2019).

The field reconnaissance also served to inform the need for further (targeted) survey work for the preferred design.

4.3.2 Ecological Land Classification and Botanical Inventory

Land cover was mapped in each study area using the Ecological Land Classification (ELC) system for southern Ontario (Lee et al. 1998), first at a desktop level using high-resolution aerial imagery, then confirmed in the field (where accessible). Detailed inventories to determine plant communities were undertaken in the study areas for Sites 1, 2, and 8 where natural vegetation was present. These inventories were carried out by systematically traversing each site for a thorough survey of species and communities. Information on plant community structure and composition was recorded to better define and refine the plant community polygons.

The spatial extent of in-field land cover confirmation or detailed inventory (ELC) in each study area is shown on Figures 2A-C. Discrepancies between survey area and site/study area boundaries result from refinements to proposed infrastructure locations over the course of Project planning.



b Land cover was confirmed at all sites, but detailed inventory to determine plant community was only completed at Sites 1, 2, and 8.

Botanical inventories were conducted at sites 1, 2, and 8 where natural vegetation was present. The searches were conducted by systematically walking through habitats in a meandering fashion, generally paralleling the principal (long) axis of a natural area, where feasible, and examining the full width of the area. Lists of all plant species identified during the botanical inventories were compiled.

4.3.3 Amphibian Call Count Survey

An amphibian (frog and toad) call count survey was conducted on April 29, 2020 at one station at a mapped unevaluated wetland adjacent to Etobicoke Creek, approximately 40 m north of Site 1 within the study area (Figure 2A). The survey followed protocols from the Marsh Monitoring Program for vocalizing frog surveys (BSC 2008). The station consisted of a semi-circle with a 100 m radius from the centre point (where the observer stands). The survey was three minutes in duration. Any frogs and toads seen or heard were noted on a digital datasheet. Frogs and toads heard or seen outside of the 100 m radius were also noted, including estimated distance (where possible).

This method involves collection of call data from fixed stations over three survey periods during the spring and early summer (April to June in southern Ontario), with an interval of at least 15 days between surveys. Surveys begin one half-hour after sunset and ended by midnight during evenings with appropriate weather conditions (i.e., little wind and a minimum air temperature of 5°C, 10°C, and 17°C for each respective survey period). However, during the spring survey conducted on April 29, 2020, it was noted that the area mapped as wetland was an overflow channel that was nearly dry and had no aquatic vegetation. No suitable habitat for amphibians was observed, and it was determined that there was no need to conduct further surveys.

4.3.4 Breeding Bird Surveys

Breeding bird point count surveys were conducted at four stations: two stations adjacent to Etobicoke Creek in the study areas for Sites 1 and 2 (Figure 2A) and two stations adjacent to Cooksville Creek in the study area for Site 8 (Figure 2B). Surveys followed protocols from the Canadian Breeding Bird Survey (Downes and Collins 2003) and the OBBA (Cadman et al. 2007). Point count stations were established in representative habitats and were spaced at minimum 250 m apart. Surveys were conducted between 30 minutes before sunrise and 10:00 am to encompass the period of maximum bird song.

Each station consisted of a circle with a 100 m radius from the centre point (where the observer stands), and each point count was 10 minutes in duration, and was separated into survey windows of 0-3, 3-5, and 5-10 minutes. All birds seen or heard were noted on pre-printed datasheets and observations were made regarding sex, age and notable behaviour, when possible. Birds heard or seen outside of the 100 m radius were also noted using methods from the OBBA, including estimated distance (where possible). Each station was visited twice, on June 11 and June 30, 2020.

4.3.5 Bat Habitat Assessment

An assessment of potential suitable maternity roost habitat for tree-roosting bats was conducted on April 29, 2020 in the forests along the east side of Etobicoke Creek within the study areas for Sites 1 and 2, and along Cooksville Creek within the study area for Site 8. Treed communities were surveyed for large-diameter (i.e., diameter at breast height [DBH] >25 cm) snags or cavity trees with potential to function as bat maternity roosts. Both areas were also investigated for potential maternity roost features (e.g., rock piles) for eastern small-footed myotis (*Myotis leibii*), designated endangered under the ESA.



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4.3.6 General Wildlife Survey and Habitat Assessment

General wildlife surveys included track and sign surveys, area searches, and incidental observations, concurrent with other field surveys. The full range of habitats were searched, with special attention paid to edge habitats and other areas where mammals might be active. Areas of exposed substrate such as sand or mud were located and examined for any visible tracks. When encountered, tracks and other signs (e.g., tracks, scats, hair, tree scrapes) were identified to a species, if possible, and recorded. All suitable habitats for reptiles were searched (e.g., flipping logs and other types of cover objects, observations in piles of rocks) where access was available, and all reptiles and amphibians observed were identified and recorded. Observations of wildlife species or signs were recorded during all field surveys.

4.3.7 Fish Habitat Assessment and Community Sampling

4.3.7.1 Fish Habitat Assessment

Detailed fish habitat assessments of Cooksville Creek and Etobicoke Creek were completed on November 4-5, 2021 to document the presence and quality of fish habitat within the study areas for Sites 1, 2, and 8 (Figures 2A, 2B). At Etobicoke Creek, the assessment was conducted over 500 m upstream and 350 m downstream of the proposed crossing (Figure 2B). At Cooksville Creek, the assessment was conducted over 150 m upstream and 200 m downstream of the proposed crossing (Figure 2C). The assessments were completed by walking along the length of the assessed reach to determine habitat morphology and watercourse characteristics. The surveyed reaches of Etobicoke Creek and Cooksville Creek were characterized according to watercourse size, type, flow regime, and presence of tributaries and downstream receptors. The channel within each surveyed reach was classified into habitat morphology types (e.g., riffle, run, pool; modified from O'Neil and Hildebrand 1986). At regular intervals along the length of the surveyed reach, the channel and the following parameters were measured, collected, or visually assessed:

- Description of watercourse patterns and confinement, channel form, stage and turbulence.
- Bankfull width and depth, wetted width and depth, and channel length.
- Substrate composition as a percentage of total area within each habitat unit using the Modified Wentworth Scale (Wentworth 1922) (e.g., organics, clay, silt, sand, gravel, cobble, boulders, and bedrock).
- Bank shape was visually assessed as sloping, vertical or undercut.
- Bank stability was visually assessed as protected (i.e., stable), vulnerable (i.e., potentially unstable), eroding (i.e., active erosion of bank), or depositional (i.e., active deposits on the bank).
- Availability of instream cover was visually assessed as overhanging vegetation (i.e., riparian vegetation), substrate, depth/turbulence, aquatic vegetation, undercut banks, and woody debris as a percentage of total area within each habitat unit.
- Type and amount of overhead cover and riparian vegetation composition was recorded within each habitat unit.
- Presence of fish passage barriers (the type, height, and permanency of the barrier were documented).
- Evidence of sensitive features present (e.g., watercress, groundwater seepage/springs, or iron staining) were documented.



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- Description of pollution point sources and/or existing infrastructure present were documented.
- Habitat mapping depicting flow direction, tributaries/side channels, islands, beaver dams, and key habitat or features that would affect stream habitat availability or potential fish use.
- Description of fish habitat potential in each watercourse for each critical life history stage: spawning areas (i.e., areas where fish reproduce and lay eggs), rearing (i.e., areas where juvenile fish find food and shelter), and overwintering habitat (i.e., areas with sufficient depth [i.e., greater than 1 m] and dissolved oxygen levels for fish to overwinter) and migratory potential were noted.
- In-situ water quality parameters including temperature, pH, and electrical conductivity.
- Supporting and environmental information (e.g., weather conditions, such as air temperature, wind direction, precipitation type, and percent cloud cover) and access notes.
- Representative photographs were taken along the surveyed reach and included sensitive features, pollution point sources, upstream, downstream, right and left downstream banks, and substrate at each habitat unit.
- Location in Universal Transverse Mercator (UTM) coordinates, North American Datum (NAD) 83.

4.3.7.2 Fish Community Sampling

Fish sampling was completed under a Licence to Collect Fish for Scientific Purposes from the Ministry of Natural Resources and Forestry (MNRF; now MNDMNRF) (Licence number 1096419). The fish sampling complied with the conditions of the licence, and the mandatory post-survey reporting of field data results were completed as per conditions of the licence, and submitted to the MNRF on 14 December 2020.

Fish presence in watercourses was documented through sampling with a backpack electrofisher (Smith Root LR-24), and baited gee minnow traps. Captured fish species were identified to species, measured (either fork length or total length, to the nearest millimetre [mm]), and external conditions were documented (e.g., presence of external deformities, lesions, parasites). Fish were released near their capture locations. Observed fish were enumerated and identified to species and approximate length classes, if possible.

The following specific information was recorded for each fishing effort:

- sample date, time, weather conditions
- in-situ water quality parameters including temperature, pH, and electrical conductivity
- sampling location and area sampled
- sampling effort/time of net sets and retrievals
- number of fish captured, species, methods, timing, fish morphology and external health characteristics

4.3.7.3 Aquatic Invertebrates

An assessment of aquatic invertebrate habitat was completed in conjunction with the fish habitat assessment of Cooksville Creek and Etobicoke Creek on November 4-5, 2021. At Cooksville Creek, the assessment was conducted over 150 m upstream and 200 m downstream of the proposed crossing. At Etobicoke Creek, the assessment was conducted over 500 m upstream and 350 m downstream of the proposed crossing. The assessments were completed by walking along the length of the assessed reach to determine habitat morphology



and watercourse characteristics. The channel within the assessed reach was classified into habitat morphology types (e.g., riffle, run, pool etc.) (modified from O'Neil and Hildebrand 1986), at regular intervals along the length of the survey area the channel and the following parameters were measured, collected, or visually assessed:

- Description of aquatic habitat potential in each watercourse for invertebrate taxa groups with potential to be present based on review of watershed reporting data (TRCA 2006a,b; CVC 2011; Aquafor Beech 2012).
- Aquatic invertebrate observations.
- Bankfull width and depth, wetted width and depth, and channel length.
- Substrate composition as a percentage of total area within each habitat unit using the Modified Wentworth Scale (Wentworth 1922) (e.g., organics, clay, silt, sand, gravel, cobble, boulders, and bedrock).
- In-situ water quality parameters including temperature, pH, and electrical conductivity.
- Supporting and environmental information (e.g., weather conditions, such as air temperature, wind direction, precipitation type, and percent cloud cover) and access notes.
- Representative photographs taken along the surveyed reach and included sensitive features, pollution point sources, upstream, downstream, right and left downstream banks, and substrate at each habitat unit.
- Location in Universal Transverse Mercator (UTM) coordinates, North American Datum (NAD) 83.

Aquatic invertebrate community sampling was not conducted during the November 2020 fish habitat assessment and community sampling.

5.0 EXISTING CONDITIONS

5.1 Regional Context

The Project is located in Ecoregion 7E (Lake Erie – Lake Ontario), which covers just over 2% of extreme southern Ontario. This region is underlain by bedrock of limestone, and is generally flat in topography, with the exception of the Niagara Escarpment. Soils are primarily calcareous mineral-based and dominated by Gray Brown Luvisols and Gleysols. Ecoregion 7E is within the Deciduous Forest Region (Rowe 1972) and has a high diversity of flora and fauna. The majority of the region is covered by cropland or pasture (78%), with 7% of the ecoregion developed. The remaining 15% is covered by forest and water (Crins et al. 2009).

Sites 1 – 3 are located in the Lower Etobicoke subwatershed of the Etobicoke Creek watershed. The Lower Etobicoke subwatershed drains an area of approximately 17 km² and outlets to Lake Ontario. Natural cover is relatively high within an urban area at 56%, and includes forest (47%), meadow (7%) and wetland (1%) (TRCA 2021).

Sites 4 – 12 are located in the Cooksville Creek subwatershed of the Credit River watershed. The Cooksville Creek subwatershed drains an area of approximately 34 km² and outlets to Lake Ontario. Over 90% of the land use distribution in the subwatershed is urban, including residential and industrial/commercial uses. Natural land uses cover 9.6% of the subwatershed, including successional (7.2%), forest (2.2%), wetland (0.2%), and aquatic (0.02%) (CVC 2011).



5.2 Surface Water Resources

Cooksville Creek is a short 34 km² watercourse that flows within the Great Lakes Basin and is a tributary of Lake Ontario. Cooksville Creek begins near Matheson Boulevard West and Hurontario Street, in the City of Mississauga and flows south under Highway 403 (approximately 3 km downstream) and the Queen Elizabeth Way (QEW) (approximately 9 km downstream). Cooksville Creek continues south, draining into Lake Ontario approximately 15 km downstream of its origin (Aquafor Beech 2012).

Etobicoke Creek drains an area of approximately 212 km² and flows within the Great Lakes Basin and is a tributary of Lake Ontario. Etobicoke Creek and its tributaries begin on the Oak Ridges Moraine in the southwest portion of Caledon in the area of Old School Road and Mississauga Road, in the municipality of Peel and flows south through Brampton and Mississauga, along the west side of Lester B Pearson International Airport, approximately 23 km downstream. Etobicoke Creek continues south under Highway 401 (approximately 28 km downstream) and the QEW (approximately 39 km downstream), draining into Lake Ontario approximately 42 km downstream of its origin (TRCA 2006). Etobicoke Creek contains approximately 273 km of watercourses from the headwaters to the confluence with Lake Ontario.

5.3 Fish and Fish Habitat

5.3.1 Fish Habitat

5.3.1.1 Cooksville Creek

Cooksville Creek is classified as a permanent warmwater watercourse that drains south into Lake Ontario approximately 4.0 km downstream of the study area. Within the assessed reach of Cooksville Creek, the watercourse had low flow, a straight confined channel morphology and predominately flat habitat with some riffle sections. The banks were steep and re-enforced with rip-rap throughout the assessed reach. A detailed summary of the fish habitat results for the assessed reach is presented in Appendix A, Table 1, and a Photo Log is provided in Appendix B.

Site 8 is within a 10 m long low quality flat (Appendix B, Photo 13 to 16). Average bankfull width and depth were 7.6 m and 0.7 m, respectively. Wetted width averaged 6.2 m, and water depth averaged 0.3 m. Instream substrate consisted of silt, cobble, sand, and gravel. Instream and overhead cover were low and were provided by floating macrophytes and some overhanging vegetation. The riparian vegetation was primarily grasses with some shrubs. The right and left downstream banks were steep, with a slope of 90%. The right and left downstream bank were comprised predominately of rip-rap with some fines. At the time of the field survey, water temperature was 10.8°C, and dissolved oxygen (DO) and pH measured within the CCME CWQG for the protection of aquatic life (i.e., DO = 5.5 to 9.5 mg/L and pH = 6.5 to 9.0) (Appendix A, Table 1) and Ontario Provincial Water Quality Objectives (PWQO) (i.e., DO = 4.0 to 8.0 and pH = 6.5 to 8.5).

Upstream of the crossing, the surveyed reach consisted primarily of flat habitat with one large area of riffle habitat (i.e., approximately 47% of the upstream reach) (Appendix B, Photos 1 to 12). The flat habitats were of low to moderate quality habitat with mean bankfull widths and depths of 9.5 m and 0.6 m, respectively. Wetted width averaged 7.8 m and water depth average 0.1 m. Instream and overhead cover were provided by floating macrophytes, some overhanging vegetation and woody debris. The most upstream flat banks had moderate stability, were moderately sloped and comprised of fines and cobble whereas the downstream banks had high stability, were steep and re-enforced with rip-rap. The riffle habitat had an average bankfull width of 8.5 m and bankfull depth of 0.7 m. Average wetted widths and depths were 5.5 m and <0.1 m, respectively. Floating



macrophytes, and some overhanging vegetation and woody debris provided instream cover for fish. The right and left downstream banks had low bank stability, were moderately sloped, and comprised of primarily fines with some cobble. Throughout the surveyed upstream reach, the riparian vegetation was primarily grasses, with some shrubs and trees.

Downstream of the crossing, the surveyed reach consisted primarily flat habitat with one small riffle area (i.e., 5% of the downstream reach) (Appendix B, Photos 17 to 40). The flat habitats were of low to moderate quality habitat with mean bankfull widths of 8.4 m and bankfull depths of 1.1 m. Average wetted widths and depths were 6.5 m and 0.6 m, respectively. Substrate was predominately silt with some sand, cobble, gravel and scattered boulders. Moderate instream cover for fish was provided by floating macrophytes, depth, woody debris, and overhanging vegetation. The riffle habitat had an average bankfull width of 6.5 m and bankfull depth of 0.4 m. Average wetted widths and depths were 5.5 m and 0.1 m, respectively. Instream cover for fish was provided by floating macrophytes. Substrate was predominately cobble with some gravel and sand. Throughout the downstream reach, the right and left downstream banks were steep (i.e., slope of 60 to 90%) and were re-enforced with rip-rap providing moderate to high bank stability. The surrounding riparian vegetation was primarily grasses with some shrubs.

5.3.1.2 Etobicoke Creek

Etobicoke Creek is classified as a permanent warmwater watercourse that drains south into Lake Ontario approximately 4.5 km downstream of the study area. Within the assessed reach of Etobicoke Creek, the watercourse had low flow, a winding confined channel morphology. A detailed summary of the fish habitat results for the assessed reach is presented in Appendix A, Table 2, and a Photo Log is provided in Appendix C. One area of point source pollution was observed, a drain near the Queensway, approximately 220 m downstream from Site 1 (Appendix C, Photo 17).

The proposed crossing, Site 1, is 78 m long rapid habitat. Average wetted width and depth were 5.5 m and 0.3 m, respectively. In stream substrate consisted primarily of cobble and boulders with some gravel and sand. Low instream cover for fish was provided by substrate and floating macrophytes. The riparian vegetation was primarily composed of grasses with some trees on the right downstream bank. Both banks had moderate stability and were comprised of cobble, fines, and boulder. The left downstream bank had a moderate slope (i.e., 30%) whereas the right downstream bank was quite steep (i.e., 90%). At the time of the field survey, water temperature was 10.0°C, DO and pH were within the CCME CWQG for the protection of aquatic life (i.e., DO = 5.5 to 9.5 mg/L and pH = 6.5 to 9.0) (Appendix A, Table 2) and PWQO (i.e., DO = 4.0 to 8.0 and pH = 6.5 to 8.5).

Upstream of the crossing, the surveyed reach had alternating run/riffle/flat habitat (Appendix C, Photos 34 to 59). The run habitat was of moderate quality habitat with average bankfull widths of 17.2 m and average bankfull depths of 1.4 m. Average wetted width and depths were 5.2 m and 0.8 m, respectively. Substrate was predominately fines with cobble, boulder and gravel. Instream cover for fish was provided by floating macrophytes, depth, substrate, and woody debris. The riffle habitats had average bankfull widths and depths of 14.9 m and 0.6 m, respectively. Wetted width averaged 6.8 m and wetted depth averaged 0.2 m. Substrate was predominately cobble and boulder with gravel and sand. Instream cover for fish was provided by floating macrophytes and substrate. The flat habitats were of low to moderate quality with average bankfull widths of 16.0 m and average bankfull depths of 1.1 m. Average wetted widths and depths were 9.5 m and 0.6 m, respectively. Instream substrate varied between the flats. The most upstream flat was predominately bedrock with some fines, whereas the more downstream flat was primarily fines and gravel with some cobble. Moderate instream and



overhead cover were provided by overhanging vegetation, woody debris, floating macrophytes, and depth. Along the right downstream bank approximately 335 m upstream of Site 1, the tributary of Little Etobicoke Creek connected with Etobicoke Creek (Appendix C, Photo 51). The surrounding riparian habitat throughout the upstream reach consisted primarily of grasses with some trees and shrubs. The right and left downstream bank had moderate steepness, moderate to high stability, and consisted of cobble, boulder, fines and some gravel.

The downstream reach consisted of alternating flat and run habitat sequence, with an area of a pool and riffle habitat (Appendix C. Photos 1 to 33). The downstream run habitat was of high quality habitat, with an average bankfull width of 24.2 m and average bankfull depth of 1.0 m. Wetted width and depth averaged 7.7 m and 0.4 m, respectively. Instream substrate was predominately cobble and gravel with some boulder sand. Instream cover for fish was provided by an abundance of floating macrophytes, depth, woody debris and substrate. The flat habitats were of moderate to high quality habitat, with an average bankfull width of 12.4 m and average bankfull depth of 1.4 m. Wetted width and depth averaged 8.4 m and 0.9 m, respectively. Instream substrate was predominately cobble, gravel, and organic with some sand and boulder. Instream cover for fish was provided by floating and submerged macrophytes, substrate, woody debris, and depth. Immediately downstream of the rapids at Site 1, there was a small moderate quality pool (i.e., approximately 15 m in length), bankfull width and depth averaged 18.0 m and 1.3 m, respectively. The wetted width averaged 10.0 m and the wetted depth averaged 0.7 m. Instream substrate was primarily fines, with some coarser substrates (i.e., gravel, cobble, sand, and boulder). Moderate instream cover for fish was provided by floating macrophytes, depth, and woody debris. The riffle habitat had an average bankfull width and depth of 17.2 m and 0.7 m, respectively. Wetted width averaged 6.0 m and wetted depth averaged 0.2 m. Substrate consisted of primarily of cobble and gravel with boulder and some sand. Moderate instream cover was provided by floating macrophytes and substrate. The surrounding riparian vegetation throughout the downstream reach consisted primarily of grasses with shrubs and trees. The right and left downstream banks consisted primarily of sand and fines, with cobble, gravel, and some boulder. The banks had moderate to high stability throughout. The left downstream bank had moderate height and slope compared to the right downstream bank which was quite high and steep (i.e., height >1.0 m, 90 to 90% slope), And had evidence of slumping in the downstream end.

5.3.2 Fish Community

5.3.2.1 Cooksville Creek

The fish communities of Cooksville Creek and Etobicoke Creek consist of a variety of native/introduced sport, forage and bait fish species (Appendix A, Table 3). Cooksville Creek provides warmwater habitat for two sport fish, brown trout (*Salmo trutta*) and rainbow trout (*Oncorhynchus mykiss*). Fish surveys were completed in November 2020 using backpack electrofishing and minnow traps. No fish were captured at Cooksville Creek during 987 seconds of electrofishing effort over a 350 m section and seven baited minnow traps set for 23.9 traphours. No fish observations were documented.

There were no fish barriers in the assessed reach of Cooksville Creek and the reach provided low suitable spawning, rearing/nursery, and overwintering habitat for salmonid and trout species due to the limited riffle habitats and the predominately silt and sand substrate. Suitable potential for spawning, rearing and foraging habitat for suckers, forage and bait fish species was found throughout the assessed reach. Water depth in some of the pool habitat would provide summer temperature refuge habitat (i.e., 0.7 to 1.0 m) but was limited in depth to provide suitable overwintering habitat (i.e., >2 m).



5.3.2.2 Etobicoke Creek

Etobicoke Creek provides habitat for numerous sport fish, including brook trout (*Salvelinus fontinalis*), brown bullhead (*Ameiurus nebulosus*), coho salmon (*Oncorhynchus kisutch*), rock bass (*Ambloplites rupestris*), round Whitefish (*Prosopium cylindraceum*), smallmouth bass (*Micropterus dolomieu*), walleye (*Sander vitreus*), white perch (*Morone americana*), and yellow perch (*Perca flavescens*). Historical records documented American eel (*Anguilla rostrata*) designated endangered under the ESA and redside dace (*Clinostomus elongatus*) designated endangered under the ESA and SARA, in Lower Etobicoke Creek (TRCA 2006a). However, redside dace has not been documented in the Etobicoke Creek watershed since 1950 and there is no known redside dace habitat within the study area (MECP 2021, pers. comm.). American Eel has been observed in Etobicoke Creek within the last six years and therefore the study area within Etobicoke Creek has the potential to support American eel (MECP 2021, pers. comm.).

During the fish survey, a total of 41 fish were captured at Etobicoke Creek during 1436 seconds of electrofishing over 900 m area (Appendix A, Table 3). No fish were captured in the four baited minnow traps set for 14.6 traphours. A dead Salmonid carcass was observed near the rapid and run habitat at the upstream end of Site 1 (Appendix C, Photo 38). All fish captured were of native/introduced origin and are common of S5 provincial ranking or higher (Eakins 2018). No SAR or invasive species were captured or observed during the field program. All fish captured were live released immediately downstream of the capture location. No health abnormalities/conditions were observed.

There were two potentially seasonal fish barriers observed immediately upstream of Site 1, both were rock dams measuring approximately 0.5 m in height. The assessed reach of Etobicoke Creek provided suitable water depth and connectivity to Lake Ontario and other tributaries to provide moderate potential for migratory habitat for all fish species (e.g., salmonids and suckers). The surveyed reach provided moderately suitable spawning and rearing/nursey habitat for salmonids and suckers species, through the presence of suitable riffle habitat with coarse substrate and flow. The run, pool and flat habitat had suitable depth, substrate, and instream cover to support refugia and rearing/nursey habitat for a variety of fish species. Potential for spawning, rearing and foraging habitat for forage and bait fish species was found throughout the assessed reach. Water depth in some of the flat and pool habitat would provide summer temperature refuge habitat as well, had suitable depth to provide overwintering habitat (i.e., depths >1 m).

5.4 Aquatic Invertebrates

5.4.1.1 Cooksville Creek

According to the 2011 CVC study, aquatic invertebrate communities in Cooksville Creek demonstrated a level of degradation. Three stations had highly impacted aquatic invertebrate communities, which was evident from the low diversity, absence of pollution-intolerant species (i.e., stoneflies [*Plecoptera*], mayflies [*Ephemeroptera*], and caddisflies [*Tricoptera*]) and a dominance of pollution-tolerant species (i.e., worms [*Lumbricina*], sow bugs [*Oniscidea*], and midges [*Chironomidae*]). The remaining stations were ranked as moderately impacted based on various aquatic invertebrate community indices. The impaired aquatic communities in Cooksville Creek likely result from unstable flows, degraded habitat quality, and poor water quality from unmanaged stormwater, salt, water temperatures, chemical and contaminant pollutants (CVC 2011; Aquafor 2012).

The surveyed reach of Cooksville Creek consisted primarily of low to moderate quality flat habitat and two areas of riffle habitat (i.e., 84% of the surveyed area was flat habitat and 16% comprised of riffle habitat; Section 5.3.1.1). The areas of higher proportions of silt and lower proportions of sand within the flat habitats would



provide suitable depositional habitat for Chironomids, and other pollution-tolerant burrowing species. The riffle habitats contained coarse substrates, flow, and depths that would provide suitable erosional habitat for stoneflies, mayflies, and caddisflies. The flat habitats were predominately comprised of silt, with some sand, gravel, and cobble. Vegetational habitats were limited to some areas in the downstream reach, where instream macrophytes and vegetations were in higher proportions (i.e., ≥20%) to support vegetation associated all aquatic invertebrates. Based on the habitats within the surveyed reach, potential depositional habitats were in highest proportion of the habitat types for aquatic invertebrates in Cooksville Creek. No aquatic invertebrates and or freshwater mussels were observed within the surveyed reach.

5.4.1.2 Etobicoke Creek

In the 2006 TRCA Report Card, aquatic invertebrate communities in Etobicoke Creek were ranked as fair. The ranking system considered fair if 60% to 69% of the indicators were within targets. The monitoring program carried out in 2004 showed that 14 out of the 19 monitoring stations (i.e., 74%) had evidence of a healthy invertebrate communities and were ranked as "fair" or "better" (TRCA 2006b). However, in another TRCA report, aquatic invertebrate communities were ranked as potentially impaired over three years for almost all sites located in the Lower Etobicoke Creek watershed (TRCA 2006a). In 2001 to 2003, five stations were sampled throughout the Lower Etobicoke Creek watershed, all stations for each year were ranked as potentially impaired, with the exception of one station in 2001 which was ranked as unimpaired. A potentially impaired ranking indicates that five or more indices (e.g., number of taxa) were calculated outside of the unimpaired criteria limits. The likely factors to this impairment in Etobicoke Creek are poor water quality from the pollution of chemicals and contaminants released into the watercourse and limited substrate diversity due to problems with overall hydrology (TRCA 2006a).

The surveyed reach of Etobicoke Creek had alternating run/riffle/flat habitat with a large rapid and small pool habitat (Section 5.3.1.2). The riffle and rapid habitats had suitable coarse substrates, flow, and depths that would provide erosional habitat for substratum associated aquatic invertebrates. The pool and flat habitats had varying proportions of organics, fines, and coarser substrates. The areas of the pool and flat habitats with greater proportions of organics and fines than sand would provide suitable depositional habitat for burrowing aquatic invertebrates. Vegetational habitats were limited to the three most downstream habitats surveyed, where the proportions of instream vegetation were suitable for these aquatic communities (i.e., ≥20%). The variability in aquatic community habitat types observed within Etobicoke Creek during the field surveys are similar to those results from the previous TRCA reports (TRCA 2006 a,b). No aquatic invertebrates or freshwater mussels were observed within the surveyed reach.

5.5 Vegetation

5.5.1 Plant Communities

Six ELC communities were identified in one or more study areas, including deciduous forest, cultural woodland, cultural thicket, and cultural meadow, as well as anthropogenic communities such as residential and commercial properties. The ELC communities are shown on Figures 3A-J and are briefly described in Table 2.



Table 2: Plant Communities on the Sites and in the Study Areas

ELC Community	Field Description	SRANKa					
Cultural							
СИМ	On Site 1, there is a forb-dominated cultural meadow with species such as wild carrot (<i>Daucus carota</i>), red clover (<i>Trifolium pratense</i>), ragweed (<i>Ambrosia artemisiifolia</i>), common dandelion (<i>Taraxacum officinale</i>), and chicory (<i>Cichorium intybus</i>). The meadow was highly disturbed due to frequent pedestrian traffic and the soil was highly compacted. Trees were sparsely distributed along the perimeter of the meadow and were dominated by Siberian elm (<i>Ulmus pumila</i>).						
Cultural Meadow	Outside of Site 1, there is a cultural meadow in the southern portion of the study area.						
	On Site 2, there is a forb-dominated cultural meadow overlapping Site 2 dominated by dense patches of tansy (<i>Tanacetum vulgare</i>) and lady's bedstraw (<i>Galium verum</i>), with Canada goldenrod (<i>Solidago canadensis</i>), wild carrot, butter-and-eggs (<i>Linaria vulgaris</i>), spotted knapweed (<i>Centaurea stoebe</i>), and common milkweed (<i>Asclepias syriaca</i>).						
CUW Cultural Woodland	Outside of Site 2, there is an open immature cultural woodland in the eastern portion of the study area dominated by green ash (<i>Fraxinus pennsylvanica</i>), Siberian elm (<i>Ulmus pumila</i>), and honeysuckle (<i>Lonicera sp.</i>) The ground cover is dominated by Canada goldenrod (<i>Solidago canadensis</i>) and dog-strangling vine (<i>Vincetoxicum rossicum</i>).	N/A					
CUT1-1 Sumac Cultural Thicket	On Site 2, there is a mature cultural thicket dominated by staghorn sumac (<i>Rhus typhina</i>).	N/A					
Forest							
FOD6-1 Fresh-Moist Sugar Maple – Lowland Ash Deciduous Forest	Outside of Site 1, there is a deciduous forest within the southern portion of the study area dominated by sugar maple (<i>Acer saccharum</i>) and green ash in the canopy, with black walnut (<i>Juglans nigra</i>), beech (<i>Fagus grandifolia</i>), basswood (<i>Tilia americana</i>), and white elm (<i>Ulmus americana</i>) associates. The canopy cover was dense (>90%) with the exception of a small area of standing dead ash trees. There were abundant mature trees throughout this forest, with a DBH of up to approximately 50 cm. The understorey was dominated by red raspberry (<i>Rubus idaeus</i>) and invasive honeysuckle (<i>Lonicera sp.</i>), and the ground was covered by a thick layer of sugar maple leaves, with species such as Canada goldenrod (<i>Solidago canadensis</i>), white snakeroot (<i>Ageratina altissima</i>), zig-zag goldenrod (<i>Solidago flexicaulis</i>), wood avens (<i>Geum urbanum</i>), and goutweed (<i>Aegopodium podagraria</i>).	S5					



ELC Community	Field Description	SRANK ^a
FOD7 Fresh-Moist Lowland Deciduous Forest	On Site 1, there is an immature deciduous forest adjacent to Etobicoke Creek dominated by green ash and Siberian elm. The forest was disturbed by pedestrian traffic, resulting in compacted trails and scattered litter. On Site 8, there is a deciduous forest adjacent to Cooksville Creek dominated by green ash, black locust (<i>Robinia pseudoacacia</i>), Manitoba maple (<i>Acer negundo</i>) and willow trees (<i>Salix</i> sp.), with common buckthorn (<i>Rhamnus cathartica</i>) and riverbank grape (<i>Vitis riparia</i>).	N/A
FOD Deciduous Forest	On Site 1 and Site 2, there is a deciduous forest adjacent to Etobicoke Creek with sugar maple, green ash, and willow trees.	N/A
Anthropogenic		
M Manicured	On Sites 1 – 10, there is manicured lawn and landscaped areas.	N/A
RES Residential	Throughout all study areas, there are paved and landscaped areas associated with residential properties.	N/A
COM Commercial	On Sites 1 – 6 and Sites 8 – 12, there are paved and landscaped areas associated with commercial properties.	N/A
CVS_1 Education	Outside of Site 7, there are paved and landscaped areas associated with education facilities in the southern portion of the study area.	N/A
CVI-1 Transportation	Throughout all study areas, there are large transportation corridors (i.e., roads).	N/A

^a An SRank is a provincial –level rank indicating the conservation status of a species or plant community and is assigned by the NHIC in Ontario (NHIC 2021). SRanks are not legal designations but are used to prioritize protection efforts in the Province. SRanks for plant communities in Ontario are defined in the Significant Wildlife Habitat Technical Guide (MNRF 2000). Ranks 1-3 are considered extremely rare to uncommon in Ontario; Ranks 4 and 5 are considered to be common and widespread. n/a indicates a community that has not been ranked, which often applies to anthropogenic, culturally-influenced or high-level ELC communities (i.e., FOM).

5.5.2 Vascular Plants

On Site 1 and in the immediate vicinity, a total of 54 vascular plant species were identified during the botanical inventory or other surveys (Appendix D). Of these, 56% are native species, and 43% are exotic species. The remaining 2% (one plant) was unable to be identified to the species level due to plant condition or seasonal timing (i.e., not flowering).

On Site 2 and in the immediate vicinity, a total of 57 vascular plant species were identified during the botanical inventory or other surveys (Appendix D). Of these, 40% are native species, and 58% are exotic species. The remaining 2% (one plant) was unable to be identified to the species level due to plant condition or seasonal timing (i.e., not flowering).

On Site 8 and in the immediate vicinity, a total of 42 vascular plant species were identified during the botanical inventory or other surveys (Appendix D). Of these, 26% are native species, and 74% are exotic species.



All of the plant species identified during the botanical inventories or other field surveys are secure and common, widespread and abundant in Ontario and globally (S4 or S5; G5) or are unranked alien species (SNA; GNR). None of the plant species identified in the SAR screening as having ranges which overlap the study areas (Appendix F) were found during the botanical inventories or other field surveys. However, butternut (*Juglans cinerea*), designated endangered under the ESA, was determined to have moderate potential to occur in an unsurveyed portion of deciduous forest (FOD) on Site 1 (Figure 2A) along the west side of Etobicoke Creek. Butternut is discussed further in Section 6.1.

5.6 Wildlife

5.6.1 Birds

A total of 31 bird species were observed during breeding bird surveys or other surveys (Appendix E); 21 species were observed in the vicinity of Site 1, 16 species were observed in the vicinity of Site 2, and 23 species were observed in the vicinity of Site 8.

Most bird species identified during surveys are considered secure and common, widespread and abundant in Ontario and globally (S4 or S5; G5), or are ranked SNA (not applicable – species is not a target for conservation).

One of the bird species observed during field surveys is designated threatened under the ESA as well as SARA: chimney swift (*Chaetura pelagica*). Three chimney swifts were observed flying over Site 8 during one of the breeding bird surveys. Chimney swifts most commonly breed in chimneys, but other anthropogenic structures and large diameter cavity trees are also used (COSEWIC 2007). There are no structures or large diameter cavity trees to provide potential suitable nesting or roosting habitat on Site 8, or any other site. Outside of all sites, residential chimneys (RES) throughout the study areas (Figures 3A-J) may provide suitable nesting and roosting habitat. Chimney swift is discussed further in Section 6.1.

5.6.2 Bats

No potential maternity roosting habitat for bats was observed on the sites during field surveys. Outside of Site 8, three large diameter cavity trees (>25 cm DBH) were observed in the deciduous forest (FOD7) in the study area, approximately 90 m south of the site (Figure 2B). These trees were determined to have moderate potential to provide suitable maternity roosting habitat for tree-roosting bats including little brown myotis (*Myotis lucifugus*), northern myotis (*Myotis septentrionalis*), and tri-colored bat (*Perimyotis subflavus*), all of which are designated endangered under the ESA as well as SARA. Outside of Site 1, three additional large diameter cavity trees (>25 cm DBH) were observed in the deciduous forest (FOD7) in the study area, approximately 70 m north of the site (Figure 2A), which may also provide suitable maternity roosting habitat for these three bat species. Outside of Site 8, a rock pile adjacent to Cooksville Creek approximately 10 m south of the site was determined to have moderate potential to provide suitable maternity roosting habitat for eastern small-footed myotis (Figure 2B). Habitat for bat SAR is discussed further in Section 6.1.

5.6.3 Amphibians

No amphibian species were observed during the amphibian call count survey or other field surveys conducted for the Project.



5.6.4 Other Wildlife

Three mammals were observed during field surveys (Appendix E): eastern cottontail (*Sylvilagus floridanus*), grey squirrel (*Sciurus carolinensis*), and mink (*Mustela vison*). All three species are considered secure and common, widespread and abundant in Ontario and globally (S4 or S5; G5) (Appendix E).

Two arthropod SAR, monarch (*Danaus plexippus*) and yellow-banded bumblebee (*Bombus terricola*), were assessed to have moderate potential to occur on the sites and within the respective study areas based on the availability of potential suitable habitat, although neither species was observed during any of the surveys. Both species are designated special concern under the ESA, and monarch is also designated special concern under SARA. Monarch is found wherever there are milkweed (*Asclepias* spp.) plants for its caterpillars and wildflowers that supply a nectar source for adults. It is often found on abandoned farmland, meadows, open wetlands, prairies and roadsides, but also in city gardens and parks (COSEWIC 2010). Yellow-banded bumble bee is a forage and habitat generalist. Mixed woodlands are commonly used for nesting and overwintering, but it also occupies various open habitats including native grasslands, farmlands, and urban areas. Nest sites are mostly abandoned rodent burrows (COSEWIC 2015).

The cultural meadows (CUM) overlapping Site 1 and Site 2 and the respective study areas (Figures 3A-B) were assessed to have potential to provide foraging habitat for monarch and yellow-banded bumblebee. Common milkweed (*Asclepias syriaca*), the preferred host plant of monarch, was also identified in these areas on the sites during field surveys. In addition, the deciduous forests (FOD, FOD6-1, FOD7) overlapping Sites 1, 2, and 8 and the respective study areas (Figures 3A, 3B, 3G) may provide suitable nesting and overwintering habitat for yellow-banded bumblebee. Monarch and yellow-banded bumblebee are discussed further in Section 6.6.

6.0 ASSESSMENT OF SIGNIFICANT NATURAL HERITAGE FEATURES

This section assesses the natural heritage features and functions (as outlined in Section 2.0) located within each study area. The following sources were used during the assessment of features:

- Natural Heritage Reference Manual (NHRM; MNR 2010)
- Significant Wildlife Habitat Technical Guide (SWHTG; MNR 2000)
- Significant Wildlife Habitat Mitigation Support Tool (SWHMiST; MNRF 2014)
- Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E (MNRF 2015)

6.1 Habitat for Threatened or Endangered Species

General habitat protection is provided by the ESA to all threatened and endangered species. General habitat is defined as the area on which a species depends directly or indirectly to carry out life processes, including reproduction, rearing, hibernation, migration or feeding. Species-specific habitat protection is only afforded to those species for which a habitat regulation has been prepared and passed into law as a regulation of the ESA. A habitat regulation outlines specific habitat features and associated buffers that are protected, and also specifies the geographic area(s) of the province where the habitat regulation applies. In some cases, a General Habitat Description (GHD) may also be prepared to help define and refine the area of protected habitat in advance of a habitat regulation.



One species designated threatened under the ESA, chimney swift, was observed during field surveys. An additional five species designated threatened or endangered under the ESA, butternut, eastern small-footed myotis, little brown myotis, northern myotis, and tri-colored bat, were assessed to have moderate potential to occur on one or more of the sites and/or in their respective study areas.

Chimney Swift

The GHD (MNR 2013) for chimney swift defines habitat by one category:

 Category 1 – human-made nest/roost, or a natural nest/roost cavity and the area within 90 m of the natural cavity

Chimney swifts were observed flying over Site 8 during field surveys. However, there are no suitable nesting or roosting structures for chimney swift overlapping this or any of the sites. Off-site, residential chimneys (RES) throughout all study areas (Figures 3A-J) may provide suitable nesting and roosting habitat for chimney swift. Because potential suitable nesting habitat within the study areas will not be altered, chimney swift is not expected to be impacted by the proposed Project. Foraging habitat is not a category of habitat protected under the GHD. Further analysis is not warranted.

Butternut

There is no habitat regulation or GHD for butternut, so this species receives general habitat protection under the ESA.

No butternut was observed during botanical inventories or other field surveys conducted within or in the vicinity of Site 1, Site 2, and Site 8 (Figures 3A, 3B, 3G). However, site boundaries changed after field surveys were completed, and portions of Site 1 have not been investigated for the presence of butternut. The unsurveyed portion of deciduous forest (FOD) on Site 1 (Figure 3A) along the west side of Etobicoke Creek may provide suitable habitat for butternut. Because the absence of butternut on Site 1 has not yet been confirmed, butternut is carried forward to the impact assessment in Section 7.1.

Bats

There is no habitat regulation or GHD for any of the listed bats (eastern small-footed myotis, little brown myotis, northern myotis, and tri-colored bat), so these species receive general habitat protection under the ESA.

Off-site, cavity trees observed in the deciduous forests (FOD7) approximately 70 m north of Site 1 and 90 m south of Site 8 may provide suitable maternity roosting habitat for tree-roosting SAR bats (little brown myotis, northern myotis, and tri-colored bat) (Figures 2A-B). In addition, a rock pile along Cooksville Creek approximately 10 m south of Site 8 may provide suitable maternity roosting habitat for eastern small-footed myotis (Figure 2B). Suitable maternity roosting habitat for these species that may be present within the study areas will not be altered.

No potential bat maternity roosting habitat was observed on Sites 1, 2, and 8 during field surveys. However, site boundaries changed after field surveys were completed, and portions of Site 1 have not been investigated for the presence of bat habitat. The unsurveyed portion of deciduous forest (FOD) on Site 1 (Figure 3A) along the west side of Etobicoke Creek may provide suitable maternity roosting habitat for little brown myotis, northern myotis, and tri-colored bat. Because the absence of habitat for these three bat species on the site has not yet been confirmed, little brown myotis, northern myotis, and tri-colored bat are carried forward to the impact assessment in Section 7.1.



6.2 Areas of Natural and Scientific Interest

Areas of Natural and Scientific Interest are designated by the province according to standardized evaluation procedures. Areas of Natural and Scientific Interest are ranked by the MNDMNRF as being either provincially or regionally significant.

There are no ANSI on the sites or in the study areas. Further analysis is not warranted.

6.3 Wetlands

Significant wetlands are areas identified as provincially significant by the MNDMNRF using evaluation procedures established by the Province, as amended from time to time (MMAH 2020a). Wetlands are assessed based on a range of criteria, including biology, hydrology, societal value, and special features (MNDMNRF 2021d). In general, wetlands smaller than 0.5 ha are not evaluated. However, wetlands less than 0.5 ha in size that are within 750 m of other wetlands and provide important ecological benefits may be included as part of an existing PSW complex.

According to LIO (MNDMNRF 2021a), there is a mapped unevaluated wetland measuring approximately 0.1 ha in size approximately 40 m to the north of Site 1, within the study area (Figure 3A). During the spring survey conducted on April 29, 2021, it was noted that the feature was not a wetland, but instead an overflow channel to Etobicoke Creek that was dry and largely devoid of vegetation at the time of the field survey. Regardless, the area mapped as a wetland within the study area will not be altered, and is therefore not expected to be impacted by the Project.

There are no wetlands on any of the other sites or in their respective study areas. Further analysis is not warranted.

6.4 Significant Woodlands

Woodlands can vary in their level of significance at the local, regional and provincial levels. Significant woodlands are areas which are ecologically important in terms of features such as species composition, age of trees and stand history; functionally important due to their contribution to the broader landscape because of their location, size or due to the amount of forest cover in the planning area; or economically important due to site quality, species composition, or past management history (MMAH 2020a). Where local municipalities have not defined or mapped significant woodlands, these features are to be identified using criteria established by the MNDMNRF as included in the NHRM for Policy 2.3 of the PPS (MNR 2010).

The City of Mississauga has identified significant woodlands in its jurisdiction under the Significant Natural Areas overlay (City of Mississauga 2021 – OP Schedule 3; Figure 1), and they are defined as those woodlands that meet one or more of the following criteria:

- woodlands, excluding cultural savannahs, greater than or equal to four hectares;
- woodlands, excluding cultural woodlands and cultural savannahs, greater than or equal to two hectares and less than four hectares;
- any woodland greater than 0.5 hectares that:
 - i) supports old growth trees (greater than or equal to 100 years old);
 - ii) supports a significant linkage function as determined through an Environmental Impact Study approved by the City in consultation with the appropriate conservation authority;



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- iii) is located within 100 metres of another Significant Natural Area supporting a significant ecological relationship between the two features;
- iv) is located within 30 metres of a watercourse or significant wetland; or,
- v) supports significant species or communities.

Two woodland communities along Etobicoke Creek and one along Cooksville Creek meet the criteria for significance as they are greater than four hectares in size and are located within 30 m of a watercourse: the deciduous forest complex (FOD7, FOD) on Site 1 (Figure 3A), the deciduous forest (FOD) on Site 2 (Figure 3B), and the deciduous forest (FOD7) on Site 8 (Figure 3G).

Development within or adjacent to a Significant Natural Area will not be permitted unless all reasonable alternatives have been considered and any negative impacts minimized. Uses are limited to conservation, flood and/or erosion control, passive recreation, and essential infrastructure. Any negative impact that cannot be avoided will be mitigated through restoration and enhancement to the greatest extent possible (City of Mississauga 2021).

Based on the above analysis, there are significant woodlands associated with Etobicoke Creek and Cooksville Creek overlapping Site 1, Site 2, and Site 8. Significant woodlands are therefore carried forward to the impact assessment (Section 7.2).

6.5 Significant Wildlife Habitat

Significant wildlife habitat (SWH) is one of the more complicated natural heritage features to identify and evaluate. The NHRM includes criteria and guidelines for designating SWH. There are two other documents, the Significant Wildlife Habitat Technical Guide (SWHTG) and the Significant Wildlife Habitat Mitigation Support Tool (SWHMiST) (MNR 2000 and MNRF 2014), that can be used to help decide what areas and features should be considered significant wildlife habitat. In addition, a list of recommended criteria for identification of SWH is provided in the Region OP (Region of Peel 2021). These documents were used as reference material for this study. Significant wildlife habitat should be evaluated in the context of the entire planning authority's jurisdiction; where habitat representation in a planning area is high, though the habitat may be valuable to wildlife, the likelihood of it being significant is reduced (MNR 2000).

Significant wildlife habitat is typically identified on a site-specific basis and is therefore not often mapped at a landscape level in municipal OPs; however, according to the City OP (City of Mississauga 2021), SWH in the City is generally encompassed within the Significant Natural Areas overlay (OP Schedule 3; Figure 1). Uses are limited to conservation, flood and/or erosion control, passive recreation, and essential infrastructure. Any negative impact that cannot be avoided will be mitigated through restoration and enhancement to the greatest extent possible (City of Mississauga 2021).

Four types of SWH were assessed to have potential to occur on one or more of the sites and/or within their respective study areas:

- Bat Maternity Colonies (Site 1)
- Animal Movement Corridors (Site 1, Site 2, and Site 8)
- Landbird Migratory Stopover Areas (Site 1, Site 2, and Site 8)
- Habitat for Special Concern or Rare Species (Site 1 and Site 2)



Bat Maternity Colonies Habitat

Although no potential bat maternity roosting habitat was observed on the sites during field surveys, the unsurveyed portion of the deciduous forest (FOD) on Site 1 (Figure 3A) along the west side of Etobicoke Creek may provide suitable roost habitat for bat maternity colonies. In addition, the portions of deciduous forest (FOD7) in the northern portion of the study area of Site 1 (Figure 2A), and the southern portion of the study area of Site 8 (Figure 2B), were observed to have large-diameter cavity trees that may qualify as bat maternity colonies habitat. SWH for bat maternity colonies habitat is therefore carried forward to the impact assessment in Section 7.2.

Animal Movement Corridors

Based on the recommended criteria for identification of SWH in the Region OP (Region of Peel 2021), animal movement corridors are defined as elongated, naturally vegetated parts of the landscape used by animals to move from one habitat to another. Although the applicable criteria schedules (Ecoregion 7E; MNRF 2015) only identify amphibian movement corridors as SWH, the Region OP also considers white-tailed deer corridors, as well as more general animal and plant movement corridors, in its definition of SWH, and at three scales: primary (e.g., major physiographic features such as the Niagara Escarpment), secondary (e.g., major river valleys), and tertiary (e.g., hedgerows, riparian strips).

Etobicoke Creek, which overlaps Site 1 and Site 2, and Cooksville Creek, which overlaps Site 8, are likely part of general movement corridors for wildlife and plants. The valleylands are critical features in the surrounding urban setting that provides functional movement corridors through the City to Lake Ontario. SWH for animal movement corridors is therefore carried forward to the impact assessment in Section 7.2.

Landbird Migratory Stopover Areas

Based on the recommended criteria for identification of SWH in the Region OP (Region of Peel 2021), all river and creek valleys within 5 km of Lake Ontario should be identified as SWH for landbird migrants. Both Etobicoke Creek where it overlaps Sites 1 and 2, and Cooksville Creek where it overlaps Site 8 are within 5 km of Lake Ontario and therefore qualify as SWH for landbird migrants. SWH for landbird migrants is therefore carried forward to the impact assessment in Section 7.2.

Habitat for Special Concern or Rare Species

The cultural meadows (CUM) overlapping Site 1 and Site 2, and their respective study areas (Figures 3A-B), have potential to provide foraging habitat for monarch and yellow-banded bumblebee, both designated species concern under the ESA. Common milkweed, the preferred host plant of monarch, was also observed in low abundance in these meadows during field surveys. The deciduous forests (FOD, FOD6-1, FOD7) overlapping Sites 1, 2, and 8 and the respective study areas study areas (Figures 3A, 3B, 3G) may provide suitable nesting and overwintering habitat for yellow-banded bumblebee.

Although common milkweed was observed growing in the meadows in low density, no monarch caterpillars or adults were observed. The presence of milkweed is not an indication of monarch breeding. The areas of foraging habitat are small and isolated, and unlikely to support a large concentration of individuals. Suitable habitat off the sites in the study areas will not be disturbed and habitat for monarch is well-represented throughout the broader region. Habitat on the sites is therefore not likely to be significant for this species. Further analysis is not warranted.



Yellow-banded bumblebee is a forage and habitat generalist that uses various open habitats. No bumblebee species were observed during field surveys. Suitable habitat off the sites in the study areas will not be disturbed and habitat for yellow-banded bumblebee is well-represented throughout the broader region. Habitat on the sites is therefore not likely to be significant for this species. Further analysis is not warranted.

6.6 Significant Valleylands

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

The City of Mississauga has identified significant valleylands in its jurisdiction under the Significant Natural Areas overlay (City of Mississauga 2021 – OP Schedule 3; Figure 1). According to the City of Mississauga (2021), significant valleylands are associated with the main branches, major tributaries and other tributaries and watercourse corridors draining directly to Lake Ontario, including the Credit River, Etobicoke Creek, Mimico Creek, and Sixteen Mile Creek. Because both Etobicoke Creek and Cooksville Creek are permanent watercourse corridors draining directly into Lake Ontario, both creeks qualify to be significant valleylands. In addition, both the Etobicoke Creek and Cooksville Creek valleylands are mapped as Significant Natural Areas (City of Mississauga 2021 – OP Schedule 3; Figure 1).

Development within or adjacent to a Significant Natural Area will not be permitted unless all reasonable alternatives have been considered and any negative impacts minimized. Uses are limited to conservation, flood and/or erosion control, passive recreation, and essential infrastructure. Any negative impact that cannot be avoided will be mitigated through restoration and enhancement to the greatest extent possible (City of Mississauga 2021).

In addition, valleys and hazard lands are generally regulated by the local conservation authority (in this case, CVC or TRCA) and development within or adjacent to these features is subject to common permitting policies (TRCA 2008; CVC 2010).

Based on the above analysis, the Etobicoke Creek valleyland which overlaps Site 1 and Site 2, and the Cooksville Creek valleyland which overlaps Site 8, qualify to be significant valleylands. Significant valleylands are therefore carried forward to the impact assessment in Section 7.3.

6.7 Fish and Fish Habitat

The reaches of Etobicoke Creek that overlap Sites 1 and 2 and the reach of Cooksville Creek that overlaps Site 8 are considered warmwater fish habitat for a variety of life stages (i.e., spawning, nursery/rearing/foraging, overwintering, migratory route) and fish species. Development and site alteration is not permitted within fish habitat except in accordance with provincial and federal requirements (City of Mississauga 2021; MMAH 2020a). Fish habitat is therefore carried forward to the impact assessment in Section 7.4.



7.0 IMPACT ASSESSMENT

7.1 Habitat of Endangered or Threatened Species

There is an unsurveyed portion of deciduous forest (FOD) on Site 1 (Figure 3A) along the west side of Etobicoke Creek which may provide suitable habitat for butternut, as well as three tree-roosting SAR bats, little brown myotis, northern myotis, and tri-colored bat. It is recommended that a search for butternut and potential maternity roosting habitat be conducted in unsurveyed portions of Site 1 to confirm absence. Acoustic monitoring (i.e., a passive 10-day survey in June) may be required to confirm absence of SAR bats if potential bat maternity roosts are identified. A butternut health assessment by a certified butternut health assessor would be required to determine tree (health) category if any butternuts are identified on the site.

If habitat for butternut and/or SAR bats is confirmed on the site, and the habitat is expected to be disturbed by the proposed construction activities, authorization (registration or permitting) under the ESA will be required.

7.2 Significant Woodlands / Significant Wildlife Habitat

Two woodlands along Etobicoke Creek and one woodland along Cooksville Creek were determined to qualify as significant based on the assessment in Section 6.4: the deciduous forest complex (FOD7, FOD) on Site 1 (Figure 3A), the deciduous forest (FOD7) on Site 2 (Figure 3B), and the deciduous forest (FOD7) on Site 8 (Figure 3G). These woodlands were also determined to qualify for three types of SWH: bat maternity colonies (Site 1), animal movement corridors (Site 1, Site 2, and Site 8), and landbird migratory stopover areas (Site 1, Site 2, and Site 8).

On Site 1, approximately 1.4 ha of deciduous forest is proposed to be removed. The surveyed portion of the forest on the east side of the creek was highly disturbed by pedestrian traffic, resulting in compacted trails and scattered garbage. Although the portion of the forest on the west side of Etobicoke Creek was unsurveyed, its adjacency to a residential neighbourhood suggests this portion of the forest may be similarly disturbed.

On Site 2 and Site 8, approximately 0.1 ha of deciduous forest is proposed to be removed at each site. The areas of forest proposed to be removed at both sites are adjacent to large roads, which has resulted in disturbance caused by edge effects. Scattered garbage was observed at both sites.

The areas of deciduous forest proposed to be removed are part of large forest complexes that extend for multiple kilometres along Etobicoke Creek and Cooksville Creek to the north and south of the sites, and are therefore proportionally very small. Tree removal will be completed outside of the core active season for wildlife (i.e., outside April – October) which will minimize impacts to wildlife including roosting bats and migrating landbirds and other wildlife. In addition, following completion of construction activities associated with the Project, the impacted areas of the forests will be replanted to the extent possible. Ground directly above the buried infrastructure will need to be maintained in early successional vegetation to avoid integrity issues.

Mitigation measures for protection and rehabilitation of the woodlands are provided in Section 8.3.

7.3 Significant Valleylands

Etobicoke Creek and Cooksville Creek have been identified as significant valleylands by the City of Mississauga (2021). Construction activities associated with open-cut crossing are proposed at Etobicoke Creek, as well as construction of the preferred alignments by tunnel boring for both Etobicoke Creek and Cooksville Creek.

Etobicoke Creek is within TRCA regulation limits and the Project will require a permit for development to occur within these regulated limits. General mitigation measures to minimize impacts to Etobicoke Creek and its



valleyland are provided in Sections 8.1 and 8.4, and additional mitigation measures will be determined in consultation with the TRCA as part of the permitting process. Given that Etobicoke Creek has a large and defined valleyland, and the area of proposed disturbance is limited to one temporary crossing, the Project is not expected to have any negative impacts on the morphology of the valleyland.

7.4 Fish and Fish Habitat

Construction activities involved in carrying out the open-cut crossing construction activities at Etobicoke Creek and through the construction of the preferred alignments by tunnel boring for both Etobicoke Creek and Cooksville Creek have the potential to impact fish and fish habitat. Potential Project activities that may occur near or in water were reviewed to identify applicable Pathways of Effects (DFO 2014) and include potential effects from the following:

- Use of industrial equipment
- Heavy equipment used during construction has the potential to increase bank instability and lead to the potential for sediment laden runoff entering the watercourse
- Equipment leaks can lead to contaminants entering the watercourse
 - Fish entrainment and impingement can occur on de-watering pump intakes if screens are not appropriately sized
 - Potential for indirect or direct effects to fish, eggs and larvae as a result of using industrial equipment below the highwater mark
- Vegetation clearing/grading and excavation
 - The Project will involve the clearing of vegetation, grading and excavations for the open cut Etobicoke Creek crossing as well as tunnel boring entrance and exit locations
 - The removal of vegetation and disturbance of soils can lead to bank instability and create the potential for sediment laden runoff to enter the watercourse unless properly managed
 - Removal of vegetation may change habitat structure and cover, change nutrient concentrations, and change water temperatures due to removal of shading
- Placement of material or structure in water
 - Placement of temporary isolation materials (i.e., coffer dams) to facilitate the open cut Etobicoke Creek crossing where appropriate, to isolate the work area so the construction activities can take place "in the dry"
 - Placement of materials in Etobicoke Creek may change fish habitat structure and cover
- Change in flow
- There is the potential for sediment laden dewatering discharge if not properly managed.
 - There is potential that work will require dewatering and flow will not be able to be maintained during construction



- Impediments to fish passage
 - During construction, the temporary diversion of flow has the potential to obstruct fish movement
- Removal of organic debris
 - The project may involve the removal of organic debris for the open cut Etobicoke Creek crossing as well as tunnel boring entrance and exit locations
 - Removal of organic materials in Etobicoke Creek may change fish habitat structure and cover
 - The removal of organic debris can cause disturbance of creek beds and can lead to bank instability and create the potential for sediment laden runoff to enter the watercourse unless properly managed

8.0 MITIGATION

8.1 General Best Management Practices

Standard Best Management Practices to be followed during site preparation and construction to mitigate damage to natural features include the following:

- Minimize Project footprint and duration to the extent possible.
- Clearly demarcate and maintain site boundaries to prevent encroachment into adjacent natural features.
- To maintain compliance with the MBCA, avoid removal of vegetation during the bird nesting season (April 1 August 31; ECCC 2021b), unless construction disturbance is preceded by a nesting survey conducted by a qualified biologist. If any active nests are found during the nesting survey, a buffer will be installed around the nest to protect against disturbance. Vegetation within the protection buffer cannot be removed until the young have fledged the nest.
- Ensure all equipment is cleaned prior to transportation and maintained free of fluid leaks, for use on the sites to avoid the spread or introduction of invasive species, or noxious weeds.
- Prepare a grading plan, drainage plan and sediment and erosion control plan for each site.
- Develop and implement a site-specific spill management plan and always have all components on site in event of a spill.
- Remove and properly dispose of all construction-related debris and excess materials following construction.

8.2 Habitat for Threatened or Endangered Species

Measures to be followed to mitigate negative direct and indirect impacts to butternut, little brown myotis, northern myotis, and tri-colored bat on Site 1 include the following:

Confirm the absence of butternut and potential bat maternity roosts in the unsurveyed portion of the site (i.e., along the west side of Etobicoke Creek). Acoustic monitoring (i.e., a passive 10-day survey in June) may be required to confirm absence of SAR bats if potential bat maternity roosts are identified.



■ If habitat for butternut and/or SAR bats is confirmed on the site, and the habitat is expected to be disturbed by the proposed construction activities, authorization (registration or permitting) under the ESA will be required. Additional mitigation requirements will be determined through the ESA authorization process.

8.3 Significant Woodlands / Significant Wildlife Habitat

Measures to be followed to mitigate negative direct and indirect impacts on the deciduous forests that qualify as significant woodlands and SWH on Site 1, Site 2, and Site 8 include the following:

- Avoid compacting the soil in the setback area (which can negatively impact tree roots) by limiting the use of heavy machinery within 5 m of the dripline (where potential for root damage is most likely), particularly during wet periods (e.g., spring) when soil may already be saturated.
- Conduct tree removal outside of the core active season for wildlife including roosting bats and migrating landbirds (i.e., outside April October).
- Rehabilitate, re-stabilize and re-vegetate all disturbed areas upon completion of the construction works to restore the proposed development footprint to its pre-construction condition, where possible.
- Use native, non-invasive plant species for rehabilitation plantings, where possible.

8.4 Fish and Fish Habitat

Measures to be followed to mitigate negative direct and indirect impacts to Etobicoke Creek and negative indirect impacts to Cooksville Creek include the following:

- Conduct all in-water work outside of the MNDMNRF restricted warmwater fisheries timing window, which restricts near or in-water work from October 1 to July 15 (i.e., in-water work can occur from July 16 to September 30), subject to confirmation with the MNDMNRF. No in-water work is expected to occur in Cooksville Creek.
- Conduct instream work during a period of low flow and avoid wet, windy, and rainy periods.
- Install sediment and erosion controls (e.g., silt fencing) along the extent of the construction disturbance footprint prior to commencement of site preparation and construction activities to prevent sediment from entering the watercourse.
- Manage water flowing onto the site, as well as water being pumped/diverted from the site such that sediment is filtered out prior to the water entering the watercourse (e.g., rainfall, water pumped into or from watercourse).
- Regularly inspect and maintain the sediment and erosion controls.
- Undertake all instream activities in isolation of open or flowing water to avoid introducing sediment into the watercourse.
- Monitor turbidity/suspended sediment concentrations to document potential downstream effects of instream work.
- Isolate the in-water work area. A qualified environmental professional will complete a fish rescue to remove and relocate fish.



- Use appropriately screened water intakes to prevent entrainment or impingement of fish following the DFO Interim Code of Practice: Fish Intake Screens (DFO 2021b).
- Develop a response plan that will be implemented immediately in the event of a sediment release or spill of a deleterious substance and an emergency spill kit will be kept on the site.
- Limit machinery fording of the watercourse to a one-time event or use temporary crossing structures and use watercourse bank and bed protection measures following the DFO Interim Code of Practice: temporary Stream Crossings (DFO 2021c).
- Wash, refuel, and service equipment away from the watercourse (i.e., >30 m distance).
- Plan activities near water such that chemicals do not enter the watercourse.
- Minimize depth of excavation, where possible.
- Minimize organic debris (e.g., woody debris) clearing and use proper clearing techniques. Salvage and replace organic debris areas to pre-construction condition.
- Restrict dredging to the isolated section of the watercourse.
- Store and stabilize all stockpiled materials, including but not limited to excavated overburden and topsoil, excess materials, construction debris and containers in a manner that will prevent the release of leaching of substances that may be deleterious to fish from entering any watercourse.
- Revegetate cleared and disturbed areas and armour exposed soils on watercourse banks to pre-construction condition to minimize exposed soils and therefore erosion potential. Revegetate cleared areas with native species that were removed. Rehabilitate and re-contour land to pre-construction condition.
- Return aguatic habitat to pre-construction conditions.
- Remove all material or structures (e.g., isolation dams) placed in the watercourse.

9.0 CONCLUSIONS

The proposed Project has been assessed for potential ecological impacts under the PPS (MMAH 202a), policies of the City of Mississauga (2021), as well as other relevant legislation, including the ESA.

Based on this assessment, it is expected that there will be medium-term negative impacts to three significant woodlands on Site 1, Site 2, and Site 8 through the removal of small portions of the woodlands. However, following rehabilitation of these woodlands, it is expected that the form and functions of these woodlands (including their function as potential SWH) will be restored.

Temporary impacts to fish and fish habitat are also anticipated during the installation of Project infrastructure in Etobicoke Creek, but are expected to be minor given the short duration of disturbance and other mitigation in place (timing, restoration).

These conclusions are based on the following recommendations:

■ All mitigation measures detailed in Section 8.0 will be implemented.



- A DFO Request for Review will be submitted for work being completed in Etobicoke Creek. Dependant upon the type of work being undertaken, residual effects of the Project that may result in the harmful alternation, disruption, or destruction to fish habitats and/or as a result of the DFO review process, a DFO *Fisheries Act* Authorization for the Project may be required.
- As work is being completed within CVC and TRCA regulation limits at Sites 1, 2, and 8, permits from the CVC and TRCA will be obtained for development to proceed, and all mitigation requirements identified in the permits will be implemented.
- Should habitat for butternut and/or SAR bats be confirmed on Site 1, and the habitat is expected to be disturbed by the proposed construction activities, authorization (registration or permitting) under the ESA will be obtained.

10.0 LIMITATIONS

The results of this report are based on information available to Golder at the time of the review, and the status of species listed in the noted Acts and Regulations effective as of the date of this report. The review may be subject to limitations associated with base mapping and other publicly available information used. Additional surveys may be required to confirm habitat use and/or delineate feature boundaries for setback measurements.



11.0 CLOSURE

We trust this report meets your current needs. If you have any questions, please contact the undersigned.

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Barban Blelo

Ecologist

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Yeather J. Melches

BB/HM/wlw

Attachments: Figure 1: Project Sites and Study Area

Figures 2A-C: Survey Locations

Figures 3A-J: Ecological Land Classification

Appendix A: Fish Habitat Characterization and Species Recorded in Etobicoke and Cooksville

Creeks

Appendix B: Photo Log - Cooksville Creek
Appendix C: Photo Log - Etobicoke Creek
Appendix D: Plant Species Observations
Appendix E: Wildlife Species Observations
Appendix F: Species at Risk Screening

https://golderassociates.sharepoint.com/sites/100160/deliverables/natural environment/3_assessment report (preferred design)/18112273-tm-rev2-natural environment assessment _28jan2022.docx



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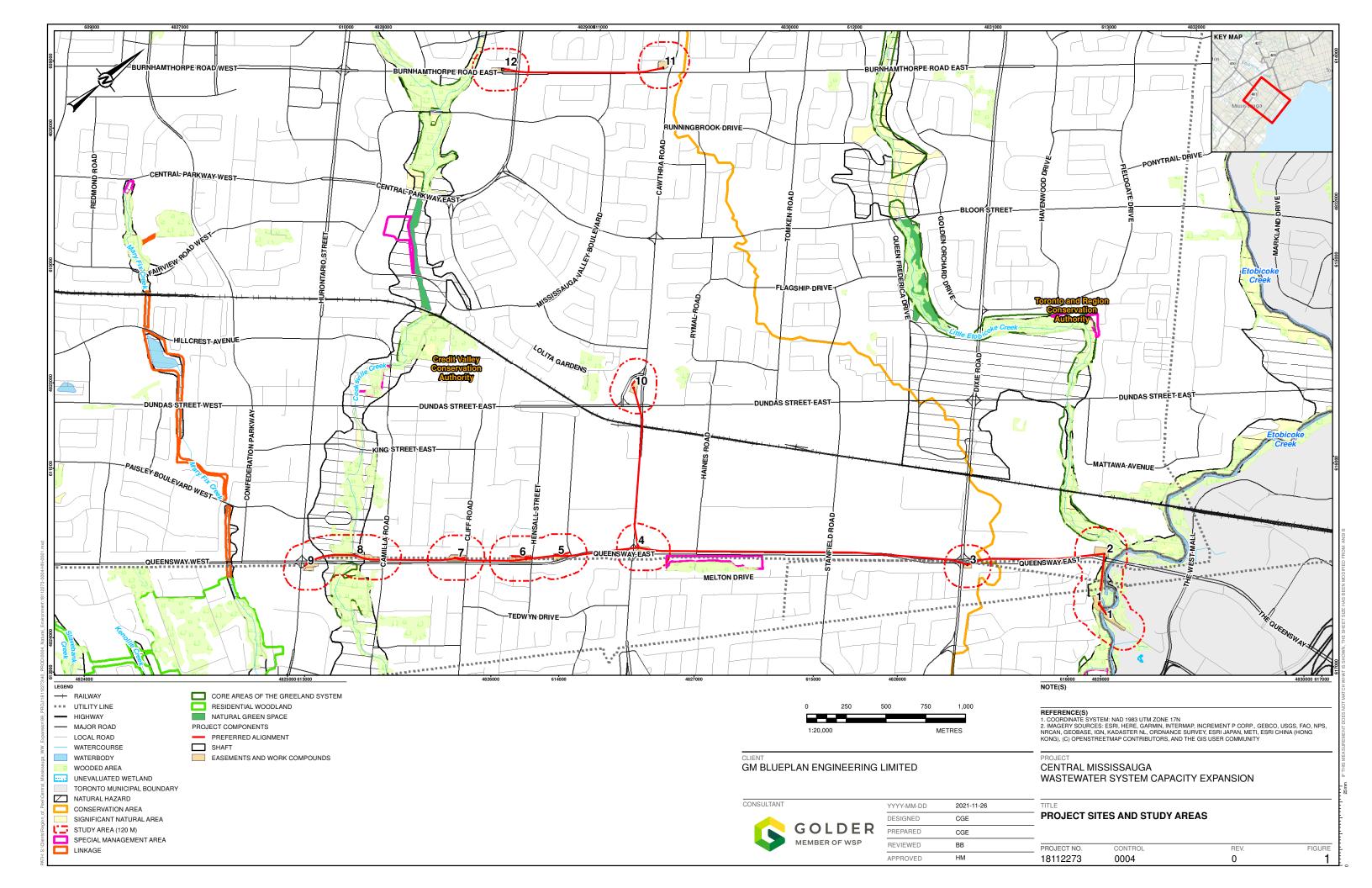
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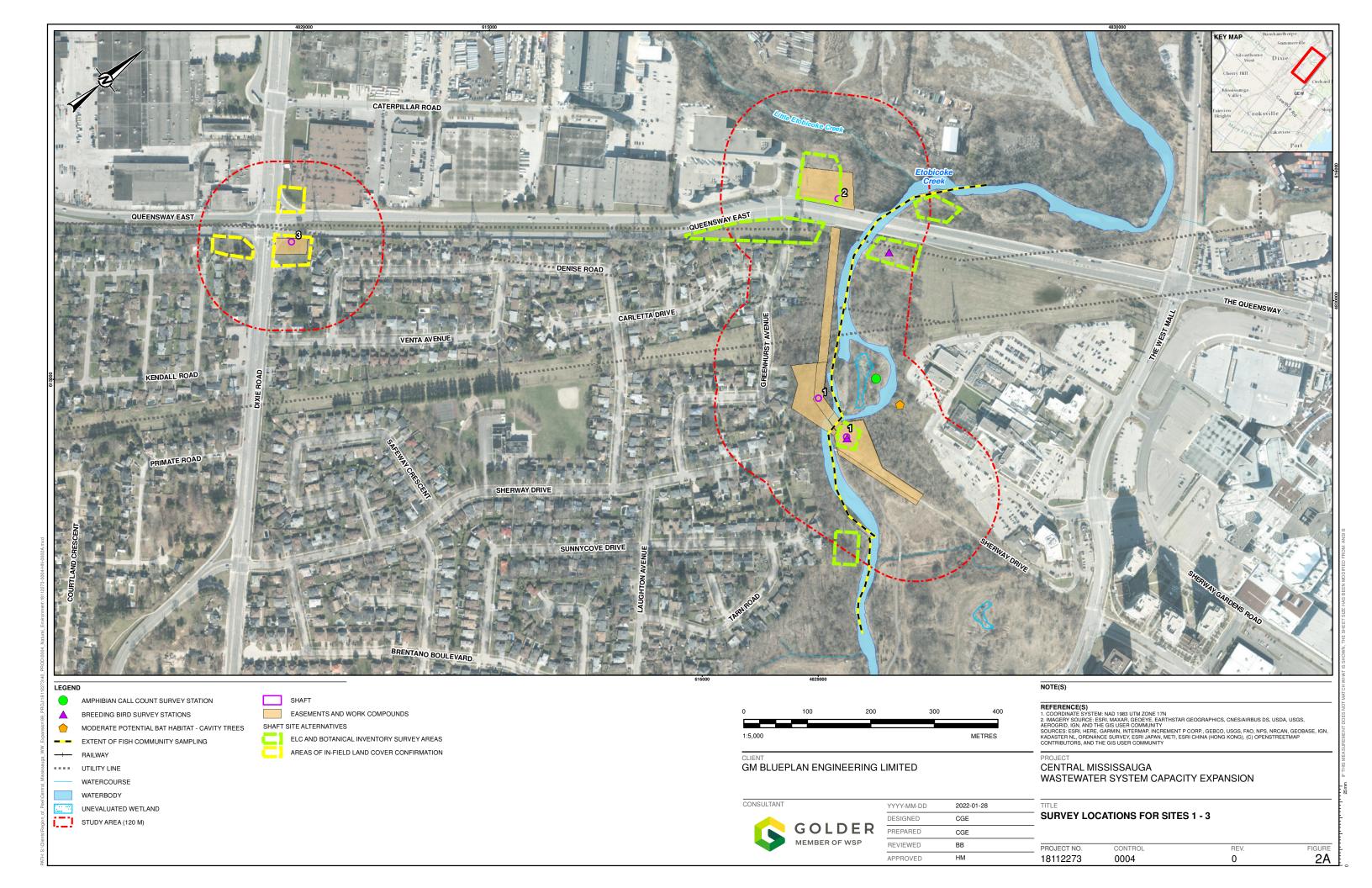
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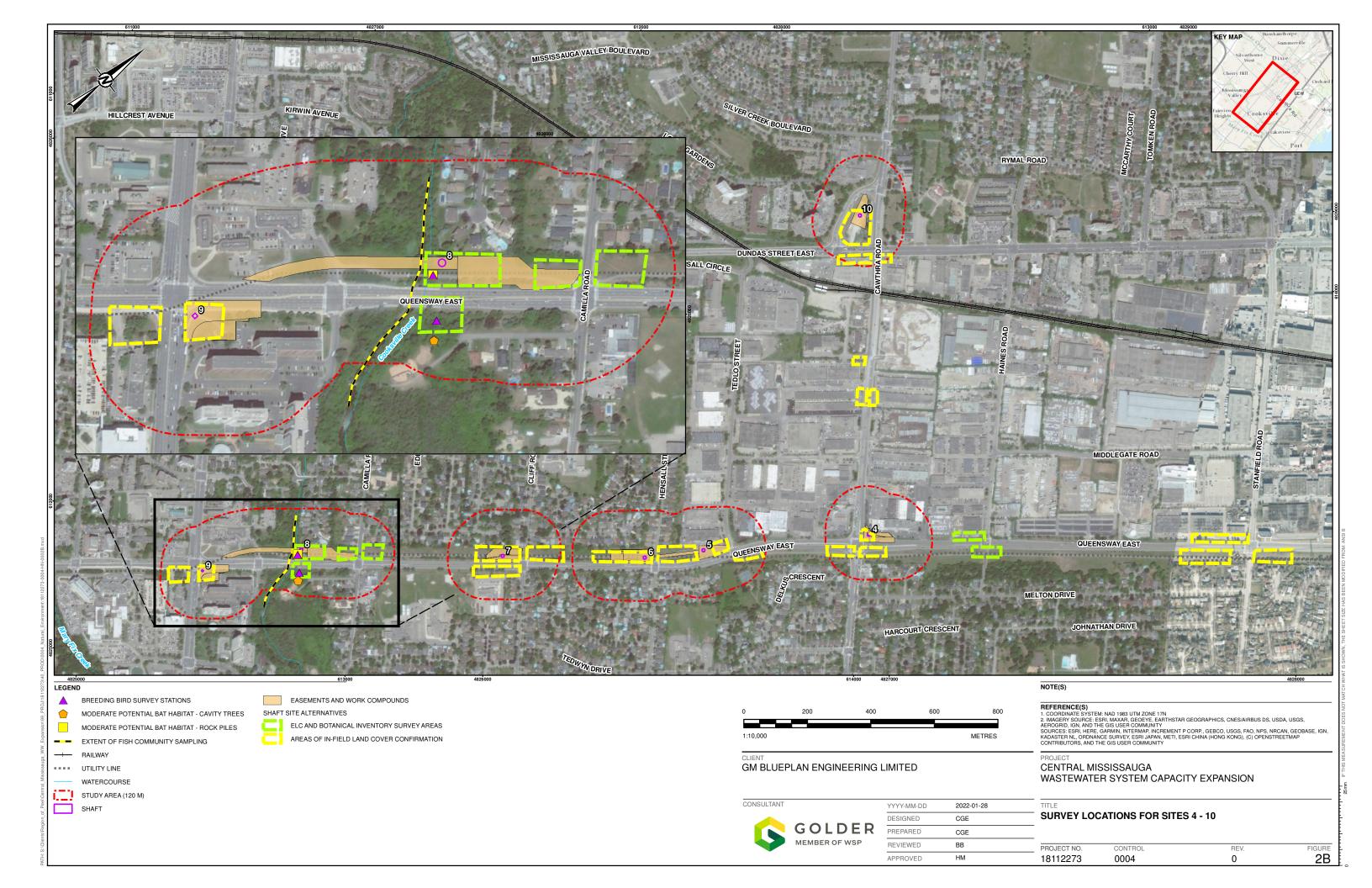


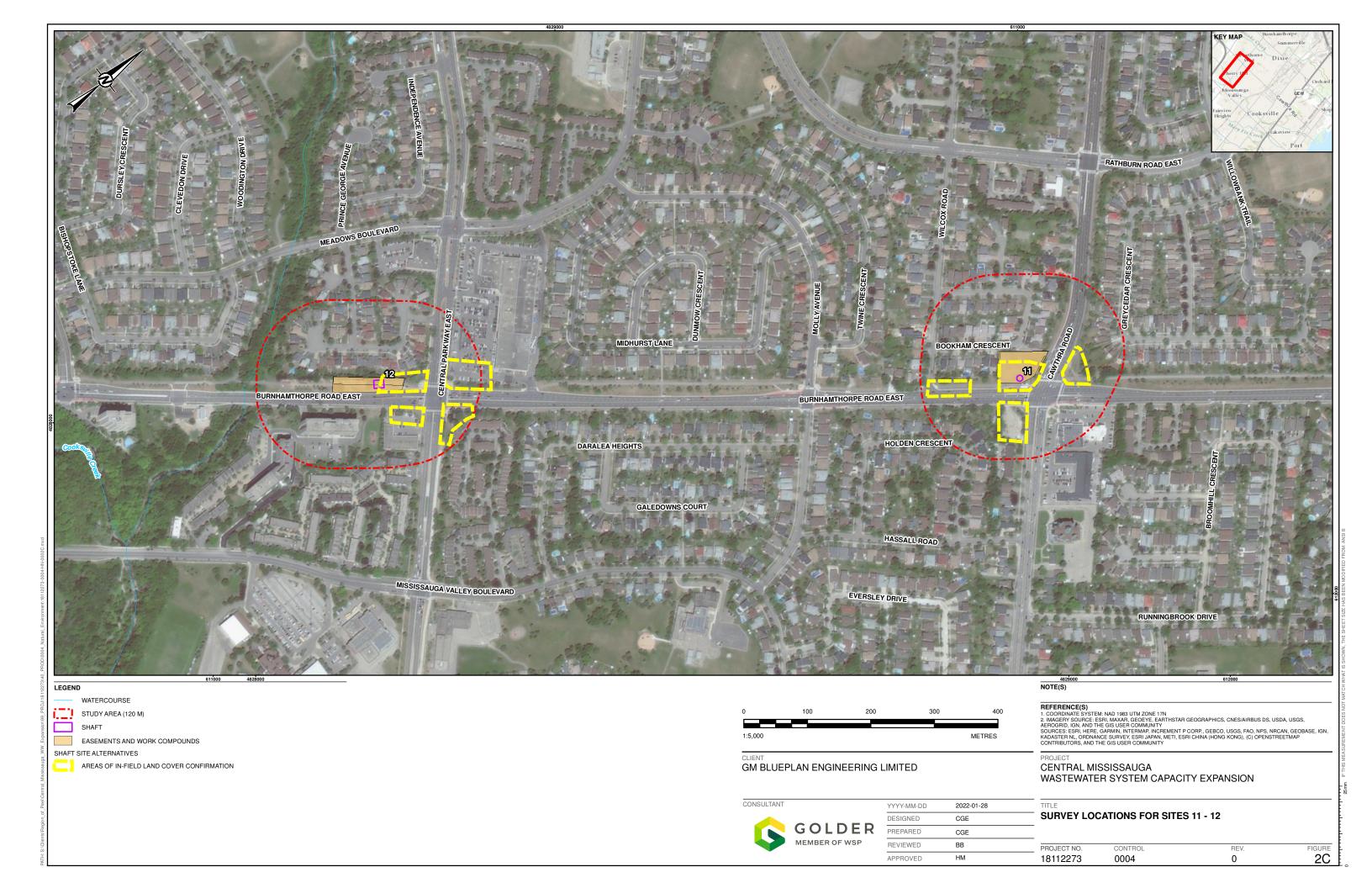
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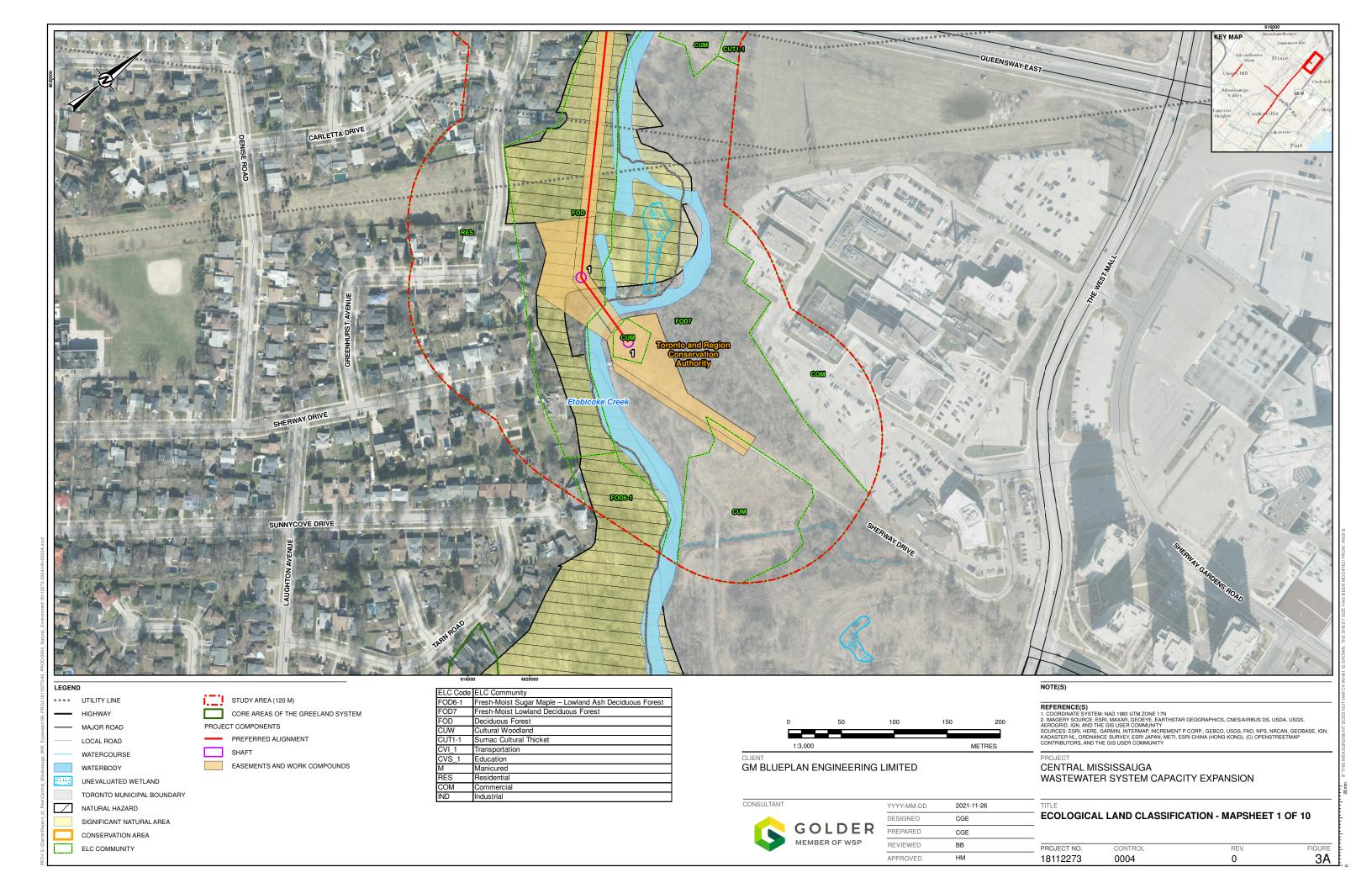


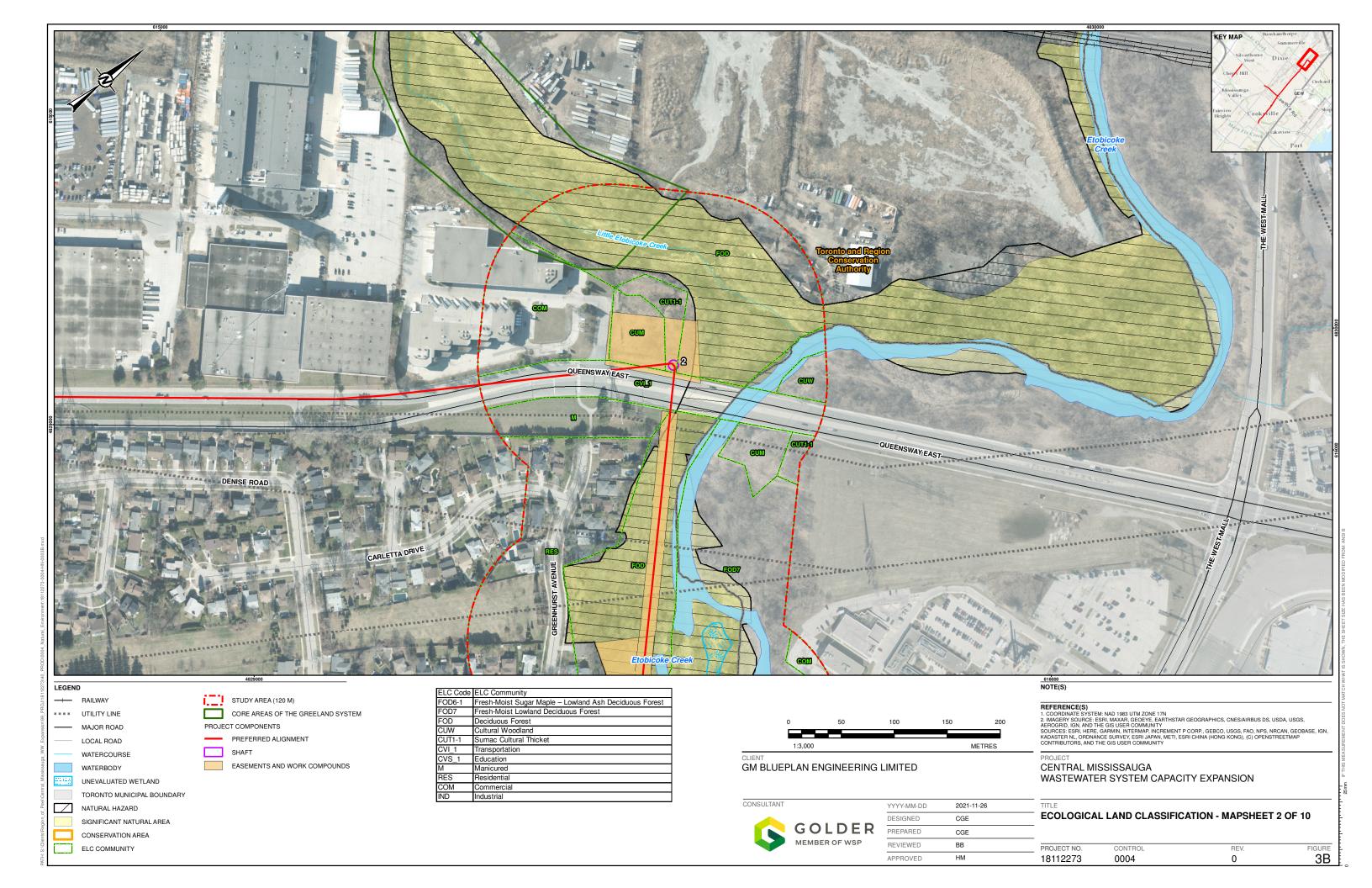


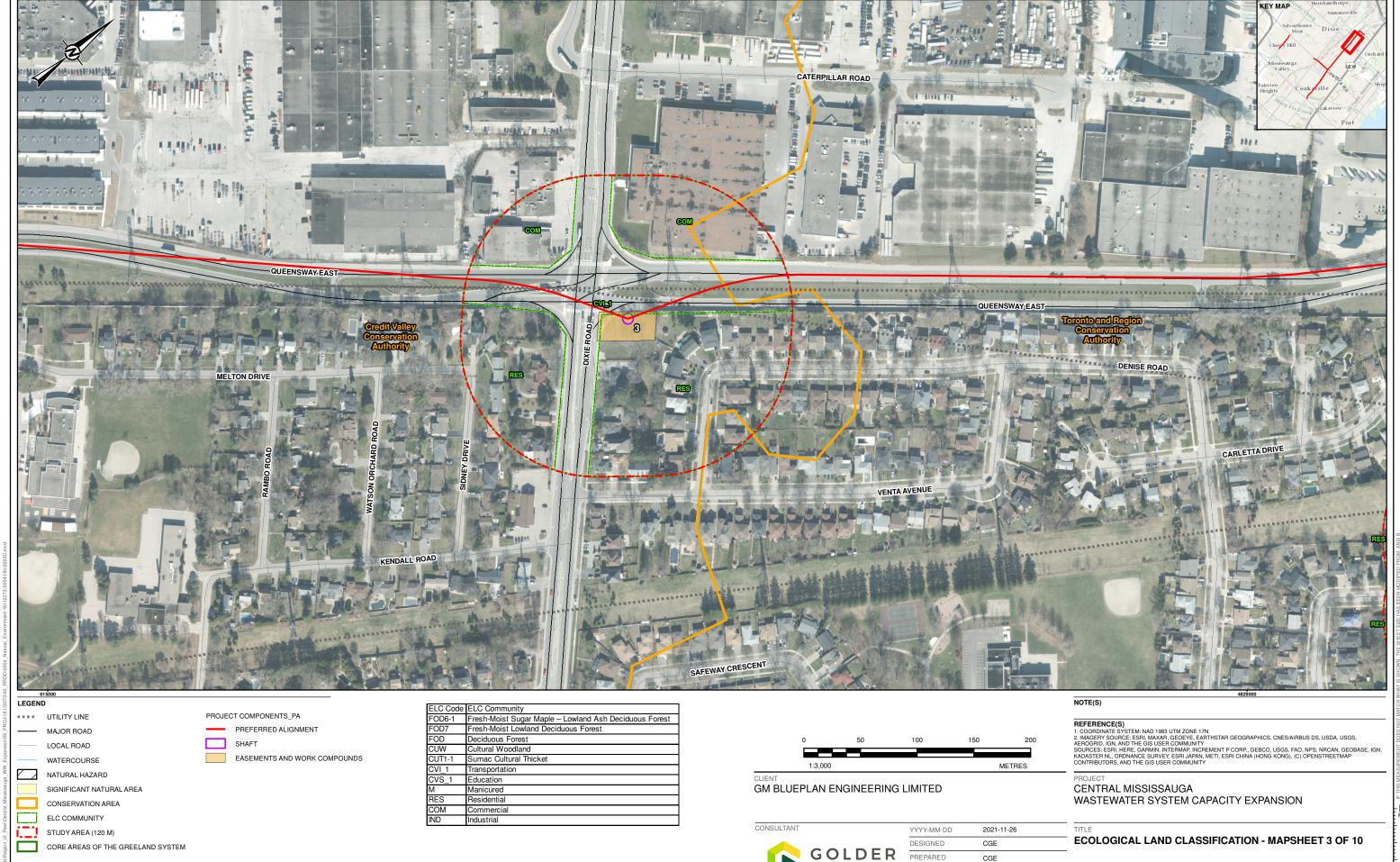












MEMBER OF WSP

REVIEWED

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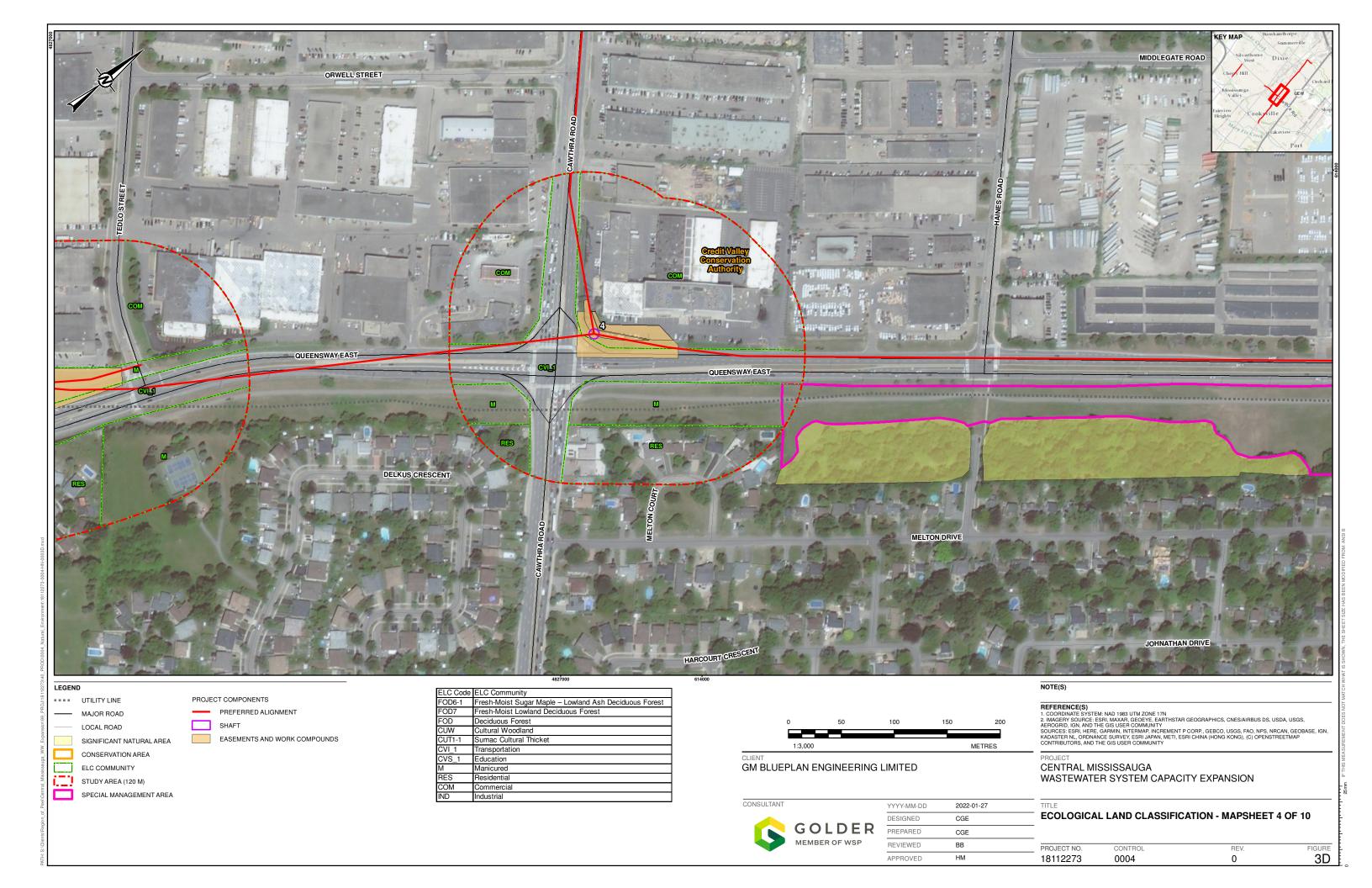
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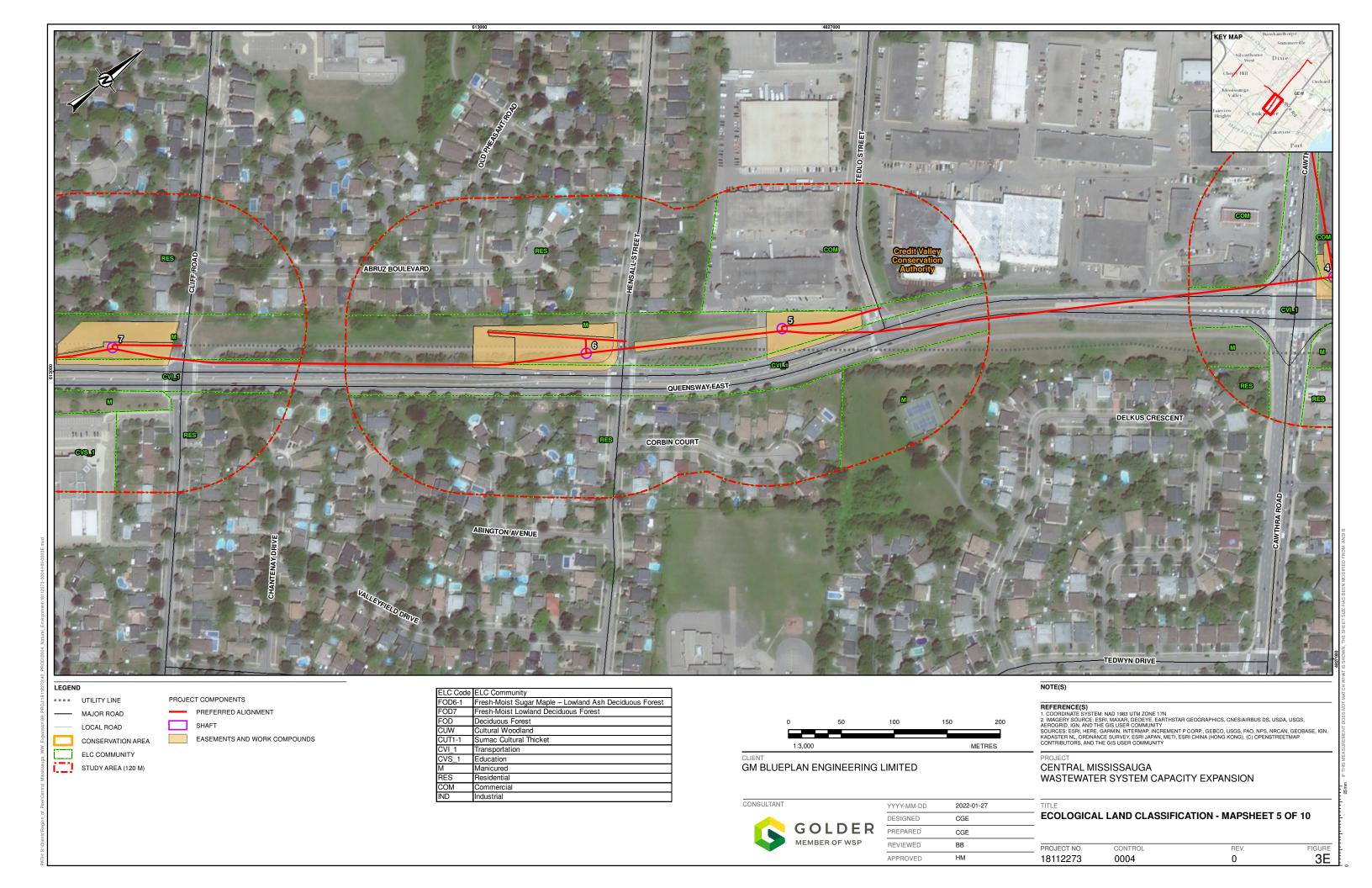
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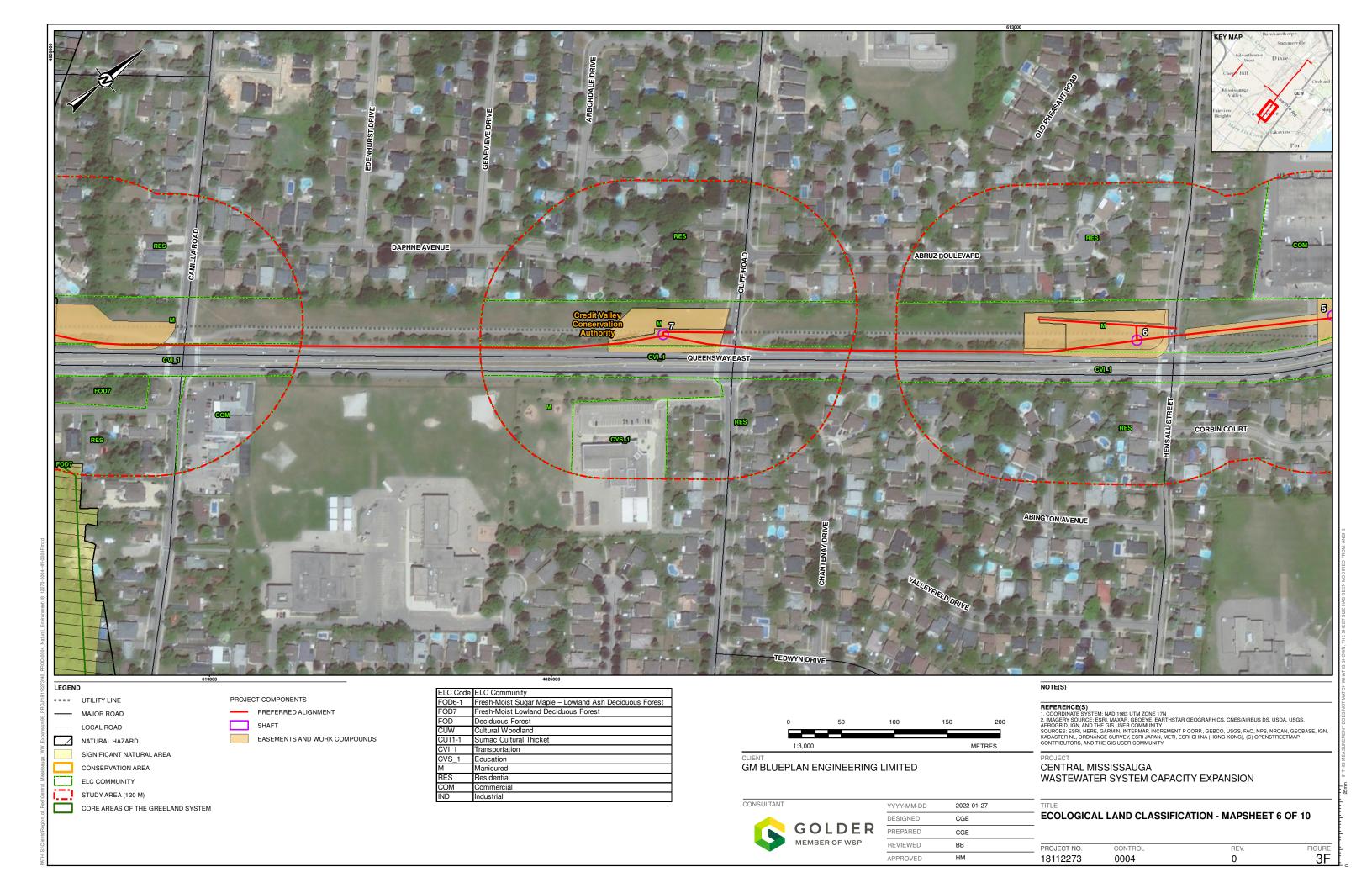
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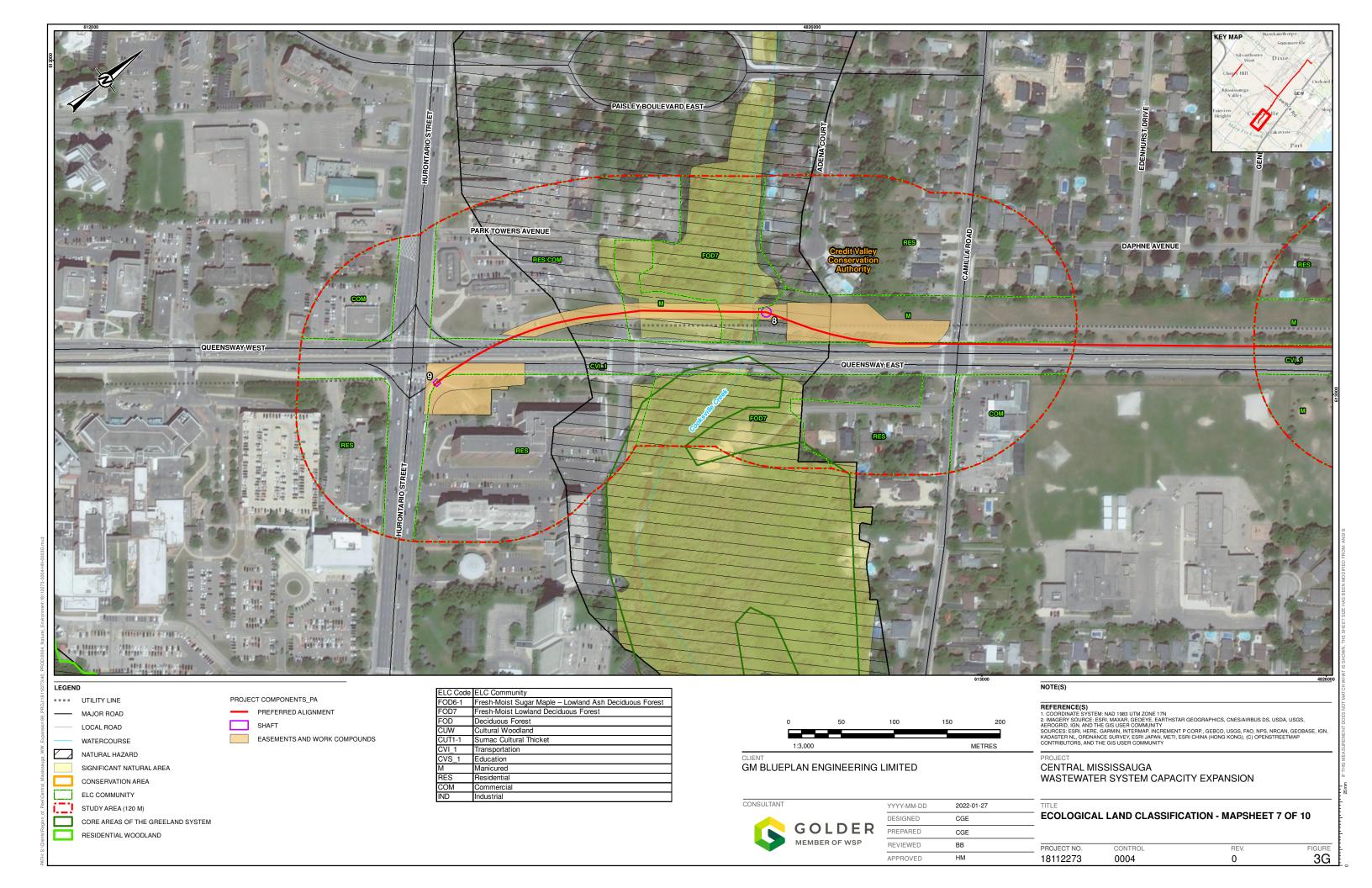
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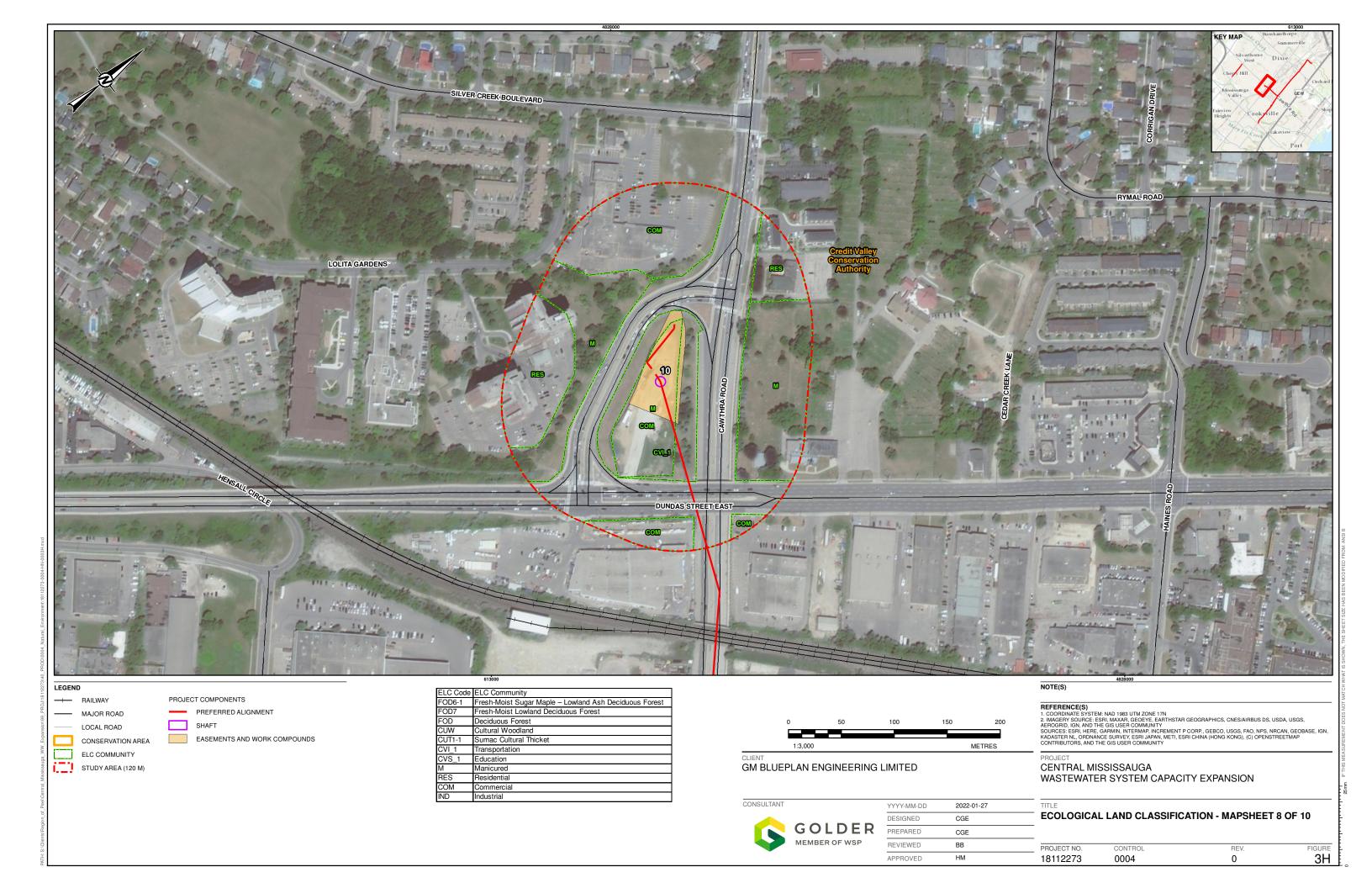
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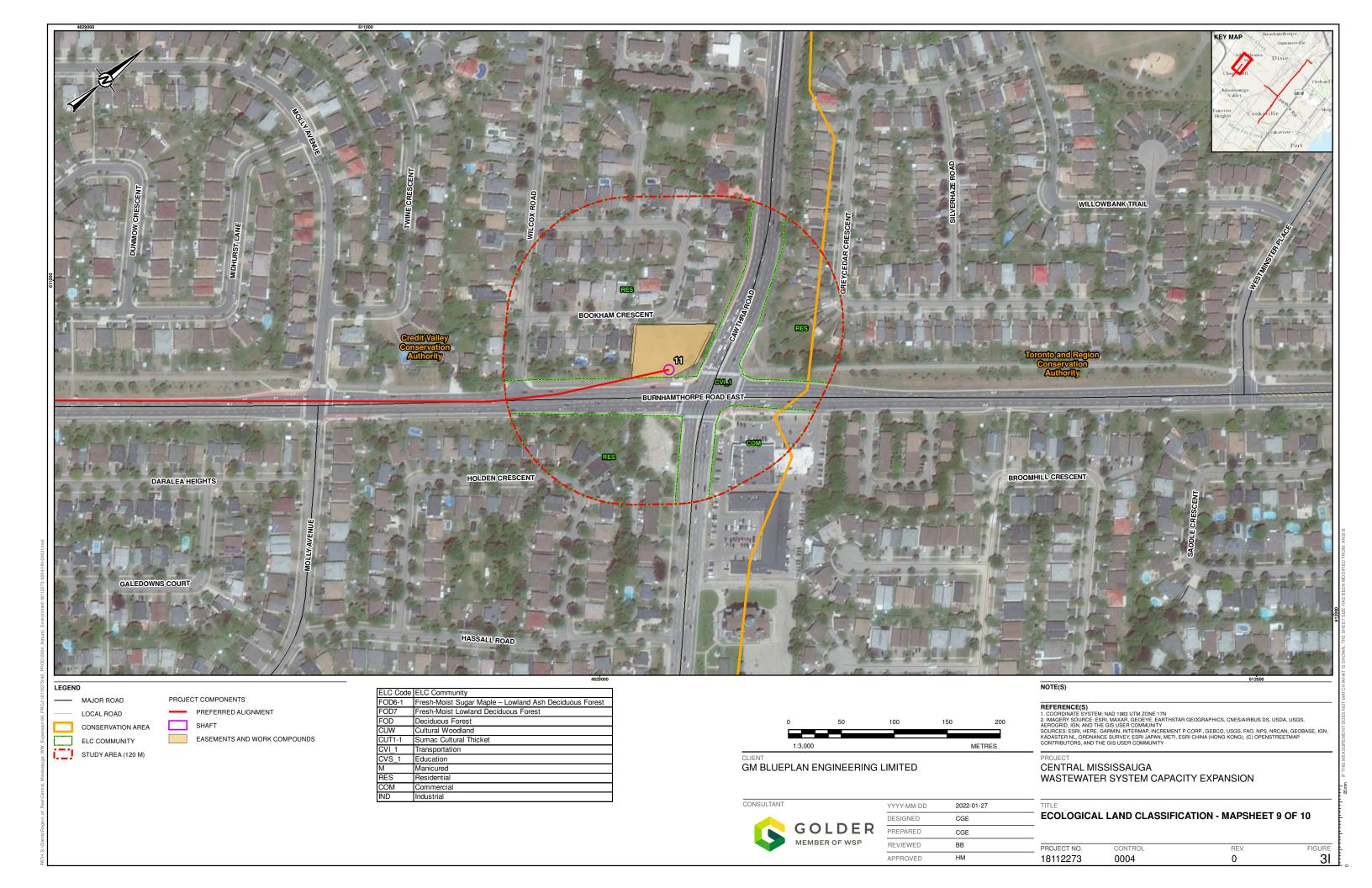


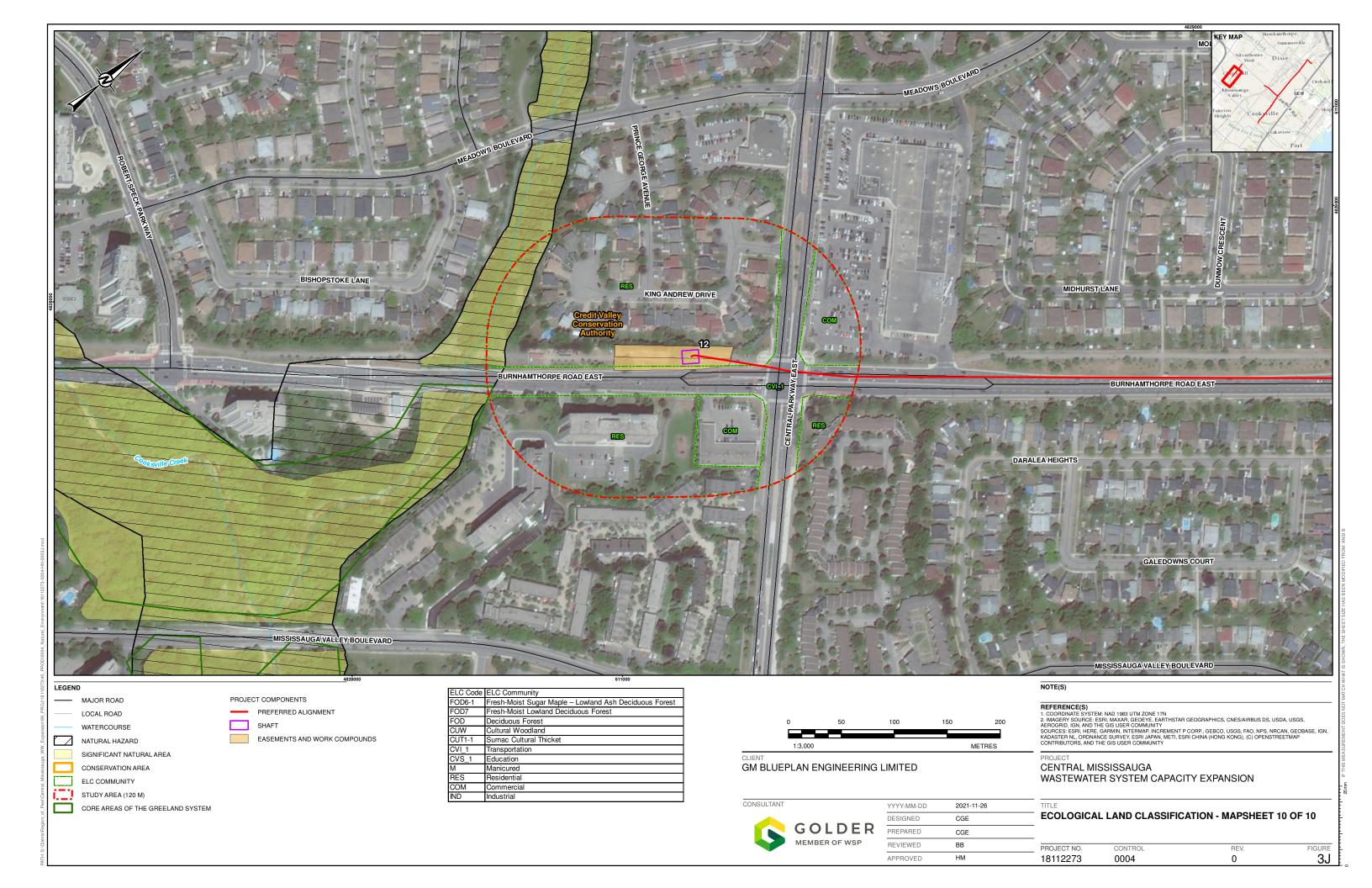












APPENDIX A

Fish Habitat Characterization and Species Recorded in Etobicoke and Cooksville Creeks



November 2021 18112273

Table 3: Fish Species Recorded in Cooksville Creek and Etobicoke Creek

Common Name	Latin Name	S Rank ^(a)	G Rank ^(b)	ESA ^(c)	SARA ^(d)	Ecological Orgin	Tolerance to Environmental Disturbances ^(e)	Cooksville Creek	Etobicoke Creek ^(f)
Alewife	Alosa pseudoharengus	SNA	G5	_	_	Invasive	Intermediate		Н
American Eel	Anguilla rostrata	S1?	G4	END	_	Native	Intermediate		H, X
Black Crappie	Pomoxis nigromaculatus	S4	G5	_	_	Native/Introduced	Tolerant		X
Blackchin Shiner	Notropis heterodon	S4	G5	_	_	Native	Intolerant		Н
Blacknose Dace	Rhinichthys atratulus	S5	G5	_	_	Native	Intermediate	Х	H, X, C
Blacknose Shiner	Notropis heterolepis	S5	G5	_	_	Native	Intolerant		Н
Bluegill	Lepomis macrochirus	S5	G5	_	_	Native	Intermediate		Х
Bluntnose Minnow	Pimephales notatus	S5	G5	_	_	Native	Intermediate	X	H, X
Brook Stickleback	Culaea inconstans	S5	G5	_	_	Native	Intermediate	Х	H, X
Brook Trout	Salvelinus fontinalis	S5	G5T5	_	_	Introduced/Invasive	Intolerant		H, X
Brown Bullhead	Ameiurus nebulosus	S5	G5	_	_	Native	Intermediate		X
Brown Trout	Salmo trutta	SNA	G5	_	_	Introduced/Invasive	Intolerant	Х	Н
Chinook Salmon	Oncorhynchus tshawytscha	SNA	G5	_	_	Introduced/Invasive	Intolerant		Н
Coho Salmon	Oncorhynchus kisutch	SNA	G5	_	_	Introduced/Invasive	Intolerant		H, X
Common Carp	Cyprinus carpio	SNA	G5	_	_	Invasive	Tolerant	Х	H, X
Common Shiner	Luxilus cornutus	S5	G5	_	_	Native	Intermediate	Х	H, X
Creek Chub	Semotilus atromaculatus	S5	G5	_	_	Native	Intermediate	Х	H, X
Emerald Shiner	Notropis atherinoides	S5	G5	_	_	Native	Intermediate		H, X
Fathead Minnow	Pimephales promelas	S5	G5	_	_	Native	Tolerant	Х	H, X
Fantail Darter	Etheostoma flabellare	S4	G5	_	_	Native	Intolerant		Н
Freshwater Drum	Aplodinotus grunniens	S5	G5	_	_	Native	Tolerant		H, X
Golden Shiner	Notemigonus crysoleucas	S5	G5	_	_	Native	Intermediate		Н
Goldfish	Carassius auratus	SNA	G5	_	_	Invasive	Tolerant	Х	Н
Johnny Darter	Etheostoma nigrum	S5	G5	_	_	Native	Tolerant		H, X
Lake Chub	Couesius plumbeus	S5	G5	_	_	Native	Intermediate	Х	H, C
Largemouth Bass	Micropterus salmoides	S5	G5	_	_	Native	Tolerant		H,X
Logperch	Percina caprodes	S5	G5	_	_	Native	Intolerant		Н
Longnose Dace	Rhinichthys cataractae	S5	G5	_	_	Native	Intermediate	Χ	H, X, C
Mottled Sculpin	Cottus bairdii	S5	G5	_	_	Native	Intermediate		Н
Northern Hog Sucker	Hypentelium nigricans	S4	G5	_	_	Native	Intermediate		Н
Pearl Dace	Margariscus margarita	S5	G5	_	_	Native	Intermediate		Н
Pumpkinseed	Lepomis gibbosus	S5	G5		_	Native	Intermediate		H, X
Rainbow Darter	Etheostoma caeruleum	S4	G5	_	_	Native	Intolerant		Н
Rainbow Trout	Oncorhynchus mykiss	SNA	G5	_	_	Introduced/Invasive	Intolerant	Х	
Rainbow Smelt	Osmerus mordax	S5	G5	_	_	Invasive	Intermediate		H, X
Redside Dace	Clinostomus elongatus	S2	G3G4	END	END	Native	Intolerant		Н



November 2021 18112273

Common Name	Latin Name	S Rank ^(a)	G Rank ^(b)	ESA ^(c)	SARA ^(d)	Ecological Orgin	Tolerance to Environmental Disturbances ^(e)	Cooksville Creek	Etobicoke Creek ^(f)
River Chub	Nocomis micropogon	S4	G5	_	_	Native/Introduced	Intermediate		Н
Rock Bass	Ambloplites rupestris	S5	G5	_	_	Native	Intermediate		H, X
Rosyface Shiner	Notropis rubellus	S4	G5	_	_	Native	Intermediate		Н
Round Goby	Neogobius melanostomus	SNA	G5	_	_	Invasive	Intermediate	X	
Round Whitefish	Prosopium cylindraceum	S4	G5	_	_	Native	Intolerant		Х
Shorthead Redhorse	Moxostoma macrolepidotum	S5	G5	_	_	Native	Intermediate		Н
Spotfin Shiner	Cyprinella spiloptera	S4	G5	_	_	Native	Intermediate		Н
Spottail Shiner	Notropis hudsonius	S5	G5	_	_	Native	Intermediate		H, X
Slimy Sculpin	Cottus cognatus	S5	G5	_	_	Native	Intolerant		H, X
Smallmouth Bass	Micropterus dolomieu	S5	G5	_	_	Invasive	Intermediate		X
Stonecat	Noturus flavus	S4	G5	_	_	Native	Tolerant		Н
Tessellated Darter	Etheostoma olmstedi	S4	G5	_	_	Native	Intermediate		Х
Threespine Stickleback	Gasterosteus aculeatus	S4	G5	_	_	Native	Intermediate		H, X
Walleye	Sander vitreus vitreus	S5	G5T5	_	_	Native	Intermediate		X
White Bass	Morone chrysops	S4	G5	_	_	Native	Tolerant		Н
White Crappie	Pomoxis annularis	S4	G5	_	_	Native	Tolerant		
White Perch	Morone americana	SNA	G5	_	_	Invasive	Intermediate		H, X
White Sucker	Catostomus commersonii	S5	G5	_	_	Native	Tolerant	Х	H, X
Yellow Perch	Perca flavescens	S5	G5	_	_	Native	Intermediate		Х

(a) Provincial Ranks (SRANK) are Rarity Ranks assigned to a species or ecological communities, by the Natural Heritage Information Centre (NHIC). These ranks are not legal designations. SRANKS are evaluated by NHIC on a continual basis and updated lists produced annually. SX (Presumed Extirpated), SH (Possibly Extirpated - Historical), S1 (Critically Imperiled), S2 (Imperiled), S3 (Vulnerable), S4 (Apparently Secure), S5 (Secure), SNA (Not Applicable), S#S# (Range Rank), S? (Not ranked yet), SAB (Breeding Accident), SAN (Non-breeding Accident), SX (Apparently Extirpated). Last assessed November 2019.

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

(c) Ontario Endangered Species Act, 2007 (ESA) (O.Reg 242/08 last amended 29 June 2020 as O.Reg 328/20). Species at Risk in Ontario List, 2007 (O.Reg 230/08 last amended 11 Aug 2018 as O. Reg 404/18, s. 1.) Schedule 1 (Extirpated - EXP), Schedule 2 (Endangered - END), Schedule 3 (Threatened - THR), Schedule 4 (Special Concern - SC)

- (d) Federal Species at Risk Act (SARA), Schedule 1. END = endangered.
- (e) Eakins, R. J. 2020. Ontario Freshwater Fishes Life History Database. Version 4.86. Online database. Available at: http://www.ontariofishes.ca Accessed July 2021
- (f) Historical records found in the Lower Etobicoke Creek Subwatershed. Available at: http://trca.on.ca/dotAsset/108689.pdf. Accessed July 2021

Notes: H = historical records (> 25 years); X = current records from background data; C = captured during the field survey. Sources:

MNRF. 2021. Fish ON-Line Availabel at: https://www.gisapplication.lrc.gov.on.ca/FishONLine/Index.html?site=FishONLine&viewer=FishONLine&locale=en-US. Accessed: Accessed June 2021

MNRF, 2021, Land Information Ontario Aquatics Resource Laver, Accessed June 2021

DFO. 2021. Aquatic Species at Risk Mapping. Availabel at: http://www.dfo-mpo.gc.ca/species-especes/sara-lep/map-carte/index-eng.html. Accessed Accessed June 2021

EDD Maps. 2021.



APPENDIX B

Photo Log - Cooksville Creek





Photo 1: Looking downstream at the riffle habitat 150 m upstream of Site 8



Photo 2: Looking at left downstream bank at riffle habitat 150 m upstream of Site 8



Photo 3: Looking at right downstream bank at riffle habitat 150 m upstream of Site 8



Photo 4: Looking upstream at the riffle habitat 150 m upstream of Site 8

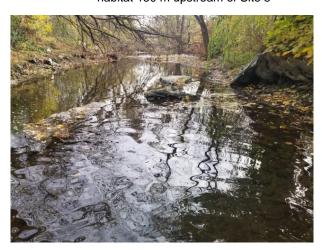


Photo 5: Looking downstream at the flat habitat 70 m upstream of Site 8



Photo 6: Looking at left downstream bank at flat habitat 70 m upstream of Site 8





Photo 7: Looking at the right downstream bank at the flat habitat 70 m upstream of Site 8



Photo 8: Looking upstream at the flat habitat 70 m upstream of Site 8



Photo 9: Looking downstream at the flat habitat 50 m upstream of Site 8



Photo 10: Looking at the left downstream bank at the flat habitat 50 m upstream of Site 8



Photo 11: Looking at the right downstream bank at the flat habitat 50 m upstream of Site 8



Photo 12: Looking upstream at the flat habitat 50 m upstream of Site 8





Photo 13: Looking downstream at the flat habitat at Site 8



Photo 14: Looking at the left downstream bank at the flat habitat at Site 8



Photo 15: Looking at the right downstream bank at the flat habitat at Site 8



Photo 16: Looking upstream at the flat habitat at Site 8



Photo 17: Looking downstream at the flat habitat 45 m downstream of Site 8



Photo 18:

Looking at the left downstream bank at flat habitat 45 m downstream of Site 8





Photo 19: Looking at right downstream bank at the flat habitat 45 m downstream of Site 8



Photo 20: Looking upstream at the flat habitat 45 m downstream of Site 8



Photo 21: Looking downstream at the riffle habitat 55 m downstream of Site 8



Photo 22: Looking at left downstream bank at the riffle habitat 55 m downstream of Site 8



Photo 23: Looking at right downstream bank at the riffle habitat 55 m downstream of Site 8



Photo 24:

Looking upstream at the riffle habitat 55 m downstream of Site 8





Photo 25: Looking downstream at the flat habitat 65 m downstream of Site 8



Photo 26: Looking at left downstream bank at the flat habitat 65 m downstream of Site 8



Photo 27: Looking at right downstream bank at the flat habitat 65 m downstream of Site 8



Photo 28: Looking upstream at the flat habitat 65 m downstream of Site 8

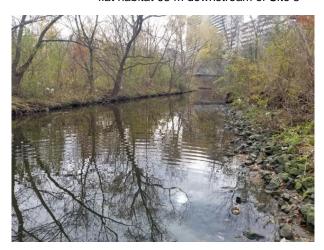


Photo 29: Looking downstream at the flat habitat 105 m downstream of Site 8



Photo 30: Looking at left downstream bank at the flat habitat 105 m downstream of Site 8





Photo 31: Looking at right downstream bank at the flat habitat 105 m downstream of Site 8



Photo 32: Looking upstream at the flat habitat 105 m downstream of Site 8



Photo 33: Looking downstream at the flat habitat 155 m downstream of Site 8



Photo 34: Looking at left downstream bank at the flat habitat 155 m downstream of Site 8



Photo 35: Looking at right downstream bank at the flat habitat 155 m downstream of Site 8

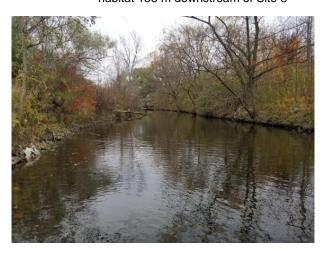


Photo 36:

Looking upstream at the flat habitat 155 m downstream of Site 8





Photo 37: Looking downstream at the flat habitat 200 m downstream of Site 8



Photo 38: Looking at left downstream bank at the flat habitat 200 m downstream of Site 8



Photo 39: Looking at right downstream bank at the flat habitat 200 m downstream of Site 8



Photo 40: Looking upstream at the flat habitat 200 m downstream of Site 8



January 28, 2022

APPENDIX C

Photo Log - Etobicoke Creek





Photo 1: Looking downstream at flat habitat 335 m downstream of Site 1



Photo 2: Looking at left downstream bank at flat habitat 335 m downstream of Site 1



Photo 3: Looking at right downstream bank at flat habitat 335 m downstream of Site 1



Photo 4: Looking upstream at flat habitat 335 m downstream of Site 1

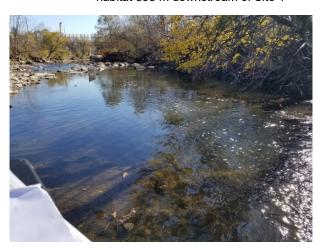


Photo 5: Looking downstream at run habitat 315 m downstream of Site 1



Photo 6:

Looking at left downstream bank at run habitat 315 m downstream of Site 1





Photo 7: Looking at right downstream bank at run habitat 315 m downstream of Site 1



Photo 8: Looking upstream at run habitat 315 m downstream of Site 1



Photo 9: Looking downstream at riffle habitat 260 m downstream of Site 1



Photo 10: Looking at left downstream bank at riffle habitat 260 m downstream of Site 1



Photo 11: Looking at right downstream bank at riffle habitat 260 m downstream of Site 1



Photo 12:

Looking upstream at riffle habitat 260 m downstream of Site 1





Photo 13: Looking downstream at flat habitat 230 m downstream of Site 1



Photo 14: Looking at left downstream bank at flat habita1t 230 m downstream of Site 1



Photo 15: Looking at right downstream bank at flat habitat 230 m downstream of Site 1



Photo 16: Looking upstream at flat habitat 230 m downstream of Site 1

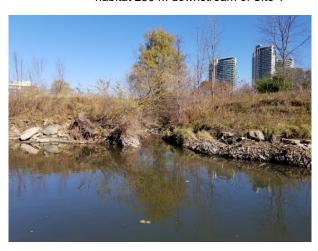


Photo 17: Drainage that enters Etobicoke Creek 220 m downstream of Site 1



Photo 18:

Looking downstream at flat habitat 190 m downstream of Site 1





Photo 19: Looking at the left downstream bank at flat habitat 190 m downstream of Site 1



oto 20: Looking at the right downstream bank flat habitat 190 m downstream of Site 1



Photo 21: Looking upstream at flat habitat 190 m downstream of Site 1



Photo 22: Looking downstream at run habitat 135 m downstream of Site 1

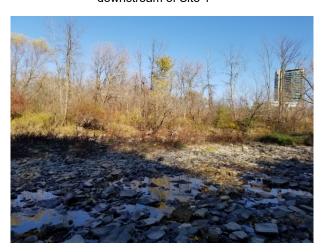
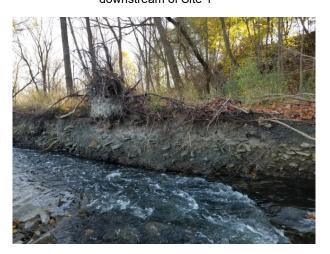


Photo 23: Looking at left downstream bank at run habitat 135 m downstream of Site 1



Looking at right downstream bank at run habitat 135 m downstream of Site 1

Photo 24:





Photo 25: Looking upstream at run habitat 135 m downstream of Site 1



Photo 26: Looking downstream at flat habitat 86 m downstream of Site 1



Photo 27: Looking at left downstream bank at flat habitat 86 m downstream of Site 1



Photo 28: Looking at right downstream bank at flat habitat 86 m downstream of Site 1



Photo 29: Looking upstream at flat habitat 86 m downstream of Site 1



Photo 30: Looking downstream at run habitat 45 m downstream of Site 1





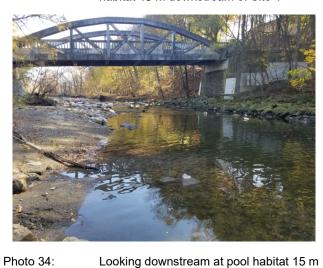
Photo 31: Looking at left downstream bank at run habitat 45 m downstream of Site 1



Photo 32: Looking at right downstream bank at run habitat 45 m downstream of Site 1



Photo 33: Looking upstream at run habitat 175 m 45 m downstream of Site 1



Looking downstream at pool habitat 15 m downstream of Site 1



Photo 35: Looking at left downstream bank at pool habitat 15 m downstream of Site 1



Looking at right downstream bank at pool habitat 15 m downstream of Site 1





Photo 37: Looking upstream at rapid habitat 15 m downstream of Site 1



Photo 38: Dead Salmonid found near rapid and run habitat at Site 1



Photo 39: Looking downstream at run habitat 30 m upstream of Site 1



Photo 40: Looking at left downstream bank at run habitat 30 m upstream of Site 1



Photo 41: Looking at right downstream bank at run habitat 30 m upstream of Site 1



Photo 42: Looking upstream at run habitat 30 m upstream of Site 1





Photo 43: Looking downstream at flat habitat 100 m upstream of Site 1



Photo 44: Looking at left downstream bank at flat habitat 100 m upstream of Site 1



Photo 45: Looking at right downstream bank at flat habitat 100 m upstream of Site 1



Photo 46: Looking upstream at flat habitat 100 m upstream of Site 1



Photo 47: Looking downstream at riffle habitat 225 to 280 m upstream of Site 1



Photo 48:

Looking at left downstream bank at riffle habitat 225 to 280 m upstream of Site 1





Photo 49: Looking at right downstream bank at riffle habitat 225 to 280 m upstream of Site 1



Photo 50: Looking upstream at riffle habitat 225 to 280 m upstream of Site 1



Photo 51: Looking at Tributary on right downstream bank 335 m upstream of Site 1



Photo 52: Looking downstream at flat habitat 280 to 430 m upstream of Site 1



Photo 53: Looking at left downstream bank at flat habitat 280 to 430 m upstream of Site 1



Photo 54: Looking at right downstream bank at flat habitat 280 to 430 m upstream of Site 1





Photo 55: Looking upstream at flat habitat 280 to 430 m upstream of Site 1



Photo 56: Looking downstream at riffle habitat 430 to 470 m upstream of Site 1



Photo 57: Looking at left downstream bank at riffle habitat 430 to 470 m upstream of Site 1



Photo 58: Looking at right downstream bank at riffle habitat 430 to 470 m upstream of Site 1



Photo 59: Looking upstream at riffle habitat 430 to 470 m upstream of Site 1



Photo 60: Blacknose Dace captured at Etobicoke Creek



January 28, 2022

APPENDIX D

Plant Species Observations



Scientific Name	Common Name	Origin ^a	E6Vp	GRANK ^c	CDVNKC	Site 1	Site 2	Site 8
Trees (25 taxa)	Common Name	Origin	ESA	GRANK	SKANK	Oite i	Oite 2	Oite 0
Abies balsamea	Balsam fir	N		G5	S5	~	I	~
Acer negundo	Manitoba maple	(N)		G5	S5	~	~	~
Acer platanoides	Norway maple	(14)		GNR	SNA	~	~	~
Acer saccharum	Sugar maple	N		G5	S5	~	•	
Fagus grandifolia	Beech	N		G5	S4	~		
Fraxinus pennsylvanica	Green ash	N		G5	S4	~	~	~
Juglans nigra	Black walnut	(N)		G5	S4	~	~	•
Juniperus virginiana	Eastern red cedar	N N		G5	S5	•	~	
Malus pumila		IN		G5	SNA	~	•	~
Morus alba	Apple White mulberry	l l		G?	SNA	~	~	~
Picea abies	•	l l			_		~	~
Pinus resinosa	Norway spruce Red pine			G5	SNA			~
		N		G5	S5		V	
Populus deltoides	Eastern cottonwood	N	_	G5T5	S5		~	
Populus grandidentata	Large-toothed aspen	N		G5	S5		~	
Populus tremuloides	Trembling aspen	N		G5	S5	~		•
Prunus persica	Peach	l I	_	_	_			*
Prunus serotina	Black cherry	N	_	G5	S5		~	
Pyrus calleryana	Callery pear	I	_	_	_			~
Quercus alba	White oak	N		G5	S5	~		
Robinia pseudoacacia	Black locust	I		G5	SNA		~	~
Salix alba	White willow	I		G5TNR	SU		~	~
Thuja occidentalis	Eastern white cedar	N		G5	S5	~	~	
Tilia americana	Basswood	N	_	G5	S5	~		
Ulmus americana	White elm	N	_	G5?	S5	~	~	
Ulmus pumila	Siberian elm	I	_	GNR	SNA	~	~	~
Small Trees, Shrubs, and Woo	· · · · · · · · · · · · · · · · · · ·							
Cornus sericea	Red-osier dogwood	N	_	G5	S5	~	~	
Crataegus monogyna	English hawthorn	I	_	G5	SNA		~	
Euonymus alatus	Winged euonymus	I	_	_	_	~		
Lonicera sp.	Honeysuckle	I	_	_	_	~	~	
Malus coronaria	Wild crabapple	N	_	G5	S4			~
Parthenocissus inserta	Virginia creeper	N	_	G5	S5	~		>
Prunus virginiana	Choke cherry	N	_	G5	S5	~	>	
Rhamnus cathartica	Common buckthorn	I		GNR	SNA	~	~	>
Rhus typhina	Staghorn sumac	N		G5	S5	~	~	
Rosa multiflora	Multiflora rose	1	_	GNR	SNA		~	
Rubus idaeus	Common red raspberry	N	_	G5	S5	~		
Salix petiolaris	Slender willow	N	_	G5	S5		~	
Solanum dulcamara	Climbing nightshade	I	_	GNR	SNA		~	~
Vincetoxicum rossicum	Dog strangling vine	I	_	GNR	SNA	~	~	
Vitis riparia	Riverbank grape	N	_	G5	S5	~	~	~
Graminoids (9 taxa)	•	•		•				
Bromus tectorum	Downy brome (cheatgrass)	l I	_	GNR	SNA	~		
Cladium mariscoides	Smooth twig-rush	N	_	G5	S5	~		
Juncus torreyi	Torrey's rush	N	_	G5	S5	~		
Phalaris arundinacea	Reed canary grass	N	_	G5	S5	~		
Phleum pratense	Common timothy	I	_	GNR	SNA	~	~	~
Scirpus atrovirens	Dark-green bulrush	N	_	G5	S5	~		
Setaria pumila	Yellow foxtail	ı	_	GNR	SNA			~
Typha angustifolia	Narrow-leaved cattail	ı	_	G5	SNA	~		~
Typha latifolia	Broad-leaved cattail	N	_	G5	S5	~		~
77						*	l	•



Scientific Name	Common Name	Origin ^a	FSA ^b	GBANK c	SRANK	Site 1	Site 2	Site 8
Forbs (49 taxa)		Origin	LOA	ORANI	OI WITH			
Achillea millefolium	Common yarrow	T		G5T5?	SNA		*	~
Aegopodium podagraria	Goutweed	 		GNR	SNA	~	*	•
Ageratina altissima (Eupatorium)	White snakeroot	N		G5T5	S5	~		
Allium tricoccum	Wild leek	N	_	G5	S5	•	~	
Ambrosia artemisiifolia	Ragweed	N	_	G5	S5	~	~	
Apios americana	Groundnut	N	_	G5	S5	•	~	
Arctium lappa	Giant burdock	1	_	GNR	SNA	~	~	~
Asclepias syriaca	Common milkweed	N N	_	G5	S5	~	~	•
Asclepias tuberosa	Butterfly weed	N	_	G5?	S4	<u> </u>	•	
Centaurea stoebe	Spotted knapweed	1	_	GNR	SNA	•	~	
Chelidonium majus	Celandine	i	_	GNR	SNA	~	•	
Chenopodium album	Lamb's-quarters	i		G5T5	SNA	•	~	~
·	·	<u> </u>		-				
Cichorium intybus	Chicory	<u> </u>	_	GNR	SNA	~	~	*
Cirsium arvense	Canada thistle	<u> </u>		GNR	SNA			*
Daucus carota	Wild carrot	I	_	GNR	SNA	~	~	*
Dipsacus fullonum	Fuller's teasel	1	_	GNR	SNA		~	~
Doellingeria umbellata	Flat-topped aster	N	_	G5T5	S5		~	
Erodium cicutarium	Stork's-bill		_	GNR	SNA		~	
Galium verum	Yellow bedstraw			GNR	SNA		~	
Geum urbanum	Wood avens	1		G5	SNA	<u> </u>		
Glechoma hederacea	Ground-ivy	I	_	GNR	SNA	~		
Helianthus sp.	Sunflower	_	_	_	_	~		
Helianthus tuberosus	Jerusalem artichoke	N		G5	S5			~
Iris pseudacorus	Yellow iris	ı		GNR	SNA			~
Linaria vulgaris	Butter-and-eggs	ı		GNR	SNA		~	
Malva neglecta	Common mallow	1		GNR	SNA			~
Medicago sativa	Alfalfa	1		GNR	S5			~
Petroselinum crispum	Parsley	1		GNR	SNA			~
Picris hieracioides	Oxtongue	I		G5	SNA		~	
Plantago lanceolata	Narrow-leaved plantain	I	_	G5	SNA			~
Polygonum aviculare	Prostrate knotweed	I	_	GNR	SNA			~
Polygonum cuspidatum	Japanese knotweed	I	_	GNR	SNA			*
Potentilla argentea	Silvery cinquefoil	I	_	GNR	SNA		~	
Rumex crispus	Curled dock	I	_	GNR	SNA		~	
Silene latifolia	White campion	I		GNR	SNA		~	
Silene vulgaris	Bladder campion	I		GNR	SNA		~	
Solidago canadensis	Canada goldenrod	N		G5T5	S5	~	~	~
Solidago flexicaulis	Zig-zag goldenrod	N	_	G5	S5	~		
Symphyotrichum ericoides	Heath aster	N	_	G5T5	S5		~	
Symphyotrichum lateriflorum	Calico aster	N	_	G5T?	S5	~	~	~
Symphyotrichum novae-angliae	New England aster	N	_	G5	S5		~	~
Tanacetum vulgare	Common tansy	1		GNR	SNA	~	~	
Taraxacum officinale	Common dandelion		_	G5	SNA	~	~	~
Tragopogon dubius	Goat's-beard	I		GNR	SNA		~	
Trifolium pratense	Red clover	I	_	GNR	SNA	~	~	*
Trifolium repens	White clover		_	GNR	SNA			~
Verbascum thapsus	Common mullein		_	GNR	SNA	~	~	
Vicia cracca	Cow-vetch	I	_	GNR	SNA	~	~	
Xanthium strumarium	Rough cocklebur	N	_	G5	S5	~		



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Scientific Name	Common Name	Origin"	ESA	GRANK ^c SRANK ^c	Site 1	Site 2	Site 8

^a Origin: N = Native; I = Introduced.



^b Ontario *Endangered Species Act (ESA), 2*007 (O.Reg 242/08 last amended 29 June 2020 as O.Reg 328/20). Species at Risk in Ontario List, 2007 (O.Reg 230/08 last amended 11 Aug 2018 as O. Reg 404/18, s. 1.); Schedule 1 (Extirpated - EXP), Schedule 2 (Endangered - END), Schedule 3 (Threatened - THR), Schedule 4 (Special Concern - SC)

^cRanks based upon determinations made by the Ontario Natural Heritage Information Centre.

G = Global; S = Provincial; Ranks 1-3 are considered imperiled or rare; Ranks 4 and 5 are considered secure.

SNA = Not applicable for Ontario Ranking (e.g. Exotic species); SNR = Provincial conservation status not yet assessed;

B = status applies to the breeding population of the species

January 28, 2022

APPENDIX E

Wildlife Species Observations



Common Name	Scientific Name	SRANK	GRANK ^a	FSA ^b	SARAC	Site 1	Site 2	Site 8
Birds			0101111		07.11.0.1			
American goldfinch	Carduelis tristis	S5B	G5	_	I — I	~	~	~
American redstart	Setophaga ruticilla	S5B	G5	_	_	~		
American robin	Turdus migratorius	S5B	G5	_	_	~		~
Baltimore oriole	Icterus galbula	S4B	G5	_	_		~	*
Black-capped chickadee	Poecile atricapilla	S5	G5	_	_	~		
Blue jay	Cyanocitta cristata	S5	G5	_	_	~	~	~
Brown-headed cowbird	Molothrus ater	S4B	G5	_	_	~	~	
Cedar waxwing	Bombycilla cedrorum	S5B	G5	_	_	~	~	~
Chimney swift	Chaetura pelagica	S4B, S4N	G5	THR	THR			~
Common grackle	Quiscalus quiscula	S5B	G5	_	_	~	~	~
Downy woodpecker	Picoides pubescens	S5	G5	_	_			~
Eastern kingbird	Tyrannus tyrannus	S4B	G5	_	_		~	
European starling	Sturnus vulgaris	SNA	G5	_	_	~	~	~
Gray catbird	Dumetella carolinensis	S4B	G5	_	_	~	~	~
Great Crested Flycatcher	Myiarchus crinitus	S4B	G5	_	_	~		
House finch	Carpodacus mexicanus	SNA	G5	_	_			~
House sparrow	Passer domesticus	SNA	G5	_	_			~
Mallard	Anas platyrhynchos	S5	G5	_	_			~
Mourning dove	Zenaida macroura	S5	G5	_	_	~	~	~
Northern cardinal	Cardinalis cardinalis	S5	G5	_	_	~	~	~
Northern rough-winged swallow	Stelgidopteryx serripennis	S4B	G5	_	_	~		
Red-eyed vireo	Vireo olivaceus	S5B	G5	_	_	~	~	
Red-winged blackbird	Agelaius phoeniceus	S4	G5	_	_	~	~	~
Ring-billed gull	Larus delawarensis	S5B,S4N	G5	_	_	~	~	~
Rock pigeon	Columba livia	SNA	G5	_	_			~
Sharp-shinned hawk	Accipiter striatus	S5	G5	_	_			~
Song sparrow	Melospiza melodia	S5B	G5	_	_	~	~	~
Turkey vulture	Cathartes aura	S5B	G5	_	_	~		~
Warbling vireo	Vireo gilvus	S5B	G5	_	_			~
Winter wren	Troglodytes hiemalis	S5B	G5	_		~		
Yellow warbler	Setophaga petechia	S5B	G5	_	-	~	~	~
Mammals								
Eastern cottontail	Sylvilagus floridanus	S5	G5	_	_			~
Grey squirrel	Sciurus carolinensis	S5	G5	_	-	~	~	>
Mink	Mustela vison	S4	G5	_	_	~		

 ^a Ranks based upon determinations made by the Ontario Natural Heritage Information Centre
 G = Global; S = Provincial; Ranks 1-3 are considered imperiled or rare; Ranks 4 and 5 are considered secure.
 SNA = Not applicable for Ontario Ranking (e.g. Exotic species)

Bolded species are designated under the ESA



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^b Ontario *Endangered Species Act, 2007* (ESA) (O.Reg 242/08 last amended 29 June 2020 as O.Reg 328/20). Species at Risk in Ontario List, 2007 (O.Reg 230/08 last amended 11 Aug 2018 as O. Reg 404/18, s. 1.); Schedule 1 (Extirpated - EXP), Schedule 2 (Endangered - END), Schedule 3 (Threatened - THR), Schedule 4 (Special Concern - SC)

^c Federal *Species at Risk Act* (SARA), Schedule 1. THR = threatened.

January 28, 2022

APPENDIX F

Species at Risk Screening



Taxon	Common Name	Scientific Name	Endangered Species Act ¹	Species at Risk Act (Sch 1) ²	COSEWIC ³	Provinc ial (SRank)	Habitat Requirements ⁵	ESA Habitat Protection Provisions ⁶	Potential to Occur on Site or in the Study Area	Rationale for Potential to Occur on Site or in the Study Area
Amphibian	Jefferson salamander	Ambystoma jeffersonianum	END	END	END	S2	In Ontario, Jefferson salamander is found only in southern Ontario, along southern portions of the Niagara Escarpment and western portions of the Oak Ridges Moraine. Jefferson salamander prefers moist, well-drained deciduous and mixed forests with a closed canopy. It overwinters underground in mammal burrows and rock fissures, and moves to vernal pools and ephemeral wetlands in the early spring to breed. Breeding ponds are typically located in or near to forested habitats, and contain submerged debris (i.e., sticks, vegetation) for egg attachment sites. Ephemeral breeding pools need to have water until at least mid-summer (mid to late July) (Jefferson Salamander Recovery Team 2010).	Regulated In the geographic areas of: City of Hamilton; counties of Brant, Dufferin, Elgin, Grey, Haldimand, Norfolk, and Wellington; regional municipalities of Halton, Niagara, Peel, Waterloo and York Regulated Habitat: i. wetland, pond or vernal pool, or other temporary pool, being used or was used in previous five years, by Jefferson salamander or Jefferson dominated polyploidy ii. area within 300 m of wetland, pond or vernal or other temporary pool that provides suitable foraging, dispersal, migration or hibernation conditions iii. wetland, pond or vernal or other temporary pool that provides suitable breeding conditions, is within 1 km of an area described in i. and is connected to the area described in i. and an area described in iv. iv. an area providing suitable conditions for Jefferson salamander or Jefferson dominated polyploids to disperse and is within 1 km of an area described in i.	Low	There is no suitable vernal pool or wetland habitat on the sites or in the study areas.
Amphibian	Jefferson X Blue- spotted salamander, Jefferson genome dominates	Ambystoma hybrid pop. 1		_	_	S2	In Ontario, Jefferson x blue-spotted salamander prefers moist, well-drained deciduous and mixed forests with a closed canopy. It overwinters underground in mammal burrows and rock fissures, and moves to vernal pools and ephemeral wetlands in the early spring to breed. Breeding ponds are typically located in or near to forested habitats, and contain submerged debris (i.e., sticks, vegetation) for egg attachment sites. Ephemeral breeding pools need to have water until at least mid-summer (mid to late July) (Jefferson Salamander Recovery Team 2010).		Low	There is no suitable vernal pool or wetland habitat on the sites or in the study areas.
Amphibian	Western chorus frog - Great Lakes St. Lawrence / Canadian Shield population	Pseudacris triseriata	_	THR	THR	S3	In Ontario, habitat of this amphibian species typically consists of marshes or wooded wetlands, particularly those with dense shrub layers and grasses, as this species is a poor climber. They will breed in almost any fishless pond including roadside ditches, gravel pits and flooded swales in meadows. This species hibernates in terrestrial habitats under rocks, dead trees or leaves, in loose soil or in animal burrows. During hibernation, this species is tolerant of flooding (Environment Canada 2015).		Low	There is no suitable vernal pool or wetland habitat on the sites or in the study areas.



Taxon	Common Name	Scientific Name	Endangered Species Act ¹	Species at Risk Act (Sch 1) ²	COSEWIC ³	Provinc ial (SRank)	Habitat Requirements⁵	ESA Habitat Protection Provisions ⁶	Potential to Occur on Site or in the Study Area	Rationale for Potential to Occur on Site or in the Study Area
Arthropod	Monarch	Danaus plexippus	SC	SC	END	S2N, S4B	In Ontario, monarch is found throughout the northern and southern regions of the province. This butterfly is found wherever there are milkweed (<i>Asclepias</i> spp.) plants for its caterpillars and wildflowers that supply a nectar source for adults. It is often found on abandoned farmland, meadows, open wetlands, prairies and roadsides, but also in city gardens and parks. Important staging areas during migration occur along the north shores of the Great Lakes (COSEWIC 2010).		Moderate	The open meadows on Site 1 and Site 2 may provide suitable breeding and foraging habitat. Sparsely distributed milkweed plants were observed within the meadows.
Arthropod	Mottled duskywing	Erynnis martialis	END		END	S2	In Ontario, the mottled duskywing is found in the same habitat as its food plant <i>Ceanothus</i> spp.: open or partially open, dry, sandy areas, or limestone alvars. These habitats are relatively uncommon and include dry open pine and pine oak woodland, other open dry woodlands, alvars, savannah and other dry open sandy habitats. Usually seen nectaring on wildflowers, or on wet sandy roads in the company of other duskywing species (Linton 2015).	General	Low	There is no suitable dry open habitat on the sites or in the study areas.
Arthropod	Nine-spotted lady beetle	Coccinella novemnotata	END		END	SH	In Ontario, nine-spotted lady beetle is a habitat generalist that may occur in both natural and anthropogenic landscapes, including agricultural fields, suburban gardens and parks, forests, prairie, meadow, riparian areas and isolated natural areas. Distribution of this species is driven primarily by prey abundance rather than habitat type. Adults overwinter together in well-ventilated microhabitats, including under stones, rock crevices, in grass tussocks and leaf litter, or in tree bark (COSEWIC 2016). Species may be extirpated from province.	General	Low	This species has not been seen in the province since the mid-1990s and is believed to be extirpated.
Arthropod	Rapids clubtail	Gomphus quadricolor	END	END	END	S1	In Ontario, rapids clubtail has been recorded in only four rivers in southwestern and southeastern Ontario: Thames, Humber, Credit and Mississippi. This dragonfly's nymph inhabits medium to large, swift-flowing streams with interspersed rapids and muddy pools. Gravel or cobble substrate is preferred, and protruding boulders are used by adults to perch. Riparian forest habitat is also required for adult females (Hamill 2010).	Regulated In the geographic areas of: Municipalities of Mississippi Mills, Thames Centre, South-West Oxford, Zorra, Caledon, King and Vaughan Regulated Habitat: • any part of river, stream or other water body up to high water mark currently used, or used within past 5 years by clubtail or on which it depends for life processes; or adjacent area of deciduous or mixed forest or of deciduous or mixed treed swamp and within 200 m of relevant high water mark	Low	This species is believed to be extirpated from the Credit River in the vicinity of the study areas.
Arthropod	West Virginia white	Pieris virginiensis	SC	_	_	\$3	In Ontario, west Virginia white is found primarily in the central and southern regions of the province. This butterfly lives in moist, mature, deciduous and mixed woodlands, and the caterpillars feed only on the leaves of toothwort (<i>Cardamine</i> spp.), which are small, spring-blooming plants of the forest floor.		Low	Although forests on Sites 1, 2, and 8 may provide suitable habitat, there are only historical records for this species in the vicinity



Taxon	Common Name	Scientific Name	Endangered Species Act ¹	Species at Risk Act (Sch 1) ²	COSEWIC ³	Provinc ial (SRank)	Habitat Requirements⁵	ESA Habitat Protection Provisions ⁶	Potential to Occur on Site or in the Study Area	Rationale for Potential to Occur on Site or in the Study Area
							These woodland habitats are typically maple-beech- birch dominated. This species is associated with woodlands growing on calcaerous bedrock or thin soils over bedrock (Burke 2013).			of the study areas (i.e., 1955).
Arthropod	Yellow-banded bumble bee	Bombus terricola	SC	SC	SC	S2	Yellow-banded bumblebee is a forage and habitat generalist, occupying open woodlands, meadows, grasslands, farmlands and urban parks, and taking nectar from various flowering plants (COSEWIC 2015). It is an early emerging species, making it likely an important pollinator of early blooming wild flowering plants (e.g., wild blueberry) and agricultural crops (e.g., apple). Nest sites are often in abandoned rodent burrows in old fields and queens overwinter by burrowing into loose soil or rotting trees (COSEWIC 2015).		Moderate	The open meadows on Site 1 and Site 2 may provide suitable breeding and foraging habitat. In addition, the deciduous forests overlapping Sites 1, 2, and 8 and the respective study areas may provide suitable nesting and overwintering habitat.
Bird	American white pelican	Pelecanus erythrorhynchos	THR		NAR	S2B	In Ontario, American white pelican breeds in colonies on remote islands in large freshwater lakes and rivers. They cover a vast amount of territory between their breeding sites and foraging habitat which can be 50 to 100 km away. The colony may shift their nesting location from year to year according to habitat availability. They nest in a vegetation lined depression, on relatively flat, higher ground, with a soil substrate (Knopf and Evans 2004).	Regulated In the geographic areas of: Thunder Bay, Kenora, and Rainy River Districts Regulated Habitat: • area used presently or during past 10 years for nesting by a single pelican or colony of pelicans and area within 300 m	Low	There is no island habitat on the sites or in the study areas.
Bird	Bald eagle	Haliaeetus leucocephalus	SC	_	NAR	S2N,S4 B	In Ontario, bald eagle nests are typically found near the shorelines of lakes or large rivers, often on forested islands. The large, conspicuous nests are typically found in large super-canopy trees along water bodies (Buehler 2000).		Low	There are no shorelines of large lakes or rivers on the sites or in the study areas.
Bird	Bank swallow	Riparia riparia	THR	THR	THR	S4B	In Ontario, bank swallow breeds in a variety of natural and anthropogenic habitats, including lake bluffs, stream and river banks, sand and gravel pits, and roadcuts. Nests are generally built in a vertical or near-vertical bank. Breeding sites are typically located near open foraging sites such as rivers, lakes, grasslands, agricultural fields, wetlands and riparian woods. Forested areas are generally avoided (Garrison 1999).	General (Draft) Category 1 – Breeding colony, including burrows and substrate between them Category 2 – Area within 50 m of the front of breeding colony face Category 3 – Area of suitable foraging habitat within 500 m of the outer edge of breeding colony	Low	Although vertical banks were observed along Etobicoke Creek, outside of Site 2 in the eastern portion of the study area, no evidence of nesting was observed.
Bird	Barn owl	Tyto alba	END	END	END	S1	In Ontario, barn owl breeding habitat consists of open countryside, with a preference for pastures, hayfields, marshes and grassy roadsides. Suitable habitat contains suitable nesting sites and adequate mice and vole populations. Nesting occurs in a wide variety of human made structures including barns and nest boxes, as well as natural sites such as hollow trees and cavities in cliffs and riverbanks	Regulated In the geographic areas of: n/a Regulated Habitat: • nesting or roosting site being used or was used by a barn owl during the past 12 months • any barn, building or other structure on or in which a nesting or roosting site is located	Low	There is no suitable open countryside habitat on the sites or in the study areas.



Taxon	Common Name	Scientific Name	Endangered Species Act ¹	Species at Risk Act (Sch 1) ²	COSEWIC ³	Provinc ial (SRank)	Habitat Requirements⁵	ESA Habitat Protection Provisions ⁶	Potential to Occur on Site or in the Study Area	Rationale for Potential to Occur on Site or in the Study Area
							(Marti et al. 2005). In Ontario, anthropogenic nest sites such as barns may be preferred (COSEWIC 2010).	 tree or other natural feature on or in which a nesting or roosting site is located and the area within 25 m of the base of that tree or natural feature area within 1 km of a nesting or roosting site and/or a barn, building, or other structure, tree or other natural feature on or in which a nesting or roosting site is located that provides suitable foraging conditions for barn owl 		
Bird	Barn swallow	Hirundo rustica	THR	THR	THR	S4B	In Ontario, barn swallow breeds in areas that contain a suitable nesting structure, open areas for foraging, and a body of water. This species nests in human made structures including barns, buildings, sheds, bridges, and culverts. Preferred foraging habitat includes grassy fields, pastures, agricultural cropland, lake and river shorelines, cleared rights-ofway, and wetlands (COSEWIC 2011). Mud nests are fastened to vertical walls or built on a ledge underneath an overhang. Suitable nests from previous years are reused (Brown and Brown 1999).	General Category 1 – Nest Category 2 – Area within 5 m of the nest Category 3 – Area between 5-200 m of the nest	Low	Although three unoccupied barn swallow nests were observed during the field reconnaissance in October 2019 beneath the Etobicoke Creek bridge immediately west of Site 1, no individuals or any evidence of nesting was observed during breeding bird surveys, or any other surveys conducted.
Bird	Bobolink	Dolichonyx oryzivorus	THR	THR	THR	S4B	In Ontario, bobolink breeds in grasslands or graminoid dominated hayfields with tall vegetation (Gabhauer 2007). Bobolink prefers grassland habitat with a forb component and a moderate litter layer. They have low tolerance for presence of woody vegetation and are sensitive to frequent mowing within the breeding season. They are most abundant in established, but regularly maintained, hayfields, but also breed in lightly grazed pastures, old or fallow fields, cultural meadows and newly planted hayfields. Their nest is woven from grasses and forbs. It is built on the ground, in dense vegetation, usually under the cover of one or more forbs (Renfrew et al. 2015).	General Category 1 – Nest and area within 10 m of nest Category 2 – Area between 10 – 60 m of the nest or centre of approximated defended territory Category 3 - Area of continuous suitable habitat between 60 – 300 m of the nest or centre of approximated defended territory	Low	The study areas lack breeding habitat, such as hayfields or grasslands, suitable for this species.
Bird	Canada warbler	Cardellina canadensis	SC	THR	THR	S4B	In Ontario, breeding habitat for Canada warbler consists of moist mixed forests with a well-developed shrubby understory. This includes low-lying areas such as cedar and alder swamps, and riparian thickets (McLaren 2007). It is also found in densely vegetated regenerating forest openings. Suitable habitat often contains a developed moss layer and an uneven forest floor. Nests are well concealed on or near the ground in dense shrub or fern cover, often in stumps, fallen logs, overhanging stream banks or mossy hummocks (Reitsma et al. 2010).		Low	There is no suitable swamp or thicket habitat on the sites or in the study areas.



Taxon	Common Name	Scientific Name	Endangered Species Act ¹	Species at Risk Act (Sch 1) ²	COSEWIC ³	Provinc ial (SRank)	Habitat Requirements⁵	ESA Habitat Protection Provisions ⁶	Potential to Occur on Site or in the Study Area	Rationale for Potential to Occur on Site or in the Study Area
Bird	Chimney swift	Chaetura pelagica	THR	THR	THR	S4B, S4N	In Ontario, chimney swift breeding habitat is varied and includes urban, suburban, rural and wooded sites. They are most commonly associated with towns and cities with large concentrations of chimneys. Preferred nesting sites are dark, sheltered spots with a vertical surface to which the bird can grip. Unused chimneys are the primary nesting and roosting structure, but other anthropogenic structures and large diameter cavity trees are also used (COSEWIC 2007).	General Category 1 – Human-made nest/roost, or natural nest/roost cavity and area within 90 m of natural cavity	High	There is no suitable natural or anthropogenic habitat on the sites. Three chimney swift individuals were observed flying over Site 8. Chimneys on residential houses throughout all study areas may provide suitable nesting habitat.
Bird	Common nighthawk	Chordeiles minor	SC	THR	SC	S4B	In Ontario, these aerial foragers require areas with large open habitat. This includes farmland, open woodlands, clearcuts, burns, rock outcrops, alvars, bogs, fens, prairies, gravel pits and gravel rooftops in cities (Sandilands 2007).		Low	The study area lacks large areas of open habitat preferred by this species.
Bird	Eastern meadowlark	Sturnella magna	THR	THR	THR	S4B	In Ontario, eastern meadowlark breeds in pastures, hayfields, meadows and old fields. Eastern meadowlark prefers moderately tall grasslands with abundant litter cover, high grass proportion, and a forb component (Hull 2003). They prefer well drained sites or slopes, and sites with different cover layers (Roseberry and Klimstra 1970).	General Category 1 – Nest and area within 10 m of the nest Category 2 – Area between 10 – 100 m of the nest or centre of approximated defended territory Category 3 – Area of continuous suitable habitat between 100 – 300 m of the nest or centre of approximated defended territory	Low	The study areas lack suitable breeding habitat (i.e., pastures, hayfields, meadows) preferred by this species.
Bird	Eastern wood- pewee	Contopus virens	SC	SC	SC	S4B	In Ontario, eastern wood-pewee inhabits a wide variety of wooded upland and lowland habitats, including deciduous, coniferous, or mixed forests. It occurs most frequently in forests with some degree of openness. Intermediate-aged forests with a relatively sparse midstory are preferred. In younger forests with a relatively dense midstory, it tends to inhabit the edges. Also occurs in anthropogenic habitats providing an open forested aspect such as parks and suburban neighborhoods. Nest is constructed atop a horizontal branch, 1-2 m above the ground, in a wide variety of deciduous and coniferous trees (COSEWIC 2012).		Low	Although forests on Sites 1, 2, and 8 may provide suitable habitat, this species was not observed during breeding bird surveys or other field surveys.
Bird	Golden-winged warbler	Vermivora chrysoptera	SC	THR	THR	S4B	In Ontario, golden-winged warbler breeds in regenerating scrub habitat with dense ground cover and a patchwork of shrubs, usually surrounded by forest. Their preferred habitat is characteristic of a successional landscape associated with natural or anthropogenic disturbance such as rights-of-way, and field edges or openings resulting from logging or burning. The nest of the golden-winged warbler is built on the ground at the base of a shrub or leafy plant, often at the shaded edge of the forest or at the edge of a forest opening (Confer et al. 2011).		Low	There is no suitable scrub habitat on the sites or in the study areas.



Taxon	Common Name	Scientific Name	Endangered Species Act ¹	Species at Risk Act (Sch 1) ²	COSEWIC ³	Provinc ial (SRank)	Habitat Requirements⁵	ESA Habitat Protection Provisions ⁶	Potential to Occur on Site or in the Study Area	Rationale for Potential to Occur on Site or in the Study Area
Bird	Henslow's sparrow	Ammodramus henslowii	END	END	END	SHB	In Ontario, Henslow's sparrow breeds in large grasslands with low disturbance, such as lightly grazed and ungrazed pastures, fallow hayfields, grassy swales in open farmland, and wet meadows. Preferred habitat contains tall, dense grass cover, typically over 30 cm high, with a high percentage of ground cover, and a thick mat of dead plant material. Henslow's sparrow generally avoids areas with emergent woody shrubs or trees, and fence lines. Areas of standing water or ephemerally wet patches appear to be important. This species breeds more frequently in patches of habitat greater than 30 ha and preferably greater than 100 ha (COSEWIC 2011).	General Category 1 – Nest or probable breeding occurrence and the area within 50 m Category 2 – Area of continuous suitable habitat outside of category 1	Low	The study area lacks suitable breeding habitat (i.e., large, undisturbed grasslands) preferred by this species.
Bird	Horned grebe	Podiceps auritus	SC	SC	SC	S1B, S4N	In Ontario, horned grebe breeds in small freshwater ponds, marshes or lake inlets, which includes manmade ponds. Preferred habitat has a mixture of open water and emergent vegetation and is usually less than 10 ha in size. The horned grebe builds a cryptic floating nest in the shallows not far from open water (Hoar 2007).		Low	There are no freshwater ponds or marshes on the sites or in the study areas.
Bird	King rail	Rallus elegans	END	END	END	S2B	In Ontario, king rail breeds in freshwater marshes, especially large marshes with a variety of water level conditions and a mosaic of habitats. This species prefers relatively shallow wetlands containing dense emergent vegetation (especially cattails), patches of open water, hummocks, mudflats and shrubby swales. Nests are generally well concealed in patches of dense, uniform vegetation over shallow water areas (COSEWIC 2011).	General	Low	There are no large marshes on the sites or in the study areas.
Bird	Least bittern	lxobrychus exilis	THR	THR	THR	S4B	In Ontario, least bittern breeds in marshes, usually greater than 5 ha, with emergent vegetation, relatively stable water levels and areas of open water. Preferred habitat has water less than 1 m deep (usually 10 – 50 cm). Nests are built in tall stands of dense emergent or woody vegetation (Woodliffe 2007). Clarity of water is important as siltation, turbidity, or excessive eutrophication hinders foraging efficiency (COSEWIC 2009).	General (as of June 30, 2013)	Low	There are no large marshes on the sites or in the study areas.



Taxon	Common Name	Scientific Name	Endangered Species Act ¹	Species at Risk Act (Sch 1) ²	COSEWIC ³	Provinc ial (SRank)	Habitat Requirements ⁵	ESA Habitat Protection Provisions ⁶	Potential to Occur on Site or in the Study Area	Rationale for Potential to Occur on Site or in the Study Area
Bird	Northern bobwhite	Colinus virginianus	END	END	END	S1	In Ontario, northern bobwhite breeds in early successional habitats. This species requires a combination of three habitat types: woody cover, cropland and grassland. Croplands provide foraging habitat, grassland and fields are used for nesting, and dense brush provides both winter forage and year-round cover. This species nests on the ground in a shallow depression lined with grasses and other dead vegetation (Brennan et al. 2014).	General	Low	There is no early successional habitat on the sites or in the study areas.
Bird	Olive-sided flycatcher	Contopus cooperi	SC	THR	SC	S4B	In Ontario, olive-sided flycatcher breeding habitat consists of natural openings in coniferous or mixed forests, including bogs, burns, riparian zones, and cutover areas. They are also found in semi-open forest stands and early successional forest when tall snags and residual live trees are present. In the boreal forest it is often associated with muskeg, bogs, fens and swamps dominated by spruce and tamarack. Open areas with tall trees or snags for perching are used for foraging (COSEWIC 2007). Nests are usually built on horizontal branches of conifers (Peck and James 1987).		Low	There are no coniferous or mixed forests on the sites or in the study areas.
Bird	Peregrine falcon (anatum/tundrius subspecies)	Falco peregrinus anatum/ tundrius	SC	SC	NAR	S3B	In Ontario, peregrine falcon breeds in areas containing suitable nesting locations and sufficient prey resources. Such habitat includes both natural locations containing cliff faces (heights of 50 - 200 m preferred) and also anthropogenic landscapes including urban centres containing tall buildings, open pit mines and quarries, and road cuts. Peregrine falcons nest on cliff ledges and crevices and building ledges. Nests consist of a simple scrape in the substrate (COSEWIC 2007).		Low	There is no suitable natural or anthropogenic habitat on the sites or in the study areas.
Bird	Piping plover	Charadrius melodus circumcinctus	END	END	END	S1B	In Ontario, breeding habitat for the piping plover consists of large, sparsely vegetated beaches of open sand, gravel or cobble, frequently adjacent to freshwater dune formations. The Great Lakes population typically breeds on beaches wider than 10 m with greater than 400 m of shoreline. Beaches separated from the tree line by freshwater dunes for at least 50 m are preferred. Nesting areas are often near to a seep, river or marsh. As of 2013, two subpopulations exist in Ontario. One population has bred in recent years on Lake Huron and Georgian Bay; the other population at Lake of the Woods. Historically, this species has bred at sites on Lake Erie and Lake Ontario (Kirk 2013).	General Category 1 – Nest scrape and terrestrial area within 50 m (lengthwise) of the scrape Category 2 – Open Beach/Bar or Open Sand Dune ELC community series between 50-500 m (lengthwise) of the nest scrape	Low	There is no beach habitat on the sites or in the study areas.



Taxon	Common Name	Scientific Name	Endangered Species Act ¹	Species at Risk Act (Sch 1) ²	COSEWIC ³	Provinc ial (SRank)	Habitat Requirements ⁵	ESA Habitat Protection Provisions ⁶	Potential to Occur on Site or in the Study Area	Rationale for Potential to Occur on Site or in the Study Area
Bird	Prothonotary warbler	Protonotaria citrea	END	END	END	S1B	In Ontario, prothonotary warbler breeds in mature and semi-mature, deciduous swamp forest with a closed canopy, and large expanses of relatively deep, open standing water. Swamps are typically dominated by silver maple, black ash, yellow birch, and black gum. These birds' nest in tree cavities, favouring small, shallow holes often situated at low heights in dead or dying trees. Nests are typically situated over standing or slow-moving water. Artificial nest boxes are also readily accepted. This species is area sensitive and is seldom found in forests less than 100 ha in size (COSEWIC 2007).	General	Low	There are no deciduous swamps on the sites or in the study areas.
Bird	Red-headed woodpecker	Melanerpes erythrocephalus	SC	END	END	S4B	In Ontario, red-headed woodpecker breeds in open, deciduous woodlands or woodland edges and are often found in parks, cemeteries, golf courses, orchards and savannahs (Woodliffe 2007). They may also breed in forest clearings or open agricultural areas provided that large trees are available for nesting. They prefer forests with little or no understory vegetation. They are often associated with beech or oak forests, beaver ponds and swamp forests where snags are numerous. Nests are excavated in the trunks of large dead trees (Frei et al. 2017).		Low	Although deciduous forests on Sites 1, 2, and 8 may provide suitable habitat, this species was not observed during breeding bird surveys.
Bird	Red knot - rufa subspecies	Calidris canutus rufa	END	END	END	S1N	The majority of red knots overwinter in Tierra del Fuego, Argentina and migrate to the Canadian Arctic each spring for a short breeding season, before heading south again in the fall. During migration, they stop at several staging sites to rest and re-fuel before continuing their journey. Knots use different habitats and food sources on breeding, wintering and staging grounds. On their wintering and migration stopover sites, they inhabit intertidal areas, salt marshes, and brackish lagoons, wherever they can find molluscs and other invertebrates that form the main part of their diet (COSEWIC 2007).	General	Low	There is no intertidal, salt marsh, or lagoon habitat on the sites or in the study areas.
Bird	Red-necked grebe	Podiceps grisegena	NAR	_	NAR	S3B,S4 N	Breeding distribution scattered across range in suitable waterbodies including shallow freshwater lakes, secluded bays and protected marshes, usually with some emergent vegetation, but also bogs, quiet river channels, large irrigation ditches and borrow pits. Mostly maritime in winter, but overwinters in small numbers around Lake Ontario (Stout and Nuechterlein 1999).		Low	The study area lacks suitable breeding habitat, such as quiet river channels, preferred by this species.



Taxon	Common Name	Scientific Name	Endangered Species Act ¹	Species at Risk Act (Sch 1) ²	COSEWIC ³	Provinc ial (SRank)	Habitat Requirements ⁵	ESA Habitat Protection Provisions ⁶	Potential to Occur on Site or in the Study Area	Rationale for Potential to Occur on Site or in the Study Area
Bird	Short-eared owl	Asio flammeus	SC	SC	THR	S2N,S4 B	In Ontario, short-eared owl breeds in a variety of open habitats including grasslands, tundra, bogs, marshes, clear-cuts, burns, pastures and occasionally agricultural fields. The primary factor in determining breeding habitat is proximity to small mammal prey resources (COSEWIC 2008). Nests are built on the ground at a dry site and usually adjacent to a clump of tall vegetation used for cover and concealment (Gahbauer 2007).		Low	There is no large open habitat on the sites or in the study areas.
Bird	Wood thrush	Hylocichla mustelina	SC	THR	THR	S4B	In Ontario, wood thrush breeds in moist, deciduous hardwood or mixed stands that are often previously disturbed, with a dense deciduous undergrowth and with tall trees for singing perches. This species selects nesting sites with the following characteristics: lower elevations with trees less than 16 m in height, a closed canopy cover (>70 %), a high variety of deciduous tree species, moderate subcanopy and shrub density, shade, fairly open forest floor, moist soil, and decaying leaf litter (COSEWIC 2012).		Low	Although forests on Sites 1, 2, and 8 may provide suitable habitat, this species was not observed during breeding bird surveys or other field surveys.
Bird	Yellow-breasted chat	lcteria virens virens	END	END	END	S1B	In Ontario, yellow-breasted chat breeds in early successional, shrub-thicket habitats including woodland edges, regenerating old fields, railway and transmission line rights-of-way, young coniferous reforestations, and wet thickets bordering wetlands. Tangles of grape (Vitis spp.) and raspberry (Rubus spp.) vines are features of most breeding sites. There is some evidence that the yellow-breasted chat is an area sensitive species. Nests are located in dense shrubbery near to the ground (COSEWIC 2011).	General (as of January 24, 2013)	Low	There is no shrub-thicket habitat on the sites or in the study areas.
Fish	American Eel	Anguilla rostrata	END	_	THR	S1?	In Ontario, American Eel is native to the Lake Ontario, St. Lawrence River and Ottawa River watersheds. Their current distribution includes lakes Huron, Erie, and Superior and their tributaries. The Ottawa River population is considered extirpated. The preferred habitat of the American eel is cool water of lakes and streams with muddy or silty substrates in water temperatures between 16 and 19°C. The American Eel is a catadromous fish that lives in fresh water until sexual maturity then migrates to the Sargasso Sea to spawn (Burridge et al. 2010; Eakins 2016).	General (as of June 30, 2013)	Low	There are only historical records of the species in the Lower Etobicoke Creek subwatershed. In addition, this species was not observed during electrofishing surveys.



Taxon	Common Name	Scientific Name	Endangered Species Act ¹	Species at Risk Act (Sch 1) ²	COSEWIC ³	Provinc ial (SRank)	Habitat Requirements⁵	ESA Habitat Protection Provisions ⁶	Potential to Occur on Site or in the Study Area	Rationale for Potential to Occur on Site or in the Study Area
Fish	Lake sturgeon - Great Lakes / Upper St. Lawrence population	Acipenser fulvescens	END	_	THR	S2	In Ontario, lake sturgeon, a large prehistoric freshwater fish, is found in all the Great Lakes and in all drainages of the Great Lakes and of Hudson Bay. This species typically inhabits highly productive shoal areas of large lakes and rivers. They are bottom dwellers and prefer depths between 5-10 m and mud or gravel substrates. Small sturgeons are often found on gravelly shoals near the mouths of rivers. They spawn in depths of 0.5 to 4.5 m in areas of swift water or rapids. Where suitable spawning rivers are not available, such as in the lower Great Lakes, they are known to spawn in wave action over rocky ledges or around rocky islands (Golder 2011).	General	Low	Etobicoke Creek and Cooksville Creek are likely too small to provide suitable habitat for this species.
Fish	Redside Dace	Clinostomus elongatus	END	END	END	\$2	In Ontario, Redside Dace, a small coolwater species common in the USA but less so in Canada, is found in tributaries of western Lake Ontario, Lake Erie, Lake Huron and Lake Simcoe. They are found in pools and slow-moving areas of small headwater streams with clear to turbid water. Overhanging grasses, shrubs, and undercut banks, are an important part of their habitat, as are instream boulders and large woody debris. Preferred substrates are variable and include silt, sand, gravel and boulders. Spawning occurs in shallow riffle areas (Redside Dace Recovery Team 2010).	In the geographic areas of: cities of Hamilton and Toronto; counties of Bruce, Grey, Huron, Simcoe, and Wellington; regional municipalities of Durham, Halton, Peel and York; townships of St. Joseph, Jocelyn and Hilton; and the village of Hilton Beach Regulated Habitat: i. any part of a stream or other watercourse currently being used by Redside Dace, or was used during previous 20 years by Redside Dace and that provides suitable conditions to carry out life processes ii. the area encompassing the meander belt width of the stream or watercourse described in i., and the vegetated area or agricultural lands within 30 m of the stream or watercourse iii. stream, permanent or intermittent headwater drainage feature, groundwater discharge area or wetland that augments or maintains baseflow, coarse sediment supply or surface water quality of a part of stream or other watercourse described in i., provided that stream or watercourse has an average bankfull width of 7.5 m or less In the geographic areas of: in the City of Hamilton, counties of Bruce, Grey, Huron, Simcoe, and Wellington, and the regional municipalities of Durham, Halton, Peel and York Regulated Habitat: iv. Any part of a stream or other watercourse used by a Redside Dace at any time in the past located in the same or	Low	There are only historical records of the species in the Lower Etobicoke Creek subwatershed. In addition, this species was not observed during electrofishing surveys.



Taxon	Common Name	Scientific Name	Endangered Species Act ¹	Species at Risk Act (Sch 1) ²	COSEWIC ³	Provinc ial (SRank)	Habitat Requirements⁵	ESA Habitat Protection Provisions ⁶	Potential to Occur on Site or in the Study Area	Rationale for Potential to Occur on Site or in the Study Area
								adjacent sub-watershed as area identified in i. that provides suitable conditions for successful stream corridor rehabilitation and for natural recolonization of Redside Dace v. area encompassing the meander belt width of an area described in iv., and the vegetated area or agricultural lands within 30 m of an area described in iv. vi. stream, permanent or intermittent headwater drainage feature, groundwater discharge area or wetland that augments or maintains baseflow, coarse sediment supply or surface water quality of a part of stream or other watercourse described in iv., provided that stream or watercourse has an average bankfull width of 7.5 m or less.		
Fish	Shortnose cisco	Coregonus reighardi	END	END	END	SH	In Ontario, shortnose cisco species was last reported in Georgian Bay in 1985 and Lake Ontario in 1964. It prefers clear, deep waters and water temperatures between 2 and 10°C (COSEWIC 2005).	General (as of June 30, 2013)	Low	Etobicoke Creek and Cooksville Creek are likely too small to provide suitable habitat for this species.
Mammal	Eastern small- footed myotis	Myotis leibii	END	_		S2S3	This species is not known to roost within trees, but there is very little known about its roosting habits. The species generally roosts on the ground under rocks, in rock crevices, talus slopes and rock piles. It occasionally inhabits buildings. Areas near the entrances of caves or abandoned mines may be used as hibernacula, where the conditions are drafty with low humidity, and may be subfreezing (Humphrey 2017)	General	Moderate	No suitable maternity roosting habitat was identified on the sites. A rock pile along Cooksville Creek approximately 10 m south of Site 8 may provide suitable maternity roosting habitat for eastern small-footed myotis. There are no potential hibernacula features known in the vicinity of the study areas.
Mammal	Little brown myotis	Myotis lucifugus	END	END	END	S4	In Ontario, this species' range is extensive and covers much of the province. It will roost in both natural and man-made structures. Roosting colonies require a number of large dead trees, in specific stages of decay and that project above the canopy in relatively open areas. May form nursery colonies in the attics of buildings within 1 km of water. Caves or abandoned mines may be used as hibernacula, but high humidity and stable above freezing temperatures are required (ECCC 2018).	General	Moderate	The unsurveyed portion of deciduous forest on Site 1 may provide suitable maternity roosting habitat for this species. Off-site, cavity trees observed in the deciduous forests approximately 70 m north of Site 1 and 90 m south of Site 8 may provide suitable maternity roosting habitat. There are no potential hibernacula features



Taxon	Common Name	Scientific Name	Endangered Species Act ¹	Species at Risk Act (Sch 1) ²	COSEWIC ³	Provinc ial (SRank)	Habitat Requirements ⁵	ESA Habitat Protection Provisions ⁶	Potential to Occur on Site or in the Study Area	Rationale for Potential to Occur on Site or in the Study Area
										known in the vicinity of the study areas.
Mammal	Northern myotis	Myotis septentrionalis	END	END	END	S3	In Ontario, this species' range is extensive and covers much of the province. It will usually roost in hollows, crevices, and under loose bark of mature trees. Roosts may be established in the main trunk or a large branch of either living or dead trees. Caves or abandoned mines may be used as hibernacula, but high humidity and stable above freezing temperatures are required (ECCC 2018).	General	Moderate	The unsurveyed portion of deciduous forest on Site 1 may provide suitable maternity roosting habitat for this species. Off-site, cavity trees observed in the deciduous forests approximately 70 m north of Site 1 and 90 m south of Site 8 may provide suitable maternity roosting habitat. There are no potential hibernacula features known in the vicinity of the study areas.
Mammal	Tri-colored bat	Perimyotis subflavus	END	END	END	S3?	In Ontario, tri-colored bat may roost in foliage, in clumps of old leaves, hanging moss or squirrel nests. They are occasionally found in buildings although there are no records of this in Canada. They typically feed over aquatic areas with an affinity to large-bodied water and will likely roost in close proximity to these. Hibernation sites are found deep within caves or mines in areas of relatively warm temperatures. These bats have strong roost fidelity to their winter hibernation sites and may choose the exact same spot in a cave or mine from year to year (ECCC 2018).	General	Moderate	The unsurveyed portion of deciduous forest on Site 1 may provide suitable maternity roosting habitat for this species. Off-site, cavity trees observed in the deciduous forests approximately 70 m north of Site 1 and 90 m south of Site 8 may provide suitable maternity roosting habitat. There are no potential hibernacula features known in the vicinity of the study areas.
Mammal	Woodland vole	Microtus pinetorum	SC	SC	SC	S3?	In Ontario, woodland vole is associated with mature deciduous forests with soft, often sandy soils and a deep litter and humic layer, suitable for burrowing. Common associates include oaks, hickory, black walnut, American beech and tulip tree. This species is often found at woodland edges near roads, railway tracks and field edges. Woodland vole is restricted to the Carolinian forest zone (COSEWIC 2010).		Low	The soils of deciduous forests on Sites 1, 2, and 8 are likely too compacted to provide suitable habitat for this species.
Reptile	Blanding's turtle - Great Lakes / St. Lawrence population	Emydoidea blandingii	THR	THR	END	S3	In Ontario, Blanding's turtle will use a range of aquatic habitats, but favor those with shallow, standing or slow-moving water, rich nutrient levels, organic substrates and abundant aquatic vegetation. They will use rivers, but prefer slow-moving currents and are likely only transients in this type of habitat. This species is known to travel great distances over	General Category 1 – Nest and area within 30 m or overwintering sites and area within 30 m Category 2 – Wetland complex (i.e., all suitable wetlands or waterbodies within 500 m of each other) that extends up to 2 km from occurrence, and the area within 30 m	Low	There is no suitable wetland habitat on the sites or in the study areas.



Taxon	Common Name	Scientific Name	Endangered Species Act ¹	Species at Risk Act (Sch 1) ²	COSEWIC ³	Provinc ial (SRank)	Habitat Requirements ⁵	ESA Habitat Protection Provisions ⁶	Potential to Occur on Site or in the Study Area	Rationale for Potential to Occur on Site or in the Study Area
							land in the spring in order to reach nesting sites, which can include dry conifer or mixed forests, partially vegetated fields, and roadsides. Suitable nesting substrates include organic soils, sands, gravel and cobble. They hibernate underwater and infrequently under debris close to water bodies (COSEWIC 2016).	around those suitable wetlands or waterbodies Category 3 – Area between 30 – 250 m around suitable wetlands/waterbodies identified in category 2, within 2 km of an occurrence		
Reptile	Eastern hog- nosed snake	Heterodon platirhinos	THR	THR	THR	S 3	In Ontario, eastern hog-nosed snake can be classified as a habitat generalist as it uses a variety of habitats across its range. This snake typically uses habitat with open vegetation cover, including open woodlands, wetlands, fields, forest edges, beaches and dunes, and disturbed sites, most often near water. In the Georgian Bay area, disturbed fields, rock barrens and forests appear to be preferred habitats. This species relies on sandy well drained soils. Hibernation occurs in sandy soils below the frost line. This species has been observed excavating hibernation sites in mixed intolerant upland forests. Nesting and oviposition have been noted in upland sandy areas and rock outcrops under large flat rocks. The majority of their diet is comprised of American toad and Fowler's toad (Kraus 2011).	General (as of June 30, 2013)	Low	The sites and the respective study areas are likely too urbanized to provide suitable habitat for this species.
Reptile	Eastern ribbonsnake - Great Lakes population	Thamnophis sauritius	SC	SC	SC	S4	In Ontario, eastern ribbonsnake is semi-aquatic, and is rarely found far from shallow ponds, marshes, bogs, streams or swamps bordered by dense vegetation. They prefer sunny locations and bask in low shrub branches. Hibernation occurs in mammal burrows, rock fissures or even ant mounds (COSEWIC 2012).		Low	Although vegetated shorelines on Sites 1, 2, and 8 may provide suitable habitat, there are only historical records for this species in the vicinity of the study area.
Reptile	Midland painted turtle	Chrysemys picta marginata	_	l	SC	S 4	In Ontario, painted turtles use waterbodies, such as ponds, marshes, lakes and slow-moving creeks, with a soft bottom and abundant basking sites and aquatic vegetation. This species hibernates on the bottom of waterbodies (Ontario Nature 2018).		Low	There is no soft-bottom aquatic habitat with aquatic vegetation on the sites or in the study areas.
Reptile	Milksnake	Lampropeltis triangulum	NAR	SC	SC	S4	In Ontario, milksnake uses a wide range of habitats including prairies, pastures, hayfields, wetlands and various forest types, and is well-known in rural areas where it frequents older buildings. Proximity to water and cover enhances habitat suitability. Hibernation takes place in mammal burrows, hollow logs, gravel or soil banks, and old foundations (COSEWIC 2014).		Low	The sites and the respective study areas are likely too urbanized to provide suitable habitat for this species.



Taxon	Common Name	Scientific Name	Endangered Species Act ¹	Species at Risk Act (Sch 1) ²	COSEWIC ³	Provinc ial (SRank)	Habitat Requirements⁵	ESA Habitat Protection Provisions ⁶	Potential to Occur on Site or in the Study Area	Rationale for Potential to Occur on Site or in the Study Area
Reptile	Northern map turtle	Graptemys geographica	SC	SC	SC	\$3	In Ontario, the northern map turtle prefers large waterbodies with slow-moving currents, soft substrates, and abundant aquatic vegetation. Ideal stretches of shoreline contain suitable basking sites, such as rocks and logs. Along Lakes Erie and Ontario, this species occurs in marsh habitat and undeveloped shorelines. It is also found in small to large rivers with slow to moderate flow. Hibernation takes place in soft substrates under deep water (COSEWIC 2012).		Low	The wetlands and waterbodies in the study area are not large enough for this species.
Reptile	Snapping turtle	Chelydra serpentina	SC	SC	SC	S3	In Ontario, snapping turtle uses a wide range of waterbodies, but shows preference for areas with shallow, slow-moving water, soft substrates and dense aquatic vegetation. Hibernation takes place in soft substrates under water. Nesting sites consist of sand or gravel banks along waterways or roadways (COSEWIC 2008).		Low	There is no soft-bottom aquatic habitat with aquatic vegetation on the sites or in the study areas.
Reptile	Spotted turtle	Clemmys guttata	END	END	END	S2	In Ontario, spotted turtle habitat consists of shallow, slow-moving and unpolluted water such as ponds, bogs, marshes, ditches, vernal pools and sedge meadows. It is also occasionally found in woodland streams or sheltered shallow bays. These habitats are characterized by soft substrates and abundant aquatic vegetation. Females lay eggs in soil and leaf litter in wooded areas close to wetlands. Hibernation takes place in substrates under water, often under moss hummocks or muskrat dens (COSEWIC 2014).	General (as of June 30, 2013)	Low	There is no soft-bottom aquatic habitat with aquatic vegetation on the sites or in the study areas.
Reptile	Stinkpot or Eastern musk turtle	Sternotherus odoratus	SC	THR	SC	S3	In Ontario, eastern musk turtle is very rarely out of water and prefers permanent bodies of water that are shallow and clear, with little or no current and soft substrates with abundant organic materials. Abundant floating and submerged vegetation is preferred. Hibernation occurs in soft substrates under water. Eggs are sometimes laid on open ground, or in shallow nests in decaying vegetation, shallow gravel or rock crevices (COSEWIC 2012).		Low	There is no soft-bottom aquatic habitat with aquatic vegetation on the sites or in the study areas.
Reptile	Wood turtle	Glyptemys insculpta	END	THR	THR	S 2	In Ontario, wood turtle spends spring and fall in or near waterbodies, including clear rivers and streams with sandy or gravel-sand substrates and moderate to fast current. During the summer, this species is often found on land in habitats with moderate or patchy shrub and tree cover, often more than 500 m from water. Hibernation takes place in substrates under water. Nesting sites are found on sand or gravel-sand beaches and banks with patchy vegetation cover. Other sites less often used include gravel holes, roadsides, railways, utility corridors, farmland and pastures (Ontario Wood Turtle Recovery Team 2010).	Regulated In the geographic areas of: regional municipalities of Halton, Niagara, and Waterloo; and counties of Huron and Simcoe Regulated Habitat: • any part of a river, stream, or other body of water, up to high water mark, being used by wood turtle or on which it directly depends to carry out its life processes and any part of a river, stream, or other body of water, up to high water mark within 2000 m that provides suitable conditions for wood	Low	The portions of Etobicoke Creek and Cooksville Creek that overlap the sites are likely too urbanized to provide suitable habitat for this species.



Taxon	Common Name	Scientific Name	Endangered Species Act ¹	Species at Risk Act (Sch 1) ²	COSEWIC ³	Provinc ial (SRank)	Habitat Requirements ⁵	ESA Habitat Protection Provisions ⁶	Potential to Occur on Site or in the Study Area	Rationale for Potential to Occur on Site or in the Study Area
								turtle to carry out life processes • the area above the high water mark within 200 m of the area desscribed above • area above the high water mark not described above and that is being used by a wood turtle as a nesting site or that is within 300 m of that area In the geographic areas of: territorial districts of Algoma, Nipissing and Parry Sound; the City of Greater Sudbury; and county of Renfrew Regulated Habitat: • any part of a river, stream, or other body of water, up to high water mark, being used by wood turtle or on which it directly depends to carry out its life processes and any part of a river, stream, or other body of water, up to high water mark within 6000 m that provides suitable conditions for wood turtle to carry out life processes • the area above the high water mark within 500 m of the area described above • area above the high water mark not described above and that is being used by a wood turtle as a nesting site or that is within 300 m of that area		
Vascular Plant	American chestnut	Castanea dentata	END	END	END	S1S2	In Ontario, American chestnut occurs in mixed or deciduous forests in the Carolinian zone (Farrar 1995). It is often found in communities with dense canopy cover and often associated with oak and maple. This tree grows primarily on acidic, sand or gravel soils (Boland et al. 2012).	General (as of June 30, 2013)	Low	This tree typically occurs in the Carolinian zone which does not overlap the sites or study areas.
Vascular Plant	American ginseng	Panax quinquefolius	END	END	END	S2	In Ontario, American ginseng is found in moist, undisturbed and relatively mature deciduous woods often dominated by sugar maple. It is commonly found on well-drained, south-facing slopes. American ginseng grows under closed canopies in well-drained soils of glacier origin that have a neutral pH (ECCC 2018).	General Category 1 – Area occupied by American ginseng and area of forest or treed swamp ELC community classes within 100 m of occupied area Category 2 – Area of forest or treed swamp ELC community classes between 100-150 m of occupied area, and contiguous with category 1	Low	There are no undisturbed forests on the sites or in the study areas.
Vascular Plant	Butternut	Juglans cinerea	END	END	END	S2?	In Ontario, butternut is found along stream banks, on wooded valley slopes, and in deciduous and mixed forests. It is commonly associated with beech, maple, oak and hickory (Voss and Reznicek 2012). Butternut prefers moist, fertile, well-drained soils, but can also be found in rocky limestone soils. This species is shade intolerant (Farrar 1995).	General (as of June 30, 2013)	Moderate	Unsurveyed areas on Site 1 along the western side of Etobicoke Creek may provide suitable habitat for this species.



Appendix A – Species at Risk Screening

Taxon	Common Name	Scientific Name	Endangered Species Act ¹	Species at Risk Act (Sch 1) ²	COSEWIC ³	Provinc ial (SRank)	Habitat Requirements⁵	ESA Habitat Protection Provisions ⁶	Potential to Occur on Site or in the Study Area	Rationale for Potential to Occur on Site or in the Study Area
Vascular Plant	Clinton's clubrush	Trichophorum clintonii	_	_	_	S2S3	In Ontario, Clinton's clubrush grows in prairies, open woods, and rocky crevices along rivers (Oldham and Brinker 2009).		Low	The floodplains of Etobicoke Creek and Cooksville Creek on Sites 1, 2, and 8 are likely too disturbed to provide suitable habitat for this species.
Vascular Plant	Field sedge	Carex conoidea	_	_	_	S 3	In Ontario, field sedge grows in prairies and along the shores of rivers and lakes (Oldham and Brinker 2009).		Low	The floodplains of Etobicoke Creek and Cooksville Creek on Sites 1, 2, and 8 are likely too disturbed to provide suitable habitat for this species.
Vascular Plant	Harbinger-of- spring	Erigenia bulbosa	_		_	S2S3	In Ontario, harbinger-of-spring is an early ephemeral species that grows in rich, moist deciduous woodlands. It is often associated with flood plains, bottomlands and riverbanks (Oldham and Brinker 2009).		Low	The floodplains of Etobicoke Creek and Cooksville Creek on Sites 1, 2, and 8 are likely too disturbed to provide suitable habitat for this species.
Vascular Plant	Virginia lungwort	Mertensia virginica	_		_	\$3	Moist deciduous woods and thickets, usually on floodplains. Sometimes cultivated and some populations may have originated as garden escapes (Oldham and Brinker 2009).		Low	The floodplains of Etobicoke Creek and Cooksville Creek on Sites 1, 2, and 8 are likely too disturbed to provide suitable habitat for this species.
Vascular Plant	White-haired panic grass	Dichanthelium ovale ssp. praecocius	_	_	_	S3	In Ontario, white-haired panic grass grows in dry, open, sandy or rocky woodland borders, sand barrens, dunes, and dry prairies (Oldham and Brinker 2009; Reznicek et al. 2011).		Low	There is no suitable dry and sandy habitat on the sites or in the study areas.

¹ Endangered Species Act (ESA), 2007 (O.Reg 242/08 last amended 27 March 2018 as O.Reg 219/18). Species at Risk in Ontario List, 2007 (O.Reg 230/08 last amended 1 Aug 2018 as O. Reg 404/18, s. 1.); Schedule 1 (Extirpated - EXP), Schedule 2 (Endangered - END), Schedule 3 (Threatened - THR), Schedule 4 (Special Concern - SC)

⁵ Provincial Ranks (SRANK) are Rarity Ranks assigned to a species or ecological communities, by the Natural Heritage Information Centre (NHIC). These ranks are not legal designations. SRANKS are evaluated by NHIC on a continual basis and updated lists produced annually. SX (Presumed Extirpated), SH (Possibly Extirpated - Historical), S1 (Critically Imperiled), S2 (Imperiled), S3 (Vulnerable), S4 (Apparently Secure), SNA (Not Applicable), S#S# (Range Rank), S? (Not ranked yet), SAB (Breeding Accident), SAN (Non-breeding Accident), SX (Apparently Extirpated). Last assessed November 2017.



² Species at Risk Act (SARA), 2002. Schedule 1 (Last amended 25 February 2019); Part 1 (Extirpated), Part 2 (Endangered), Part 3 (Threatened), Part 4 (Special Concern)

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

⁴ Global Ranks (GRANK) are Rarity Ranks assigned to a species based on their range-wide status. GRANKS are assigned by a group of conservation Data Centres (CDCs), scientific experts and the Nature Conservancy. These ranks are not legal designations. G1 (Extremely Rare), G2 (Very Rare), G3 (Rare to uncommon), G4 (Common), G5 (Very Common), GH (Historic, no record in last 20yrs), GU (Status uncertain), GX (Globally extinct), ? (Inexact number rank), G? (Unranked), Q (Questionable), T (rank applies to subspecies or variety). Last assessed August 2011

Appendix A – Species at Risk Screening

⁶ General Habitat Protection is applied when a species is newly listed as endangered or threatened on the SARO list under the ESA, 2007. The definition of general habitat applies to areas that a species currently depends on. These areas may include dens and nests, wetlands, forests and other areas essential for breeding, rearing, feeding, hibernation and migration. General habitat protection will also apply to all listed endangered or threatened species without a species-specific habitat regulation as of June 30, 2013 (ESA 2007, c.6, s.10 (2)). Regulated Habitat is species-specific habitat used as the legal description of that species habitat. Once a species-specific habitat regulation is created, it replaces general habitat protection. Refer to O.Reg 242/08 for full details regarding regulated habitat.

General References:

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REGION OF PEEL

WASTEWATER CAPACITY IMPROVEMENTS IN CENTRAL MISSISSAUGA

Natural Environment Reports

Cooksville Creek Scour Hazard



TECHNICAL MEMORANDUM

DATE September 15, 2021 **Project No.** 18112273

TO Chris Campbell, Infrastructure Planning, Partner

GM BluePlan Engineering Limited

FROM Christopher Davidson, Maxwell Robinson, and

Andrew Forbes

EMAIL cdavidson@golder.com

HYDRAULIC AND GEOMORPHIC HAZARD ASSESSMENT AT COOKSVILLE CREEK TO SUPPORT THE PROPOSED SANITARY SEWER CROSSING UPSTREAM OF THE QUEENSWAY EAST BRIDGE

1.0 INTRODUCTION

Golder Associates Ltd. (Golder) was retained by GM BluePlan Engineering to complete a hydraulic and geomorphic hazard assessment at a discrete section of Cooksville Creek in Mississauga, Ontario to support the proposed design and implementation of a 1500 mm diameter sanitary sewer crossing at the watercourse (the Project). As shown on Figure 1, the proposed sewer crossing at Cooksville Creek has been targeted at a location immediately upstream of the existing bridge/channel crossing at Queensway East. The results from the hydraulic and geomorphic hazard assessment at the crossing location will be used to inform the minimum burial depth, lateral setback limits, and any related remediation measures to minimize future opportunities of damage and/or exposure of the planned infrastructure.

This technical memorandum presents the methods and results of the hydraulic and geomorphic hazard assessment at the subject reach of Cooksville Creek (i.e., approximately 50 m section of channel located upstream of the Queensway Bridge). The document is organized as four main sections. The methods and results of the existing conditions assessment at the channel reach are presented in Section 2.0, the methods/results of the scour analysis and lateral stability assessment for the proposed crossing location are provided in Section 3.0, a summary of the estimated minimum required burial depths and setback distances are presented in Section 4.0), and high-level considerations for potential mitigation options are provided in Section 5.0.

2.0 EXISTING CHANNEL CONDITIONS

Hydrological and fluvial geomorphic conditions at the subject reach of Cooksville Creek were assessed based on the results of a field survey and desktop analyses. The field survey was carried out in June 2021 and involved measurements or observations of channel geometry (i.e., topographic channel surveys including cross-sections and profile), flows and water levels, and channel geomorphology (i.e., identification of characteristic bed and bank morphology, channel substrate, instream and/or riparian vegetation, and erosion and deposition features). The desktop analysis involved the review of available flood discharge estimates for Cooksville Creek (based on the output from a HEC-RAS model that was developed by Credit River Conservation Authority [CVC]), as well as an analysis of historical air photograph records (from 1950 to 1988) and recent aerial imagery (2018) to assess past changes in channel patterns and the likelihood of lateral channel migration over the life of the Project. The results

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of the field survey and desktop analyses were used to characterize existing channel conditions, and, where applicable, to support the scour analyses and lateral stability assessments (presented in Section 3.0).

A summary of the key results from the existing conditions assessment is presented in Table 1, noting the following supporting materials:

- The locations of the cross sections from the CVC HEC-RAS model are shown on Figure 1 (including the surveyed cross-sections from the Golder field studies used to augment the existing model set up);
- The estimated longitudinal channel profile at the subject reach is shown on Figure 2; and
- Select photographs from the field visit at the subject reach are included in Attachment A (Photograph Log from Field Surveys).



Table 1: Summary of Hydrological and Fluvial Geomorphic Characteristics at the Subject Reach of Cooksville Creek

			400 year	2-year		
Watercourse Name	Drainage Area (ha)	Estimated Channel Width	General Description of Observed Channel Morphology and Erosion-Sedimentation Processes	Observed Substrate and Vegetation	100-year Maximum Discharge (m ³ /s) ⁽²⁾	Maximum Discharge (m³/s) (2)
Cooksville Creek	2,520 (1)	9 – 17 m	Medium-sized permanent watercourse that includes well defined bed and banks with some evidence of erosion- sedimentation processes: - discrete sections of undercut and/or exposed banks - instances of failed gabion baskets/armouring at the banks (assumed to be originally installed at the time of channel straightening — refer to Section 3.2) - examples of accumulated woody debris at the channel - examples of exposed roots and overhanging trees at the banks and overbank areas	Bed substrate in the vicinity of the proposed crossing was characterized by mostly graveland sand-sized materials, noting that the channel bed at the Queensway Bridge crossing (located immediately downstream) was dominated by coarser substrate (i.e., cobble-sized materials with some flagstone). The channel bed supported little to no instream vegetation. Bank substrate in the vicinity of the proposed crossing was characterized by mostly finegrained materials (i.e., silt and fine sand) with the occasional deposit of cobbles (originating from the failed gabion baskets/armouring), noting that, similar to the observations of the bed substrate, the channel banks at the Queensway Bridge crossing included cobblesized materials with some flagstone. The channel banks were fairly well-vegetated with mostly grasses and shrubs.	214.9	71.6

¹ The catchment area at the subject reach was inferred based on the results from the Ontario Flow Assessment Tool (OFAT).
² Flows at the subject reach were obtained directly from the existing HEC-RAS model for Cooksville Creek (originally developed by CVC and further augmented by Golder [based on the results] of the field survey from June 2021]).



3.0 SCOUR AND SETBACK ASSESSMENTS

In the absence of a comparable Ontario regulation for crossing structures, the requirement to regulate pipeline crossings in Alberta, as stipulated in the Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body (the Code) (ESRD 2013) under the Alberta Water Act, was adopted to guide the scour analysis and lateral setback assessments for the hydraulic and geomorphic hazard assessment at Cooksville Creek. The Code states:

"All pipes for pipeline crossings that will carry a substance that causes or may cause an adverse effect on the aquatic environment, including fish habitat, must be installed at an elevation that is below the one-inone-hundred year bed scour depth of the water body."

In addition to the above, the CVC guidance on scour assessments in the Credit River Watershed, as described in the Credit Valley Conservation Fluvial Geomorphic Guidelines: Factsheet VI: Scour Analysis (CVC 2019), was considered to further guide the approach to the scour analysis and lateral setback studies at the proposed crossing location. This guidance document identifies two methods to quantify potential scour: the 'Simplified Standard Method' that is typically used when site-specific information is unavailable or limited and the 'Detailed Method' that can be relied on if detailed information has been obtained at the crossing location. The Detailed Method was shown to be applicable for the scour calculations described herein.

Based on the above, scour analyses and lateral stability assessments were carried out at the proposed crossing location to determine the site-specific minimum burial depth to avoid future scour and sagbend setback limits. It is understood that the site-specific minimum burial depth will be compared against the proposed burial depth of the pipe to assess the potential requirement for additional scour protection mitigation measures, and setback limit recommendations will be subsequently incorporated in the design to minimize the potential for damage and/or exposure of the infrastructure at the watercourse crossing location due to processes of vertical degradation or lateral movement of the channel.

3.1 Design Basis and Methodology

The approach used to evaluate potential scour depth at the proposed crossing location was taken from the U.S. Bureau of Reclamation technical guideline, described as Computing Degradation and Local Scour (Pemberton and Lara 1984), and considers three different scour calculation methods: Blench (1969); Lacey from Pemberton and Lara (1984); and Neill from Pemberton and Lara (1984). Each calculation method relies on site-specific hydraulic estimates/properties for the subject crossing. In the case of this particular assessment, the hydraulic analysis to inform the three different scour calculation methods was developed using the CVC-generated HEC-RAS model for Cooksville Creek under 100-year flow conditions (refer to Table 1 for the flow estimates), with the understanding that the model was refined/augmented with the surveyed channel cross-sections from the Golder field surveys (carried out in June 2021). As outlined in CSA (2011), a minimum cover depth of 1.5 m is recommended for crossings with defined channels based on industry standards. However, to be conservative, the maximum estimated scour depth from Blench (1969), Lara (1984), and Neill (1984) should be selected if the one or more of the estimated values is greater than 1.5 m.

The method used to assess the minimum required sagbend setback distance at the proposed crossing location relied on the observations from the field surveys in June 2021, coupled with the results from a historical air photograph analysis. The setback distances from the top of bank were initially determined for the



crossing based on the maximum bankfull depth of channel, where bank erosion was thought to be the dominant mechanism for lateral channel instability. This approach considered the following:

- If no evidence of significant active erosion was observed during the field verification program, and the estimated bankfull depth was less than 1.5 m, a recommended minimum sagbend setback of 3.0 m (default value) was applied.
- If no evidence of significant active erosion was observed, and the estimated bankfull depth was greater than 1.5 m, a recommended minimum sagbend setback of twice the maximum bankfull depth was used.
- If evidence of significant active erosion was observed, a recommended minimum sagbend setback of 5.0 m (default value), twice the maximum bankfull depth, or the estimated meander belt width of the channel, whichever is greater and regardless of the estimated bankfull depth (i.e., less than or greater than 1.5 m), was relied on.

The sagbend setback recommendations for Cooksville Creek were evaluated/adjusted (as appropriate) based on the results of the historical air photograph analysis. As part of this exercise, the observed channel patterns at the subject reach were compared in the historical air photo/imagery record (1950-2018) to identify any notable instances of lateral movement over time. If potential cut-off formations or active channel meander movement (i.e., downstream migration of meander bends or lateral shifting) were observed, floodplain and meander belt width characteristics were also considered in the determination of setback distances.

3.2 Results of Lateral Stability Assessment and Recommended Minimum Setbacks

The results of the lateral stability assessment for the proposed crossing location are presented in Table 2, noting the key findings from the supporting historical air photo analysis are illustrated in Attachment B (Historical Air Photo Analysis for Subject Reach of Cooksville Creek).



Table 2: Results of the Lateral Stability Assessment and Recommended Sagbend Setbacks

Watercourse Name and Crossing ID ⁽¹⁾	Field Estimated Watercourse Dimensions (1)	Lateral Channel Stability Based on Air Photograph Analysis (2)	Erosion and Sedimentation Patterns Based on Field Surveys	Dominant Mechanism of Lateral Instability	Criteria for Setback Distance	Recommended Minimum Setbacks (3-5)
Cooksville Creek – Cross Section 14110	Bankfull Width = 9.6 Bankfull Depth = 0.9	The key findings from the review of the historical air photograph record were as follows: Prior to 1968 (captured in the photos/images from 1950 and 1960) and the construction of the Queensway East, the air photograph analysis showed that the channel followed a strong meandering pattern along the full extent of the study reach, noting a series of prominent and active meander bends that trended in a mostly down-valley direction. From 1968 onward (captured in the photos/images from 1968, 1980, 1988 and present), the air photograph analysis showed that the channel planform has been noticeably altered (relative to the observed channel pattern in 1950 and 1960), recognizing that the channel in the more recent period of record follows a mostly straight alignment and has remained relatively unchanged (i.e., lateral shift or migration of the channel of approximately 5 m or less). The results suggest that the channel at the subject reach was realigned and straightened before 1968. These channel modifications were likely carried out to accommodate urban development along the margins of the watercourse corridor, as well as associated downstream roadworks (e.g., completion of the Queensway East roadway and bridge). In addition, the observed channel patterns between 1968 and present day showed only small adjustments, suggesting that, in the more recent period of the air photo record, the channel has been relatively fixed/stationary from a lateral stability standpoint.	The channel in the vicinity of the crossing location included several examples of moderate bank/lateral erosion, and, by extension, the potential for active channel widening.	Bank Erosion	The criteria for the setback limits align with Footnote 5c, recognizing that preliminary estimates of the belt width of the channel were shown to be clearly greater than the minimum default value of 5.0 m (5a) and twice the bankfull depth (5b)	The channel in the vicinity of the proposed crossing was shown to be realigned and straightened before 1968. Based on the Toronto and Region Conservation Authority (TRCA) Belt Width Delineation Procedure (TRCA 2004), it is understood that portions of the channel planform that have been previously modified no longer represent the natural meander potential of a watercourse, meaning that these altered sections of the channel prevent reliable measurements of a meander belt width. To that end and in accordance with TRCA guidelines, the meander belt width for the study reach at Cooksville Creek was estimated to be approximately 60 m based on the historical air photographs that recorded the position of the unaltered channel configuration (in other words, the belt width measurements were estimated with consideration for the strong meander pattern that formerly characterized channel conditions along the full extent of the subject reach). As detailed in Section 3.0, the design of any crossing structures should account for appropriate setback distances to minimize the potential for damage and/or exposure of the infrastructure at the watercourse crossing location due to processes of vertical degradation or lateral movement of the channel. However, for the study reach at Cooksville Creek, it is recognized that extending the setback distances the length of the estimated belt width of the channel would be impractical and cost prohibitive. Furthermore, Golder is of the opinion that the estimated dimensions of the meander belt width for this particular study are overly conservative, with consideration of the following: The meander belt width is not directly representative of current conditions in the vicinity of the crossing location, recognizing the following: The belt width for the study reach was estimated based on the historical air photographs from 1950 and 1960, noting that these photos were required to assess meander potential/migration for a formerly unaltered section of the channel configuration; The channel at the



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Watercourse Name and Crossing ID ⁽¹⁾	Field Estimated Watercourse Dimensions (1)	Lateral Channel Stability Based on Air Photograph Analysis (2)	Erosion and Sedimentation Patterns Based on Field Surveys	Dominant Mechanism of Lateral Instability	Criteria for Setback Distance	Recommended Minimum Setbacks (3-5)
						The channel at the proposed crossing location is now straight and largely unconfined and has shown limited evidence of lateral movement over the past 50+ years.
						The existing bridge span and adjoining abutments of the Queensway East Bridge are located within the boundaries of the estimated belt width of the study reach.
						Any upgrade or replacement of the existing bridge crossing will be designed to convey up to and including the 100-year flow or Regional event; hence, major flows will be directed to the channel and bridge opening, with limited opportunities to outflank the crossing feature and erode a separate flow path.
						For the reasons identified above and from the perspective of channel hydraulics and fluvial geomorphology, it is recommended that the design include a belt width allowance of approximately 19.2 m (or 2 times the bankfull width) to account for the existing configuration of the channel , meaning, by extension, a minimum setback distance of approximately 4.8 m from the top of bank on either side of the channel (i.e., Setback at Left Bank of 4.8 m + Bankfull Width at Channel of 9.6 m + Setback at Right Bank of 4.8 m = Belt Width Allowance of 19.2 m). The suggested sagbend setback distances are expected to provide sufficient opportunities to maintain accommodate any relevant changes to channel form and function (e.g., observed evidence of channel widening).

Notes:

- The estimated bankfull geometry at the crossing location was based on the channel geometry information from the CVC-generated HEC-RAS Model for Cooksville Creek.
- 2. The period of record for the historical air photo analysis was 68 years (1950-2018).
- 3. Minimum Setback when lateral channel movement (meander bend migration or potential cut-off formation) is dominant mechanism:
 - a. Meander belt width where channel not confined by valley wall.
 - b. Minimum 5.0 m from top of valley slope, where channel confined by valley wall.
- 4. Minimum Setback when bank erosion not observed or is shown to be very minor:
 - a. Minimum default value = 3.0 m when bank height <1.5 m
 - b. Twice bankfull depth when bank height >1.5 m
- 5. Minimum Setback when active bank erosion observed (greater of):
 - a. Minimum default value (5.0 m)
 - b. Twice bankfull depth
 - c. Meander belt width.



3.3 Results of Scour Assessment and Preliminary Minimum Burial Depth Requirements

The results of the scour assessment at the proposed crossing location are summarized in Table 3.

Table 3: Results of Scour Analysis and Preliminary Burial Depth Requirements Based on the Scour Calculation Methods from Pemberton and Lara (1984)

Watercourse Name	Ca	Preliminary Burial			
Water course Name	Blench Method	Lacey Method	Neill Method	Depth Requirement	
Cooksville Creek – Cross Section 14110	2.30	0.44	1.50	2.30	

As indicated in Section 3.1, the approach to estimate the potential scour depths at the proposed crossing location were developed based on the three scour calculation methods from Pemberton and Lara (1984) (as presented above in Table 3); however, the analysis also considered the scour depth guidance from CVC (2019). As part of this exercise, it was assumed that the calculated scour depths from Blench (1969), Lara (1984), and Neill (1984) equated to 'General Scour', as defined in CVC (2019), recognizing that the CVC guidance suggests the computation of both General Scour (i.e., event-based or short-term degradation of the channel bed at a cross-section scale) and Natural Scour (i.e., long-term degradation of the bed at a reach scale via natural fluvial processes) to develop scour depth estimates in an open channel setting. A plan to incorporate Natural Scour to the preliminary burial depth requirements would mean a potential increase from 2.30 m to a number on the order of 5 m (using, for example, the CVC guidance for calculating Natural Scour by multiplying the estimated bankfull depth of the channel [0.9 m] by a factor of 2.5). However, Golder is of the opinion that, for the subject channel reach, the design approach of deriving the scour depth estimates based on General Scour alone (using the three scour calculation methods from Pemberton and Lara [1984]) includes both a suitable level of conservatism and direct consideration for natural scour processes, and, hence, is expected to provide sufficient long-term cover at the proposed crossing location. This considers the following:

- Based on the results from the Golder field surveys in June 2021, the section of channel located immediately downstream of the proposed crossing (specific to the discrete section of channel at the Queensway East Bridge) was shown to include bed and bank armouring (i.e., cobble-sized substrate with some flagstone), with the understanding that these substrate materials, coupled with the topographic high point that is characteristic of the bridge crossing location, would serve to limit opportunities for vertical degradation at the upstream reach due to natural fluvial processes;
- Further to the results of the Golder field surveys in June 2021, the channel at the proposed crossing location was shown to support little to no evidence of active bed erosion/lowering, recognizing that the dominant pattern of erosion-sedimentation at the subject channel appears to be limited to bank erosion (moderate in spatial extent and magnitude) and associated channel widening processes;
- The scour depth guidance from CVC (2019) included the results of past erosion studies to inform the estimates of Natural Scour, some of which were specific to Cooksville Creek; however, of note, the study by Parish and Tinkler (1998) was targeted at sections of Cooksville Creek that had included relatively extensive bank protection without any corresponding bed armouring (increasing the potential/likelihood of vertical



degradation) and followed a period of rapid urbanization in Mississauga (the reported results were from the 1970s and 1980s when land use related flow and channel change would have been heightened), recognizing that any past bank armouring at the proposed crossing location is now largely absent (or no longer functional) and the results of the field and desktop studies (including the historical air photo analysis) suggested relatively stable channel conditions in the recent period of record; and

- The scour calculation methods from Pemberton and Lara (1984) include the following factor of safety or contingency condition, and, with that in mind, it is expected that these safety buffers would account for an added element of channel scour (Natural Scour or other):
 - A multiplier (described as the "Z" factor in the equations) is used to define the channel shape, with the understanding that, for this analysis, a higher multiplier was applied (by assuming moderate bend conditions at the subject reach when, based on the results of the field and desktop assessment, the channel was shown to be straight) to account for some degree of lateral or vertical channel adjustment over time.

4.0 SUMMARY OF MINIMUM REQUIRED BURIAL DEPTHS AND RECOMMENDED SAGBEND SETBACKS

The results of the lateral stability assessments and scour analyses (presented in Sections 3.2 and 3.3 above) were used to develop site-specific burial depth requirements and minimum lateral setback recommendations at the proposed crossing location. A summary of these requirements and recommendations are presented in Table 4 and on Figure 3.

Table 4: Summary of Minimum Required and Recommended Burial Depths and Setbacks at the Proposed Watercourse Crossing

Watercourse Name and Crossing ID	Minimum Required Burial Depth (m) (1)	Minimum Recommended Setback Distance (m) (2)
	The design should include a minimum required burial depth of 2.3 m based on the Neil Method (General Scour) – equivalent to an elevation of 97.57 masl at the crossing location	The design should include a belt width allowance of approximately 19.2 m to account for the existing configuration of the channel, meaning, by extension, a minimum recommended setback distance of approximately 4.8 m from the top of bank on either side of the channel

Notes:

- 1. Elevation in meters based on the assumed survey datum that was established by Golder during the field studies in June 2021.
- The 'Left Bank' of the channel is defined as the bank that is located on the left side of the channel when looking downstream, while the 'Right Bank' of the channel is defined as the bank that is located on the right side of the channel when looking downstream.



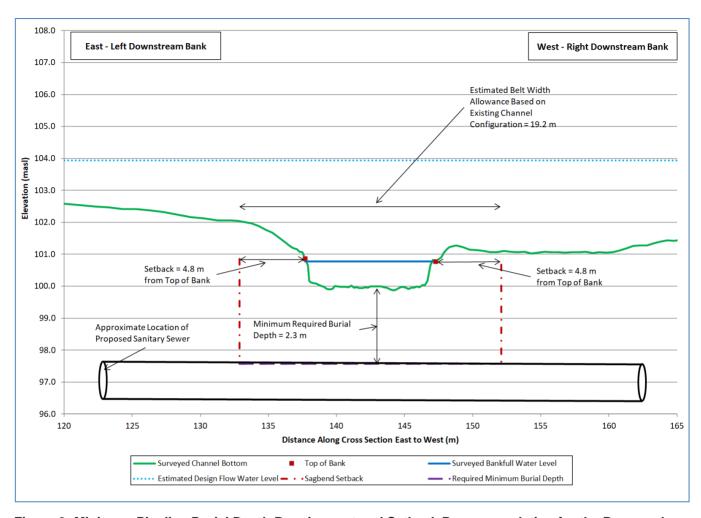


Figure 3: Minimum Pipeline Burial Depth Requirement and Setback Recommendation for the Proposed Crossing Location

5.0 POTENTIAL CONSIDERATIONS FOR ADDED COVER PROTECTION

Based on the proposed design drawings for the Project (GM BluePlan, 2020), the obvert (top) elevation of the proposed sewer pipe at the crossing location ranges from approximately 97.61 masl at the left bank to approximately 97.59 masl at the right bank, meaning that, as illustrated on Figure 2, the required cover depth/thickness at the channel are largely available (i.e., the elevation of the estimated scour depth was shown to be no more than 0.02 m and 0.04 m lower than the top of pipe – well within the margin of error for the analysis). However, if supported and/or required by CVC and recognizing that the design elevation for the pipe is fixed, one or more of the following mitigation measures could be considered to offer added cover protection of the proposed infrastructure:



- Placement of rip rap or river stone at the bed and banks of the channel in the immediate vicinity of the crossing location to provide local erosion protection/armouring, with a plan to layer the rock to a thickness of roughly 0.3 m (keyed in below the grade of the channel) and for a distance of approximately 5 m (centered over the pipe); and
- Installation of a small rock weir or riffle at a location immediately downstream of the channel crossing to reduce channel velocities and shear stresses in the immediate vicinity of the crossing location (i.e., development of a comparatively low energy environment by maintaining a raised hydraulic control downstream of the crossing), recognizing that any instream feature at the channel will need to be designed to maintain flood flow conveyance, fish passage, and characteristic erosion-sedimentation patterns.

6.0 CLOSURE

If you have any questions or require further information, please contact the undersigned.

Respectfully submitted,

Golder Associates Ltd.

Christop bilim

Christopher Davidson, PEng Water Resources Engineer

MR/CD/AF/mp

Andrew Forbes, MSc, PGeo Associate and Senior Consultant

Attachments: Figure 1 – Site Location Plan

Figure 2 - Estimated Longitudinal Channel Profile at Subject Reach of Cooksville Creek

Attachment A – Photograph Log from Field Surveys (June 2021)

Attachment B - Historical Air Photo Analysis for Subject Reach of Cooksville Creek

 $https://golder associates.sharepoint.com/sites/100160/deliverables/surface \ water/cooksville \ creek/final/rev1/18112273-tm-rev1-scour \ assessment-15sep2021.docx \ and \ assessment-15sep2021.docx \ assessment-15sep2021.doc$



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FIGURES



LEGEND

FLOW DIRECTION

WATERCOURSE

ESTIMATED CENTRELINE OF CHANNEL BEYOND THE LIMITS OF THE STUDY REACH CHANNEL CROSS SECTION OBTAINED FROM THE CVC HEC-RAS MODEL

GOLDER SURVEYED CHANNEL CROSS SECTION ADDED TO THE CVC HECRAS MODEL

STUDY REACH FOR ANALYSIS





NOTE(S)

REFERENCE(S)

1. BASE DATA: MINRF LIO, 2020
2. IMAGERY SOURCE: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDIVANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND

THE GIS GOSEN COMMONTH.

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3. COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N

GM BLUEPLAN ENGINEERING LIMITED

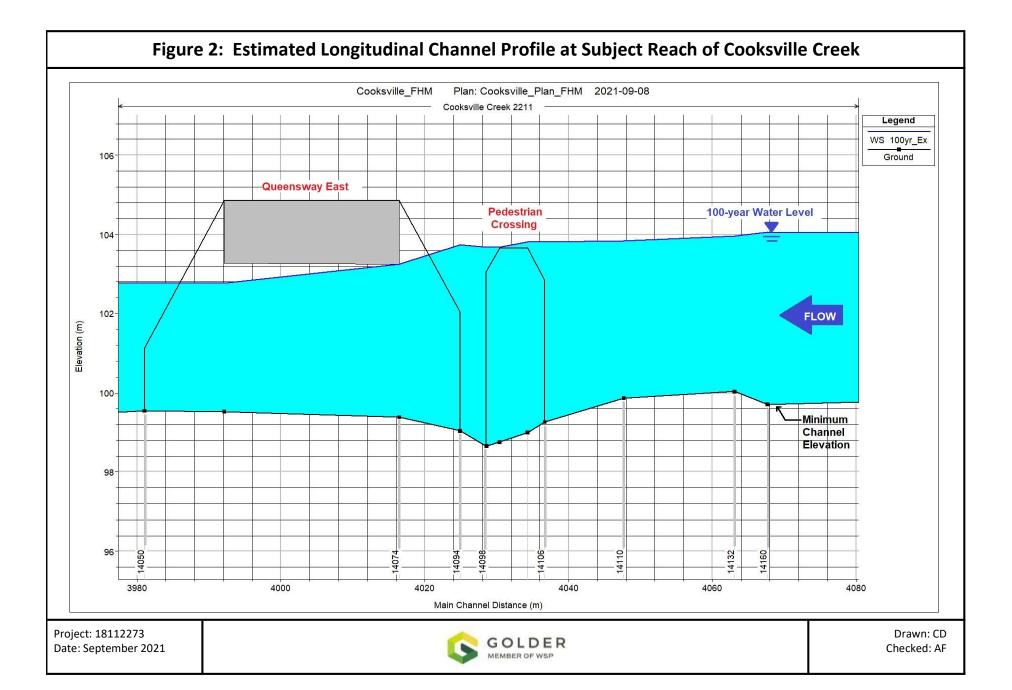
HYDRAULIC AND GEOMORPHIC HAZARD ASSESSMENT AT COOKSVILLE CREEK TO SUPPORT THE PROPOSED SANITARY SEWER CROSSING UPSTREAM OF THE QUEENSWAY EAST BRIDGE

SITE LOCATION PLAN

GOLDER MEMBER OF WSP

YYYY-MM-DD	2021-09-15
DESIGNED	CGE
PREPARED	CGE
REVIEWED	AF
APPROVED	AF

CONTROL PROJECT NO. REV. **FIGURE** 18112273 8000 ----



September 15, 2021

Project No. 18112273

ATTACHMENT A

Photograph Log from Field Surveys (June 2021)



Photograph 1.1: Subject reach of Cooksville Creek near upstream end; Photograph 1.2: Subject reach of Cooksville Creek near upstream end; view looking north and upstream on June 21, 2021 view looking south and downstream on June 21, 2021. 50m U/S U/S Photograph 1.3: Subject reach of Cooksville Creek near upstream end; view looking east at LDB on June 21, 2021. Photograph 1.4: Subject reach of Cooksville Creek near upstream end; view looking west at RDB on June 21, 2021. 50m U/S 50m U/S LDB RDB Photograph 1.5: Subject reach of Cooksville Creek near mid-point; view looking north and upstream on June 21, 2021. Photograph 1.6: Subject reach of Cooksville Creek near mid-point; view looking south and downstream on June 21, 2021. 30m U/S Photograph Log from Field Survey GOLDER MEMBER OF WSP 2021-09-09 Project: 18112273 Date: Cooksville Creek 1 of 2

Photograph 1.7: Subject reach of Cooksville Creek near mid-point; view looking east at LDB on June 21, 2021.

Photograph 1.8: Subject reach of Cooksville Creek near mid-point; view looking west at RDB on June 21, 2021.



Photograph 1.9: Subject reach of Cooksville Creek near downstream end; view looking north and upstream on June 21, 2021.



Photograph 1.10: Subject reach of Cooksville Creek near downstream end; view looking south and downstream on June 21, 2021.



Photograph 1.11: Subject reach of Cooksville Creek near downstream end; view looking east at LDB on June 21, 2021.



Photograph 1.12: Subject reach of Cooksville Creek near downstream end; view looking south and downstream at RDB on June 21, 2021.







Photograph Log from Field Survey

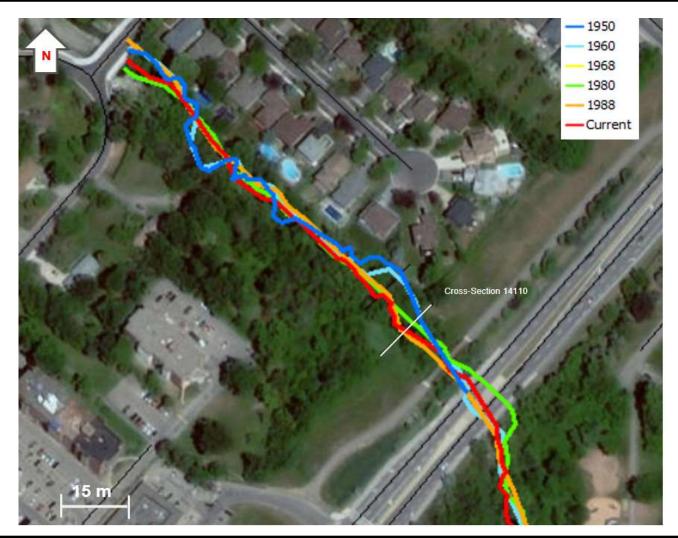
Project: 18112273 Date: 2021-09-09 Cooksville Creek 2 of 2

ATTACHMENT B

Historical Air Photo Analysis for Subject Reach of Cooksville Creek



Attachment B: Historical Air Photo Analysis for Subject Reach of Cooksville Creek



18112273 2021-09-09



Drawn By: LM Approved By: AF



REGION OF PEEL

WASTEWATER CAPACITY IMPROVEMENTS IN CENTRAL MISSISSAUGA

Natural Environment Reports

Etobicoke Creek Scour Hazard



TECHNICAL MEMORANDUM

DATE November 26, 2020 **Project No.** 18112273

TO Chris Campbell, Infrastructure Planning, Partner

GM BluePlan Engineering Limited

FROM Christopher Davidson

Terry Winhold

EMAIL cdavidson@golder.com

HYDRAULIC AND GEOMORPHIC HAZARD ASSESSMENT AT PROPOSED SHAFT LOCATIONS AND NEW SEWER CONNECTION FOR SCHEDULE 'C' MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT FOR THE CAPACITY EXPANSION OF THE CENTRAL MISSISSAUGA WASTEWATER SYSTEM

1.0 INTRODUCTION

Golder Associates Ltd. (Golder) was retained by GM BluePlan Engineering to provide engineering services for a Schedule 'C' Municipal Class environmental assessment for the capacity expansion of the Central Mississauga Wastewater System (CMWS) in the Regional Municipality of Peel.

The overall requirements for a Schedule 'C' Municipal Class environmental assessment include field evaluations and impact assessments to be completed in sufficient detail to allow the assessment of project alternatives relative to potential impacts on natural environment features and functions; and to facilitate recommendations on design parameters to avoid impacts or minimize environmental effects.

This technical memorandum presents minimum sewer pipe burial depth and setback recommendations for four representative Etobicoke Creek cross-sections associated with CMWS capacity expansion (i.e., potential shaft locations and potential sewer alignments) south of the Queensway in Mississauga (see Figure 1). The recommendations at each channel cross-section location are based on the results of a scour analysis and lateral stability assessment specific to each location. This memorandum also includes high level mitigation concepts for scour and erosion protection measures in order to reduce potential future damages to the proposed sewer infrastructure.

18112273

TW

Α

Preferred Shaft Site

2.0 EXISTING CHANNEL CONDITIONS

Hydrological and fluvial geomorphic conditions at the four Etobicoke Creek cross-section locations were assessed based on the results of a field survey (carried out in July, 2020) and desktop analyses. The field survey involved measurements or observations of channel geometry (i.e., topographic channel surveys including cross-sections and profile), water levels, and channel geomorphology (i.e., identification of characteristic bed and bank morphology, channel substrate, instream and/or riparian vegetation, and erosion and deposition features). The desktop analysis involved the derivation of flood discharges for Etobicoke Creek from the HEC-RAS model developed by Toronto Region Conservation Authority (TRCA), as well as a review of historical air photograph records (from 1954 to 2005) and recent aerial imagery (from 2018) to assess past changes in channel patterns and the likelihood of lateral channel migration over the life of the project. The results of the field survey and desktop analyses were used to characterize existing channel conditions and, where applicable, to support the scour analyses and lateral stability assessments (presented in Section 3.0).

A summary of key hydrological and fluvial geomorphic conditions is presented in Table 1. Select photographs taken during the field visit are included in Appendix A.



Table 1: Summary of Hydrological and Fluvial Geomorphic Characteristics at the Watercourse Cross-section Locations

Watercourse Name	Cross-Section	Drainage Area (ha)	General Channel Characteristics	100-year Maximum Discharge (m³/s)	2-year Maximum Discharge (m³/s)
	Cross Section 1	~20,4001	Channel width is approximately 20 m. Well defined bed and banks, bed material is mostly flagstone. Evidence of erosion especially at RDB (right downstream bank).		
Etobicoke	Cross Section 2		Channel width is approximately 11 m. RDB material is silt and fine sand. Bed material is mostly flagstone. There is a permanent island in mid channel and downstream of the island there is evidence of a former channel on the LDB (left downstream bank) side which is currently dry. There is little evidence of erosion in the present mainstream.	335	125
Creek	Cross Section 3		Channel width is approximately 20 m. Well defined bed and bank. Both left and right bank materials are flagstone. Channel bed material is silt and fine sand. There is little evidence of erosion and appears to be mostly a depositional area.		
	Cross Section 4		Cross-section is oriented parallel to a sharp meander bend. Channel width is approximately 15 m. West bank and bed material is silt and fine sand and appears to be mostly a depositional area. East bank has steep slope and consists of sedimentary rock.		

¹ Drainage area at the site was assumed similar to Water Survey of Canada catchment for flow monitoring station 02HC030 'Etobicoke Creek below Queen Elizabeth Highway' located 1.2 km downstream of The Queensway

3.0 SCOUR AND SETBACK ASSESSMENTS

In the absence of a comparable Ontario regulation for pipeline crossings (or sewer crossings and related infrastructure), the requirement to regulate pipeline crossings in Alberta, as stipulated in the Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body (the Code) (ESRD 2013) under the Alberta Water Act, was adopted for the Etobicoke Creek scour assessments. This code has also been adopted for recent oil and gas pipeline crossing assessments in Ontario (Golder 2015). The Code states:

"All pipes for pipeline crossings that will carry a substance that causes or may cause an adverse effect on the aquatic environment, including fish habitat, must be installed at an elevation that is below the one in one hundred year bed scour depth of the water body."

Further to this, the sewer design is expected to provide sufficient burial depth and setback distances so that processes of channel degradation or lateral movement, such as bed scour or bank erosion, do not expose the proposed sewer or related infrastructure over its expected lifetime.

3.1 Design Basis and Methodology

A hydraulic analysis was performed at the four representative cross-section locations using the derived 100-year instantaneous discharge values for Etobicoke Creek (refer to Table 1), in combination with the topographic channel survey (i.e., channel cross-section data that was obtained from the field surveys). A 1-Dimensional uniform flow analysis (Manning's equation) was used to determine the hydraulic properties for the scour analysis. Roughness values for this flow analysis were estimated based on field observations (i.e., channel bed material and vegetative cover). Channel gradient (longitudinal slope) was determined based on the longitudinal fall across the four surveyed cross sections.

The methods used to assess scour depth were taken from the U.S. Bureau of Reclamation technical guideline "Computing Degradation and Local Scour" (Pemberton and Lara 1984). Scour depths were assessed using three different scour calculation methods: Blench (1969); Lacey from Pemberton and Lara (1984); and Neill from Pemberton and Lara (1984). A minimum pipeline burial depth of 1.5 m is recommended for crossings with defined channels based on industry standards (CSA 2011). To be conservative, this minimum burial depth should be adopted if the scour depths calculated using the three methods were all less than 1.5 m. Otherwise, the maximum scour depth from the three methods was selected if greater than 1.5 m.

Setback recommendations were based on an aerial photograph analysis. Recent satellite imagery and historical air photos (Figure 2) were compared to identify any notable (visual) lateral movement over time in the vicinity of the representative cross-sections and alternative sewer alignments and crossing locations. The amount of bank movement over the period of record was measured from the air photos and used to calculate the average annual rate of erosion. If potential cut-off formations or active channel meander movement (i.e., downstream migration of meander bends or lateral shifting) was observed, floodplain and meander belt width characteristics were also considered in the determination of setback distances. The recommended setback distance from the existing channel top of bank was selected according to the following criteria:

- 1) If no movement visible on air photos:
 - 3 m for bank heights less than or greater than 1.5 m
 - Greater of 5 m or 2x bank height for bank heights greater than 1.5 m



- 2) If movement visible on air photos, greater of:
 - measured average annual rate of movement x 100 years
 - meander belt or floodplain width if meander cutoffs or major channel shifts observed

Given the significant amount of lateral channel movement observed on the historic air photos, and to be conservative in our assessment, it was also assumed that the general direction of erosion or channel movements could reverse during the project life, such that the approximate alignment at the beginning of the air photo period could be restored.

3.2 Results of Lateral Stability Assessment and Recommended Minimum Setbacks

The lateral stability assessments and recommended setbacks for each of the four representative cross-sections are presented in Table 2, with consideration of the notes/criteria at the bottom of the table. Results of the airphoto comparison for the 64 year period of record (1954-2018) is presented in Figure 2.

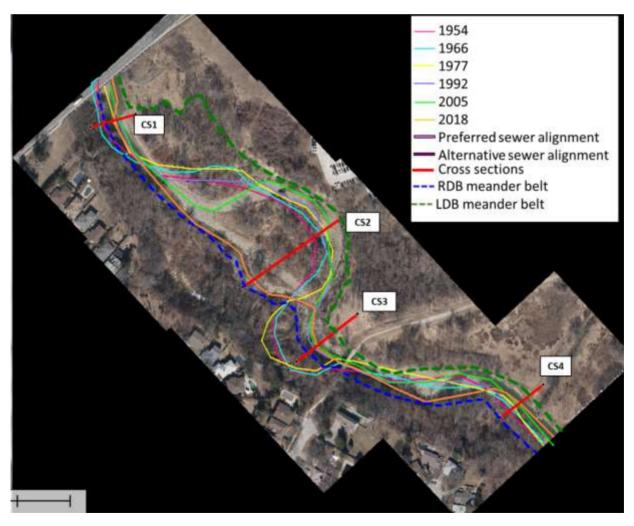


Figure 2: Etobicoke creek alignment from air photo comparison (1954-2018)



November 26, 2020

Table 2: Results of Lateral Stability Assessment and Recommended Sagbend Setbacks

Watercourse Name		Field Estimated Watercourse Dimensions (1)		Lateral Channel Stability Based on Air	Erosion and Sedimentation Patterns	Dominant Mechanism of	Criteria for	Recommended Minimum Setback ⁽³⁻⁵⁾	
	Crossing ID	Bankfull Width (m)	Maximum Bankfull Depth (m)	Photograph Analysis (2)	Based on Field Surveys	Lateral Instability	Setback Distance	Left Bank (m) ⁽⁶⁾	Right Bank (m) ⁽⁶⁾
	Cross Section 1	19.0 2.05 to 15.0 m during period of record. Average annual		Channel is generally stable with well vegetated banks and some evidence of erosion and sedimentation.	Bank erosion	See note 5	25.0	5.0	
3Etobicoke Creek	Cross Section 2	1 113 250 "		Well vegetated banks and well-defined main channel with limited evidence of erosion. There is an island in the middle of the cross the section with evidence of past lateral movement on the RDB side (i.e., dry channel observed to left of the island)	Lateral channel movement	See note 3	94.0	5.0	
	Cross Section 3	20.0	2.06	The historical air photograph analysis demonstrated that the channel alignment/ planform has moved up to 33.0 m during period of record as a result of major channel shift between 1977 and 1992. Average annual rate = 0.5 m in LDB bank direction.	Vegetated banks and well defined channel. Mostly depositional area with some evidence of erosion.	Lateral channel movement	See note 3	12.0	8.0
	Cross Section 4	15.2	2.13	The historical air photograph analysis demonstrated that the channel alignment/ planform has moved up to 12.0 m during period of record. Average annual rate = 0.18 m in LDB direction.	Vegetated banks and well-defined channel. Mostly deposition area with erodible LDB materials and sedimentary rock in RDB.	Minor to moderate bank erosion (RDB)	See note 5	10.0	12.0

Setback is measured horizontally from the top of bank. Minimum burial depth (a constant elevation) is determined by scour calculations and is to be maintained between the left and right setbacks. Additional Notes:

- The estimated bankfull geometry at each of the crossing locations was based on field surveys by Golder in July 2020.
 The period of record for the air photo analysis is 64 years (1954-2018).
- 3. Setback when lateral channel movement (meander bend migration or potential cut-off formation) is dominant mechanism:
 - a. Meander belt width where channel not confined by valley wall.
 - b. Minimum 5.0 m from top of valley slope, where channel confined by valley wall.
- 4. Minimum Setback when bank erosion not observed:
 - a. Minimum default value = 3.0 m when bank height <1.5 m
 - b. Twice bankfull depth when bank height >1.5 m
- 5. Minimum Setback when bank erosion observed (greater of):
 - a. Minimum default value (5.0 m)
 - b. Twice bankfull depth
 - c. Measured annual rate of erosion x 100 years
 - d. To be conservative: assume that direction of erosion may reverse during project life to approximate alignment at beginning of air photo period of record.
- 6. The 'Left Bank' of the channel is defined as the bank that is located on the right side of the channel when looking downstream, while the 'Right Bank' of the channel is defined as the bank that is located on the right side of the channel when looking downstream.



3.3 Results of Scour Assessment and Preliminary Minimum Burial Depth Recommendations

The results of the scour assessment and associated preliminary burial depth recommendations for each of the watercourse crossings are summarized in Table 3.

Generally, the Blench and Neil method values produce comparable results, while the Lacey method appears to underestimate scour depth. The Lacey method does not take into account the width of the channel, and may be less appropriate for a relatively narrow stream with a relatively high peak flow.

Table 3: Results of Scour Analysis and Preliminary Pipeline Burial Depth Recommendations for Watercourse Crossings

Mataraauraa		Calcula	ted Scour I	Depth ⁽¹⁾	Draliminan, Minimum Dinalina Durial
Watercourse Name	Cross-Section	Blench method	Lacey Method	Neill Method	Preliminary Minimum Pipeline Burial Depth Recommendation
	Cross Section 1	3.4	0.7	2.4	Maximum value of 3.4 m
Etobicoke	Cross Section 2	4.5	0.7	3.1	Maximum value of 4.5 m
Creek	Cross Section 3	3.7	1.1	2.1	Maximum value of 3.7 m
	Cross Section 4	4.5	1.1	2.7	Maximum value of 4.5 m

3.4 Summary of Minimum Recommended Burial Depths and Sagbend Setbacks

The results of the lateral stability assessments and scour analyses (presented in Sections 3.2 and 3.3 above) were used to develop site-specific burial depth and minimum setback recommendations for each of the cross-section locations. A summary of these recommendations is presented in Table 4 and illustrated on Figures 3 to 6 below. The approximate location of the existing sanitary sewer pipe as understood from the 1972 "As Constructed" drawings from Marshall Macklin Monaghan (1972) provided by GM BluePlan is shown on the figures; these locations represent estimates relative to 1972 topography and structures and need to be confirmed in the field.

Table 4: Summary of Minimum Recommended Burial Depths and Setbacks at Watercourse Crossings

		Relevant Figure Number to	Minimum	Minimum Recommended Setback Distance (m) ⁽²⁾		
Watercourse Name	Crossing ID	Illustrate Site- Specific Minimum Burial Depths and Sagbend Setbacks	Recommended Burial Depth (m) ⁽¹⁾	Left Bank	Right Bank	
	Crossing 1	Figure 3	3.4 m or 92.1	25.0	5.0	
Etobicoke	Crossing 2	Figure 4	4.5 m or 100.0	94.0	5.0	
Creek	Crossing 3	Figure 5	3.7 m or 89.9	12.0	8.0	
	Crossing 4	Figure 6	4.5 m or 86.9	10.0	12.0	

Notes:

Elevation in meters based on assumed survey datum established by Golder (July 2020).



The 'Left Bank' of the channel is defined as the bank that is located on the left side of the channel when looking downstream, while the 'Right Bank' of the channel is defined as the bank that is located on the right side of the channel when looking downstream.

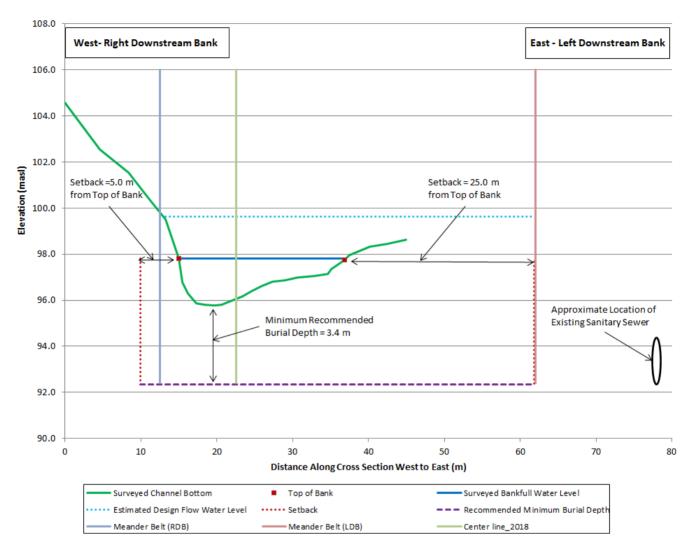


Figure 3: Minimum Pipeline Burial Depth and Setback Recommendation for Cross Section 1



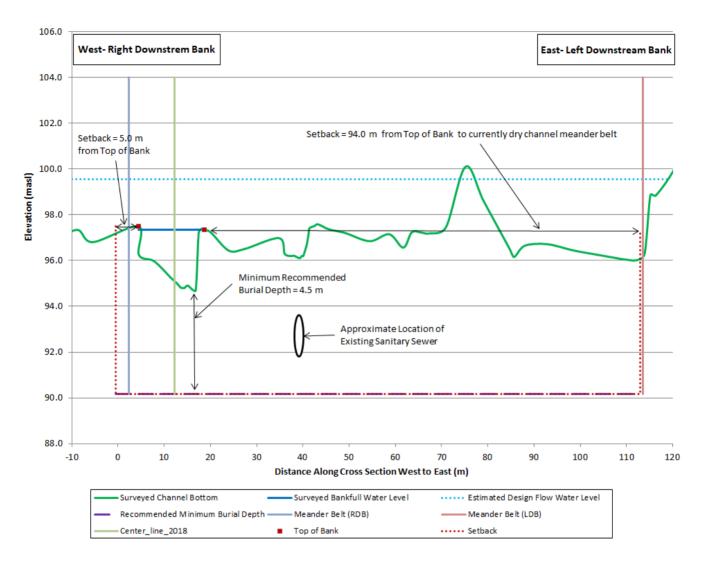


Figure 4: Minimum Pipeline Burial Depth and Setback Recommendation for Cross Section 2



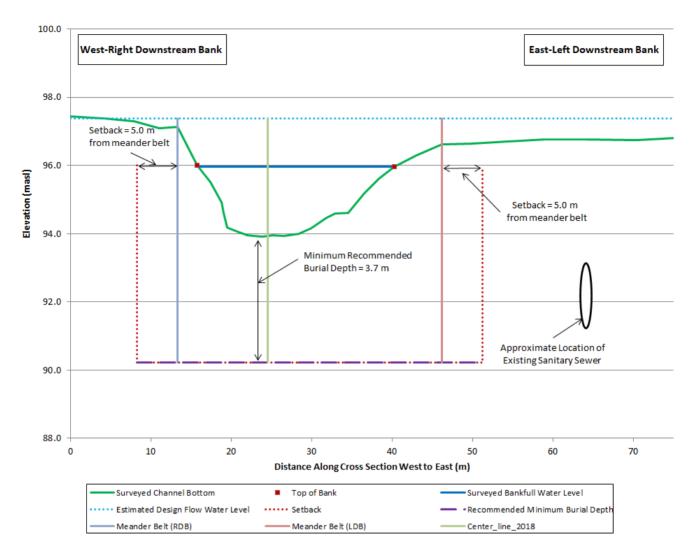


Figure 5: Minimum Pipeline Burial Depth and Setback Recommendation for Cross Section 3



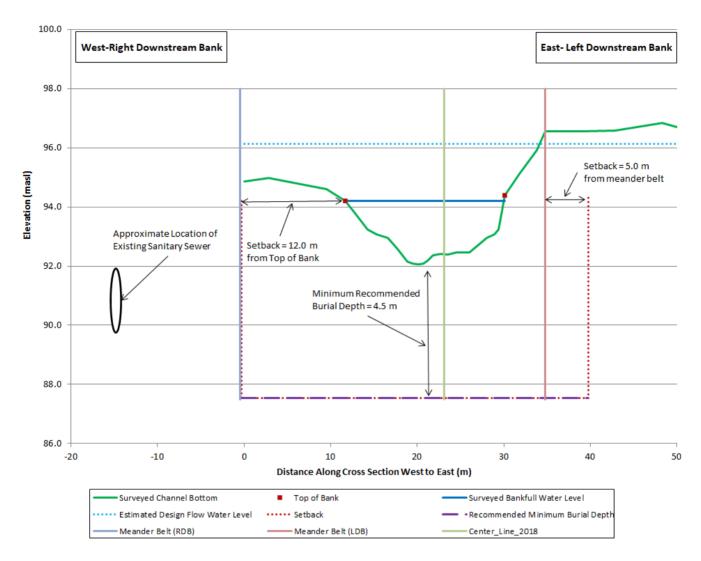


Figure 6: Minimum Pipeline Burial Depth and Setback Recommendation for Cross Section 4



4.0 MITIGATION CONCEPTS

The results from the hydraulic and fluvial geomorphology assessment suggests that Etobicoke Creek at the proposed connection locations is subject to significant erosion or lateral channel movement and potential scour ranging from 3.4 to 4.5 m during a 100-year flow event.

Using the original construction drawings for the existing sewer (MMM, 1972), Golder estimated the elevation of the existing 84-inch diameter sanitary sewer at each of the cross sections. The results (shown in Table 5 below) suggest that obvert of the existing sewer is very close to the existing channel bottom elevation (i.e., between 1.3 m and 0.1 m). While the existing sewer is not directly under the channel at all of the surveyed cross section locations, the proximity to the creek will make selection of a feasible alignment and connection location for the proposed sewer difficult. This is because the depths of the current sewer (to which the proposed sewer must connect) are considerably less (i.e., shallower) than the recommended burial depths. Given that the calculated cover (required burial depth) most likely cannot be achieved when connecting to the existing sewer, it is understood that an open cut method of construction with appropriate mitigation in the form of scour and erosion protection will likely be used in the vicinity of the Etobicoke Creek channel.

Table 5: Estimated Elevations and Burial Depths for Existing Sanitary Sewer

	Pipe Invert (m)	Pipe Obvert (m)	Channel Invert / Burial Depth (m)
Cross Section 1	92.3	94.5	95.8 / 1.3
Cross Section 2	91.9	94.0	94.7 / 0.7
Cross Section 3	91.2	93.4	93.9 / 0.5
Cross Section 4	89.9	92.0	92.1 / 0.1

In order to provide a level of protection against potential channel scour, erosion and lateral movement (should the recommended burial depths and setbacks prove to be impractical), Golder proposes the following high-level mitigation concepts be taken into consideration when designing the proposed sanitary sewer alignment and connection:

Connection Location: The fluvial geomorphology results suggest that all sewer alignment options along Etobicoke Creek will likely be subject to some form of scour and/or erosive attack over the life of the project. It therefore follows that any sewer alignment that limits the length of proposed sewer along (parallel to) Etobicoke Creek will be preferable as it will limit exposure to erosion and lateral channel movement. As shown on Figure 1, the 01A Alternative Shaft Location involves the shortest alignment along Etobicoke Creek (connecting just south of the Queensway), followed by 01B, and lastly 01D. More serious consideration should therefore be given to the 01A and 01B alternatives which offer shorter routes and less risk to the proposed sewer. GM BluePlan is also investigating an additional connection point (01E, an undetermined distance south of 01D on the west side of the creek). This would offer similar conditions to 01D, but with a longer distance and likely a slightly deeper connection point.



- Bank Armouring: Where the proposed sewer is outside of the current stream banks, it should be possible to limit the erosion threat by preventing channel migration into the area overtop of the proposed sewer. This could be accomplished by armouring the channel banks near the proposed sewer alignment with riprap, armour stone or rock filled gabion baskets (gabions). Gabions have already been used to limit channel migration under the Queensway crossing of Etobicoke Creek (see Photo Appendix A). A conceptual sketch of gabion bank protection is included on Figure 7. The preferred method, sizing, dimensions, and locations would be determined at the detailed design stage.
- Stream Bed Armouring: Where the proposed sewer alignment crosses the current stream channel and continues across the floodplain within the setback limits, it should be possible to reduce the risk of scour and potential damage to the sewer by including erosion protection above the pipe. This protection could take several forms, including a layer of large-sized riprap or engineered materials such as cable concrete. A conceptual sketch of rip rap armour scour protection is included on Figures 8 and 9. Using the estimated bankfull velocities (generally between 5 and 6 m/s) and flow depths from the fluvial geomorphology analysis, extrapolating from the design nomographs in the MTO Drainage Manual (MTO, 1998) suggests a riprap size on the order of 700 mm to 1000 mm diameter would be required. This type of armoring would be most easily installed during open trench construction of the proposed sanitary sewer. The preferred method, sizing, dimensions, and locations would be determined at the detailed design stage.
- Floodplain Trench Armouring: Figure 10 presents a typical section of the proposed sewer installed across the floodplain within the recommended setback limits. The section illustrates a riprap armouring concept that would be required to protect the sewer in the event Etobicoke Creek were to shift laterally and expose the sewer to potential scour and erosion.
- High Flow Weirs: It may be possible to provide some limited protection for both existing and proposed sanitary sewers by reducing expected high-flow velocities in Etobicoke Creek. This could be achieved through the construction of one or more "high-flow weirs" across the overbank (floodplain). The weirs would be designed to allow full conveyance during bankfull flow and small events, but partially constrict flows during high flow events. The result would be increased water levels upstream of the weir with a corresponding decrease in average channel flow velocity., This would have the beneficial effect of reducing (but not eliminating) channel bank erosion and potentially bed scour during the typically most damaging high flow events. Consequently, this mitigation option would have to be used in conjunction with other mitigation options to provide the desired protection. A conceptual sketch of an "embankment weir" configuration is included on Figure 10. While this mitigation concept does have the potential to provide some protection to both the existing and proposed sanitary sewer, it would result in higher upstream water levels during major flood events, which could adversely impact upstream properties and infrastructure. For this reason, regulatory approvals for this option would likely be challenging.



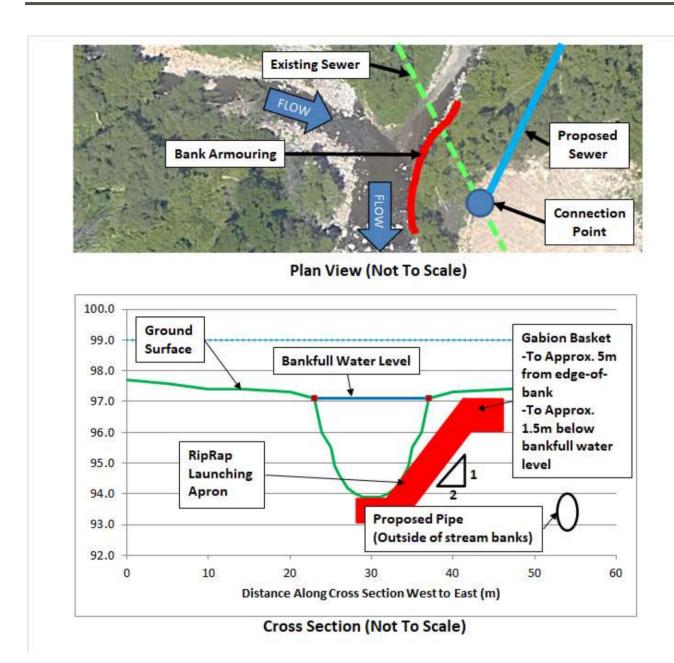


Figure 7: Conceptual Bank Armouring Sketch



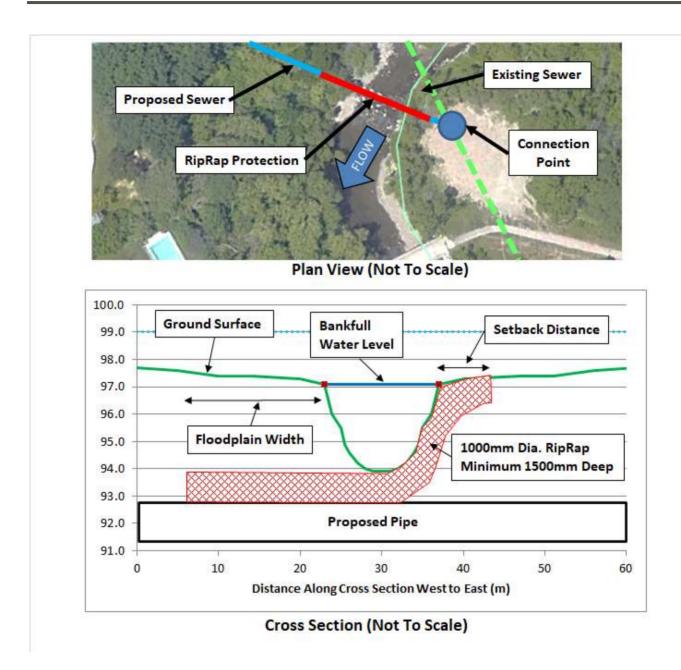


Figure 8: Conceptual Stream Bed Armouring Sketch



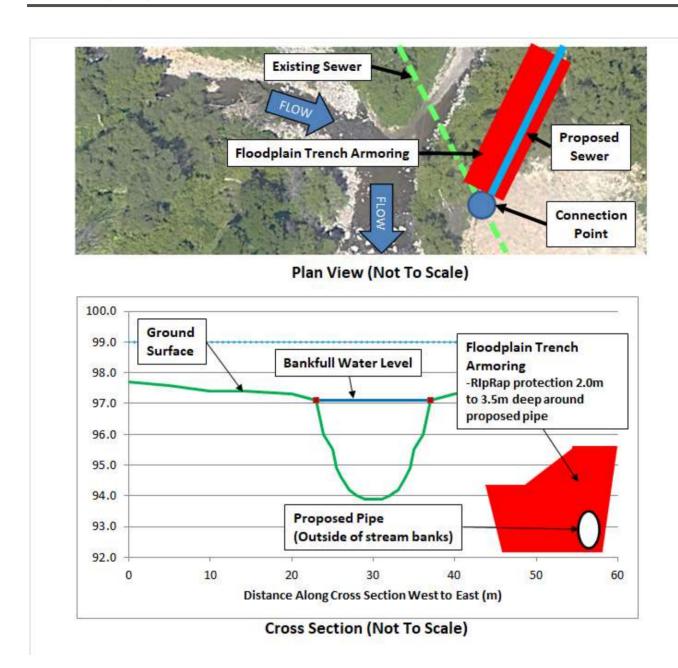


Figure 9: Conceptual Floodplain Trench Armouring Sketch



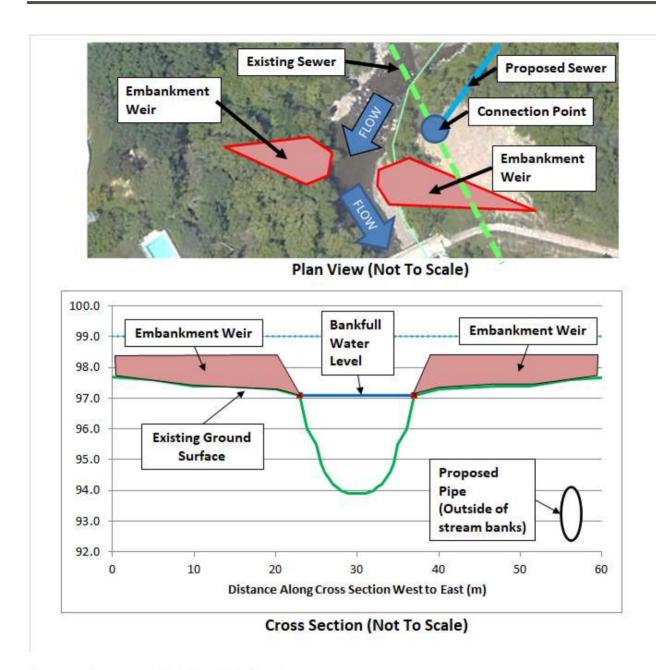


Figure 10: Conceptual High Flow Weir Sketch



High Level Cost Estimate

A high-level cost estimate for the mitigation options described above is provided in Table 6 below. The table describes the cost of channel Bank and Bed Armoring plus Floodplain Trench armouring required for connection options 01A, 01B, and 01D; the cost of the High Flow Weir (which could be associated with one or all of the connection points) is provided as a separate cost.

Table 6: High-Level Cost Estimate for Mitigation Options

Option	Floodplain Trench Armoring	Channel Bank and Bed Armouring at Crossing	Total Cost
Connection Option 01A	\$54,000	\$364,000	\$418,000
Connection Option 01B	\$540,000	\$260,000	\$800,000
Connection Option 01D	\$945,000	\$0	\$945,000
High Flow Weir ¹			\$102,000

¹ The High Flow Weir option is not a stand-alone mitigation alternative. It could potentially be used in combination with the channel and floodplain trench armouring to reduce the overall cost of these mitigation alternatives.

The costs provided in Table 6 above assume the following:

- All connections are assumed from a point at the edge the floodplain on the west bank of Etobicoke Creek, north of the Queensway Bridge.
- Floodplain trench armoring (Figure 9) is assumed for approximately 50% of the distance from the assumed connection point to a point on the west bank of Etobicoke Creek roughly in-line (north-south) with the connection option location. This represents floodplain trench armoring of 15 m, 150 m, and 263 m for connection Options 01A, 01B, and 01D, respectively. The cost shown here is primarily the riprap material.
- Channel bed armoring (Figure 8) across the floodplain and active channel, including 70 m for Option 01A and 50 m for Option 01B. Option 01D is assumed to be on the same side of the creek as the starting connection at the Queensway and therefore is assumed not to require crossing the floodplain and creek. The cost shown here is primarily the riprap material and coffer dams assumed required to build across Etobicoke Creek.
- The High Flow Weir option is not a stand-alone mitigation alternative. It could potentially be used in combination with the channel and floodplain trench armouring to reduce the overall cost of these mitigation alternatives. The cost shown here includes gravel material and cable concrete over the surface area.
- The cost does not include permits or additional studies required for the work. Discussions with regulators would be required to determine requirements.



- The cost does not include any allowance for blasting, rock excavation, shoring, or dewatering, as these are assumed required for the proposed pipe regardless of whether it receives erosion protection.
- Likewise, the cost of tree clearing, access roads, or reseeding is not included, as it would be required for the proposed pipe regardless of erosion protection.
- The cost of the pipe and any manholes is not included.

5.0 CLOSURE

If you have any questions or require further information, please contact the undersigned.

Respectfully submitted,

Chrisp bilin

GOLDER ASSOCIATES LTD.

Christopher Davidson, PEng Water Resources Engineer Terry Winhold Senior Water Resources Engineer

CD/TW/mp

Attachments: Appendix A - Photographs

 $https://golder associates.sharepoint.com/sites/100160/deliverables/surface\ water/final\ for\ trca/18112273-tm-rev0-scour\ assessment-26 nov2020.docx$



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APPENDIX A

Photographs



Appendix A – Photographs 18112273



Photo 1: Etobicoke Creek under Queensway Bridge, looking at east bank



Photo 4: Upstream of Cross Section 2 Main (west) Channel, looking downstream (south)



Photo 2: Gabion Basket erosion protection on the west bank at Queensway Bridge



Photo 5: Bank Erosion at Cross Section 2 Main (west) Channel, looking downstream (south)



Photo 3: Looking downstream (south) from Queensway Bridge towards Cross Section 1



Photo 6: Cross Section 2 Side (east) Channel, looking downstream (south)

Appendix A – Photographs 18112273



Photo 7: Slope Erosion at Cross Section 2 Side (east) Channel, looking upstream (north)



Photo 8: Cross Section 3, looking upstream (north)



Photo 9: Cross Section 3, looking downstream (south) at Sherway Drive Bridge



Photo 10: Undercut gabion basket at Sherway Drive Bridge (east side), downstream of Cross Section 3



Photo 11: Erosion on west bank between Cross Section 3 and 4



Photo 12: Cross Section 4, looking upstream (north) towards Sherway Drive Bridge



REGION OF PEEL

WASTEWATER CAPACITY IMPROVEMENTS IN CENTRAL MISSISSAUGA

Natural Environment Reports

Etobicoke Creek Tree Screening



Date of Site Visit:	11/13/2020	File:	718018	
To:	Region of Peel			
From:	GM BluePlan Engineerin	g Ltd.		
Project:	Wastewater Capacity Imp	provement	in Central Mississaug	ја
Subject:	Proliminary Troo Scroonin	a Poport a	t Etobicoko Crook	

Preliminary Tree Screening Report at Etobicoke Creek

TECHNICAL MEMO

INTRODUCTION

The Region of Peel (Region) retained GM BluePlan Engineering Limited (GM BluePlan) to provide consulting services for a Schedule 'C' Municipal Class Environmental Assessment (EA) for Wastewater Capacity Improvements in Central Mississauga (the Project). The Class EA will develop a strategy to increase conveyance capacity of key trunk sewers to service future growth and ensure alignment with the Region's long-term plan for providing wastewater services within Mississauga City Centre, Hurontario Corridor and Dundas Corridor areas. Through the EA evaluation process, the preliminary preferred strategy, including the sewer alignment and shaft sites, has been selected and involves a section of tunneled sewer within the Etobicoke Creek valley and an open cut creek crossing. To accommodate the construction of the open cut crossing, two compounds are proposed on the west and east sides of the creek at Sherway Drive (Site 1B). Due to the required clearing at both compound locations, a preliminary tree screening investigation was completed for Site 1B.

The main objective of the screening is to provide an understanding of the tree condition and diversity at Site 1B to support the selection of the preferred alignment and sewer construction methodology as well as to help identify any additional studies and mitigation measures that may be required to support next steps including detailed design, permitting and approvals and construction.

Figure 1 provides a map an overview of the study area for the Preliminary Tree Screening.



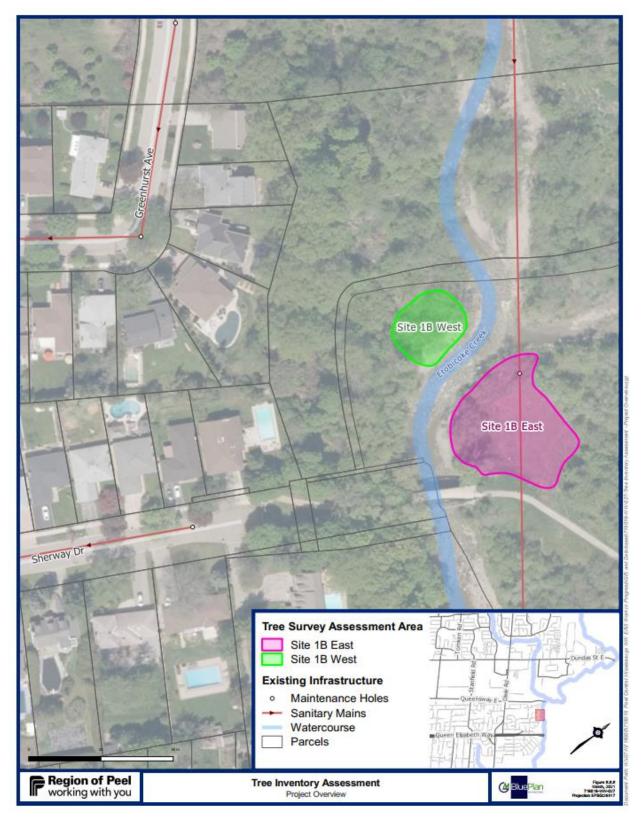


Figure 1: Preliminary Tree Screening Study Area



2 METHODOLOGY

This Preliminary Tree Screening was completed by an ISA Certified Arborist, Pamela Teddy (ON-2580A), supported by an environmental technician. The survey looked at tree species identification, diameter at breast height (DBH), overall condition of the tree including a high overview of browse and pest damage, proximity to creek bank with note of possible hinderances to growth. Additionally, the site was inspected for species at risk (SAR) trees. Tree inspections were limited to visual, on-ground examination, any data and information collected is based on the conditions at the time of inspection. The survey team used a set of vernier calipers to collect DBH of trees up to 12 cm of diameter, and a fiberglass measuring tape to measure circumference of larger trees. Circumference at breast height were converted to DBH using this mathematical equation: $\frac{c}{\pi} = dbh$, entries were then rounded up to the nearest 0.5 cm.

The following information is summarized in this report:

- Inventory of trees including species identification, DBH, and condition rating
- Identification of any observed Species at Risk (SAR)
- Outline of construction mitigation and site management guidelines

Site 1B was accessed on November 13th, 2020, it was overcast, and the temperature was 4°C, wind was negligible at the time of assessment. As the survey was conducted late in the fall, identification required the use of winter bud ID and bark pattern.

The notes taken during the November 13th site visit can be found at the end of this report.

2.1 Site Description

Site 1B is within a public access green trail, within the floodplains of the Etobicoke Creek. The access used to enter the site was a paved path from Sherway Drive. The assessment included two sections, Site 1B (West) and Site 1B (East), separated by the creek and border between City of Toronto and City of Mississauga (**Figure 1**). The study area of the tree screening was selected based on the conceptual design of each construction compound. These compounds will be further refined through next stages of the project.

Site 1B (West) is located in Mississauga and Site 1B (East) is located in Toronto, both are located within TRCA regulated lands. The East side of the creek is a previously cleared site (site was cleared in 2018 by Region of Peel contractor for trunk sewer repair) and generally has a higher creek bank than the West side and habitat features are related more closely to a managed park, with a grass plot and the bank lined with trees and shrubs. The East side of the creek also shows signs of planting efforts (by the TRCA) and monitoring efforts through the young tree monitoring program. The West side of the creek has habitat features that are more closely related to a woodlot, there are unsanctioned walking trails that cross through this section of the site. Access to the West side of the creek is restricted by a post and paddle fence.

2.2 Tree Condition Rating

Condition assessment of the trees was based on overall form of the tree, proportion of visible dead tissue, damage by wildlife and abiotic factors, evidence of pests or disease, and whether there was included bark at branch unions. Each tree was identified to species, and where trees were in young growth stages, a stem count was conducted. The tree condition classification are as follows:



- Good Condition: tree is healthy and generally devoid of visible injuries, pests, and diseases. They show proper tree form and branch unions are strong.
- Fair Condition: with some support, the tree can return to a good or healthy status, though left on its own there is a higher chance that it's condition can continue to deteriorate.
- Poor Condition: tree is visibly under a large amount of stress, factors can include a light incidence
 of bark cracking and injury, broken branches, pests and diseases, growth inhibiting factors including
 strong competition from nearby species.
- Dead Condition: the tree does not show evidence of life when the main bark is exposed, twigs and branches very brittle and easily broken noted generally in field notes

3 GENERAL OBSERVATIONS AND ANALYSIS

3.1 Tree Species Diversity

Table 1 and **Table 2** show the species count and composition of Site 1B East and West, respectively, surveyed during the site visit. Field data results are provided Appendix B. **Figure 2** shows the composition of established trees.

The full screening data include a planting by the TRCA located on the grassy section of the bank on Site 1B East. Not included in the count were grapevines, likely riverbank grape, that were climbing over trees at or near the bank, especially on the American elm (*Ulmus americana*) and Manitoba maple (*Acer negundo*).

Table 1: Species Count and Composition of Trees at Site 1B East

Common Name	Scientific Name	Count	%	Native / Non- Native
Manitoba Maple	Acer negundo	11	27.5	Non-Native
Sugar Maple	Acer saccharum	2	5	Native
Basswood	Tilia americana	2	5	Native
Willow sp.	Salix sp.	1	2.5	Non-Native
American Elm	Ulmus americana	19	47.5	Native
Ash Sp	Fraxinus sp.	5	12.5	Native

Table 2: Species Count and Composition of Trees at Site 1B West

Common Name	Scientific Name	Count	%	Native / Non- Native
Manitoba Maple	Acer negundo	2	4.7	Non-Native
Basswood	Tilia americana	12	27.9	Native
Willow sp.	Salix sp.	4	9.3	Non-Native
American Elm	Ulmus americana	4	9.3	Native
Ash Sp	Fraxinus sp.	19	44.2	Native

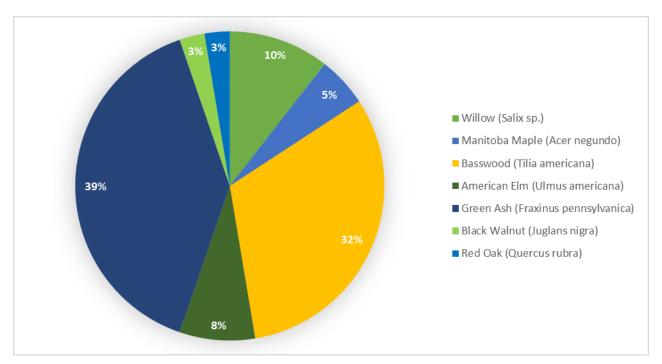


Common Name	Scientific Name	Count	%	Native / Non- Native
Black Walnut	Juglans nigra	1	2.3	Native
Red Oak	Quercus rubra	1	2.3	Native

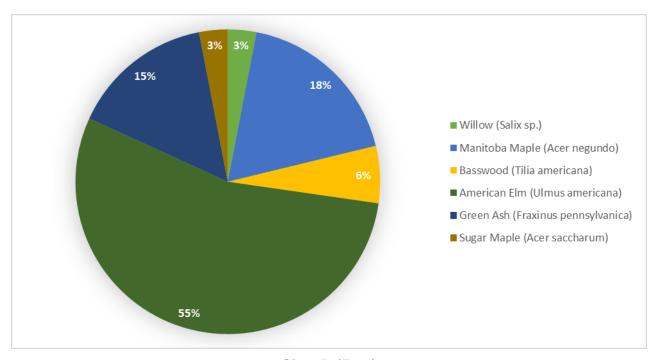
The established tree species composition at Site 1B is seen in below **Figure 2**. The most abundant species observed was the Green Ash (*Fraxinus pennsylvanica*), the majority being in poor condition. It was also noted that several Ash (*Fraxinus sp.*) trees displayed Emerald Ash Borer (*Agrilus pianipennis*) (EAB) exit holes. It is likely that this poor tree condition rating is related to the EAB damage. The second most abundant species was the American Elm (*Ulmus americana*), the majority being in good condition. It was noted that these trees were not self-pruning effectively and some individuals carried supplemental branches, in addition to supporting grapevine growth, leading to additional strain on the branches and risk of future detrimental effects.

From **Table 1** we can see that there are some non-native species at the site. The proportion of non-native species can be addressed during the construction mitigation phase.





Site 1B (West)



Site 1B (East)

Figure 2: Established Tree Composition on Site 1B (West and East)



3.2 Diameter Size Class Distribution

Overall, Site 1B (East and West) shows good recruitment in the understory to replace older specimens. As noted in **Figure 3** below, there are fewer large mature trees through these are being replaced by a good grouping of younger trees. The City of Mississauga's Tree By-Law protects trees of 15 cm DBH and greater¹. The diameter size classes used lump all the trees of smaller diameter into the 0-14.5 cm range and those trees equal to or larger than 15 cm are broken out to better understand the sizing of protected trees that will be impacted by the construction efforts. Note that this distribution does not take into consideration the difference between native and non-native species.

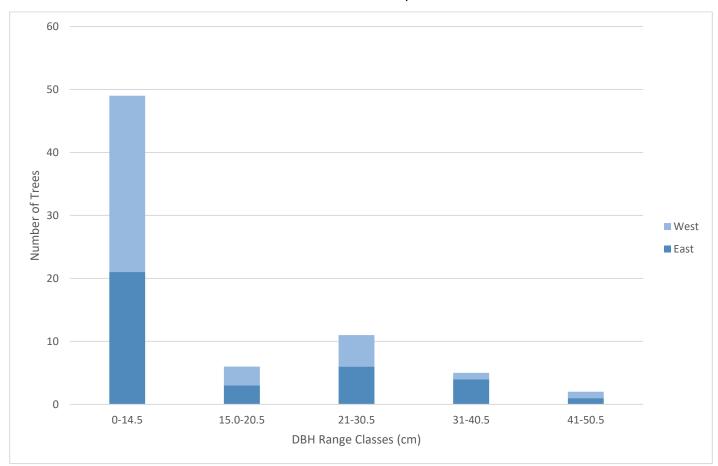


Figure 3: Number of Trees in Five DBH Size Classes

3.3 Tree Condition

The overall condition of trees at Site 1B (East and West) was good, with numerous young tree recruitment. Species that tended to be in poor to fair condition were Crack willow (*Salix fragilis*), which is known to grow erratically and have poor structural integrity, and Ash (*Fraxinus sp.*), which are being predated upon by Emerald Ash Borers (*Agrilus pianipennis*) (exit holes observed). Another pest that may be affecting tree condition is the European Gypsy Moth (*Lymantria dispar dispar*), as several egg masses were observed,

¹ Corporation of the City of Mississauga Tree Permit By-Law Number 474-05



the moth is presumed to be active at the site. Some of the tree growth at the creek bank at Site 1B East showed horizonal growth patterns, abnormal for their species.

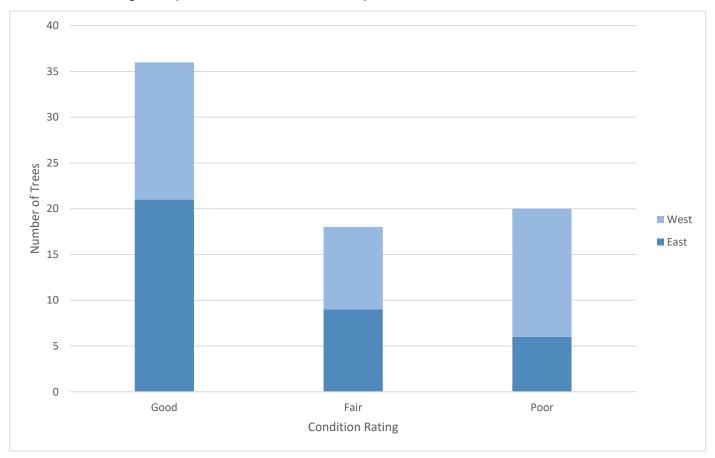


Figure 4: Tree Condition at Site 1B

3.4 Species at Risk

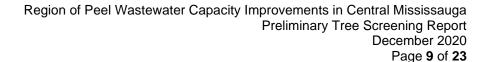
There were no SAR identified during the site visit.

3.5 Summary of Observations & Recommendations

Based on the initial screening, Site 1B East has a total of 40 trees large enough to have a DBH measurement assessed, where 30% were non-native. Trees on the East side tended to be in the smaller diameter range category and in generally good condition. The East side also had a previously cleared section with some replanting efforts from the Toronto and Region Conservation Authority, these plants were considered as part of the full site review of shrubs, whips and understory plants.

The initial screening at Site 1B West identified 43 trees large enough for DBH measurement located within a woodlot. Of the trees assessed on the west side, 14% were non-native, tree condition tended to be more variable than on the East side. The West side showed a lot of trees in the smaller recruitment phase. There was a substantial amount of understory including shrubs and whips here that were recorded as part of the whole site assessment.

In total, there are 265 trees and shrubs located within the areas of disturbance for site 1B (East and West), 83 of these are trees tall enough for DBH measurement. The variety of species indicates that they provide mixed habitat types and ecological function. Where possible, it is recommended that appropriate hoarding





is erected to protect trees near the construction zone prior to the start of construction works, and that a replacement plan is designed to maintain or increase current habitat and ecological value post-construction.

The Mississauga Tree By-Law states that a permit is required for removal when five (5) or more trees each with a diameter of 15 cm on a lot are removed within a single calendar year². The City of Toronto Tree By-Law requires a permit for any vegetation and any tree located in an area regulated under the Ravine and Natural Feature Protection By-Law which includes protected areas undergoing a Schedule B or C Municipal Class Environmental Assessment process³.

Replacement planting for the removal of trees should be at a ratio of 2:1⁴, with the final number of required replacements being based on the actual number of trees that are to be removed as listed by the City of Mississauga in their Terms of Reference for Arborist Report, Tree Inventory/Survey &Tree Preservation Plans. City of Toronto requires a tree replacement ratio of 1:1 (any size) for City trees and 3:1 (diameter of 30 cm and greater, measured 1.4 m above ground level) for private trees⁵.

The development of a tree replacement plan can ensure that the habitat will maintain its integrity and can potentially increase the health of the ecosystem. Replacement efforts should consider proportional replanting based on size classes, using native species, especially those found within the site and surrounding areas. Removal of unhealthy specimens and invasive species for construction purposes should be replaced with native species functioning in a similar habitat niche. For example, removal of a buckthorn (*Rhamnus cathartica*) shrub for construction should be replaced with a native species such as dogwood (*Cornus sp*).

4 MITIGATION AND MANAGEMENT

4.1 Mitigation Measures

Open cut construction methodology is being proposed at the Etobicoke Creek crossing. The remaining proposed pipe within the valley will be tunneled. In addition, construction compounds on the East and West side of Site 1B will require clearing to enable access, construction and equipment storage.

Tree protection zones are recommended adjacent to the construction compound, and ideally at the tree dripline, to provide protection to surrounding tree species that may be impacted.

4.1.1 Potential Impacts to Trees

Open cut construction involves the clearing and excavation of soil for pipe installation. Once the pipe is installed, the excavation can be backfilled with soil and surface vegetation. This method requires the removal of plants and soils to access the area of work which may lead to creek bank erosion and impacts to the woodlot habitat. Additional potential impacts from open cut construction include tree damage in surrounding area and soil compaction from equipment and foot traffic. Soil compaction and damage to

² Corporation of the City of Mississauga Tree Permit By-Law Number 474-05

³ Toronto Municipal Code Chapter 658, Ravine and Natural Feature Protection

⁴ City of Mississauga Terms of Reference Arborist Reports, Tree Inventory/Survey & Tree Preservation Plans

⁵ City of Toronto Auditor General's Report: Permit Issuance and tree Bylaw Enforcement Require Significant Improvement



roots may cause trees to suffer for extended periods before eventual failure due to loss of ability to take in water and nutrients from the surrounding environment.

4.1.2 Soil Compaction and Root Damage

Tunneled construction is completed using tunnel boring machines. The only surface works involved with tunnel construction are the entrance and exit shafts (within the construction compound). Tunnelling can have a potential impact on tree roots and stability depending on the depth at which tunneling occurs. In general, most of the fine, absorbing root growth occurs within the upper 30 to 60 centimeters of soil, though many species do develop deeper structural root systems. To reduce the impact to tree roots and maintain root growth viability, it is recommended that tunneling occur at a minimum of 2.5 m burial depth (root depth for species has been studied by the USDA forest service for their fire effects information system)⁶.

There is a potential that disruption to the soil substrate may lead to the activation of invasive species seeds from dormancy affecting habitat and forest health post-construction. It is recommended to minimize soil disturbance, however where open cut is required, it is recommended to replace the soil with clean material and/or monitor regularly for invasive species regrowth.

4.1.3 Emerald Ash Borer

Emerald Ash Borer (Agrilus pianipennis), EAB, are present at this site based on the observation of exit holes. The cities of Mississauga and Toronto are both within the regulated areas as set out by the Canadian Government regarding movement of infested wood, as such wood and debris must be kept in the area to prevent further spread of the insect⁷. This material can be reused to created habitat through the forest regeneration process.

4.2 **Tree Protection / Management During Construction**

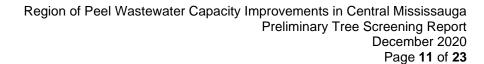
5 **NEXT STEPS**

The overall condition of trees at Site 1B was good, however there was evidence suggesting the presence of EAB and European Gypsy Moth. In addition, almost 22% of the trees observed were non-native. No SAR trees observed at the site. Considering the nature of the site, the following strategies are recommended during the design and construction of the proposed works.

- 1. Implementation of tree protection zones during construction to provide protection to surrounding tree species that may be impacted.
- 2. Ensure tunneled alignment is a minimum of 2.5 m burial depth to reduce the impact to tree roots and maintain root growth viability.
- 3. Minimize soil disturbance, where possible. Where open cut is required, it is recommended to replace the soil with clean material and/or monitor regularly for invasive species regrowth.
- 4. Removal of unhealthy specimens and invasive species for construction purposes should be replaced with native species functioning in a similar habitat niche.

⁶ USDA Fire Effects Information System (FEIS)

⁷ Government of Canada CFIA Areas regulated for the emerald ash borer





5. It is acknowledged that a further detailed tree inventory study will need to be undertaken to support detailed design.

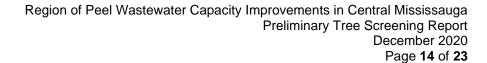
A complete tree species inventory including tree tagging is recommended for each construction compound within the Etobicoke Creek valley during the Detailed Design stage. This will ensure that specimens requiring tree protection zones are afforded the appropriate spacing, specimens slated for removal are accounted for and the tree replacement plan can be developed to enhance the habitat post-construction.



Appendix A: List of Trees and Shrubs Noted on Site



Common Name	Scientific Name	Count	%	Native or Non-native
American Elm	Ulmus americana	20	7.5	Native
Green Ash	Fraxinus pennsylvanica	31	11.7	Native
Basswood	Tilia americana	20	7.5	Native
Black Walnut	Juglans nigra	1	0.4	Native
Cherry Sp.	Prunus sp.	5	1.9	Native
Common Buckthorn	Rhamnus cathartica	10	3.8	Non-Native
Honeysuckle sp.	Lonicera sp.	13	4.9	Non-Native
Manitoba Maple	Acer negundo	16	6.0	Non-Native
Multi Flora Rose	Rosa multiflora	2	0.8	Non-Native
Nannyberry	Vibernum lentago	8	3.0	Native
Raspberry Sp.	Rubus sp.	4	1.5	Native
Red Maple	Acer rubrum	1	0.4	Native
Red Oak	Quercus rubra	1	0.4	Native
Red Osier Dogwood	Cornus stolonifera	37	14.0	Native
Staghorn Sumac	Rhus typhina	16	6.0	Native
Sugar Maple	Acer saccharum	14	5.3	Native
White Spruce	Picea glauca 2		0.8	Native
Willow Sp.	Salix. Sp. 6 2		2.3	Non-Native
Winged Euonymus	Euonymus alatus	58	21.9	Non-Native





Appendix B: Field Data



Tree Inventory Data Sheet - Central Mississauga EA

Team Pamela Teddy and Sandra Anastasio

Date November 13, 2020

Weather Mostly Cloudy

Site (Location/Address) Etobicoke Creek and Sherway Drive, Mississauga (Site 1B – east side of creek)

Species Common Name	Species Scientific Name	DBH / Circumference (cm)	Health Condition / Browse	Site Condition / Features	GPS Coordinates
Manitoba Maple	Acer negundo	C: 52.5 DBH: 17	Good condition - some Broken stems - grape vines climbing tree	On creek bank	0615840 4829295
Manitoba Maple	Acer negundo	C: 45 DBH: 14.5	Good condition - broken stems - grape vines climbing tree	On creek bank	0615840 4829295
Basswood	Tilia americana	C: 40.5 DBH: 13	Good condition - affected by Manitoba Maple	On creek bank	0615840 4829295
Willow Sp.	Salix sp.	C: 20.5 DBH: 7	Good condition - some dead lower branches	On creek bank	0615840 4829295
Manitoba Maple	Acer negundo	C: 38 _{stem 1} , 34.5 _{stem 2} DBH: 12.5 _{stem 1} , 11 _{stem2} , 11 _{stem 3}	Good condition	On creek bank	0615838 4829293
American Elm	Ulmus americana	C: 74.5 DBH: 24	Fair condition - some broken branches - some new growth - grape vines climbing tree	In proximity to creek	0615838 4829290
American Elm	Ulmus americana	C: 47 DBH: 15	Good condition - main leader stem broken	In proximity to creek	0651838 4829288
American Elm	Ulmus americana	C: 87 DBH: 28	Good condition - many dead branches from base to 2/3 high	In proximity to creek	0651838 4829288



Species Common Name	Species Scientific Name	DBH / Circumference (cm)	Health Condition / Browse	Site Condition / Features	GPS Coordinates
American Elm	Ulmus americana	DBH: 3.5	Good condition	In proximity to creek	0651831 4829289
Manitoba Maple	Acer negundo	DBH: 2.5	Good condition - grape vines on tree	In proximity to creek	0651831 4829289
Ash Sp.	Fraxinus sp.	DBH: 1	Good condition - young tree	In proximity to creek	0615832 4829289
American Elm	Ulmus americana	C: 113 DBH: 36	Fair condition - dead branches from base to 2/3 high	In proximity to creek	0615831 4829283
American Elm	Ulmus americana	C: 82 DBH:26.5	Fair condition - dead branches from base to 2/3 high - close to wooden debris	On creek bank	0615831 4829283
Manitoba Maple (x3)	Acer negundo	Unknown - Difficult to access	Fair to poor condition	On creek bank	0615831 4829283
American Elm	Ulmus americana	C: 124 DBH:39.5	Good condition - dead branches on lower half	On creek bank	0615828 4829273
Manitoba Maple	Acer negundo	C: 40 DBH:13	Good condition - some broken branches	In proximity to creek	0615828 4829273
Basswood	Tilia americana	C: 21 DBH: 7	Poor condition - wooden debris affecting growth	In proximity to creek	0615833 4829260
American Elm	Ulmus americana	C: 90. 103 DBH:29	Fair to good condition - infestation of moths	In proximity to creek	0615833 4829261
Ash Sp.	Fraxinus sp.	DBH: 2.5	Good condition	In proximity to creek	0615836 4829256
Manitoba Maple	Acer negundo	C: 26 DBH: 8.5	Fair condition - main branch horizontal - many sprouts	In proximity to creek	0615837 4829255
American Elm (x3)	Ulmus americana	C: 89.5 _{stem1} , 82 _{stem2} , 44 _{stem3}	Good condition - some dead branches in lower half - grape vines climbing tree	In proximity to creek	0615830 4829247



Species Common Name	Species Scientific Name	DBH / Circumference (cm)	Health Condition / Browse	Site Condition / Features	GPS Coordinates
		DBH: 28.5 _{stem1} , 26.5 _{stem2} , 14 _{stem3}			
American Elm	Ulmus americana	DBH: 2	Poor condition - young tree - in flood range	In proximity to creek	0615836 4829242
Ash Sp.	Fraxinus sp.	C: 30 DBH:9.5	Fair to poor condition - growing horizontally - competition at roots	In proximity to creek	0615836 4829242
Ash Sp.	Fraxinus sp.	DBH: 4	Fair condition - hardy regrowth - rotting stump	In proximity to creek	0651842 4829250
Ash Sp.	Fraxinus sp.	C: 61.5 DBH: 20	Fair condition - basal regrowth - infestation of emerald ash borer	In proximity to creek	0615842 4829249
American Elm	Ulmus americana	C: 120 DBH: 38.5	Good condition	In proximity to creek	0615848 4829255
American Elm	Ulmus americana	C: 53 DBH: 17	Good condition	In proximity to creek	0615848 4829255
Sugar Maple	Acer saccharum	C: 37 _{stem1} , 43 _{stem2} DBH: 12 _{stem1} , 14 _{stem2}	Fair condition - included bark (prone to failure)	In proximity to creek	0615848 4829255
American Elm	Ulmus americana	C: 131 DBH: 42	Good condition	In proximity to creek	0615848 4829255
American Elm	Ulmus americana	C: 118 DBH: 38	Good condition - some broken branches	In proximity to creek	0615848 4829255
American Elm	Ulmus americana	DBH: 3	Poor condition	In proximity to creek	0615848 4829250
American Elm	Ulmus americana	DBH: 2.5	Good condition	In proximity to creek	0651853 4829255



Summary of Observations – Site 1B (east side of creek)

Diversity of Trees	Low
Site Conditions	Mostly cleared area, many herbaceous plants (e.g. goldenrod, grass, wild parsnip), smell of rot near creek bank
Health / Condition of Trees	Good condition
Species at Risk	None



Tree Inventory Data Sheet - Central Mississauga EA

Team Pamela Teddy and Sandra Anastasio

Date November 13, 2020

Weather Mostly Cloudy

Site (Location/Address) Etobicoke Creek and Sherway Drive, Mississauga (Site 1B – west side of creek)

Species Common Name	Species Scientific Name	DBH / Circumference (cm)	Health Condition / Browse	Site Condition / Features	GPS Coordinates
Basswood	Tilia americana	C: 42 DBH: 13.5	Good condition	In proximity to creek	
Basswood	Tilia americana	DBH: 3.5	Good condition - growth towards water	In proximity to creek	
Manitoba Maple	Acer negundo	C: 38 DBH: 12.5	Good condition - basal sprouts	In proximity to creek	
Basswood	Tilia americana	C: 43 DBH: 14	Good condition - evidence of squirrel habitat	In proximity to creek	
Manitoba Maple	Acer negundo	C: 35 DBH: 11.5	Poor condition - dead basal sprouts	In proximity to creek	
Ash Sp.	Fraxinus sp.	C: 15 DBH: 5	Good condition - growth towards the water	In proximity to creek	
Basswood	Tilia americana	C: 45 DBH: 14.5	Good condition	In proximity to creek	
Ash Sp.	Fraxinus sp.	C: 33 DBH: 10.5	Poor condition - oil was observed in the creek nearby	In proximity to creek	
Ash Sp.	Fraxinus sp.	C: 36 DBH:11.5	Poor condition - oil was observed in the creek nearby	In proximity to creek	
Basswood	Tilia americana	C: 32 DBH:10.5	Fair condition - minor cracks in bark - growth towards the water	In proximity to creek	



Species Common Name	Species Scientific Name	DBH / Circumference (cm)	Health Condition / Browse	Site Condition / Features	GPS Coordinates
Ash Sp.	Fraxinus sp.	DBH: 3.5	Poor condition - broken bark	In proximity to creek	
Basswood	Tilia americana	C: 29 DBH: 9.5	Poor condition	In proximity to creek	
American Elm	Ulmus americana	C: 151 DBH: 48.5	Good condition	In proximity to creek	
Ash Sp.	Fraxinus sp.	DBH: 5.5	Dead	In proximity to creek	
Basswood	Tilia americana	C: 49 DBH: 16	Good condition	In proximity to creek	
American Elm	Ulmus americana	C: 46 DBH: 15	Good condition	In proximity to creek	
American Elm	Ulmus americana	C: 21 DBH: 7	Good condition	In proximity to creek	
Asp Sp.	Fraxinus sp.	C: 50 DBH: 16	Poor condition	In proximity to creek	
Ash Sp.	Fraxinus sp.	C: 17.5 DBH: 6	Fair condition	In proximity to creek	
Basswood	Tilia americana	C: 20 DBH: 6.5	Fair condition	In proximity to creek	
Ash Sp.	Fraxinus sp.	C: 26 DBH: 8.5	Poor condition - emerald ash borer exit	In proximity to creek	
Ash Sp.	Fraxinus sp.	C: 18 DBH: 6	Good condition	In proximity to creek	
Ash Sp.	Fraxinus sp.	C: 42 DBH:13.5	Poor condition	In proximity to creek	
Ash Sp.	Fraxinus sp.	C: 26 DBH: 8.5	Poor condition - bursting bark	In proximity to creek	



Species Common Name	Species Scientific Name	DBH / Circumference (cm)	Health Condition / Browse	Site Condition / Features	GPS Coordinates
Ash Sp.	Fraxinus sp.	C: 41 DBH: 13	Fair condition - broken Manitoba Maple resting in canopy	In proximity to creek	
Ash Sp.	Fraxinus sp.	N/A	Dead	In proximity to creek	
American Elm	Ulmus americana	C: 116 DBH: 37	Good condition - moss on bark - broken branches on lower half	In proximity to creek	
Ash Sp.	Fraxinus sp.	N/A	Dead	In proximity to creek	
Crack Willow	Salix fragilis	C: 52 DBH: 16.5	Fair condition	In proximity to creek	
Crack Willow	Salix fragilis	C: 80 DBH: 25.5	Fair condition	In proximity to creek	
Crack Willow	Salix fragilis	C: 96 DBH: 31	Fair condition	In proximity to creek	
Crack Willow	Salix fragilis	C: 78 DBH: 25	Fair condition	In proximity to creek	
Ash Sp.	Fraxinus sp.	C: 76 DBH: 24.5	Poor condition	In proximity to creek	
Ash Sp.	Fraxinus sp.	DBH: 2	Poor to fair condition	In proximity to creek	
Ash Sp.	Fraxinus sp.	DBH: 4	Poor condition	In proximity to creek	
Black Walnut	Juglans nigra	DBH: 1.5	Fair condition	In proximity to creek	
Ash Sp.	Fraxinus sp.	N/A	Dead - snag trunk	In proximity to creek	
Red Oak	Quercus rubra	C: 87 DBH: 28	Good condition - small canopy	In proximity to creek	



Species Common Name	Species Scientific Name	DBH / Circumference (cm)	Health Condition / Browse	Site Condition / Features	GPS Coordinates
Basswood	Tilia americana	DBH: 5	Good condition - young tree	In proximity to creek	
Basswood	Tilia americana	DBH: 6.5	Poor condition - growing horizontally	In proximity to creek	
Ash Sp.	Fraxinus sp.	DBH: 6.5	Poor to fair condition	In proximity to creek	
Basswood	Tilia americana	C: 65 DBH: 21	Good condition	In proximity to creek	
Basswood	Tilia americana	C: 35 DBH: 11.5	Good condition	In proximity to creek	

Summary of Observations – Site 1B (west side of creek)

Diversity of Trees	Low	
Site Conditions	Pathway, some recruitment of young woody deciduous and shrub spp., smell of rot near creek bank	
Health / Condition of Trees	Good condition	
Species at Risk	None	



Tree Inventory Data Sheet - Central Mississauga EA

Team Pamela Teddy and Sandra Anastasio

Date November 13, 2020

Weather Mostly Cloudy

Site (Location/Address) Etobicoke Creek and Sherway Drive, Mississauga (Site 1B, east and west side of

creek)

Species Common Name	Species Scientific Name	Count	Site Condition / Features	Additional Notes / Comments	GPS Coordinates
Nannyberry	Vibernum lentago	8	In proximity to creek bank		
Cherry Sp.	Prunus sp.	5	In proximity to creek bank		
Staghorn Sumac	Rhus typhina	16	In proximity to creek bank		
Honeysuckle sp.	Lonicera sp.	13	In proximity to creek bank		
Red Osier Dogwood	Cornus stolonifera	37	In proximity to creek bank		
Ash Sp.	Fraxinus sp.	7	In proximity to creek bank		
Manitoba Maple	Salix fragilis	7	In proximity to creek bank		
Winged Euonymus	Euonymus alatus	58	In proximity to creek bank		
Common Buckthorn	Rhamnus cathartica	10	In proximity to creek bank		
White Spruce	Picea glauca	2	In proximity to creek bank		
Red Maple	Acer rubrum	1	In proximity to creek bank		
Sugar Maple	Acer saccharum	13	In proximity to creek bank		
Basswood	Tilia americana	6	In proximity to creek bank		
Willow Sp.	Salix. Sp.	1	In proximity to creek bank		
Multi Flora Rose	Rosa multiflora	2	In proximity to creek bank		
Raspberry Sp.	Rubus sp.	4	In proximity to creek bank	With 5 active canes	