REPORT

Natural Environment Report

Proposed Caledon Pit / Quarry

Submitted to:

CBM Aggregates, a division of St. Marys Cement Inc. (Canada)

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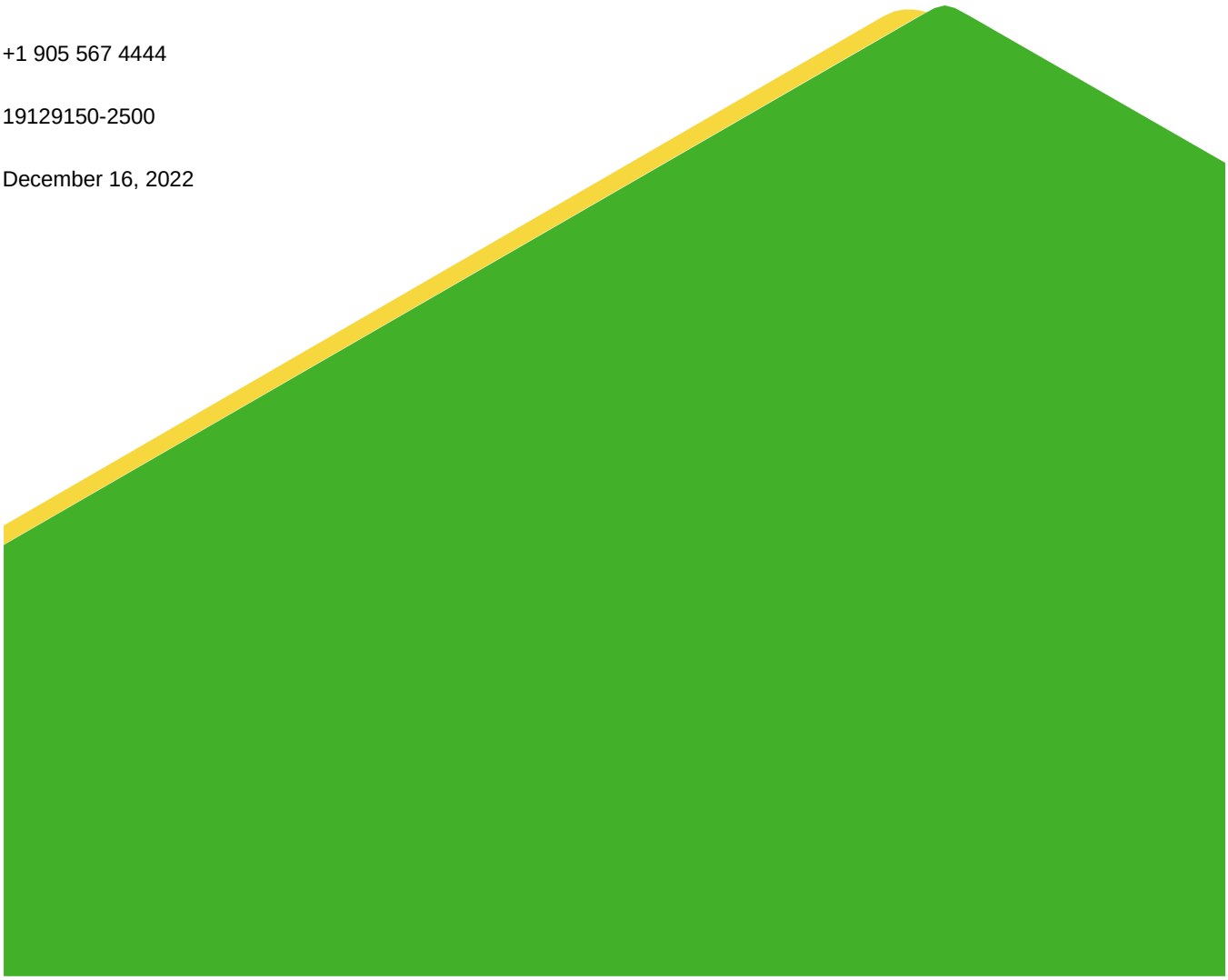

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1.0 INTRODUCTION

CBM Aggregates (CBM), a division of St. Marys Cement Inc. (Canada) is applying to the Ministry of Natural Resources and Forestry (MNRF) for a Class A Licence (Pit and Quarry Below Water) and to the Town of Caledon for an Official Plan Amendment and Zoning By-law Amendment to permit a mineral aggregate operation. Golder Associates Ltd., a member of WSP (Golder), has been retained by CBM to complete a Natural Environment Report for the proposed CBM Caledon Pit / Quarry in accordance with the Terms of Reference developed in consultation with the Development Application Review Team (DART) found in Appendix A, and the MNRF, *Aggregate Resources Act* Ontario Regulation 244/97.

CBM owns / controls approximately 323 hectares of land located at the northwest, northeast and southwest intersection of Regional Road 24 (Charleston Sideroad) and Regional Road 136 (Main Street). Of these lands, approximately 262 hectares are proposed to be licenced under the *Aggregate Resources Act* and designated / zoned under the *Planning Act* to permit the proposed CBM Caledon Pit / Quarry. These lands are mapped as a Caledon High Potential Mineral Aggregate Resource Area (CHPMARA) in the Town of Caledon Official Plan and High Potential Mineral Aggregate Resource Area (HPMARA) in the Region of Peel Official Plan and are protected for their aggregate potential.

The remaining approximately 61 hectares of land owned / controlled by CBM are not subject to the application. These lands are referred to as “CBM Additional Lands” and these lands include approximately 36 hectares of land that is located adjacent to the minor urban centre of Cataract. As part of the application, CBM is proposing to create an upland forest and meadow grassland on these lands and is exploring the potential of conveying them permanently to a public authority for long term protection.

The lands proposed to be licenced under the *Aggregate Resources Act* are referred to as the “Subject Site” or “Site” and are legally described as Part of Lots 15-18, Concession 4 WSCR and Part of Lot 16, Concession 3 WSCR (former Geographic Township of Caledon) (Figure 1). The Subject Site is approximately 262 hectares and extraction is proposed on approximately 204 hectares. These lands are referred to as the “Extraction Area”. The remaining approximate 58 hectares within the Subject Site and outside of the Extraction Area are referred to as the “Setback / Buffer Lands”. The Setback / Buffer Lands are used to provide setbacks to surrounding land uses and natural heritage features and the majority of these lands include a 5 metre visual / acoustic berm and visual plantings. For the purpose of this study, “Adjacent Lands” are defined as lands within 120 m of the Subject Site and the Study Area for this assessment matches the expected groundwater zone of influence (ZOI) as defined in the Water Report Level 1/2 (Water Report; Golder 2022a). The proposed Extraction Area includes approximately 80 million tonnes of a high quality bedrock resource and approximately 5 million tonnes of a high quality sand and gravel resource. Testing has confirmed that the mineral aggregate resource found on-Site is suitable for the production of a wide range of construction products, including the use for high performance concrete. The bedrock resource provides some of the strongest and most durable aggregate material in Southern Ontario. The primary market area for the proposed CBM Caledon Pit / Quarry is the Greater Toronto Area, including the Town of Caledon and the Region of Peel. This Site represents a close to market source of a high quality mineral aggregate resource.

The proposed tonnage limit for the proposed CBM Caledon Pit / Quarry is 2.5 million tonnes per year and on average CBM anticipates shipping approximately 2.0 million tonnes per year. The proposed CBM Caledon Pit / Quarry is proposed to be operated in 7 phases. Phases 1, 2A, 3, 4, 5 are located to the northwest of the intersection of Regional Road 24 and 136. This area is referred to as the “Main Area”. Phase 2B is located to the northeast of the intersection of Regional Road 24 and 136. This area is referred to as the “North Area”. Phase 6

and 7 are located to the southwest of the intersection of Regional Road 24 and 136. This area is referred to as the “South Area”.

Operations would commence in the Main Area and Phase 1 would include the permanent processing area (crushing, screening and wash plant), aggregate recycling area and the entrance / exit for the proposed CBM Caledon Pit / Quarry. Until such time as sufficient space is opened up to establish the permanent processing area, a temporary mobile crushing and processing plant is proposed to be used in Phase 1. The entrance / exit for the CBM Caledon Pit / Quarry is proposed to be located onto Regional Road 24, approximately 775 m west of Regional Road 136. The entrance / exit is proposed to be controlled by a new traffic light and the installation of taper lanes and acceleration lanes on Regional Road 24 at CBM’s expense. The primary haul route for the proposed CBM Caledon Pit / Quarry is trucks will travel eastward on Regional Road 24 and then southward on Highway 10. The proposed haul route is an existing aggregate haul route and is designated as an aggregate haul route in the Town of Caledon Official Plan.

Access to the North Area for aggregate extraction is anticipated approximately 10 years after the start of the operations in the Main Area. There will be no processing in the North Area and aggregate extracted from the North Area is proposed to be transported to the Main Area through a proposed tunnel underneath Regional Road 136. Access to South Area is anticipated approximately 30 years after the start of the operations in the Main Area. In the South Area, CBM is proposing to permit a portable processing plant and the aggregate extracted and /or processed from the South Area is proposed to be moved to the Main Area through a proposed tunnel underneath Regional Road 24 . Aside from the establishment of a 1 hectare stormwater settling pond on the easternmost portion of the North Area in the initial year of operation, the North and South areas will be maintained in their current state and agricultural uses until they are required for preparation for aggregate extraction.

The CBM Caledon Pit / Quarry is proposed to operate (extraction, processing and drilling) 7:00 am to 7:00 pm Monday to Saturday, excluding statutory holidays and shipping is proposed from 6:00 am to 7:00 pm Monday to Saturday consistent with other mineral aggregate operations in Caledon. CBM is also proposing to permit limited shipping in the evening and nighttime (7:00 pm to 6:00 am) to support public authority contracts that require the delivery of aggregates during these hours to complete public infrastructure projects. These activities will be limited to only highway trucks and shipping loaders and no other operations will be permitted during evening or nighttime hours. Site preparation and rehabilitation is proposed to be permitted 7:00 am to 7:00 pm Monday to Friday.

The proposed CBM Caledon Pit / Quarry involves stripping topsoil and overburden from the Subject Site to create perimeter berm and any excess soil will be temporarily stored in the northern portion of the Main Area or used for progressive rehabilitation of the Site. The proposed Extraction Area includes extracting both sand and gravel below the water table and the Site will be dewatered to allow operations in a dry state. The Site will be extracted in sequence of the proposed phases (Phase 1 to 7) and following extraction of Phase 7 the permanent processing plant in Phase 1 will be removed and this will be the final area to be extracted and rehabilitated. The phasing of the proposed mineral aggregate operation has been designed to reach final extraction limits and depths within each phase so progressive rehabilitation of the side slopes can be completed.

The overall goal of the final rehabilitation plan is to create a landform that represents an ecological and visual enhancement and provides future opportunities for conservation, recreational, tourism and water management. Overall the progressive and final rehabilitation plan for the Site includes the creation of: lakes, vegetated shorelines, islands, wetlands, upland forested areas, riparian plantings adjacent to the existing watercourse, nodal shrub and tree planting on upland areas, grassland meadows and specialized habitat features for bats and turtles.

The proposed rehabilitation has been designed to use all of the on-Site topsoil and overburden and does not require the importation of additional soils.

The Natural Environment Report assessed the proposed CBM Caledon Pit / Quarry and based on the implementation of the recommendations found in Section 7.0 of this report, this assessment concluded the following:

- No negative impacts on natural heritage features on the Site or in the Study Area are anticipated.
- Monitoring as recommended in the Water Report (Golder 2022a) will be implemented to mitigate against potential impacts to water levels in adjacent sensitive features (i.e., Tributary #1 and pond and Coulterville Wetland Complex)
- Consultation with the Ministry of Environment, Conservation and Parks will be conducted to confirm permitting requirements under the *Endangered Species Act* for impacts to species at risk habitat.
- A Request for Review will be submitted to Fisheries and Oceans Canada to confirm conclusions that there will be no negative impact to fish or fish habitat in the Credit River

The proposed Aggregate Resources Act Site Plans includes all of the technical recommendations from this report to ensure that the Site operates in accordance with applicable provincial standards and the applicable policy requirements of the Provincial Policy Statement, Places To Grow Plan, Greenbelt Plan, Region of Peel Official Plan and Town of Caledon Official Plan.

1.1 Site and Study Area

1.1.1 Site Description

The majority of the Site is covered by open agricultural field and pasture. There are also woodlands in the north, northwest and south portions of the Site (Figure 2). There are also several structures associated with residential properties across the Site, including a houses, barns and other outbuildings. There is also one unnamed tributary in the northwest corner of the Site (Figure 3).

1.1.2 Study Area

There is a large woodland and the evaluated non-significant Coulterville Wetland Complex in the northwest portion of the Study Area, and Cataract Southwest Provincially Significant Wetland (PSW) located in the south portion of the Study Area. There is a second PSW known as the Credit River at Alton Wetland Complex along the Credit River north of the Site (Figure 2). The hamlet of Cataract is located in the southeast corner of the Study Area. The west portion of the Study Area is largely agricultural fields. The Toronto at Osprey Valley golf course is located in the north portion of the Study Area. The Credit River is located in the north portion of the Study Area and then flows to the east of the Study Area.

2.0 ENVIRONMENTAL POLICY CONTEXT

The Site is located in the Town of Caledon (the Town) and the Region of Peel (the Region). Documents reviewed to gain an understanding of the natural heritage features and regulations that are relevant to the proposed Site and Study Area consisted of the following:

- The ARA (Ontario 1990) and the Aggregate Resources of Ontario Standards (MNRF 2020)

- The Provincial Policy Statement (MMAH 2020)
- The *Fisheries Act* (Canada 1985)
- The Migratory Birds Convention Act (Canada 1994)
- The Species at Risk Act (Canada 2002)
- The Endangered Species Act (Ontario 2007)
- The Growth Plan for the Greater Golden Horseshoe (MMAH 2019)
- The Greenbelt Plan (MMAH 2017a)
- The Niagara Escarpment Plan (MMAH 2017b)
- The Region of Peel Official Plan (2022)
- The Town of Caledon Official Plan (2018)
- The Credit Valley Conservation Authority O. Reg. 160/06 Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses (Ontario 2006)

An overview of the above noted legislation and policy documents are discussed in Sections 2.1 to 2.11.

2.1 Aggregate Resources Act

Applicants are required under the ARA Provincial Standards (MNRF 2020) to prepare a Natural Environment Report (NER). The NER is required to identify the designated natural heritage features and areas on, and within 120 m of the Site, as defined in the Provincial Policy Statement (PPS) with guidance from supporting technical manuals prepared by the Ministry of Natural Resources and Forestry (MNRF) (MNR 2000; MNR 2010; MNRF 2014a; MNRF 2015a). Where any of these features/areas have been identified, the report must identify and evaluate any negative impacts on the natural features/areas, including their ecological functions, and identify any proposed preventative, mitigative or remedial measures. The report must also identify if the Site or any of the features/areas are located within a natural heritage system that has been identified by a municipality in ecoregions 6E and 7E or by the province as part of a provincial plan.

2.2 Provincial Policy Statement

The PPS was 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

b) significant coastal wetlands

- 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)

  c) significant valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River)

  d) significant wildlife habitat (SWH)

  e) significant areas of natural and scientific interest (ANSI)

  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 2.1.4, 2.1.5 and 2.1.6 unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions.

2.3 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 work in or near-water must comply with the provisions of the *Fisheries Act*.

Measures to protect fish habitat include avoiding in-water work (i.e., below the high-water mark) and work on the banks or shoreline of watercourse/waterbody, as well maintaining riparian vegetation. Any project that is unable to avoid impacts to fish or fish habitat will require a project review (DFO 2019). If it is determined through the Fisheries and Oceans Canada (DFO) review process that the project will result in death of fish or the harmful alteration, disruption, or destruction of fish habitat (HADD), an authorization under the *Fisheries Act* is required. This includes projects that have the potential to obstruct fish passage or impacts 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 to fish habitat will be offset, as well as outlining associated costs and monitoring commitments. Proponents also have a duty to notify DFO of any unforeseen activities that cause harm to fish and outline the steps taken to address them.

2.4 Migratory Birds Convention Act

The *Migratory Birds Convention Act* (MBCA) (Canada 1994) prohibits the killing or capturing of migratory birds, as well as any damage, destruction, removal, or disturbance of active nests. It also allows the Canadian government to pass and enforce regulations to protect various species of migratory birds, as well as their habitats. While Environment and Climate Change Canada (ECCC) can issue permits allowing the destruction of nests for scientific or agricultural purposes, or to prevent damage being caused by birds, it does not typically allow for permits in the case of industrial or construction activities.

2.5 Species at Risk

2.5.1 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 the *Species at Risk Act* (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. A permit may only be issued if the following conditions are met:

- all reasonable alternatives to the activity that would reduce the impact on the species have been considered and the best solution has been adopted
- all feasible measures will be taken to minimize the impact of the activity on the species or its critical habitat or the residences of its individuals
- the activity will not jeopardize the survival or recovery of the species

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 aquatic species listed as endangered, threatened, or extirpated and migratory birds are protected under SARA, unless ordered by the Governor in Council.

2.5.2 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), and if approved by the provincial Minister of Environment, Conservation and Parks, species are added to the provincial *Endangered Species Act* (ESA) which came into effect June 30, 2008 (Ontario 2007). The legislation prohibits the killing or harming of species identified as endangered or threatened in the various schedules to the Act. The ESA also provides habitat protection to all species listed as threatened or endangered. As of June 30, 2008, the Species at Risk in Ontario (SARO) List is contained in Ontario Regulation (O. Reg.) 230/08.

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 SARO list as an endangered or threatened species*".

General habitat protection is provided, by the ESA, to all threatened and endangered species. 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 where alterations to the habitat of protected species may be considered.

2.6 Growth Plan for the Greater Golden Horseshoe

The Growth Plan for the Greater Golden Horseshoe was issued under *The Places to Grow Act*. 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. Although the Site and Study Area are within the plan area of the Growth Plan of the Greater Golden Horseshoe (MMAH 2020), policies of the Greenbelt Plan and Niagara Escarpment Plan (NEP) generally take precedence over policies of the Growth Plan. Where there is a conflict between the plans, the most restrictive policies are generally applied.

A Natural Heritage System (NHS) for the Greater Golder Horseshoe was developed and mapped under the Growth Plan in February 2018, which will support planning for the protection of the region's natural heritage and biodiversity. Until the Region and Town complete their conformity exercise, the Growth Plan NHS mapping does not apply and NHS mapping is deferred to NHS mapping (i.e., Greenlands System) provided in the Region's and Town's OPs.

The majority of the Site is outside of the proposed NHS of the Growth Plan as approved in February 2018. A small portion of the north and northwest portions of the Site are within the proposed NHS. Notwithstanding the NHS policies, Section 4.2.8.2 states that new mineral aggregate operations within the NHS for the Growth Plan are subject to specific policies. Regardless of the Growth Plan NHS mapping, the proposed extraction area has been delineated to avoid and protect adjacent significant natural features.

Within the NHS, applications for new aggregate operations may be permitted within Key Natural Heritage Features (KNHF) and Key Hydrologic Features (KHF) and their vegetation protection zones, except for:

- Significant wetlands
- Habitat of endangered species and threatened species, and
- Significant woodlands, unless the woodland is occupied by young plantation or early successional habitat (as defined by the Ministry of Natural Resources and Forestry [MNRF])

KNHFs, in the context of the Growth Plan (2020), include wetlands, fish habitat, life science ANSIs, significant valleylands, significant woodlands, SWH, rare plant communities (i.e., sand barrens, savannahs, tallgrass prairies, alvars), and habitat of endangered or threatened species. KHFs include permanent and intermittent streams, lakes, seepage areas and springs, and wetlands.

2.7 Greenbelt Plan

To regulate land development and focus population growth within the Greater Golden Horseshoe of southern Ontario, the provincial government established a special land use planning area known as the Greenbelt Planning Area. Land use designations and the various policies that govern proposed development within this area have been established by the Greenbelt Plan (MMAH 2017a). The Greenbelt Plan Area encompasses both the NEP Area and the Oak Ridges Moraine Conservation Plan (ORMCP) Area. In general, the province has ensured that land use designations within the Greenbelt Plan Area are in accord with those in the NEP and the ORMCP, but where policy discrepancies exist, the more restrictive ones are generally applied. 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 Greenbelt NHS.

The Site and majority of the Study Area are within the Protected Countryside land use designation of the Greenbelt Plan (MMAH 2017a). The Protected Countryside contains a Natural System which is composed of two types of features: the Greenbelt NHS and the water resource system. Portions of the Site and Study Area are within the NHS, including:

- Woodland B off-Site, in the northwest portion of the Study Area (Figure 5)
- Woodland D off-Site, in the north portion of the Study Area (Figure 5)
- Agricultural fields in the northwest and north portions of the Site (Figure 2)

Development or site alteration proposed within the Greenbelt NHS must demonstrate, through appropriate studies, that there will be no negative impacts on KNHFs or KHFs, or their functions. Policies of the plan also require that connectivity between KNHFs and KHFs, and along the Greenbelt NHS, are maintained. New aggregate operations may be permitted within KHFs and KNHFs and associated vegetation protection zones, except for the following features:

- Significant wetlands
- Habitat of endangered species and threatened species
- Significant woodlands, unless the woodland is occupied by young plantation or early successional habitat (as defined by the MNRF).

There are also a number of requirements that must be included on the site plans and additional requirements that must be met for final rehabilitation.

KNHFs, in the context of the Greenbelt Plan (MMAH 2017a), include wetlands, fish habitat, life science ANSIs, significant valleylands, significant woodlands, SWH, rare plant communities (i.e., sand barrens, savannahs, tallgrass prairies, alvars), and habitat of endangered or threatened species. KHFs include permanent and intermittent streams, lakes, seepage areas and springs and wetlands.

Development within 120 m of a KNHF or KHF requires a natural heritage evaluation be completed to determine appropriate vegetation protection zones (VPZ).

2.8 Niagara Escarpment Plan

The Niagara Escarpment is a bedrock feature of southern Ontario that stretches from Niagara Falls to Tobermory, at the northern tip of the Bruce Peninsula, across the mouth of Georgian Bay to Manitoulin Island and across Manitoulin Island to the islands of St. Joseph and Cockburn, from which it arcs into the state of Michigan (Chapman and Putnam 1984). The tableland plain, rock cliffs, and till and talus slopes of the Niagara Escarpment represent some of the most distinctive natural features of southern Ontario. The NEP (MMAH 2017b) serves as a framework of objectives and policies for development and protection of the area. The land use planning designations and various policies that govern proposed development within this area are established and overseen by the Niagara Escarpment Commission (NEC).

The Site is not located in the NEP area. The southeast portion of the Study Area (i.e., south of the Site boundary) is within the NEP area and is designated as Escarpment Protection Area and Escarpment Rural Area. Cataract, in the southeast corner of the Study Area, is also designated a Minor Urban Center.

In general, where development is proposed within 120 m of a KNHF, and there is potential for adverse impacts on the feature or its function, or connectivity between two key features (natural heritage or hydrologic), a natural heritage evaluation must be completed to identify vegetation protection zones, evaluate the impacts and address how they will be mitigated.

KNHFs, in the context of the NEP (MMAH 2017b), include wetlands, fish habitat, life science and earth science ANSIs, significant valleylands, significant woodlands, SWH, habitat of endangered or threatened species, and habitat of special concern species in Escarpment Natural and Escarpment Protection land use areas. KHFs include permanent and intermittent streams, lakes, seepage areas and springs and wetlands.

2.9 Region of Peel

The Site is located within the Region of Peel's High Potential Mineral Aggregate Resource Area (HPMARA). This area generally identify lands that include primary and secondary sand and gravel resource areas and bedrock resources located in the Region that are not constrained by significant natural heritage features, Plans of Subdivision, and approved settlement areas.

The Region of Peel Official Plan as adopted on Nov 4, 2022 (OP; 2022) maps a Greenlands System in Peel. The Greenlands System consists of Core Areas, Natural Areas and Corridors (NAC), and Potential Natural Areas and Corridors.

Development and site alteration is generally prohibited within Core Areas of the Greenlands System, with some exceptions for conservation, recreation, minor development or alteration, and essential infrastructure. Core Areas include significant coastal wetlands, core woodlands, Environmentally Sensitive or Significant Areas (as identified by conservation authorities), provincially significant life science ANSIs, habitat of endangered or threatened species, Escarpment Natural Areas of the NEP, land core valley and stream corridors. There are no Core Areas mapped on the Site. Off-Site, there are three features mapped as Core Areas within the Study Area: Woodland B in the northwest corner of the Study Area (Figure 5), Woodland E in the northeast corner of the Study Area (Figure 5), and the Cataract Southwest PSW located in the south portion of the Study Area (Figure 2).

Protection of NAC and Potential Natural Areas and Corridors is deferred to the Town. These features are not mapped in the Region's OP and must be identified on a site-specific basis.

NAC are defined as evaluated non-significant wetlands, NAC woodlands, SWH, fish habitat, regionally significant life science ANSIs, provincially significant earth science ANSIs, Escarpment Protection Areas of the NEP, the shoreline and littoral zone of Lake Ontario and other natural lakes, other valley and stream corridors (i.e., non-Core Areas), headwater source and discharge areas, and any other natural feature interpreted as part of the NAC by the Town.

Potential Natural Areas and Corridors are defined as unevaluated wetlands, cultural woodlands or cultural savannahs within the Urban System and Rural Service Centers, woodlands greater than 0.5 ha, regionally significant earth science ANSIs, sensitive groundwater recharges areas, portions of historical shorelines, open space portions of the Parkway Belt West Plan Area, potential Environmentally Sensitive or Significant Areas (as identified by conservation authorities), and any other natural feature interpreted as part of the Potential Natural Areas and Corridors by the Town.

2.10 Town of Caledon

The Site is located within the Town's High Potential Mineral Aggregate Resource Area (CHPMARA). This area generally identify lands that include primary and secondary sand and gravel resource areas and bedrock resources located in the Town that are not constrained by significant natural heritage features, Plans of Subdivision, and approved settlement areas. New aggregate operations are encouraged to locate in these areas.

The majority of the Site is designated as Rural Lands, General Agricultural Area, or is subject to OP Amendments (OPA) 161 (Mineral Resources policies) and 156, based on Schedule A of the Town's OP (2018).

Woodland B off-Site in the northwest portion of the Study Area (Figure 5) and Tributary #1 (Figure 3) are designated as an Environmental Policy Area according to Schedule A. Environmental Policy Areas include all Natural Core Areas and Natural Corridors as defined in Table 3.1 of the Town's OP. Any development in, or adjacent to, an Environmental Policy Area requires the completion of an Environmental Impact Study (EIS) following the Town's EIS and Management Plan requirements in the OP.

Natural Core Areas include woodland core areas, wetland core areas, NEC Natural Areas, all life science ANSIs, all Environmentally Significant Areas, habitat of endangered or threatened species, SWH, and all Greenbelt KNHFs and KHFs and related VPZ.

Natural Corridors include core fishery resource areas, all valley and stream corridors, and all Greenbelt KNHFs and KHFs and related vegetation protection zones.

New aggregate operations are prohibited in the following areas:

- Escarpment Natural and Protection Area designations of the NEP
- Core Areas of the Regional Greenland System defined in the Region's OP
- Environmental Policy Areas defined in the Town's OP (with some exceptions for habitat of endangered and threatened species, valley and stream corridors, woodland core areas and other woodlands, fishery resource areas, SWH, locally significant wetlands, other wetlands and Greenbelt KNHFs and KHFs)
- Kettle lakes and their catchments
- Natural lakes and their shorelines
- Within significant woodlands of the Greenbelt NHS

2.11 Credit River Conservation

The Study Area is located within the jurisdiction of Credit River Conservation (CVC). The majority of the Site and Study Area are outside of CVC regulated limits according to available mapping (CVC 2022). Tributary #1 and the evaluated non-significant Coulterville Wetland Complex (Figure 3) are within CVC regulated limits. Because this Project is under the purview of the ARA, the *Conservation Authorities Act* does not apply and permits from CVC will not be required.

3.0 METHODS

3.1 Background Review

The investigation of existing conditions on the Site and 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:

- Natural Heritage Information Centre (NHIC) database, maintained by the MNRF (NHIC 2022)
- Land Information Ontario (LIO) geospatial data (MNRF 2022a)
- Species at Risk Public Registry (ECCC 2022)
- Species at Risk in Ontario (SARO) List (Ontario 2008)
- 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 2022)
- Bat Conservation International (BCI) range maps (BCI 2022)
- Ontario Butterfly Atlas (Jones et al. 2022)
- eBird species maps (eBird 2022)
- Vascular Plants Atlas (Leslie 2018)
- MNRF LIO Aquatic Resources Area Layer (MNRF 2022b)
- MNRF Fish On-Line (MNRF 2022c)
- DFO Aquatic SAR Mapping (DFO 2022)
- iNaturalist occurrence records (iNaturalist 2022)
- Region of Peel Official Plan (2022)
- Town of Caledon Official Plan (2018)
- Caledon Meltwater Deposits – Forks of the Credit Earth Science Inventory Checklist (Webster et al. 2013)
- Provincially Significant Cataract Southwest Wetland Complex Evaluation Report (CVC and MNR 2008)

- Credit River Watershed and Region of Peel Natural Areas Inventory (CVC 2011)
- Caledon Creek and Credit River Subwatershed Study Characterization Report (CVC 1998)
- Credit River Watershed Natural Heritage System Final Summary Report (CVC 2015)
- Credit Valley Source Protection Area Approved Updated Assessment Report (CTC 2019)
- CVC Regulation Mapping (CVC 2022a)
- High-resolution aerial imagery

To develop an understanding of the drainage patterns, ecological communities and potential natural heritage features that may be affected by the proposed aggregate development, 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, ANSIs, 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 1 km of the Study Area.

Information requests were also submitted to the Aurora District MNRF (June 17, 2021), MECP (June 17, 2021) and CVC. A response was received from the MNRF on June 22, 2021 (Fortini 2021, pers. comm.), from the MECP on June 24, 2021 (Snell 2021, pers. comm.) and from CVC on January 20, 2022 (Appendix B).

3.2 SAR Screening

SAR 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 (including 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.

3.3 Field Surveys

The habitats and communities on the Site and in the Study Area, where accessible, were characterized through field surveys. The following sections outline the methods used for each of the field surveys. 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.

If a feature was to be excluded from the licence or extraction boundary, field surveys were sufficient to determine potential impacts of the Project, but not as detailed as if the feature was going to be removed.

The dates when all surveys were conducted are included in Table 1.

Table 1: Summary of Field Surveys Conducted in the Proposed Caledon Pit / Quarry Study Area

Date	Type of Survey
April 8, 2020	Site reconnaissance and wildlife habitat assessment, Turtle Habitat Assessment, General Wildlife Survey
April 27, 2020	Anuran Call Count (ACC) Survey #1, General Wildlife Survey and Habitat Assessment
May 1, 2020	Bat Maternity Roost Habitat Assessment, General Wildlife Survey, Turtle Habitat Assessment, Snake Visual Encounter Survey (VES)
May 21, 2020	ACC #2, General Wildlife Survey and Habitat Assessment
May 25, 2020	Ecological Land Classification (ELC), Botanical Inventory #1, General Wildlife Survey, Snake Visual Encounter Survey (VES)
June 1, 2020	Snake Visual Encounter Survey (VES)
June 1-15, 2020 June 15-28, 2020	Bat Acoustic Survey, General Wildlife Survey and Habitat Assessment
June 15, 2020	Snake Visual Encounter Survey (VES)
June 9, 2020 June 16, 2020	Breeding Bird Survey (BBS) #1, General Wildlife Survey and Habitat Assessment
June 8, 2020	ACC #3, General Wildlife Survey and Habitat Assessment
July 2-3, 2020	BBS #2, General Wildlife Survey and Habitat Assessment
July 28-29, 2020	ELC, Botanical Inventory #2, General Wildlife Survey and Habitat Assessment, Snake Visual Encounter Survey (VES)
August 6, 2020	Significant Natural Feature Boundary Delineation (including woodland dripline and verification of wetlands) #1, Botanical Inventory #3, General Wildlife Survey and Habitat Assessment
August 24, 2020	Fish Habitat Survey #1, General Wildlife Survey
July 14, 2021	Study Area Reconnaissance (including qualitative windshield survey of off-Site watercourses), Fish Habitat Survey #2

Date	Type of Survey
September 28, 2021	Significant Natural Feature Boundary Delineation (including woodland dripline and verification of wetlands) #2, General Wildlife Survey and Habitat Assessment
October 7, 2021	ELC, Botanical Inventory #4, General Wildlife Survey and Habitat Assessment
October 18, 2021	Significant Natural Feature Boundary Delineation (including woodland dripline and wetland boundaries) #3 (verification with agencies)

3.3.1 Plant Community Surveys and Botanical Inventory

Plant communities on the Site and in the Study Area were first delineated at a desktop level using high-resolution aerial imagery, then ground-truthed in the field (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 Study Area, where accessible, for a thorough survey of species and communities. Information on dominant plant species and plant community structure and composition was recorded in order to better define and refine the plant community polygons.

The botanical inventory included area searches in all naturally-occurring habitats on the Site, and in the Study Area, where accessible. Portions of residential areas including structures, driveways, planted gardens and lawn were excluded from the survey area. The searches were conducted by systematically walking through all habitats in a meandering fashion, generally paralleling the principal (long) axis of a natural area, where feasible, and ensuring that the full width of the area was examined. Each natural feature was surveyed during each round of botanical survey to capture the range of flowering periods and create a comprehensive list of species. A list of all plant species identified during all of the field surveys were compiled.

3.3.1.1 Tree Inventory

A general inventory of all treed communities on the Site was conducted concurrently with the plant community and botanical surveys. The general density, size range and age of trees in each of the treed communities was assessed, and a list of tree species was recorded.

3.3.1.2 Wetland Assessment

Unevaluated wetlands mapped or identified through field surveys within the proposed extraction area were evaluated according to the Ontario Wetland Evaluation System (OWES) for southern Ontario (MNRF 2014b). Information on dominant plant species and plant community structure and composition was recorded in order to better define and refine the plant community polygons. Soil cores were sampled by hand using an Eijkelkamp soil auger to 1 m depth or depth of refusal, whichever came first. The location, direction and type (i.e., intermittent, permanent) of any water inflow or outflow was recorded.

Through OWES, wetlands are assessed for significance based on four components: biology, hydrology, societal value and special features. Each component is further subdivided into subcomponents, which are individually assessed and scored. The scores of the subcomponents are added to calculate the score for each component, and the scores of all four components are added to calculate the total wetland score. A total wetland score of 600 points or greater is considered provincially significant. A wetland may also be considered provincially significant

with a score of 200 points or greater in either the biological or special features component (even if the total wetland score is less than 600 points).

Once a wetland has been evaluated by the MNRF as either provincially significant or non-significant, other wetland units in close proximity (i.e., within 750 m) can be combined as part of the previously assessed wetland through a process known as complexing. Wetland complexes typically have similar or complementary biological, social and/or hydrological functions, and wildlife in the area of the complex are variously dependent on each component to support different life stages. When considering a wetland for complexing, a modified version of the OWES assessment that is significantly reduced in scope and effort is conducted to determine if it is appropriate to complex. This assessment must be submitted to the MNRF for review and approval.

According to OWES, unevaluated wetlands smaller than 2 ha in size are generally not eligible for assessment or complexing, except where a qualified evaluator has determined the wetland provides important ecological benefit. A rationale documenting the reasons for assessment and/or complexing of wetlands smaller than 2 ha must be provided with the wetland assessment submitted to the MNRF.

3.3.2 Anuran Call Count Survey

Anuran (frog and toad) call count surveys were conducted at seven pre-selected stations on the Site and within the Study Area (Figure 2). One pre-selected survey station (ACC#7) was determined to be off-Site and inaccessible during ground truthing and was therefore not surveyed. Surveys followed protocols from the Marsh Monitoring Program method for vocalizing frog surveys (BSC 2008). This method involves collection of call data from fixed stations over three survey periods during the spring and early summer (generally April to early July), with an interval of at least 15 days between surveys. Surveys began 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). The exact survey dates for each of the three survey periods are dependent on appropriate weather conditions.

Each station consisted of a semi-circle with a 100 m radius from the centre point (where the observer stands), and each survey was three minutes in duration. All frogs and toads seen or heard were noted on pre-printed datasheets. Frogs and toads heard or seen outside of the 100 m radius were also noted, including estimated distance (where possible). The habitat at each station was assessed to confirm suitability for breeding amphibians. Photos were collected at each station from each cardinal direction (i.e., N, E, S, W).

No suitable habitat for Jefferson salamander (*Ambystoma jeffersonianum*) was identified on the Site. Therefore, egg mass surveys were not conducted.

3.3.3 Breeding Bird Survey

Breeding bird point count surveys for songbirds and other diurnal birds were conducted at 21 pre-selected stations on the Site and within the Study Area (Figure 2). 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 on the Site and were spaced a minimum of 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). The habitat at each station was assessed, and photos were collected from each cardinal direction (i.e., N, E, S, W). The order in which the stations were surveyed was changed during each round such that each station was surveyed at different times of the morning.

No suitable habitat for crepuscular birds or chimney swift (*Chaetura pelagica*) was identified on the Site and species-specific surveys targeting these species were therefore not conducted. However, crepuscular birds observed during other evening surveys (e.g., anuran call count surveys) were recorded.

Cavity trees with potential to support red-headed woodpecker (*Melanerpes erythrocephalus*) were surveyed for in conjunction with the bat habitat assessment (Section 3.3.4.1).

3.3.3.1 Grassland Bird Survey

Three of the breeding bird survey stations (i.e., CBBS14, CBBS15, CBBS16) (Figure 2) were assessed to have habitat that was potentially suitable for bobolink (*Dolichonyx oryzivorus*) and/or eastern meadowlark (*Sturnella magna*). These stations were surveyed based on the draft Survey Methodology under the Endangered Species Act, 2007: *Dolichonyx oryzivorus* (Bobolink) (MNR 2007). Breeding was able to be confirmed during the first two rounds of surveys and a third round of surveys was therefore not required.

3.3.3.2 Barn Swallow Survey

Nine structures in the Study Area were identified as having potential to provide nesting habitat for barn swallow (*Hirundo rustica*). In addition to the breeding bird surveys, an investigation of the interior of these structures was conducted (where possible and safe to enter) to search for barn swallow nests. A count of all active and inactive barn swallow nests observed in each structure was recorded. Inaccessible structures were assessed from the exterior for evidence of nesting activity (e.g., barn swallow entering or exiting the structure).

3.3.4 Bat Survey

Field survey methods were based on the guidance documents Survey Protocol for Species at Risk Bats within Treed Habitats (MNRF 2017) and Bat and Bat Habitat: Guidelines for Wind Power Projects (MNR 2011a).

3.3.4.1 Habitat Assessment

Maternity Roost Habitat

Potential maternity roost habitat in woodlands in the north portion of the Study Area are contained within significant woodlands (i.e., Woodlands B and D; Figure 5). Significant woodlands must remain outside of the proposed extraction area in accordance with the policies of the PPS (MMAH 2020), Greenbelt Plan (MMAH 2017a) and Growth Plan (MMAH 2019). Therefore, detailed habitat assessments were not completed within these habitats. For woodlands outside of the proposed extraction area (Figure 5), an overall habitat assessment was conducted concurrently with plant community surveys. The following parameters were evaluated for each woodland community:

- average tree diameter
- snag density estimate
- presence of cavities, hollow limbs, etc.
- description of understory (dense, moderate, or sparse) and canopy cover (closed, open)

- presence of rock piles or exposed bedrock
- proximity to water

Within the proposed extraction area, a detailed habitat assessment was conducted at seven pre-selected survey stations located at both natural and anthropogenic features to assess the potential for, and quality of, bat maternity roost habitat.

A snag density survey was conducted in woodlands within the proposed extraction area (Figure 5) to evaluate the relative quality of each feature as potential maternity roost habitat. The surveyor completed a thorough walk-through of each feature using meandering transects. This method is appropriate for woodland features less than 10 ha in size (MNRF 2017). All but one of the woodlands (i.e., Woodland C) within the proposed extraction area measure less than 10 ha in size. Woodland C (Figure 5) measures just over 10 ha in size and it was determined that the feature could still be adequately assessed with a walk-through. Data collected for individual snag trees included:

- tree species
- height
- diameter-at-breast height (DBH)
- snag class
- description of suitable habitat features (e.g., cavity, peeling bark)

Other natural features, such as rock piles or exposed bedrock with crevices, that may be used by non-tree roosting bats were also identified and recorded within the proposed extraction area. The following parameters were collected for each feature identified:

- sun exposure and direction
- size of feature
- type of feature (rock pile, talus slope, bedrock crevice)
- condition of feature (e.g., age, vegetation cover)
- proximity to water

Anthropogenic structures within the proposed extraction area were assessed from the exterior and interior (where possible and safe to access). The following parameters were collected:

- presence of suitable roosting features (e.g., chimneys, loose boards, condition of soffits)
- potential entrance/egress points
- presence of guano
- proximity to water

Hibernation Habitat

The Study Area is located in a region with known or suspected karst features that may provide suitable habitat for hibernating bats. A karst assessment was completed as part of the hydrogeological studies for the project. Detailed methods for this assessment are provided in the Water Report (Golder 2022a). The results of the assessment were used to evaluate the potential for hibernaculum to be present in the Study Area.

3.3.4.2 Acoustic Survey

As described in Section 3.3.4.1, significant woodlands must remain outside of the proposed extraction area and acoustic surveys were not completed within these habitats.

Passive full-spectrum bat detectors model SM4BAT FS were deployed at seven locations within the proposed extraction area (Figure 2). The detectors were programmed to record between a half hour before sunset and a half hour after sunset. Detectors recorded for a total of 14 nights. Due to a technical malfunction of equipment, detector BH#1a only recorded for the first 10 nights. Ten nights is the minimum required for acoustic surveys and the data collected was therefore deemed sufficient for analysis.

3.3.4.3 Data Analysis

Acoustic data were filtered in Sonobat Data Wizard to remove noise files, and the high-grade noise scrubber setting was used. The data was analyzed and auto-classified using SonoBat 4.4.5 call analysis software (Sonobat, Arcata, CA, USA). To identify calls to the species level, SonoBat measures numerous variables of call sequences (e.g., maximum frequency, minimum frequency, duration, and call slope; Table 2). SonoBat regional classifiers are based on the most robust, species-confirmed full-spectrum reference library available and integrates quantitative machine learning with algorithms that incorporate more than two decades of expert acoustic classification (SonoBat 2018). Manual call analysis of a portion of the calls was performed to determine at what threshold the software's species attributions become unreliable. Manual call analysis was also performed to test attribution of call sequences to the non-bat category (i.e., birds, rodents or static discharge). The same call analysis criteria used by SonoBat 4.4.5 was applied during manual analysis in addition to visual comparison to reference files. Call analysis software may give false positive identifications or false negative non-identifications and the likelihood of these erroneous identifications is related to the presence of various factors, including echoes, multiple bats, naturally overlapping call characteristics and poor recording quality. In some instances, all files within a species category were manually analysed to confirm identifications (i.e., for unlikely species and high frequency files). Calls were grouped as undetermined high- or low- frequency species (i.e., characteristic frequency above or below 35 kHz), or undetermined bats when species or group determinations could not be made. A Myotis category was also created that included calls identified as undifferentiated Myotis species, as well as high-frequency calls not identified to the species or genus level.

Bat passes cannot always be identified to species level. This can be due to either poor quality of the recording (i.e., high signal to noise ratio), or ambiguity of the call type. Some bat species have very similar calls and all bats have variability in their call repertoires. Some bat calls are quite diagnostic and can be confidently identified to species while other bat passes can only be identified to a Genus or to a group of species.

Table 2: Bat call analysis criteria used to inform Sonobat 4.4.5 Auto-classification and Manual Call Analysis

Bat Species or Group	Criteria* (values indicated are one standard deviation below and above each respective mean)
Bat	Calls with poor call quality that hinders discrimination of other call characteristics
High-frequency bat	Broad band FM calls with a Lo f >35Khz but where poor call quality hinders discrimination of other call characteristics
Undifferentiated Myotis Species	Broad band FM calls with a Lo f >32Khz, distinctive downward 'toes' are visible at the end of call pulses.
Little brown myotis	Lo f 35-38 kHz, f_c 38-41 kHz, Hi f 61-78 kHz, upper 6.7-14, lower 2.3-4.6, dur 4.9-6.7 Longer duration calls (duration >7 and lower slope <3) are distinctive
Northern myotis	Lo f 32-42 kHz, f_c 40-47 kHz, Hi f 95-114 kHz, upper 18-30, lower 7.4-16, dur 3.1-4.6
Eastern small-footed myotis	Lo f 42-39 kHz, f_c 42-46 kHz, Hi f 86-104 kHz, upper 27-40, lower 7-12, dur 2.5-3.9 Frequency modulation sweep a smooth curve (i.e., no inflection), beginning steeply and then increasing in curvature. May have a well-defined downward tail. Some calls may have an inflection, but the smoothly curved variant is diagnostic.
Tri-colored bat	Lo f 40-43 kHz, f_c 37-44 kHz, Hi f 54-81 kHz, upper 1.7-14, lower 0.4-1.7, dur 5.8-8.4 Strongly inflected, almost vertical frequency modulation changing to low slope below 47 kHz for the majority of the call
Eastern red bat	Lo f 37-43 kHz, f_c 37-44 kHz, Hi f 54-81 kHz, upper 4.4-16, lower 0.7-3.2, dur 4.6-9.1 U-shaped calls (up–turn at end of call); may exhibit variable f_c across sequence
Low-frequency bat**	Short band FM calls with a Lo f <35Khz but where poor call quality hinders discrimination of other call characteristics
Big brown bat	Lo f 25-28 kHz, f_c 26-30 kHz, Hi f 42-56 kHz, upper 3.3-8.3, lower 0.7-2.9, dur 5.3-11. Calls with Hi f above 65kHz are diagnostic (distinguished from silver-haired bat)
Silver-haired bat	Lo f 24-27 kHz, f_c 25-28 kHz, Hi f 33-51 kHz, upper 1.7-9.3, lower 0-2.7, dur 4.8-13, calls with flat slope ≥26 kHz are diagnostic (distinguished from big brown bat)
Hoary bat	Lo f 18-22 kHz, f_c 18-22 kHz, Hi f 21-31 kHz, upper 0.3-4.1, lower -0.1-0.2, dur 7-15, call may have pronounced or subtle U-shape

*** Lo *f***: lowest apparent frequency, ***fc***: frequency of the call at its lowest slope or the lowest frequency for consistent FM sweeps, **Hi *f***: highest apparent frequency, **upper**: the slope of the upper portion or onset of the call (kHz/ms), **lower**: the slope of the lower portion or body of the call (kHz/ms), **dur**: call duration (ms).
****** Used for manual call identification. SonoBat attributes high- or low-frequency species groupings based on individual calls identified to the species level (SonoBat 2017)

3.3.5 Fish and Fish Habitat Survey

A qualitative fish habitat assessment was conducted for all surface water features on the Site and in the Study Area monitored as part of the surface water assessment (Figure 3). A reconnaissance of the Site was also conducted during the survey to identify any additional unmapped watercourses. Only the portion of the watercourses that intersect a public road or were accessible from the Site were assessed. WC#1 was assessed both upstream and downstream of the associated on-line pond, where accessible. Habitat morphology types were assessed according to methods modified from O'Neil and Hildebrand (1986).

Habitat parameters collected, where present, included:

- description of general habitat characteristics (i.e., permanence, stream pattern, confinement, channel form, stage, turbulence)
- channel morphology (i.e., riffle, run, pool, chute, rapids)
- connectivity to other watercourses and/or waterbodies and previously unidentified or unmapped waterbodies/watercourses
- wetted and bankfull width and depth
- amount (%) and type of upland, riparian, and in-water vegetation
- amount (%) and type of in-water cover (i.e., organic/woody debris, substrate, vegetation, turbidity, depth/surface turbulence)
- amount (%) and type of overhead cover (i.e., organic/woody debris, undercut banks, ledges, overhanging vegetation)
- amount (%) and type of substrate (i.e., bed rock, boulder, cobble, gravel, sand, silt, clay)
- stability of the bank (i.e., erosional, slumping, depositional, stable) and bank/soil composition
- presence of fish species or specialized habitats (i.e., spawning habitats, over wintering, rearing/nursery, migratory routes) or features such as rocky shoals, islands, boulder gardens, gravel beds, deep pools, aquatic vegetation beds, rapids, etc.
- identification of ground water upwellings, springs, watercress, and iron staining
- description of barriers to fish movements, height of barriers (m) and permanence of barriers
- description of existing infrastructure, such as culverts or bridges (i.e., type, size, condition)
- description of fish habitat potential in each watercourse. Fish habitat is defined in subsection 2 (1) of the *Fisheries Act* as all waters frequented by fish and any other areas upon which fish depend directly or indirectly to carry out their life processes, including but not limited to: spawning, nursery/rearing, food supply and migration.
- observations of any fish and aquatic species

A fish inventory was not conducted as part of the field investigation because existing fish inventory data from the MNRF were deemed adequate for the purpose of this assessment.

3.3.6 General Wildlife Survey

General wildlife surveys were completed based on guidelines from several resources (Pyle 1984; Bookhout 1994; McDiarmid 2012; MNRF 2013a; MNRF 2016). General wildlife surveys included track and sign surveys, area searches, and incidental observations, concurrent with other field surveys. The full range of habitats across the Site and Study Area were searched, where accessible, with special attention paid to edge habitats, hedgerows or fencerows 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. Any wildlife (including mammals, butterflies, and dragonflies)

seen and identified were recorded. When encountered, tracks and other signs (e.g., tracks, scats, hair, tree scrapes, stick nests, etc.) were identified to a species, if possible, and recorded. Observations of wildlife species or signs during all field surveys were recorded.

Visual encounter surveys (VES) for reptiles and amphibians, as well as reptile and amphibian habitat (with a focus on SAR) were conducted in the Study Area. All suitable habitats for reptiles and amphibians were searched (e.g., flipping logs and other types of cover objects, observations in piles of rocks, potential hibernaculum features) and all reptiles and amphibians observed were identified and recorded.

General mortality surveys were also conducted while on Site during surveys and while driving to and from the Site. All observations of frogs, salamanders, snakes, turtles, and medium to large size mammals were recorded.

Area searches for breeding birds outside of the point-count stations (Section 3.3.3) were also conducted and any breeding evidence was recorded.

3.3.6.1 Turtle Habitat Assessment

A habitat assessment was conducted at all seven of the anuran call count survey stations (Figure 2). An assessment of the Site and vicinity for potential additional habitat (aquatic, overwintering, nesting) for turtles was also conducted. The following parameters were evaluated for each location:

- Presence and depth of water
- Presence and abundance of aquatic vegetation
- Substrate type
- Presence of basking objects or locations (e.g., logs, rocks, hummocks, clear shoreline)

Three locations were identified as potential aquatic habitat for turtles (Figure 2).

Because all of the locations were assessed to have a low potential to support turtles, were located outside of the Study Area, or were located in the Cataract Southwest PSW which must be protected from negative impacts, no further investigations (i.e., turtle visual encounter surveys, turtle nesting surveys) were necessary.

3.3.6.2 Significant Wildlife Habitat

In general, habitat features with potential to provide SWH as outlined in the Ecoregion 6E Criterion Schedule (MNRF 2015a) were identified at the desktop level and investigated through species-specific surveys. For example, all SWH related to birds were investigated as part of the breeding bird surveys (Section 3.3.3). Additional discrete habitat features with potential to provide SWH were identified and recorded in the field during all field surveys, and included the following:

- Vernal pools, wetlands or ponds with potential to provide amphibian breeding habitat
- Wetlands or ponds with potential to provide turtle overwintering habitat
- Rock piles, crumbling foundations or bedrock crevices with potential to provide reptile hibernation habitat
- Rare vegetation communities (i.e., cliffs/talus slopes, alvar, sand barren, savannah, tallgrass prairie, old growth forest)
- Stick nests

- Exposed sand or gravel areas adjacent to wetlands or waterbodies with potential to provide turtle nesting habitat
- Seeps or springs
- Terrestrial crayfish chimneys

3.3.7 Significant Natural Feature Boundary Delineation

Three significant natural features were identified adjacent to the proposed extraction area that require protection: two significant woodlands (i.e., Woodlands B and D; Figure 5) and Cataract Southwest PSW (Figure 2). Woodland B also overlapped a portion of the evaluated, non-significant Coulterville Wetland Complex (Figure 3).

Woodlands were assessed for significance based on the applicable in-effect policies contained in the relevant Provincial Plans, Region of Peel Official Plan and Town of Caledon Official Plan (Section 6.5).

Significant woodland boundaries were identified according to the dripline, and wetland boundaries were identified according to OWES methods. MNRF was also consulted regarding the boundary delineation of the PSW through email and a telephone call with Steve Varga on September 21, 2021.

Boundaries were delineated in the field by an OWES-certified biologist and marked with flagging stakes and/or flagging tape. Where the wetland and woodland dripline boundary differed in Woodland B, both boundaries were delineated separately. The boundaries were subsequently verified in the field by a second OWES-certified biologist in consultation with representatives from CVC, the Town and the Region. MNRF deferred field verification of the PSW boundary to CVC.

3.3.8 Study Area Reconnaissance

A reconnaissance was conducted to characterize existing conditions off-Site, within the Study Area, that were not accessible. The reconnaissance was completed through roadside assessment or from public access points (e.g., recreational trails). As part of the Study Area reconnaissance, the following was conducted for natural features, where possible:

- High-level plant community mapping
- Inventory of dominant plant species
- Verification of wetland areas (as mapped in background resources)
- Identification of potential wildlife habitat

3.4 Analysis of Significance and Sensitivity and Impact Assessment

An assessment was conducted to determine if any significant environmental features or SAR exist, or have moderate or high potential to exist, in the Study Area and assess whether the proposed extraction would negatively impact surrounding significant natural heritage features or SAR. Preventative, mitigative and remedial measures were considered in assessing the net effects of the proposed extraction operation on the surrounding ecosystem.

Field data collected in conjunction with the background data compilation was also analysed and integrated with the hydrogeological and surface water studies to complete a potential impact assessment. Impacts were identified as direct (those that will occur on the Site) and indirect (those affecting features and functions off-Site) in the

context of both municipal and provincial policy considerations. The water balance completed as part of the surface water assessment was reviewed and an assessment of the potential impacts of that water balance on natural features on, and in the vicinity of, the Site was conducted.

4.0 EXISTING CONDITIONS

4.1 Ecosystem Setting and Regional Context

The Study Area is located in Ecoregion 6E (Lake Simcoe – Rideau), which covers just over 6% of southern Ontario (Crins et al. 2009). Ecoregion 6E is underlain by bedrock of dolomite and limestone and is characterized by gently rolling surface terrain interspersed by drumlin fields and moraines. Soils are primarily mineral-based and dominated by Gray Brown Luvisols and Melanic Brunisols. The majority of the region is covered by cropland or pasture (57%), with 16% covered by forest and 4% covered by water (Crins et al. 2009).

The Site is partially located within subwatershed 18 (i.e., the Credit River Melville to Forks Sub-watershed; CVC 1998) which is part of the Credit River watershed, west of the main branch of the Credit River near Cataract and Coulterville.

4.2 Hydrogeology

Based on field investigations and monitoring completed as part of the Water Report (Golder 2022a), most groundwater levels showed approximately 2-3 m of seasonal fluctuation during the monitoring period

In general, the seasonal trend observed throughout the Study Area during the observation period showed a smooth steady decline in the summer months (2020 and 2021), concurrent with warm weather and active plant growth, which presumably reduces the water available for infiltration and recharge. The summer and early fall period is followed by an increase in groundwater levels in the late fall, concurrent with cooler temperatures and most vegetation becoming dormant, making more water available for recharge. This is followed by the winter period in which groundwater levels further decline, as the ground is frozen and precipitation is stored in the snow pack. This period was followed by the spring freshet, and a corresponding rise in groundwater levels due to increased infiltration and recharge.

The maximum water table elevation in the Main Area was observed to vary from 420.7 masl in the north to 393.5 masl in the southwest. The maximum water table elevation in the North Area was observed to vary from approximately 407 masl in the northwest to 397.3 masl in the southeast. The maximum water table elevation in the South Area was observed to vary from 405.3 masl in the northeast to 391.0 masl in the south.

Horizontal groundwater flow is generally from the northwest to the east, southeast and south, and parallels topography from high to low elevation, particularly to the east, southeast and south of the Study Area towards the Niagara escarpment and Credit River valley.

4.3 Surface Water Resources

The predominant surface water features in the Study Area include the Credit River Main and Erin Branches to the east and southwest, respectively. The Credit River Erin Branch receives the majority of drainage from the Site under existing conditions via Tributaries #1 and #8 (Figure 3). There are five other tributaries of the Credit River in the Study Area (Figure 3).

Water level and water temperature in each of the seven tributaries were monitored as part of the water assessment (Golder 2022a). Generally, the continuous water level records were marked by low water levels during the summer and early fall. Winter water levels generally remained low, marked with high water events likely caused by short melt events. Water levels through the spring were moderate to high following the freshet. Water levels in the fall were marked with responses to large precipitation events.

Historic flows at the Credit River were analyzed to characterize the seasonal trends as well as how the flow within the river has changed over the years. Seasonal trends in the Credit River adjacent to the Site over the last 20 years are marked by low flows during mid summer to mid fall. Winter flows generally remained low but were higher in comparison due to the likely presence of high flow events likely caused by short melt events. Flows through the spring were high following the freshet. Flows in the fall were low to moderate even though large precipitation events were common, which suggests that the influence of precipitation events on flow in the Credit River can vary monthly. Overall, these trends are similar to the trends in the seven tributaries within the Study Area.

Continuous water temperature data was collected between October 2021 and October 2022. Water temperatures in the tributaries followed a typical seasonal trend, where temperatures warm through the spring as air temperatures consistently remain above 0°C. This warming continues until mid-summer when daily air temperatures begin to drop. These temperatures drop rapidly through the fall and remain around 0°C through the winter until the spring freshet. Instantaneous maximum water temperature measurements recorded in Tributary #1 at the northwest corner of the Site (surface water monitoring station SW14) was 26.82°C.

Instantaneous flow measurements were collected from May 2020 to December 2021 as part of the water assessment (Golder 2022a). Similar to the continuous water level record, the continuous flow record at all stations was marked by low flows during the summer and early fall. Winter flows generally remained low, marked with high flow events likely caused by short melt events. Flows through the spring were moderate to high following the freshet. Flows in the fall were marked with responses to large precipitation events.

The water assessment (Golder 2022a) determined that tributaries in the Study Area were minorly fed by groundwater flow through most of the year with runoff playing a larger role in seasonal fluctuations. While many of the tributaries can be classified as drainage paths beside roadways or low-lying areas with high soil permeability, the remaining watercourses were found to be fed mainly by baseflow with runoff only playing a minor part in seasonal fluctuations. Because the period of the baseflow analysis was short (2020 - 2021), the proportion of runoff to interflow and baseflow may vary from year to year.

A more detailed discussion of surface water resources is provided in a separate report, entitled Water Report (Golder 2022a).

4.4 Vegetation

4.4.1 Regional Setting

The Study Area is located in the Great Lakes – St. Lawrence Forest Region and the Huron-Ontario subregion. The natural upland forest cover in this region is dominated by sugar maple (*Acer saccharum*), American beech (*Fagus grandifolia*), basswood (*Tilia americana*), white ash (*Fraxinus americana*), white oak (*Quercus alba*), bur oak (*Quercus macrocarpa),* eastern hemlock (*Tsuga canadensis*) and eastern white pine (*Pinus strobus*). The lowland areas are characterized by forests of silver maple (*Acer saccharinum*), American elm (*Ulmus*

americana), red elm (*Ulmus rubra),* black ash (*Fraxinus nigra*) and eastern white cedar (*Thuja occidentalis*) (Rowe 1972).

4.4.2 Plant Communities

Based on the field surveys conducted the majority of the Site is characterized by agricultural fields in addition to areas of upland forest, plantation, cultural meadow and isolated pockets of wetland. The ELC communities are shown on Figure 2 and ELC communities on the Site are briefly described in Table 3.

Table 3: Plant Communities on the Proposed CBM Caledon Pit / Quarry Site

Station	ELC Community	Description	SRANK[a]
UPLAND			
Veg1-1	CUT	Located in the west corner of the Site, east of tributary #1. Dominated by choke cherry (*Prunus virginiana*), white ash and scots pine (*Pinus sylvestris*) with an understory of choke cherry, red-osier dogwood (*Cornus sericea*) and hawthorn. Ground cover was moderate and dominated by Canada goldenrod (*Solidago canadensis*), wild carrot (*Daucus carota*) and wild basil (*Clinopodium vulgare*). Trees and shrubs were generally less than 10 cm DBH, with little deadfall and no snag trees.	n/a
Veg1-2	CUT	Located in the west corner of the Site, west of tributary #1. Old orchard / cultural thicket dominated by apple (*Malus pumila*), white ash, scots pine and white cedar with an understory of choke cherry and apple. Ground layer was dominated by Canada goldenrod and smooth brome (*Bromus inermis*). Trees and shrubs were generally less than 10 cm DBH with occasional larger trees less than 25 cm DBH, with little deadfall and rare snag trees.	n/a
Veg2-1	FOD8-1	Located off-Site, in the northwest corner of the Study Area. A dense canopy dominated by trembling aspen (*Populus tremuloides*) and balsam poplar (*Populus balsamifera*) with sugar maple, white ash, hop-hornbeam (*Ostrya virginiana*) and apple. Understory was characterized by Virginia creeper (*Parthenocissus quinquefolia*), Tatarian honeysuckle (*Lonicera tatarica*), European buckthorn (*Rhamnus cathartica*), alternate-leaved dogwood (*Cornus alternifolia*) and choke cherry. The ground cover was moderate and characterized by geranium, woodland strawberry (*Fragaria vesca*), avens (*Geum* sp.), common dandelion (*Taraxacum officinale*) and three-flowered bedstraw (*Galium triflorum*). The community was mature with trees measuring up to 50 cm DBH, abundant small to medium deadfall and occasional snag trees measuring less than 25 cm DBH.	S5
Veg 2-2	FOD5-2	Located off-Site, in the northwest corner of the Study Area. A deciduous forest with moderate canopy cover dominated by sugar maple, American beech and black cherry (*Prunus serotina*) with associates of white ash. The community was mature with the majority of trees measuring <25 cm DBH and occasional larger trees up to and greater than 50 cm DBH. Occasional large and small deadfall, as well as occasional small and large diameter snag trees. Medium size snag trees (between 25-50 cm DBH) were rare.	S5
Veg3	FOD5-7	Located at the north end of the Site, immediately south of Main Street. A dense canopy dominated by sugar maple, black cherry, eastern hemlock and American beech with a sparse understory of sugar maple, American elm, white ash and eastern hemlock. Ground cover was moderate and dominated by blue cohosh (*Caulophyllum thalictriodes*) and wood fern (*Dryopteris* sp.). The community was mature with trees measuring up to 50 cm DBH, abundant small to medium deadfall and occasional snag trees.	S5
Veg3	CUM	Forb dominated meadows located on the west and east sides of a deciduous forest (FOD5-7) at the north end of the Site. Dominated by Canada goldenrod, New England aster (*Symphyotrichum novae-angliae*), wild carrot, common milkweed (*Asclepias syriaca*), riverbank grape (*Vitis riparia*), wild basil, avens, strawberry, and spotted cat's-ear (*Hypochaeris radicata*).	n/a
Veg4-2	CUP3-1	A small mature, naturalizing red pine coniferous plantation located off-Site, in the north portion of the Study Area, along the railway. The plantation had a dense canopy cover dominated by red pine (*Pinus resinosa*) with black locust (*Robinia pseudoacacia*), white pine and Norway maple (*Acer platanoides*). The understory was sparse and dominated by choke cherry and elderberry (*Sambucus* sp.). Ground cover was very sparse and composed of dandelion and broad-leaved enchanter's nightshade (*Circaea lutetiana spp. canadensis*). There was abundant small deadfall and occasional larger deadfall, and occasional snag trees.	n/a
Veg4-5	FOD4-11	Located off-Site, in the north portion of the Study Area, along the railway. Dominated by black locust with associates of Norway maple and green ash (*Fraxinus pennsylvanica*). The understory was sparse and dominated by Tatarian honeysuckle and choke cherry with a dense ground cover dominated by Canada goldenrod. Trees measured less than 25 cm dBH with rare deadfall and occasional snag trees.	n/a
Veg4-3	CUP3-3	Located off-Site, in the north portion of the Study Area, along the railway. Dominated by scots pine and white ash with a small component of mature sugar maple. Trees measured less than 25 cm DBH with rare deadfall and rare snag trees.	n/a
Veg4-3	CUS	Located at the north edge of the Site and Study Area. The savannah had a similar species composition to the adjacent coniferous plantation (CUP3-3), but with a very open canopy (30% cover). Canopy was dominated by scots pine and white ash with some sugar maple. The understory was dominated by alternate-leaved dogwood, choke cherry and riverbank grape, with a dense groundcover of Canada goldenrod, riverbank grape and wild basil.	n/a
Veg4-1	FOD5-1	Located off-Site, in the north portion of the Study Area adjacent to the railway. A mature forest dominated by sugar maple, American beech and red oak (*Quercus rubra*) with a moderate understory dominated by sugar maple. The ground cover was sparse and dominated by blue cohosh, Virginia waterleaf (*Hydrophyllum virginianum*) and bloodroot (*Sanguinaria canadensis*).	S5
Veg4-4	CUP3-1	Located at the north edge of the Site north of Charleston Sideroad. Mature red pine plantation with a large amount of dead trees in the center and associates of Texas ash (*Fraxinus albicans*), tree-of-heaven (*Ailanthus altissima*) and black cherry. The understory was dense and dominated by red raspberry (*Rubus idaeus*) and Tatarian honeysuckle. Ground cover was dominated by herb-robert (*Geranium robertianum*) and Canada goldenrod. Trees measured less than 50 cm DBH with abundant small and large deadfall and snag trees.	n/a
Veg 5	FOD5-2	An isolated deciduous forest dominated located in the east central portion of the Site, south of Charleston Sideroad. Moderate canopy cover dominated by sugar maple, American beech and black cherry with moderate understory of the same species. Ground cover was dense and dominated by blue cohosh, Virginia waterleaf, white trillium (*Trillium grandiflorum*) and broad-leaved hellebore (*Epipactis helleborine*). A mature community with trees measuring up to 50 cm DBH, abundant small and large deadfall and occasional snag trees.	S5
Veg 6	CUW	An old apple orchard with scattered overstory of American elm located off-Site, in the southeast portion of the Study Area. The understory was dominated by apple with choke cherry and red raspberry. Ground cover was moderate and dominated by Canada goldenrod, avens and herb-robert.	n/a

Station	ELC Community	Description	SRANK[a]
Veg 7-1	FOD5-7	Located in the south portion of the Site. Canopy dominated almost exclusively by sugar maple with associates of black cherry and American beech in the sub-canopy. Understory and ground cover were dominated by sugar maple in association with Virginia waterleaf, blue cohosh and sedges. A mature community with trees measuring up to 50 cm DBH, abundant small and large deadfall and occasional small-diameter snag trees.	S5
Veg7-2	CUW/CUS	Located in the south portion of the Site. Tree species dominated by black cherry, sugar maple and apple with Tatarian honeysuckle. Ground cover was dominated by Canada goldenrod with wild basil, Canada anemone (*Anemonastrum canadense*), common St. John's wort (*Hypericum perforatum*), Canada thistle (*Cirsium arvense*), black raspberry (*Rubus occidentalis*), wild carrot and oxeye daisy (*Leucanthemum vulgare*).	n/a
Veg7-3	CUP3-2	Located off-Site in the south portion of the Study Area. A narrow plantation hedgerow dominated by eastern white pine with associates of sugar maple, black cherry, basswood and black maple (*Acer nigrum*). Understory dominated by riverbank grape, Virginia creeper, and alternate-leaved dogwood. The groundcover was composed of bull thistle (*Cirsium vulgare*), common mullein (*Verbascum thapsus*), yellow wood sorrel (*Oxalis stricta*), bindweed (*Convolvulus* sp.) and curled dock (*Rumex crispus*).	n/a
n/a	CUM	Fields used as pasture for livestock north of the intersection of Mississauga Road and Charleston Sideroad	n/a
n/a	CUM	Located off-Site, in the northwest corner of the Study Area.	n/a
WETLAND			
Veg1-2	SWT2-2	A willow thicket swamp located along tributary #1 in the west corner of the Site dominated by willows (*Salix* spp.).	S5
Veg1-3	SWC1-1	Located in the west corner of the Site, immediately north of Mississauga Rd. A coniferous swamp dominated by white cedar with associates of balsam poplar, paper birch (*Betula papyrifera*) and willow. Ground cover was sparse and dominated by spotted joe-pye weed (*Euthrochium maculatum*), sedges and broad-leaved cattail (*Typha latifolia*). Trees measured up to 25 cm in DBH with occasional deadfall and small snag trees.	S5
Veg2-1	SWM3-2	Located off-Site, within the northwest corner of the Study Area. Dominated by trembling aspen, balsam poplar, paper birch and Freeman maple (*Acer x freemanii*) with associates of balsam fir (*Abies balsamea*). The understory was sparse and composed of green ash and American elm with red-osier dogwood. The ground cover was moderate and dominated by fringed sedge (*Carex crinita*), geranium, jewelweed (*Impatiens capensis*), heal-all (*Prunella vulgaris*) and dwarf-raspberry (*Rubus pubescens*). The swamp was mature with trees measuring up to 50 cm in DBH and abundant deadfall, but only occasional snag trees.	S5
Veg8	MAS2-1 / MAS3-1	A shallow marsh that is part of the Cataract Southwest PSW off-Site, in the south portion of the Study Area. The marsh was characterized by broad-leaved cattail, narrow-leaved cattail (*Typha angustifolia*), arrowhead (*Sagittaria latifolia*), horsetail, blue vervain (*Verbena hastata*), Canada bluejoint (*Calamagrostis canadensis*), reed canary grass (*Phalaris arundinacea*), northern beaked sedge (*Carex utriculata*) and duckweed (*Lemna minor*). The marsh was surrounded by eastern white cedar and willows. Species along the top of bank included Timothy (*Phleum pratense*), common milkweed, staghorn sumac (*Rhus typhina*), white goosefoot (*Chenopodium album*), Canada thistle, and common mullein.	S5

[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 2019). 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 (MNR 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., FOD).

4.4.3 Tree Inventory

Three woodland communities were identified within the extraction limit on the Site: Woodlands C, F and G (Figure 5). All three woodland communities will be removed for the proposed extraction. The woodland area will be replaced at a minimum 1:1 ratio elsewhere on the Site or on adjacent lands owned/controlled by CBM. Information collected from the tree inventory was used to develop the tree compensation plan, including identification of planting locations, density and species. Detailed descriptions of these communities are provided in Table 3 and the area of the communities is provided in Table 4.

Table 4: Size of Woodland Communities within Proposed Extraction Limit

Woodland Community	Area (ha)
Woodland C (FOD5-7)	12.6
Woodland F (FOD5-2)	2.09
Woodland G (FOD5-7)	4.16
Total	**18.9**

4.4.4 Wetland Assessment

Five unevaluated wetlands were mapped on the Site according to LIO (MNRF 2022a) (Figure 3). A summary of the characterization for each unevaluated wetland is provided in Table 5. Based on this assessment, the boundaries of each of the unevaluated wetlands were refined and classified according to ELC. These refined wetland boundaries are shown on Figure 2.

Table 5: Unevaluated Wetland Assessment

Evaluation Criteria	Unit 1	Unit 2	Units 3 and 4	Unit 5
Wetland Community: Unit meets the 50% wetland vegetation rule	Yes Confirmed to be small meadow marsh with pooling water in early spring.	No Temporary ponding in depression of agricultural field observed in early April. However, ponding was observed to be dry by end of April. Confirmed to be planted through with crop. Vernal pools / low lying area also in adjacent deciduous forest.	Yes Confirmed to be thicket swamp (SWT2-2) along watercourse. Also connected to coniferous swamp (SWC1-1) to west.	Yes Confirmed to be pond and meadow marsh.
Photo	 Facing southwest  Facing northeast	 Facing east	 Facing west	 View of pond and inlet (facing east)  View of meadow marsh at east end of pond (facing east)
Size: Wetland units must be 2 ha or greater to be eligible for assessment under OWES (some exceptions for ecological benefit or significance)	0.10 ha	n/a	3.4 ha	0.12 ha

Evaluation Criteria	Unit 1	Unit 2	Units 3 and 4	Unit 5
Significant Ecological Functions	None observed (no SAR, no SWH, no fish habitat or hydrological functions)	None observed (no SAR, no SWH, no fish habitat or hydrological functions)	None observed (no SAR, no SWH, low potential for fish habitat)	None observed (no SAR, no SWH, no spawning, nursery or migration habitat for fish)
Distance from existing evaluated wetlands: Must be within 750 m to be eligible for complexing	460 m from evaluated non-significant Coulterville Wetland Complex 2.5 km from Cataract Southwest PSW	485 m from evaluated non-significant Coulterville Wetland Complex 2.3 km from Cataract Southwest PSW	296 m from evaluated non-significant Coulterville Wetland Complex 2 km from Cataract Southwest PSW	617 m from evaluated non-significant Coulterville Wetland Complex 1.7 km from Cataract Southwest PSW
Eligible for OWES Assessment: Unit must meet wetland vegetation and size criteria to be eligible for assessment. If the unit meets minimum criteria, it may be evaluated for significance on its own or may be complexed with an existing evaluated wetland (if within 750 m).	No (Does not meet size criterion)	No (Does not meet wetland vegetation criterion)	Yes (Meets both wetland vegetation and size criterion; eligible for complexing with Coulterville Wetland Complex)	No (Does not meet size criterion)

There are no PSWs or evaluated non-significant wetlands on the Site (Section 5.3). The Cataract Southwest PSW is located approximately 430 m south of the Site, and the evaluated non-significant Coulterville Wetland Complex is located immediately northwest of the Site, within the Study Area (Figure 3). The boundaries of both features were delineated in the field (Section 3.3.7).

The feature comprised of unevaluated wetland units 3 and 4 was the only unevaluated wetland that met the minimum size criterion to be considered for assessment under OWES. Unevaluated wetland units 3 and 4 are located approximately 2 km from the Cataract Southwest PSW, have no hydrological connections with the PSW and are located in a different watershed than the PSW. Therefore unevaluated wetland units 3 and 4 are not eligible to be complexed with the PSW. Unevaluated wetland units 3 and 4 are located approximately 296 m southwest of the evaluated non-significant Coulterville Wetland Complex and are therefore eligible for complexing with this previously evaluated wetland. Unevaluated wetland units 3 and 4 are also have a direct hydrological connection to the Coulterville Wetland Complex via an unnamed watercourse. Therefore, unevaluated wetland units 3 and 4 are recommended to be complexed into the existing non-significant Coulterville Wetland Complex

Wetland units 1 and 5 did not meet the size criterion. No significant ecological functions (e.g., habitat for SAR, specialized fish habitat, or SWH) were identified in wetland units 1 and 5 that would warrant assessment for significance or complexing.

Unit 2 was determined not to be a wetland and therefore cannot be assessed.

4.4.5 Vascular Plants

A total of 164 vascular plant species were identified during the botanical, and other, surveys completed in the Study Area (Appendix C). Of these, 60% are native species and 26% are exotic species. The remaining species were unable to be identified to the species level due to plant condition (i.e., browsed), difficulty in taxonomic differentiation, or because the assessment was completed from the edge of the community due to access constraints.

Significant and Sensitive Species

All of the plant species identified are secure and common, widespread, and abundant in Ontario and globally (S4 or S5; G5) or are unranked alien species (SNA; GNR).

Four of the plant species are considered regionally rare (CVC 2011): skunk currant (*Ribes glandulosum*), hobblebush (*Viburnum lantanoides*), Sprengel's sedge (*Carex sprengelii*) and meadow horsetail (*Equisetum pratense*). All but one of these regionally rare species occur off-Site. Sprengel's sedge was observed in the cultural woodland (CUW) off-Site in the southeast portion of the Study Area, as well as in in the cultural woodland / cultural savannah (CUW/CUS) in the south portion of the Site (Figure 2).

None of the plant species identified in the desktop SAR screening as having ranges which overlap the Study Area were found during the botanical, or other, field surveys (Appendix D).

4.5 Wildlife

4.5.1 Amphibians

A total of six amphibian species were observed during anuran call count surveys (Table 6). Spring peeper (*Pseudacris crucifer*) was the most frequently detected and abundant amphibian species recorded, followed by gray treefrog (*Hyla versicolor*), northern leopard frog (*Lithobates pipiens*), American toad (*Anaxyrus americanus*),

wood frog (*Lithobates sylvaticus*) and green frog (*Lithobates clamitans*). One additional species, western chorus frog (*Pseudacris triseriata*), was observed during other field surveys on the Site (Appendix E).

The Cataract Southwest PSW off-Site (i.e., ACC5 and ACC6), in the southern portion of the Study Area (Figure 2), had both the highest abundance of breeding amphibians (15 individuals plus a full chorus of two species) and highest number of amphibian species (six) recorded during anuran call count surveys. Two western chorus frog (*Pseudacris triseriata*) individuals were also observed in the PSW during other field surveys. Station ACC2 (Figure 2) had the second highest abundance (eight individuals) and number of species (four) of breeding amphibians. No amphibians were recorded at stations ACC1 and ACC4 (Figure 2) during anuran call count surveys or during any other field surveys.

Table 6: Anuran Call Count Survey Results for the Site

Station	Habitat	Species[1] and Abundance[2]					
		AMTO	GRTF	GRFR	NLFR	SPPE	WOFO
ACC1	Coniferous swamp	—	—	—	—	—	—
ACC2	Pond	2	2	—	2	2	—
ACC3	Marsh	—	—	—	—	FC	—
ACC4	Flooded area of agricultural field	—	—	—	—	—	—
ACC5	Marsh (west of trail) - Cataract Southwest PSW	—	—	—	—	11	—
ACC6	Marsh (east of trail) Cataract Southwest PSW	3	FC	4	4	FC	4
ACC7	Not surveyed (off-Site and inaccessible)						
ACC8	Marsh	—	—	—	—	1	1

[1] Species: AMTO = American toad; GRTF = Gray treefrog; GRFR = Green frog; NLFR = Northern leopard frog; SPPE = Spring peeper; WOFO = Wood frog
[2] Abundance: numbers represent individuals; FC = full chorus (i.e., calls overlap and are unable to be counted individually)

Significant and Sensitive Species

The majority of the amphibian species identified through the anuran call count, egg mass, or other, surveys are secure and common, widespread, and abundant in Ontario and globally (S5; G5).

One species, western chorus frog, is designated as threatened under the SARA and ranked S3 (vulnerable) in Ontario. Habitat of western chorus frog typically consists of marshes or wooded wetlands, particularly those with dense shrub layers and grasses (Environment Canada 2015). Western chorus frog was observed off-Site, in the Cataract Southwest PSW in the southern portion of the Study Area.

Western chorus frog is discussed further as part of the SWH assessment in Appendix H.

4.5.2 Breeding Birds

A total of 71 bird species were observed during breeding bird, or other, surveys conducted in the Study Area (Appendix E). Song sparrow (*Melospiza melodia*), red-eyed vireo (*Vireo olivaceus*), American robin (*Turdus migratorius*), red-winged blackbird (*Agelaius phoeniceus*), savannah sparrow (*Passerculus sandwichensis*), house wren (*Troglodytes aedon*) and black-capped chickadee (*Poecile atricapillus*) were the most frequently detected bird species during breeding bird surveys.

Barn swallow nests and/or barn swallow nesting activity were observed at five structures in the Study Area (Table 7; Figure 4).

Table 7: Barn Swallow Nest Survey Results

Structure	Nests		Comments	Is Structure Barn Swallow Nesting Habitat?
	# active	# inactive		
Barn #4	13	12	Barn swallow observed entering and exiting the barn.	Yes
Shed #4	0	0	No evidence of barn swallow nesting	No
Barn #2	1	3	Stone first floor, aluminum clad hay loft. Barn swallow observed entering and exiting the barn.	Yes
Barn #3	0	4	Stone first floor, wooden-clad hay loft	Yes
Shed #3	0	1	Single story wooden clad shed	Yes
House and Shed #2	—	—	Structures assessed to be unsuitable for barn swallow nesting	No
Barn #1a	—	—	No access to barn. Nine barn swallow observed outside the barn and entering and exiting the structure. Confirmed barn swallow was nesting.	Yes
Barn #1b	—	—	No access to barn. No barn swallow observed around the outside or entering/exiting the structure.	No

Significant and Sensitive Species

The majority of the bird species identified through the breeding bird, or other, surveys are secure and common, widespread, and abundant in Ontario and globally (S4 or S5; G5), or SNA (not applicable – species is not a target for conservation). Chimney swift (*Chaetura pelagica*) is ranked S3B (vulnerable) in Ontario.

Seven of the bird species observed during field surveys are designated under the ESA: barn swallow (*Hirundo rustica*), bobolink, chimney swift, eastern meadowlark, eastern wood-pewee (*Contopus virens*), grasshopper sparrow (*Ammodramus savannarum*) and wood thrush (*Hylocichla mustelina*).

Barn swallow, designated threatened under the ESA, 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 and forages over grassy fields, pastures, agricultural cropland, shorelines, and wetlands (COSEWIC 2011). Suitable nests from previous years may be reused (Brown and Brown 1999). Barn swallow were confirmed to be actively nesting in two structures on the Site (i.e., Barn #1a and Barn #2) and one structure off-Site within the Study Area (i.e., Barn #4) (Figure 4). Evidence of nesting from previous years was also observed in two structures on Site (i.e., Barn #3 and Shed #3) (Figure 4). Because nests from previous years may be re-used, Barn #3 and Shed #3 are also considered to be barn swallow nesting habitat. However, barn swallow is scheduled to be down-listed to special concern under the ESA by January 25, 2023 (COSSARO 2021) and will no longer receive individual or habitat protection under the ESA after that date. Best management practices (Section 7.2.2) will be implemented to maintain compliance with the MBCA and avoid adverse impacts to individuals and nests.

Bobolink, designated threatened under the ESA, 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 and has a low tolerance for presence of woody vegetation (Renfrew et al. 2015). Bobolink was confirmed to be breeding in two pasture fields on the Site, northwest of the intersection of Mississauga Road and Charleston Sideroad (Figure 4).

Chimney swift, designated threatened under the ESA, 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). A single chimney swift individual was observed off-Site, flying over the southeast portion of the Study Area (near CBBS06) (Figure 2) during the first breeding bird survey. No individuals were observed during any subsequent breeding bird, or other field surveys. There is no suitable habitat on the Site to support breeding habitat for this species. Off-Site, uncapped chimney structures on residences within the Study Area may provide roosting or nesting habitat for this species. No residential structures within the Study Area will be removed or altered as a result of the proposed Project and no adverse impacts to chimney swift are anticipated. Further discussion is not warranted.

Eastern meadowlark, designated threatened under the ESA, breeds in pastures, hayfields, meadows and old fields with abundant litter cover, high grass proportion, and a forb component (Hull 2019). They prefer well drained sites or slopes, and sites with different cover layers (Roseberry and Klimstra 1970). Eastern meadowlark was confirmed to be breeding in two pasture fields northwest of the intersection of Mississauga Road and Charleston Sideroad (Figure 4). A singing male was also observed in a small cultural savannah (CUS) off-Site, in the southeast portion of the Study Area (near CBBS06) (Figure 2). However, the field is too small to provide suitable habitat and the individual was considered an unpaired male.

Eastern wood-pewee, designated special concern under the ESA, 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. Also occurs in anthropogenic habitats providing an open forested aspect, such as parks and suburban neighborhoods (COSEWIC 2012a). On Site, eastern wood-pewee was assessed to be a possible breeder in the sugar maple – black cherry deciduous forest (FOD5-7) and the sugar maple – beech deciduous forest (FOD5-2) east of Charleston Sideroad, and a probable breeder in the sugar maple – black cherry deciduous forest (FOD5-7) south of Main Street (Figure 4). Off-Site, eastern wood-pewee was assessed to be a probable breeder in Woodlands B and D (Figure 5).

Grasshopper sparrow, designated special concern under the ESA, is found in medium to large grasslands with low herbaceous cover and few shrubs. It also uses a wide variety of agricultural fields, including cereal crops and pastures (COSEWIC 2013). No grasshopper sparrow individuals were observed on the Site. Off-Site, a single individual was observed in a field south of Mississauga Rd adjacent to survey station CBBS03 (Figure 2).

Wood thrush, designated special concern under the ESA, 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 (COSEWIC 2012b). No wood thrush individuals were observed in forest habitat on the Site. Off-Site, wood thrush was assessed to be a probable breeder in Woodland B (Figure 5).

Bobolink, chimney swift, and eastern meadowlark receive individual and habitat protection under the ESA and are discussed further in Section 5.1. Eastern wood-pewee, grasshopper sparrow and wood thrush are only designated as special concern and therefore do not receive individual or habitat protection under the ESA. These three bird species are discussed as part of SWH in Section 5.7.

4.5.3 Bats

4.5.3.1 Habitat Assessment

Maternity Roost

A summary of the maternity roost habitat assessment conducted on the anthropogenic structures and woodland communities on Site is provided in Table 8. Although the Woodland C (Figure 5) at BH#4 (Figure 2) had a low snag density and no rock piles, an acoustic detector was still deployed at this community as a conservative measure.

Table 8: Maternity Roost Habitat Assessment Results

Survey Station	Feature	Habitat Assessment	Snag Density (snags / ha)	Overall Habitat Potential[1]
BH#1a	Barn #1a	Large wooden barn. Cracked holes observed in the sides that may provide entry/egress points for bats.	—	High
	House and various other outbuildings	House has been recently repaired. All structures have low potential to provide bat habitat.	—	Low
	Shed #1	V-shaped aluminum shed in poor condition. Cracked and open windows that may provide entry/egress points for bats.	—	Moderate
BH#1b	Barn #1b	Wooden barn.	—	High
BH#2	Barn #2	Large barn with wooden sides and aluminum shingles on roof. Barn in poor condition with shingles coming off and numerous holes that may provide entry/egress points for bats. Large aluminum sided barn attached to wooden barn also with numerous holes.	—	High
	Barn #3	Small barn. East side partially open. Building dilapidated.	—	Moderate
	House	Brick house.	—	Low
	Shed #2	Shed made of aluminum and wood with A-frame roof connected to house. Multiple holes in shed roof may provide entry/egress points for bats.	—	Moderate
	Shed #3	Large red aluminum shed. Small gap in the roof of shed.	—	Low
BH#3	Coniferous swamp (SWC1-1) / Woodland A	White cedar swamp with closed canopy and young trees. Low snag density and few trees with cavities, peeling bark or leaf clumps.	0.4	Low
BH#4	Deciduous forest (FOD5-7)/ Woodland C	Overall characterized as young deciduous woodland with closed canopy and occasional mature trees.	0.8	Low to Moderate
BH#5	Barn #4	Large wooden barn with several gaps that may provide entry/egress points for bats.	—	High
	Shed #4 / small barn	Shed or small barn adjacent to the house with broken window and gaps in sides that may provide entry/egress points for bats.	—	High
BH#6	Deciduous forest (FOD5-2) / Woodland F	Overall characterized as young deciduous woodland. Several mature trees with cavities located along western woodland edge. Several large rock piles also observed throughout woodland.	2.4	Moderate
BH#7	Deciduous forest (FOD5-7) / Woodland G	Forest characterized by mature trees with a closed canopy. Several trees with cavities located along woodland edge.	2.6	Moderate

Notes: 1 – Features assessed to have a moderate or high habitat potential were investigated further through acoustic surveys.

Hibernacula

A site visit was conducted on April 23, 2020 to assess possible karst features in the vicinity of the Study Area. No potential hibernacula were identified during the karst survey on the Site or in the Study Area.

A more detailed discussion of the investigation of karst resources is provided in a separate report, entitled Water Report (Golder 2022a).

4.5.3.2 Acoustic Survey

In total, six bat species were identified during the acoustic survey: hoary bat (*Lasiurus cinereus*), silver-haired bat (*Lasionycteris noctivagans*), big brown bat (*Eptesicus fuscus*), red bat (*Lasiurus borealis*), little brown myotis, and eastern small-footed myotis. Additional bat passes were identified as unknown myotis species, high frequency unknown species, low frequency unknown species and big brown bat or silver-haired bat passes. The mean bat passes per night with standard deviation for all bat species at the stationary detectors is provided in Table 9. The total and maximum number of passes of myotis species is provided in Table 10.

Table 9: Mean (Standard Deviation) Bat Passes per Night at Acoustic Monitoring Stations from June 1 – 29, 2020[1]

Survey Station	# of Nights Surveyed	Total Passes per Night (all bats)	Bat Species or Call Frequency Type											
			HiF total[2]	LoF total[2]	LoF Unknown Species[3]	HiF Unknown Species[4]	Hoary Bat	Silver-haired Bat	Big Brown Bat	Red Bat	Big Brown or Silver-haired Bat	Unknown Myotis	Little Brown Myotis	Eastern small-footed Myotis
1A	10	208.8(115.96)	0(0)	208.8(115.96)	80.4(42.69)	0(0)	27.8(25.78)	3.7(2.79)	96.9(61.38)	0(0)	0(0)	0(0)	0(0)	0(0)
1B	14	62.5(49.86)	8.5(7.26)	54(45.53)	26.21(25.75)	2.93(3.02)	2.86(2.82)	1.43(1.4)	23.5(18.94)	1.29(1.68)	0(0)	0.79(0.89)	2.29(2.55)	1.21(2.78)
2	14	94.64(89.82)	15.86(15.52)	78.79(78.78)	27.64(27.07)	4.57(5.4)	1.36(1.65)	2.86(4.93)	43.21(44.93)	0.64(1.08)	3.14(5.22)	1.64(1.22)	8(9.95)	1.57(1.7)
4	14	119.21(91.59)	7.93(6.39)	111.29(88.74)	18.36(15.45)	1.64(1.55)	2.07(1.73)	3.29(2.46)	84.14(68.09)	0.5(1.16)	3.43(3.11)	0.79(1.05)	3.14(3.23)	1.86(1.99)
5	14	456.93(286.46)	165.57(135.64)	291.36(179.07)	58.14(36.12)	65(49.27)	13.29(9.36)	0(0)	219.93(140.91)	0(0)	0(0)	45.57(40.92)	18.21(13.64)	36.79(37.86)
6	14	47.93(96.42)	16.29(26.17)	31.64(71.34)	6(11.76)	6.93(19.11)	4(8.26)	2.14(1.79)	19.43(50.44)	4.14(7.36)	0.07(0.27)	1.86(1.75)	1.93(2.73)	1.43(2.17)
7	14	182.36(99.88)	30.64(12.64)	151.71(95.8)	15.43(10.35)	11.31(5.75)	18.79(15.24)	3.93(3.52)	111.21(86.06)	10.21(5.98)	2.36(2.17)	1.07(1.07)	5.43(3.69)	3.43(1.7)

[1] - Results presented in the format of X (Y), where X = mean number of bats passes per night and Y = standard deviation

[2] - HiF = High Frequency; LoF = Low Frequency

[3] - Recordings classified as bats with low frequency calls but could not be classified to the species level, typically including hoary bat, big brown bat and silver-haired bat

[4] - Recordings classified as bats with high frequency calls but could not be classified to the species level, typically including red bat, tricolored bat and all bats in the myotis genera

Table 10: Total Passes and Maximum Passes within One Night for SAR Bats at Acoustic Monitoring Stations June 1 – 29, 2020[1]

Survey Station	Bat Species or Call Frequency Type							
	Total Unknown HiF[1]	Max Unknown HiF[1]	Total Myotis Species	Max Myotis Species	Total Little Brown Myotis	Max Little Brown Myotis	Total Eastern Small-footed Myotis	Max Eastern Small-footed Myotis
1A	0	0	0	0	0	0	0	0
1B	41	11	11	2	32	9	17	9
2	64	18	23	4	112	32	22	5
4	23	5	11	3	44	12	26	6
5	910	145	638	113	255	47	515	98
6	97	73	26	5	27	10	20	7
7	147	21	15	3	76	14	48	6

[1] - HiF = High Frequency; LoF = Low Frequency

Significant and Sensitive Species

Four of the bat species observed during the field surveys are secure and common in Ontario (S4), while little brown myotis is ranked S3 (vulnerable) and eastern small-footed myotis is ranked S2S3 (imperiled to vulnerable). Globally, two species (big brown bat and eastern small-footed myotis) are ranked G4 or G5 (secure and common), three species (hoary bat, red bat, and silver-haired bat) are ranked G3G4 (vulnerable to apparently secure), one species (little brown myotis) is ranked G3 (vulnerable) (Appendix E).

Two of the bat species observed during the acoustic surveys are also designated endangered under the ESA: little brown myotis and eastern small-footed myotis.

Based on the level and pattern of activity recorded for little brown myotis during the acoustic survey, it is likely that this species uses Barn #1b, Barn #2, Barn #3, Barn #4 and the two deciduous forests east of Charleston Sideroad (bat survey stations #6 and #7) for maternity roosting. The deciduous forest (FOD5-7) at station #4 south of Main Street was assessed not to provide maternity roost habitat for this species. Although a total of 44 passes were recorded over the 14 night survey period, none of the passes were detected within an hour of sunset when bats typically exit their roosts. In addition, the forest has a low snag density (<1/ha) (Section 4.5.3.1). Based on the study results, it was determined that bats are likely using a network of roosts in the area of which Barn #4 (located 400 m northwest of the deciduous forest) and Barns #2 and #3 (located 870 m southwest of the forest) are likely the primary roosts. Given the very high activity at the nearby barns and the proximity of the barns to the deciduous forest, the low number of records at the deciduous forest (none of which occurred near sunset) and the low density of cavity trees in the deciduous forest, it was assessed that individuals recorded were commuting or foraging individuals and were not using the forest for roosting habitat. Off-Site, within the Study Area, Woodland B (Figure 5) was assessed to have moderate to high potential to provide maternity roosting habitat for little brown myotis.

Based on the level and pattern of activity recorded for eastern small-footed myotis during the acoustic survey, it is likely that this species uses Barn #1b, Barn #2, Barn #3, Barn #4 and the rock piles associated with the two deciduous forests east of Charleston Sideroad (bat survey stations #6 and #7) for maternity roosting. Although anthropogenic structures are not commonly used by this species for maternity habitat, roosting in structures has been previously observed (Humphrey 2017). Barn #4 likely provides the primary roost for this species, with Barns #2, #3 and #4 and rock piles at the deciduous forests (stations #6 and #7) functioning as secondary roosts as part of a roost network. The deciduous forest (FOD5-7) at station #4 south of Main Street was assessed not to provide maternity roost habitat for this species. Although a total of 26 passes were recorded over the 14 night survey period, only one pass was detected within an hour of sunset when bats typically exit their roosts. In addition, this species is not known to roost in trees and no rock piles or other exposed bedrock were observed in this area during the habitat assessment (Section 4.5.3.1). Based on the study results, it was determined that bats are likely using a network of roosts in the area of which Barn #4 (located 400 m northwest of the deciduous forest) is likely the primary roost. Given the very high activity at the Barn #4 and the proximity of the barn to the deciduous forest, the low number of records at the deciduous forest (only one of which occurred near sunset) and the absence of suitable habitat features in or adjacent to the forest, it was assessed that individuals recorded were commuting or foraging individuals and were not using the forest for roosting habitat.

Individuals likely also forage Site over Coulterville Wetland Complex, Cataract Southwest PSW, tributaries and the Credit River (Figure 3).

4.5.4 Fish and Fish Habitat

A summary of the qualitative fish habitat survey is provided below and detailed results provided in Appendix F.

WC#1 (associated with Tributary #1) (Figure 3) was characterized as an agricultural drain with defined bed and banks. The channel was overhung and inundated with terrestrial and emergent vegetation. WC#1 had low water level and flow velocity at the time of the survey. According to MNRF data (MNRF 2022b) WC#1 has a coldwater thermal regime. A corrugated steel pipe (CSP) culvert measuring 4.5 m in length and 0.45 m in diameter was observed at a farm crossing approximately 64 m upstream (west) of Pond #1. A second CSP culvert measuring 5.1 m in length and 0.45 m in diameter was identified at the driveway crossing. Tributary #1 traverses the northwest portion of the Site and Study Area and appears to terminate in the Coulterville Wetland Complex north of the Site. No fish were observed and WC#1 was assessed to have low potential for fish habitat, including overwintering, spawning, rearing or migration. WC#1 is connected to Pond #1, but connectivity was poor at the time of the survey with only a trickle flow with 0.1 m wetted width and 0.01 m wetted depth at the confluence. A low flow was observed during the site reconnaissance conducted during the spring freshet period in April 2020.

Pond #1 (Figure 3) measured approximately 18 m x 50 m with a muck substrate and estimated depth of 1 m. Small bodied fish (cyprinid sp.) were observed in the pond. There was a weir on the downstream (east) end of the pond to control the water level, which is a barrier for fish movement. No flow was observed downstream of the weir at the time of the survey. As a result, WC#1 downstream of the pond was dry. A low flow was observed in WC#1 downstream of the weir during the site reconnaissance conducted during the spring freshet period in April 2020. Downstream of the pond, WC#1 is not channelized, and consists of a narrow floodplain deluged with grasses and terrestrial vegetation. No important or critical fish habitat was observed, and overall fish habitat potential is low, due to the shallow water depths, low flow, and barrier to fish movement.

WC#2 (off-Site) (Figure 3) was characterized as a marsh and is part of the Cataract Southwest PSW. Approximately 10% of the surface area of the marsh consisted of open water at the time of the survey with the remainder densely vegetated with emergent and submergent vegetation. Wetted depth averaged 0.7 m, with a maximum observed depth of 1.0 m. Young-of-year cyprinids were observed in the marsh during the survey. Some downed woody debris was observed, including standing dead trees in the west end of the marsh. The marsh does not appear to have good connectivity to any other watercourses. The marsh provides good in-water cover for fish and is quality rearing habitat for small-bodied fish.

No watercourse was identified at WC#3 (Figure 3). The area was dry with no defined bed or banks and no evidence of historic flow. The surveyed area is a fence line between two agricultural fields. There was no fish habitat present.

WC#4 (off-Site, associated with Tributary #4) (Figure 3) was characterized as dry with no defined bed or banks. A CSP culvert measuring 15 m in length and 0.5 m in diameter was identified at the crossing of Main Street. Upstream (west) of Main Street was a low area through a pasture field, and downstream (east) of Main Street was a low area with overgrown grasses and cattails. According to MNRF data (MNRF 2022b) WC#4 has a coldwater thermal regime. WC#4 likely only holds water after rain events and during spring freshet. Overall, WC#4 was assessed to have low fish habitat potential.

WC#5 (off-Site, associated with Tributary #5) (Figure 3) had a poorly defined channel and was dry at the time of the survey. A CSP culvert with plastic liner measuring 15 m in length and 0.54 m in diameter was identified at the crossing of Main Street. The upstream reach (west of Main Street) is parallel to a residential property, and the downstream reach (east of Main Street) flows towards a golf course. According to MNRF data (MNRF 2022b)

WC#5 has a coldwater thermal regime. Substrates consisted of sand and silt. Riparian vegetation was manicured lawn on both banks. WC#5 likely only holds water after rain events and during freshet. Overall, WC#5 was assessed to have low fish habitat potential.

WC#6 (off-Site, associated with Tributary #6) (Figure 3) was characterized as a roadside ditch / low area in meadow on the south side of Shaws Creek Road. The station was dry with no defined channel. A concrete box culvert measuring 11 m in length, 6.6 m wide and 2.3 m high was identified at the crossing of Shaws Creek Road. According to MNRF data (MNRF 2022b) WC#6 has a coldwater thermal regime. WC#6 likely only holds water after rain events and during freshet. Overall, WC#6 was assessed to have low fish habitat potential.

WC#7 (off-Site, associated with Tributary #7) (Figure 3) on the north side of Shaws Creek was not visible from the road due to tree cover and the station was not assessed. However, it was determined that WC#7 is unlikely to be a watercourse at the survey point based on the surrounding topography.

WC#8 (off-Site, associated with Tributary #8) (Figure 3) was dry with no defined channel. A CSP culvert measuring 16 m in length and 0.65 m in diameter was identified at the crossing of Shaws Creek Road. WC#8 was characterized by a low area through a meadow on the upstream (south) side of the road, and by a low area in mixed forest on the downstream (north) side of the road. Evidence of historic flow was observed and WC#8 likely only holds water after rain events and during freshet. Overall, WC#8 was assessed to have low fish habitat potential.

No watercourse was identified at WC#9 (off-Site, associated with Tributary #9) (Figure 3). There is a roadside ditch with shallow stagnant water at the survey location, and an offline pond to the south. A plastic culvert with diameter of 0.38 m was identified under the driveway at this location. Overall, WC#9 was assessed to have low fish habitat potential.

No other unmapped surface water features were observed on the Site or in the Study Area.

The Credit River is located off-Site, within the Study Area, approximately 125 m east of the Site at the closest point (Figure 3). The reach of the Credit River within the Study Area is considered to have a coldwater thermal regime (MNRF 2022b). Numerous fish species have been recorded in the Credit River, including:, black crappie (*Pomoxis nigromaculatus*), blacknose dace (*Rhinichthys atratulus*), bluntnose minnow (*Pimephales notatus*), brassy minnow (*Hybognathus hankinsoni*), brook stickleback (*Culaea inconstans*), brook trout (*Salvelinus fontinalis fontinalis*), brown bullhead (*Ameiurus nebulosus*), brown trout (*Salmo trutta*), central mudminnow (*Umbra limi*), common shiner (*Luxilus cornutus*), creek chub (*Semotilus atromaculatus*), fantail darter (*Etheostoma flabellare*), fathead minnow (*Pimephales promelas*), golden shiner (*Notemigonus crysoleucas*), Iowa darter (*Etheostoma exile*), Johnny darter (*Etheostoma nigrum*), largemouth bass (*Micropterus salmoides*), lognose dace (*Rhinichthys cataractae*), mottled sculpin (*Cottus bairdii*), northern hog sucker (*Hypentelium nigricans*), northern pike (*Esox lucius*), northern redbelly dace (*Chrosomus eos*), pumpkinseed (*Lepomis gibbosus*), rainbow darter (*Etheostoma caeruleum*), rainbow trout (*Oncorhynchus mykiss*), river chub (*Nocomis micropogon*), rock bass (*Ambloplites rupestris*), slimy sculpin (*Cottus cognatus*), white sucker (*Catostomus commersonii*) (Fortini 2021, pers. comm.; CVC 2022).

Significant and Sensitive Species

The majority of the fish species recorded in the Credit River are considered secure and common in Ontario and globally (S5; G5). Off-Site and outside of the Study Area, two fish species have been recorded in the Credit River: American brook lamprey (*Lampetra appendix*) and Atlantic salmon (*Salmo salar*). None of the fish SAR with

ranges that overlap the Study Area were observed during the field surveys or have been historically recorded within the Study Area.

American brook lamprey, ranked S3 (vulnerable) in Ontario, has been recorded outside of the Study Area in the Credit River (CVC 2022). Habitat of adults includes gravel-sand riffles and runs of creeks and small to medium rivers with strong flow (Page and Burr 2011) and cool, clear water (Hoff 1988). Eggs are laid in nests in gravel/sand riffles and runs with strong flow. Juveniles are found in slow moving water buried in soft substrate of medium to large streams. None of the tributaries within the Study Area were assessed to have suitable habitat that would support this species. American brook lamprey is discussed further in Section 5.7.

Several records of juvenile Atlantic salmon, designated as extirpated under the ESA and not designated under SARA, have been recorded within the Credit River near Belfountain, approximately 4 km downstream of the Study Area. Atlantic salmon have also been recorded in the Credit River at Forks of the Credit approximately 1.9 km east of the Study Area (CVC 2022). Suitable river habitat for Atlantic salmon is described as clean water below 25°C with a stony bottom of various particle sizes. Adults build nests in shallow, swift running water in substrates of coarse material, ranging from gravel to cobble. Lake Ontario population prefers to spawn on gravel shoals in clear, cold streams with a steep gradient. Juvenile salmon settle in riffles of intermediate water depth with cobble substrate (COSEWIC 2006). Restocking programs for Atlantic salmon have been ongoing in the province as part of the recovery efforts to re-establish the population. Restocking of the Credit River was conducted as part of the first phase of stream restoration between 2006-2010 (OFAH 2017). None of the tributaries within the Study Area were assessed to have suitable habitat that would support this species. Extirpated species do not receive individual or habitat protection under the ESA. Stocked Atlantic salmon will be considered as part of the assessment of fish habitat in Section 5.2.

4.5.5 Other Wildlife and Wildlife Habitat

Arthropods

Five arthropods were observed during field surveys (Appendix E): cabbage white butterfly (*Pieris rapae*), ebony jewelwing (*Calopteryx maculata*), monarch (*Danaus plexippus*), mourning cloak (*Nymphalis antiopa*) and twelve-spotted skimmer (*Libellula pulchella*).

Mammals

Five mammals, or signs (other than bats) were observed during field surveys (Appendix E): beaver (*Castor canadensis*), coyote (*Canis latrans*), eastern chipmunk (*Tamias striatus*), racoon (*Procyon lotor*), and white-tailed deer (*Odocoileus virginianus*).

Turtles

The results of the turtle habitat assessment are provided in Table 11. There is no suitable habitat on the Site or in the Coulterville Wetland Complex in the northwest portion of the Study Area. Off-Site, the Cataract Southwest PSW south of the Study Area may provide suitable aquatic habitat. No individuals were observed during field surveys. However, a predated nest that appeared to belong to snapping turtle was identified on the recreational rail trail adjacent to the PSW.

Table 11: Turtle Habitat Assessment Results

Station	Habitat Assessment
ACC1	Coniferous swamp along tributary. Low potential to support turtles due to insufficient water. No nesting habitat observed.
ACC2 / T3	Pond has low potential to support turtles due to a lack of aquatic vegetation and basking features. Adjacent marsh at east end is too small and shallow to support turtles, and is likely to dry up during the summer. No nesting habitat observed.
ACC3	Small, isolated marsh with shallow temporary ponding. No basking features observed. Low potential to support turtles due to insufficient water. No nesting habitat observed.
ACC4	Flooded area of agricultural field with temporary ponding. Area actively planted with crop. Not suitable for turtles.
ACC5 / T2	Cataract Southwest PSW. Marsh (west of trail). Potential turtle habitat.
ACC6 / T2	Cataract Southwest PSW. Marsh and shallow pond east of trail. Potential turtle habitat.
ACC7	Not surveyed (off-Site and inaccessible)
ACC8	Marsh with shallow temporary ponding. Low potential to support turtles due to insufficient water.
T1	Mixed swamp with shallow standing water observed in the early spring. Area observed to be dry by May 25. Low potential to support turtles due to insufficient water and small size. No nesting habitat observed.

Snakes

One snake species was observed during the field surveys (Appendix E): eastern gartersnake (*Thamnophis sirtalis sirtalis*). A potential snake hibernaculum entrance was identified near Barn #2 (Figure 4) consisting of a rocky pile with holes that extended below ground. The entrance and adjacent area was surveyed five times between May and July 2020. During the survey on July 27, 2020, the hole was observed to have been filled in by the landowner. As there is no access, there is no longer potential for a snake hibernaculum and no further assessment is warranted.

Wildlife Habitat

Off-Site, Woodland B within the northwest portion of the Study Area (Figure 5), is part of a larger tract that may facilitate local wildlife movement.

Off-Site, within the Study Area, the Credit River valleyland likely functions as a regional movement corridor for wildlife.

No seeps or springs were identified on the Site or within the Study Area (Figure 3). Two seeps were identified along the Niagara escarpment southeast of the Study Area during field investigations for the water assessment (Golder 2022a). One seep was identified along the recreational rail trail south of Cataract Road (Figure 1), in a

location where a concrete box culvert had been installed under the former rail bed, suggesting that this was a persistent seepage location along the escarpment. Some seepage was also observed at the base of the gorge, below the rapids and just above the level of the Credit River, as seen from the bridge on the rail trail. This area of the gorge was not accessible to the public for safety reasons.

Significant and Sensitive Species

The majority of species observed during general wildlife surveys are secure and common in Ontario and globally (S5; G5) or SNA (not applicable – species is not a target for conservation) (Appendix E).

A predated nest likely belonging to snapping turtle, designated special concern under the ESA, was observed near the Cataract Southwest PSW. 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). Although no individuals were observed during field surveys, the shallow marsh communities associated with the Cataract Southwest PSW may provide suitable aquatic habitat for snapping turtle, and the adjacent recreational rail trail may provide suitable nesting habitat. No overwintering habitat was identified. Snapping turtle was not previously identified in the Cataract Southwest PSW as part of the wetland evaluation (CVC and MNR 2008). Snapping turtle is discussed further in Section 5.7.

There are no records of Blanding's turtle (*Emydoidea blandingii*), designated threatened under the ESA, within 10 km of the Site (NHIC 2022; Ontario Nature 2022; iNaturalist 2022). Further, MECP did not flag Blanding's turtle as a possible SAR in the Study Area through the information request (Snell 2021, pers. comm). Further assessment is not warranted.

A single monarch, designated special concern under the ESA, was observed in the agricultural fields around survey station CBBS21 at the north end of the Site during the breeding bird survey on July 2 (Figure 2). 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). Flowering plants along the agricultural field edge may provide suitable foraging habitat for this species. The cultural meadow off-Site, to the north of the agricultural field may also provide suitable foraging habitat and host plants. Monarch is discussed further in Section 5.7.

None of the other wildlife SAR with ranges that overlap the Study Area (Appendix D) were observed on the Site or in the Study Area during field surveys.

5.0 ASSESSMENT OF SIGNIFICANT NATURAL HERITAGE FEATURES

This section assesses the natural heritage features and functions (as outlined in Section 2.0) located within the 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 2014a)
- Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E (MNRF 2015a)

5.1 Habitat of Endangered or Threatened 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.

Four species designated threatened or endangered under the ESA were observed during field surveys and assessed to have suitable habitat on the Site or within the Study Area (Section 4.0): eastern small-footed myotis, little brown myotis, bobolink and eastern meadowlark.

Under the PPS, development may be permitted within, and adjacent to, habitat of endangered or threatened species in accordance with provincial or federal requirements.

Policies related to habitat for threatened or endangered under the Greenbelt Plan, Region and Town OPs are discussed further in Sections 5.8, 5.9 and 5.10 respectively.

Little Brown Myotis

There is no habitat regulation or GHD for little brown myotis and the species receives general habitat protection under the ESA. The provincial recovery strategy provides recommended criteria to be used in preparing a habitat regulation (Humphrey and Fotherby 2019). For anthropogenic maternity roosting sites, habitat is best defined by the physical structure providing roosting habitat. For natural maternity roosting sites, habitat is best defined by the extent of the ELC community in which the roost, or potential roost, occurs.

The recovery strategy also recommends that foraging resources (e.g., woodlands, wetlands, waterbodies) within 2,400 m of the maternity roost Site for little brown myotis be considered regulated habitat. Agricultural fields are not considered to be foraging habitat under these recommendations.

Barn #1b, Barn #2, Barn #3, Barn #4 and the two deciduous forests east of Charleston Sideroad (bat survey stations #6 and #7) have been identified as maternity roosting habitat for little brown myotis (Section 4.5.3). Foraging resources within 2,400 m of the barns and deciduous forests include Woodland C on Site (Figure 5), all nine of the unnamed tributaries, the Credit River, Cataract Southwest PSW, Coulterville Wetland Complex, ponds

in the Toronto at Osprey Valley golf course (Figure 3), Woodlands B and D (Figure 5), and several other woodlands to the north, east, west and south of the Study Area (Figure 2).

Barn #4 is outside of the proposed extraction area and will not be directly impacted.

Barn #1b, Barn #2, Barn #3 and the two deciduous forests are within the proposed extraction area and will be removed.

The majority of foraging habitat is located off-Site and outside of the proposed extraction area and will not be directly impacted. Woodland C on Site (Figure 5) will be removed during extraction, but will be replaced within the Study Area during progressive and final rehabilitation (Section 7.1). The proposed extraction area will be set back 30 m from Tributary #1 and the Coulterville Wetland Complex, and 15 m from Woodlands B and D. No adverse impacts to the hydrological or hydrogeological conditions sustaining these features are anticipated (Sections 6.2, 6.4, 6.5). Progressive and final rehabilitation of the Site will also create suitable foraging habitat for the future.

Potential impacts to little brown myotis are discussed in Section 6.1.

Eastern Small-footed Myotis

There is no habitat regulation or GHD for eastern small-footed myotis and it receives general habitat protection under the ESA. The provincial recovery strategy provides recommended criteria to be used in preparing a habitat regulation (Humphrey 2017). For anthropogenic roosting sites, habitat is best defined by the physical structure providing roosting habitat and the airspace immediately surrounding the structure that permits unobstructed entry or exit to the roost. In addition, suitable foraging habitat (e.g., woodlands, wetlands, waterbodies) within 565 m of the roost should be considered part of the protected habitat. Agricultural fields are not considered to be foraging habitat under these recommendations.

Barn #1b, Barn #2, Barn #3, Barn #4 and the rock piles associated with the two deciduous forests east of Charleston Sideroad (bat survey stations #6 and #7) have been identified as maternity roosting habitat for eastern small-footed myotis (Section 4.5.3). Foraging resources within 565 m of the barns and deciduous forests include tributary #1, Cataract Southwest PSW, Coulterville Wetland Complex (Figure 3), Woodlands B and C (Figure 5), and woodlands to the north and east of the Study Area (Figure 2).

Barn #4 is outside of the proposed extraction area and will not be directly impacted.

Barn #1b, Barn #2, Barn #3 and the two deciduous forests are within the proposed extraction area and will be removed.

The majority of foraging habitat is located off-Site and outside of the proposed extraction area and will not be directly impacted. Woodland C (Figure 5) will be removed during extraction, but will be replaced within the Study Area during progressive and final rehabilitation (Section 7.1). The proposed extraction area will be set back 30 m from Tributary #1 and the Coulterville Wetland Complex, and 15 m from Woodland B. No adverse impacts to the hydrological or hydrogeological conditions sustaining these features are anticipated (Sections 6.2, 6.4, 6.5). Progressive and final rehabilitation of the Site will also create suitable foraging habitat for the future.

Potential impacts to eastern small-footed myotis are discussed in Section 6.1.

Eastern Meadowlark and Bobolink

The eastern meadowlark GHD (MNRF 2015b) defines habitat by three categories:

- Category 1 - nest and the area within 10 m of the nest
- Category 2 - the area between 10 m and 100 m of the nest or center of approximated defended territory
- Category 3 - the area of suitable continuous habitat between 100 m and 300 m of the nest or center of approximated defended territory

The bobolink GHD (MNRF 2013b) defines habitat by three categories:

- Category 1 - nest and the area within 10 m of the nest
- Category 2 - the area between 10 m and 60 m of the nest or center of approximated defended territory
- Category 3 - the area of suitable continuous habitat between 60 m and 300 m of the nest or center of approximated defended territory

Eastern meadowlark and bobolink were confirmed to be breeding in two pasture fields northwest of the intersection of Mississauga Road and Charleston Sideroad (Figure 4). Because no specific nest sites were identified, the center of each field was conservatively assumed to be a nesting site and Category 2 and 3 habitat mapped around that point. Based on the mapping, the entirety of each pasture field (totalling 15.8 ha) was delineated as the habitat for both species. Adjacent fields do not represent suitable grassland habitat and were therefore not mapped as Category 3 habitat. Mapped habitat for eastern meadowlark and bobolink is within the extraction area and will be removed.

Potential impacts to eastern meadowlark and bobolink are discussed in Section 6.1.

5.2 Fish Habitat

A summary of the fish habitat assessment discussed in Section 4.5.4 is provided in Table 12.

Table 12: Summary of Fish Habitat Assessment

Watercourse / Feature	Fish Habitat
WC#1 / Tributary #1	Low potential–may provide flow/nutrients to pond
Pond (Pond #1)	Low potential – barrier to flow and movement downstream
WC#2 / Cataract Southwest PSW (Off-Site)	Fish habitat
WC#3 (Off-Site)	n/a
WC#4 / Tributary #4 (Off-Site)	Low potential – likely only holds water after rain events and during spring freshet
WC#5 / Tributary #5 (Off-Site)	Low potential – likely only holds water after rain events and during spring freshet
WC#6 / Tributary #6 (Off-Site)	Low potential – likely only holds water after rain events and during spring freshet

Watercourse / Feature	Fish Habitat
WC#7 / Tributary #7 (Off-Site)	n/a
WC#8 / Tributary #8 (Off-Site)	Low potential – likely only holds water after rain events and during spring freshet
WC#9 / Tributary #9 (Off-Site)	Low potential – roadside ditch
Credit River (Off-Site)	Fish habitat

Under the PPS, development may be permitted within, and adjacent to, fish habitat in accordance with provincial or federal requirements.

Under the NEP policies, fish habitat is considered a KNHF. Within the NEP area (which overlaps the Cataract Southwest PSW in the southeast corner of the Study Area), new aggregate operations are permitted within, and adjacent to, fish habitat in accordance with provincial or federal requirements.

Policies related to fish habitat under the Greenbelt Plan, Region and Town OPs are discussed further in Sections 5.8, 5.9 and 5.10 respectively.

Under the Region's OP, fish habitat is defined as a NAC of the Region's Greenlands System. Policies for protection of NAC is deferred to the Town.

There is no fish habitat within the proposed extraction limits. On Site, outside of the extraction limits, Tributary #1 and Pond #1 are fish habitat. Off-Site, within the Study Area, the Credit River and Cataract Southwest PSW are fish habitat (Figure 3).

Potential impacts to fish habitat are discussed in Section 6.2.

5.3 Significant Wetlands

Significant wetlands are areas identified as provincially significant by the MNRF using evaluation procedures established by the Province, as amended from time to time. Wetlands are assessed based on a range of criteria, including biology, hydrology, societal value, and special features.

Under the PPS policies, aggregate development is prohibited within significant wetlands.

Under NEP policies, aggregate extraction is prohibited within wetlands.

Policies related to significant wetlands under the Greenbelt Plan, Region and Town OPs are discussed further in Sections 5.8, 5.9 and 5.10 respectively.

There are no significant wetlands on the Site. Off-Site, the Cataract Southwest PSW is located in the south portion of the Study Area in the NEP area (Figure 3). Cataract Southwest PSW is a small complex of ten kettle wetlands covering 8.896 ha with a catchment basin of approximately 203 ha and is composed primarily of marsh (93.3%) with a small amount of swamp (6.7%) (CVC and MNR 2008).

A portion of the Credit River at Alton PSW is located off-Site, in the north portion of the Study Area along the Credit River (Figure 3).

Potential impacts to significant wetlands are discussed in Section 6.3.

5.4 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 2020). Guidelines for determining significance of woodlands are presented in the NHRM (MNR 2010). Significant woodlands may also be defined and designated by the local planning authority.

Under PPS policies (Section 2.2), aggregate extraction may be permitted within significant woodlands where it is demonstrated there will be no negative impacts on the natural feature or its ecological functions.

Under NEP policies, aggregate extraction is prohibited within significant woodlands.

Policies related to significant woodlands under the Greenbelt Plan, Region and Town OPs are discussed further in Sections 5.8, 5.9 and 5.10 respectively.

The PPS, Greenbelt Plan and NEP defer to the NHRM for identification and assessment of significant woodlands. The NHRM identifies four key characteristics to be evaluated for determining significant woodlands in Ontario, including woodland size, ecological function (e.g., interior habitat or linkages), uncommon characteristics (e.g., rare plant community) and economic and societal functional value.

All woodlands on Site and in the Study Area (Figure 5) were assessed for significance according to the provincial criteria (Appendix G; Table 1). There are no significant woodlands on the Site. Off-Site, four woodlands (B, D, E and H) were identified as significant (Figure 5). Woodlands B and D are located within the Greenbelt NHS, and Woodlands H and E are located within the NEP area.

Each woodland was also assessed to determine if it met criteria to be a Core Woodland as defined by the Region (Appendix G; Table 2), a Woodland Core Area as defined by the Town (Appendix G; Table 3) or a NAC Woodland as defined by the Region (Appendix G; Table 4). Woodlands B, D and E were identified as Regional Core Woodlands and are discussed further in Section 5.9.1. Woodlands A, C, F, G and H were identified as Regional NAC Woodland and are discussed further in Section 5.9.2. Woodlands B, C, D and G were identified as Town Woodland Core Areas and are discussed further in Section 5.10.2.

CVC has also assessed and categorized woodlands within the watershed as either High-Functioning or Supporting (CVC 2015). Woodlands B, D and E are mapped as High Functioning woodlands, and Woodlands A and C are mapped as Supporting Woodlands (Figure 5). High Functioning Woodlands are considered to represent key natural heritage features in the watershed essential to maintaining the integrity and resilience of the NHS. Supporting Woodlands enhance the quality and function of High Functioning Woodlands and collectively improve the resilience of the NHS and contribute to targets for natural cover in the watershed (CVC 2015).

Potential impacts to significant woodlands are discussed in Section 6.5.

5.5 Significant Valleylands

General guidelines for determining significance of valleylands are presented in the NHRM (MNR 2010). Significant valleylands may also be defined and designated by the local planning authority.

Under PPS policies, aggregate extraction may be permitted within, and adjacent to, significant valleylands where it is demonstrated there will be no negative impacts on the natural feature or its ecological functions.

Under NEP policies, aggregate extraction may be permitted within, and adjacent to, significant valleylands where it is demonstrated the feature will be protected, enhanced, or replaced.

Policies related to significant valleylands under the Greenbelt Plan, Region and Town OPs are discussed further in Sections 5.8, 5.9 and 5.10 respectively.

The PPS, Greenbelt Plan and NEP defer to the NHRM for identification and assessment of significant valleylands. The NHRM identifies three key characteristics to be evaluated for determining significant valleylands in Ontario, including landform-related function and attributes (e.g., surface water and groundwater functions), ecological features (e.g., degree of naturalness), and restored ecological functions (e.g., restoration potential and value).

There are no significant valleylands on the Site. Off-Site, the Credit River valleyland in the north portion of the Study Area meets the following criteria to be considered significant according to the NHRM:

- Surface water functions (permanent watercourse, areas of erosion and deposition)
- Ground water functions (groundwater seeps)
- Landform prominence (well-defined morphology)
- Distinctive geomorphic landforms
- Degree of naturalness (contiguous woodland, high proportion of natural vegetation cover, riparian vegetation width greater than 30 m)
- Community and species diversity (high diversity)
- Habitat value
- Linkage function (continuous natural vegetation corridor width minimum of 100 m, functional ecological connections to other natural areas, important wildlife corridor)

The small valleyland associated with Tributary #1 on the Site is considered a Supporting Valleyland by the CVC (CVC 2015). Supporting valleylands are considered important for conveyance, attenuation, storage and release of water, nutrient provision and movement, and as productive aquatic habitat (CVC 2015).

Potential impacts to significant valleylands are discussed in Section 6.7.

5.6 Significant Areas of Natural and Scientific Interest

Significant ANSIs are areas identified as provincially significant by the MNRF using evaluation procedures established by the Province, as amended from time to time.

Under PPS policies, aggregate extraction may be permitted within, and adjacent to, significant ANSIs where it is demonstrated there will be no negative impacts on the natural feature or its ecological functions.

Under NEP policies, aggregate extraction may be permitted within, or adjacent to (i.e., within 120 m), an ANSI and its VPZ, where it is demonstrated how the feature will be protected, enhanced, or replaced.

Policies related to significant ANSIs under the Region and Town OPs are discussed further in Sections 5.9 and 5.10 respectively.

There are no ANSIs on the Site. Off-Site, in the southeast corner of the Study Area, the Caledon Meltwater Deposits – Forks of the Credit Earth Science ANSI is located approximately 400 m south of the Site (Figure 1). The ANSI was designated for its representation of kettled meltwater deposits (Webster et al. 2013). The ANSI is located within the NEP area.

Potential impacts to the Caledon Meltwater Deposits – Forks of the Credit Earth Science ANSI are discussed in Section 6.8.

5.7 Significant Wildlife Habitat

SWH is one of the more complicated natural heritage features to identify and evaluate. The NHRM (MNR 2010) includes criteria and guidelines for designating SWH. The SWHTG and the SWHMiST (MNR 2000 and MNRF 2014a) can also be used to help decide what areas and features should be considered SWH. These documents were used as reference material for this study.

Under PPS policies, aggregate extraction may be permitted within, and adjacent to, SWH where it is demonstrated there will be no negative impacts on the natural feature or its ecological functions.

Under NEP policies, aggregate extraction may be permitted within, or adjacent to, SWH and its VPZ, where it is demonstrated how the feature will be protected, enhanced, or replaced.

Policies related to SWH under the Greenbelt Plan, Region and Town OPs are discussed further in Sections 5.8, 5.9 and 5.10 respectively.

There are five general types of SWH: seasonal concentration areas, rare vegetation communities, specialized habitats, habitat for species of conservation concern (SOCC), and migration corridors. The specific habitats considered in this report are evaluated based on the criteria outlined in the Ecoregion 6E Criterion Schedule (MNRF 2015a). An assessment was conducted of all habitats on the Site and within the Study Area to determine if they met SWH criteria (Appendix H).

5.7.1 Seasonal Concentration Areas

Seasonal concentration areas are those areas where large numbers of a species congregate at one particular time of the year. Examples include deer yards, amphibian breeding habitat, bird nesting colonies, bat hibernacula, raptor roosts, and passerine migration concentrations. If a SAR, or if a large proportion of the population may be lost if significant portions of the habitat are altered, all examples of certain seasonal concentration areas may be designated.

There are no seasonal concentration area SWH types on the Site.

Off-Site, within the Study Area, the following SWH types were identified:

- Cataract Southwest PSW in the southeast corner of the Study Area may provide turtle wintering area SWH

5.7.2 Rare Vegetation Communities

This category includes vegetation communities that are considered rare in the province. Generally, communities assigned an SRANK of S1 to S3 (extremely rare to rare-uncommon) by the NHIC could qualify. It is assumed that these habitats are at risk and that they are also more likely to support rare species and other features that are considered significant.

There are no rare vegetation communities on the Site or within the Study Area.

5.7.3 Specialized Habitats

Specialized habitats are microhabitats that provide a critical resource to some groups of wildlife. Examples include salt licks for ungulates and groundwater seeps for wild turkeys.

There are no specialized habitat SWH types on the Site.

Off-Site, within the Study Area, the following SWH types were identified:

- The recreational rail trail adjacent to Cataract Southwest PSW in the southeast corner of the Study Area may provide turtle nesting area SWH

5.7.4 Habitat for Species of Conservation Concern

Species that are considered SOCC include three groups of species:

- Species that are rare, those whose populations are significantly declining, or have a high percentage of their global population in Ontario
- Species listed as special concern under the ESA
- Species listed as threatened or endangered under SARA

Rare species are considered at five levels: globally rare, nationally rare, provincially rare, regionally rare, and locally rare (i.e., in the municipality). This is also the order of priority that should be attached to the importance of maintaining species. Some species have been identified as being susceptible to certain practices, and their presence may result in an area being designated SWH. Examples include species vulnerable to forest fragmentation and species such as woodland raptors that may be vulnerable to forest management or human disturbance. The final group of species of conservation concern includes species that have a high proportion of their global population in Ontario. Although they may be common in Ontario, they are found in low numbers in other jurisdictions.

There is no habitat for SOCC on the Site.

Off-Site, within the Study Area, the following habitat for SOCC were identified:

- Woodland (FOD8-1 / SWM3-2 / FOD5-2) in the northwest of the Study Area (Figure 4) provides significant habitat for eastern wood-pewee
- Woodland (FOD8-1 / SWM3-2) in the northwest of the Study Area (Figure 4) provides significant habitat for wood thrush
- Woodland (FOD5-1 / FOD4-11 / CUP3-3) in the north of the Study Area (Figure 4) provides significant habitat for eastern wood-pewee

- Grassland south of Mississauga Road in south portion of Study Area (Figure 4) provides significant habitat for grasshopper sparrow
- Cataract Southwest PSW in the southeast corner of the Study Area (Figure 4) may provide significant habitat for snapping turtle

5.7.5 Animal Movement Corridors

The SWHTG (MNR 2000) defines animal movement corridors as elongated, naturally vegetated parts of the landscape used by animals to move from one habitat to another. This is generally in response to different seasonal habitat requirements. For example, trails used by deer to move to wintering areas or areas used by amphibians between breeding and summer habitat. To qualify as SWH, these corridors would be a critical link between habitats that are regularly used by wildlife. There are two types of corridors defined for Ecoregion 6E: amphibian movement corridors and deer movement corridors.

There are no animal movement or corridors on the Site or in the Study Area.

5.8 Greenbelt Plan Natural Heritage Features

5.8.1 Key Natural Heritage Features

The following KNHF were identified on the Site, within the extraction limit:

- SAR habitat (little brown myotis, eastern small-footed myotis, bobolink, eastern meadowlark) (Figure 4)
- Wetlands (unevaluated wetland unit #1) (Figure 3)

Within the Greenbelt Plan NHS, mineral aggregate operations are prohibited within habitat of endangered or threatened species. Outside of the Greenbelt Plan NHS, KNHFs within the Greenbelt Protected Countryside (which overlaps the Site and extraction limit) are subject to the policies of the PPS. All SAR habitat identified within the extraction limit is located within the Greenbelt Protected Countryside and outside of the Greenbelt Plan NHS. The PPS permits development within habitat of endangered or threatened species in accordance with provincial or federal requirements.

Mineral aggregate extraction may be permitted within non-significant wetlands where it is demonstrated the feature can be replaced.

The following KNHF were identified on the Site, outside of the extraction limit:

- Fish habitat (Tributary #1 and Pond #1) (Figure 3)
- Wetlands (unevaluated wetland units #3, 4) (Figure 3)

The following KNHF were identified off-Site, within the Study Area:

- Fish habitat (Credit River) (Figure 3)
- Wetlands (Coulterville Wetland Complex, located within the Greenbelt NHS) (Figure 3)
- Significant woodlands (Woodlands B and D, located within the Greenbelt NHS) (Figure 5)
- Significant valleylands (Credit River valleyland)
- SWH (eastern wood-pewee, wood thrush, grasshopper sparrow) (Figure 4)

Mineral aggregate extraction is prohibited within significant woodlands located within the Greenbelt Plan NHS. Extraction may be permitted adjacent to significant woodlands where an appropriate VPZ is implemented. Potential impacts to significant woodlands are discussed further in Section 6.5.

Mineral aggregate extraction may be permitted within and adjacent to fish habitat in accordance with provincial or federal requirements. Potential impacts to fish habitat are discussed further in Section 6.2.

Mineral aggregate extraction is also permitted within and adjacent to non-significant wetlands, significant valleylands and SWH. Potential impacts to these features are discussed in Section 6.4, Section 6.7 and Section 6.9, respectively.

5.8.2 Key Hydrological Features

The following KHF were identified off-Site, within the Study Area:

- Stream (Credit River) (Figure 3)
- Wetlands (Coulterville Wetland Complex) (Figure 3)

Mineral aggregate extraction is permitted within and adjacent to streams and non-significant wetlands. Potential impacts to these features are discussed in Section 6.2 and Section 6.4, respectively.

5.9 Region of Peel Natural Heritage Features

5.9.1 Core Areas

No Core Areas were mapped or identified on the Site.

Although SAR habitat was identified on the Site for little brown myotis and eastern small-footed myotis (Woodlands F and G; Figure 5) and bobolink and eastern meadowlark (pastures northwest of Charleston Side Road and Mississauga Road) (Figure 4), these areas are not considered significant habitat of endangered or threatened species as defined in the Region's OP. Woodlands F and G were assessed to be part of a roost network for little brown myotis and eastern small-footed myotis, but not primary roosting areas. These features may support small numbers of bats on an infrequent basis but are not relied on as a critical resource for survival and reproduction. The primary roost is located outside of the extraction limit and will not be impacted by the proposed extraction. Further, habitat for these species will be replaced on or adjacent to the Site.

The fields supporting bobolink and eastern meadowlark are agricultural fields that are actively used for livestock and may also be planted in crop during some years as part of a rotation. As such, the fields are considered agricultural land use and do not constitute a permanent or significant habitat for these grassland birds. Further, habitat for these species will be replaced on or adjacent to the Site.

The following Core Areas were mapped or identified off-Site, within the Study Area:

- Core Woodlands (Woodlands B, D and E) (Figure 5)
- Core Valley and Stream Corridor (Credit River) (Figure 3)
- Escarpment Natural Areas of the NEP (Cataract Southwest PSW) (Figure 3)

Aggregate extraction is prohibited within Core Areas. Policies for development adjacent to Core Areas is deferred to the Town. Potential impacts to these features are discussed in Section 6.0.

5.9.2 Natural Areas and Corridors

The following NAC were identified on the Site, within the extraction limit:

- NAC woodlands (Woodlands C, F and G) (Figure 5)

The following NAC were identified on the Site, outside of the extraction limit:

- NAC woodlands (Woodland A) (Figure 5)
- Evaluated non-significant wetlands (Coulterville Wetland Complex) (Figure 3)
- Fish habitat (Tributary #1 and Pond #1) (Figure 3)
- Other valley and stream corridors (Tributary #1) (Figure 3)

The following NAC were identified off-Site, within the Study Area:

- NAC woodlands (Woodland H) (Figure 5)
- Caledon Meltwater Deposits – Forks of the Credit Earth Science ANSI (Figure 1)
- SWH (eastern wood-pewee, wood thrush, grasshopper sparrow) (Figure 4)
- Fish habitat (Credit River) (Figure 3)

Mineral aggregate extraction may be permitted within, and adjacent to, NAC features where it is demonstrated there will be no negative impact on the feature and an overall ecological benefit through restoration or enhancement. Potential impacts to these features are discussed in Section 6.0.

5.9.3 Potential Natural Areas and Corridors

The following Potential Natural Areas and Corridors were identified on the Site, outside of the extraction limit:

- Unevaluated wetlands (unevaluated wetland unit # 1 and 5)

No Potential Natural Areas and Corridors were identified within the extraction limit or off-Site, within the Study Area.

Mineral aggregate extraction may be permitted within, and adjacent to, Potential Natural Areas and Corridors features where it is demonstrated there will be no negative impact on the feature and an overall ecological benefit through restoration or enhancement. Potential impacts to unevaluated wetlands are discussed in Section 6.4.

5.10 Town of Caledon Natural Heritage Features

5.10.1 Environmental Policy Areas

There are no mapped Environmental Policy Areas on the Site, within the extraction limit.

One Environmental Policy Area is mapped on the Site, outside of the extraction limit:

- Tributary #1 (Figure 3)

One Environmental Policy Area is mapped off-Site, within the Study Area:

- Woodland B (Figure 5)

New aggregate operations are prohibited in Environmental Policy Areas. Potential impacts on Tributary #1 are discussed in Section 6.2, and potential impacts on Woodland B are discussed in Section 6.5.

5.10.2 Natural Core Areas and Natural Corridors

The following Natural Core Areas were identified on the Site, within the extraction limit:

- Woodland Core Areas (Woodlands C and G) (Figure 5)
- Greenbelt KNHF (SAR habitat for little brown myotis, eastern small-footed myotis, bobolink, eastern meadowlark) (Figure 4)
- Greenbelt KNHF and KHF (unevaluated wetland unit #1) (Figure 3)

Mineral aggregate extraction may be permitted within Woodland Core Areas where the feature does not meet any criteria to be considered a Regional Core Area and it is demonstrated that significant ecological attributes, functions and linkages of the feature will be retained and/or replaced in an equal or greater amount through progressive rehabilitation (OP Section 5.11.2.2.6). Woodlands C and G are not considered Regional Core Areas (Section 5.9.1). Further, any tree removal from woodlands will also be subject to the Town's *Woodland Conservation By-law* No. 2000-100 (Caledon 2000). Potential impacts to Woodland Core Areas are discussed in Section 6.6.

As discussed in Section 5.9.1, although SAR habitat was identified on the Site and within the extraction limit, these areas are not considered significant habitat of endangered or threatened species and therefore do not qualify as a Natural Core Area. However, these habitats do meet the definition of a Greenbelt KNHF.

Mineral aggregate extraction may be permitted within Greenbelt KNHFs or KHFs where the KNHF/KHF does not satisfy any other criteria of OP Section 5.11.2.2.5 a) to d), f) to i) and k) (i.e., areas in which mineral aggregate operations are prohibited) and significant ecological attributes, functions and linkages of the feature will be retained and/or replaced in an equal or greater amount through progressive rehabilitation.

OP Section 5.11.2.2.5 criteria include:

a) Designated Settlement Areas

b) Registered and Draft Approved Plans of Subdivision, located outside designated Settlement Areas

c) The Escarpment Natural and Protection Area designations in the NEP

d) The Core Areas of the Greenland System in Peel designations in the Region of Peel Official Plan

f) For quarries, within 200 metres measured horizontally from the brow of the Niagara Escarpment or any greater setback required by the Niagara Escarpment Commission in accordance with the NEP

g) Cemeteries and other human burial sites

h) Kettle lakes and their catchments with catchments being defined as lands adjacent to kettle lakes that, due to their topography and/or geology, provide surface and/or groundwater contributions to the lake that are necessary to maintain the lake's ecological functions, attributes and features

i) Natural lakes and their shorelines

k) Within the Greenbelt NHS, new mineral aggregate operations and new wayside pits and quarries, or any ancillary or accessory use thereto, area not permitted within significant woodlands unless the woodland is occupied by young plantation or early successional habitat, as defined by the Ministry of Natural Resources and Forestry in accordance with the Greenbelt Plan

Unevaluated wetland unit #1 and SAR habitat on the Site do not satisfy any other criteria of OP Section 5.11.2.2.5. Further, the Town permits development within habitat of threatened or endangered species in accordance with provincial legislation. Potential impacts to unevaluated wetlands are discussed in Section 6.4 and potential impacts to SAR habitat are discussed in Section 6.1.

The following Natural Core Areas and/or Natural Corridors were identified on the Site, outside of the extraction limit:

- Valley and Stream Corridor / Greenbelt KNHF and KHF (Tributary #1) (Figure 3)
- Greenbelt KNHF and KHF (unevaluated wetland units #3, 4, 5) (Figure 3)

The following Natural Core Areas and/or Natural Corridors were identified off-Site, within the Study Area:

- Woodland Core Areas / Greenbelt KNHF (Woodlands B and D) (Figure 5)
- Core Fishery Resource Area / Valley and Stream Corridor / Greenbelt KNHF and KHF (Credit River) (Figure 3)
- NEC Natural Area (Cataract Southwest PSW) (Figure 3)
- SWH / Greenbelt KNHF (eastern wood-pewee, wood thrush, grasshopper sparrow) (Figure 4)
- Greenbelt KNHF and KHF (Coulterville Wetland Complex) (Figure 3)
- Greenbelt KNHF (Credit River valleyland)

Mineral aggregate extraction may be permitted adjacent to Woodland Core Areas where the feature does not meet any criteria to be considered a Regional Core Area and it is demonstrated that significant ecological attributes, functions and linkages of the feature will be retained and/or replaced in an equal or greater amount through progressive rehabilitation. Potential impacts to Woodland Core Areas are discussed in Section 6.6.

Tributary #1 and the Credit River drain an area more than 125 ha. As such, mineral aggregate extraction are prohibited within these features. Extraction adjacent to these features must demonstrate no negative impacts. Further, the quality and quantity of surface water entering Core Fishery Resource Areas and All Stream and Valley Corridors is to be maintained. Potential impacts to Core Fishery Resource Areas / Stream and Valley Corridors are discussed in Section 6.2.

Mineral aggregate extraction may be permitted adjacent to NEC Natural Areas where it is demonstrated there will be no negative impacts. Potential impacts to Cataract Southwest PSW are discussed in Section 6.3.

Because the Greenbelt KNHFs or KHFs Coulterville Wetland Complex and SWH for eastern wood-pewee and wood thrush also meet criteria of OP Section 5.11.2.2.5 d) and k), mineral aggregate extraction is prohibited within these features. Extraction adjacent to these features must demonstrate no negative impacts. Potential impacts to other wetlands are discussed in Section 6.4 and potential impacts to SWH are discussed in Section 6.9.

Greenbelt KNHFs or KHFs unevaluated wetland units #3, 4 and 5, and SWH for grasshopper sparrow do not satisfy any other criteria of OP Section 5.11.2.2.5 a) to d), f) to i) and k). Mineral aggregate extraction may be permitted adjacent to these features where it is demonstrated that significant ecological attributes, functions and linkages of the features will be retained and/or replaced in an equal or greater amount through progressive rehabilitation. Potential impacts to other wetlands are discussed in Section 6.4 and potential impacts to SWH are discussed in Section 6.9.

No potential Environmentally Significant Areas were identified on the Site or within the Study Area.

5.10.3 Supportive Natural Systems and Natural Linkages

Supportive Natural Systems and Natural Linkages that also meet the definition of a Greenbelt KNHF or KHF have been assessed under the more restrictive policies of the Town's Environmental Policy Areas (Section 5.10.1). These features are not discussed again in this section.

The following Supportive Natural Systems and Natural Linkages were identified on the Site, within the extraction limit:

- Other Woodlands (Woodland F) (Figure 5)

Mineral aggregate extraction may be permitted within Other Woodlands where the feature does not meet any criteria to be considered a Regional Core Area and it is demonstrated that significant ecological attributes, functions and linkages of the feature will be retained and/or replaced in an equal or greater amount through progressive rehabilitation. Woodland F is not considered a Regional Core Area. Further, any tree removal from woodlands will also be subject to the Town's *Woodland Conservation By-law* No. 2000-100 (Caledon 2000). Potential impacts to Other Woodlands are discussed in Section 6.6.

The following Supportive Natural Systems and Natural Linkages were identified on the Site, outside of the extraction limit:

- Other Woodlands (Woodland A) (Figure 5)

The following Supportive Natural Systems and Natural Linkages were identified off-Site, within the Study Area:

- Other Woodlands (Woodland E, H) (Figure 5)
- NEC Protection Areas (Town of Cataract)
- Earth Science ANSI (Caledon Meltwater Deposits – Forks of the Credit Earth Science ANSI) (Figure 1)

Mineral aggregate extraction may be permitted adjacent to Other Woodlands where the feature does not meet any criteria to be considered a Regional Core Area and it is demonstrated that significant ecological attributes, functions and linkages of the feature will be retained and/or replaced in an equal or greater amount through progressive rehabilitation. Woodlands A and H are not considered a Regional Core Area. Woodland E is considered a Core Woodland, which is a Regional Core Area. Potential impacts to Core Woodlands and Other Woodlands are discussed in Section 6.6.

Development may be permitted adjacent to Earth Science ANSIs, subject to the policies of the NEP (Section 5.6). Potential impacts to the Caledon Meltwater Deposits – Forks of the Credit Earth Science ANSI are discussed in Section 6.8.

Development may be permitted adjacent to NEC Protection Areas, subject to the policies of the NEP. The NEP requires mineral aggregate extraction within the NEP area demonstrate how the Escarpment's scenic resources and open landscape character will be maintained and how connectivity between KNHF and KHF will be maintained or enhanced, where possible.

6.0 IMPACT ANALYSIS

An overview of each significant natural heritage feature identified on Site or within the Study Area and proposed mitigation measures to avoid or minimize negative impacts is provided in Table 13.

Table 13: Summary of Impact Analysis and Mitigation Measures for the Study Area

Feature	Location			Mitigation
	Extraction Limit	Licence Boundary	Study Area	
Habitat for SAR Bats	X			■ MECP consultation ■ Remove habitat outside active season (Mar 15 -Nov 30) ■ Create compensation habitat
Habitat for Eastern meadowlark/ bobolink	X			■ Submit Notice of Activity ■ Remove habitat outside active season (May 1 – July 31) ■ Create compensation habitat
Tributary #1 / Pond #1		X		■ 30 m setback for extraction ■ 10 m no-disturbance setback ■ Sediment and erosion controls ■ Water level monitoring
Credit River			X	■ Submit DFO Request for Review ■ Water quality and temperature monitoring
Significant Woodlands			X	■ 15 m setback for extraction ■ 10 m no-disturbance setback ■ Sediment and erosion controls
Cataract Southwest PSW			X	■ N/A
Coulterville Wetland Complex			X	■ 30 m setback for extraction ■ 10 m no-disturbance setback ■ Sediment and erosion controls ■ Water level monitoring
Unevaluated wetlands	X	X		■ 30 m setback for extraction for wetland units 3, 4 and 5 ■ 10 m no-disturbance setback for wetland units 3, 4 and 5 ■ Replace an equal or greater amount of wetland habitat as contained in wetland unit 1 in final rehabilitation
Other Woodlands	X			■ Replace an equal or greater amount of woodland area in progressive and final rehabilitation
Significant Valleylands			X	■ Sediment and erosion controls

Feature	Location			Mitigation
	Extraction Limit	Licence Boundary	Study Area	
Significant ANSIs			X	■ N/A
SWH			X	■ SWH generally overlaps with other significant features and mitigation measures recommended for these other features are expected to also be sufficient to prevent negative impacts to SWH

6.1 Habitat of Endangered and Threatened Species

6.1.1 Little Brown Myotis and Eastern Small-footed Myotis

An Information Gathering Form (IGF) was submitted to the MECP on June 6, 2022 to initiate consultation on permitting requirements under the ESA for removal of little brown myotis and eastern small-footed myotis habitat. Bat boxes and rock piles will be installed on Site, outside of the extraction limits, to compensate for loss of maternity roost habitat. In addition, maternity roost habitat will be removed outside of the active season in southern Ontario for little brown myotis (April 1 – September 30) and eastern small-footed myotis (March 15 – November 30).

6.1.2 Eastern Meadowlark and Bobolink

Because the area of habitat to be impacted is less than 30 ha, the Project is eligible to register under the ESA through the online Notice of Activity under Part IV of O. Reg. 830/21. All conditions of Part IV of O. Reg. 830/21 will be followed, including removal of habitat outside of the nesting period of May 1 – July 31.

6.2 Fish Habitat / Streams / Stream and Valley Corridors

6.2.1 Tributary #1 / Pond

Extraction will be set back a minimum of 30 m from Tributary #1 and the pond, and a VPZ of 10 m will be implemented. Although minimal changes were found to occur within Tributary #1 due to catchment loss, observations during the 96-hour pumping test show that groundwater drawdown will decrease the available water table supporting Tributary #1 resulting in reduced flow during operations (maximum of 23%) and post-rehabilitation (maximum 21%) (Golder 2022a). Water levels in the pond are also expected to be lower due to the reduced flow in Tributary #1. However, Tributary #1 was found to be dry during portions of the year and observations of surface water – groundwater interactions in the watercourse at the northwest corner of the Site suggest that Tributary #1 is not often supported by groundwater, particularly during the driest portions of the year. Because no change to surface water inputs to Tributary #1 is expected, and it already experiences dry periods under existing conditions and both the tributary and pond were assessed to have low potential to provide fish habitat (including specialized habitats that would be sensitive to water flow or depth), the reduction in baseflow is not anticipated to have negative impacts on fish habitat in either the tributary or pond. As indicated in the Blast Impact Assessment (Golder 2022b), because there is no spawning in Tributary #1 or the pond and blasting limits at the west side of the Main Area will meet DFO guidelines (Wright and Hopky 1998), no impacts on fish habitat in Tributary #1 or the pond are anticipated due to blasting. A more detailed discussion of potential impacts to surface water resources is provided in a separate report, entitled Water Report (Golder 2022a).

Ongoing monitoring will be conducted in Tributary #1 and the pond (Section 7.2.1).

With the implementation of best management practices (Section 7.2.2) and mitigation measures (Section 7.2.4), and enhancements (i.e., riparian plantings) during progressive rehabilitation (Section 7.1), no negative impacts on Tributary #1 or the pond are expected due to the proposed extraction. Further analysis is not warranted.

6.2.2 Credit River

The Credit River is located off-Site and outside of the proposed extraction area. Credit River is not expected to be directly impacted by the proposed extraction.

Although the proposed extraction is expected to reduce the runoff to the Credit River by approximately 1.5% due to removal of a portion of its catchment, the surplus from the extraction area is expected to be maintained and will report to the Credit River via quarry dewatering (operational) or groundwater inputs and lake outflows (rehabilitation).

Discharge from the quarry will be outlet into the Credit River approximately 380 m north of the Site. The maximum average water discharge rate during operations is expected to be approximately 40 – 42 L/s which is 2.2 - 2.4% of the average annual flow rate in the Credit River at this location. Discharge rates could potentially range from 0 – 200 L/s depending on precipitation and season. As such, it is proposed that a storage pond be used in the north extraction area to mitigate peak flows directed to the discharge route. The pond will also allow fines and solids to settle out of the water column resulting in improved water quality before discharge to the river. Potential discharge limits will be developed with the MECP through the Industrial Sewage Works (ISW) Environmental Compliance Approval (ECA). Based on the surface water assessment, the Credit River is a large system that can sustain an increased input of 2.2-2.4% from discharge with negligible effects to habitat, either at the outlet or downstream. (Golder 2022a).

This discharge also has potential to impact water temperature and water quality entering the Credit River, which provides coldwater fish habitat. Water collected from quarry operations and discharged to the Credit River will be monitored for total suspended solids and temperature to mitigate any negative impacts to fish habitat and ensure it meets the discharge objectives for those parameters, as specified in the Water Report (Golder 2022a) and the ECA permit.

With the implementation of best management practices (Section 7.2.2) and mitigation measures (Section 7.2.1), no negative impacts on fish habitat in the Credit River are expected due to the proposed extraction. In accordance with the *Fisheries Act*, a DFO Request for Review will be submitted to confirm these conclusions.

6.3 Significant Wetlands

The closest proposed extraction is located approximately 430 m from the Cataract Southwest PSW. There will be no direct impacts to the PSW (i.e., removal) as a result of the proposed extraction. The groundwater model shows a drawdown of 1 m near the PSW, based on conservative assumptions. The hydrogeological assessment in the Water Report (Golder 2022a) indicates that the pit pond that has been created as a result of another operation, located approximately 375 m west of the PSW, has conservatively not been represented in the model and is expected to have a dampening effect on shallow groundwater drawdown which will limit influence of the extraction south of the Site. Furthermore, groundwater levels immediately west of the Site will be monitored allowing hydrogeologic and water-related ecological conditions in the area to be further assessed as extraction proceeds.

Extraction is located approximately 465 m from the Credit River at Alton PSW and no direct impacts to the PSW as a result of the proposed extraction are anticipated. The Credit River at Alton PSW is outside of the groundwater ZOI and is not expected to be impacted by any drop in localized groundwater levels due to extraction

in the north area. No changes to the catchment area of the Credit River at Alton PSW are anticipated. The armoured channel and outlet to the Credit River for the discharge of excess quarry water will be constructed immediately west of the Credit River at Alton PSW. Armouring the discharge channel will minimize erosion and sedimentation in the channel and potential indirect impacts on the PSW during operations. Further, erosion and sediment controls will be implemented to minimize potential indirect impacts on the PSW during construction of the channel.

With the implementation of best management practices (Section 7.2.2) and enhancements during final rehabilitation (Section 7.1), no negative impacts on the Cataract Southwest PSW or Credit River at Alton PSW are expected due to the proposed extraction. Further analysis is not warranted.

6.4 Other Wetlands

Unevaluated wetland unit 1 is outside of the proposed extraction limit but will be removed to construct a berm. No significant ecological functions or linkages to other significant natural features were identified in this wetland (Section 4.4.4). Further, a total of 4.8 ha of wetland area will be created during final rehabilitation (Section 7.1).

Extraction will be set back a minimum of 30 m from the Coulterville Wetland Complex (including unevaluated wetland units 3 and 4) as well as from unevaluated wetland unit 5, and a VPZ of 10 m will be implemented. Setbacks and VPZs should be of a sufficient distance to protect wetland form and functions (e.g., hydrological, hydrogeological, wildlife habitat) from potential development impacts, including direct removal, edge effects, and screening of human disturbances (e.g., noise, light) (Beacon 2012).

According to Beacon's Ecological Buffer Guideline Review (Beacon 2012), 10 m is recommended as the base buffer width for protection of wetland features and functions (e.g., water quality, core habitat and screening of human disturbance). The majority of the 10 m VPZ will be reforested as part of the rehabilitation plan. The similarity in structure between the wetland and the reforestation area will create a soft edge at the interface, which will be an ecological improvement over the hard edge that currently exists just beyond the wetland edge and the adjacent agricultural crop fields (MNR 2011b). The soft edge transition zone will also help mitigate potential for invasive species migration into the wetland. Cadenasso and Pickett (2001) demonstrated that a thinned/sparsely vegetated or "open" edge allowed for higher volume of seed dispersal as well as further distance of dispersal into the forest interior compared to an intact or "vegetated" edge. In addition, erosion and sediment control measures will be implemented for Woodland B which overlaps Coulterville Wetland Complex (Section 6.5).

The 30 m extraction setback is consistent with Greenbelt Plan recommendations for wetlands. The proposed 30 m extraction setback will also increase the effective size of the VPZ because it includes existing non-wetland portions of Woodland B, which will provide increased protections for water quality, disturbance (i.e., noise and dust) screening, and edge effects. The proposed 30 m extraction setback is also expected to be sufficient to maintain or enhance existing wildlife habitat functions (e.g., habitat for SWH birds, potential bat roosting habitat, local wildlife movement corridor). Based on the results of the water assessment (Golder 2022a), Coulterville Wetland Complex is perched above the water table and is not groundwater fed. This conclusion was based on low hydraulic conductivity in near surface soils and in the shallow overburden (suggesting there is low permeability) indicating a perched water system relative to the deep overburden and bedrock aquifer. Any drop in localized groundwater levels due to extraction in the Main Area will not impact the wetland. The majority (i.e., 98%) of the catchment area for this wetland is located off-Site, to the north and will not be impacted by the proposed extraction. Portions of the catchment area that overlap the proposed extraction limit will be replaced through

regrading during final rehabilitation. As such, the size of the catchment area will be returned to existing conditions upon rehabilitation and no long term impacts to the Coulterville Wetland Complex are anticipated.

Ongoing monitoring will be conducted in the Coulterville Wetland Complex and Tributary #1 / pond (which support wetland units 3, 4 and 5) (Section 7.2.1).

With the implementation of best management practices (Section 7.2.2) and mitigation measures (Section 7.2.5), and the creation of a net gain in wetland area during final rehabilitation (Section 7.1), no negative impacts on Other Wetlands are expected due to the proposed extraction. Further analysis is not warranted.

6.5 Significant Woodlands

All four significant woodlands (i.e., Woodlands B, D, E and H) and High Functioning Woodlands (i.e., Woodlands B, D and E) are located off-Site and outside of the extraction limit. Best management practices (Section 7.2.2) are expected to minimize any indirect adverse impacts on Woodlands E and H.

Woodlands B and D are immediately adjacent to the proposed extraction area. Extraction will be set back a minimum of 15 m from Woodlands B and D, and a VPZ of 10 m will be implemented.

The 15 m setback, as measured from the dripline, is expected to be sufficient to protect the woodland root zone. No standard policies for the Town related to recommended setbacks for woodlands were found. As such, policies from adjacent municipalities were referenced instead. Municipalities such as the City of Toronto (Toronto 2016), City of Guelph (Guelph 2019) and Centre Wellington (Centre Wellington 2018) recommend minimum tree protection distances based on the tree DBH, which can extend up to 6 m from the tree trunk for trees measuring up to 100 cm DBH. The City of Brampton recommends tree protection distances of double the dripline radius from trees measuring greater than 30 cm DBH (Brampton 2014). The dripline is defined as the outermost extent of the crown. The dripline for large, mature trees may extend several metres from the trunk of the tree. Larger protection distances are recommended for woodland or ravine features where the combined root network may be larger. Protection distances for woodland or ravine features may extend up to 12 m from the outside of the tree trunk for trees measuring up to 100 cm DBH (Toronto 2016; Guelph 2019). Woodlands B and D are composed of large, mature trees generally measuring between 30 cm and 50 cm DBH, with some larger individuals. The proposed 15 m setback is greater than the minimum protection distance recommended by surrounding municipalities.

A critical root zone for the woodland was also evaluated to identify an appropriate VPZ in which no disturbance is permitted. The critical root zone is the area where the majority of root fibres are located. Disturbance in this area may impact the survival of the tree. The critical root zone, as defined by the International Society of Arboriculture, is equal to a 1 ft radius from the tree trunk for each inch of tree DBH (i.e., 0.3 m radius for each 2.5 cm) (PNWISA 2021). Similarly, the City of Ottawa recommends a 10 cm radius for each 1 cm DBH (Ottawa 2021). For trees measuring between 30 cm and 50 cm DBH, the critical root zone would be from 3 m up to 6 m from the tree trunk. Based on this calculation, the 10 m VPZ is expected to be sufficient to protect critical root zone of Woodlands B and D.

The 15 m setback will be reforested as part of the rehabilitation plan. The similarity in structure between the significant woodlands and the reforestation area will create a soft edge at the interface, which will be an ecological improvement over the hard edge that currently exists between the interface of the significant woodlands and adjacent agricultural crop fields (MNR 2011b).

In addition, erosion and sediment control measures will be implemented where gradients indicate there is potential for runoff to enter the significant woodlands.

With the implementation of best management practices (Section 7.2.2) and mitigation measures (Section 7.2.6), as well as enhancements (i.e., setback plantings) and creation of a net gain in woodland area during progressive and final rehabilitation (Section 7.1), no negative impacts on significant woodlands or High Functioning Woodlands are expected due to the proposed extraction. Further analysis is not warranted.

6.6 Other Woodlands

Woodland A (also mapped as a Supporting Woodland by CVC) is located outside of the extraction limits and will not be directly impacted by the proposed extraction.

Woodlands C (also mapped as a Supporting Woodland by CVC), F and G (total area of 18.9 ha) are located within the extraction limits and will be removed as part of the proposed extraction. No significant ecological functions or linkages to other significant natural features were identified in any of the woodlands (Section 4.0). Further, a total of 67.7 ha of forest area will be created during progressive and final rehabilitation (Section 7.1).

With the implementation of best management practices (Section 7.2.2) and mitigation measures (Section 7.2.87), and creation of a net gain in woodland area during progressive and final rehabilitation (Section 7.1), no negative impacts on Other Woodlands or Supporting Woodlands are expected due to the proposed extraction. Further analysis is not warranted.

6.7 Significant Valleylands

The Credit River valleyland is located off-Site and outside of the extraction limit. A small channel will be created on the valley slope between the north end of the Site and the Credit River to allow for quarry discharge. The channel will follow existing surface water flow paths, where present, that already convey runoff to the Credit River and will use an existing concrete box culvert beneath the rail line north of the Site. The channel will be armoured with rip rap to allow conveyance of the required maximum flows without erosional scouring. Minimal vegetation clearing (including tree removal) will be required to permit equipment access to construct the channel and for future maintenance. All temporary disturbance areas will be stabilized and restored with an appropriate groundcover seed mix following construction. Further, erosion and sediment controls will be implemented during construction of the channel. No negative impacts to the form or function of the valleyland are anticipated.

With the implementation of best management practices (Section 7.2.2), no negative impacts on significant valleylands are expected due to the proposed extraction. Further analysis is not warranted.

The small valleyland associated with Tributary #1 on the Site is considered a Supporting Valleyland by the CVC. Extraction will be set back a minimum of 30 m from Tributary #1 and a VPZ of 10 m will be implemented. No direct impacts to this Supporting Valleyland are expected. With the implementation of best management practices (Section 7.2.2) and mitigation measures (Section 7.2.1), and enhancements (i.e., riparian plantings) during progressive rehabilitation (Section 7.1), no negative impacts on the Supporting Valleyland are expected due to the proposed extraction. Further analysis is not warranted.

6.8 Significant ANSIs

Caledon Meltwater Deposits – Forks of the Credit Earth Science ANSI is located off-Site, approximately 415 m south of the extraction limits and will not be directly impacted by the proposed extraction. The significance of the

ANSI is related to geologic processes/features, and therefore any drop in localized groundwater levels due to extraction in the south area, will not impact the ANSI.

With the implementation of best management practices (Section 7.2.2), no negative impacts on the Caledon Meltwater Deposits – Forks of the Credit Earth Science ANSI are expected due to the proposed extraction. Further analysis is not warranted.

6.9 SWH

All SWH is located off-Site and outside of the extraction limit and will not be directly impacted by the proposed extraction.

SWH for snapping turtle and turtle wintering areas overlap Cataract Southwest PSW. Potential impacts are discussed in Section 6.3.

Turtle nesting SWH is located on the recreational rail trail adjacent to the PSW. This type of habitat is not dependent on water and therefore no indirect impacts associated with local surface water or groundwater changes during operations or rehabilitation are expected.

SWH for eastern wood-pewee and wood thrush overlap Woodlands B and D. Potential impacts are discussed in Section 6.5.

Although the grassland habitat that provides SWH for grasshopper sparrow is located within the groundwater ZOI, these habitat types are not groundwater fed and any drop in localized groundwater levels due to extraction in the South Area will not impact the SWH. No significant changes to the catchment area of this habitat are expected (Golder 2022a). No negative impacts to SWH for grasshopper sparrow are expected due to the proposed extraction. Further analysis is not warranted.

7.0 REHABILITATION / MITIGATION / MONITORING

7.1 Landscape / Buffer / Planting Plans

The post-extraction rehabilitation plan has been designed to fit into the overall regional context and complement the existing topography and terrestrial and aquatic features in the area. Additional lands owned by CBM outside of the licence boundary (located to the south and east of the South Area; Figure 1), referred to as the Off-Site Ecological Enhancement Area, is also considered as part of the overall rehabilitation plan for the proposed extraction (Figure 6).

The majority of the Site and Off-Site Ecological Enhancement Area is currently characterized by agricultural land use for crops and livestock and have a high level of disturbance. The few natural features within the proposed extraction area are small and isolated from the larger natural heritage systems to the north, northwest and east of the Site and susceptible to edge effects. As such, these features have reduced capacity to support wildlife and diverse natural vegetation communities. The rehabilitation plan has been designed to support the following goals:

- Increase biodiversity of the Site post-extraction
- Improve and/or enhance habitat connectivity across the Site and to existing adjacent natural heritage systems. Create new habitat features to support the existing local wildlife community and/or attract additional wildlife and increase productivity

- Increase the amount of natural cover on the Site, including a net gain in area of woodland, wetland and grassland/meadow habitats
- Increase the abundance of native species on the Site and reduce potential for invasive species establishment

Because the extraction is below-water, the overall final rehabilitation plan will consist of three separate lakes in each of the North, Main and South Areas surrounded by nearshore, riparian, and upland habitats (Figure 6). Proposed rehabilitation of the extraction area will proceed progressively through each phase. The detailed rehabilitation plan is contained in the Site Plans for the Project (MHBC 2022).

The shoreline of the lakes will be contoured, where possible, to create convoluted or irregular shoreline gradients. Where sloping and excavation depths allow, shoals or islets will be created to increase habitat diversity. Stumps and logs will be placed along the shoreline as habitat structure. Boulders and rock rubble from the extraction will also be used for habitat structure. These types of structures will provide suitable areas for amphibian breeding, bird perching, waterfowl nesting, fish habitat, and turtle basking. Rock piles and bat boxes that provide habitat for bats will also be installed adjacent to the Main and South Areas, in the approximate locations shown on Figure 6.

Organic material will be placed in shallow water areas to promote the establishment of shoreline and aquatic vegetation and to create habitat for aquatic fauna and amphibians. A total of 4.8 ha of shoreline wetland habitat will be created. In the shoreline wetland areas, shallow emergent marsh vegetation will be planted in the water with species that may consist of, but are not limited to: red-osier dogwood, slender willow (*Salix petiolaris*), and herbaceous plants such as water plantain (*Alisma plantage-aquatic*), lake sedge (*Carex lacustris*), swamp milkweed (*Asclepias incarnate*), softstem bulrush (*Schoenoplectus tabernaemontani*) and common cattail (*Typha latifolia*).

The lake in the North Area is expected to be shallower and contain a deeper bottom layer of sediment that will provide a growing medium for plants, as well as habitat for turtles. Aquatic plants will include herbaceous plants such as pickerelweed (*Pontederia cordata)*, broad-leaved arrowhead, water plantain species (*Alisma* spp.), cattail (*Typha* sp.), and greater water dock (*Rumex hydrolapathum*) and submergent macrophytes such as eelgrass (*Zostera marina*), broad waterweed (*Elodea canadensis*), slender naiad (*Najas flexilis*), common hornwort (*Ceratophyllum demersum*). Shallow emergent marsh vegetation will be planted in water ±0.15 m deep and extend ±5 m from the shore. Basking logs, nesting platforms and boxes will be created for turtle, waterfowl, and swallows respectively. Areas of suitable nesting substrate will also be constructed along or adjacent to the shoreline.

Above-water side slopes will be rough graded to a 2:1 aspect to ensure stability. The slopes will be seeded with a mix of grasses and legumes consisting of native, non-invasive species. Plantings (i.e., nodal plantings) included in the rehabilitation plan should focus on locally native, non-invasive species that create habitat in the short term and promote natural succession processes. To facilitate a natural connection with the existing woodlands adjacent to the Main and North Areas, plantings should include species characteristic of each of the significant woodlands. Along the setback to significant woodland #B species may include sugar maple, American beech, paper birch, American elm, white cedar, balsam fir, eastern hemlock, red maple (*Acer rubrum*), trembling aspen, black cherry, alternate-leaved dogwood, gray dogwood (*Cornus racemosa*), and red-osier dogwood. Along the setback to significant woodland #D, species may include sugar maple, American beech, red oak, paper birch, black walnut (*Juglans nigra*), American elm, and alternate-leaved dogwood. On north-facing slopes and setbacks which are expected to be cooler and moister, species may include white cedar, white spruce (*Picea glauca*), Norway spruce (*Picea abies*), red maple, paper birch, and American basswood. On the east/west-facing slopes and setbacks

species may include white pine, white cedar, white spruce, European larch (*Larix decidua)*, trembling aspen, balsam poplar, sugar maple, black cherry, red oak, and bur oak. Shrubs such as serviceberry (*Amelanchier* spp.), nannyberry (*Viburnum lentago*), ninebark (*Physocarpus opulifolius*), dogwoods, highbush cranberry (*Viburnum opulus*), elderberry, choke cherry, and others may be used to add diversity and increase pollinator/wildlife diversity.

Riparian plantings along Tributary #1 will be conducted to enhance existing habitat conditions and will include a variety of native species including, but not limited to, white cedar, balsam poplar, pussy willow (*Salix discolor*), slender willow (*Salix petiolaris*), red-osier dogwood, nannyberry, elderberry (*Sambucus canadensis*), meadowsweet (*Spiraea* sp.), fowl bluegrass (*Poa palustris*), lake sedge (*Carex laeviconica*), fox sedge (*Carex vulpinoidea*), blue vervain (*Verbena hastata*), and spike rush species (*Eleocharis* spp.)

A total of 67.7 ha of upland forest will be planted to replace forest lost through the proposed extraction and to create connections between the rehabilitated habitat and those off-Site. Of this, 5 ha will be planted within the first year of the licence being issued. A 15.5 ha of woodland will be created in the Off-Site Ecological Enhancement Area within five years of the licence being issued. The forest block in the Main Area will include species representative of the woodland communities that will be removed as well as the adjacent existing woodland (i.e., Woodland B), to expand the quality and quantity of upland habitat currently available. Species may include sugar maple, American beech, paper birch, American elm, white cedar, balsam fir, eastern hemlock, red maple, trembling aspen, black cherry, alternate-leaved dogwood, gray dogwood, and red-osier dogwood. The forest block east of the South Area (i.e., in the Off-Site Ecological Enhancement Area) will include species representative of the woodland communities that will be removed, such as: sugar maple, American beech, black cherry, American basswood (*Tilia americana*), eastern hop-hornbeam, eastern hemlock, American elm, alternate-leaved dogwood, choke cherry, smooth serviceberry (*Amelanchier laevis*), round-leaved dogwood (*Cornus rugosa*), and red elderberry (*Sambucus racemosa*). Other species that may be added to supplement include red oak, white oak, black maple, mountain maple (*Acer spicatum*), northern bush honeysuckle (*Diervilla lonicera*), Canada fly honeysuckle (*Lonicera canadensis*), pin cherry (*Prunus pensylvanica*), and maple-leaved viburnum (*Viburnum acerifolium*).

A total of 27.9 ha of meadow habitat will be created in the North Area and in the Off-Site Ecological Enhancement Area. Meadow habitat will be created within five years of the licence being issued. The meadow areas will be planted primarily with grass species (60-80%) such as poverty oatgrass (*Danthonia spicata*), bottlebrush grass (*Elymus hystrix*), common panic grass (*Panicum capillare*), big bluestem (*Andropogon gerardii*), Canada wild rye (*Elymus canadensis)*, switch grass (*Panicum virgatum*), wool-grass (*Scirpus cyperinus*), and Virginia wild rye (*Elymus virginicus*). A smaller proportion will be planted with forbs or legumes (20-40%) such as Canada anemone (*Anemone canadensis*), black-eyed susan (*Rudbeckia hirta*), common evening primrose (*Oenothera biennis*), common milkweed (*Asclepias syriaca*), yarrow (*Achillea millefolium*), New England aster (*Symphyotrichum novae-angliae*), and wild bergamot (*Monarda fistulosa*).

The meadow and forest block in the Off-Site Ecological Enhancement Area will also create a linkage with the Cataract Southwest PSW to the south, provide additional upland habitat to support wildlife using the PSW, and also enhance erosion controls on the slope adjacent to the PSW.

7.2 Adaptive Management / Mitigation

7.2.1 Adaptive Management and Long-Term Monitoring

Ongoing monitoring will be conducted in sensitive receptors (i.e., Coulterville Wetland Complex, Tributary #1 / pond).

A detailed description of adaptive monitoring for the pit / quarry operation is provided in the Water Report (Golder 2022a).

7.2.2 General Best Management Practices

Standard Best Management Practices to be followed during Site preparation and operations to mitigate damage to the adjacent natural features include the following:

- Clearly demarcate and maintain recommended setbacks on the site plan.
- Implement standard erosion and sediment control measures during site preparation, as well as during construction of the discharge channel.
- Restore and stabilize all temporary disturbance areas of the discharge channel with an appropriate stabilizing seed mix to minimize erosion and sedimentation post-construction.
- To comply with the MBCA, avoid removal of vegetation during the active season for breeding birds (April 15 – August 15), 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.
- To comply with the MBCA, avoid removal of Barn #1a, Barn #2, Barn #3 and Shed #3 during the active season for barn swallow (May 1 – August 31), unless disturbance is preceded by a nesting survey conducted by a qualified biologist. If any active nests are found during the nesting survey, the structure cannot be removed until the young have fledged the nest.

7.2.3 Habitat of Endangered and Threatened Species

The following mitigation measures are recommended to minimize adverse impacts on SAR individuals:

- Follow all conditions of ESA approvals/permits.
- Remove Barn #1b, Barn #2, Barn #3 and Woodlands F and G (in the south portion of the Site) outside of the bat active period of March 15 – November 30. Because these features are habitat for two SAR bat species, the most restrictive active period is used.
- Remove habitat for eastern meadowlark and bobolink outside of the nesting period of May 1 – July 31.

7.2.4 Fish Habitat

The following mitigation measures are recommended to minimize adverse impacts on fish and fish habitat:

- Implement standard erosion and sediment control measures as described in Section 7.2.2.
- Implement a minimum setback for extraction of 30 m from Tributary #1 and the pond. There will be no disturbance, including berms, within 10 m of these features (i.e., within the VPZ).

- Conduct water level monitoring at Tributary #1 during operations.
- Submit a DFO Request for Review prior to construction of the outlet to the Credit River. All mitigation and/or monitoring requirements identified by DFO through the review will be implemented.
- Water collected from quarry operations and discharged off-Site (i.e.to the Credit River) will be monitored for total suspended solids and temperature to ensure it meets the discharge objectives for those parameters, as specified in the Water Report and ECA permit.

7.2.5 Other Wetlands

The following mitigation measures are recommended to minimize adverse indirect impacts on other wetlands:

- Implement a minimum setback for extraction of 30 m from the Coulterville Wetland Complex. There will be no disturbance, including berms, within 10 m of the wetland (i.e., within the VPZ).
- Implement a minimum setback for extraction of 30 m from unevaluated wetland units 3, 4 and 5. There will be no disturbance, including berms, within 10 m of these features (i.e., within the VPZ).
- Conduct water level monitoring at Coulterville Wetland Complex during operations.
- Replace unevaluated wetland unit #1 with an equal or greater amount of wetland area during progressive and final rehabilitation.
- Implement sediment and erosion controls adjacent to Coulterville Wetland Complex.

7.2.6 Significant Woodlands

The following mitigation measures are recommended to minimize adverse indirect impacts on the adjacent significant woodlands B and D:

- Implement a minimum setback for extraction of 15 m from the significant woodlands. There will be no disturbance, including berms, within 10 m of the significant woodlands (i.e., within the VPZ).
- If gradients indicate there is potential for runoff to enter the significant woodlands, implementation of sediment and erosion controls will occur prior to commencement of operations to prevent the runoff of suspended solids into the significant woodlands. In particular, in such areas where potential runoff exists, silt fencing (or similar) will be installed along the dripline of the significant woodland in those areas prior to commencement of activities within 30 m of the significant woodland, including Site preparation and vegetation clearing.
- Where installed, silt fencing will be maintained for the duration of the operations phase adjacent to the significant woodlands and will include regular inspections for signs of damage or deterioration.
- Following rehabilitation adjacent to the significant woodlands, any silt fencing or other erosion/sediment controls that had been installed, will be removed from the Site.
- To avoid compacting the soil in the setback area (which can negatively impact tree roots) the use of heavy machinery should be minimized within 10 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.

7.2.7 Other Woodlands

The following mitigation measures are recommended to minimize adverse impacts on other woodlands:

- Replace Woodlands C, F and G with an equal or greater amount of woodland area during progressive and final rehabilitation.

8.0 SUMMARY

The proposed Caledon Pit / Quarry has been assessed for potential ecological impacts under the ARA Provincial Standards, the Provincial Policy Statement, Greenbelt Plan, policies of the Region of Peel and Town of Caledon, as well as other relevant legislation, including the *Fisheries Act*, MBCA and ESA.

Based on these analyses, it is concluded that:

- The Site does not contain any Core Areas of the Region of Peel Greenlands System;
- The Site includes an area designated “Environmental Policy Area” in the Town’s Official Plan in the northwest corner of the Main Area. This feature is not included in the proposed extraction area and will be protected from negative impacts;
- The Site includes “Natural Core Areas” as defined in the Town’s Official Plan in the north portion of the Main Area and the south portion of the South Area. These features are within the proposed extraction area; however, aggregate extraction is permitted in accordance with the Town’s Official Plan Section 5.11.2.2.6;
- A portion of the Main Area and North Area is part of the Greenbelt “Natural Heritage System”. These areas do not include significant woodlands or habitat of endangered and threatened species habitat and therefore mineral aggregate operations are a permitted use. The rehabilitation plan for these areas has been designed to significantly enhance the Greenbelt Natural Heritage System compared to existing conditions;
- The proposed extraction area does not include provincially significant wetlands, fish habitat, life science areas of natural and scientific interest (ANSI), earth science ANSI, significant valleylands, significant wildlife habitat, significant woodlands, sand barrens, savannahs, tallgrass prairie or alvars;
- The proposed extraction area includes the removal of 6.3 ha of habitat for endangered species habitat for bats. This habitat is located outside of the Greenbelt Plan Natural Heritage System and development will be completed in accordance with provincial requirements. As a result, the application will result in an overall benefit for bat habitat;
- The proposed extraction area results in the removal of 15.8 ha of habitat for threatened species habitat for bobolink and eastern meadowlark. This habitat is located outside of the Greenbelt Plan Natural Heritage System and development will be completed in accordance with provincial requirements. As a result, the application will result in an overall benefit for bobolink and eastern meadowlark habitat;
- The proposed CBM Caledon Pit/Quarry results in the removal of 18.9 ha of non-significant woodland areas and 67.7 ha of woodland area will be created. Of this, 52.2 ha of woodland areas will be created within the licence area as part of visual screening and rehabilitation plan. Five ha of this will be planted within the first year of the licence being issued. Outside of the licence area, a 15.5 ha woodland will be created within five years of the licence being issued. Taking into consideration the proposed off-Site ecological enhancement plan and the rehabilitation plan, woodland areas on-Site will be increased by a 3.6 to 1 ratio (67.7 ha to created and 18.9 ha to be removed);

- The proposed CBM Caledon Pit/Quarry results in the removal of 0.1 ha of non-significant wetland area and the proposed rehabilitation plan will create 4.8 ha of wetland area. As a result, wetland areas on-Site will be increased by a 48: 1 ratio;
- In total the application results in the removal of 22.2 ha of key natural heritage features (i.e. non significant wetland and habitat of endangered and threatened species) that are permitted to be removed in accordance with applicable policies. Taking into account the proposed rehabilitation plan and the off-Site ecological enhancement plan, the application results in the creation of 100.4 ha of new key natural heritage features (i.e. meadow, wetland, woodland) and 158.3 ha of new key hydrologic features (i.e. lake) that is also considered fish habitat, which is a key natural heritage feature; and
- Adjacent key natural heritage features will be protected from negative impacts based on the recommendations in this report including sediment / erosion controls, ecological setback, water monitoring and mitigation, and the implementation of standard best management practices to control noise and dust.

Overall, it is concluded that with the implementation of the recommendations in this report the proposed application maintains and enhances connectivity between key natural heritage features, protects adjacent key natural heritage features from negative impacts, any key natural heritage proposed for extraction is appropriate taking into account applicable policy requirements and the application results in a significant net ecological enhancement compared to existing conditions.

9.0 RECOMMENDATIONS

The following notes will be included on the Site Plan for the proposed Caledon Pit / Quarry:

- Barn #1b, Barn #2, Barn #3 and Woodlands F and G as shown on Figure 4 shall only be removed outside of the bat active period of March 15 – November 30.
- Habitat for eastern meadowlark and bobolink as shown on Figure 4 shall only be removed outside of the nesting period of May 1 – July 31.
- To comply with the *Migratory Birds Convention Act*, Barn #1a, Barn #2, Barn #3 and Shed #3 as shown on Figure 4 shall not be removed during the active season for barn swallow (May 1 – August 31), unless disturbance is preceded by a nesting survey conducted by a qualified biologist. If any active nests are found during the nesting survey, the structure shall not be removed until the young have fledged the nest.
- To comply with the *Migratory Birds Convention Act*, removal of vegetation shall not be permitted during the active season for breeding birds (April 15 – August 15), 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 shall be installed around the nest to protect against disturbance. Vegetation within the protection buffer shall not be removed until the young have fledged the nest.
- Implement a minimum setback for extraction of 15 m from significant woodlands as shown on Figure 5. There shall be no disturbance, including berms, within 10 m of these significant woodlands.
- Implement a minimum setback for extraction of 30 m from the Coulterville Wetland Complex as shown on Figure 3. There shall be no disturbance, including berms, within 10 m of the wetland.

- Implement a minimum setback for extraction of 30 m from Tributary #1 and the pond as shown on Figure 3. There shall be no disturbance, including berms, within 10 m of these features.
- Implement a minimum setback for extraction of 30 m from unevaluated wetland units 3, 4 and 5 as shown on Figure 3. There shall be no disturbance, including berms, within 10 m of these features.
- All conditions of *Endangered Species Act* approvals/permits shall be followed.
- Sediment and erosion control measures shall be installed along the dripline of the significant woodlands in areas where runoff has the potential to enter the woodland, and adjacent to the Coulterville Wetland Complex prior to commencement of activities within 30 m of the significant woodlands (e.g., Site preparation) and will be actively monitored and maintained for the duration of the proposed operations. Following rehabilitation of the areas adjacent to the significant woodlands, the control measures shall be removed.
- Prior to construction of the outlet to the Credit River, a Request for Review to Fisheries and Oceans Canada (DFO) shall be submitted and all DFO requirements shall be implemented.
- Water collected in the sump(s) shall be pumped to a settling pond located on the east side of the North Area, from which water will flow from gravity for off-Site discharge to the Credit River.
- Water collected from quarry operations and discharged off-Site to the Credit River shall be monitored for total suspended solids and temperature to ensure it meets the discharge objectives for those parameters, as specified in the environmental compliance approval.
- Implement the water monitoring requirements for Locations 1 and 2:
  - Location 1: Main Quarry – Northwest Area – Tributary #1
  - Location 2: Main Quarry – Northwest Area – Coulterville Wetland Complex
- Aggregate Resources Act Rehabilitation Plan

  Lake Shoreline – Main, North and South Area

  - The shoreline of the lakes shall be contoured, where possible to create convoluted or irregular shoreline gradients.
  - Where sloping and excavation depths allow, shoals or islets shall be created to increase habitat diversity.
  - Stumps and logs shall be placed along the shoreline as wildlife habitat structure. Boulders and rock rubble from the extraction shall also be used for wildlife habitat structure.

  Woodland – Main Area

  - The woodland in the Main Area as shown on Figure 6 shall be planted with tree species representative of the woodland communities that will be removed, such as sugar maple, American beech, paper birch, white elm, white cedar, balsam fir, eastern hemlock, red maple, trembling aspen, black cherry, alternate-leaved dogwood, gray dogwood, red-osier dogwood.
  - Trees shall be planted at approximately 2.5 m spacing to achieve a density of 1600 seedlings per hectare. Two years after planting the target density shall be 1200 seedlings per hectare with a survival rate of 75%. Infill plantings shall be completed if required in year two after planting.

Habitat for Eastern Small-footed Myotis and Little Brown Myotis – Main Area

- Rock piles shall be placed in the locations as shown on Figure 6 to create habitat for eastern small-footed myotis. Rock piles shall vary in size and height between 0.5 m and 2 m. Crevices shall be created through stacking slabs of flat rock varying in size from several centimeters to one meter long.
- Bat boxes shall be installed in the same location as the rock piles to provide habitat for little brown myotis.

Setback areas / Slopes – Main, North and South Area

- All slopes located above the final water level shall be seeded with an appropriate native, non-invasive seed mix to prevent erosion during operations.
- Nodal plantings shall be expanded naturally through seed rain.
- Along the setback to significant woodland #B as shown on Figure 5 plant species representative of the existing woodland, such as sugar maple (*Acer saccharum*), American beech (*Fagus grandifolia*), paper birch (*Betula papyrifera*), American elm (*Ulmus americana*), white cedar (*Thuja occidentalis*), balsam fir (*Abies balsamea*), eastern hemlock (*Tsuga canadensis*), red maple (*Acer rubrum*), trembling aspen (*Populus tremuloides*), black cherry (Prunus serotina), alternate-leaved dogwood (*Cornus alternifolia*), gray dogwood (*Cornus racemosa*), red-osier dogwood (*Cornus sericea*), shall be planted
- Along the setback to significant woodland #D, as shown on Figure 5 plant species representative of the existing woodland, such as sugar maple (*Acer saccharum*), American beech (*Fagus grandifolia*), red oak (*Quercus rubra*), paper birch (*Betula papyrifera*), black walnut (*Juglans nigra*), American elm (*Ulmus americana*), alternate-leaved dogwood (*Cornus alternifolia*), shall be planted.
- On north-facing slopes and setbacks which are expected to be cooler and moister, as shown on Figure 6 plant species such as white cedar (*Thuja occidentalis*), white spruce (*Picea glauca*), Norway spruce (*Picea abies*), red maple (*Acer rubrum*), paper birch (*Betula papyrifera*), American basswood (Tilia americana), shall be planted.
- On the east/west-facing slopes and setbacks as shown on Figure 6 plant species such as white pine (*Pinus strobus*), white cedar (*Thuja occidentalis*), white spruce (*Picea glauca*), European larch (*Larix decidua)*, trembling aspen (*Populus tremuloides*), balsam poplar (*Populus balsamifera*), sugar maple (*Acer saccharum*), black cherry (*Prunus serotina*), red oak (*Quercus rubra*), bur oak (*Quercus macrocarpa*), shall be planted.
- Within the setback and slope areas shrubs shall also be planted to add diversity and increase wildlife/pollinator diversity, such as: serviceberry (*Amelanchier* spp.), nannyberry (*Viburnum lentago*), ninebark (*Physocarpus opulifolius*), dogwoods *(Cornus* spp.)*,* highbush cranberry (*Viburnum opulus*), elderberry (*Sambucus* spp.), choke cherry (*Prunus virginiana*).

Shoreline Wetland – Main, North and South Areas

- Organic material shall be placed in shallow water areas to promote the establishment of shoreline and aquatic vegetation and to create habitat for aquatic fauna and amphibians. Stumps and trees of non-commercial value shall be stockpiled during clearing operations and used as habitat structure. Boulders and rock rubble from the extraction operation shall also be used to increase habitat diversity along the shoreline area, where possible.

- In the shoreline wetland areas, shallow emergent marsh vegetation shall be planted in the water with species that may consist of, but are not limited to: red-osier dogwood (*Cornus stolonifera*), slender willow (*Salix petiolaris*), and herbaceous plants such as water plantain (*Alisma plantage-aquatic*), lake sedge (*Carex lacustris*), swamp milkweed (*Asclepias incarnate*), softstem bulrush (*Schoenoplectus tabernaemontani*) and common cattail (*Typha latifolia*).

Riparian Plantings – Main Area

- Riparian plantings along Tributary #1 as shown on Figure 6 shall include a variety of native species including, but not limited to, white cedar (*Thuja occidentalis*), balsam poplar (*Populus balsamifera*), pussy willow (*Salix discolor*), slender willow (*Salix petiolaris*), red-osier dogwood (*Cornus sericea*), nannyberry (*Viburnum lentago*), elderberry (*Sambucus canadensis*), meadowsweet (*Spiraea* sp.), fowl bluegrass (*Poa palustris*), lake sedge (*Carex laeviconica*), fox sedge (*Carex vulpinoidea*), blue vervain (*Verbena hastata*), and spike rush species (*Eleocharis* spp.).

Turtle Habitat – North Area

- Turtle habitat shall be created in the North Area at the location shown on Figure 6.
- The turtle habitat pond shall include sediment on the pond bottom to provide a growing medium for plants, and provide habitat for turtles (e.g., overwintering).
- Plant emergent macrophytes shall include species such as pickerelweed (*Pontederia cordata)*, broad-leaved arrowhead (*Sagittaria latifolia)*, water plantain species (*Alisma* spp.), cattail (*Typha* sp.), common arrowhead (*Sagittaria latifolia)*, and greater water dock (*Rumex hydrolapathum*).
- Plant submergent macrophytes shall include species such as eelgrass (*Zostera marina*), broad waterweed (*Elodea canadensis*), slender naiad (*Najas flexilis*), common hornwort (*Ceratophyllum demersum*).
- Basking features such as logs or rocks shall be placed throughout the shallow shoreline areas.
- Areas of suitable nesting substrate shall be constructed along or adjacent to the shoreline.

Meadow – North Area

- Meadow habitat for eastern meadowlark and bobolink shall be created in the North Area outside of the extraction at the location shown on Figure 6.
- A minimum of 60-80% of the meadow shall be covered by at least three different grass species, such as: poverty oatgrass (*Danthonia spicata*), bottlebrush grass (*Elymus hystrix*), common panic grass (*Panicum capillare*), big bluestem (*Andropogon gerardii*), Canada wild rye (*Elymus canadensis)*, switch grass (*Panicum virgatum*), wool-grass (*Scirpus cyperinus*), Virginia wild rye (*Elymus virginicus*).
- At least one of the grass species shall be taller than 50 cm, which shall include at least one of the following: bottlebrush grass (1.3 m), big bluestem (>3.0 m), Canada wild rye (1.3 m), switch grass (1.6 m).
- Remaining 20-40% shall be covered by forbs or legumes such as Canada anemone (*Anemone canadensis*), black-eyed susan (*Rudbeckia hirta*), common evening primrose (*Oenothera biennis*), common milkweed (*Asclepias syriaca*), yarrow (*Achillea millefolium*), New England aster (*Symphyotrichum novae-angliae*), and wild bergamot (*Monarda fistulosa*).

- Meadow seed mixes shall be sown at a rate of 25kg/ha.

- Off-Site Ecological Enhancement Plan

South Ecological Enhancement Area

- Create a 20.3 ha meadow for eastern meadowlark and bobolink on lands south of the proposed Caledon Pit / Quarry in the location shown on Figure 6.
- A minimum of 60-80% of the meadow will be covered by at least three different grass species, such as: poverty oatgrass (*Danthonia spicata*), bottlebrush grass (*Elymus hystrix*), common panic grass (*Panicum capillare*), big bluestem (*Andropogon gerardii*), Canada wild rye (*Elymus canadensis)*, switch grass (*Panicum virgatum*), wool-grass (*Scirpus cyperinus*), Virginia wild rye (*Elymus virginicus*).
- At least one of the grass species will be taller than 50 cm, which includes the following: bottlebrush grass (1.3 m), big bluestem (>3.0 m), Canada wild rye (1.3 m), switch grass (1.6 m),
- Remaining 20-40% will be covered by forbs or legumes such as: Canada anemone (*Anemone canadensis*), black-eyed susan (*Rudbeckia hirta*), common evening primrose (*Oenothera biennis*), common milkweed (*Asclepias syriaca*), yarrow (*Achillea millefolium*), New England aster (*Symphyotrichum novae-angliae*), and wild bergamot (*Monarda fistulosa*).
- Meadow seed mixes will be sown at 25kg/ha.

Woodland

- Create a 15.5 ha woodland on lands south of the proposed Caledon Pit / Quarry in the location shown on Figure 6.
- This woodland will be planted with tree species representative of the woodland communities that will be removed, such as: sugar maple (*Acer saccharum*)), American beech (*Fagus grandifolia*), black cherry (*Prunus serotina*), American basswood (*Tilia americana*), Eastern hop-hornbeam (*Ostrya virginiana*), Eastern hemlock (*Tsuga canadensis*), and American elm (*Ulmus americana*).
- Seedlings will be planted at a density of 1600 per ha at approximate spacing of 2.5 m.
- This woodland will also be planted to include shrub species representative of the woodland communities that will be removed, such as: alternate-leaved dogwood (*Cornus alternifolia*), choke cherry (*Prunus virginiana*), smooth serviceberry (*Amelanchier laevis*), round-leaved dogwood (*Cornus rugosa*), red elderberry (*Sambucus racemosa*).
- Other species that may be added to supplement the woodland include species such as: red oak (*Quercus rubra*), white oak (*Quercus alba*), black maple (*Acer nigrum*), mountain maple (*Acer spicatum*), northern bush honeysuckle (*Diervilla lonicera*), Canada fly honeysuckle (*Lonicera canadensis*), pin cherry (*Prunus pensylvanica*), and maple-leaved viburnum (*Viburnum acerifolium*).

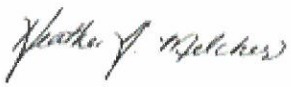
10.0 CLOSURE

We trust this report meets your current needs. If you have any further questions regarding this report, please contact the undersigned. Curriculum Vitae are provided in Appendix I.

Signature Page

Golder Associates Ltd.

Amber Sabourin, HBSc (Env)
Ecologist



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Director, Ecology - Ontario Earth and Environment

AVS/HM/mp

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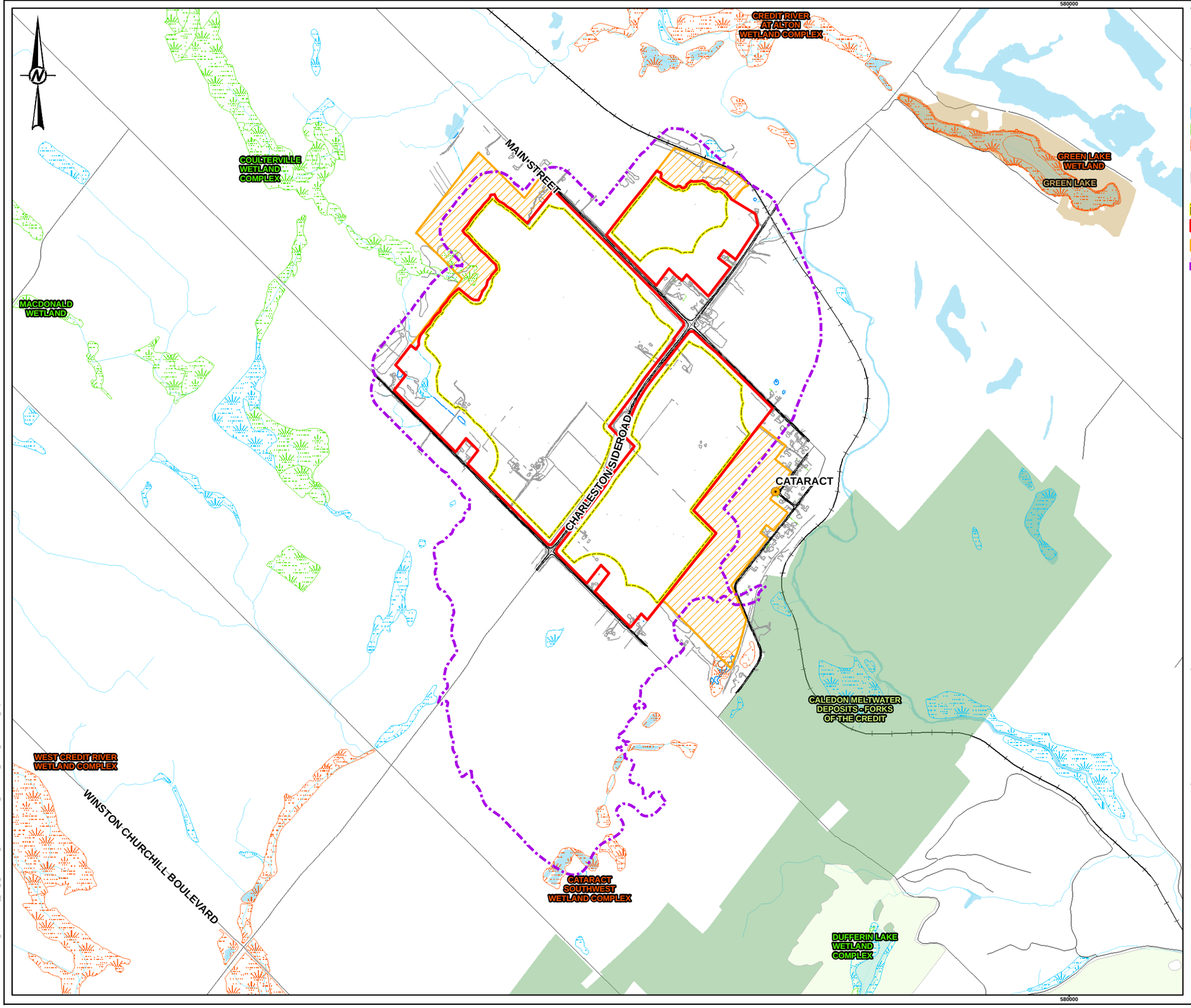
FIGURES

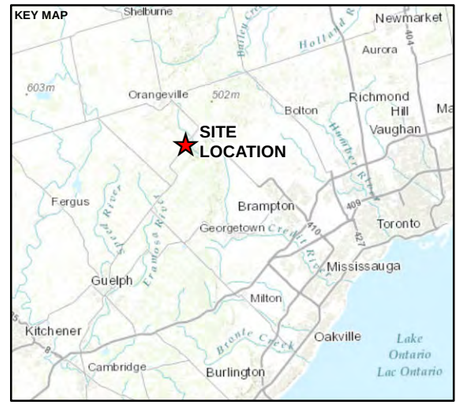


LEGEND

- TOWN/VILLAGE
- ROAD
- RAILWAY
- WATERCOURSE
- WATERBODY
- UNEVALUATED WETLAND
- OTHER EVALUATED WETLAND
- PROVINCIALLY SIGNIFICANT WETLAND
- ANSI, EARTH SCIENCE
- ANSI, LIFE SCIENCE
- CANDIDATE ANSI, LIFE
- LIMIT OF EXTRACTION
- LICENCE BOUNDARY
- ADDITIONAL LANDS OWNED / CONTROLLED BY CBM
- STUDY AREA

SITE TOPOGRAPHIC DATA

- SITE INFRASTRUCTURE
- ROAD
- RAIL LINE
- HEDGE
- RIVER-STREAM-SHORELINE
- RIVER-STREAM INTERMITTENT



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2. WATERCOURSES OBTAINED FROM CREDIT VALLEY CONSERVATION AUTHORITY OPEN DATA PORTAL, NOVEMBER 2022 IN COMBINATION WITH SITE WATERCOURSE SURVEY PROVIDED BY FIRST BASE SOLUTIONS NOVEMBER 2021.
3. IMAGERY FIRSTBASE SOLUTIONS SPRING 2021, SPRING 2019 (15CM RESOLUTION) AND SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
4. SITE TOPOGRAPHIC DATA - SPRING 2021, FIRSTBASE SOLUTIONS, 2021
5. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT

CBM AGGREGATES, A DIVISION OF ST. MARYS CEMENT INC. (CANADA).

PROJECT

CALEDON PIT / QUARRY

TITLE

SITE LOCATION PLAN

CONSULTANT

GOLDER
MEMBER OF WSP

YYYY-MM-DD	2022-12-13
DESIGNED	CGE
PREPARED	CGE
REVIEWED	AS
APPROVED	HM

PROJECT NO.	CONTROL	REV.	FIGURE
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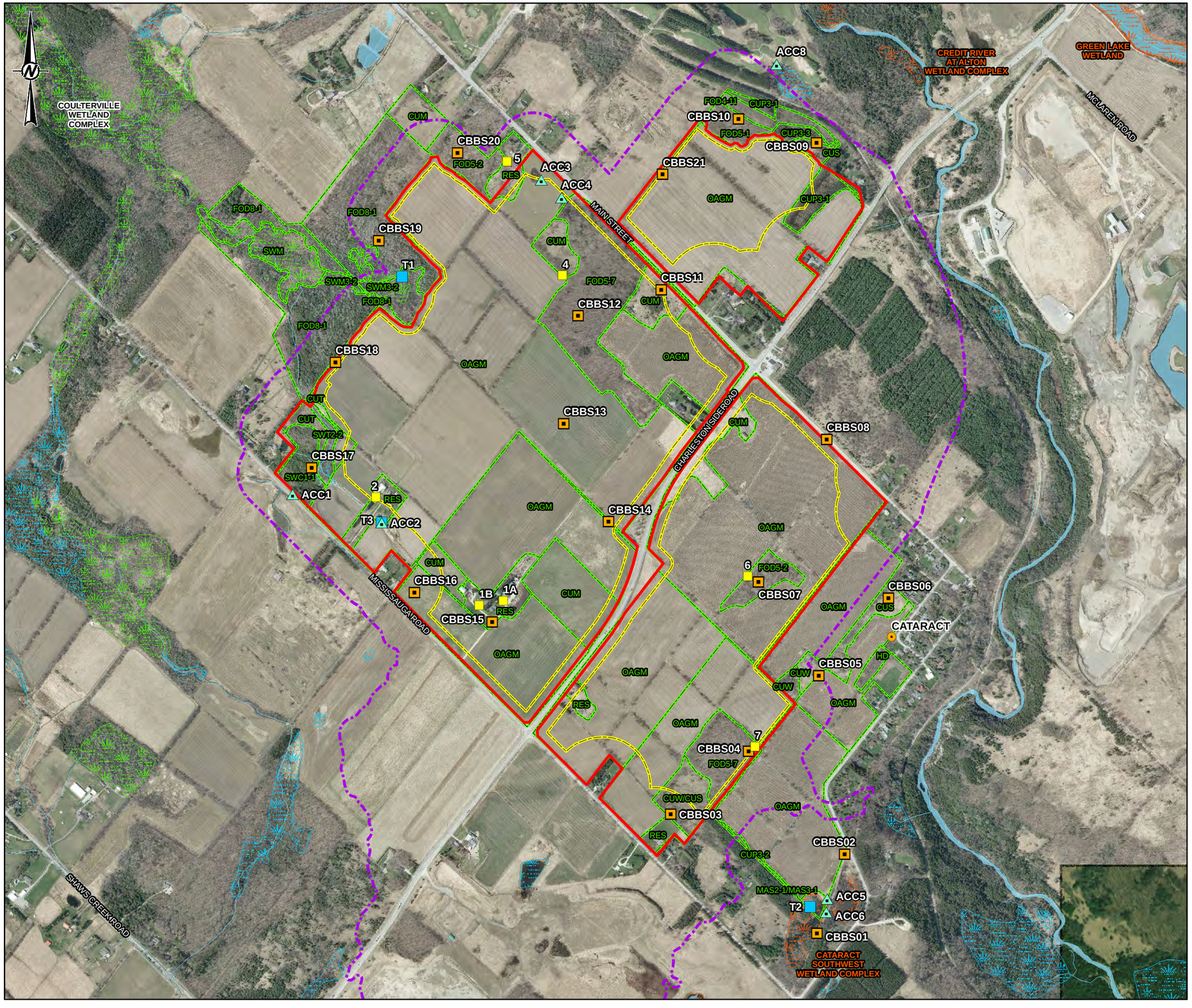

LEGEND

- TOWN/VILLAGE
- WATERCOURSE
- WATERBODY
- UNEVALUATED WETLAND
- OTHER EVALUATED WETLAND
- PROVINCIALLY SIGNIFICANT WETLAND
- ELC COMMUNITY
- LIMIT OF EXTRACTION
- LICENCE BOUNDARY
- STUDY AREA
- BAT DETECTOR STATION
- ANURAN CALL COUNTY SURVEY LOCATION
- BREEDING BIRD SURVEY LOCATION
- TURTLE HABITAT ASSESSMENT
- CUT — ELC COMMUNITY CODES
- ACC1 — WILDLIFE STATION CODES

ELC Code	Description
CUM	Cultural Meadow
CUP3-1	Red Pine Coniferous Plantation
CUP3-2	White Pine Coniferous Plantation
CUP3-3	Scotch Pine Coniferous Plantation
CUS	Cultural Savannah
CUT	Cultural Thicket
CUW	Cultural Woodland
CUW/CUS	Cultural Woodland /Cultural Savannah
FOD4-11	Dry Fresh Black Locust Deciduous Forest
FOD5-1	Dry - Fresh Sugar Maple Deciduous Forest
FOD5-2	Dry - Fresh Sugar Maple - Beech Deciduous Forest
FOD5-7	Dry - Fresh Sugar Maple - Black Cherry Deciduous Forest
FOD8-1	Moist - Fresh Aspen - Poplar Deciduous Forest
HD	Deciduous Hedgerow
MAS2-1/MAS3-1	Cattail Mineral Shallow /Cattail Organic Shallow Marsh
OAGM	Open Agriculture
RES	Residential
SWC1-1	White Cedar Mineral Coniferous Swamp
SWM	Mixed Swamp
SWM3-2	Poplar - Conifer Mineral Mixed Swamp
SWT2-2	Willow Mineral Thicket Swamp

0 250 500 750

1:12,500 METRES

NOTE(S)

1. LOCATIONS ARE APPROXIMATE.

REFERENCE(S)

1. BASE DATA MNRF LIO OBTAINED 2020
2. WATERCOURSES OBTAINED FROM CREDIT VALLEY CONSERVATION AUTHORITY OPEN DATA PORTAL, NOVEMBER 2022 IN COMBINATION WITH SITE WATERCOURSE SURVEY PROVIDED BY FIRST BASE SOLUTIONS NOVEMBER 2021.
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   SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY
4. SITE TOPOGRAPHIC DATA - SPRING 2021, FIRSTBASE SOLUTIONS, 2021
5. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT

CBM AGGREGATES, A DIVISION OF ST. MARYS CEMENT INC. (CANADA).

PROJECT

CALEDON PIT / QUARRY

TITLE

ECOLOGICAL LAND CLASSIFICATION AND WILDLIFE SURVEY STATIONS

CONSULTANT

GOLDER
MEMBER OF WSP

YYYY-MM-DD	2022-12-13
DESIGNED	CGE
PREPARED	CGE
REVIEWED	AS
APPROVED	HM

PROJECT NO.	CONTROL	REV.	FIGURE
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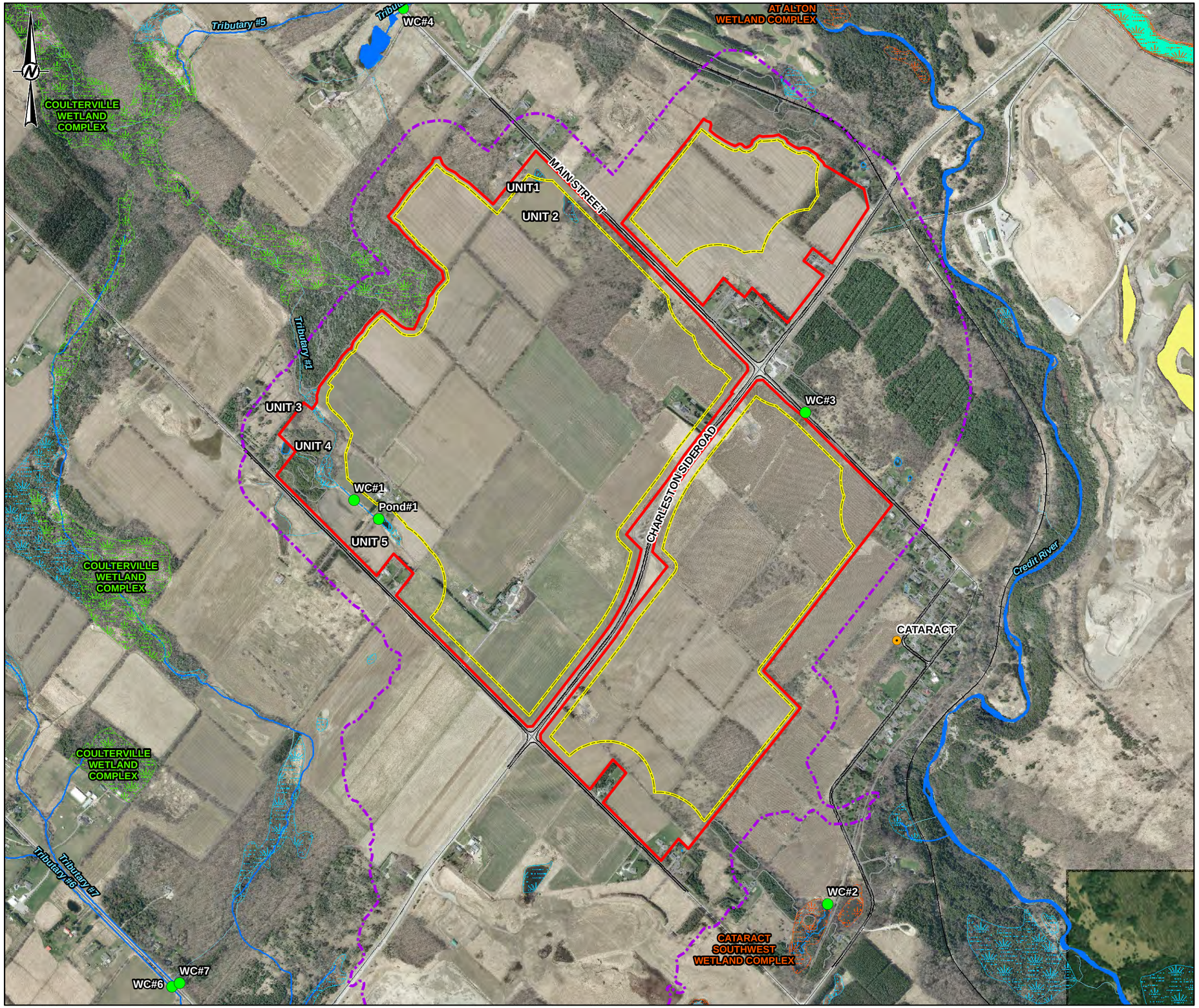

LEGEND

- TOWN/VILLAGE
- Fish Habitat Survey Location
- ROAD
- RAILWAY
- WATERCOURSE
- WATERBODY
- UNEVALUATED WETLAND
- OTHER EVALUATED WETLAND
- PROVINCIALLY SIGNIFICANT WETLAND
- COLD THERMAL REGIME
- COOL
- UNKNOWN
- LIMIT OF EXTRACTION
- LICENCE BOUNDARY
- STUDY AREA

SITE TOPOGRAPHIC DATA

- SITE INFRASTRUCTURE
- ROAD
- RAIL LINE
- RIVER-STREAM-SHORELINE
- RIVER-STREAM INTERMITTENT

0 500 1,000

1:12,500 METRES

NOTE(S)

1. LOCATIONS ARE APPROXIMATE.

REFERENCE(S)

1. BASE DATA MNRF LIO OBTAINED 2020
2. WATERCOURSES OBTAINED FROM CREDIT VALLEY CONSERVATION AUTHORITY OPEN DATA PORTAL, NOVEMBER 2022 IN COMBINATION WITH SITE WATERCOURSE SURVEY PROVIDED BY FIRST BASE SOLUTIONS NOVEMBER 2021.
3. IMAGERY FIRSTBASE SOLUTIONS SPRING 2021, SPRING 2019 (15CM RESOLUTION) AND SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY
4. SITE TOPOGRAPHIC DATA - SPRING 2021, FIRSTBASE SOLUTIONS, 2021
5. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT

CBM AGGREGATES, A DIVISION OF ST. MARYS CEMENT INC. (CANADA).

PROJECT

CALEDON PIT / QUARRY

TITLE

AQUATIC FEATURES AND FISH SURVEY STATIONS

CONSULTANT

GOLDER
MEMBER OF WSP

YYYY-MM-DD	2022-12-13
DESIGNED	CGE
PREPARED	CGE
REVIEWED	AS
APPROVED	HM

PROJECT NO.	CONTROL	REV.	FIGURE
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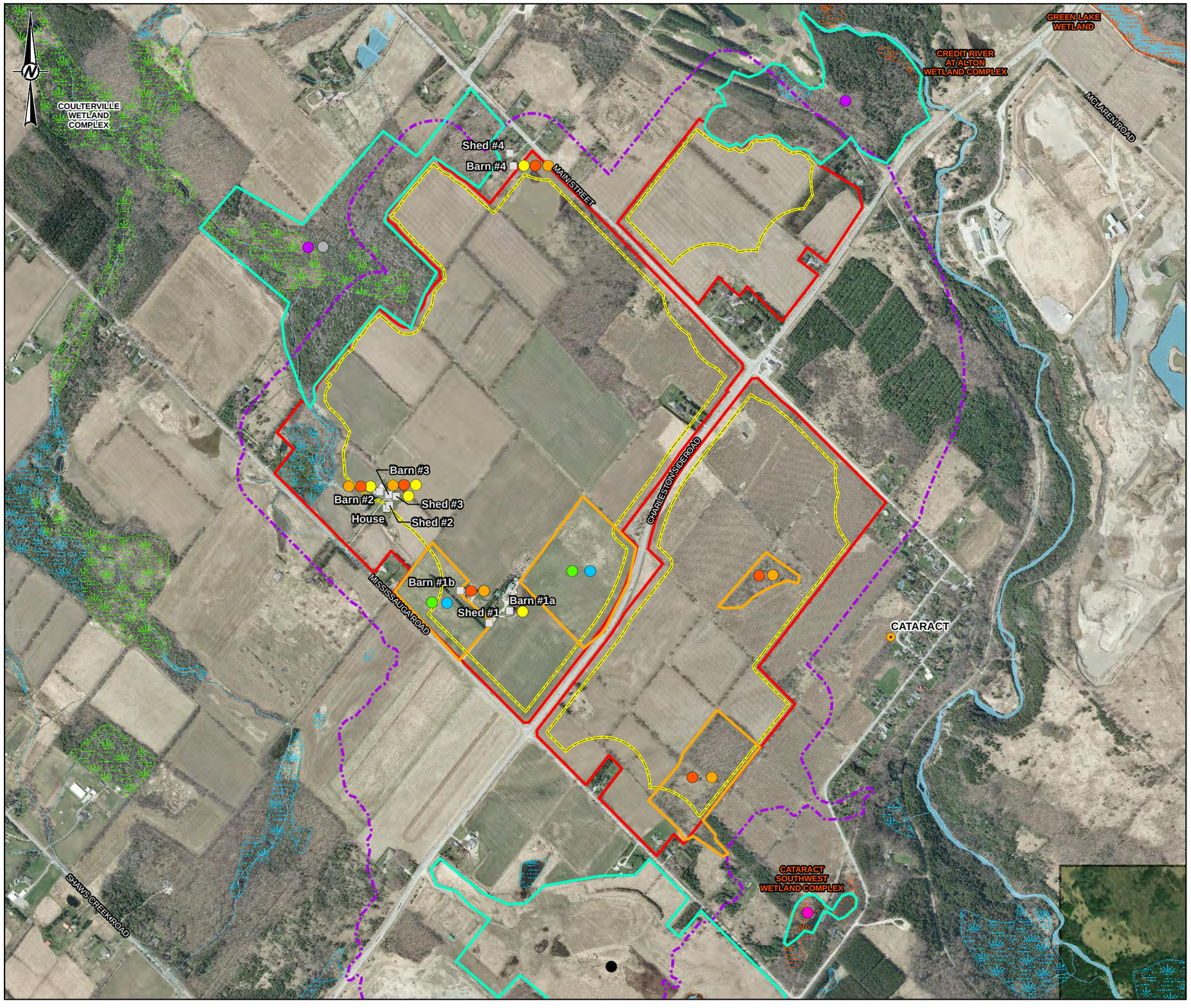

LEGEND

- TOWN/VILLAGE
- STRUCTURE
- WATERCOURSE
- WATERBODY
- UNEVALUATED WETLAND
- OTHER EVALUATED WETLAND
- PROVINCIALLY SIGNIFICANT WETLAND
- SAR HABITAT
- SWH HABITAT
- LIMIT OF EXTRACTION
- LICENCE BOUNDARY
- STUDY AREA

SAR SPECIES

- MYLU - LITTLE BROWN MYOTIS
- MYLE - EASTERN SMALL-FOOTED MYOTIS
- BARS - BARN SWALLOW
- EAME - EASTERN MEADOWLARK
- BOBO - BOBOLINK

SWH SPECIES

- EAWP - EASTERN WOOD-PEWEE
- WOTH - WOOD THRUSH
- SNTU - SNAPPING TURTLE
- GRSP - GRASSHOPPER SPARROW

0 250 500 750

1:12,500 METRES

NOTE(S)

1. LOCATIONS ARE APPROXIMATE.

REFERENCE(S)

1. BASE DATA MNRF LIO OBTAINED 2020
2. WATERCOURSES OBTAINED FROM CREDIT VALLEY CONSERVATION AUTHORITY OPEN DATA PORTAL, NOVEMBER 2022 IN COMBINATION WITH SITE WATERCOURSE SURVEY PROVIDED BY FIRST BASE SOLUTIONS NOVEMBER 2021.
3. IMAGERY FIRSTBASE SOLUTIONS SPRING 2021, SPRING 2019 (15CM RESOLUTION) AND SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY
4. SITE TOPOGRAPHIC DATA - SPRING 2021, FIRSTBASE SOLUTIONS, 2021
5. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT

CBM AGGREGATES, A DIVISION OF ST. MARYS CEMENT INC. (CANADA).

PROJECT

CALEDON PIT / QUARRY

TITLE

SIGNIFICANT NATURAL HERITAGE FEATURES

CONSULTANT

GOLDER
MEMBER OF WSP

YYYY-MM-DD	2022-12-13
DESIGNED	CGE
PREPARED	CGE
REVIEWED	AS
APPROVED	HM

PROJECT NO.	CONTROL	REV.	FIGURE
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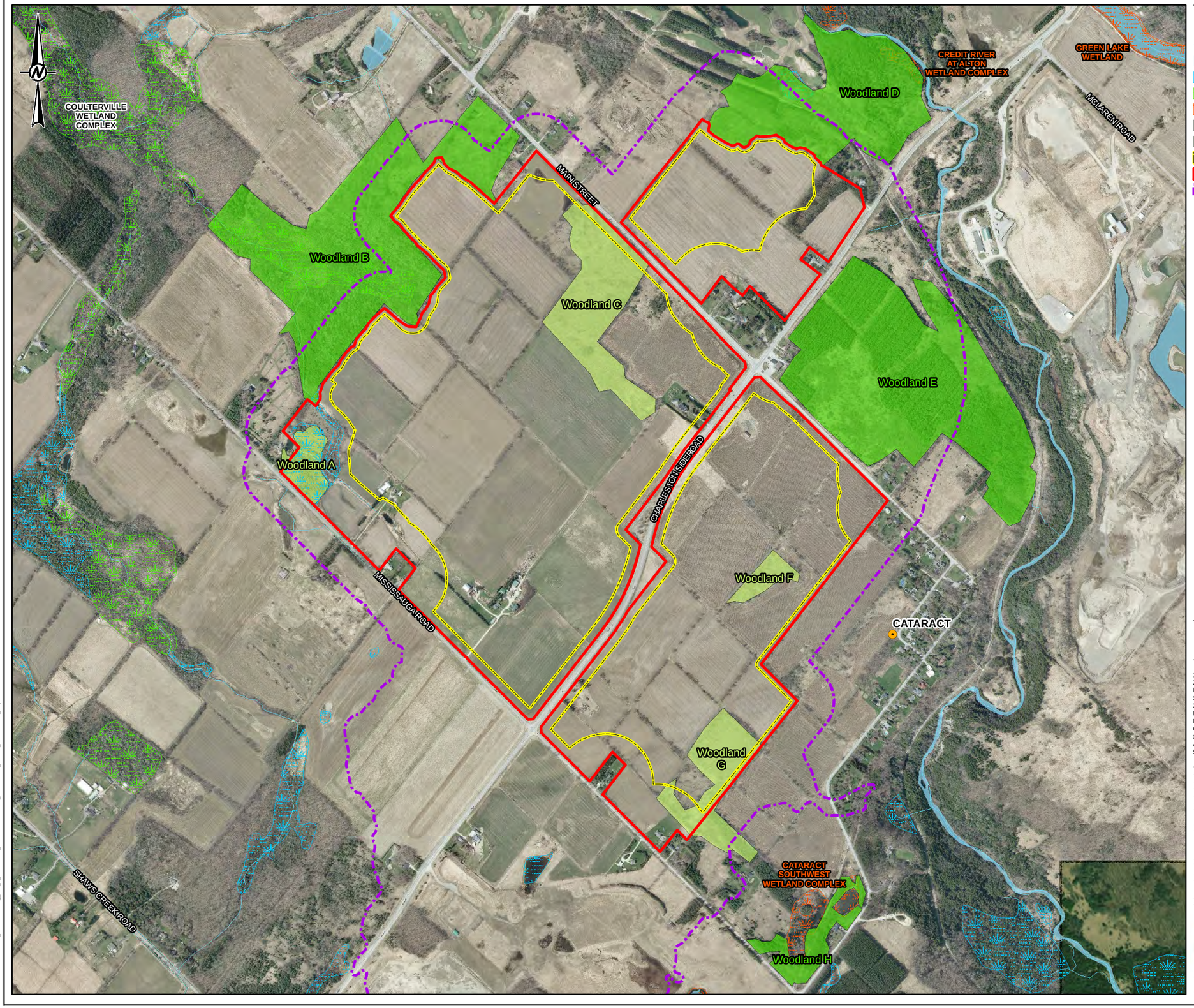

LEGEND

- TOWN/VILLAGE
- WATERCOURSE
- WATERBODY
- UNEVALUATED WETLAND
- OTHER EVALUATED WETLAND
- PROVINCIALLY SIGNIFICANT WETLAND
- WOODLAND
- SIGNIFICANT WOODLAND
- LIMIT OF EXTRACTION
- LICENCE BOUNDARY
- STUDY AREA

0 250 500 750

1:12,500 METRES

NOTE(S)

1. LOCATIONS ARE APPROXIMATE.

REFERENCE(S)

1. BASE DATA MNRF LIO OBTAINED 2020
2. WATERCOURSES OBTAINED FROM CREDIT VALLEY CONSERVATION AUTHORITY OPEN DATA PORTAL, NOVEMBER 2022 IN COMBINATION WITH SITE WATERCOURSE SURVEY PROVIDED BY FIRST BASE SOLUTIONS NOVEMBER 2021.
3. IMAGERY FIRSTBASE SOLUTIONS SPRING 2021, SPRING 2019 (15CM RESOLUTION) AND SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
   SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY
4. SITE TOPOGRAPHIC DATA - SPRING 2021, FIRSTBASE SOLUTIONS, 2021
5. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT
CBM AGGREGATES, A DIVISION OF ST. MARYS CEMENT INC. (CANADA).

PROJECT
CALEDON PIT / QUARRY

TITLE
SIGNIFICANT WOODLANDS

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2022-12-13
DESIGNED	CGE
PREPARED	CGE
REVIEWED	AS
APPROVED	HM

PROJECT NO.	CONTROL	REV.	FIGURE
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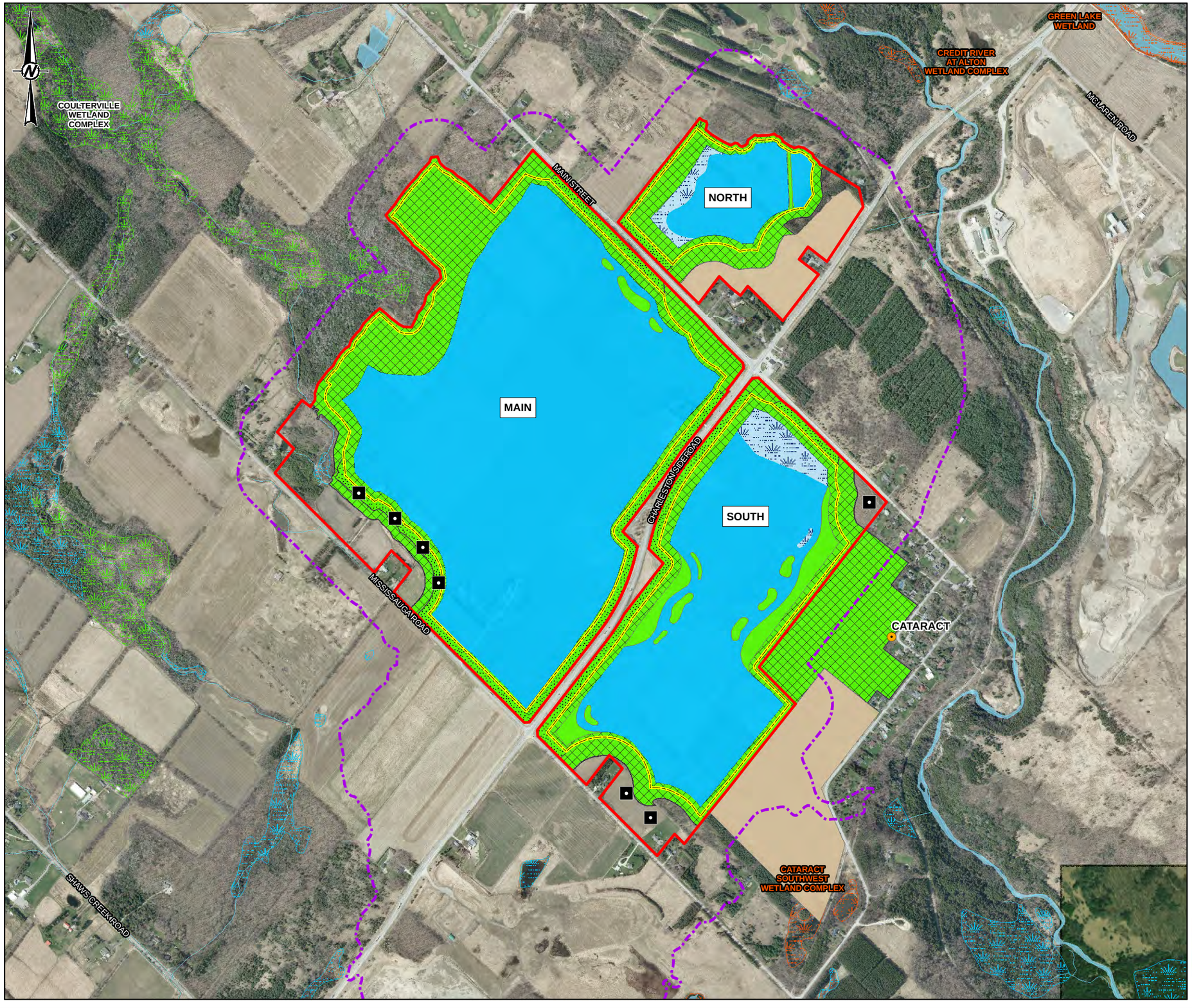

LEGEND

- TOWN/VILLAGE
- ROCK PILE AND BAT BOX LOCATION
- WATERCOURSE
- WATERBODY
- UNEVALUATED WETLAND
- OTHER EVALUATED WETLAND
- PROVINCIALLY SIGNIFICANT WETLAND
- LIMIT OF EXTRACTION
- LICENCE BOUNDARY
- STUDY AREA

REHABILITATION LANDFORM AND ECOLOGICAL ENHANCEMENT AREAS

- GRADIUAL GRADE OR ISLAND
- GRASSLAND
- LAKE
- MEADOW
- WETLAND
- WOODLAND

0 250 500 750

1:12,500 METRES

NOTE(S)

1. LOCATIONS ARE APPROXIMATE.

REFERENCE(S)

1. BASE DATA MNRF LIO OBTAINED 2020
2. WATERCOURSES OBTAINED FROM CREDIT VALLEY CONSERVATION AUTHORITY OPEN DATA PORTAL, NOVEMBER 2022 IN COMBINATION WITH SITE WATERCOURSE SURVEY PROVIDED BY FIRST BASE SOLUTIONS NOVEMBER 2021.
3. IMAGERY FIRSTBASE SOLUTIONS SPRING 2021, SPRING 2019 (15CM RESOLUTION) AND SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
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5. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT
CBM AGGREGATES, A DIVISION OF ST. MARYS CEMENT INC. (CANADA).

PROJECT
CALEDON PIT / QUARRY

TITLE
REHABILITATION CONCEPT

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2022-12-13
DESIGNED	CGE
PREPARED	CGE
REVIEWED	AS
APPROVED	HM

PROJECT NO.	CONTROL	REV.	FIGURE
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APPENDIX A

Terms of Reference

TECHNICAL MEMORANDUM

DATE August 24, 2022 **Project No.** 19129150

TO David Hanratty, PGeo
CBM Aggregates

CC Jennifer Deleemans, Mike Lebreton

FROM Heather Melcher **EMAIL heather_melcher@golder.com**

PROPOSED CBM CALEDON QUARRY TERMS OF REFERENCE – WATER RESOURCES AND NATURAL ENVIRONMENT

Golder Associates Ltd. (Golder) has been retained by CBM Aggregates (CBM), a division of St. Marys Cement Inc. (Canada) to complete technical studies to accompany an application to the Ministry of Natural Resources and Forestry (MNRF) for a new Class A Quarry Below Water licence under the *Aggregate Resources Act* (ARA) (project). The assessment will also be used for a Planning Act approval and application for Town of Caledon Official Plan and Zoning By-law amendment. Furthermore, these studies will provide an assessment of the application taking into consideration the applicable in-effect policies contained in the relevant Provincial Plans, Region of Peel Official Plan and Town of Caledon Official Plan.

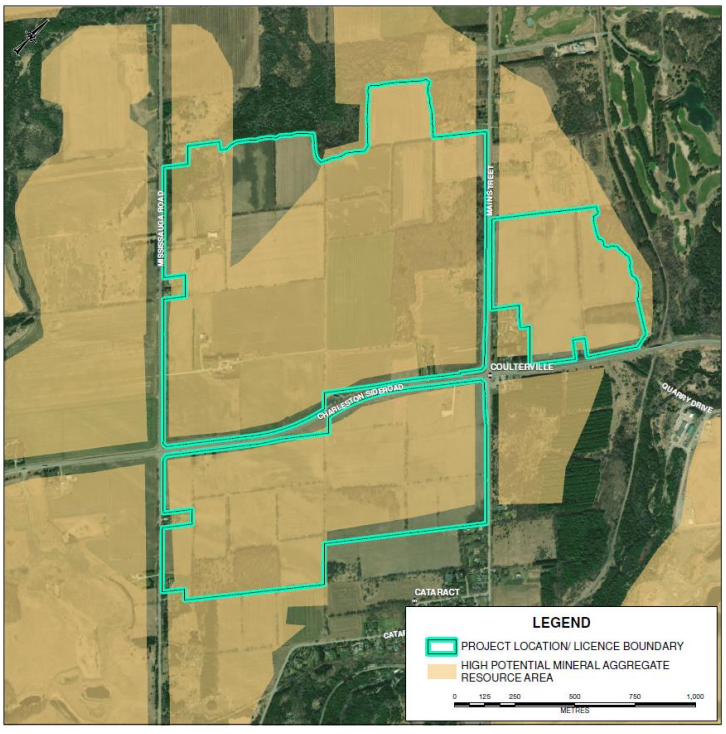


Figure 1: Proposed CBM Caledon Quarry Location

Golder Associates Ltd.
6925 Century Avenue, Suite #100 Mississauga, Ontario, L5N 7K2 Canada T: +1 905 567 4444 +1 905 567 6561

The properties to be licensed are located on Charleston Sideroad and Mississauga Road, Town of Caledon, Region of Peel, Ontario (site). The site is approximately 262.4 hectares (ha) in size (Figure 1).

This Terms of Reference (TOR) includes a summary of the assessment and deliverables associated with the water resources and natural environment components.

On June 2, 2021, CBM submitted to Credit Valley Conservation (CVC), the Town of Caledon, and the Region of Peel an earlier version of this TOR document, as requested during a meeting held on April 22, 2021. Comments were received from CVC on the TOR on July 9, 2021. Comments were also recently received from the Region of Peel on July 11, 2022. Golder has incorporated these comments into this TOR document, where applicable.

1.0 WATER RESOURCES

Groundwater and surface water resource investigations will be undertaken in accordance with the Technical Reports and Information Standards published by the MNRF in August 2020, with the following technical reports being prepared by qualified persons upon completion of the investigations.

Maximum Predicted Water Table Report

This report will detail how the maximum predicted water table is identified in metres above sea level, relative to the proposed depth of excavation at the site, and will be determined by monitoring the groundwater table for a minimum of one (1) year to account for seasonal variations and influences due to precipitation.

Water Report Level 1 and 2 (combined)

Level 1 – This assessment will determine the potential for impacts to groundwater and surface water resources and their uses (including water wells, groundwater aquifers, surface water courses and bodies, springs, discharge areas) and will identify if the site is in a Wellhead Protection Area for Quantity (WHPA-Q) under the Clean Water Act. If so, the report will identify applicable source water protection policies and mitigation measures that will be implemented.

Level 2 – Where the Level 1 assessment has identified a potential for impacts from the site on groundwater and/or surface water resources and their uses, an impact assessment will be carried out to determine the significance of the effect and the potential for mitigation. The assessment will address the potential effects of the operation on groundwater and surface water features located within the zone of influence, including but not limited to:

- Water wells (includes all types e.g., municipal, private, industrial, commercial, geothermal and agricultural);
- Springs (e.g., place where ground water flows out of the ground);
- Aquifers;
- Surface water courses and bodies (e.g., lakes, rivers, brooks); and
- Wetlands.

The assessment will include (but not be limited to) the following:

- A description of the physical setting including local geology, hydrogeology, and surface water systems;
- Any proposed water diversion, discharge, storage and drainage facilities;
- A water budget (e.g., how water is managed on-site);
- The possible positive or negative impacts that the proposed site may have on the water regime;
- Monitoring and mitigation plan(s); and
- Technical supporting data in the form of tables, graphs and figures.

Greenbelt Plan Considerations

The scope of the planned groundwater and surface water investigations will also address key hydrologic areas and features, as described in the Greenbelt Plan (2017). Key hydrogeologic areas are areas which contribute to the hydrologic functions of the Water Resource System. These areas maintain ground and surface water quality and quantity by collecting, storing and filtering rainwater and overland flow, recharge aquifers and feed downstream tributaries, lakes, wetlands and discharge areas. These areas are also sensitive to contamination and feed key hydrologic features and drinking water sources.

Key hydrologic areas include:

- Significant groundwater recharge areas;
- Highly vulnerable aquifers; and
- Significant surface water contribution areas.

Key hydrologic features within these areas include:

- Permanent and intermittent streams;
- Lakes (and their littoral zones);
- Seepage areas and springs; and
- Wetlands.

For lands within a key hydrologic feature in the Protected Countryside, it is noted that development or site alteration is permitted for aggregate extraction, subject to the non-renewable resource policies set out in Section 4.3.2 of the Greenbelt Plan.

Caledon Official Plan Considerations

The scope of the planned groundwater and surface water investigations will also address the requirements for development within valley and stream corridors as set out in Section 3.2.5 of the Town of Caledon Official Plan (2018). This includes the following considerations:

- The quality and quantity of surface water entering valley and stream corridors are to be maintained, and, where appropriate, enhanced and restored.

- Restoration and enhancement of valley and stream corridors is encouraged. Where appropriate, a riparian habitat zone will be maintained or established on lands abutting watercourses and waterbodies.
- Management and restoration of valley and stream corridors will adhere to the Town's ecosystem principle, goals, objectives, policies and performance measures.

Other Considerations

The groundwater and surface water investigations will be undertaken at the scales necessary to characterize groundwater and surface water conditions potentially impacted by the proposed quarry, including the immediate site, zone of influence and surrounding subwatershed scales, where information is available and relevant to the assessment of impacts.

The predicted zone of influence of the quarry will ultimately be determined through the hydrogeologic and surface water assessments, and as such, a pre-defined maximum zone of influence is not assumed. Justification of the proposed extent and scale of the investigation and analysis undertaken will be provided in the Water Report.

The impact assessment will evaluate the potential for cumulative impacts of the proposed quarry where information for the assessment of cumulative impacts is available and relevant to the impact assessment, including groundwater quantity, groundwater users and total groundwater use in the broader subwatershed).

The study will also assess the potential impact of the quarry in relation to future climate change, including a drought scenario, if considered applicable.

1.1 Hydrogeologic Investigation

The hydrogeologic investigation is a key component of the overall program to support the licence application. The hydrogeologic investigation program integrates with the surface water and natural environment studies. The key components of the hydrogeologic investigation are summarized below.

A karst assessment will also be completed as part of the hydrogeologic investigation which will include: an investigation of closed depressions and surface water flows, tracer tests and conductivity profiling in wells during the planned pumping tests, an evaluation of the proportions of surface water and groundwater flows in the study area, and an assessment of evidence potentially indicative of preferential flow in the bedrock aquifer.

1.1.1 Initial Activities

A detailed background review of hydrogeological information will be carried out initially, including the following:

- LIO SWOOP Topographic Data;
- OGS Surficial geology;
- OGS Bedrock geology;
- OGS Drift thickness;
- MECP Water Well Records;
- MECP PTTWs;
- AquaResource Integrated Water Budget Report - Tier 2, Credit Valley Source Protection Area;

- Information from previous site investigations Credit Valley Conservation (CVC) Subwatershed Study Reports;
- CVC Source Protection Area and CTC Source Protection Region Assessment Reports; and
- Other websites with information on water taking activities and natural features in the study area.

Published geological data for the area provides an initial understanding of the distribution of overburden on the site, the depth to bedrock, the thickness of the Gasport (formerly Amabel) Formation and approximate elevation of the base of the Gasport (formerly Amabel) Formation, and an initial understanding of groundwater elevations across the area.

The hydrogeological information compiled during the background review will be presented as a series of maps and will establish a framework for the refinement and finalization of the field investigations.

Initial activities will also include site reconnaissance of the area to help verify information obtained during the background review and support finalization of the field investigations.

A survey of private wells within 1 km of the site will also be undertaken.

1.1.2 Monitoring Well Installation and Testing

Twenty-eight monitoring well locations will be drilled, to an approximate depth of 30 m (assumed 5 m of overburden, on average, and 25 m of rock). All locations in the monitoring network will be surveyed for location and elevation. Further details of the proposed monitoring well network are provided in Attachment A.

Drilling, Core Logging and Photography

The drilling will be carried out under Golder supervision using Choice Sonic Drilling Ltd. (CSD), obtaining 100 mm continuous core through the overburden and HQ-sized (63.5 mm) continuous core in the bedrock. All cores will be logged and photographed. Overburden core will be bagged, and rock core will be boxed (1.5 m boxes holding a total of 3 m of core per box).

Following coring, the rock boreholes will be reamed to 120 mm to facilitate monitoring well installation. A surface casing will be installed into the top of rock to provide access for geophysical logging and hydraulic (packer) testing, and for monitoring well installation.

Geophysical Logging

Geophysical logging will be carried out immediately following the coring of the drillholes, and will consist of collecting natural gamma, conductivity, heat pulse flowmeter (static and low pumping conditions), and optical televiewer (OTV) logs. The field work and analysis will be carried out in house by Golder staff using in house equipment. Results will be compiled and processed relatively quickly and used to help plan the hydraulic (packer) testing program. All data will be processed and presented using WellCAD.

Hydraulic (Packer) Testing

Upon completion of geophysical logging, the boreholes will be packer tested. We will complete up to three interval tests per borehole using straddle packers (nominally spaced at 5 m), testing from the bottom of the hole up to the highest level possible within the water column. Using the geological and hydrogeological information obtained

from coring and geophysics, the tests will be conducted within appropriate geologic intervals (i.e., within the Gasport (formerly Amabel) or within the underlying strata).

Monitoring Well Installation and Instrumentation

Each of the 28 boreholes will be completed with two piezometers. The piezometers will typically have 1.5 m well screens and be 32 mm in diameter. The wells will be constructed by a licensed well driller using filter sand, bentonite pellets and grout, and completed at surface with a lockable protective casing and registered in the MECP system with a well tag.

We understand that it is important to obtain hydraulic information in the Gasport (formerly Amabel), and underlying Clinton and Cataract Groups, and propose that each piezometer nest target two of the three zones, to provide overall coverage of hydraulic heads in all three zones (i.e., 56 piezometers will provide the ability to have about 18 monitors in each of these three zones).

Single-well Hydraulic Testing

All piezometers will be developed, and single well response tests completed in the piezometer. This will be carried out by using dedicated water level loggers, which will be left in place for the groundwater monitoring program. Hydraulic conductivity will be estimated from the tests, and used as input to the hydrogeological assessment, and groundwater-surface water modelling.

Water Quality Sampling

All wells will be completed with dedicated water sampling equipment (tubing and Waterra foot-valves) for groundwater sampling. The wells will be purged and then sampled following standard collection and sample handling protocols. All 56 piezometers will be sampled for general chemistry, nutrients, inorganics and metals (RCAP suite), and 28 of the wells will also be sampled for BTEX and PHC F1-F4. The analytical work will be carried out by BV Labs (formerly Maxxam Analytics) in Mississauga.

Analysis and Reporting

The data collected during the drilling and testing, and water sampling will be compiled and used to inform other investigations and be incorporated into the combined Water Report Level 1/2 and a Maximum Predicted Water Table Report.

1.1.3 Groundwater Monitoring Program

The groundwater monitoring program will take place from the point of drilling the wells until submission of the licence application package to the MNRF and include monitoring of the 56 piezometers at the 28 proposed monitoring well locations, in addition to monitoring springs and seeps located in areas along the Credit River, the Niagara Escarpment and the Alton Forest complex.

All wells and piezometers will be equipped with water level loggers, programmed to record at 15 minute intervals. Loggers will be downloaded quarterly, and manual water level measurements made to correlate to the logger data. A barologger station will be set up at the site to provide barometric corrections to the logger data. Hydrographs will be compiled on a quarterly basis.

Analysis and Reporting

The data collected during the groundwater monitoring program will be compiled and used to inform other investigations, provide important hydrogeological inputs to groundwater-surface water modelling and support the

hydrogeological impact assessment. The overall results will be incorporated into the Level 1 and 2 Water Report and . Maximum Predicted Water Table Report.

1.1.4 Pumping and Tracer Tests

Based on the data obtained during the monitoring well and resource investigations described above, locations to conduct pumping / tracer tests will be selected on the property. Up to four tests, if required, will be completed depending on the nature of hydrogeologic conditions on the site.

Combined pumping and tracer tests will help establish the transmissivity of the rock, as well as assess the potential connectivity of fractures in the rock mass to various natural environment features in the area. Four pumping / tracer tests will be performed, each of 96 hours in duration, as described below.

Install Pumping Wells and Offset Monitoring Wells

Once the number and location of the test areas have been determined, a 150 mm diameter pumping well will be installed at each test location (cased through the overburden and open in the bedrock), to an assumed depth of 30 m (assumed 5 m through overburden and 25 m in the rock). Up to four offset wells nests will also be installed at each location to the same assumed maximum depth, completing the open holes with two-level 32 mm diameter piezometers, in a manner similar to the other monitoring wells. Pumping and offset observation wells will be MECP registered and tagged.

Obtain Category 2 PTTW

Golder will prepare and submit EASR applications on behalf of VCNA for permits to take water (PTTW) for each of the four planned 96 hour tests.

Conduct Four (96 hour) Pumping and Tracer Tests

Once the pumping and offset observation wells have been installed and permits obtained, pumping and tracer tests will be carried out. An ecologically friendly tracer such as fluorescein would be introduced in one or more observation wells prior to the start of pumping, and the pumping well water monitored using a fluorometer or other appropriate device to detect the potential presence of traced water at the pumping well. Pumped water will be managed to ensure that it is not recirculated into the groundwater system during the test.

Groundwater levels at the pumping well, offset wells, and other monitoring wells will be monitored using data loggers and/or manual measurements during the test. Levels would also be monitored prior to the test for a minimum of 48 hours and immediately following the test for a period of 7 days, to monitor the recovery data.

It is proposed that the four tests will be completed a minimum of 3 weeks apart, which should allow time for water levels to recover to ambient between successive tests.

Analysis and Reporting

The data collected during the pumping / tracer tests will be compiled and used to inform other investigations, provide important hydrogeological inputs to groundwater-surface water modelling and support the hydrogeological impact assessment. The overall results will be incorporated into the Level 1/2 Hydrogeological Study Report.

1.1.5 Integrated Groundwater / Surface Water Modelling

An integrated, fully-coupled groundwater / surface water model will be developed to simulate current conditions and estimate future water quantity impacts as a result of quarrying. The modelling will be undertaken using the computer program HydroGeoSphere (HGS).

HGS has been successfully applied in water resource and mining applications at the watershed and subwatershed scale in Ontario and worldwide. Of particular note, HGS was given a comparatively favourable review in the MNRF-sponsored document *Integrated Surface and Groundwater Model Review and Technical Guide* (AquaResource, 2011).

HGS is a three-dimensional numerical code that can dynamically consider all major components of the hydrologic cycle, including: precipitation, evapotranspiration, snowmelt, overland flow, infiltration, unsaturated zone flow, and saturated groundwater flow. HGS may model flow within bedrock using an equivalent porous media (EPM) approach or a discrete fracture network; however, at the scale of this analysis we assume that an EPM approach is sufficient. HGS' fully inclusive treatment of the hydrologic system allows for a seamless and robust simulation of flow and water level behaviour within the watershed, including at quarries, streams, wetlands and within the subsurface.

The model will be constructed on the basis of both publicly available data and the results of the site-specific geology and water resources field assessments, including: Digital Elevation Model (DEM) topography, government mapping and databases (e.g., Ministry of Environment, Conservation and Parks [MECP], Water Well Information System [WWIS] and Permit To Take Water [PTTW] databases), background data/reporting including CVC source water protection modelling, climate data, subcatchment delineations and water budgets, drilling data including geologic picks and hydrostratigraphic unit characterization, geophysical testing, packer testing, pumping tests, spring reconnaissance and measured groundwater levels and surface water levels / flows. The model will be calibrated to field observations in both steady-state (long-term average) and transient settings at appropriate time scale(s).

The modelling assessment will consider the following base simulations:

1) Existing Conditions (calibrated model)

2) Full Build-Out Operations (maximum extraction and dewatered state)

3) Full Rehabilitation (all rehabilitative measures, including backfilling and flooding, in-place)

The modelling will examine potential impacts under both average annual steady-state and transient (likely monthly) conditions for each scenario. Modelled effects will include drawdown and flow changes at key receptors including PTTW permit holders, private water wells, wetlands, streams and the Credit River as well as any interaction with pre-existing source protection plans and policies. The modelling may also include, at a relatively coarse scale, other major water users within the zone of influence and will thus be able to address cumulative impacts.

After the base scenarios have been finalized, a sensitivity analysis will be performed to better understand potential upper and lower bounds to potential impacts.

1.1.6 Impact Assessment and Hydrogeological Reporting

The results of the various geological and hydrogeological field investigations, monitoring, pumping and tracer testing, and integrated groundwater-surface modelling will be brought together to complete a hydrogeologic impact assessment. The hydrogeologic impact assessment and its supporting studies will inform the natural environment studies and provide the basis for preparing the combined Level 1 and 2 Water Report and a Maximum Predicted Water Table for a Class A, Quarry Below Water licence application under the Aggregate Resources Act.

If the assessment identifies a potential for impacts, mitigation measures and/or an adaptive management plan, if required, will be identified in the report.

1.2 Surface Water Resources Assessment

A surface water monitoring program and impact assessment will be completed for the site and surrounding catchment areas. The impact assessment and reporting for these tasks will be combined with the results of the hydrogeological assessment in the combined Water Report Level 2 and a Maximum Predicted Water Table Report.

1.2.1 Background Review

Golder will complete a background review of the available information pertaining to the site and surround area that may be within the zone of influence of the proposed quarry. The information reviewed will consist of:

- Aerial photographs and topographic, physiographic and geologic mapping;
- Water Survey or Canada and Credit Valley Conservation stream gauging data;
- Meteorological data from local CVC gauges (i.e., 1795 Quarry Drive, Town of Caledon, etc.);
- Ontario source water protection mapping;
- Published water resources reports; and
- Any existing permits or monitoring reports from the site.

Any additional work to fill data gaps identified as part of the background review will be included in a separate scope and budget.

1.2.2 Field Monitoring

A stream monitoring network will be established on the watercourses that drain the site and the areas of the proposed numerical model extents. We have assumed this will include 14 - 16 monitoring stations on tributaries to the Credit River. The exact number of stations and locations will be determined through the initial field reconnaissance that will be completed with the hydrogeology and natural environment component leads.

Manual water level (staff gauges) and flow measurements will be conducted at each station quarterly for a period of two years. Pressure transducers will be deployed at each station to develop a water level record for each station at 15-minute intervals. A barologger will also be installed at the site to provide atmospheric pressure compensation for the water level transducer data. Two on-site stations will be paired with mini-piezometers to better understand surface groundwater interactions in the area. Field monitoring will be continued following the development of the impact assessment to continue the understanding and characterisation of the watercourses.

No stream flow monitoring stations are proposed on the main channel of the Credit River at this time. Publicly available government stream gauge data will be relied upon to provide water level and flow data from the Credit River. Available baseflow data will be supplemented by completing low flow monitoring in the Credit River at three locations, to evaluate the baseflow contributions in the project study area. Two low flow monitoring events are currently proposed.

The surface water monitoring will also include a one-year of quarterly water quality monitoring program. This program will include the analysis of metals, nutrients and general chemistry at five watercourse stations surrounding the Site. The five sampling locations will be selected from a subset of the stream flow monitoring stations in an attempt to maximise the value of each monitoring station by selected stations that more likely maintain water and flow year-round (avoiding stations that have dry conditions most of the year). The five stations will be remain consistent throughout the sampling year. Turbidity and total suspended solids (TSS) will also be collected at these five stations to develop a turbidity / TSS relationship that can be used to estimate TSS from real-time measurements.

1.2.3 Cross Sectional Surveys

To develop a reliable stage-discharge rating curves (rating curves) at the surface water stations, cross sectional surveys will be collected and used to develop small local hydraulic models, which will in turn be used to interpolate and extrapolate the rating curves somewhat beyond the range of measured flows. It is recommended that approximately four detailed cross sectional surveys be completed at each surface water station to capture key hydraulic controls. Surveys are to be completed at upstream and downstream locations for each of the water level logger installations. The cross sectional surveys are typically distributed along the stream profile to capture the station equipment and key hydraulic characteristics (i.e., pools, riffles and control features), with the feature controlling the downstream water levels being most important to capture. The cross sectional surveys are expected to extend over the stream banks and on to the floodplain, to capture the total flow cross section under a flood event.

All survey data will be tied into a local benchmark which is permanently secured above the anticipated high water level. The water level logger installation will be surveyed to the benchmark upon installation and once each year to identify any settling, heave or other movement of the logger stations.

1.2.4 Rating Curve Development

The cross-sectional survey data will be collected and incorporated into a hydraulic model to develop theoretical rating curves which will be calibrated to measured flows.

Rating curves will be developed for each water level monitoring station in a hydraulic modelling package (i.e., HEC-RAS or equivalent) using the manual flow and water level measurements and cross sectional survey data collected during the monitoring program. The hydraulic model will utilize the cross sectional surveys at each station to generate a theoretical rating curve that will be calibrated using the measured flows and water levels collected over the monitoring period. Typically, the HEC-RAS modelled results are utilized to extrapolate the upper end of the rating curve, while field measured points better served to populate the lower and mid sections of the curve.

The Water Survey of Canada operates flow stations and already provides continuous flow data for the Credit River (downstream of Charleston Sideroad, and others further up and downstream), meaning that Golder will not need to develop rating curves and flow hydrographs for the stations on the Credit River.

1.2.5 Water Balance

An annual water balance will be developed for the drainage areas contributing to the quarry and monitoring station catchments using Thornthwaite water budgets available from Meteorological Services of Canada under the existing, operational and rehabilitated conditions. The results of the water balances will be used to help assess the potential impacts that the proposed extraction and rehabilitation activities may have on the existing local hydrologic cycle. Meteorological Services of Canada data will be compared to local CVC station data.

Results of the Thornthwaite water balance will also be used to verify the recharge distributions developed using the integrated numerical model.

1.2.6 Water Level Hydrographs

Continuous water level and flow data will be processed on a monthly basis to confirm data quality and equipment accuracy. This will allow Golder to identify, and correct, any variations or potential issues with the monitoring stations, or equipment, early to reduce the risk of lost data.

The continuous water level record will be used with the rating curves to develop a continuous flow record which will be presented in flow hydrographs. Flow hydrographs will be created for the continuous water level stations. The flow hydrograph records will be further analysed to provide an estimate of baseflow, flow duration statistics, peak flows and totals of monthly and annual discharge at each location. This information will be used to calibrate and verify the HGS existing conditions model.

1.2.7 Stream Temperature Monitoring

Through their review of an earlier version of this TOR document, CVC requested continuous temperature monitoring be completed at the 14 – 16 surface water stations located on tributaries to the Credit River. Dedicated water temperature loggers will be installed to collect continuous daily temperature measurements. Monitoring of these loggers will be completed as part of the quarterly surface water monitoring program outlined in Section 1.2.2.

1.2.8 Impact Assessment and Reporting

The data collected will be analysed in conjunction with the background information and integrated with the hydrogeological and natural science studies. The impact assessment will consider potential effects of the proposed extraction on the surface water features on the site, and up to the distance of the expected groundwater drawdown zone (nine stream flow monitoring stations have been assumed within this drawdown). Potential effects will be estimated for two future scenarios including full development of the proposed quarry (i.e., the last day of extraction) and rehabilitated conditions (i.e., the residual effects of the development following completion of rehabilitation to a flooded quarry lake or partially backfilled and flooded excavation).

Reporting will be completed in conjunction with the hydrogeology discipline and will include the following:

- Documented field data
- Present rating curves and water level / flow hydrographs as well as monthly and annual total volumes
- Present WSC gauge flows on the Credit River as well as monthly and annual total volumes

- Quantify expected project effects on surface water resources by comparing projected post-development to pre-development flow rates. This information will be provided to the Natural Environment discipline for assessment of the significance of changes to the natural environment

2.0 NATURAL ENVIRONMENT ASSESSMENT

Golder will undertake a work program for a Natural Environment Report (NER) in order to evaluate the natural features in the vicinity of the site. Golder will assess the potential impacts of the proposed below water extraction on those features and their ecological functions and, if necessary, recommend measures to prevent or mitigate negative impacts on any significant features.

This study will provide an assessment of the application taking into consideration the applicable in-effect policies contained in the relevant Provincial Plans, Region of Peel Official Plan and Town of Caledon Official Plan.

2.1 Background Review

A background information search and literature review will be completed to gather data about the local area and identify significant natural features, as defined under the Provincial Policy Statement, Greenbelt Plan, Region of Peel (Core Areas, Natural Features and Corridors and Potential Natural Features and Corridors), and Town of Caledon (Environmental Policy Areas), and species at risk (SAR) that have been reported as occurring, or potentially occurring in the local landscape, including the following resources:

- Natural Heritage Information Centre (NHIC) database maintained by the Ontario Ministry of Natural Resources and Forestry (MNRF)
- Species at Risk Public Registry
- Species at Risk in Ontario (SARO) List
- Atlas of Breeding Birds of Ontario (OBBA)
- Bat Conservation International (BCI) range maps
- Ontario Butterfly Atlas
- Atlas of the Mammals of Ontario
- Ontario’s Reptile and Amphibian Atlas
- Land Information Ontario (LIO)
- MNRF LIO Aquatic Resources Area Layer
- MNRF Fish On-Line
- DFO Aquatic Species at Risk Maps
- eBird species range maps
- Town of Caledon Official Plan

- Region of Peel Official Plan
- Information available from CVC (e.g., fish collection records, wetland mapping)
- Credit River Watershed Natural Heritage System Final Summary Report
- Existing aerial photography.

To develop an understanding of the ecological communities, wildlife habitat and potential natural heritage features in the study area, 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 (ANSIs), life science sites, rare vegetation communities, provincially rare species (ranked S1-S3 by the NHIC) and other natural heritage features within 1 km of the site.

2.1.1 SAR Screening

A SAR screening will be completed conducted for species listed under the *Endangered Species Act* (ESA) (Ontario 2007) per the Species at Risk in Ontario (SARO) List (O. Reg. 230/08), as well as those listed under the *Species at Risk Act* (SARA).

An assessment will be conducted to determine which SAR had potential habitat in the study area**.** Species with ranges overlapping the study area, or recent occurrence records in the vicinity, will be screened by comparing their habitat requirements to habitat conditions in the study area, as interpreted from aerial imagery.

The potential for the species to occur will be 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 (based on the background data review) and good quality habitat is present.

The desktop SAR screening will be confirmed and updated through the field surveys, described below.

2.2 Field Surveys

Based on preliminary desktop review, there are limited surface water features on the site. Golder is planning limited surveys in the designated and/or mapped significant woodlands as it is anticipated, based on review of land use policies and regulations, that extraction will not be permitted within the woodlands, and a setback may be required.

The following field surveys will be completed on the site (assuming no land access in the study area will be permitted). In the case that Golder is not scoping to complete the survey in the mapped/designated significant woodlands, it has been identified below. If a feature was to be excluded from the licence or extraction boundary, field surveys were sufficient to determine potential impacts of the project, but not as detailed as if the feature was going to be removed. The field surveys have been determined based on the known habitats on the site, as determined through the desktop assessment. Species-specific surveys will target SAR identified as having a moderate or high potential to occur in the vicinity of the site, to confirm use of habitats. Observations of wildlife and vegetation during all surveys will be documented and a running list maintained for inclusion in the NER.

Species-specific surveys will also provide data for evaluation of significant wildlife habitat (SWH). All surveys will be completed using provincially-approved methods and guidelines.

- Three-season plant community assessment (using Ecological Land Classification [ELC]) and botanical inventory (spring, summer and late summer). Due to the large size of the site, the botanical inventory will be limited to dominant species in each ELC community. Based on preliminary knowledge of the site, the potential for SAR plants is anticipated to be minimal and specific surveys for rare plants will not be required. However, all rare plants observed in the field will be recorded.
- Verification of any on-site wetlands and evaluation using the Ontario Wetland Evaluation System [OWES] where necessary).
- Woodland dripline delineation. Woodlands will be assessed for significance based on the applicable in-effect policies contained in the relevant Provincial Plans, Region of Peel Official Plan and Town of Caledon Official Plan. The boundary of significant woodlands will be delineated using a handheld GPS and verified with the Town of Caledon, the Region of Peel and CVC.
- Two rounds of breeding bird surveys.
- Three rounds of nighttime anuran (frog and toad) call count surveys.
- Turtle habitat assessment.
- Qualitative aquatic/fish habitat assessment of the on-site watercourses. “Windshield” survey of the watercourses that will be monitored as part of surface water assessment. Only the portion of the watercourses that intersect a public road or access will be assessed. The Credit River will not be assessed. It is assumed that there is sufficient background fish community data available for all watercourses and a fish inventory is not required.
- Bat habitat assessment. Golder will complete an assessment for habitat suitability for maternity roosting and for hibernacula.
- Bat acoustic assessment. Golder will deploy up to seven acoustic detectors to be located throughout the site in areas identified as suitable maternity roost habitat, during the bat habitat assessment. Acoustic monitoring will not be completed in the mapped/designated significant woodlands.
- Wildlife habitat assessment, including SWH. VES will be completed using MNRF-approved protocols to search for wildlife, including mammals, amphibians, reptiles, etc. Focus will be given to habitat edges and all signs of wildlife (e.g., scat, fur, browse, etc.) will be documented.

2.3 Impact Assessment and Reporting

The data collected will be analysed in conjunction with the background data and integration with other disciplines, including hydrogeological and surface water studies. The impact assessment will consider all potential impacts of the proposed extraction on the natural environment on the site, and up to the distance of the expected groundwater drawdown zone. Where relevant, the impact assessment will evaluate wetland water balance based on guidance from Toronto and Region Conservation Authority (TRCA) documents: Wetland Water Balance Risk Evaluation (2017), Water Balance Guidelines for the Protection of Natural Features (2012), and Wetland Water Balance Monitoring Protocol (2016). The results of the desktop review, SAR screening, any consultation with

agencies, field surveys, and the impact assessment will be incorporated into a report that satisfies the requirements of both the NER, including relevant figures, under the ARA and an Environmental Impact Study (EIS) for the Town of Caledon and the Region of Peel. Mitigation measures and recommendations on suitable setbacks from natural features with appropriate rationale will also be included.

Where relevant, this study shall be shared with other technical experts completing studies for the application to avoid internal inconsistencies.

In addition, Golder will provide proactive input to the development of the site plans, including the progressive and final rehabilitation plans for the site, in consultation with the planner. It is anticipated that the analysis will also facilitate discussions of potential regional enhancement opportunities.

3.0 CLOSURE

We trust that this technical memorandum meets your current needs. Please contact the undersigned with any questions or comments.

Golder Associates Ltd.

Heather Melcher, MSc
Director, Ecology

Craig De Vito, PEng
Surface Water Engineer

George Schneider, MSc, PGeo
Senior Geoscientist

HM/CDV/GS/mp

Attachments: Attachment A – Groundwater Monitoring Well Network Details

ATTACHMENT A

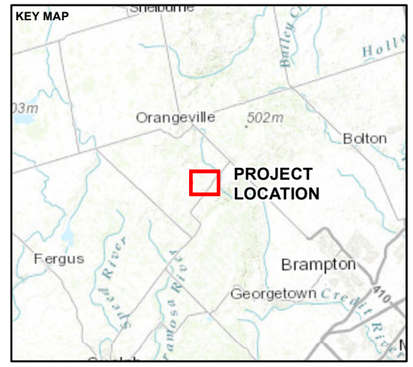
Groundwater Monitoring Well Network Details

TABLE 1 - SUMMARY OF MONITORING WELLS INSTALLED
PROPOSED CBM CALEDON QUARRY

Drilled Name:	Date Drilled:	Easting (m) UTM 17T	Northing (m) UTM 17T	Elevation (masl)	Total Hole Depth (mbgs):	Depth of casing (mbgs):	Depth to Bedrock (mbgs):	Depth to bottom of Gasport (mbgs)	Depth to top of Cabot Head (mbgs):	Downhole Geophysics Completion	Packer Testing Completion	Mon Well Completion	Deep (A) Well Stickup (m)	Deep (A) Well Formation	Screen from (m)	Screen to (m)	Shallow (B) Well Stickup (m)	Shallow (B) Well Formation	Screen from (m)	Screen to (m)
MW20-01(CAL) A/B	27-Feb-20	577458.50	4852268.28	395.10	19.41	9.06	8.53	14.86	17.32	13-Mar-20	19-Mar-20	20-Mar-20	0.99	Shaley Dolostone or Cabot Head Fm	15.40	17.10	0.99	Gasport Fm	11.10	12.62
MW20-02(CAL)	02-Mar-20	577900.04	4852138.37	399.63	19.57	15.94	15.24	18.05	19.57	11-Mar-20	N/A	23-Mar-20	1.05	Shaley Dolostone or Cabot Head Fm	16.96	18.48				
MW20-03(CAL)	04-Mar-20	578243.54	4851907.30	390.67	35.97	N/A	34.44	Not present	35.66	N/A	N/A	05-Mar-20	1.00	Overburden	15.58	18.63				
MW20-04(CAL)	06-Mar-20	578264.75	4852313.19	399.46	18.50	15.08	14.33	Not present	16.54	13-Mar-20	N/A	24-Mar-20	1.04	Shaley Dolostone or Cabot Head Fm	16.11	17.63				
MW20-05(CAL) A/B	09-Mar-20	578423.10	4852712.60	399.63	14.84	2.06	1.52	10.60	13.91	20-Mar-20	25-Mar-20	25-Mar-20	1.00	Shaley Dolostone or Cabot Head Fm	12.25	13.77	1.00	Gasport Fm	4.25	5.77
MW20-06(CAL) A/B	10-Mar-20	578474.24	4852972.59	400.15	16.03	2.32	2.14	10.96	14.25	23-Mar-20	26-Mar-20	26-Mar-20	0.99	Gasport Fm	10.12	11.64	0.99	Gasport Fm	4.20	5.72
MW20-07(CAL) A/B	11-Mar-20	578359.89	4853250.44	404.07	19.45	2.74	2.13	13.20	16.40	18-Mar-20	01-Apr-20	01-Apr-20	0.77	Shaley Dolostone or Cabot Head Fm	15.11	16.63	0.77	Gasport Fm	9.74	11.26
MW20-08(CAL) A/B	13-Mar-20	578009.81	4853574.83	406.93	18.59	2.74	1.98	15.10	17.32	19-Mar-20	30-Mar-20	31-Mar-20	0.92	Gasport Fm	13.30	14.82	0.92	Gasport Fm	5.38	6.90
MW20-09(CAL)	17-Mar-20	578343.84	4854157.49	399.95	9.01	5.79	5.33	Not Present	7.48	26-Mar-20	N/A	07-Apr-20	1.01	Shaley Dolostone or Cabot Head Fm	6.85	8.37				
MW20-10(CAL) A/B	19-Mar-20	577837.95	4854407.28	411.32	21.19	12.04	10.97	16.76	19.55	24-Mar-20	08-Apr-20	08-Apr-20	0.92	Shaley Dolostone or Cabot Head Fm	18.62	20.14	0.89	Gasport Fm	14.49	16.01
MW20-11(CAL) A/B	24-Mar-20	577671.98	4853921.39	409.72	19.39	3.07	2.13	16.46	18.16	07-Apr-20	14-Apr-20	15-Apr-20	1.03	Gasport Fm	13.81	15.33	1.01	Gasport Fm	3.96	5.48
MW20-12(CAL) A/B	26-Mar-20	577271.90	4854321.42	412.43	22.65	5.94	3.66	19.80	21.66	08-Apr-20	17-Apr-20	17-Apr-20	1.02	Gasport Fm	17.09	18.62	1.01	Gasport Fm	4.42	5.94
MW20-13(CAL) A/B	08-Apr-20	576873.11	4854473.14	415.53	28.23	15.08	13.10	23.92	25.68	15-Apr-20	23-Apr-20	24-Apr-20	0.93	Shaley Dolostone or Cabot Head Fm	24.05	25.57	0.93	Gasport Fm	18.14	19.66
MW20-13 (CAL) C	08-Apr-20	576873.11	4854473.14	415.53	5.10	N/A	N/A	N/A	N/A	N/A	N/A	08-Apr-20	0.93	Overburden	3.08	4.60				
MW20-14(CAL) A/B	28-Apr-20	577575.99	4853100.42	406.71	26.35	2.74	2.29	22.40	24.50	14-May-20	26-May-20	26-May-20	0.96	Shaley Dolostone or Cabot Head Fm	22.60	24.12	1.05	Gasport Fm	14.98	16.50
MW20-15(CAL) A/B	20-May-20	576576.79	4853544.15	417.06	37.17	12.30	11.60	33.84	35.62	27-May-20	08-Jun-20	09-Jun-20	0.70	Shaley Dolostone or Cabot Head Fm	33.77	35.29	0.71	Gasport Fm	28.81	30.33
MW20-15 (CAL) C	20-May-20	576576.79	4853544.15	417.06	5.00	N/A	N/A	N/A	N/A	N/A	N/A	20-May-20	0.70	Overburden	2.74	4.27				
MW20-16(CAL) A/B	22-May-20	576784.58	4853806.76	421.40	39.77	14.90	11.90	35.52	37.28	26-May-20	10-Jun-20	10-Jun-20	1.05	Gasport Fm	34.84	36.36	1.05	Gasport Fm	16.80	18.33
MW20-17(CAL) A/B	26-May-20	576752.28	4852966.36	406.64	28.82	3.15	3.05	24.84	27.49	01-Jun-20	02-Jun-20	02-Jun-20	1.05	Shaley Dolostone or Cabot Head Fm	25.64	27.16	0.99	Gasport Fm	12.75	14.27
MW20-18(CAL)	09-Jun-20	577058.36	4852658.80	404.29	28.15	12.19	11.88	23.80	26.06	12-Jun-20	15-Jun-20	15-Jun-20	1.03	Gasport Fm	12.42	13.94				
MW20-19(CAL) A/B	27-Oct-20	576906.96	4851999.96	396.98	27.39	6.20	2.14	22.05	24.48	29-Oct-20	30-Oct-20	31-Oct-20	1.07	Gasport Fm	15.95	17.47	1.07	Gasport Fm	8.00	9.52
MW20-20(CAL) A/B	29-Oct-20	576476.35	4852467.69	403.00	27.99	5.98	2.14	25.15	27.18	30-Oct-20	03-Nov-20	03-Nov-20	0.82	Shaley Dolostone or Cabot Head Fm	25.33	26.85	0.82	Gasport Fm	12.97	14.49
MW20-20(CAL) C	03-Nov-20	576476.26	4852468.33	403.00	5.00	N/A	2.14	N/A	N/A	N/A	N/A	03-Nov-20	0.96	Gasport Fm	2.42	3.95				
MW20-21(CAL) A/B	04-Nov-20	576014.37	4852839.77	415.23	39.70	15.10	12.51	36.73	38.38	05-Nov-20	06-Nov-20	07-Nov-20	1.07	Gasport Fm	33.27	34.79	1.07	Gasport Fm	15.77	17.29
MW20-22(CAL) A/B	18-Nov-20	575785.36	4851966.28	399.27	30.75	5.94	4.57	28.16	29.81	18-Nov-20	N/A	19-Nov-20	0.97	Goat Island Fm	23.47	25.00	0.97	Goat Island Fm	6.89	8.41
MW20-23(CAL) A/B	23-Nov-20	576205.53	4851555.91	395.05	26.76	12.19	11.28	23.54	25.30	24-Nov-20	N/A	24-Nov-20	0.87	Shaley Dolostone or Cabot Head Fm	22.59	24.11	0.87	Goat Island Fm	14.68	16.20
MW20-23 (CAL) C	23-Nov-20	576205.91	4851556.34	395.00	7.00	N/A	N/A	N/A	N/A	N/A	N/A	23-Nov-20	0.88	Overburden	4.57	6.09				
MW20-24(CAL) A/B	03-Dec-20	575337.66	4854341.85	437.75	37.49	20.88	20.11	37.49	N/A	04-Dec-20	N/A	04-Dec-20	0.87	Gasport Fm	33.81	35.33	0.87	Goat Island Fm	21.49	23.02
MW20-25(CAL) A/B	10-Dec-20	574853.76	4852900.48	419.02	51.82	13.39	10.52	48.93	50.67	10-Dec-20	N/A	11-Dec-20	1.56	Gasport Fm	44.03	45.55	1.55	Goat Island Fm	16.84	18.36
MW20-26(CAL) A/B	17-Dec-20	574373.86	4853638.42	438.89	66.11	15.55	12.19	64.55	66.11	18-Dec-20	N/A	21-Dec-20	1.16	Gasport Fm	55.16	56.68	1.16	Goat Island Fm	31.12	32.64
MW20-26 (CAL) C	17-Dec-20	574375.17	4853637.62	438.88	10.00	N/A	N/A	N/A	N/A	N/A	N/A	17-Dec-20	1.07	Overburden	7.26	8.78				
MW20-27(CAL) A/B	12-Feb-21	575953.96	4853770.16	431.15	52.43	31.24	28.96	50.32	51.93	17-Feb-21	N/A	18-Feb-21	0.97	Goat Island Fm	41.99	43.51	0.98	Goat Island Fm	33.85	35.37
MW20-28(CAL) A/B	22-Feb-21	576139.79	4854987.82	419.31	30.82	12.80	12.19	28.45	30.20	23-Feb-21	N/A	23-Feb-21	0.96	Gasport Fm	24.07	25.59	0.93	Gasport Fm	16.51	18.03

LEGEND

- MONITORING WELL
- MONITORING WELL (PUMPING TEST)
- TEST WELL
- HISTORICAL MONITORING WELL
- TOWN/VILLAGE
- WATERCOURSE
- ROAD
- WATERBODY
- WETLAND
- PRELIMINARY PROJECT LOCATION



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NOTE(S)

REFERENCE(S)

1. BASE DATA MNRF LIO OBTAINED 2020
2. IMAGERY FIRSTBASE SOLUTIONS SPRING 2019 (15CM RESOLUTION) AND SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
   SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY
3. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT
CBM AGGREGATES, A DIVISION OF ST. MARYS CEMENT INC. (CANADA).

PROJECT
CALEDON QUARRY

TITLE
2020-2021 MONITORING AND PUMPING WELL LOCATIONS

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2022-08-26
DESIGNED	CGE
PREPARED	CGE
REVIEWED	GP
APPROVED	-

PROJECT NO.	CONTROL	REV.	FIGURE
19129150	0006	0.0	1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25mm

PATH: S:\Clients\Vulcan\tm_Cimentos\Long_Par_5_Caledon\99_PROJ\19129150\40_PROD\0006_Resource_Analysis\19129150-0006-CS-0010.mxd PRINTED ON: 2022-08-26 AT: 12:41:33 PM

APPENDIX B

Information Requests

From: Snell, Shamus (MECP)
To: Sabourin, Amber
Cc: 19129150, VCNA Licence Caledon
Subject: MECP SARB Review: Information Request
Date: June 24, 2021 2:56:57 PM
Attachments: image001.png
image002.png

EXTERNAL EMAIL

Hi Amber,

The Ministry of Environment, Conservation and Parks (MECP) Species at Risk Branch (SARB) has conducted review proposed quarry, and the areas adjacent to it and has detected additional Species at Risk (SAR) occurrences which need to be considered as part of your assessment.

- American Brook Lamprey (*Lethenteron appendix*);
- Louisiana Waterthrush (*Parkesia motacilla*).

While this review represents MECP's best currently available information, it is important to note that a lack of information for a site does not mean that SAR or their habitat are not present. There are many areas where the Government of Ontario does not currently have information, especially in areas not previously surveyed. On-site assessments will need to be performed to verify site conditions, identify and confirm presence of species at risk and/or their habitats.

The subject property overlaps numerous observations of Bobolink and Eastern Meadowlark and the imagery of the subject property suggests there is suitable habitat on the subject property which could be used as nesting habitat. It is recommended that species specific surveys for Bobolink and Eastern Meadowlark be performed.

If any vegetation removal must occur as part of the project proposal then survey's for Butternut should be completed. If butternut trees are detected and the proponent wish's to remove them, then Butternut Health Assessment must be completed on all trees which might be impacted by the proposed development prior to the removal of any vegetation and start of construction.

No geographic coordinates where provided to reference the review location. Please ensure that future screenings or information requests include coordinates of the review location in UTM or Latitude and longitude. Failure to provide this information can cause delays in reviewing your request.

It is the responsibility of the proponent to ensure that SAR are not killed, harmed, or harassed, and that their habitat is not damaged or destroyed through the proposed activities to be carried out on the site. If the proposed activities can not avoid impacting protected species and their habitats then the proponent will need to apply for a authorization under the Endangered Species Act (ESA).

Regards,

Shamus Snell
A/ Management Biologist
Species at Risk Branch
Ministry of Environment, Conservation and Parks
Email: shamus.snell@ontario.ca

From: Sabourin, Amber <Amber_Sabourin@golder.com>
Sent: June 17, 2021 11:27 AM
To: Species at Risk (MECP) <SAROntario@ontario.ca>
Cc: 19129150, VCNA Licence Caledon <114392@golder.com>
Subject: Information Request

Good morning,

We are working on a project for a proposed quarry located near Caledon, Ontario. The general project location (blue) and study area boundary (orange) are shown in the attached figure. We kindly request any SAR records you may have for this area.

Note that we have already completed a desktop screening, including a review of NHIC records, and have identified the following SAR with ranges that overlap the study area:

Common Name	Scientific Name		Common Name	Scientific Name
Monarch	*Danaus plexippus*		Little brown myotis	*Myotis lucifugus*
Yellow-banded bumble bee	*Bombus terricola*		Northern myotis	*Myotis septentrionalis*
Bank swallow	*Riparia riparia*		Tri-colored bat	*Perimyotis subflavus*
Barn swallow	*Hirundo rustica*		Eastern ribbonsnake	*Thamnophis sauritius*

Bobolink	*Dolichonyx oryzivorus*		Milksnake	*Lampropeltis triangulum*
Canada warbler	*Cardellina canadensis*		Snapping turtle	*Chelydra serpentina*
Chimney swift	*Chaetura pelagica*		American ginseng	*Panax quinquefolius*
Eastern meadowlark	*Sturnella magna*		American hart's-tongue fern	*Asplenium scolopendrium*
Eastern wood-pewee	*Contopus virens*		Butternut	*Juglans cinerea*
Grasshopper sparrow	*Ammodramus savannarum*		Dense blazing star	*Liatris spicata*
Henslow's sparrow	*Ammodramus henslowii*		Hill's pondweed	*Potamogeton hillii*
Wood thrush	*Hylocichla mustelina*		Redside dace	*Clinostomus elongatus*
Eastern small-footed myotis	*Myotis leibii*			

Best regards,
Amber

Amber Sabourin
Ecologist

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LinkedIn | Instagram | Facebook | Twitter

Work Safe, Home Safe

From: Fortini, Natosha (MNRF)
To: Sabourin, Amber
Subject: RE: Information Request
Date: June 22, 2021 12:10:56 PM
Attachments: image005.png
image001.png
image002.png
Caledon Meltwater Deposits-ForksoftheCredit ANSI Report &Maps2013.pdf
Cataract Southwest W.C. Map B&W(8x11).pdf
Cataract Southwest W.C. Wetland Evaluation.pdf
Cover letter Cataract SW Caledon.pdf
Suggested Steps for GTA Wetland Boundary Surveys MNRF.pdf
Wetlands around Coulterville, Caledon.pdf

EXTERNAL EMAIL

Hi Amber,

Please see the following information and attachments as a response to your information request:

Fisheries:
The site is adjacent to the Credit River and a number of cold water tributaries flow through or adjacent to the property. Fish species we have on record include, but are not limited to:

Atlantic Salmon,Blacknose Dace,Bluntnose Minnow,Brassy Minnow,Brook Stickleback,Brook Trout,Brown Bullhead,Brown Trout,Central Mudminnow,Common Shiner,Creek Chub,Fantail Darter,Fathead Minnow,Golden Shiner,Johnny Darter,Largemouth Bass,Longnose Dace,Mottled Sculpin,Northern Hog Sucker,Northern Pearl Dace,Northern Redbelly Dace,Pumpkinseed,Rainbow Darter,Rainbow Trout,Redside Dace,River Chub,Rock Bass,Sticklebacks,Stonecat,White Sucker,Yellow Perch,American Brook Lamprey,Iowa Darter,Northern Pike, River Chub,Slimy Sculpin

Wetlands and Other Natural Heritage Features:
Enclosed is the wetland evaluation, accompanying map and covering letter for the provincially significant Cataract Southwest Wetland Complex which is located in the southwest corner of the project area.

In the northwest part of the project area there is the currently non-provincially significant Coulterville Wetland Complex. This is an older evaluation that is only available in a hard copy form in our Aurora District office wetland files. The files are currently not open to the public. When the office is again open to the public a time can be arranged to see the wetland evaluation and for a cost you can photocopy the file. Since this is an older evaluation its wetland boundaries should be considered very approximate. MNRF analysis of Spring 2019 aerial imagery shows additional wetland area around the southern part of the southeastern wetland unit that extends into the project area. The aerial imagery also shows three unevaluated wetlands along a downstream watercourse to the southwest and two unevaluated wetlands in and near a woodlot to the southeast that are within the project area. Only one of these unevaluated wetlands is currently mapped in our provincial database (Land Information Ontario- LIO). An enclosed map shows the additional wetlands outlined in red. The five unevaluated wetlands are within 750 metres of the Coulterville Wetland Complex and should be accessed for possible inclusion in the wetland complex. Since this is an older wetland evaluation it should be updated with any recent information on species at risk or other provincially, regionally or locally significant species.

In case a wetland delineation is going to be carried out, enclosed is a one-page pdf outlining suggested steps for doing wetland surveys.

It should also be noted that the Provincial Caledon Meltwater Deposits- Forks of the Credit Earth Science Area of Natural and Scientific Interest abuts the southwest corner of the project area. Enclosed is the latest draft ANSI report.

If you have any questions on these wetlands or the ANSI you can reach Steve Varga, Management Biologist at 289-221-8157 or by email at steve.varga@ontario.ca.

Species at Risk:
As of April 2019, the responsibility of the Endangered Species Act has been moved to the Ministry of Environment, Conservation, and Parks. Please contact MECP at SAROntario@ontario.ca for information on species at risk.

Sincerely,

Natosha

Natosha Fortini
Management Biologist | Aurora District | Ontario Ministry of Natural Resources and Forestry | 50 Bloomington Rd. W., Aurora, ON, L4G 0L8 | P: 289-380-6181| F: 905.713.7361 | natosha.fortini@ontario.ca

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From: Sabourin, Amber <Amber_Sabourin@golder.com>
Sent: June 17, 2021 11:27 AM
To: Fortini, Natosha (MNRF) <Natosha.Fortini@ontario.ca>
Cc: 19129150, VCNA Licence Caledon <114392@golder.com>
Subject: Information Request

Good morning,

We are working on a project for a proposed quarry located near Caledon, Ontario. The general project location (blue) and study area boundary (orange) are shown in the attached figure. We kindly request any natural heritage information you may have available for this study area, such as:

- Species at risk records (note that an information request will also be submitted to MECP)
- Fisheries data
- PSW report for Cataract Southwest Complex
- Rare species occurrence data
- Any designated natural areas or sensitive natural areas mapping
- Any natural heritage reports that may be available

Note that we have already completed a desktop screening, including review of NHIC records, and have identified the following SAR with ranges that overlap the study area:

Common Name	Scientific Name		Common Name	Scientific Name
Monarch	*Danaus plexippus*		Little brown myotis	*Myotis lucifugus*
Yellow-banded bumble bee	*Bombus terricola*		Northern myotis	*Myotis septentrionalis*
Bank swallow	*Riparia riparia*		Tri-colored bat	*Perimyotis subflavus*
Barn swallow	*Hirundo rustica*		Eastern ribbonsnake	*Thamnophis sauritius*
Bobolink	*Dolichonyx oryzivorus*		Milksnake	*Lampropeltis triangulum*
Canada warbler	*Cardellina canadensis*		Snapping turtle	*Chelydra serpentina*
Chimney swift	*Chaetura pelagica*		American ginseng	*Panax quinquefolius*
Eastern meadowlark	*Sturnella magna*		American hart's-tongue fern	*Asplenium scolopendrium*
Eastern wood-pewee	*Contopus virens*		Butternut	*Juglans cinerea*
Grasshopper sparrow	*Ammodramus savannarum*		Dense blazing star	*Liatris spicata*
Henslow's sparrow	*Ammodramus henslowii*		Hill's pondweed	*Potamogeton hillii*
Wood thrush	*Hylocichla mustelina*		Redside dace	*Clinostomus elongatus*
Eastern small-footed myotis	*Myotis leibii*			

Please let me know if you need any additional information to fulfill this request.
Kind regards,
Amber

Amber Sabourin
Ecologist

Golder Associates Ltd.
6925 Century Avenue, Suite #100, Mississauga, Ontario, Canada L5N 7K2
T: +1 905 567 4444 | **D:** +1 905 567-6100 x1819 | **C:** 416-779-5711 | **golder.com**
LinkedIn | Instagram | Facebook | Twitter

Work Safe, Home Safe

APPENDIX C

Plant List

Scientific Name	Common Name	Origin[a]	S Rank[b]	G Rank[b]	Regionally Rare[c]	COW[d]	ESA[e]	Location															
								Veg 1-1	Veg 1-2	Veg 1-3	Veg 2-1	Veg 2-2	Veg 3	Veg 4-1	Veg 4-2	Veg 4-3	Veg 4-4	Veg 4-5	Veg 5	Veg 6	Veg 7-1	Veg 7-2	Veg 7-3	Veg 8
								CUT	CUT/ SWT2-2	SWC1-1	FOD8-1 / SWM3-2	FOD5-2	FOD5-7 / CUM	FOD5-1	CUP3-1	CUP3-3	CUP3-1	FOD4-11	FOD5-2	CUW	FOD5-7	CUW/ CUS	CUP3-2	MAS2-1 / MAS3-1
Trees (29 taxa)																							
Abies balsamea	Balsam Fir	N	S5	G5	—	-3	—				x											x		
Acer nigrum	Black Maple	N	S4	G5	—	3	—																x	
Acer platanoides	Norway Maple	I	SNA	GNR	—	5	—								x			x						
Acer saccharum	Sugar Maple	N	S5	G5	—	3	—				x	x	x	x	x	x			x	x	x	x	x	
Acer x freemanii	Freeman Maple	N	SNA	GNA	—	-5	—				x													
Ailanthus altissima	Tree-of-Heaven	I	SNA	GNR	—	5	—										x							
Betula papyrifera	Paper Birch	N	S5	G5	—	3	—			x	x					x								
Fagus grandifolia	American Beech	N	S4	G5	—	3	—					x	x	x					x		x			
Fraxinus albicans	Texas Ash	I	SNA	GNR	—	—	—										x							
Fraxinus americana	White Ash	N	S4	G5	—	3	—	x			x	x	x			x				x		x		
Fraxinus pennsylvanica	Green Ash	N	S4	G5	—	-3	—				x				x			x						
Juglans nigra	Black Walnut	N	S4	G5	—	3	—									x								
Larix laricina	Tamarack	N	S5	G5	—	-3	—			x														
Ostrya virginiana	Eastern Hop-hornbeam	N	S5	G5	—	3	—				x		x											
Picea abies	Norway Spruce	I	SNA	G5	—	5	—									x								
Picea glauca	White Spruce	N	S5	G5	—	3	—															x		
Picea sp	Pine sp.	—	—	—	—	—	—																x	
Pinus resinosa	Red Pine	N	S5	G5	—	3	—								x		x							
Pinus strobus	Eastern White Pine	N	S5	G5	—	3	—	x							x								x	
Pinus sylvestris	Scots Pine	I	SNA	GNR	—	3	—	x							x	x						x		
Populus balsamifera	Baslsam Poplar	N	S5	G5	—	-3	—			x														
Populus tremuloides	Trembling Aspen	N	S5	G5	—	0	—		x		x											x		
Prunus serotina	Black Cherry	N	S5	G5	—	3	—					x	x				x		x		x	x	x	
Quercus rubra	Red Oak	N	S5	G5	—	3	—							x	x									
Robinia pseudoacacia	Black Locust	I	SNA	G5	—	3	—								x			x						
Thuja occidentalis	Eastern White Cedar	N	S5	G5	—	-3	—	x		x	x													x
Tilia americana	Basswood	N	S5	G5	—	3	—						x						x			x	x	
Tsuga canadensis	Eastern Hemlock	N	S5	G5	—	3	—					x	x						x					
Ulmus americana	White Elm	N	S5	G5	—	-3	—	x	x		x		x			x						x		
Small trees, shrubs and woody vines (28 taxa)																								
Clematis virginiana	Viginia Clematis / Virgin's-bower	N	S5	G5	—	0	—				x													
Cornus alternifolia	Alternate-leaved Dogwood	N	S5	G5	—	3	—			x	x		x	x	x	x		x	x	x	x	x	x	
Cornus racemosa	Gray Dogwood	N	S5	G5	—	0	—		x		x													
Cornus sericea	Red-osier Dogwood	N	S5	G5	—	-3	—	x	x	x	x	x	x		x	x		x				x		
Crataegus monogyna	English Hawthorn	I	SNA	G5	—	3	—															x		
Crataegus sp.	Hawthorn sp.	—	—	—	—	—	—	x							x	x				x				
Lonicera tatarica	Tatarian Honeysuckle	I	SNA	GNR	—	3	—			x	x						x	x		x		x		
Malus pumila	Common Apple	I	SNA	G5	—	5	—	x	x		x									x		x		
Parthenocissus quinquefolia	Virginia Creeper	N	S4	G5	—	3	—	x			x		x	x		x	x	x	x		x	x	x	
Prunus sp	Cherry sp.	—	—	—	—	—	—		x															
Prunus virginiana	Choke Cherry	N	S5	G5	—	3	—	x			x		x	x		x	x	x	x	x	x			
Rhamnus cathartica	European Buckthorn	I	SNA	GNR	—	0	—	x	x		x		x									x		
Rhus typhina	Staghorn Sumac	N	S5	G5	—	3	—															x		x
Ribes glandulosum	Skunk Currant	N	S5	G5	R	-3	—				x													
Ribes sp.	Currant sp.	—	—	—	—	—	—					x	x	x				x	x	x	x			
Rosa acicularis	Prickly Rose	N	S5	G5	—	3	—						x											
Rubus idaeus	Red Raspberry	N	S5	G5	—	3	—	x	x					x			x	x	x	x		x		
Rubus occidentalis	Black Raspberry	N	S5	G5	—	5	—							x				x	x			x		
Rubus pubescens	Dwarf Raspberry / Dewberry	N	S5	G5	—	-3	—				x													
Salix discolor	Pussy Willow	N	S5	G5	—	-3	—		x	x														
Salix sp.	Willow sp.	—	—	—	—	—	—		x															x
Sambucus sp.	Elderberry sp.	—	—	—	—	—	—						x	x	x							x		
Spiraea alba	White Meadowsweet	N	S5	G5	—	-3	—															x		
Syringa vulgaris	Common Lilac	I	SNA	GNR	—	5	—	x														x		
Toxicodendron radicans	Poison Ivy	N	S5	G5	—	0	—														x	x		
Viburnum lantanoides	Hobblebush	N	S5	G5	R	0	—		x															

Scientific Name	Common Name	Origin[a]	S Rank[b]	G Rank[b]	Regionally Rare[c]	COW[d]	ESA[e]	Location																
								Veg 1-1	Veg 1-2	Veg 1-3	Veg 2-1	Veg 2-2	Veg 3	Veg 4-1	Veg 4-2	Veg 4-3	Veg 4-4	Veg 4-5	Veg 5	Veg 6	Veg 7-1	Veg 7-2	Veg 7-3	Veg 8
								CUT	CUT/ SWT2-2	SWC1-1	FOD8-1 / SWM3-2	FOD5-2	FOD5-7 / CUM	FOD5-1	CUP3-1	CUP3-3	CUP3-1	FOD4-11	FOD5-2	CUW	FOD5-7	CUW/ CUS	CUP3-2	MAS2-1 / MAS3-1
Trees (29 taxa)																								
Viburnum opulus	Highbush Cranberry	N	S5	G5TNR	—	-3	—	x	x	x						x						x		
Vitis riparia	Riverbank Grape	N	S5	G5	—	0	—	x	x				x			x	x		x			x	x	
Graminoids (18 taxa)																								
Bromus inermis	Smooth Brome	I	SNA	G5	—	5	—	x	x							x								
Calamagrostis canadensis	Bluejoint Reedgrass	N	S5	G5	—	-5	—		x											x				x
Carex crinita	Fringed Sedge	N	S5	G5	—	-5	—				x													
Carex intumescens	Bladder Sedge	N	S5	G5	—	-3	—				x													
Carex pensylvanica	Pennsylvania Sedge	N	S5	G5	—	5	—						x											
Carex plantaginea	Plantain-leaved Sedge	N	S5	G5	—	5	—			x				x							x			
Carex rosea	Rosy Sedge	N	S5	G5	—	5	—					x		x							x			
Carex sp.	Sedge sp.	—	—	—	—	—	—												x					
Carex spicata	Spiked Sedge	I	SNA	GNR	—	3	—															x		
Carex sprengelii	Sprengel's Sedge	N	S5	G5	R	0	—													x		x		
Carex utriculata	Northern Beaked Sedge	N	S5	G5	—	-5	—																	x
Dactylis glomerata	Orchard Grass	I	SNA	GNR	—	3	—										x							
Phalaris arundinacea	Reed Canarygrass	N	S5	G5	—	-3	—		x															x
Phleum pratense	Common Timothy	I	SNA	GNR	—	3	—	x	x	x						x				x		x		x
Phragmites australis	European Reed	I	SNA	G5T5	—	-3	—		x															
Scirpus atrovirens	Dark-green Bulrush	N	S5	G5	—	-5	—			x														
Typha angustifolia	Narrow-leaved Cattail	I	SNA	G5	—	-5	—																	x
Typha latifolia	Broad-leaved Cattail	N	S5	G5	—	-5	—		x															x
Ferns and Allies (7 taxa)																								
Dryopteris carthusiana	Spinulose Wood Fern	N	S5	G5	—	-3	—					x												
Dryopteris sp.	Wood Fern sp.	—	—	—	—	—	—				x	x	x								x			
Equisetum arvense	Field Horsetail	N	S5	G5	—	0	—			x	x													
Equisetum pratense	Meadow Horsetail	N	S5	G5	R	-3	—								x									
Equisetum sp.	Horsetail sp.	—	—	—	—	—	—		x				x											
Hydrophyllum virginianum	Virginia Waterleaf	N	S5	G5	—	0	—						x	x						x	x	x		
Onoclea sensibilis	Sensitive Fern	N	S5	G5	—	-3	—			x			x											
Forbs (83 taxa)																								
Achillea millefolium	Common Yarrow	I	S5	G5	—	3	—	x								x								
Actaea pachypoda	White Baneberry	N	S5	G5	—	5	—					x									x			
Actaea rubra	Red Baneberry	N	S5	G5	—	3	—					x							x					
Actea sp	Baneberry sp.	—	—	—	—	—	—							x										
Agrimonia gryposepala	Hooked Agrimony	N	S5	G5	—	3	—		x		x													
Alliaria petiolata	Garlic Mustard	I	SNA	GNR	—	0	—						x	x	x			x		x	x			
Allium tricoccum	Wild Leek	N	S4	G5	—	3	—						x	x					x		x			
Anemonastrum canadense	Canada Anemone	N	S5	G5	—	-3	—															x		
Arisaema triphyllum	Jack-in-the-Pulpit	N	S5	G5	—	-3	—					x		x										
Asarum canadense	Wild Ginger	N	S5	G5	—	5	—					x	x								x			
Asclepias syriaca	Common Milkweed	N	S5	G5	—	5	—	x	x				x			x						x		x
Caulophyllum thalictriodes	Blue Cohosh	N	S5	G5	—	5	—					x	x	x					x		x			
Chelidonium majus	Greater Celadine	I	SNA	GNR	—	5	—						x						x		x			
Chenopodium album	White Goosefoot	I	SNA	G5	—	3	—																	x
Circaea lutetiana spp. canadensis	Broad-leaved Enchanter's Nightshade	N	S5	G5	—	3	—					x		x	x			x		x	x		x	
Cirsium arvense	Canada Thistle	I	SNA	G5	—	3	—															x		x
Cirsium vulgare	Bull Thistle	I	SNA	GNR	—	3	—																x	
Clinopodium vulgare	Wild Basil	N	S5	G5	—	5	—	x	x				x			x				x		x		
Convolvulus sp.	Bindweed sp.	—	—	—	—	—	—																x	
Daucus carota	Wild Carrot	I	SNA	GNR	—	5	—	x	x				x			x						x		
Dianthus armeria	Deptford Pink	I	SNA	GNR	—	5	—															x		
Dicentra spp.	—	—	—	—	—	—	—							x										
Epipactis helleborine	Broad-leaved Hellebore	I	SNA	GNR	—	3	—						x		x				x					
Erigeron annus	Annual Fleabane	N	S5	G5	—	3	—																x	
Erigeron strigosus	Rough Fleabane	N	S5	G5	—	3	—									x						x		
Erythronium americanum	Yellow Trout-lily	N	S5	G5	—	5	—						x	x					x	x	x			

Scientific Name	Common Name	Origin[a]	S Rank[b]	G Rank[b]	Regionally Rare[c]	COW[d]	ESA[e]	Location																
								Veg 1-1	Veg 1-2	Veg 1-3	Veg 2-1	Veg 2-2	Veg 3	Veg 4-1	Veg 4-2	Veg 4-3	Veg 4-4	Veg 4-5	Veg 5	Veg 6	Veg 7-1	Veg 7-2	Veg 7-3	Veg 8
								CUT	CUT/ SWT2-2	SWC1-1	FOD8-1 / SWM3-2	FOD5-2	FOD5-7 / CUM	FOD5-1	CUP3-1	CUP3-3	CUP3-1	FOD4-11	FOD5-2	CUW	FOD5-7	CUW/ CUS	CUP3-2	MAS2-1 / MAS3-1
Trees (29 taxa)																								
Eupatorium perfoliatum	Common Boneset	N	S5	G5	—	-3	—			x														
Euthamia graminifolia	Grass-leaved Goldenrod	N	S5	G5	—	0	—										x					x		
Euthrochium maculatum	Spotted Joe Pyeweed	N	S5	G5	—	-5	—		x															
Fragaria vesca	Woodland Strawberry	N	S5	G5	—	3	—				x							x		x	x	x		
Fragaria virginiana	Wild Strawberry	N	S5	G5	—	3	—	x	x	x			x							x				
Galium sp.	Bedstraw sp.	—	—	—	—	—	—		x											x				
Galium trifidum	Three-petaled Bedstraw	N	S5	GNR	—	-3	—				x											x		
Galium triflorum	Three-flowered Bedstraw	N	S5	G5	—	3	—													x				
Geranium robertianum	Herb-Robert	N	S5	G5	—	3	—		x				x	x	x		x		x	x	x			
Geum aleppicumx	Yellow Avens	N	S5	G5	—	0	—													x				
Geum sp.	Avens sp.	—	—	—	—	—	—	x	x		x							x						
Helianthus sp.	Sunflower sp.	—	—	—	—	—	—															x		
Hippuris vulgaris	Common Mare's-tail	N	S5	G5	—	-5	—																	x
Hypericum perforatum	Common St. John's Wort	I	SNA	GNR	—	5	—	x	x							x	x					x		
Hypochaeris radicata	Spotted Cat's-ear	I	SNA	GNR	—	3	—						x											
Impatiens capensis	Spotted Jewelweed	N	S5	G5	—	-3	—				x							x						
Impatiens spp.	Jewelweed sp.	—	—	—	—	—	—		x															
Lemna minor	Lesser Duckweed	N	S5	G5	—	-5	—																	x
Leucanthemum vulgare	Oxeye Daisy	I	SNA	GNR	—	5	—									x						x		
Lotus corniculatus	Bird's-foot Trefoil	I	SNA	GNR	—	3	—	x	x													x		
Lycopus americanus	American Water-horehound	N	S5	G5	—	-5	—			x														
Lycopus sp.	Water-horehound sp.	—	—	—	—	—	—				x													
Nasturtium officinale	Watercress	I	SNA	GNR	—	-5	—			x														
Oxalis sp.	Wood Sorrel sp.	—	—	—	—	—	—		x				x											
Oxalis strictax	Upright Yellow Wood-sorrel	N	S5	G5	—	3	—																x	
Phlox divaricata	Wild Blue Phlox	N	S4	G5	—	3	—							x										
Plantago lanceolata	English Plantain	I	SNA	G5	—	3	—	x	x													x		
Potentilla recta	Sulphur Cinquefoil	I	SNA	GNR	—	5	—															x		
Potentilla sp.	Cinquefoil sp.	—	—	—	—	—	—	x																
Prunella vulgaris	Heal-all	N	S5	G5	—	0	—	x		x	x													
Pyrola asarifolia	Pink Pyrola	N	S5	G5	—	-3	—			x														
Ranunculus sp.	Buttercup sp.	—	—	—	—	—	—															x		
Rudbeckia triloba	Brown-eyed Susan	I	SNA	G5	—	3	—	x	x															
Rumex crispus	Curled Dock	I	SNA	GNR	—	0	—																x	
Sagittaria latifolia	Broad-leaved Arrowhead	N	S5	G5	—	-5	—																	x
Sanguinaria canadensis	Bloodroot	N	S5	G5	—	3	—					x	x	x						x	x	x	x	
Saponaria officinalis	Bouncing-bet	I	SNA	GNR	—	3	—																x	
Securigera varia	Crown Vetch	I	SNA	GNR	—	5	—									x								
Silene vulgaris	Bladder Campion	I	SNA	GNR	—	5	—	x									x							
Solanum dulcamara	Bittersweet Nightshade	I	SNA	GNR	—	0	—				x								x					
Solidago canadensis	Canada Goldenrod	N	S5	G5	—	3	—	x					x			x	x	x		x		x		
Solidago sp.	Goldenrod sp.	—	—	—	—	—	—	x			x													
Streptopus lanceolatus	Rose Twisted-stalk	N	S5?	G5T5	—	3	—						x											
Symphyotrichum novae-angliae	New England Aster	N	S5	G5	—	-3	—						x											
Taraxacum officinale	Common Dandelion	I	SNA	G5	—	3	—	x	x		x		x	x	x			x	x	x		x		
Thalictrum pubescens	Tall Meadow-rue	N	S5	G5	—	-3	—						x											
Tragopogon pratensis	Meadow Goatsbeard	I	SNA	GNR	—	5	—															x		
Tragopogon sp.	Goatsbeard sp.	—	—	—	—	—	—	x																
Trifolium pratense	Red Clover	I	SNA	GNR	—	3	—															x		
Trillium erectum	Red Trillium	N	S5	G5	—	3	—					x	x	x					x					
Trillium grandiflorum	White Trillium	N	S5	G5	—	3	—					x	x						x		x			
Tussilago farfara	Colts-foot	I	SNA	GNR	—	3	—	x	x	x														
Urtica dioica	Stinging Nettle	N	S5	G5	—	0	—							x					x					
Uvularia grandiflora	Large-flowered Bellwort	N	S5	G5	—	5	—												x					
Verbascum thapsus	Common Mullein	I	SNA	GNR	—	5	—									x							x	x
Verbena hastata	Blue Vervain	N	S5	G5	—	-3	—																	x

Scientific Name	Common Name	Origin[a]	S Rank[b]	G Rank[b]	Regionally Rare[c]	COW[d]	ESA[e]	Location															
								Veg 1-1	Veg 1-2	Veg 1-3	Veg 2-1	Veg 2-2	Veg 3	Veg 4-1	Veg 4-2	Veg 4-3	Veg 4-4	Veg 4-5	Veg 5	Veg 6	Veg 7-1	Veg 7-2	Veg 7-3	Veg 8
								CUT	CUT/ SWT2-2	SWC1-1	FOD8-1 / SWM3-2	FOD5-2	FOD5-7 / CUM	FOD5-1	CUP3-1	CUP3-3	CUP3-1	FOD4-11	FOD5-2	CUW	FOD5-7	CUW/ CUS	CUP3-2	MAS2-1 / MAS3-1
Trees (29 taxa)																							
Vicia cracca	Tufted Vetch	I	SNA	GNR	—	5	—	x	x							x	x			x		x		
Viola pubescens	Yellow Violet	N	S5	G5	—	3	—						x	x					x		x			
Viola sp.	Viola sp.	—	—	—	—	—	—				x	x						x						

[a] Origin: N = Native; (N) = Native but not in study area region; I = Introduced.

[b] Ranks based upon determinations made by the Natural Heritage Information Centre (2019).

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

NA = Not applicable [used mainly for abundance of non-natives; NR = Not ranked [used mainly for non-natives];

Q = Taxonomic questions not fully resolved; T = sub-specific taxon (taxa) present in the province; U = Uncertain.

[c] Regionally Rare Plants per Kaiser, Jeff. 2001. The Vascular Plant Flora of the Region of Peel and the Credit River Watershed. Prepared for Credit Valley Conservation, The Regional Municipality of Peel, and the Toronto and Region Conservation Authority.

R = Regionally Rare

[d] COW = Coefficient of Wetness as determined by Floristic Quality Assessment System for Southern Ontario (Oldham et al. 1995)

-5 (Obligate Wetland Species)

-4 to -2 (Facultative Wetland Species)

-1 to 1 (Facultative Species)

APPENDIX D

SAR Screening

Taxon	Common Name	Scientific Name	Endangered Species Act[1]	Species at Risk Act (Sch 1)[2]	Provincial (SRank)[3]	Habitat Requirements	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	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).	Low	No suitable breeding habitat was identified on the site. In addition, the site and study area are not within the currently known range of this species.
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	No suitable breeding habitat was identified on the site. In addition, any records of this species in the area are historic.
Arthropod	Black dash	*Euphyes conspicua*	—	—	S3	This small skipper primarily inhabits large graminoid meadow marshes but can also be found in open areas along small streams. The main larval host is tussock sedge (*Carex stricta*) (Layberry et al. 1998).	Low	No large graminoid meadow marshes were identified on the site. No tussock sedge was identified during the botanical inventory to provide larval host sites.
Arthropod	Monarch	*Danaus plexippus*	SC	SC	S2N, S4B	In Ontario, monarch is found throughout the northern and southern regions of the province. This butterfly is found wherever there is 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. Important staging areas during migration occur along the north shores of the Great Lakes (COSEWIC 2010).	High	There are areas of open cultural meadow on the site and in the study area to provide foraging habitat and growing habitat for milkweed, monarch's host plant. One monarch was observed in the open meadow at the north end of the study area west of breeding bird survey station CBBS21.
Arthropod	River bluet	*Enallagama anna*	—	—	S2	In Ontario, river bluet occupies streams and small rivers typicallly in open areas, but also along riparian woodland edges (Westfall and May 1996; Acorn 2004; Paulson 2009).	Low	This species typically prefers a riparian component to occupied watercourses. The watercourse on site flows through an agricultural field and lacks this type of habitat. Off-site, the watercourse flows through woodland which likely provides too much cover.
Arthropod	Spatterdock darner	*Rhionaeschna mutata*	—	—	S2	In Ontario, spatterdock darner is found in fishless, vegetated ponds, pools, open marshes and bogs. Spatterdock (*Nuphar* sp.) and white waterlily (*Nymphaea* sp.) are typically associated with occupied habitats (Curry 2001, Colburn 2004; Genoways and Brenner 1995).	Moderate	There is no suitable pond or lake habitat on the site with abundant vegetation. Off-site, the Cataract-Southwest PSW may provide suitable habitat.
Arthropod	Unicorn clubtail	*Arigomphus villosipes*	—	—	S3	In Ontario, unicorn clubtail is found in mud-bottomed ponds and lakes with little submerged vegetation (WDNR 2018).	Moderate	There is no suitable pond or lake habitat on the site with abundant vegetation. Off-site, the Cataract-Southwest PSW may provide suitable habitat.

Taxon	Common Name	Scientific Name	Endangered Species Act[1]	Species at Risk Act (Sch 1)[2]	Provincial (SRank)[3]	Habitat Requirements	Potential to Occur on Site or in the Study Area	Rationale for Potential to Occur on Site or in the Study Area
Arthropod	Yellow-banded bumble bee	*Bombus terricola*	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 and study area provide a comination of open meadow, field, and woodland habitats that support both foraging and nesting habitat.
Bird	Bank swallow	*Riparia riparia*	THR	THR	S4B	In Ontario, bank swallow breeds in a variety of natural and anthropogenic habitats, including lake bluffs, stream and riverbanks, 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).	Low	There are no suitable steep valley slopes, riverbanks, stockpiles or bluffs on the site or in the the study area to provide nesting habitat. In addition, no individuals were observed during field surveys.
Bird	Barn swallow	*Hirundo rustica*	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 2019).	High	Barn swallow was confirmed to be breeding on the site and nesting in several structures on the site (i.e., Barn #1a, Barn #2, Barn #3 and Shed #3) and in the study area (Barn #4).
Bird	Bobolink	*Dolichonyx oryzivorus*	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).	High	Bobolink was confirmed to be breeding in two pasture fields on the site, northwest of the intersection of Mississauga Road and Charleston Sideroad.
Bird	Canada warbler	*ardellina canadens*	SC	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	Although there is forest habitat on the site and within the study area, no individuals were observed during field surveys.

Taxon	Common Name	Scientific Name	Endangered Species Act[1]	Species at Risk Act (Sch 1)[2]	Provincial (SRank)[3]	Habitat Requirements	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	S3B	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).	High	There is no suitable habitat on the site to support breeding habitat for this species. Off-site, uncapped chimney structures on residences within the study area may provide roosting or nesting habitat for this species. A single chimney swift individual was observed off-site, flying over the southeast portion of the study area (near CBBS06) during the first breeding bird survey. No individuals were observed during any subsequent breeding bird, or other field surveys.
Bird	Common nighthawk	*Chordeiles minor*	SC	THR	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 majority of agricultural land on the site is actively planted in crop and does not provide suitable habitat. No individuals were observed during field surveys.
Bird	Eastern meadowlark	*Sturnella magna*	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 2019). They prefer well drained sites or slopes, and sites with different cover layers (Roseberry and Klimstra 1970).	High	Eastern meadowlark was confirmed to be breeding in two pasture fields on site, northwest of the intersection of Mississauga Road and Charleston Sideroad. A singing male was also observed in a small cultural savannah (CUS) off-site, in the southeast portion of the study area (near CBBS06). However, the field is too small to provide suitable habitat and the individual was considered an unpaired male.
Bird	Eastern wood-pewee	*Contopus virens*	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).	High	On site, eastern wood-pewee was assessed to be a possible breeder in the sugar maple – black cherry deciduous forest (FOD5-7) and the sugar maple – beech deciduous forest (FOD5-2) east of Charleston Sideroad, and a probable breeder in the sugar maple – black cherry deciduous forest (FOD5-7) south of Main Street. Off-site, eastern wood-pewee was assessed to be a probable breeder in significant woodland #1 and significant woodland #2.
Bird	Grasshopper sparrow *pratensis* subspecies	*Ammodramus savannarum* (pratensis subspecies)	SC	SC	S4B	In Ontario, grasshopper sparrow is found in medium to large grasslands with low herbaceous cover and few shrubs. It also uses a wide variety of agricultural fields, including cereal crops and pastures. Close-grazed pastures and limestone plains (e.g. Carden and Napanee Plains) support highest density of this bird in the province (COSEWIC 2013).	High	No grasshopper sparrow individuals were observed in grassland habitat on the site. Off-site, a single individual was observed in a field south of Mississauga Rd, wihin the study area, adjacent to survey station CBBS03.

Taxon	Common Name	Scientific Name	Endangered Species Act[1]	Species at Risk Act (Sch 1)[2]	Provincial (SRank)[3]	Habitat Requirements	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	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).	Low	There is no suitable large grassland habitat on the site. In addition, no individuals were observed during field surveys.
Bird	Louisiana waterthrush	*Parkesia motacilla* (formerly Seiurus motacilla)	THR	THR	S3B	In Ontario, Louisiana waterthrush inhabits mature forests along steeply sloped ravines adjacent to running water. It prefers clear, cold streams and densely wooded swamps. Trees, bushes, exposed roots, cliffs, banks and mossy logs are favoured nesting spots. Riparian woodlands are preferred stopover sites during migration. Nests are concealed from view at the base of uprooted trees, among mosses, or under logs and in cavities along the stream bank (COSEWIC 2006).	Low	There is no suitable ravine habitat on the site or in the study area. In addition, no individuals were observed during field surveys. Outside of the study area, the Credit River valleyland may provide suitable habitat for this species.
Bird	Wood thrush	*Hylocichla mustelina*	SC	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).	High	No wood thrush individuals were observed in forest habitat on the site. Off-site, wood thrush was assessed to be a probable breeder in significant woodland #1.
Fish	American brook lamprey	*Lampetra appendix*	—	—	S3	Habitat of adults includes gravel-sand riffles and runs of creeks and small to medium rivers with strong flow (Page and Burr 2011) and cool, clear water (Hoff 1988). Larvae burrow into sand and silt, often in pools or slow water near shore. Eggs are laid in nests in gravel/sand riffles and runs with strong flow. Juveniles are found in slow moving water buried in soft substrate of medium to large streams.	Moderate	There is no suitable habitat on the site and no records of American brook lamprey in watercourses on the site or in the study area. It has been recorded in the Credit River outside of the study area.

Taxon	Common Name	Scientific Name	Endangered Species Act[1]	Species at Risk Act (Sch 1)[2]	Provincial (SRank)[3]	Habitat Requirements	Potential to Occur on Site or in the Study Area	Rationale for Potential to Occur on Site or in the Study Area
Fish	Atlantic salmon - Lake Ontario pop'n	*Salmo salar*	EXP	—	SX	In Ontario, Atlantic salmon occur within Lake Ontario and its tributaries. A stocking program has been initiated to restore Atlantic salmon to Ontario. Stocked salmon are typically identified by a visible marking or fin clip as to distinguish from wild salmon. Atlantic salmon occur in an anadromous form and landlocked form. Anadromous salmon migrate to the sea as juveniles and spend 1-4 years at sea while they mature. They return to freshwater as adults to spawn. Landlocked populations, such as those within lake Ontario, live as adults in lakes and open waterbodies and spawn in the lakes and their tributaries. Suitable river habitat for salmon is described as clean water below 25°C with a stony bottom of various particle sizes (i.e. coarse sand, to gravel and large boulders). Adults build nests (redds) in shallow (20-30 cm), swift running water in substrates of coarse material, ranging from gravel to cobble. Lake Ontario population prefers to spawn on gravel shoals in clear, cold streams with a steep gradient. Juvenile salmon settle in riffles of intermediate water depth (20-70 cm) with cobble substrate (COSEWIC 2006).	Moderate	There is no suitable habitat on the site and no records of Atlantic salmon in watercourses on the site or in the study area. Atlantic salmon has been stocked in the Credit River as part of the first phase of stream restoration between 2006-2010 (OFAH 2017).
Fish	Redside dace	*Clinostomus elongatus*	END	END	S2	In Ontario, redside dace, a small cool water 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).	Low	There are no records of redside dace from tributaries in the study area or in the Credit River (MNRF 2022b; MNRF 2021; MECP 2021; CVC 2022)
Mammal	Eastern small-footed myotis	*Myotis leibii*	END	—	S2S3	In Ontario, eastern small-footed myotis is not known to roost in 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, but it occasionally inhabits buildings. Entrances of caves or abandoned mines where humidity is low, and temperatures are cool and sometimes subfreezing may be used as hibernacula (Humphrey 2017).	High	Based on the level and pattern of activity recorded for eastern small-footed myotis during the acoustic survey, it is likely that this species uses Barn #1b, Barn #2, Barn #3, Barn #4 and the rock piles associated with the two deciduous forests east of Charleston Sideroad (bat survey stations #6 and #7) for maternity roosting.
Mammal	Little brown myotis	*Myotis lucifugus*	END	END	S3	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).	High	Based on the level and pattern of activity recorded for little brown myotis during the acoustic survey, it is likely that this species uses Barn #1b, Barn #2, Barn #3, Barn #4 and the two deciduous forests east of Charleston Sideroad (bat survey stations #6 and #7) for maternity roosting.
Mammal	Northern myotis	*Myotis septentrionalis*	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).	Low	No individuals were recorded during acoustic surveys.

Taxon	Common Name	Scientific Name	Endangered Species Act[1]	Species at Risk Act (Sch 1)[2]	Provincial (SRank)[3]	Habitat Requirements	Potential to Occur on Site or in the Study Area	Rationale for Potential to Occur on Site or in the Study Area
Mammal	Tri-colored bat	*Perimyotis subflavus*	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).	Low	No individuals were recorded during acoustic surveys.
Reptile	Eastern ribbonsnake - Great Lakes population	*Thamnophis sauritius*	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	This species typically prefers large basin wetlands or a network of marsh and wetland habitat. There is no suitable habitat on the site. Off-site, the Cataract Southwest PSW south of the study area may provide suitable aquatic habitat. No individuals were observed during field surveys.
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	There is no suitable habitat on the site. Off-site, the Cataract Southwest PSW south of the study area may provide suitable aquatic habitat. No individuals were observed during field surveys.
Reptile	Milksnake	*Lampropeltis triangulum*	NAR	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 and study area provide a comination of open meadow, field, and woodland habitats that may support this species. No individuals were observed during the field surveys.
Reptile	Snapping turtle	*Chelydra serpentina*	SC	SC	S4	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	There is no suitable habitat on the site. Off-site, the Cataract Southwest PSW south of the study area may provide suitable aquatic habitat. No individuals were observed during field surveys. However, a predated nest that appeared to belong to snapping turtle was identified on the Cataract Trail adjacent to the PSW.
Vascular Plant	American ginseng	*Panax quinquefolius*	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).	Low	There is no suitable habitat on the site to support this species. In addition, no individuals were observed during the field surveys.
Vascular Plant	American hart's-tongue fern	*Asplenium scolopendrium*	SC	SC	S3	In Ontario, American hart's-tongue fern grows on thin calcareous soils on or near dolomitic limestone of the Niagara Escarpment, and occasionally on open talus/scree slopes. Most populations are found on steep, moderately moist slopes that face north to northeast and are under a hardwood canopy cover (Environment Canada 2013).	Low	There is no suitable habitat on the site to support this species. In addition, no individuals were observed during the field surveys.

Taxon	Common Name	Scientific Name	Endangered Species Act[1]	Species at Risk Act (Sch 1)[2]	Provincial (SRank)[3]	Habitat Requirements	Potential to Occur on Site or in the Study Area	Rationale for Potential to Occur on Site or in the Study Area
Vascular Plant	Butternut	*Juglans cinerea*	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).	Low	No individuals were observed during the field surveys.
Vascular Plant	Grooved yellow flax	*Linum sulcatum*	—	—	S2S3	In Ontario, grooved yellow flax grows in dry sandy open areas, such as prairies, woodlands or alvar habitat (Oldham and Brinker 2009).	Low	There is no suitable habitat on the site to support this species. In addition, no individuals were observed during the field surveys.
Vascular Plant	Hill's pondweed	*Potamogeton hillii*	SC	SC	S2S3	In Ontario, Hill's pondweed grows in the muddy substrates of cold, clear, slow-moving, calcareous streams, ditches, and ponds. It is found in water up to 1 m in depth. Often found near flow obstructions including the upstream side of road culverts, among stumps and fallen trees, or in shallow water among rushes and sedges (Parks Canada Agency 2014).	Low	There is no suitable habitat on the site to support this species. In addition, no individuals were observed during the field surveys.
Vascular Plant	Nuttall's waterweed	*Elodea nuttallii*	—	—	S3	In Ontario, Nuttall's waterweed is a submerged aquatic plan that grows in lakes, pools and rivers (Voss and Reznicek 2012).	Moderate	There is no suitable habitat on the site. Off-site, the Cataract Southwest PSW south of the study area may provide suitable aquatic habitat.
Vascular Plant	Schweinitz's sedge	*Carex schweinitzii*	—	—	S3	Schweinitz's sedge grows near moist woodland seepages, on riverbanks and in wooded swamps.	Moderate	This species was not observed during field surveys. However, the Coulterville Wetland Complexo off-site, in the northwest portion of the study area, may provide suitable growing habitat.

APPENDIX E

Wildlife List

Common Name	Scientific Name	SRANK[a]	GRANK[a]	ESA[b]
Amphibians				
American toad	*Anaxyrus americanus*	S5	G5	—
Gray treefrog	*Hyla versicolor*	S5	G5	—
Green frog	*Lithobates clamitans*	S5	G5	—
Northern leopard frog	*Lithobates pipiens*	S5	G5	—
Spring peeper	*Pseudacris crucifer*	S5	G5	—
Western chorus frog - Great Lakes St. Lawrence / Canadian Shield population	*Pseudacris triseriata*	S3	G5TNR	—
Wood frog	*Lithobates sylvaticus*	S5	G5	—
Arthropods				
Cabbage white	*Pieris rapae*	SNA	G5	—
Ebony jewelwing	*Calopteryx maculata*	S5	G5	—
Monarch	***Danaus plexippus***	**S2N,S4B**	**G4**	**SC**
Mourning cloak	*Nymphalis antiopa*	S5	G5	—
Twelve-spotted skimmer	*Libellula pulchella*	S5	G5	—
Birds				
Alder flycatcher	*Empidonax alnorum*	S5B	G5	—
American crow	*Corvus brachyrhynchos*	S5B	G5	—
American goldfinch	*Spinus tristis*	S5B	G5	—
American redstart	*Setophaga ruticilla*	S5B	G5	—
American robin	*Turdus migratorius*	S5B	G5	—
American woodcock	*Scolopax minor*	S4B	G5	—
Baltimore oriole	*Icterus galbula*	S4B	G5	—
Barn Swallow	***Hirundo rustica***	**S4B**	**G5**	**THR**
Black-and-white warbler	*Mniotilta varia*	S5B	G5	—
Black-billed cuckoo	*Coccyzus erythropthalmus*	S5B	G5	—
Black-capped chickadee	*Poecile atricapillus*	S5	G5	—
Belted kingfisher	*Megaceryle alcyon*	S4B	G5	—
Brown-headed cowbird	*Molothrus ater*	S4B	G5	—
Black-throated green warbler	*Setophaga virens*	S5B	G5	—
Blue jay	*Cyanocitta cristata*	S5	G5	—
Blue-winged warbler	*Vermivora cyanoptera*	S4B	G5	—
Bobolink	***Dolichonyx oryzivorus***	**S4B**	**G5**	**THR**
Canada goose	*Branta canadensis*	S5	G5	—
Cedar waxwing	*Bombycilla cedrorum*	S5B	G5	—
Chimney swift	***Chaetura pelagica***	**S3B**	**G4G5**	**THR**
Chipping sparrow	*Spizella passerina*	S5B	G5	—
Common grackle	*Quiscalus quiscula*	S5B	G5	—
Common yellowthroat	*Geothlypis trichas*	S5B	G5	—
Downy woodpecker	*Picoides pubescens*	S5	G5	—
Eastern bluebird	*Sialia sialis*	S5B	G5	—
Eastern kingbird	*Tyrannus tyrannus*	S4B	G5	—
Eastern meadowlark	***Sturnella magna***	**S4B**	**G5**	**THR**
Eastern phoebe	*Sayornis phoebe*	S5B	G5	—
Eastern towhee	*Pipilo erythrophthalmus*	S4B	G5	—
Eastern wood-pewee	***Contopus virens***	**S4B**	**G5**	**SC**
European starling	*Sturnus vulgaris*	SNA	G5	—
Field sparrow	*Spizella pusilla*	S4B	G5	—

Common Name	Scientific Name	SRANK[a]	GRANK[a]	ESA[b]
Grasshopper sparrow	***Ammodramus savannarum***	**S4B**	**G5**	**SC**
Gray Catbird	*Dumetella carolinensis*	S4B	G5	—
Great blue heron	*Ardea herodias*	S4	G5	—
Great crested flycatcher	*Myiarchus crinitus*	S4B	G5	—
Hairy woodpecker	*Picoides villosus*	S5	G5	—
Hooded merganser	*Lophodytes cucullatus*	S5B,S5N	G5	—
Horned lark	*Eremophila alpestris*	S5B	G5	—
House sparrow	*Passer domesticus*	SNA	G5	—
House wren	*Troglodytes aedon*	S5B	G5	—
Indigo bunting	*Passerina cyanea*	S4B	G5	—
Killdeer	*Charadrius vociferus*	S5B,S5N	G5	—
Mallard	*Anas platyrhynchos*	S5	G5	—
Mourning dove	*Zenaida macroura*	S5	G5	—
Mourning warbler	*Geothlypis philadelphia*	S4B	G5	—
Northern cardinal	*Cardinalis cardinalis*	S5	G5	—
Northern waterthrush	*Parkesia noveboracensis*	S5B	G5	—
Ovenbird	*Seiurus aurocapilla*	S4B	G5	—
Pileated Woodpecker	*Dryocopus pileatus*	S5	G5	—
Pine warbler	*Setophaga pinus*	S5B	G5	—
Purple finch	*Haemorhous purpureus*	S4B	G5	—
Red-bellied woodpecker	*Melanerpes carolinus*	S4	G5	—
Red-eyed vireo	*Vireo olivaceus*	S5B	G5	—
Red-tailed hawk	*Buteo jamaicensis*	S5	G5	—
Red-winged blackbird	*Agelaius phoeniceus*	S4	G5	—
Rock pigeon	*Columba livia*	SNA	G5	—
Rose-breasted grosbeak	*Pheucticus ludovicianus*	S4B	G5	—
Ruby-crowned kinglet	*Regulus calendula*	S4B	G5	—
Ruby-throated hummingbird	*Archilochus colubris*	S5B	G5	—
Ruffed grouse	*Bonasa umbellus*	S4	G5	—
Savannah sparrow	*Passerculus sandwichensis*	S4B	G5	—
Song sparrow	*Melospiza melodia*	S5B	G5	—
Tree swallow	*Tachycineta bicolor*	S4B	G5	—
Trumpeter swan	*Cygnus buccinator*	S4	G4	—
Turkey vulture	*Cathartes aura*	S5B	G5	—
White-breasted nuthatch	*Sitta carolinensis*	S5	G5	—
Wild turkey	*Meleagris gallopavo*	S5	G5	—
Wood duck	*Aix sponsa*	S5	G5	—
Wood thrush	***Hylocichla mustelina***	**S4B**	**G4**	**SC**
Yellow warbler	*Setophaga petechia*	S5B	G5	—
Mammals				
Beaver	*Castor canadensis*	S5	G5	—
Big Brown Bat	*Eptesicus fuscus*	S4	G5	—
Coyote	*Canis latrans*	S5	G5	—
Eastern Chipmunk	*Tamias striatus*	S5	G5	—
Eastern Red Bat	*Lasiurus borealis*	S4	G3G4	—
Eastern Small-footed Myotis	*Myotis leibii*	S2S3	G4	**END**

Common Name	Scientific Name	SRANK[a]	GRANK[a]	ESA[b]
Hoary Bat	*Lasiurus cinereus*	S4	G3G4	—
Little Brown Myotis	*Myotis lucifugus*	S3	G3	**END**
Raccoon	*Procyon lotor*	S5	G5	—
Silver-haired Bat	*Lasionycteris noctivagans*	S4	G3G4	—
White-tailed Deer	*Odocoileus virginianus*	S5	G5	—
Reptiles				
Eastern Gartersnake	*Thamnophis sirtalis sirtalis*	S5	G5T5	—
Snapping turtle	***Chelydra serpentina***	**S4**	**G5**	**SC**

[a] Ranks based upon determinations made by the Ontario Natural Heritage Information Centre

[b] Status: *Endangered Species Act,* 2007 O.Reg 242/08 last amended 27 March 2018 as END= Endangered; SC = Special Concern; THR = Threatened; UN = Undetermined.

APPENDIX F

Fish Habitat Survey Results

Appendix F: Fish Habitat of Watercourses within the CBM Caledon Study Area

Watercourse ID	Channel Unit #	Length (m)	UTM Coordinates		Habitat Type	Mean Wetted Width (m)	Mean Wetted Depth (m)			Mean Bankfull Width (m)	Mean Bankfull Depth (m)			Bank Height (m)		Bank Slope (%)		Riparian Vegetation Types (%)		Total Overhead Cover Type (%)		In-water Cover Types (%)		Aquatic Macrophytes Types (%)		Substrate Type(s) (%)	Water Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%)	pH	Specific Conductivity (µS/cm)
			Easting	Northing			RMID	MID	LMID		RMID	MID	LMID	LDB	RDB	LDB	RDB	LDB	RDB	LDB	RDB	LDB	RDB	LDB	RDB						
WC#1	1	75	576694	4853196	FL	0.7	0.06	0.03	0.05	1.0	0.22	0.14	0.14	0.15	0.15	30	30	SH (25) GF (75)	SH (10) GF (90)	OHV (90)	OHV (90)	S (10)	S (10)	EM(50) SM (50)	EM(50) SM (50)	CO (40) Si (55), Sa (5)	15.7	4.7	48.6	7.9	682
	2	25	–	–	R3	0.4	0.03	0.02	0.01	0.9	0.15	0.16	0.15	0.1	0.1	30	40	SH (70) GF (30)	SH (70) GF (30)	OHV (70)	OHV (70)	S (10)	S (10)	0	0	Si (10) Sa (60) Gr (20) Co (10)	–	–	–	–	–
	3	50	576774	4853135	Pond	18.0	0.65	1.00	0.65	–	–	–	–	0.3	0.5	10	30	GF (100)	GF (100)	0	0	AV (<1)	0	EM (100)	EM (100)	Si (95) Sa (5)	23.2	1.2	14.3	7.6	663
WC#2	1	230	578229	4851887	Marsh	50.0	0.70	1.00	0.70	–	–	–	–	–	–	–	–	GF (80) CF (5) SH (15)	GF (80) CF (5) SH (15)	OHV (40)	OHV (40)	WD (5) AV (70)	WD (5) AV (70)	EM (70) SM (30)	EM (70) SM (30)	Si (30) Org (70)	20.3	4.6	51.2	7.3	554
WC#3	–	–	578157	4853480	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
WC#4	–	–	576853	4854791	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
WC#5	1	10	576758	4854893	–	–	–	–	–	1.1	0.21	0.21	0.16	0.20	0.29	60	80	Lawn (100)	Lawn (100)	0	0	0	0	0	0	Si (30) Sa (70)	–	–	–	–	–
WC#6	–	–	576103	4851618	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
WC#7	Not visible from roadside due to tree cover. Not surveyed. Watercouse off-site.																														
WC#8	–	–	576318	4851404	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
WC#9	–	–	574763	4852962	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Note: All coordin Note: All coordinates are provided as Universal Transverse Mercator's (UTM) in NAD 83 Zone 17T.
- = no data; LDB = left downstream bank; RDB = right downstream bank; RMID = right middle; MID = middle; LMID = left middle; mg/L = milligrams per litre; µS/cm = microSiemens per centimetre; US = upstream; DS = downstream;FL= flat; R3 = grade 3 run; Sa = Sand; Si = Silt; Org = Organics; Co = Cobble; Gr = Gravel; OHV = Overhanging vegetation; WD = woody debris; AV = aquatic vegetation; S = substrate; EM= emergent SM = submergent; CF = coniferous forest; GF = grasses/forbes; SH = shrubs

APPENDIX G

Woodland Analysis

Table 1: Assessment of Woodland Significance under the PPS

Woodland Feature	Provincial Significance Criterion as defined in the NHRM (MNR 2010)							Significant Woodland
	Size	Interior Forest Habitat	Proximity / Connectivity	Proximity to Water / Water Protection	Age	Diversity	Rare Species	
Criteria	*Based on a forest cover of 30% in the northern zone of the Credit River watershed (CVC 2015), a woodland must be a minimum of 20 ha to be considered significant*	*Woodlands containing a minimum of 2 ha of interior forest habitat (measured as 100 m from the edge) are considered significant*	*Woodlands within 30 m of a significant natural area, or that connect two significant features, or that are within a defined natural heritage system are considered significant (and meets minimum size threshold of 5 ha)*	*Woodlands within 30 m of any hydrologic feature, or that are within sensitive watershed, are considered significant (and meets minimum size threshold of 2.5 ha)*	*Woodlands with trees 100 years or more in age are considered significant (and meets minimum size threshold of 2.5 ha)*	*Woodlands with a high native diversity or that represent a forest species that have declined south and east of Canadian shield are considered significant (and meets minimum size threshold of 0.5 ha)*	*Woodlands containing threatened, endangered, special concern, provincially or locally rare species are considered significant (and meets minimum size threshold of 0.5 ha)*	*Does the woodland meet sufficient criteria to be considered significant?*
A	No	No	No	No (Although the woodland is within 30 m of Tributary #1, it does not meet minimum size threshold)	No	No	No	**No**
B	Yes	Yes	Yes (Within the Greenbelt Plan NHS and Regional Greenlands System)	Yes (Tributary #1 flows through woodland; Overlaps with Coulterville Wetland Complex)	Yes (Portion of forest adjacent to Main Street mapped as >125 years old (CVC 1998))	No	Yes (Eastern wood-pewee, wood thrush, and likely SAR bats)	**Yes**
C	No	No	No	No	No	No	No (Although eastern wood-pewee was recorded in woodland, the woodland is not considered to provide significant habitat for this species)	**No**
D	Yes	No	Yes (Within the Greenbelt Plan NHS)	No	No	No	Yes (Eastern wood-pewee)	**Yes**
E	Yes	Yes	Yes (Within Regional Greenlands System)	No	Unknown	Unknown	Possible	**Yes**
F	No	No	No	No	No	No	Yes (Although eastern wood-pewee and SAR bats were recorded in woodland, the woodland is not considered to provide significant habitat for eastern wood-pewee or primary roost habitat for SAR bats)	**No**
G	No	No	No	No	No	No	Yes (Although eastern wood-pewee and SAR bats were recorded in woodland, the woodland is not considered to provide significant habitat for eastern wood-pewee or primary roost habitat for SAR bats)	**No**
H	No	No	No (Although woodland is within Regional Greenlands System and adjacent to PSW, it does not meet the minimum size threshold)	Yes (Within 30 m of Cataract Southwest PSW)	Unknown	Unknown	No	**Yes**

Table 2: Assessment of Core Woodlands under the Region of Peel Official Plan

Woodland Feature	Core Woodlands as defined in the Region's OP (Peel 2021)[1]	Core Woodland
	Size	
Criteria	*All woodlands that are a minimum of 30 ha in size are considered Core Woodlands in the Rural System (Section 2.3.2.3)*	*Does the woodland meet size criterion to be considered a Core Woodland?*
A	No	**No**
B	Yes	**Yes**
C	No	**No**
D	Yes	**Yes**
E	Yes	**Yes**
F	No	**No**
G	No	**No**
H	No	**No**

1 - As defined in Section 2.3.2.3 of the Region of Peel's Official Plan, for the purposes of mineral aggregate resource extraction uses within the Rural System, Core Woodlands are defined as all woodlands that are a minimum of 30 hectares in

Table 3: Assessment of Woodland Core Areas under the Town of Caledon Official Plan

Woodland Feature	Core Woodland as Defined in Table 1 of Region's OP (Peel 2021)[1]			Woodland Core Area
	Size	Age	Significant Species and Communities	
Criteria	*All woodlands that are a minimum of 16 ha in size are considered Woodland Core Areas in the Rural System*	*All woodlands that are a minimum of 4 ha in size containing at least 0.5 ha of woodland in native trees older than 100 years and having late successional characterics are considered Woodland Core Areas*	*All woodlands that are a minimum of 4 ha in size that supports any of the following are considered Woodland Core Areas:* *• G1-G3 or S1-S3 plant or animal species, or plant community* *• Species designated by COSEWIC or COSSARO as THR, END or SC* *• Forest communities: FOC1-2, FOM2-1, FOM2-2, FOM6-1, FOD1-1, FOD1-2, FOD1-4, FOD2-2, FOD2-3, or FOD6-2*	*Does the woodland meet one or more criteria to be considered a Woodland Core Area?*
A	No	No	No	**No**
B	Yes	Yes (Portion of forest adjacent to Main Street mapped as >125 years old (CVC 1998))	Yes (Eastern wood-pewee, wood thrush, and likely SAR bats)	**Yes**
C	No	No	Yes (Eastern wood-pewee)	**Yes**
D	Yes	No	Yes (Eastern wood-pewee)	**Yes**
E	Yes	Unknown	No	**No**
F	No	No	No (Although woodland provides habitat for SC and END species, it does not meet minimum size threshold)	**No**
G	No	No	Yes (Eastern wood-pewee, SAR bats)	**Yes**
H	No	Unknown	No	**No**

1 - As defined in Section 6.7.190, within and west of the Niagara Escarpment Plan Area, woodlands meeting one or more of the criteria for Core Woodlands from Table 1 of Region of Peel's Official Plan are considered a Woodland Core Area

Table 4: Assessment of Natural Area and Corridors Woodlands under the Region of Peel Official Plan

Woodland Feature[1]	Natural Area and Corridors Woodland as Defined in Table 1 of Region's OP (Peel 2021)[2]						Natural Area and Corridors Woodland
	Size	Age	Linkage	Proximity	Surface Water Quality	Significant Species and Communities	
Criteria	*All woodlands that are between 4 ha and 16 ha in size are considered a Natural Area and Corridors Woodland in the Rural System*	*All woodlands that are between 0.5 ha and 4 ha in size containing at least 0.5 ha of woodland in native trees older than 100 years and having late successional characterics are considered Natural Area and Corridors Woodland*	*All woodlands equal to or greater than 0.5 ha in size supporting a significant linkage function are considered Natural Area and Corridors Woodland*	*All woodlands equal to or greater than 0.5 ha in size within 100 m of another significant feature supporting a significant ecological relationship between the two features are considered Natural Area and Corridors Woodland*	*All woodlands equal to or greater than 0.5 ha in size within 30 m of a watercourse, surface water feature, or any wetland (as identified through OWES) are considered Natural Area and Corridors Woodland*	*All woodlands between 0.5 ha and 4 ha in size that supports any of the following are considered Woodland Core Areas:* *• G1-G3 or S1-S3 plant or animal species, or plant community* *• Species designated by COSEWIC or COSSARO as THR, END or SC* *• Forest communities: FOC1-2, FOM2-1, FOM2-2, FOM6-1, FOD1-1, FOD1-2, FOD1-4, FOD2-2, FOD2-3, or FOD6-2*	*Does the woodland meet one or more criteria to be considered a Natural Area and Corridors Woodland?*
A	No	No	No	No	Yes (Tributary #1, unevaluated wetlands #3, 4)	No	**Yes**
C	Yes	No	No	No	No	Yes (Eastern wood-pewee)	**Yes**
F	No	No	No	No	No	Yes (Eastern wood-pewee, SAR bats)	**Yes**
G	Yes	No	No	No	No	Yes (Eastern wood-pewee, SAR bats)	**Yes**
H	No	No	No	Yes (Adjacent to Cataract Southwest PSW and provides upland terrestrial habitat for wildlife in wetland)	Yes (Cataract Southwest PSW)	No	**Yes**

1 - Woodlands B, D and E aready meet the definition of a Core Woodland Area under the Region of Peel's Official Plan and therefore were not assessed.

2 - As defined in Section 2.3.2.9, woodlands meeting one or more criteria in Table 1 of the Region of Peel's Official Plan are considered Natural Area and Corridors Woodlands

APPENDIX H

SWH Evaluation

Wildlife Habitat	Habitat Criteria	Criteria Required to Confirm SWH	Candidate Habitat	Location	Assessment	SWH Confirmed?
Seasonal Concentration Areas of Animals						
1. Waterfowl Stopover and Staging Areas (Terrestrial)	•Fields with sheet water during spring (mid-March to May). •Agricultural fields with waste grains are commonly used by waterfowl, these are not considered SWH unless they have spring sheet water available	•Any mixed species aggregations of 100 or more individuals required.	CUM	Site (near CBBS15)	Does not meet size criterion. No indicator species observed.	No
			CUM	Site (south of Charleston Sideroad)	Does not meet size criterion. No indicator species observed.	No
2. Waterfowl Stopover and Staging Areas (Aquatic)	•Ponds, marshes, lakes, bays, coastal inlets, and watercourses used during migration. •Sewage treatment ponds and storm water ponds do not qualify as a SWH, however a reservoir managed as a large wetland or pond/lake does qualify.	•Aggregations of 100 or more of listed species for 7 days, results in > 700 waterfowl use days. •Areas with annual staging of ruddy ducks, canvasbacks, and redheads are SWH	MAS2-1/MAS3-1 (Cataract Southwest PSW)	Study Area	Does not meet size criterion. No indicator species observed.	No
3. Shorebird Migratory Stopover Area	•Shorelines of lakes, rivers and wetlands, including beach areas, bars and seasonally flooded, muddy and un-vegetated shoreline habitats. •Great Lakes coastal shorelines, including groynes and other forms of armour rock lakeshores, are extremely important for migratory shorebirds in May to mid-June and early July to October. •Sewage treatment ponds and storm water ponds do not qualify as a SWH.	•Presence of 3 or more of listed species and > 1000 shorebird use days during spring or fall migration period •Whimbrel stop briefly (<24hrs) during spring migration, any site with >100 Whimbrel used for 3 years or more is significant.	No suitable ecosites identified	—	—	—
4. Raptor Wintering Area	•The habitat provides a combination of fields and woodlands that provide roosting, foraging and resting habitats for wintering raptors. •Raptor wintering (hawk/owl)sites need to be > 20 ha with a combination of forest and upland •Least disturbed sites, idle/fallow or lightly grazed field/meadow (>15ha) with adjacent woodlands •Field area of the habitat is to be wind swept with limited snow depth or accumulation. •Eagle sites have open water and large trees and snags available for roosting	Studies confirm the use of these habitats by: •One or more Short-eared Owls or; One of more Bald Eagles or; •At least10 individuals and two of the listed hawk/owl species •To be significant a site must be used regularly (3 in 5 years) for a minimum of 20 days by the above number of birds	No suitable combination of forest and upland ecosites meeting size criterion identified	—	—	—
5. Bat Hibernacula	•Hibernacula may be found in caves, mine shafts, underground foundations and Karsts. •Active mine sites should not be considered as SWH	•All sites with confirmed hibernating bats are SWH	No suitable mine shafts, caves or karst features identified.	—	—	—
6. Bat Maternity Colonies	•Maternity colonies located in Mature deciduous or mixed forest stands with >10/ha large diameter (>25cm dbh) wildlife trees •Female Bats prefer wildlife tree (snags) in early stages of decay, class 1-3 or class 1 or 2 •Silver-haired Bats prefer older mixed or deciduous forest and form maternity colonies in tree cavities and small hollows. Older forest areas with at least 21 snags/ha are preferred •Buildings are not considered to be SWH •Maternity roosts are not found in caves and mines in Ontario	•Maternity Colonies with confirmed use by: >10 Big Brown Bats and >5 Adult Female Silver-haired Bats	FOD5-7 (Bat #4)	Site	<10 snags/ha and <5 silver-haired bats	No
			FOD5-2 (Bat #6)	Site	<10 snags/ha and <5 silver-haired bats	No
			FOD5-7 (Bat #7)	Site	<10 snags/ha and <5 silver-haired bats	No
			FOD8-1	Study Area (northwest)	<10 snags/ha of appropriate size.	No
			FOD5-2	Study Area (northwest)	Occasional snag trees were identified of small (10-24 cm DBH) and large (>50 cm DBH) sizes. However, overall snag density is <10/ha. Further, the acoustic survey station adjacent to this community recorded no big brown or silver-haired bats.	No

Wildlife Habitat	Habitat Criteria	Criteria Required to Confirm SWH	Candidate Habitat	Location	Assessment	SWH Confirmed?
7. Turtle Wintering Areas	•Over-wintering sites are permanent water bodies, large wetlands, and bogs or fens with adequate Dissolved Oxygen, water deep enough not to freeze, and soft mud substrates •Man-made ponds such as sewage lagoons or storm water ponds should not be considered SWH	•Presence of 5 over-wintering Midland Painted Turtles •One or more Northern Map Turtle or Snapping Turtle over-wintering within a wetland	SWM3-2 (T1)	Study Area (northwest)	Water of insufficient depth and permanancy to provide overwintering habitat. No turtles observed.	No
			MAS2-1/MAS3-1 (T2)	Study Area (south)	Water depth measured up to 1m with organic and silt substrates. May provide overwintering habitat. No turtles were observed, however, a predated nest likely belonging to snapping turtle was observed on rail trail adjacent to marsh. The larger marsh on east side of rail trail may provide higher quality habitat.	Possible
			Pond 1 (T3)	Site	Pond assessed not to provide suitable aquatic habitat. No turtles observed.	No
8. Reptile Hibernaculum	•For snakes, hibernation takes place in sites located below frost lines in burrows, rock crevices and other natural or naturalized locations. The existence of features that go below frost line; such as rock piles or slopes, old stone fences, and abandoned crumbling foundations assist in identifying candidate SWH. •Areas of broken and fissured rock are particularly valuable since they provide access to subterranean sites below the frost line •Wetlands can also be important over-wintering habitat in conifer or shrub swamps and swales, poor fens, or depressions in bedrock terrain with sparse trees or shrubs with sphagnum moss or sedge hummock ground cover. •Five-lined skink prefer mixed forests with rock outcrop openings providing cover rock overlaying granite bedrock with fissures	Studies confirming: •Presence of snake hibernacula used by a minimum of five individuals of a snake sp. or; individuals of two or more snake spp. •Congregations of a minimum of five individuals of a snake sp. or; individuals of two or more snake spp. near potential hibernacula (eg. foundation or rocky slope) on sunny warm days in Spring (Apr/May) and Fall (Sept/Oct) •Note: If there are Special Concern Species present, then site is SWH	Rocky pile with holes that extended below ground (near Bat #2)	Site	No snake species observed. The hole was eventually filled in by the landowner.	No
9. Colonially -Nesting Bird Breeding Habitat (Bank and Cliff)	•Any site or areas with exposed soil banks, undisturbed or naturally eroding. •Does not include man-made structures (bridges or buildings) or recently (2 years) disturbed soil areas, such as berms, embankments, soil or aggregate stockpiles. •Does not include a licensed/permitted Mineral Aggregate Operation	Studies confirming: •Presence of 1 or more nesting sites with 8 or more cliff swallow pairs and/or rough-winged swallow pairs during the breeding season	No suitable ecosites identified	—	—	—
10. Colonially -Nesting Bird Breeding Habitat (Tree/Shrubs)	•Nests in live or dead standing trees in wetlands, lakes, islands, and peninsulas. Shrubs and occasionally emergent vegetation may also be used.	Studies confirming: •Presence of 5 or more active nests of Great Blue Heron or other listed species	SWM3-2	Study Area (northwest)	No open water sustained throughout the year. Although one great blue heron was observed during field surveys, no nests were observed.	No
11. Colonially -Nesting Bird Breeding Habitat (Ground)	•Nesting colonies of gulls and terns are on islands or peninsulas associated with open water or in marshy areas. •Brewers Blackbird colonies are found loosely on the ground in or in low bushes in close proximity to streams and irrigation ditches within farmlands	Studies confirming: •Presence of > 25 active nests for Herring Gulls or Ring-billed Gulls, >5 active nests for Common Tern or >2 active nests for Caspian Tern. •Presence of 5 or more pairs for Brewer's Blackbird. •Any active nesting colony of one or more Little Gull, and Great Black-backed Gull is significant.	No suitable ecosites identified	—	—	—
12. Migratory Butterfly Stopover Areas	A butterfly stopover area will be a minimum of 10 ha in size with a combination of field and forest habitat present, and will be located within 5 km of Lake Ontario •The habitat should not be disturbed, fields/meadows with an abundance of preferred nectar plants and woodland edge providing shelter are requirements for this habitat	Studies confirm: •The presence of Monarch Use Days (MUD) during fall migration (Aug/Oct)	Site and study area not located within 5 km of Lake Ontario.	—	—	—
13. Landbird Migratory Stopover Areas	•Woodlots need to be >10 haí in size and within 5 km of Lake Ontario. •If multiple woodlands are located along the shoreline those Woodlands <2km from Lake Ontario are more significant •Sites have a variety of habitats; forest, grassland and wetland complexes •The largest sites are more significant	Studies confirm: •Use of the woodlot by >200 birds/day and with >35 spp with at least 10 bird spp. recorded on at least 5 different survey dates. This abundance and diversity of migrant bird species is considered above average and significant	Site and study area not located within 5 km of Lake Ontario.	—	—	—
14. Deer Yarding Areas	Mapped by MNRF	Mapped by MNRF	None identified	—	—	—

Wildlife Habitat	Habitat Criteria	Criteria Required to Confirm SWH	Candidate Habitat	Location	Assessment	SWH Confirmed?
15. Deer Winter Congregation Areas	Mapped by MNRF	Mapped by MNRF	None identified	—	—	—
Rare Vegetation Communities						
16. Cliffs and Talus Slopes	n/a	•Confirm any ELC Vegetation Type for Cliffs or Talus Slopes	No suitable ecosites identified	—	—	—
17. Sand Barren	A sand barren area >0.5ha in size	•Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics	No suitable ecosites identified	—	—	—
18. Alvar	An Alvar site > 0.5 ha in size	•Field studies that identify four of the five Alvar Indicator Species is Significant. •Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics). •The alvar must be in excellent condition and fit in with surrounding landscape with few conflicting land uses	No suitable ecosites identified	—	—	—
19. Old Growth Forest	Woodland areas 30 ha or greater in size or with at least 10 ha interior habitat assuming 100 m buffer at edge of forest	Field Studies will determine: •If dominant trees species of the ecosite are >140 years old, then the area containing these trees is SWH •The forested area containing the old growth characteristics will have experienced no recognizable forestry activities (cut stumps will not be present)	CUP3-1	Site (north)	Does not meet woodland size criterion. No indicator species observed.	No
			CUP3-2	Study Area (south)	Does not meet woodland size criterion. No indicator species observed.	No
			FOD5-1 / FOD4-11 / CUP3-1 / CUP3-3	Study Area (north)	Does not meet interior habitat size criterion. No indicator species observed.	No
			FOD5-2	Site (south)	Does not meet woodland size criterion. No indicator species observed.	No
			FOD5-7	Site (north)	Does not meet woodland size criterion. No indicator species observed.	No
			FOD5-7	Site (south)	Does not meet woodland size criterion. No indicator species observed.	No
			FOD8-1 / SWM3-2 / SWC1-1	Study Area (northwest)	Does not meet interior habitat size criterion. No indicator species observed.	No
20. Savannah	•No minimum size to site •Site must be restored or a natural site. Remnant sites such as railway right of ways are not considered to be SWH	Field studies confirm one or more of the Savannah indicator species listed in Appendix N should be present	No suitable ecosites identified	—	—	—
21. Tallgrass Prairie	•No minimum size to site. •Site must be restored or a natural site. Remnant sites such as railway right of ways are not considered to be SWH.	Field studies confirm one or more of the Prairie indicator species listed in Appendix N should be present	No suitable ecosites identified	—	—	—
22. Other Rare Vegetation Communities	ELC Ecosite codes that have the potential to be a rare ELC Vegetation Type as outlined in Appendix M of SWHTG	Field studies should confirm if an ELC Vegetation Type is a rare vegetation community	None identified	—	—	—

Wildlife Habitat	Habitat Criteria	Criteria Required to Confirm SWH	Candidate Habitat	Location	Assessment	SWH Confirmed?
Specialized Habitats of Wildlife considered SWH						
23. Waterfowl Nesting Area	•A waterfowl nesting area extends 120 m from a wetland (> 0.5 ha) or a wetland (>0.5ha) and any small wetlands (0.5ha) within 120m or a cluster of 3 or more small (<0.5 ha) wetlands within 120 m of each individual wetland where waterfowl nesting is known to occur. •Upland areas should be at least 120 m wide so that predators such as racoons, skunks, and foxes have difficulty finding nests. •Wood Ducks and Hooded Mergansers utilize large diameter trees (>40cm dbh) in woodlands for cavity nest sites.	Studies confirmed: •Presence of 3 or more nesting pairs for listed species excluding Mallards, or; •Presence of 10 or more nesting pairs for listed species including Mallards. •Any active nesting site of an American Black Duck is considered significant	CUP3-2 adjacent to MAS2-1/MAS3-1 (PSW)	Study Area (south)	Upland area (CUP3-2) not wide enough. Although three indicator species (wood duck, mallard, hooded merganser) were observed in the habitat, not enough nesting pairs were confirmed.	No
24. Bald Eagle and Osprey Nesting, Foraging and Perching Habitat	•Nests are associated with lakes, ponds, rivers or wetlands along forested shorelines, islands, or on structures over water. •Nests located on man-made objects are not to be included as SWH (e.g. telephone poles and constructed nesting platforms).	Studies confirm the use of these nests by: •One or more active Osprey or Bald Eagle nests in an area	—	—	No suitable ecosites identified	No
25. Woodland Raptor Nesting Habitat	All natural or conifer plantation woodland/forest stands >30ha with >10ha of interior habitat. Interior habitat determined with a 200m buffer	Studies confirm: •Presence of 1 or more active nests from species list is considered significant	CUP3-1	Site (north)	Does not meet woodland size criterion. No indicator species observed.	No
			CUP3-2	Study Area (south)	Does not meet woodland size criterion. No indicator species observed.	No
			FOD5-1 / FOD4-11 / CUP3-1 / CUP3-3	Study Area (north)	Does not meet interior habitat size criterion. No indicator species observed.	No
			FOD5-2	Site (south)	Does not meet woodland size criterion. No indicator species observed.	No
			FOD5-7	Site (north)	Does not meet woodland size criterion. No indicator species observed.	No
			FOD5-7	Site (south)	Does not meet woodland size criterion. No indicator species observed.	No
			FOD8-1 / SWM3-2 / SWC1-1	Study Area (northwest)	Does not meet interior habitat size criterion. No indicator species observed.	No
26. Turtle Nesting Areas	•Best nesting habitat for turtles are close to water and away from roads and sites less prone to loss of eggs by predation from skunks, raccoons or other animals. •For an area to function as a turtle-nesting area, it must provide sand and gravel that turtles are able to dig in and are located in open, sunny areas. Nesting areas on the sides of municipal or provincial road embankments and shoulders are not SWH. •Sand and gravel beaches adjacent to undisturbed shallow weedy areas of marshes, lakes, and rivers are most frequently used	Studies confirm: •Presence of 5 or more nesting Midland Painted Turtles •One or more Northern Map Turtle or Snapping Turtle nesting is a SWH	MAS2-1 / MAS3-1 (Cataract Southwest PSW)	Study Area (south)	A predated turtle nest likely belonging to snapping turtle as observed on the rail trail adjacent to the marsh. Although the trail is a publicly accessible recreational trail, vehicles are prohibited and potential for mortality is low.	Yes
27. Seeps and Springs	•Any forested area (with <25% meadow/field/pasture) within the headwaters of a stream or river system	Field Studies confirm: •Presence of a site with 2 or more seeps/springs	None identified	-	-	-
28. Amphibian Breeding Habitat (Woodland)	•Presence of a wetland, pond or woodland pool (including vernal pools) >500m2 (about 25m diameter) within or adjacent (within 120m) to a woodland (no minimum size). Some small wetlands may not be mapped and may be important breeding pools for amphibians. •Woodlands with permanent ponds or those containing water in most years until mid-July are more likely to be used as breeding habitat	Studies confirm; •Presence of breeding population of 1 or more of the listed newt/salamander species or •2 or more of the listed frog species with at least 20 individuals (adults or eggs masses) or •2 or more of the listed frog species with Call Level Codes of 3	SWC1-1 (ACC1)	Site	No indicator species observed	No
			FOD5-7 (ACC4)	Site	No indicator species observed	No
			ACC8	Study Area (north)	Although two indicator species were observed in the habitat (wood frog and spring peeper), there was insufficient activity.	No

Wildlife Habitat	Habitat Criteria	Criteria Required to Confirm SWH	Candidate Habitat	Location	Assessment	SWH Confirmed?
29. Amphibian Breeding Habitat (Wetlands)	•Wetlands>500m2 (about 25m diameter),supporting high species diversity are significant •Presence of shrubs and logs increase significance of pond for some amphibian species because of available structure for calling, foraging, escape and concealment from predators. •Bullfrogs require permanent water bodies with abundant emergent vegetation.	Studies confirm; •Presence of breeding population of 1 or more of the listed newt/salamander species or •2 or more of the listed frog species with at least 20 individuals (adults or eggs masses) or •2 or more of the listed frog species with Call Level Codes of 3 or •Wetland with confirmed breeding Bullfrogs are significant.	Pond/Marsh (ACC2)	Site	Although two indicator species were observed in the habitat (American toad and northern leopard frog), there was insufficient activity.	No
			ACC3	Site	No indicator species observed	No
			MAS21-1 / MAS3-1 (ACC5)	Study Area (south)	No indicator species observed	No
			Marsh (ACC6)	Study Area (south)	Although four indicator species were observed in the habitat (American toad, northern leopard frog, gray treefrog, and green frog), there was insufficient activity.	No
30. Woodland Area-Sensitive Bird Breeding Habitat	•Habitats where interior forest breeding birds are breeding, typically large mature (>60 yrs old) forest stands or woodlots >30 ha. •Interior forest habitat is at least 200 m from forest edge habitat	Studies confirm: •Presence of nesting or breeding pairs of 3 or more of the listed wildlife species. •Note: any site with breeding Cerulean Warblers or Canada Warblers is to be considered SWH.	FOD5-1 / FOD4-11 (CBBS10)	Study Area (north)	Does not meet size criterion. One indicator species observed (black-throated green warbler).	No
			FOD5-2 (CBBS07)	Site	Does not meet size criterion. No indicator species observed.	No
			FOD5-7 (CBBS12)	Site (north)	Does not meet size criterion. No indicator species observed.	No
			FOD5-7 (CBBS04)	Site (south)	Does not meet size criterion. No indicator species observed.	No
			FOD8-1 / SWM3-2 / SWC1-1 (CBBS18, 19, 20)	Study Area (northwest)	Although woodland is greater than 30 ha, there is limited interior forest habitat in the study area. One indicator species observed (ovenbird).	No
31. Marsh Breeding Bird Habitat	•Nesting occurs in wetlands. •All wetland habitat is to be considered as long as there is shallow water with emergent aquatic vegetation present •For Green Heron, habitat is at the edge of water such as sluggish streams, ponds and marshes sheltered by shrubs and trees. Less frequently, it may be found in upland shrubs or forest a considerable distance from water	Studies confirm: •Presence of 5 or more nesting pairs of Sedge Wren or Marsh Wren, or •1 pair of Sandhill Cranes; or •breeding by any combination of 5 or more of the listed species •Note: any wetland with breeding of 1 or more Black Terns, Trumpeter Swan, Green Heron or Yellow Rail is SWH	MAS2-1/MAS3-1 (CBBS01)	Study Area (south)	MAS ecosites are only assessed for use by the indicator species green heron. No green herons were observed.	No
32. Open Country Bird Breeding Habitat	•Large grassland areas (includes natural and cultural fields and meadows) >30 ha •Grasslands not Class 1 or 2 agricultural lands, and not being actively used for farming (i.e. no row cropping or intensive hay or livestock pasturing in the last 5 years) •Grassland sites considered significant should have a history of longevity, either abandoned fields, mature hayfields and pasturelands that are at least 5 years or older.	Field Studies confirm: •Presence of nesting or breeding of 2 or more of the listed species •A field with 1 or more breeding Short-eared Owls is to be considered SWH	CUM	Site (near CBBS15)	Does not meet size criterion. Field is used as pasture for livestock and therefore does not meet grassland criteria. One indicator species (Savannah sparrow) observed.	No
			CUM	Site (south of Charleston Sideroad)	Does not meet size criterion. One indicator species (Savannah sparrow) observed.	No

Wildlife Habitat	Habitat Criteria	Criteria Required to Confirm SWH	Candidate Habitat	Location	Assessment	SWH Confirmed?
33. Shrub/Early Successional Bird Breeding Habitat	Large field areas succeeding to shrub and thicket habitats>10ha in size. •Shrub land or early successional fields, not class 1 or 2 agricultural lands, not being actively used for farming (i.e. no row-cropping, haying or live-stock pasturing in the last 5 years) •Shrub thicket habitats (>10 ha) are most likely to support and sustain a diversity of these species •Shrub and thicket habitat sites considered significant should have a history of longevity, either abandoned fields or pasturelands	Field Studies confirm: •Presence of nesting or breeding of 1 of the indicator species and at least 2 of the common species •A habitat with breeding Yellow-breasted Chat or Golden-winged Warbler is to be considered as Significant Wildlife Habitat	CUT (CBBS17)	Study Area (west)	Does not meet size criterion. No indicator or common species observed.	No
			CUS (CBBS09)	Study Area (north)	Does not meet size criterion. No indicator species observed. Two common species (Field sparrow, Eastern towhee) observed.	No
			CUS (CBBS06)	Study Area (southeast)	Does not meet size criterion. No indicator species observed. One common species (Field sparrow) observed.	No
			CUW (CBBS05)	Site (southeast)	Does not meet size criterion. No indicator species observed. One common species (Field sparrow) observed.	No
			CUW/CUS (CBBS03)	Site (south)	Does not meet size criterion. No indicator species observed. One common species (Eastern towhee) observed.	No
34. Terrestrial Crayfish	Wet meadow and edges of shallow marshes (no minimum size) should be surveyed for terrestrial crayfish. •Constructs burrows in marshes, mudflats, meadows, the ground can't be too moist. Can often be found far from water.	Studies Confirm: •Presence of 1 or more individuals of species listed or their chimneys (burrows) in suitable meadow marsh, swamp or terrestrial sites	MAS2-1 / MAS3-1	Study Area (south)	No chimneys observed.	No
			SWM3-1	Study Area (northwest)	No chimneys observed.	No
			SWT2-2	Site (northwest)	No chimneys observed.	No
Habitat for Species of Conservation Concern						
			CUW/CUS (CBBS03)	Site (south)	One male eastern wood-pewee singing on one date (possible breeder). Based on the low number of individuals observed and the very small habitat size compared to other larger features available in the immediate landscape, this community is not considered to provide significant breeding habitat.	No
			FOD5-7 (CBBS04)	Site (south)	One male eastern wood-pewee singing on one date (possible breeder). Based on the low number of individuals observed and the very small habitat size compared to other larger features available in the immediate landscape, this community is not considered to provide significant breeding habitat.	No
			FOD5-2 (CBBS07)	Site	One male eastern wood-pewee singing on one date (possible breeder). Based on the low number of individuals observed and the very small habitat size compared to other larger features available in the immediate landscape, this community is not considered to provide significant breeding habitat.	No

Wildlife Habitat	Habitat Criteria	Criteria Required to Confirm SWH	Candidate Habitat	Location	Assessment	SWH Confirmed?
35. Special Concern and Rare Wildlife Species	When an element occurrence is identified within a 1 or 10 km grid for a Special Concern or provincially Rare species; linking candidate habitat on the site needs to be completed to ELC Ecosites	Studies Confirm: •Assessment/inventory of the site for the identified special concern or rare species needs to be completed during the time of year when the species is present or easily identifiable. •The area of the habitat to the finest ELC scale that protects the habitat form and function is the SWH, this must be delineated through detailed field studies. The habitat needs be easily mapped and cover an important life stage component for a species e.g. specific nesting habitat or foraging habitat.	FOD5-7 (CBBS12)	Site (north)	Male eastern wood-pewee singing on two dates (probable breeder). Based on the low number of individuals observed and the small habitat size compared to other larger features available in the immediate landscape, this community is not considered to provide significant breeding habitat.	No
			FOD8-1 / SWM3-2 / FOD5-2 (CBBS18, 19, 20)	Study Area (northwest)	Male eastern wood-pewee singing on two dates (probable breeder). Given the large size of the woodland compared to others in the immediate landscape, this community is considered to provide significant breeding habitat.	Yes
			FOD8-1 / SWM3-2 (CBBS18, 19)	Study Area (northwest)	Male wood thrush singing on two dates (probable breeder). Given the large size of the woodland compared to others in the immediate landscape, this community is considered to provide significant breeding habitat.	Yes
			FOD5-1 / FOD4-11 / CUP3-3 (CBBS10)	Study Area (north)	Male eastern wood-pewee singing on two dates (probable breeder). Given the large size of the woodland compared to others in the immediate landscape, this community is considered to provide significant breeding habitat.	Yes
			Fields south of Mississauga Road (CBBS03)	Study Area (south)	Incidental grasshopper sparrow observed (possible breeder). Habitat appears to be a large meadow with potetnial to support several individuals. Baed on the availability of grassland habitat in the immediate landscape, this community is considered to provide significant breeding habitat.	Yes
			MAS2-1 / MAS3-1 (Cataract Southwest PSW)	Study Area (south)	A predated turtle nest likely belonging to snapping turtle as observed on the rail trail adjacent to the marsh. There is potential that the marshes on both sides of the rail trail provide aquatic habitat for snapping turtle. Based on the sensitivity of the wetland feature as a PSW, it is also considered to provide significant habitat for snapping turtle.	Yes

Wildlife Habitat	Habitat Criteria	Criteria Required to Confirm SWH	Candidate Habitat	Location	Assessment	SWH Confirmed?
			MAS2-1 / MAS3-1 (Cataract Southwest PSW)	Study Area (south)	Two western chorus frog individuals were identified in the marsh during anural call count surveys. However, the marsh is not within mapped critical habitat according to the federal recovery strategy. Therefore, it is not considered significant habitat for this species.	No
Animal Movement Corridors						
36. Amphibian Movement Corridors	Movement corridors between breeding habitat and summer habitat Movement corridors must be determined when Amphibian breeding habitat is confirmed as SWH from Table 1.2.2 (Amphibian Breeding Habitat –Wetland) of this Schedule	•Field Studies must be conducted at the time of year when species are expected to be migrating or entering breeding sites. •Corridors should consist of native vegetation, with several layers of vegetation. Corridors unbroken by roads, waterways or bodies, and undeveloped areas are most significant •Corridors should have at least 15m of vegetation on both sides of waterway or be up to 200m wide of woodland habitat and with gaps <20m •Shorter corridors are more significant than longer corridors, however amphibians must be able to get to and from their summer and breeding habitat.	Amphibian movement corridors is only required to be assessed where amphibian breeding SWH is identified. No amphibian breeding SWH was identified on the site or in the study area.	—	—	—
37. Deer Movement Corridors	Movement corridor must be determined when Deer Wintering Habitat is confirmed as SWH from Table 1.1 of this schedule. •A deer wintering habitat will have corridors that the deer use during fall migration and spring dispersion •Corridors typically follow riparian areas, woodlots, areas of physical geography (ravines, or ridges).	•Studies must be conducted at the time of year when deer are migrating or moving to and from winter concentration areas . •Corridors that lead to a deer wintering habitat should be unbroken by roads and residential areas. •Corridors should be at least 200m wide with gaps <20m and if following riparian area with at least 15m of vegetation on both sides of waterway. Shorter corridors are more significant than longer corridors	Deer movement corridors is only required to be assessed where deer wintering habitat is identified. No deer wintering habitat was identified on the site or in the study area.	—	—	—

APPENDIX I

Curriculum Viate

Golder Associates Ltd. – Mississauga

Principal, Senior Ecologist

Heather Melcher is a Principal, Senior Ecologist and Project Manager/Director with Golder Associates. Heather has 20 years of experience working in a number of sectors including transportation, oil and gas, transmission, land development, power, aggregates and mining. Her experience lies in designing, managing and carrying out environmental impact assessments within provincial and federal frameworks and environmental land use policies for projects of various size and complexity. She leads a team of ecologists and multi-disciplinary project teams to holistically assess potential project impacts through integration of components. Heather works closely with provincial and federal agencies to help her clients navigate changing planning and species at risk (SAR) legislation. Heather has experience developing rehabilitation plans for disturbed sites and biodiversity plans that integrate the ecology of a smaller site into the regional system as well as developing compensation habitat plans and mitigation plans for SAR. Heather is also a recognized expert witness for Local Planning Appeal Tribunal (LPAT) hearings in Ontario.

Education

M.Sc. Applied Marine Science, University of Plymouth, Devon, UK, 1998

B.Sc. (Honours) Biology, Laurentian University, Sudbury, Ontario, 1996

Certifications

PADI Master Scuba Diver Trainer, 2000

Small Craft Boat Operator, 2003

Small Non-pleasure Vessel Basic Safety - MED A3, 2011

Canadian Red Cross First Aid and CPR, 2012

WHMIS Training, 1990, 2001, 2004, 2016

Languages

English – Fluent

Employment History

Golder Associates Ltd. – Mississauga, Ontario
Principal, Senior Ecologist (2004 to Present)

Project manager, project director and/or technical lead or advisor on multi-disciplinary projects of varying size and complexity. Leads a team of ecologists in Ontario and responsible for business development as a global client lead.

ESG International – Guelph, Ontario
Ecologist/Environmental Planner (2002 to 2003)

Specialized in resource management and land use planning. Worked with clients, residential and commercial land developers, land planners and regulatory agencies to obtain permits and approvals, specifically within the framework of Niagara Escarpment and Oak Ridges Moraine legislation. Compiled, assessed and reported on marine data collected for international projects.

CBCL Ltd – Halifax, Nova Scotia
Ecologist/Environmental Planner (2001 to 2002)

Intermediate project manager responsible for designing and implementing environmental effects monitoring, environmental impact assessment, and natural heritage projects. Developed and implemented marine and freshwater fisheries and benthic investigations, aquatic habitat assessments, and water quality and sediment assessments. Liaised with clients and regulatory agencies (federal and provincial), to obtain development permits and approvals.

PROJECT EXPERIENCE – CONSTRUCTION MATERIALS

Scotian Materials Limited
Halifax, Nova Scotia, Canada

Senior Technical Lead (biophysical) for the provincial environmental assessment to support the expansion of an existing quarry. Studies completed to support the project included fish and fish habitat, species at risk, flora and fauna and wetland surveys. The technical lead for the impact assessment for the natural environment and the completion of supporting permit/approval applications. Scope included the completion of wetland and wildlife management plans.

EWL Ltd., Gordon Lake Quarry and Borrow Area
Kenora, Ontario, Canada

Natural environment component lead for permit applications under the Aggregate Resources Act (ARA). The aggregate areas are in support of rehabilitation activities associated with the decommissioning of the former Gordon-Werner Lake Mine. Coordinated aquatic and terrestrial field data collection and analysis, interpreted and integrated data with hydrogeological and surface water components, and developed a Natural Environment Level 1/2 (NEL 1/2) technical report. Responsible for negotiations with the Ministry of Natural Resources and Forestry (MNRF) and Ministry of Environment, Conservation and Parks (MECP) regarding woodland caribou and SAR bats. Prepared and submitted permitting applications under the Endangered Species Act (ESA), developed mitigation plans and coordinated with construction team.

Lafarge Canada Inc., McGill Pit
Kemptville, Ontario, Canada

Natural environment component lead for a below water pit licence application under the ARA. Coordinated aquatic and terrestrial field data collection and analysis, interpreted and integrated data with hydrogeological and surface water components and completed a comprehensive, integrated impact assessment. Developed progressive and final rehabilitation plans, participated in agency and public consultation and produced an NEL 1/2 report and municipal Environmental Impact Study (EIS) report. Led negotiations with the MNRF regarding SAR issues and developed mitigation and habitat compensation plans for butternut. Participated in an Ontario Municipal Board (OMB) hearing as an expert witness.

Colacem Cement
L'Orignal, Ontario, Canada

Natural environment component lead for the Colacem Cement Plant assessment. Designed and coordinated aquatic and terrestrial field data collection and analysis, interpreted and integrated data with physical resource components. Developed an EIS for the municipal approval process. Worked with MNRF and South Nation Conservation on significant natural heritage feature and SAR issues and with Fisheries and Oceans Canada (DFO) on a Fisheries Act authorization for removal of fish habitat. Participated in a LPAT (formerly the OMB) hearing as an expert witness.

CBM Aggregates (a division of St. Marys Cement Inc. (Canada)), Dance Pit Extension
North Dumfries, Ontario, Canada

Project manager and natural environment technical advisor for an above water pit licence application under the ARA. Worked with the natural environment component lead to collect, analyse, interpret and integrate terrestrial and aquatic data with hydrogeological and surface water components. Developed a rehabilitation plan, consulted with the Grand River Conservation Authority, the MNRF and MECP, the Region of Waterloo, the Municipality of North Dumfries and the City of Cambridge, and participated in agency and public consultation. Coordinated and managed the activities of a multi-disciplinary team including hydrogeologists, surface water engineers, noise, air quality, visual assessment and vibration specialists, public consultation and Indigenous community engagement specialists, and archaeologists. Managed and tracked overall project budget and schedule.

CBM Aggregates (a division of St. Marys Cement Inc. (Canada)), Lanci Pit Expansion
Aberfoyle, Ontario, Canada

Project manager and natural environment technical advisor for an above water pit licence application under the ARA. Worked with the natural environment component lead to analyse, interpret and integrate terrestrial and aquatic data with hydrogeological and surface water components. Developed a rehabilitation plan, consulted with the Grand River Conservation Authority, the MNRF, the municipality, and participated in agency and public consultation. Coordinated and managed the activities of a multi-disciplinary team including hydrogeologists, surface water engineers, noise scientists, archaeologists, and an Indigenous Community engagement team. Managed and tracked overall project budget and schedule.

Cavanagh Construction Ltd., Henderson II Quarry
Ottawa, Ontario, Canada

Natural environment component lead for a below water quarry licence application under the ARA. Coordinated aquatic and terrestrial field data collection and analysis, interpreted and integrated data with hydrogeological and surface water components and completed a comprehensive integrated impact assessment. Developed a rehabilitation plan, participated in agency and public consultation and developed an NEL 1/2 report and municipal EIS report. Led negotiations with the MNRF regarding SAR issues and developed compensation plans.

Tackaberry Sand and Gravel Ltd., Perth Quarry
Perth, Ontario, Canada

Natural environment component lead for a below water quarry licence application under the ARA. Coordinated aquatic and terrestrial field data collection and analysis, interpreting and integrated data with hydrogeological and surface water components. Developed a rehabilitation plan, participated in agency and public consultation and developed an NEL 1/2 report and municipal EIS. Led negotiations with the MNRF regarding SAR issues and developed compensation plans for the removal of habitat. Worked with Rideau Valley Conservation Authority and Mississippi Valley Conservation Authority on headwater drainage feature assessment and mitigation plans.

Greenfield Aggregates Sherk Pit
Waterloo, Ontario, Canada

Natural environment component lead for a below water pit licence application under the ARA. Analysed and integrated terrestrial and aquatic data with hydrogeological and surface water components, completed a comprehensive and integrated impact assessment. Developed a rehabilitation plan and an NEL 1/2 report and municipal EIS report. Participated in consultation with the Region and the Ecological and Environmental Advisory Committee (EEAC).

Lafarge Canada Inc., French Settlement Pit
Ottawa, Ontario, Canada

Natural environment component lead for a below water pit licence application under the ARA. Coordinated aquatic and terrestrial field data collection and analysis. Interpreting and integrated data with hydrogeological and surface water components. Developed a progressive and final rehabilitation plan and an NEL 1/2 report and municipal EIS report. Consulted with regulatory agencies and participated in public consultation process.

Lafarge Canada Inc., Sunningdale Pit
London, Ontario, Canada

Natural environment component lead for a below water pit licence application under the ARA. Coordinated aquatic and terrestrial field data collection and analysis. Interpreting and integrated data with hydrogeological and surface water components. Completed a comprehensive and integrated impact assessment. Developed a progressive and final rehabilitation plan and an NEL 1/2 report and EIS. Consulted with regulatory agencies and participated in public consultation process. Developed mitigation and habitat compensation plans under the ESA for barn swallow.

Lafarge Canada Inc., Limebeer Pit
Caledon, Ontario, Canada

Project manager and natural environment component lead for a below water pit licence application under the ARA. Coordinated aquatic and terrestrial field data collection and analysis. Interpreting and integrated data with hydrogeological and surface water components. Completed a comprehensive and integrated impact assessment. Developed a progressive and final rehabilitation plan and an NEL 1/2 report and EIS. Consulted with regulatory agencies, participated in public consultation process. Coordinated and managed the activities, schedule and budget of a multi-disciplinary team including hydrogeologists, groundwater modelling experts, surface water engineers, and noise and air quality specialists.

Lafarge Canada Inc., Avening Pit Extension
Creemore, Ontario, Canada

Project manager and natural environment component lead for an above water pit licence application under the ARA. Coordinated aquatic and terrestrial field data collection and analysis. Interpreting and integrated data with hydrogeological and surface water components. Completed a comprehensive and integrated impact assessment. Developed a progressive and final rehabilitation plan and an NEL 1/2 report and EIS. Coordinated and managed the activities, schedule and budget of a multi-disciplinary team including hydrogeologists, surface water engineers, and noise and air quality specialists.

Floyd Preston Ltd.
Eastern Ontario, Canada

Natural environment component lead for a quarry licence application under the ARA. Liaised with client, coordinated field data collection, mentored intermediate staff in data analysis and interpretation and prepared an NEL 1 report.

PROJECT EXPERIENCE – SPECIES AT RISK

EWL Management Ltd Madawaska Mine Decommissioning
Faraday, Ontario, Canada

Natural environment component lead for SAR permitting for bats, including little brown myotis (Myotis lucifugus), northern myotis (Myotis septentrionalis) and tricolor bat (Perimyotis subflavus). Prepared and submitted permitting documents under the ESA, led consultation with the MNRF and MECP, developed a mitigation plan and provided direction to the construction team.

TransCanada - Various Sites in Ontario
Ontario, Canada

Natural environment component lead for multi-year annual SAR and migratory bird monitoring at numerous sites across Ontario since 2012. In support of TransCanada's right-of-way maintenance brushing program. Provide SAR advice and liaise with MNRF to develop construction monitoring protocols for SAR and migratory birds. Lead crews to complete monitoring on an annual basis.

Lafarge Canada Ltd.
Various Locations, Ontario, Canada

Natural environment component lead for multi-year annual SAR monitoring and reporting at aggregate sites across Ontario following registration. Species surveys include Blanding's turtle, loggerhead shrike, least bittern and gray ratsnake. Developed survey protocols with several MNRF district offices and lead crews to complete monitoring.

Leader Resources Services Ltd.
Various Locations, Ontario, Canada

Project manager for a number of wind power projects under the Ontario Renewable Energy Approvals Act (REA). Worked with the client and the MNRF to develop protocols and coordinate field surveys. Completed and submitted ESA permitting applications and compensation plans.

Lafarge Canada Ltd.
Various Locations, Ontario, Canada

Project manager and natural environment component lead for a number of licence applications for proposed new and expanded aggregate extraction operations (pits and quarries) in Ontario under the ARA. Developed survey protocols, consulted with the MNRF, registered for activities under the ESA (Notice of Activity), completed Information Gathering Forms (IGF), prepared and submitted permit applications and developed compensation plans.

PROJECT EXPERIENCE – TRANSMISSION

Hydro One Circuit B5C/B6C Line Refurbishment EA
Westover to Burlington, Ontario, Canada

Natural environment component lead for a provincial Class Environmental Assessment for a 40 km line refurbishment. Designed the field program (terrestrial and aquatic), analysed and integrated data with other physical resource disciplines. Completed a comprehensive and integrated impact assessment. Led consultation with regulatory agencies including two district MNRF offices, Hamilton Conservation Authority, Conservation Halton, Grand River Conservation Authority, Niagara Escarpment Commission, and participating in the public consultation process. Provided input into alternatives assessment for temporary hydro line bypass and developed reports.

Wataynikaneyap Power Phase 2 Transmission Line
Northwestern Ontario, Canada

Senior advisor and technical reviewer for the wildlife component of permitting. Worked with the permitting lead and the wildlife component lead to design field programs, consult and negotiate with the MNRF and Environment and Climate Change Canada/Canadian Wildlife Service (ECCC/CWS), and prepare technical supporting documents for permitting and permit applications under the ESA, the Public Lands Act, and the federal Species at Risk Act (SARA). Provided senior leadership and technical guidance and review for all deliverables.

Nextbridge East-West Tie Transmission Line
Wawa to Thunder Bay, Ontario, Canada

Senior advisor and technical reviewer for wildlife permitting for the construction and operation of a 450 km transmission corridor. Worked with the permitting lead and the wildlife component lead to design field programs, consult and negotiate with the MNRF and ECCC/CWS, and prepare technical supporting documents for permitting and permit applications under the ESA, the Public Lands Act, and the SARA. Provided senior leadership and technical guidance and review for all deliverables.

PROJECT EXPERIENCE – TRANSPORTATION

MTO Calamity Creek Highway 11 Culvert Replacement Group 'C' Class EA
Temiskaming, Ontario, Canada

Acting environmental manager for the replacement of the Calamity Creek Culvert (47-273/C) located on Highway 11 in the City of Temiskaming Shores, District of Temiskaming. Regular consultation with the MTO, the contractor and Golder's internal team including ecologists, surface water engineers, archaeologists, cultural heritage specialists, and hydrogeologists. Deliverables included a Consultation Plan, an Environmental Screening Document (ESD), which documented the results of all factor-specific environmental studies and consultation undertaken for the project, and an Environmental Management Plan (EMP), which detailed how the environmental mitigation and monitoring commitments made in the ESD would be implemented during construction.

Ninth Line Municipal Class EA
Halton Region, Ontario, Canada

Senior natural environment technical lead. Led a team of ecologists, analysed and interpreted terrestrial and aquatic data and completed impact assessment. Liaised with prime engineering firm and agencies including the municipality and the MNRF. Provided senior technical review of natural environment study report and permitting documents.

Regional Road 57 Municipal Class EA
Clarington, Ontario, Canada

Senior natural environment technical lead. Led a team of ecologists, analysed and interpreted terrestrial and aquatic data and completed impact assessment. Liaised with prime engineering firm and agencies. Provided senior technical review of natural environment study report.

Markham GO Station Road Realignment Municipal Class EA
Markham, Ontario, Canada

Senior natural environment technical lead. Led a team of ecologists, analysed and interpreted terrestrial and aquatic data and completed impact assessment. Liaised with prime engineering firm and agencies. Provided senior technical review of natural environment study report.

PROJECT EXPERIENCE – SERVICING/INFRASTRUCTURE

Peel Wastewater Treatment Plan
Region of Peel, Ontario, Canada

Project manager and senior advisor and technical reviewer for the natural environment component for a Schedule C Environmental Assessment for the capacity expansion of the central Mississauga wastewater system. Managed a multi-disciplinary team including natural environment, archaeology, cultural heritage, and geotechnical engineering. Designed the natural environment field program and worked with the component lead to analyse and intepret data. Provided senior leadership and technical guidance and review for all natural environment deliverables.

Niagara Falls Wastewater Servicing Strategy
Niagara Falls, Ontario, Canada

Natural environment component lead for a Class Environmental Assessment for a Niagara Falls wastewater servicing strategy for a new south Niagara Falls wastewater treatment plant. Developed ecological matrices for determining the short-list of alternative sites, including constraints anlayses, designed field program and managed a team of ecologists. Analysed, interpreted and integrated data with physical resource components. Completed impact assessment, developed reports and participated in the public consultation process.

Clarksburg Master Servicing Plan
Clarksburg, Ontario, Canada

Senior advisor and technical reviewer for the natural environment component for a Class Environmental Assessment. Worked with the component lead to design field program and analyse and interpret data. Provided senior leadership and technical guidance and review for all deliverables.

Cambridge Zone 3
Cambridge, Ontario, Canada

Senior advisor and technical reviewer for the natural environment component for a Class Environmental Assessment for regional water system upgrades in Cambridge and North Dumfries. Worked with the component lead to design field program and analyse and interpret data. Provided senior leadership and technical guidance and review for all deliverables.

Town of Blue Mountains Water Supply Master Plan
Blue Mountains, Ontario, Canada

Senior advisor and technical reviewer for the natural environment component for a Class B Environmental Assessment. Worked with the component lead to design field program and analyse and interpret data. Provided senior leadership and technical guidance and review for all deliverables.

Region of Peel East to West Wastewater Diversion Strategy
Peel Region, Ontario, Canada

Senior advisor and technical reviewer for the natural environment component for a Class Environmental Assessment. Worked with the component lead to design field program and analyse and interpret data. Provided senior leadership and technical guidance and review for all deliverables.

PROJECT EXPERIENCE – WASTE

County of Simcoe Landfills and Transfer Stations
Various Sites in the County of Simcoe, Ontario, Canada

Senior natural environment technical lead for a number of landfill sites. Assisted the County with landuse planning, due diligence for new properties, approvals and permits for expansions and changing uses. Coordinated field investigations including wetland boundary delineation. Consulted with Conservation Authorities, Niagara Escarpment Commission and MNRF.

Humberstone Landfill
Niagara, Ontario, Canada

Senior advisor and technical reviewer for a provincial EA in support of a landfill expansion. Worked with the natural environment component lead to design field programs, consult with provincial agencies and prepare technical reports. Provided senior leadership and technical guidance and review for all deliverables.

Capital Region Resource Recovery Centre (CRRRC)
Ottawa, Ontario, Canada

Natural environment component lead for a provincial EA for a resource recovery centre on a 175 hectare site), including a landfill, contaminated soil management and recycling components. Designed the field program (terrestrial and aquatic), analysed and integrated data with other disciplines, completed an impact assessment. Consulted with regulatory agencies including the Conservation Authority, MNRF and DFO. Provided input to the project design, obtained permits and participated in the public consultation process.

PROJECT EXPERIENCE – RENEWABLE ENERGY

Trillium Power Wind Corporation
Lake Ontario, Ontario, Canada

Project manager and natural environment lead for an offshore wind power project in Lake Ontario under O. Reg. 359/09 Renewable Energy Approvals (REA). Coordinated and managed a multi-disciplinary team comprised of noise specialists, biologists, archaeologists, public consultation specialists, aboriginal engagement specialists, visual impact assessment specialists and geophysicists. Designed terrestrial and aquatic field surveys, including avian, bat and fisheries assessments. Led provincial and federal agency consultation and participated in public open houses. Impact assessment and reporting, designed to satisfy both provincial and federal (CEAA) requirements, was underway when the project was curtailed.

Leader Resources Services Corporation
Various Locations, Ontario, Canada

Project manager and project director/senior technical advisor for four wind farm projects under O. Reg. 359/09 REA in Huron County, Ontario. Coordinated and managed a multi-disciplinary team comprised of noise specialists, natural heritage specialists, archaeologists, cultural heritage specialists, public consultation specialists and aboriginal engagement specialists. Led regulatory agency consultation specifically regarding SAR, avian and bat issues, and participated in public consultation process. Directed and reviewed all baseline natural environment impact assessment, mitigation and monitoring reporting, including species at risk, waterbodies, and wildlife/habitat (with a focus on birds and bats). Completed REA-specific project reports.

Mann Engineering/EffiSolar
Various Locations, Ontario, Canada

Natural heritage component lead for four 10 MW ground-mounted PV solar farms in southeastern Ontario under O. Reg. 359/09 REA. Designed and coordinated field programs for terrestrial and aquatic ecosystems, including SAR. Completed impact assessment, mitigation and monitoring plans and reports and led provincial agency consultation.

SkyPower Corp.
Various Locations, Ontario, Canada

Project manager for eight wind power park projects in Renfrew County, Prince Edward County and Parry Island, Ontario. Designed and coordinated natural environment field programs, including terrestrial (avian, bats, SAR, wildlife/habitats) and aquatic. Managed a multi-disciplinary team including hydrogeologists, biologists, surface water engineers, noise and air quality experts, socio-economic and public consultation coordinators. Led provincial agency and public consultation. Completed natural environment impact assessment, mitigation and monitoring plans and reports and REA-specific project reports.

Algonquin Power
Amherst Island, Ontario, Canada

Project manager and natural environment component lead for wind power project in Prince Edward County. Designed and coordinated field programs for terrestrial (avian, bats, SAR) and aquatic ecosystems. Managed a multi-disciplinary team including hydrogeologists, biologists, surface water engineers, noise and air quality experts, socio-economic and public consultation coordinators. Led provincial and federal agency consultation and participated in public consultation. Completed natural environment impact assessment, mitigation and monitoring plans and reports and REA-specific project reports.

SkyPower Corp.
Various Locations, Ontario, Canada

Project manager for four solar power projects across Ontario, including Napanee and Norfolk. Designed, coordinated and conducted field programs and data collection. Coordinated and managed the activities of a multi-disciplinary team including noise, archaeology, and surface water. Completed screening reports to provincial and municipal standards.

OptiSolar Inc.
Various Locations, Ontario, Canada

Project manager for three solar power projects across Ontario, including Sarnia, Tilbury and Petrolia. Designed, coordinated and conducted field programs and data collection, coordinated and managed the activities of a multi-disciplinary team including noise, archaeology, surface water, traffic and natural environment. Completed screening reports to provincial and municipal standards.

PROJECT EXPERIENCE – NUCLEAR

Canadian Waste Management Office (NWMO) Deep Geologic Repository (DGR) Project Follow-up Monitoring
Kincardine, Ontario, Canada

Project manager and senior technical lead for multi-year follow-up wildlife and vegetation monitoring at the DGR site. The scope of work included SAR turtle visual encounter surveys (VES; also known as basking surveys), SAR snake emergence and egg-laying surveys, rare plant surveys, data comparisons between years of data collection, and reporting.

Canadian Nuclear Laboratories (CNL) Whiteshell Research and Development Complex Decommissioning EA
Pinawa, Manitoba, Canada

Natural environment component lead for a federal EA. Developed Valued Ecosystem Components (VEC) and pathways of effects assessment. Analysed existing conditions terrestrial and aquatic data for the regional, local and site study area including for SAR, provided recommendations for additional permitting and mitigation for potential effects to wildlife and sensitive habitats. Provided input to construction design and developed technical reports.

Canadian Nuclear Laboratories (CNL) Port Hope Area Initiative Remediation
Port Hope, Ontario, Canada

Natural environment component lead for permitting for remediation of major sites and small-scale sites, including residential, commercial, industrial and municipal properties, Port Hope Harbour, Ganaraska River and other watercourses in Port Hope. Engaged with the Ganaraska River Conservation Authority, MNRF, DFO, and Canadian Nuclear Safety Commission, completed pathways of effects assessment, impact assessment and prepared applications and obtaining permits for dredging, bank stabilization, sediment remediation, SAR, and removal and work on Crown lands.

Bruce Power Units 3&4 Restart
Kincardine, Ontario, Canada

Worked with a team to establish VEC and appropriate study areas. Coordinated field technicians and interpreted data on fish impingement, entrainment, fishing pressure and temperature and velocity effects on aquatic habitat and biota, including bass spawning surveys. Worked with a team of biologists to determine the potential for warm water discharges to affect waterfowl use of nearby areas, and evaluated effects on the white-tailed deer population due to vehicle strikes. Prepared technical reports.

Pickering Nuclear 'A' Return to Service Follow-up and Monitoring
Pickering, Ontario, Canada

Multi-year monitoring program. Coordinated aquatic field technicians and interpreted data on impingement, entrainment, fishing pressure, waterfowl surveys, and temperature and velocity effects on aquatic habitat and biota, including bass spawning surveys. Worked with a team of biologists to evaluate the effects of wildlife-vehicle interactions on nearby roadways on terrestrial biota populations. Prepared annual monitoring reports.

PROJECT EXPERIENCE – MINING

EWL Management Ltd. Dyno Mine Rehabilitation
Bancroft, Ontario, Canada

Natural environment component lead for an environmental and health risk assessment of decommissioned uranium mine. Worked with a multi-disciplinary team including surface water engineers, geotechnical engineers, and risk specialists. Designed and coordinated bioscience field technicians to carry out the natural environment workplan. Tasks included fish habitat assessment and characterization of the aquatic environment, and collection of benthic, fish, sediment and aquatic plant tissue samples in affected and reference lakes and watercourses in support of the human health and ecological risk assessment. In addition, collection of small mammal and plant tissue samples and characterization of wildlife habitat was included. Responsible for analysis and interpretation of data, as well as report preparation and liaising with stakeholders and government agencies.

EWL Management Ltd. Coldstream Mine Rehabilitation
Thunder Bay, Ontario, Canada

Natural environment component lead for an environmental and health risk assessment of a decommissioned copper mine. Worked with a multi-disciplinary team including surface water engineers, geotechnical engineers, and risk specialists. Designed and coordinated bioscience field technicians to carry out the natural environment work plan. Tasks included fish habitat assessment and characterization of the aquatic environment, and collection of benthic, fish, sediment and aquatic plant tissue samples in affected and reference lakes and watercourses in support of the human health and ecological risk assessment. In addition, collection of plant tissue samples and characterization of wildlife habitat was included. Responsible for analysis and interpretation of data, as well as report preparation and liaising with stakeholders and government agencies.

PROJECT EXPERIENCE – OIL & GAS

Enbridge Bayview Avenue Pipeline Replacement Ontario, Canada	Natural environment component lead for pipeline replacement project. Coordinated SAR screening, natural heritage feature mapping, site investigations, impact assessment, tree inventory, DFO self-assessment, consultation with MECP, registration of activities (NoA) under the Endangered Species Act and development of mitigation plan. Worked with team to obtain Toronto and Region Conservation Authority (TRCA) permits.
Enbirdge Pipelines Inc. Line 9 Southern Ontario, Canada	Project manager for natural environment component of pipeline maintenance project in southern Ontario. Coordinated SAR screening and natural heritage feature mapping, site investigations, identification of permit requirements and constraint mapping in support of brushing and other maintenance activities.
TransCanada Bear Creek Rehabilitation Ontario, Canada	Natural environment component lead for Bear Creek rehabilitation following washout and exposure of the pipeline in the creek bed. Completed baseline existing conditions reporting including fish and fish habitat, SAR and riparian habitat to meet Conservation Authority, MNRF and DFO requirements. Worked with Golder's hydrology team to obtain Conservation Authority permits, develop a rehabilitation plan suitable for the existing conditions and fish community, and recommended appropriate mitigation during construction.
TransCanada Greater Golden Horseshoe Facilities Modifications Ontario, Canada	Natural environment component lead for an environmental and socio-economic assessment for modifications to a number of facilities under the National Energy Board (NEB). Responsibilities included designing the field program (vegetation, wetlands, wildlife, fish and fish habitat), analysing data, completing the baseline and effects assessment, liaising with agencies and permitting.
TransCanada Eastern Mainline Project Ontario, Canada	Vegetation and wetland component lead for an environmental and socio-economic assessment for a 392 km new construction pipeline in southern Ontario under the National Energy Board (NEB). Designed the field program, analysed data, completed the baseline and effects assessment and reporting. Consulted and negotiated with the MNRF, Environment and Climate Change Canada (ECCC) and local Conservation Authorities, prepared permit applications, and addressed Information Requests (IRs).
TransCanada Parkway West Connection Milton, Ontario, Canada	Natural environment component lead for an environmental and socio-economic assessment for a new pipeline connection under the NEB. Designed the field program (vegetation, wetlands, wildlife, fish and fish habitat), analysed data, completed the baseline and effects assessment, led consultation with agencies and obtained permits.
TransCanada Vaughan Mainline Extension Ontario, Canada	Senior technical reviewer and advisor for the vegetation, wetland and wildlife components for an environmental and socio-economic assessment for a new construction pipeline in southern Ontario under the NEB. Consulted with provincial and federal agencies, designed and coordinated baseline, construction and post-construction monitoring programs and developed environmental protection plans.

TransCanada Kings North Connection
Ontario, Canada

Senior technical reviewer and advisor for the vegetation, wetland and wildlife components for an environmental and socio-economic assessment for a new construction pipeline in southern Ontario under the NEB. Consulted with provincial and federal agencies, designed compensation habitat for SAR, designed and coordinated baseline, construction and post-construction monitoring programs and developed environmental protection plans.

TransCanada LNG Facility
Trois Rivieres, Quebec, Canada

Aquatic technical component lead. Designed and conducted inland fisheries field programs for a liquefied natural gas facility and associated distribution pipelines. The programs included aquatic habitat assessments of all watercourse pipeline crossings, and an assessment of habitat and water quality of inland lakes in the vicinity of the facility. Interpreted data and prepared technical reports.

PROFESSIONAL AFFILIATIONS

Professional Association of Diving Instructors (PADI)

Director, Ontario Stone Sand and Gravel Association (OSSGA) Board of Directors

PUBLICATIONS

Conference Proceedings

Melcher, Heather and Amber Sabourin. 2020. *The Use of Remote Sensing in Natural Environment Surveys*. Ontario Stone Sand and Gravel Association Annual General Meeting, February. Niagara Falls, Canada.

Melcher, Heather. 2015. *Bats and the Aggregate Industry*. Ontario Stone Sand and Gravel Association Annual General Meeting, February. Toronto, Canada.

Melcher, Heather. 2014. *Changes to the Ontario Endangered Species Act and Implications to the Aggregate Industry*. Ontario Stone Sand and Gravel Association Annual General Meeting, February. Ottawa, Canada.

Other

Melcher, Heather. 2001; 2002. Effects of Agricultural Inputs of Faecal Coliforms on the Shellfish Industry in Prince Edward Island. Annual Monitoring Report. Prince Edward Island.

Golder Associates Ltd. – Mississauga

Ecologist

Amber is an Ecologist and Project Manager with over 10 years of experience in terrestrial ecology. She is skilled in Ontario flora and fauna identification, wetland evaluations, species at risk (SAR) screenings, terrestrial habitat assessments and environmental impact assessments. Amber's experience lies in the design and management of terrestrial field programs, and project management for natural environment components of projects. Amber has experience working in numerous sectors, with a focus in the power, aggregate, oil and gas, land development and mining sectors. Amber also works extensively with the *Endangered Species Act* (ESA) and *Species at Risk Act* (SARA) and associated regulations, and leads Golder's internal Species at Risk Working Group. She has led numerous field programs to support permitting under the ESA and the compilation of terrestrial baseline reports. Her field experience includes completing assessments for significant wildlife habitat, Ecological Land Classification (ELC), wetland delineation and evaluations, amphibian and reptile surveys, butternut health assessments, botanical inventories, and bat surveys.

Education

HBSc (Env) Honours Environmental Biology Co-op, University of Guelph, Guelph, Ontario, 2012

Certifications

Ecological Land Classification for southern Ontario (Ministry of Natural Resources and Forestry), 2014

Ontario Wetland Evaluation System (Ministry of Natural Resources and Forestry), 2017

WHMIS, 2017

Federal Reliability Clearance, 2018

First Aid and CPR Level C, 2019

Butternut Health Assessor (Ministry of Natural Resources and Forestry), 2019

Languages

English – Fluent

Employment History

Golder Associates Ltd. – Mississauga, Ontario
Ecologist (2012 to Present)

Responsibilities include project management, field data collection and analysis, and preparation of environmental assessment reports, screening reports, and natural environment reports for private and public sectors. Development, implementation and coordination of field programs, coordination and management of project budgets for natural environment teams, and management of an internal Species at Risk Grouping Work.

City of Guelph – Guelph, Ontario
Conservation and Efficiency Program Assist (Co-op) (September 2009 to December 2009)

Responsible for monitoring an information line related to two City rebate programs and verifying applications. Conducted presentations in the Upper Grand District School Board to educate students on water conservation and protection through interactive learning. Participated in a pilot program monitoring the water quality of residential grey water systems, including water sampling, analysis, tracking of results, and compilation of a report for the City.

Environment Canada - Canadian Wildlife Service – Burlington, Ontario
Wildlife Toxicology Technician (Co-op) (January 2009 to April 2009)

Independently managed a study exposing tadpoles of the African clawed frog to treated wastewater effluent from the Hamilton Sewage Treatment Plant in a flow-through facility, including animal care, experimental procedure and endpoint measurements. Performed field collection of European starling eggs for use in environmental toxicology monitoring program.

PROJECT EXPERIENCE – CONSTRUCTION MATERIALS

CBM Aggregates (a division of St. Marys Cement Inc. (Canada)), Dance Pit Extension North Dumfries, Ontario, Canada	Natural Environment Component Lead for an above-water pit licence application under the Aggregate Resources Act. Responsibilities included coordinating field data collection and analysis, interpreting data in cooperation with other disciplines, and preparing Level I & II Natural Environment Technical Report.
CBM Aggregates (a division of St. Marys Cement Inc. (Canada)), Lanci Pit Expansion Aberfoyle, Ontario, Canada	Natural Environment Component Lead for a below-water pit licence application under the Aggregate Resources Act. Responsibilities included coordinating field data collection and analysis, interpreting data in collaboration with other disciplines as part of the impact assessment, and preparing the Level 1 and 2 Natural Environment Technical Report for submission to the Ministry of Natural Resources and Forestry.
CBM Aggregates (a division of St. Marys Cement Inc. (Canada)), Ayr/Bromberg Pit Monitoring Ayr, Ontario, Canada	Project Manager for two monitoring programs (butternut health and tree survivability) at two adjacent operational pits. Responsibilities included field data collection and analysis, including butternut health assessments, and preparing monitoring reports in accordance with monitoring requirements set out in the Site Plan.
Queenston Quarry Reclamation Company, Queenston Quarry Redevelopment Project Niagara-on-the-Lake, Ontario, Canada	Project Manager for proposed re-development of the 100 ha former Queenston Quarry. Responsibilities included coordinating field data collection and analysis, interpreting data, and preparing an Environmental Impact Study report for submission to the Niagara Escarpment Commission. Responsible for negotiations and discussions with the Ministry of Natural Resources and Forestry regarding species at risk and development of mitigation measures.
EWL Management Ltd., Northern Ontario Quarry and Pit Project Northern Ontario, Canada	Managed, coordinated and led the terrestrial field program to conduct eastern whip-poor-will, anuran call count, and acoustic bat monitoring surveys for a proposed borrow area and quarry site. Worked with a multi-disciplinary team to collect and analyze field data for preparation of the Level 1 and 2 Natural Environment Technical Reports as part of two licence applications under the Aggregate Resources Act. Worked with the client and Ministry of Natural Resources and Forestry to develop mitigation and compensation plans for species at risk, including woodland caribou and bats.
Scotian Materials, Goffs Quarry Expansion Environmental Assessment Halifax, Nova Scotia, Canada	Conducted natural heritage studies for a proposed quarry expansion project, including preparation of an Environmental Impact Study report as part of the Environmental Assessment Registration Document. Conducted field surveys, including botanical inventory and plant community classification using the Forest Ecosystem Classification system for Nova Scotia, rapid fish habitat assessments, wildlife and SAR habitat assessments, and wetland surveys in accordance with the Nova Scotia Wetland Evaluation Technique.

Colacem, Cement Plant L'Orignal, Ontario, Canada	Prepared an Environmental Impact Statement for the municipal approval process for the proposed construction of a cement plant. Responsibilities included coordinating field data collection, analysis and interpretation of data, and preparation of the Environmental Impact Statement report. Also prepared and submitted a Request for Project Review to Fisheries and Oceans Canada for impacts to fish habitat.
Lafarge Canada Inc., Sunningdale Pit London, Ontario, Canada	Prepared the Level I & II Natural Environment Technical Report to accompany the licence application for aggregate extraction under the provincial Aggregate Resources Act. Project Manager for annual monitoring of barn swallow compensation structures installed as part of the Notice of Activity under the ESA for the project. Project management responsibilities involved coordination of field surveys to assess use of the structures, preparation of a mitigation plan, and preparation of annual monitoring reports.
Lafarge Canada Inc., Limebeer Pit Caledon, Ontario, Canada	Performed anuran call count and egg mass surveys, as well as turtle nesting surveys, to accompany a proposed aggregate licence under the Aggregate Resources Act. Prepared the Level I & II Natural Environment Technical report as part of the successful licence application.
Lafarge Canada Inc., Avening Extension Pit Creemore, Ontario, Canada	Performed anuran call count surveys and egg mass searches as part of a proposed expansion to a currently licenced and operating aggregate pit. Prepared the Level I & II Natural Environment Technical report to support the licence expansion application. Also prepared and submitted permitting documents, including a DFO Request for Project Review under the Fisheries Act, and a Notice of Activity under the ESA.

PROJECT EXPERIENCE – ENVIRONMENTAL ASSESSMENT

HydroOne Networks Inc., B5C/B6C Line Refurbishment Project Burlington, Ontario, Canada	Coordinated and led terrestrial field surveys to support the Environmental Assessment for a 24 km stretch of hydro corridor proposed for refurbishments. Completed vegetation community assessment and mapping, botanical inventory, species at risk surveys and wildlife habitat assessments in cooperation with First Nations. Also conducted a rare plant survey and mapping for a target species (New Jersey Tea).
Marten Falls Community Access Road Marten Falls, Ontario, Canada	Vegetation component lead for a coordinated provincial and federal impact assessment of the proposed all-season community access road to the Marten Falls First Nation community in northern Ontario. Responsibilities include coordination of desktop vegetation community mapping, preparation of a field study plan, coordination of field surveys in remote areas in cooperation with other technical disciplines, analysis and interpretation of data, and completion of a detailed impact assessment and reporting.
City of Cambridge Zone 3 Project Cambridge, Ontario, Canada	Natural Environment Component Lead for a municipal class Environmental Assessment related to the Regional Water System Upgrades in Cambridge and North Dumfries. Responsibilities included coordination of baseline field data collection, data analysis and interpretation, and preparation of a Natural Heritage Report for 15 short-list alternative sites.

Brantford Three Grand River Crossings
Brantford, Ontario, Canada

Natural Environment Component Lead for a municipal class Environmental Assessment related to the rehabilitation of three bridges crossing the Grand River. Completed vegetation community assessment and mapping, botanical inventory, and species at risk and wildlife habitat assessments within the study area. Also compiled a baseline natural environment report including constraints analysis, recommendations for the preliminary design, and an assessment of permitting requirements.

Town of Blue Mountains Water Supply Master Plan
Blue Mountains, Ontario, Canada

Natural Environment Component Lead for a Schedule B Municipal Class Environmental Assessment for a water supply master plan for the Town of Blue Mountains planning area. Responsibilities included coordination and implementation of the terrestrial field program, analysis and interpretation of data, and preparation of an Environmental Impact Study report.

City of Markham Victoria Square Blvd Improvements
Markham, Ontario, Canada

Natural Environment Component Lead for a Schedule C Class Environmental Assessment related to planned road improvements. Responsibilities included coordination and collection of field data, analysis and interpretation of data, and preparation of the Natural Environment Report.

Tlicho All-Weather Road Project
Northwest Territories, Canada

Completed the baseline description and effects assessment for wildlife Valued Components as part of the Adequacy Statement Response for the Environmental Assessment of a proposed 94 km all-season road. Also provided responses to agency and stakeholder Information Requests as part of the review of the Environmental Assessment.

City of Cambridge Zone 1W Project
Cambridge, Ontario, Canada

Project manager for a Class B Environmental Assessment for the Cambridge Pressure Zone 1W project. Responsibilities included coordination of field data collection, data analysis and interpretation, and preparation of a Natural Environment Report.

PROJECT EXPERIENCE – ECOLOGY

CIMA, Consumer's Drive Extension
Whitby, Ontario, Canada

Conducted a wetland evaluation using the Ontario Wetland Evaluation System (OWES) to evaluate the potential for a wetland on site to be complexed with a nearby existing Provincially Significant Wetland. Terrestrial communities on the site were also delineated and classified according to the ELC system for southern Ontario. Prepared the wetland evaluation report for submission to the Ministry of Natural Resources and Forestry.

Wetland Evaluation
Belleville, Ontario, Canada

Project manager for a wetland evaluation project on a proposed subdivision development site. Conducted a wetland evaluation using OWES to evaluate the potential for four wetland units to be complexed with an adjacent Provincially Significant Wetland. Prepared the wetland evaluation report for submission to the Ministry of Natural Resources and Forestry resulting in agency approval of the complexing recommendations. Also responsible for consultation with Lower Trent Conservation to develop appropriate mitigation measures for the development.

Emery / Metrus, Levi Creek Constructed Wetland Monitoring
Mississauga, Ontario, Canada

Conducted post-construction environmental monitoring of a constructed wetland adjacent to residential development. Monitoring was conducted for both terrestrial and wetland components, and included anuran surveys, vegetation plot monitoring following the Credit Valley Conservation (CVC) vegetation plot technique guidelines, and qualitative wildlife habitat assessments. Prepared the monitoring report for submission to CVC and Fisheries and Oceans Canada.

Scoped Subwatershed Study
Central Elgin, Ontario, Canada

Conducted a natural heritage assessment as part of a scoped subwatershed study in the Lower Kettle Creek subwatershed with the objective to provide a framework to guide future land use and development. Completed field surveys, including mapping of ELC communities, wildlife and SAR habitat assessments, and rapid watercourse and fish habitat assessments. Prepared the natural heritage sections of the scoped subwatershed study report, including provision of recommendations on environmental targets and management strategies.

Ecological Risk Assessment
Nobel, Ontario, Canada

Natural Environment Component Lead for an ecological risk assessment comparing wildlife communities on a former industrial site to a reference site to help analyse potential development options and develop ecological risk-management measures for the site. Responsibilities included design and implementation of the field study program, analysis of data using the Jaccard Index to evaluate community similarity, and preparation of the ecological assessment report.

Serafina Energy Ltd. Meota West 2 Project
Meota, Saskatchewan, Canada

Crew lead for wetland habitat classification (in accordance with Stewart and Kantrud 1971) and rare vascular plant survey (in accordance with the government of Saskatchewan Species Detection Survey Protocol) as part of baseline environmental surveys for a steam-assisted gravity drainage project. Responsibilities included schedule management, daily logistics planning, summary reporting and data management.

PROJECT EXPERIENCE – SPECIES AT RISK

American Ginseng Monitoring Program
Simcoe County, Ontario, Canada

Project Manager for the annual monitoring program of American ginseng (designated endangered under the ESA) which is required as part of an ESA permit since 2015. Responsibilities included implementation of population surveys of the American ginseng reserve, analysis and interpretation of field data in order to evaluate the health of the reserve, and coordination of annual reporting for submission to the Ministry of Natural Resources and Forestry / Ministry of Environment, Conservation and Parks.

TC Energy, Pipeline Integrity Program
Various Locations, Ontario, Canada

Project Manager for the TC Energy Eastern Region (Ontario) pipeline integrity program since 2016. Responsibilities include coordination and management of desktop natural environment and SAR screenings, liaising with the local Conservation Authority to identify and obtain permits, and coordination of SAR and avian nesting surveys across Ontario as part of pipeline maintenance activities.

Cameco Corporation, Species at Risk Surveys Port Hope, Ontario, Canada	Natural Environment Component Lead for SAR surveys at the Port Hope Conversion Facility. Responsibilities included coordination and management of desktop assessments and species-specific field surveys to identify and evaluate use of SAR habitat in proposed work areas, recommend mitigation measures and provide advice on necessary permits or authorizations required to complete the proposed work.
Canadian Nuclear Laboratories (CNL) Port Hope Remediation Port Hope, Ontario, Canada	Responsible for coordinating SAR screenings and field surveys to verify existing habitat conditions and assess the presence of potential SAR habitat in areas proposed for remediation. Provided recommendations related to mitigation measures, species-specific surveys to confirm habitat use, and permitting requirements under the ESA and/or SARA.
Municipality of Chatham-Kent, Ontario Certified Site Ready Program Chatham, Ontario, Canada	Natural Environment Component Lead for an “Investment Ready” property designation under the Ontario Certified Site Ready Program. Responsibilities include coordination and completion of SAR screenings and field assessments for two properties as part of the program designation process. Also prepared a report identifying potential SAR-related constraints for future development opportunities.
Commercial Development Township of Amaranth, Ontario, Canada	Conducted Butternut Health Assessments on 15 butternut trees and prepared the Butternut Health Assessment Report for submission to the Ministry of Environment, Conservation and Parks.
Chimney Swift Registration and Monitoring Program Mississauga, Ontario, Canada	Project Manager for a chimney reconstruction project requiring registration under the ESA for alterations to chimney swift habitat. Responsibilities included consultation with the Ministry of Natural Resources and Forestry, preparation and submission of a Notice of Activity form, and preparation and implementation of a Mitigation Plan including annual monitoring and reporting.
Digram Developments Caledon Inc., Barn Swallow Monitoring Caledon, Ontario, Canada	Coordinated and managed an annual barn swallow monitoring program of barn swallow compensation structures at a land development site in Caledon. Also prepared the mitigation plan and annual monitoring reports required as part of the Notice of Activity registration process under the ESA.

PROJECT EXPERIENCE – TRANSPORTATION/RAIL

HDR Inc., Downtown Rapid Transit Expansion Study Toronto, Ontario, Canada	Prepared the natural environment component of the Environmental Project Report as part of a Transit Project Assessment Process Environmental Assessment for the Downtown Relief Line project. Responsibilities included characterization and evaluation of existing conditions, identification of impacts and recommendation of mitigation and contingency measures. Coordinated and developed responses to agency and stakeholder comments related to natural environment in the Environmental Project Report.

Markham GO Station Road Realignment, Transit Project Environmental Assessment
Markham, Ontario, Canada

Prepared a Natural Environment Report, including detailed impact assessment, as part of a Transit Project Assessment Process for proposed improvements and road alignment associated with the Markham GO station.

Canadian National Railway Company, Credit River Bridge Replacement Post-Construction Monitoring
Georgetown, Ontario, Canada

Completed Year 1 and 2 of the post-construction vegetation monitoring program associated with restoration of the Credit River Valley following a railway bridge replacement. Prepared the monitoring report for submission to the Credit Valley Conservation Authority and Fisheries and Oceans Canada.

Canadian National Railway Company, Desktop Assessments
Northern Ontario, Canada

Conducted desktop environmental evaluation reports for siding extensions at six remote sites in northern Ontario. Each evaluation included a desktop level constraints analysis for SAR, designated natural areas, terrestrial features, wildlife habitat, aquatic features and fish habitat. The environmental evaluation report summarized each potential environmental constraint and identified applicable mitigation measures.

PROJECT EXPERIENCE – OIL & GAS

TransCanada Pipelines, Eastern Mainline Project
Ontario, Canada

Coordinated and led the terrestrial field program for baseline data collection to accompany the National Energy Board filing for twining of 245 km of pipeline between Whitby and Brockville. Responsibilities included desktop selection of field survey locations for both vegetation and wildlife components, field logistics and access planning, preparation of specific work instructions (SWI) and implementation of the field program. Collaborated with a multi-disciplinary team to prepare the Environmental and Socio-economic Assessment report and led the vegetation and wildlife effects assessment. Also designed, coordinated and implemented the terrestrial SAR field program, targeting amphibians, birds and reptiles, along the proposed route in support of SAR permitting. Also worked in cooperation with First Nations to conduct field surveys.

Canadian National Resources Limited, Cold Lake Oil Response Project
Cold Lake, Alberta, Canada

Conducted wildlife inventory, monitoring and determent activities as part of the response to a bitumen release in northern Alberta. Activities included amphibian pit-fall trapping and release, construction monitoring and mitigation, waterfowl trapping, bird surveys, and preparation of daily monitoring reports.

PROJECT EXPERIENCE – MINING

Cliffs Chromite Project
James Bay Lowlands, Ontario, Canada

Conducted Northeastern Ontario Forest Ecosystem Classification surveys in remote locations to facilitate evaluation of transportation corridor alternatives for proposed mining project. Also prepared Natural Environment Level 1 reports under the *Aggregate Resources Act* for numerous pits and quarries proposed as part of the Integrated Transportation System connecting the Black Thor Mine site to highways in the south.

Osisko, Hammond Reef Gold Project
Atikokan, Ontario, Canada

Completed baseline data collection as part of the terrestrial field program to support the Environmental and Social Impact Assessment (ESIA) for a proposed gold mine. Surveys included avian, turtle and anuran surveys, surveys to identify and delineate potential areas of wild rice colonies, as well as toxicological sampling of local vascular plant species and soil. Collaborated with a multi-disciplinary team to prepare the terrestrial baseline report and provide input into the ESIA report.

PROJECT EXPERIENCE – WASTE

Simcoe County Landfill Closures
Simcoe County, Ontario, Canada

Provided natural environment services for various landfill closure sites across Simcoe County, including preparation and submission of scoped Environmental Impact Studies and restoration plans. Also engaged in consultation with the Nottawasaga Valley Conservation Authority to determine the Terms of Reference, permitting requirements and restoration requirements, and attended a site visit with the conservation authority to delineate the wetland boundary.

Humberstone Landfill
Niagara, Ontario, Canada

Planned and coordinated a bat habitat assessment including snag density calculations as part of proposed infrastructure upgrades. Also directed preparation of Awareness Plans for SAR, including identification traits, actions to take if encountered and recommendations for mitigation measures to avoid adverse impacts.

PROJECT EXPERIENCE – POWER

NWMO / OPG Deep Geologic Repository Ecological Surveys
Tiverton, Ontario, Canada

Implemented an ecological survey program for the proposed Low and Intermediate Level Waste Deep Geologic Repository Project on the Bruce Power site. Responsibilities included field planning and implementation of an existing survey program, collection of high-quality environmental field data and compilation of annual reports. Conducted targeted field surveys including rare plant survey, turtle visual encounter surveys, and snake visual encounter surveys throughout the 35 ha study area.

OPG Salt Storage Building
Darlington, Ontario, Canada

Natural Environment Component Lead for proposed salt and transport work equipment storage buildings on the Darlington Nuclear Generating property. Prepared a natural environment and SAR screening report as part of the permit application package for the Central Lake Ontario Conservation Authority.

OPG Darlington Nuclear Power Plant
Darlington, Ontario, Canada

Natural Environment Component Lead providing services such as Environmental Impact Study, SAR Screenings, for several Projects related to the Darlington New Nuclear Plant requiring

Hydro One Networks Inc., Environmental Monitoring Plan
Timmins, Ontario, Canada

Developed an Environmental Monitoring Plan and Checklist to support planned construction activities along an existing transmission corridor from Timmins to Shining Tree. Provided recommendations for best management practices and mitigation measures to avoid or minimize damage to natural features, including species at risk, wetlands and waterbodies. Also designed a checklist for daily on-site use by the Environmental Inspector as a compliance tool to ensure activities align with the Environmental Monitoring Plan.

NextEra Canada Battery Energy Storage Facility Elmira, Ontario, Canada	Conducted the Natural Heritage Assessment to support permitting for the proposed Solid Battery Energy Storage Systems project in Elmira, including a SAR screening, site reconnaissance, preparation of a constraints analysis and identification of permit requirements under the ESA and Conservation Authorities Act.
Disco Road Organics Processing Facility Toronto, Ontario, Canada	Prepared the Records Review and Site Investigation reports to support the natural heritage portion of a Renewable Energy Approval.
Majestic and Mayer Wind Energy Project Bruce County, Ontario, Canada	Prepared updates to the Records Review, Site Investigation, Evaluation of Significance, and Environmental Effects Monitoring Plan reports to support the natural heritage portion of a Renewable Energy Approval.
Clarington Wind Energy Project Clarington, Ontario, Canada	Performed evening bat acoustic monitoring surveys to identify bat maternity roosts as part of the Natural Heritage Assessment portion of Renewable Energy Approval for proposed wind project.
Summerhaven Wind Farm Project Haldimand County, Ontario, Canada	Performed site investigations as part of natural heritage assessments to support a Renewable Energy Approval for proposed wind project. Site investigations included wildlife habitat identification, vegetation and habitat mapping, and bat maternity roosting and acoustic surveys.

PROJECT EXPERIENCE – LAND DEVELOPMENT

Hopewell Developments Inc., Matheson Boulevard Commercial Development Mississauga, Ontario, Canada	Project Manager for a commercial development site adjacent to Little Etobicoke Creek. Conducted a desktop assessment of existing environmental features, assessed potential impacts, and prepared an Environmental Impact Study report. Also identified mitigation measures and provided input into the planting plan for a buffer required by the Toronto and Region Conservation Authority.
Biddle and Associates Ltd., Northglen Residential Subdivision Development Clarington, Ontario, Canada	Natural Environment Component Lead on a dewatering monitoring program at a residential subdivision development in compliance with a Permit to Take Water. Responsibilities included designing, coordinating and managing a wetland vegetation monitoring program for a swamp adjacent to the development. Interpreted data and prepared a baseline report and subsequent monitoring reports during the dewatering phase.
Residential Development Flamborough, Ontario, Canada	Project Manager for an Environmental Impact Study for proposed residential development. Responsibilities included preparing a Terms of Reference, agency consultation, coordinating and implementing field data collection and analysis, conducting ELC, botanical inventory and amphibian call count surveys, interpreting data, as well as producing an Environmental Impact Study report for the municipality and conservation authority.

New Horizon Development Group
Wedgewood Community Development
Burlington, Ontario, Canada

Conducted field surveys and prepared the Environmental Impact Study for a proposed mixed residential / commercial development of a golf centre on the Niagara Escarpment. Also attended a site visit with representatives of several agencies, including municipal government and conservation authority, to stake woodland dripline and top of bank boundaries and discuss the findings of the report.

TRAINING

Surface Miner Training
2012

Argo Safe Operation Course
2012

Defensive Driver Training
Canadian Pro Drivers, 2015

Rail Safe
2019

PROFESSIONAL AFFILIATIONS

Ontario Stone Sand and Gravel Association Ecology Committee

PUBLICATIONS

Conference Proceedings

Melcher, Heather and Amber Sabourin. 2019. *The Use of Remotely Piloted Aircraft Images in Natural Environment Studies for ARA Licensing*. Ontario Stone Sand and Gravel Association Annual General Meeting, February. Niagara Falls, Canada.

Sabourin, Amber. 2020. *The Use of Remotely Piloted Aircraft Images in Natural Environment Studies*. Golder Technical Excellence Conference, February. Vancouver, British Columbia, Canada.

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