NATURAL ENVIRONMENT REPORT

Aggregate Resources Act Application

Elgin Road Pit, Municipality of Thames Centre

20 February 2023

TERRASTORY
environmental consulting inc.

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Project No.: 21092
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1 INTRODUCTION

1.1 Study Background

Terrastory Environmental Consulting Inc. (hereinafter "Terrastory") was retained by Brantam Excavating Inc. (hereinafter "the Applicant") to prepare this Natural Environment Report (NER) in support of a Class A (below-water) pit application pursuant to the *Aggregate Resources Act* (ARA) in the Municipality of Thames Centre (hereinafter "Municipality"). The extraction area is referred to herein as "Elgin Road Pit". The lands proposed for licensing are situated within an approximately 21.5-hectare (53 acre) parcel southwest of the intersection of Elgin Road (County Road 73) and Dundas Street (County Road 2). The lands are primarily maintained for agricultural purposes (cash crops) and also contain natural areas consisting of woodlands and wetlands. The Subject Property in which the proposed licence area is situated is legally described as Part Lots 13 & 14, Concession 1, in the former Geographic Township of Dorchester. The location of the Site within its broader landscape setting is shown in **Figure 1**.

The following terminology is employed throughout this NER to describe certain noteworthy areas and features which are shown spatially on **Figure 1**:

- **Site** – proposed area to be licensed.
- **Subject Property** – parcel/property in which the ARA licence is situated.
- **Adjacent Lands** – areas within 120 meters of the Site.
- **Study Area** – Site, Subject Property, and Adjacent Lands collectively.

1.2 Study Purpose

This NER has been prepared to address the requirements of the ARA and its associated regulation (O. Reg. 244/97) and policy standards. ARA licence applications must be made in accordance with the Provincial Standards (i.e., *Aggregate Resources of Ontario Standards: A compilation of the four standards adopted by Ontario Regulation 244/97 under the Aggregate Resources Act*) per subsection 0.2(2) of O. Reg. 244/97. Section 2.2 of the compiled Aggregate Resources of Ontario Standards triggers the need for an NER in support of ARA applications involving Class A (removal of more than 20,000 tonnes of aggregate annually) or Class B (removal of less than 20,000 tonnes of aggregate annually) licences. The NER must identify the following natural heritage features and areas existing on the Site and within 120 m of the Site:

a) Significant wetlands;
b) Other coastal wetlands in Ecoregions 5E, 6E and 7E;
c) Fish habitat;
d) Significant woodlands and significant valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Mary's River);
e) Habitat of endangered species and threatened species;
f) Significant wildlife habitat;
g) Significant areas of natural and scientific interest; and
h) Within the area of one or more provincial plan(s), any key natural heritage features not included in (a) through (g).

"Site" is defined per subsection 1(1) of the ARA as "*the land or land under water to which a licence or permit or an application therefor relates*". The compiled Standards further clarify scoping of the NER (p. 28/29) as follows:

> *Where any of the above features or areas have been identified, the report must identify and evaluate any negative impacts on the natural features or 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, included in (a) through (g), 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.*

In addition to satisfying ARA requirements, this NER is also submitted in support of Official Plan Amendment (OPA) and Zoning By-law Amendment (ZBA) applications to the Municipality to facilitate aggregate extraction. The overall scope of this NER is consistent with the general requirements for the preparation of Environmental Impact Study (EIS) reports within the Municipality and Development Assessment Reports (DAR) in Middlesex County. This NER further considers and assesses consistency of the licence application with other applicable natural heritage policies including the Provincial Policy Statement (PPS), provincial *Endangered Species Act*, and federal *Fisheries Act*.

2 APPROACH AND METHODS

This study is composed of five (5) discrete components which are bulleted below and further described in the following sections.

- **Acquire background biophysical information and mapping** available for the Study Area and local landscape (see **Section 2.1**).
- **Conduct site assessments and ecological surveys** to field-verify the accuracy of the acquired background biophysical information and collect additional biophysical information as necessary (see **Section 2.2**).
- **Assess the significance** of the biophysical information collected and natural features identified within the context of applicable natural heritage and environmental policies (see **Section 2.3**).
- **Predict the effects** of the application on the identified significant natural features and natural environment, particularly the net effects once mitigation measures and technical recommendations are implemented (see **Section 2.4**).
- **Determine whether the proposed application addresses applicable natural heritage and environmental policies** at municipal, provincial, and federal levels (see **Section 2.5**).

A curriculum vitae for the report authors (T. Knight, Senior Ecologist / President and A. McCrum, Intermediate Ecologist) is provided in **Appendix 1**.

2.1 Background Biophysical Information Assessment

This study is supported by background biophysical information and mapping acquired and reviewed from a variety of sources which are listed below in **Table 1**.

Table 1. Background Biophysical Information Acquired and Reviewed.

Type of Information Acquired	Description
Ortho-rectified Aerial Photographs	• 1954, 2001, 2006, 2010, 2015, 2020.
Natural Feature Mapping	• Municipality of Thames Centre Official Plan (October 2020) Schedule A and Appendix 1 (Part A). • County of Middlesex Official Plan (OPA No. 3 - June 2022 consolidation) Schedules A and C. • Land Information Ontario (LIO) accessed via MNRF's "Make a Map" web-based platform (accessed 27 October 2022). • Upper Thames River Conservation Authority (UTRCA) regulation mapping (accessed 27 October 2022)
Physiographic Resource Mapping and Datasets	• Provincial Digital Elevation Model. • Ontario Well Records (publicly-available). • The Soils of Middlesex County (Hagerty and Kingston 1992). • Agricultural Information Atlas (accessed 18 December 2020). • Bedrock Topography and Overburden Thickness Mapping (Gao et al. 2006). • Paleozoic Geology of Southern Ontario (Armstrong and Dodge 2007). • Surficial Geology of Southern Ontario (Ontario Geological Survey 2010). • Physiography of Southern Ontario (Chapman and Putnam 1984).
Ecological Resource Mapping and Datasets	• Natural Heritage Information Centre (NHIC) database accessed via MNRF's "Make a Map" web-based platform (squares: 17MH9565, 17MH9564, 17MH9563, 17MH9665, 17MH9664, 17MH9663; accessed 27 October 2022). • iNaturalist "(NHIC) Rare species of Ontario" project (accessed 27 October 2022). • iNaturalist "Herps of Ontario" project (accessed 27 October 2022). • Ontario Reptile & Amphibian Atlas (square: 17MH96; accessed 27 October 2022). • Ontario Breeding Bird Atlas (OBBA) database and the Atlas of the Breeding Birds of Ontario, 2001–2005 (Cadman et al. 2007) (square: 17MH96) • Ontario Butterfly Atlas database (square: 17MH96; accessed 27 October 2022). • Aquatic Species at Risk Maps by Fisheries and Oceans Canada (accessed 27 October 27 October 2022). • Atlas of the Mammals of Ontario (Dobbyn 2005).
Natural Heritage Objectives and Strategies	• Middlesex Natural Heritage Systems Study (UTRCA 2014). • Dorchester Corridor Watershed Report Card (UTRCA 2017).

2.2 Site Assessments and Surveys

The acquired background information per **Table 1** helped direct several site assessments and surveys carried out by Terrastory staff. **Table 2** below indicates the primary assessments/surveys performed during each site visit, weather conditions, and time on-site.

Table 2. Site Assessments and Ecological Surveys performed within the Subject Property.

Date	Assessments/Surveys Performed	Terrastory Staff	Weather Conditions	Time On-site
08 June 2022	Site reconnaissance, breeding bird survey #1, spring vascular plant survey, incidental observations.	A. McCrum	Air Temperature 15°C; Beaufort Wind 0-2; Cloud Cover 75-100%; No Precipitation.	7:15 – 12:15
06 July 2022	Breeding bird survey #2, incidental observations, preliminary wetland boundary delineation.	A. McCrum	Air Temperature 16°C; Beaufort Wind 0-2; Cloud Cover 0 - 25%; No Precipitation.	8:15 – 10:45
02 August 2022	Ecological Land Classification, summer vascular plant survey, wetland boundary delineation, incidental observations.	J. Consiglio	Air Temperature 19°C; Beaufort Wind 0-2; Cloud Cover 75-100%; No Precipitation.	9:10 – 16:00
14 September 2022	Fall vascular plant survey, natural feature mapping, incidental observations.	J. Consiglio	Air Temperature 18°C; Beaufort Wind 0-2; Cloud Cover 50-75%; No Precipitation.	9:25 – 12:00
03 November 2022	Brook Trout spawning (redd) survey, OSAP channel morphology assessment, incidental observations	J. Consiglio and C. Wegenschimmel	Air Temperature 8-12°C; Beaufort Wind 0-2; Cloud Cover 75-100%; No Precipitation.	9:45 – 12:30
17 November 2022	Brook Trout spawning (redd) survey, OSAP channel morphology assessment, incidental observations	C. Wegenschimmel	Air Temperature: 0 to-1°C; Water Temperature: 3-6°C; Beaufort Wind: 1; Cloud Cover; 25-50%; Background Noise: 1; No Precipitation.	10:10 – 12:25

The site assessments and surveys centred on characterizing the land use (e.g., historical development patterns, existing built features, land maintenance, etc.), physiographic (e.g., topography, drainage, surface water features, etc.), and ecological (e.g., vegetation, wildlife, habitats, etc.) conditions and features of the Subject Property and (where appropriate) Adjacent Lands. All land-use, physiographic, and ecological information described for Adjacent Lands was collected from either current aerial photographs or observations from inside the Subject Property and/or publicly accessible areas (e.g., rights-of-way, etc.). The locations and boundaries of significant natural features and/or habitats were recorded on-site with a GPS supported by representative photographs.

In addition to collecting general biophysical information, the following targeted assessments (i.e., feature- or species-specific surveys) were undertaken:

- **Vegetation Mapping according to Ecological Land Classification (ELC):** Vegetation communities on the Subject Property were characterized and mapped according to Ecological Land Classification (Lee et al. 1998) and the 2008 update to the Vegetation Type List (Lee 2008). Vegetation communities were initially identified based on current aerial photographs and then verified and refined

(as necessary) on-site. ELC mapping was scaled to the finest level of resolution deemed appropriate (i.e., either Ecosite or Vegetation Type). Vegetation communities mapped on Adjacent Lands were delineated predominantly via aerial photograph interpretation.

- **Vascular Plant Survey:** Vascular plants were recorded based on a comprehensive area search ("wandering transects") within naturally occurring (i.e., non-planted) or naturalizing areas of vegetation. Effort was paid to areas with the greatest potential to support significant vascular plants (i.e., designated Species at Risk, provincially rare, etc.) and areas with the greatest potential for impact based on the proposed development plan. Nomenclature and common names for the recorded vascular plant species are generally consistent with the Southern Ontario Vascular Plant Species List (Bradley 2013) except where a name change has more recently been adopted by NHIC.
- **Breeding Bird Surveys according to the Ontario Breeding Bird Atlas Protocol:** Two (2) rounds of breeding bird surveys were conducted in accordance with the Ontario Breeding Bird Atlas (OBBA) protocol (Bird Studies Canada et al. 2001). Surveys occurred within the appropriate season (May 24–July 10), time of day (between dawn and approximately 5 hours after dawn), and weather conditions (no rain, wind speed ≤3 on the Beaufort Wind Scale). While the OBBA protocol recommends that stations be situated at least 300 m apart (to avoid double counting), the stations established herein were often closer together to ensure more comprehensive survey coverage. Surveys occurred for a minimum duration of 10 minutes at each station.
- **Ontario Stream Assessment Protocol (OSAP):** Fish and aquatic habitat conditions within all on-site drainage features were assessed in accordance with the Ontario Stream Assessment Protocol (OSAP) (Stanfield 2010). A modified version of the OSAP Section 4, Module 1 (Rapid Assessment Methodology for Channel Structure) was employed to collect the aquatic data. OSAP provides a standard assessment technique for characterizing watercourses and their attendant fish and aquatic habitat conditions at specific locations (stations). Information to collect includes bankfull and wetted widths, channel structure, evidence of erosion, instream cover, substrate type, stability, and aquatic and riparian vegetation, and other relevant characteristics.
- **Brook Trout Spawning (Redd) Survey:** A systematic visual assessment of the channel bed was undertaken to document evidence of Brook Trout (*Salvelinus fontinalis*) spawning. Two (2) surveys were completed during the appropriate time of year (approximately late October to late November in southern Ontario) and under appropriate weather conditions (e.g., no rain, preferably clear). Evidence (or potential evidence) of spawning is confirmed (or inferred) based on the presence of a pronounced depression in the substrate whereby a female has waved her tail repeatedly to wash fines (silts/sands) downstream and provide a suitable location to deposit eggs. A confirmed redd is one in which a Brook Trout is observed above or alongside an area where the substrate has been cleaned (or where a Brook Trout female is observed in the act of creating a redd). A probable redd is one which appears to have been purposely cleared of fines but lacks an attendant fish. A possible redd shows some evidence of substrate cleaning but to a lesser extent and/or the processes in which substrate cleaning occurred are uncertain.

Terrastory was originally commissioned in early June 2022 to complete this study. The timing of project commencement precluded the possibility of undertaking anuran calling surveys to ascertain the potential presence or absence of significant amphibian breeding habitat within wetland communities west of the Site. The most appropriate timing window for spring vascular plant species had also already elapsed. As such, all wetland communities within the Subject Property are considered candidate Significant Wildlife Habitat (SWH) herein.

2.3 Significance Assessment

2.3.1 Definitions and Criteria

"Significant natural features" as described herein represent natural features and habitats that have recognized status (and therefore policy significance) within the planning jurisdiction in which an application is proposed. Significant natural features are defined herein to include those outlined in the compiled Aggregate Resources of Ontario Standards, namely:

a) Significant wetlands;
b) Other coastal wetlands in Ecoregions 5E, 6E and 7E;
c) Fish habitat;
d) Significant woodlands and significant valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Mary's River);
e) Habitat of endangered species and threatened species;
f) Significant wildlife habitat;
g) Significant areas of natural and scientific interest; and
h) Within the area of one or more provincial plan(s), any key natural heritage features not included in (a) through (g).

It is noted that the County OP provides provisions that consider and/or protect additional natural features beyond the requirements of the ARA Provincial Standards. The potential presence of these regionally significant features are outlined in section 2.2.1.1 of the County OP and include:

- Natural Hazards (e.g., steep slopes, unstable soils, fill regulated areas);
- Natural Environment Areas (e.g., floodplains, flood regulated watercourses, wetlands);
- Natural Heritage Features (e.g., significant woodlands, wildlife habitat, aquatic ecosystems, river, stream, ravines, and upland corridors, ANSIs, etc.); and
- Groundwater Features (e.g., recharge areas, discharge/headwater areas, well-head protection areas).

Criteria used to determine the presence or absence of the above significant natural features within the Study Area were considered from a variety of sources including the Natural Heritage Reference Manual (MNR 2010) and (for Significant Wildlife Habitat) the Ecoregion 7E Criteria Schedule (MNRF 2015).

Like significant natural features, "significant species" represent individuals of wild species which have recognized status (and therefore policy significance) within the planning jurisdiction in which an application is proposed. Significant species are defined herein to include:

- Species designated Endangered, Threatened, or Special Concern under O. Reg. 230/08 pursuant to the provincial *Endangered Species Act, 2007*.
- Species designated Provincially Rare (i.e., S1, S2, or S3) by NHIC.
- Species considered Regionally Rare in Middlesex County pursuant to the *List of the Vascular Plants of Ontario's Carolinian Zone* (Oldham 2017).

2.3.2 Determination

After collecting the background biophysical information and conducting the site assessments the data was interpreted to determine whether any significant natural features and/or significant species occur within the Study Area. If a natural feature or species met the significance criteria, it is considered "confirmed". If a natural feature or species may be present within the Study Area and/or Adjacent Lands given the prevailing biophysical or habitat conditions but was not confirmed based on either background or site-specific biophysical data, it is considered potential or "candidate". Candidate significant natural features and species are treated as confirmed where no additional information is available.

2.4 Effects Assessment and Mitigation

The potential ecological effects of an application can be understood spatially as zones that radiate outward from the direct project footprint (building envelope, etc.) and associated areas of site alteration (grading, etc.). While the greatest potential for effects typically occurs within areas directly subject to development or disturbance, surrounding areas may also be affected indirectly. Such indirect effects can include light or noise pollution that affects wildlife communities on Adjacent Lands, or degradation of water quality within a downstream receptor resulting from sediment runoff during extraction.

The following five-pronged approach is employed herein to assess the effects of an application on significant natural features and species and (where warranted) the natural environment in general:

1. **Scope** the effects assessment to environmental components that warrant consideration. The effects assessment herein centres principally on significant natural features and species (i.e., those that have policy significance within the planning jurisdiction, as defined in **Section 2.3**) but may also consider general environmental effects where warranted.
2. **Identify the predicted direct and indirect effects** of the application on each significant natural feature or species during all project stages (i.e., pre- to -post-development) in the absence of mitigation. Direct effects are those where there is a cause-effect relationship between a proposed activity and an effect on a natural feature or species (e.g., tree clearance within a building footprint, etc.). Indirect effects result when an activity is linked to a direct effect through a chain of foreseeable interactions or steps.
3. **Evaluate the significance** of the predicted effects for each environmental component based on their attributes (i.e., spatial extent, magnitude, timing, frequency, and duration) and likelihood (i.e., high, medium, low).
4. Where the potential for negative effects are anticipated, **recommend ecologically meaningful mitigation measures** to avoid such impacts first (where possible), and where impacts cannot be avoided to minimize, compensate, and/or enhance as appropriate.
5. **Identify the predicted residual or net effect**s of the application assuming implementation of all recommended mitigation measures.

Per step 4, mitigation measures are offered where the potential for negative effects are anticipated to a degree that cannot be supported given the prevailing policy context. Whenever possible, Terrastory works iteratively with the project team to identify extraction options that avoid negative effects first; options that would minimize or mitigate such negative effects are less preferred and considered secondarily. In general, avoidance measures that have already been incorporated into the

application or project design are not duplicated as technical recommendations herein. The Site Plans (phasing, operations, and rehabilitation) are described in **Section 5** while the effects assessment and recommended mitigation measures are provided in **Section 6**.

2.5 Natural Heritage Policy Context

There is an overlapping municipal, provincial, and federal policy framework respecting the protection of natural heritage features and areas across southern Ontario. These requirements include objectives, policies, and directives which are principally contained in federal and provincial statutes, regulations, policy statements, Official Plans, and guidance documents. The overarching natural heritage policy framework directing development activities within the Subject Property is outlined below in **Table 3**. A determination of whether the applications considered herein address such policies is provided in **Section 7**.

The Upper Thames River Conservation Authority (UTRCA) regulation (O. Reg. 157/06) is not strictly applicable to applications made under the *Aggregate Resources Act* per subsection 28(11) of the *Conservation Authorities Act*. UTRCA may review the ARA application on behalf of the County and/or as a commenting agency.

Table 3. Applicable Natural Heritage Policies.

Level of Government	Natural Heritage or Environmental Policy Requirements
Municipal	Municipality of Thames Centre Official Plan (October 2020). County of Middlesex Official Plan (OPA No. 3 June 2022 consolidation).
Provincial	*Aggregate Resources Act* (ARA), R.S.O. 1990, c. A.8, including • Ontario Regulation 244/97 – General • Aggregate Resources of Ontario Standards Provincial Policy Statement 2020, pursuant to the *Planning Act*, R.S.O. 1990, c. P.13, including: • Natural Heritage Reference Manual for Natural Heritage Policies of the Provincial Policy Statement, 2005 (MNR 2010). • Significant Wildlife Habitat Technical Guide (MNR 2000). • Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E (MNRF 2015). • Significant Wildlife Habitat Mitigation Support Tool (MNRF 2014). *Endangered Species Act* (ESA), S.O. 2007, c. 6, including: • Ontario Regulation 230/08 – Species at Risk in Ontario List • Ontario Regulation 242/08 – General • Ontario Regulation 832/21 – Habitat *Fish and Wildlife Conservation Act*, S.O. 1997, c. 41.
Federal	*Fisheries Act*, R.S.C. 1985, c. F-14, including: • Fish and Fish Habitat Protection Policy Statement (DFO 2019). *Migratory Birds Convention Act*, S.C. 1994, c. 22, including: • Migratory Birds Regulations, C.R.C., c. 1035.

3 EXISTING BIOPHYSICAL CONDITIONS

The following is a description of the biophysical features and conditions of the Site, which are shown spatially on **Figure 2**. Representative photographs are provided in **Appendix 2**.

3.1 Land-use and Landscape Setting

The Site is situated in a predominantly rural landscape near the community of Mount Brydges. Nearby parcels contain a mixture of croplands and natural areas, while several former and active aggregate pits are present in the local landscape.

3.2 Physical Setting

3.2.1 Bedrock Geology

The bedrock underlying the Study Area is characterized as Devonian-aged (i.e., 458 to 470 million-year-old) fossiliferous limestone and minor dolostone associated with the Dundee Formation (Armstrong and Dodge 2007). In Ontario, the Dundee Formation subcrops (i.e., acts as the stratigraphic unit closest to the ground surface) from Long Point to the shoreline of Lake Huron. Bedrock is expected to be 20 to 35 m below the ground surface based on bedrock topography mapping (Gao et al. 2006) and a review of publicly-available water well records. Bedrock was not encountered during borehole installation advanced as part of the Hydrogeological Assessment (EXP), though is expected to be approximately 22 to 30 m below the ground surface (bgs).

3.2.2 Surficial Geology and Groundwater Resources

The Site is situated within the Oxford Till Plain physiographic region (Chapman and Putnam 1984), which is characterized as a drumlinized and fluted till plain dissected by several valleylands associated with various branches of the Thames River. These valleylands were cut by glacial meltwaters and are now floored by gravel outwash and more recent alluvium (Ontario Geological Survey 2010).

A total of six (6) boreholes (BH1 to BH9) were advanced in support of the Hydrogeological Assessment (EXP) at depths ranging from 5.0 to 9.0 m bgs. Much of the Site is underlain by a sand/silty sand/gravel layer averaging 3.4 to 8.8 m in depth. Provincial surficial geology mapping indicates the sandy/gravelly deposit represents ice-contact stratified drift of glaciofluvial origin (Armstrong and Dodge 2007). A shallow unconfined aquifer occurs in this layer. The coarse sandy/gravelly layer overlies a silt to clayey silt till.

Groundwater monitoring performed via the Hydrogeological Assessment found shallow groundwater levels of less than 1 m bgs at wells BH4/MW and BH5/MW near the Humphrey Municipal Drain, along with groundwater levels between 1 and 2 m bgs in the northeast corner of the Site. The deepest groundwater levels were documented in BH3/MW (4.62 to 5.15 m bgs) and BH6/MW (4.39 to 5.03 m bgs).

3.2.3 Topography, Drainage, and Surface Water Features

The Site sits between approximately 275 and 279 metres above sea level (masl). Overland runoff is conveyed in a predominantly westward (and to a lesser extent northward) direction towards Caddy Creek / Humphrey Municipal Drain. The elevation of the channel banks west of the Site are at approximately 273 masl. Topographic contours (LiDAR-derived) are shown on **Figure 2**.

Caddy Creek, also referred to as the Humphrey Municipal Drain, is a permanent watercourse that conveys flows west within the northern portion of the Site and south within the natural area in the western portion of the Subject Property. Based on a review of the relevant Aquatic Resource Area (ARA) linework (AY-0001-CAD), Caddy Creek is considered a coldwater system which is expected to contain habitat for several sensitive fish species including Brook Trout, Brown Trout (*Salmo trutta*), and Greenside Darter (*Etheostoma blennioides*). Further discussion of fish habitat is provided in **Section 4.5**.

Two (2) surface water monitoring stations including SW1 (upstream) and SW2 (downstream) were established through the Hydrogeological Assessment (EXP) to ascertain water temperatures and groundwater flow verticality. The surface water stations consisted of a drive-point piezometer (6-inch screen length) alongside a staff gauge, both of which were outfitted with data loggers. Surface water temperatures ranged between 15°C and 20°C during the August and September 2022 monitoring period. Discharge conditions (i.e., upward hydraulic gradient) were documented at SW1 based on surface water readings at the staff gauge generally being below the groundwater elevation in the adjacent piezometer. This confirms interaction between groundwater and surface water in Caddy Creek / Humphrey Municipal Drain and aligns with evidence of groundwater plant indicators observed by Terrastory within the watercourse and wetland such as Watercress (*Nasturtium officinale*), Skunk Cabbage (*Symplocarpus foetidus*), and Eastern Rough Sedge (*Carex scabrata*). Recharge conditions (i.e., downward hydraulic gradient) were observed at SW2.

Caddy Creek / Humphrey Municipal Drain has two segments (or "reaches") as it flows through the Subject Property; a northern reach (flowing westward through farm fields) and western reach (flowing southward through the PSW/woodland). Channel morphology and substrate parameters were collected at AQ-1 (northern reach) and AQ-2 (western reach), which are shown on **Figure 2**. The northern reach was found to exhibit a bankfull channel width of approximately 4 m and a wetted width (on 14 September 2022) of 2.5 m. The substrates primarily consisted of silt overlying gravel. The maximum depth was 25 cm with an average depth of 10 cm. The bank heights were approximately 2 m and found to be overall stable and vegetated with various asters, goldenrods, and Jerusalem Artichoke (*Helianthus tuberosus*). Watercress (*Nasturtium officinale*) was documented in this reach, suggesting groundwater inputs. The western reach exhibited a bankfull width of 4 m and a wetted width (on 14 September 2022) of 3 m. The substrates are primarily fine sand with areas of gravel and cobble (1 to 5 cm diameter). Maximum depth was 15 cm. Riparian vegetation consisted of an overstory of Manitoba Maple (*Acer negundo*) with Spotted Joe-pye Weed (*Eutrochium maculatum*), Virgin's Bower (*Clematis virginiana*), Tall Meadowrue (*Thalictrum pubescens*), and Tall Goldenrod (*Solidago altissima*). Watercress was also documented in this reach but not at the aquatic assessment station (AQ-2).

Water chemistry sampling as reported in the Hydrogeological Assessment (EXP) showed a similar signature between the groundwater and surface water resources, further suggesting hydrological connectivity between these systems.

There is an absence of significant surface erosion, watercourses, or swales within the agricultural fields of the Site, indicating that stormwater runoff likely tends to sheet flow westward/northward towards Caddy Creek and/or is absorbed into the surficial soils.

3.3 Ecological Setting

3.3.1 Vegetation Communities

Most of the Site (>95%) was under active agricultural production in 2022. Vegetation communities within the Study Area are described below and mapped in **Figure 2**.

A willow dominated mineral swamp (SWMD4-1) occurs in the southwest corner of the Study Area, spanning north. The swamp is characterized by mature Hybrid Crack Willow (*Salix × fragilis*) throughout the canopy layer, with Hybrid Crack Willow, Manitoba Maple (*Acer negundo*), and Black Ash (*Fraxinus nigra*) throughout the subcanopy. An even mixture of Glossy Buckthorn (*Frangula alnus*), Common Buckthorn (*Rhamnus cathartica*), ash species (*F. nigra*, *F. pennsylvanica*), and goldenrod species (*Solidago altissima* var. *altissima*, *S. rugosa* ssp. *rugosa*) comprise the ground layer. The dense ground layer vegetation is characterized by an even mixture of Enchanter's Nightshade (*Circaea canadensis*), avens species (*Geum aleppicum*, *G. canadense*), Virgin's Bower (*Clematis virginiana*), and Tall Meadowrue (*Thalictrum pubescens*). The species composition of this community suggests a history of anthropogenic disturbance.

The western edge of the willow swamp abuts a White Cedar – Hardwood Mixed Swamp (SWMO1-1) following a slight drop in grade. The canopy is dominated by a patchy mixture of mature Eastern White Cedar (*Thuja occidentalis*) and Yellow Birch (*Betula alleghaniensis*). Eastern White Cedar, Yellow Birch, Glossy Buckthorn, and ash species comprise the subcanopy. Regenerating ash species, Glossy Buckthorn, and Eastern White Cedar characterize the sparse understory, while Skunk Cabbage (*Symplocarpus foetidus*), Tall Meadowrue, Evergreen Woodfern (*Dryopteris intermedia*), and Enchanter's Nightshade cover the ground layer. This vegetation community is considered characteristic of seepage zones per Lee (2008) which is also reflected in the species assemblage.

The mixed swamp is bisected by a coniferous forest (FOCM4-1) dominated by Eastern White Cedar, where a small change in elevation has produced drier growing conditions. Eastern White Cedar dominates the canopy and subcanopy, with a very small component of Black Cherry (*Prunus serotina*). The understory and ground layer are similarly dominated by Eastern White Cedar, with occasional stems of Jack-in-the-Pulpit (*Arisaema triphyllum*) scattered throughout.

A deciduous woodland (WODM5) spans the eastern edge of the mixed swamp and coniferous forest, abutting the Site. A mixture of Black Cherry, American Elm (*Ulmus americana*), Black Walnut (*Juglans nigra*), and Eastern White Cedar comprise the canopy. Patches of American Elm, Common Buckthorn, Manitoba Maple, and Staghorn Sumac (*Rhus typhina*) are scattered throughout the dense subcanopy, while Common Buckthorn and Manitoba Maple comprise the understory. Tall Goldenrod, Canada Fleabane (*Erigeron canadensis*), Common Ragweed (*Ambrosia artemisiifolia*), and Multiflora Rose (*Rosa multiflora*) are scattered throughout the ground layer.

A small deciduous woodland (WODM4-1) dominated by Common Apple (*Malus pumila*) along a portion of the Study Area's western edge grades into a lowland willow forest (FODM7-3) characterized by mature Hybrid Crack Willow and small pockets of Trembling Aspen (*Populus tremuloides*) throughout the canopy and subcanopy. Common Buckthorn, Wild Red Raspberry (*Rubus idaeus* spp. *strigosus*), and Riverbank Grape characterize the understory, while regenerating Common Buckthorn seedlings, Multiflora Rose, and Tall Goldenrod comprise the ground layer. The lowland forest gently slopes downward towards the Humphrey Municipal Drain where it abuts the willow swamp's edge. Continuing north from the lowland forest is a meadow (MEGM3-5) dominated by

Smooth Brome which spans the length of the municipal drain grading into a goldenrod dominated meadow (MEFM1-1) northeast across the Study Area.

A mineral swamp (SWDM5) characterized by a mixture of Trembling Aspen and Hybrid Crack Willow abuts the eastern edge of the Humphrey Municipal Drain and the willow swamp. Green Ash (*F. pennsylvanica*) and Trembling Aspen comprise the subcanopy, with Green Ash and Manitoba Maple in the understory. The dense ground layer is dominated by a mixture of Goldenrod species, avens species, and Enchanter's Nightshade.

A meadow marsh (MAMM2-4) characterized by mixed forbs spans the mineral swamp's eastern edge. This community is comprised of Panicled Aster (*Symphyotrichum lanceolatum*), Spotted Joe-Pye Weed (*Eutrochium maculatum* var. *maculatum*), Spotted Jewelweed (*Impatiens capensis*), and Reed Canary Grass (*Phalaris arundinacea*). Bordering the eastern edge of the meadow marsh is a mineral thicket swamp (SWTM3-6) characterized by Heart-leaved Willow (*Salix eriocephala*) in the subcanopy and dense Heart-leaved Willow and Pale Dogwood (*Cornus obliqua*) in the understory, with stems of Slender Stinging Nettle (*Urtica dioica* ssp. *gracilis*) occupying gaps in the woody vegetation.

A mineral meadow marsh (MAMM1-12) dominated by Common Reed (*Phragmites australis* ssp. *australis*) demarcates the northernmost edge of natural lands within the Study Area. This community is characterized by a dense monoculture of Common Reed that adjacent landowners have mowed trails through.

To the north, the surrounding landscape consists of rural residential properties interspersed with agricultural lands, with light industrial lands located northeast of the Site. East of the Site is comprised of lands undergoing active aggregate extraction, with rural residential properties, active agriculture, and coniferous plantations (CUP3, CUP3-3) dominated by non-native tree species to the southeast.

3.3.2 Vascular Plants

A total of 157 vascular plant species were recorded within the Subject Property (see **Appendix 3**). Locally rare Evergreen Woodfern (*Dryopteris intermedia*) and Northern Beech Fern (*Phegopteris connectilis*) were identified on the Site in the wooded riparian corridor of Caddy Creek. Black Ash was documented at the southwestern edge of the Site and in other places within the various swamp communities (see **Section 4.4.4**).

3.3.3 Breeding Bird Surveys

Breeding bird surveys were conducted at ten (10) stations on 8 June and 6 July 2022. A total of thirty-three (33) bird species were detected. Out of the 33 species, 30 are considered at least "Possible" breeders within the Subject Property. Two (2) bird species were "Observed" with no breeding evidence (Turkey Vulture and Bank Swallow) and one empty nest was identified with no evidence of breeding (Cliff Swallow). A full list of bird species observed is provided in **Appendix 4**.

At a provincial level, the native bird species recorded have been assigned an S-rank of either S4 or S5 by the NHIC, which indicates that their provincial populations are "apparently secure" or "secure", respectively.

Consistent with the OBBA protocol (Bird Studies Canada et al. 2001), the highest level of breeding evidence obtained during the surveys was "Confirmed" either by a nest with young (NY) adult

carrying food for young (FY) and/or distraction display by adult (DD). This was obtained for 3 species, including American Robin (*Turdus migratorius*), Barn Swallow (*Hirundo rustica*), and Killdeer (*Charadrius vociferus*).

Of the 33 native species, 11 were considered "Probable", either by the observation of pairs of birds (code P), or territorial males (code T), which is defined as a singing male being present at the same location at least seven days apart,). Probable breeders included American Redstart (*Setophaga ruticilla*), Gray Catbird (*Dumetella carolinensis*), Great-crested Flycatcher (*Myrarchus crinitus*), House Wren (*Troglodytes aedon*), Indigo Bunting (*Passerina cyanea*), Northern Cardinal (*Cardinalis cardinalis*), Red-eyed Vireo (*Vireo olivaceus*), Red-winged Blackbird (*Agelaius phoeniceus*), Song Sparrow (*Melospiza melodia*), Willow Flycatcher (*Empidonax traillii*) and Yellow Warbler (*Setophaga petechia*).

Of the 33 native species of birds, 16 species were determined to be "Possible" breeders within the Subject Property, evidenced documentation of a singing male (S) observed in suitable habitat during the breeding season (H). These species were birds that had only been observed during one of the two breeding bird surveys. Species including American Crow (*Corvus brachyrhynchos*), American Goldfinch (*Spinus tristis*), Black-capped Chickadee (*Poecile atricapillus*), Blue Jay (*Cyanocitta cristata*), Brown-headed Cowbird (*Molothrus ater*), Cedar Waxwing (*Bombycilla cedrorum*), Chipping Sparrow (*Spizella passerine*), Common Grackle (*Quiscalus quiscula*), Common Yellowthroat (*Geothlypis trichas*), Eastern Wood Pewee (*Contopus virens*), European Starling (*Sturnus vulgaris*), Field Sparrow (*Spizella pusilla*), House Sparrow (*Passer domesticus*), Mourning Dove (*Zenaida macroura*), Savannah Sparrow (*Passerculus sandwichensis*), and Warbling Vireo (*Vireo gilvis*).

One species "Observed" with no breeding evidence was Bank Swallow (*Riparia riparia*) and Turkey Vulture (*Cathartes aura*) seen flying over adjacent lands. It should also be noted that a Cliff Swallow (*Petrochelidon pyrrhonota*) nest was observed, however there was no evidence of adult birds during site assessments.

Of the 33 species identified during breeding bird surveys, three Species at Risk were detected: Bank Swallow, Barn Swallow, and Eastern Wood-pewee. An incidental observation of a Wood Thrush (*Hylocichla mustelina*) occurred at the southwestern boundary of the Site on 6 July 2022. More information pertaining to observations of these species is provided in **Section 4.3** and **Section 4.4** below.

3.3.4 Brook Trout Spawning (Redd) Survey

As Caddy Creek is considered a coldwater watercourse with expected presence of Brook Trout (based on the ARA dataset), a redd survey was conducted on 03 and 17 November 2022 to confirm the presence or absence of spawning evidence by this species. No confirmed, probable, or potential redds (as defined in **Section 2.2**) were identified.

3.3.5 Incidental Wildlife

A variety of wildlife species were recorded incidentally during the 2022 fieldwork program. Eastern Cottontail (*Sylvilagus floridanus*), Red Fox (*Vulpes vulpes*), White-tailed Deer (*Odocoileus virginianus*), and Black Swallowtail (*Papilio polyxenes*).

4 SIGNIFICANCE ASSESSMENT

Based on the biophysical information collected during background information gathering (per **Table 1**) and the results of the site assessments and surveys (per **Sections 2.2** and **3**), **Table 4** below provides a determination of the presence (or potential presence) of each significant natural feature considered herein. Shaded rows denote features which were confirmed or may be present within the Site or Adjacent Lands and are considered further as part of the effects assessment in **Section 5**. Significant natural feature mapping is provided in **Figure 3**.

Table 4. Summary of the Assessment of Significant Natural Features within the Site and Adjacent Lands.

Significant Natural Feature	Status within the Site	Status on Adjacent Lands (i.e., <120 m from the Site)
Significant Natural Features per ARA Provincial Standards		
Significant Wetlands	**Absent.**	**Confirmed.** See **Section 4.1.**
Significant Woodlands	**Absent.**	**Confirmed.** See **Section 4.2.**
Significant Valleylands	**Absent.**	**Absent.**
Significant Wildlife Habitat	**Absent.**	**Confirmed.** See **Section 4.3.**
Significant Areas of Natural and Scientific Interest	**Absent.**	**Absent.**
Habitat of Endangered and Threatened Species (per ESA)	**Absent.**	**Present.** See **Section 4.4.**
Fish Habitat (per *Fisheries Act*)	**Confirmed.** See **Section 4.5.**	**Confirmed**. See **Section 4.5.**
County Natural System (certain components not considered by ARA Provincial Standards)		
Natural Hazards, Natural Environment Areas, Natural Heritage Features, Groundwater Features	**Confirmed**. See **Section 4.6.**	**Confirmed**. See **Section 4.6.**

4.1 Provincially Significant Wetlands (and other Adjoining Wetlands)

Swamp and marsh communities located within the Subject Property west of the Site form part of the Provincially Significant Dorchester Swamp (UT 24) Wetland Complex (hereinafter "PSW") per Appendix 1 of the Municipality's OP and Schedule A of the County's OP. Terrastory delineated the boundary of the PSW during the 2022 fieldwork program consistent with OWES protocols (see **Figure 3**). Terrastory's delineation refined the boundary and resulted in a slightly different configuration in comparison to the provincial mapping; the true wetland limit is both more and less extensive than currently mapped, depending on location.

An assessment of potential effects to the PSW associated with the proposed pit operations plan is provided in **Section 6.1**.

4.2 Significant Woodlands

A Significant Woodland has been mapped within the Subject Property per Appendix 1 of the Municipality's OP and Schedule C of the County's OP. Given the conditions observed during Terrastory's fieldwork, including (but not exclusive to) the presence of an overlapping PSW and

coldwater watercourse, the Significant Woodland designation is considered appropriate. The dripline of the Significant Woodland (as field verified and delineated by Terrastory staff) is shown on **Figure 3**.

An assessment of potential effects to the Significant Woodland associated with the proposed pit operations plan is provided in **Section 6.1**.

4.3 Significant Wildlife Habitat

An assessment of the likelihood that any candidate or confirmed SWH types or areas occur within or adjacent to the Site is provided in **Appendix 6**. Based on the results of this assessment, six (6) SWH types are considered further through this study:

- Seasonal Concentration Areas of Animals
    1. Bat Maternity Colonies (**candidate**)
    2. Reptile Hibernacula (**candidate**)
- Rare Vegetation Communities or Specialized Habitats for Wildlife
    3. Amphibian Breeding Habitat (Wetlands) (**candidate**)
    4. Seepage Areas and Springs (**confirmed**)
- Habitat of Species of Conservation Concern
    5. Special Concern and Rare Wildlife Species (**confirmed**)
- Animal Movement Corridors
    6. Amphibian Movement Corridors (**candidate**)

Also based on this assessment, a total of five (5) Special Concern or provincially rare species are considered to have a possible likelihood of occurrence on the Subject Property given their habitat associations and current distribution in southern Ontario (or were confirmed during the fieldwork program):

1) Eastern Wood-pewee (*Contopus virens*)
2) Wood Thrush (*Hylocichla mustelina*)
3) Monarch (*Danaus plexippus*)
4) Yellow-banded Bumble Bee (*Bombus terricola*)
5) Snapping Turtle (*Chelydra serpentina*)

A general description of each SWH type and Special Concern/provincially rare species and their habitats within the Study Area is offered below. An assessment of potential effects to the candidate/confirmed SWH features and Special Concern/provincially rare species associated with the proposed pit operations plan is provided in **Section 6.3**.

4.3.1 Bat Maternity Colonies

Big Brown Bat (*Eptesicus fuscus*) and Silver-haired Bat (*Lasionycteris noctivagans*) form maternity colonies that roost with pups in various features, particularly cracks, cavities, or loose bark associated with large-diameter trees (≥25 cm diameter at breast height), snags, and buildings. Snags/cavity trees in earlier stages of decay (i.e., decay classes 1-3) may be preferred.

The Significant Woodland contains larger-diameter snags and cavity trees, and therefore provides candidate significant habitat for bat maternity colonies. Neither roost density surveys nor ultrasonic

acoustic monitoring were undertaken through this study as the Significant Woodland will be protected from extraction by an ecologically appropriate setback.

4.3.2 Reptile Hibernaculum

Snakes in Ontario hibernate in areas which provide access below the frost line or that do not freeze during winter. A wide array of features may function as snake hibernacula, including natural (e.g., small mammal burrows, crevices in bedrock, etc.) and human-built (e.g., rock piles, old stone foundations, etc.) features. Survey methodologies for confirming snake use of a potential hibernacula typically involve spring or (less preferred) fall surveys to identify congregations of snakes near their point of exit or emergence from a hibernaculum; however, such surveys may still produce a false negative (i.e., fail to successfully identify hibernacula) given the camouflaged, cryptic nature of snakes and variability in emergence/exit dates.

Candidate snake hibernacula, particularly small mammal burrows and small rock piles, were noted within the wooded areas and along the edge of Caddy Creek, as well as in other parts of the Study Area (outside the Site). The Site is routinely tilled and maintained for cash crops; therefore, it is unlikely to support significant congregations of overwintering snakes.

4.3.3 Amphibian Breeding Habitat and Amphibian Movement Corridors

Anuran calling surveys were not undertaken as part of this study given the time period at which the study originally commenced (late spring 2022). As such, all wetlands associated with the PSW are considered candidate significant amphibian breeding habitat (though most areas likely lack sufficient standing water to support amphibian breeding). The contiguous natural area along the Caddy Creek / Humphrey Municipal Drain riparian corridor is also considered a potentially significant amphibian movement corridor.

4.3.4 Seepage Areas and Springs

See discussion in **Section 3.2.3** related to observed vascular plant indicators of groundwater seepage in the PSW and Caddy Creek, along with the confirmation of an upward hydraulic gradient and groundwater/surface water interactions as established through the Hydrogeological Assessment (EXP).

4.3.5 Eastern Wood-pewee

Eastern Wood-pewee is designated Special Concern in Ontario per O. Reg. 230/08 pursuant to the *Endangered Species Act* (ESA) and is federally designated Special Concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). This species is most commonly associated with relatively open, deciduous and mixed forests of various sizes, as well as forest edges and other areas with relatively continuous canopy cover (e.g., parks, cemeteries, etc.). This species' preference for open forests and forest edges may be attributed to its aerial foraging behaviour (COSEWIC 2012). Territory sizes were shown to average approximately 1.75 ha (representing a circle with a radius of 75 m) in a study in southern Ontario (COSEWIC 2012).

The location where Eastern Wood-pewee was documented within the Study Area is shown on **Figure 3**.

4.3.6 Wood Thrush

Wood Thrush is designated Special Concern in Ontario per O. Reg. 230/08 pursuant to the ESA and is federally designated Special Concern by COSEWIC. Wood Thrush is predominantly found in deciduous and mixed forests with a well-developed understorey of regenerating trees and shrubs. This species is more often found in larger forest blocks but may successfully breed within smaller forest fragments (Cadman et al. 2007). In a study in Pennsylvania, Wood Thrush territory sizes were shown to be 2.5 ha on average with a range of 1.5-4 ha (Evans et al. 2008).

Wood Thrush was documented as a "possible" breeder within the wooded area west of the Site (see **Figure 3**) on the basis of an incidental observation on 06 July 2022.

4.3.7 Monarch

Monarch is designated Special Concern in Ontario per O. Reg. 230/08 pursuant to the ESA and is federally designated Endangered by COSEWIC. Monarch is well-known to be host-specific and oviposits exclusively on species of milkweed (*Asclepias* spp.). This species is a generalist forager and may nectar in any area with wildflowers.

No Monarch adults were observed during site assessments; however, the meadow community at the western limits of the Site provides suitable ovipositing due to the presence of Common Milkweed (*Asclepias syriaca*). Suitable foraging habitat is present within the meadow community and along the edge of Caddy Creek within the Site.

4.3.8 Yellow-banded Bumble Bee

Yellow-banded Bumble Bee is designated Special Concern in Ontario per O. Reg. 230/08 pursuant to the ESA and is federally designated Special Concern by COSEWIC. This species occupies a range of open areas that contain nectaring sites and nests underground in abandoned rodent burrows or decomposing logs, typically in woodlands.

Current records in southern Ontario suggest that this species is associated with more densely forested landscapes north of the Carolinian zone. Notwithstanding this, given that the Subject Property provides potentially suitable nectaring, nesting, and overwintering habitat for this species, and bumble bee surveys were not undertaken as part of this study, the Study Area is assumed to contain suitable habitat for Yellow-banded Bumble Bee.

4.3.9 Snapping Turtle

The Snapping Turtle is designated Special Concern per O. Reg. 230/08 pursuant to the ESA and is federally designated Special Concern by COSEWIC. This species occupies a wide range of aquatic habitats with slow moving water and nesting in gravelly and sandy areas near watercourses or wetlands. This species is also known to make long-distance overland movements (i.e., several kilometers) between habitats.

As this species is known to travel long distances from wetlands and watercourses to nesting areas, Snapping Turtle could potentially be present and move within the Site. However, wetlands and watercourses suitable for hibernation and foraging is limited in the general area, and nesting habitat is not limited in the general landscape.

4.4 Habitat of Endangered and Threatened Species

An assessment of the likelihood that any Endangered and Threatened species or their habitats occur within the Subject Property or Adjacent Lands is provided in **Appendix 6**. A total of six (6) Endangered or Threatened species are considered to have at least a possible likelihood of occurrence on the Subject Property given their habitat associations and current distribution in southern Ontario (or were confirmed through the fieldwork program):

1) Bank Swallow (*Riparia riparia*) (**confirmed**)
2) Barn Swallow (*Hirundo rustica*) (**confirmed)**
3) Little Brown Myotis (*Myotis lucifugus*) (**possible**)
4) Northern Myotis (*Myotis septentrionalis*) (**possible**)
5) Tri-colored Bat (*Perimyotis subflavus*) (**possible**)
6) Black Ash (**confirmed**)

A general description of each Endangered/Threatened species and their habitat is offered below. An assessment of potential effects to these Endangered/Threatened species associated with the proposed pit operations plan is provided in **Section 6.4**.

4.4.1 Bank Swallow

Bank Swallow is designated Threatened in Ontario per O. Reg. 230/08 pursuant to the ESA and is federally designated Threatened by COSEWIC. This species is a colonial breeder which nests in exposed, sandy substrates on vertical or steep surfaces, including cliff/bluff faces, river-banks, and construction stockpiles. Foraging habitat includes a variety of open areas including agricultural lands, meadows, prairies, woodland clearings, marshes, and waterbodies.

This species was documented foraging above Adjacent Lands to the east. The Site does not currently contain suitable nesting habitat for this species.

4.4.2 Barn Swallow

Barn Swallow is designated Threatened in Ontario per O. Reg. 230/08 pursuant to the ESA and is federally designated Threatened by COSEWIC. Prior to European settlement Barn Swallow nested in or on natural features (e.g., caves, cliff faces, etc.); today most nesting is associated with built structures such as barns, bridge/culvert undersides, and awnings/overhangs on the sides of buildings (COSEWIC 2011). Foraging habitat includes a variety of open areas such as agricultural lands, old fields, and open water. Foraging distances from nest sites depend on habitat quality and social characteristics, but have been found to extend greater than one kilometre (Brown and Brown 1999) though may only average a few hundred metres for most forays (Turner 1981).

Barn Swallow has not been afforded regulated habitat under O. Reg. 832/21 of the ESA; however, MECP has prepared a general habitat description based on the following habitat categorization scheme:

- **Category 1:** Nest;
- **Category 2:** The area within 5 m of the nest; and
- **Category 3:** The area between 5 m and 200 m of the nest.

A Barn Swallow nest with young was observed underneath a concrete bridge on a residential driveway on Adjacent Lands (see **Figure 3**), approximately 6 m west of the Site boundary. Adults were observed foraging above agricultural fields located on the Site during both breeding bird surveys in June/July 2022.

4.4.3 Endangered Bats

Little Brown Myotis, Northern Myotis, and Tri-colored Bat have the potential to roost and forage within the Study Area. Each of these bat species is designated Endangered in Ontario per O. Reg. 230/08 pursuant to the ESA and are federally designated Endangered by COSEWIC. Little Brown Myotis and Northern Myotis form maternity colonies that roost in large-diameter trees with cracks, crevices, and/or exfoliating bark; Little Brown Myotis will also frequently roost in buildings (e.g., attics, barns, etc.). Roosting sites for Tri-colored Bat maternity colonies are less understood but have been documented in dead or dying leaf clusters of oaks (*Quercus* spp.) and maples (*Acer* spp.), along with live foliage and buildings (Humphrey and Fotherby 2019). Individuals (i.e., non-reproductive females and males) of all three bat species may roost in smaller diameter trees and other spaces (e.g., beneath house siding, etc.) which are not occupied by maternity colonies. Overwintering habitat includes caves and mines that maintain temperatures above 0°C. White Nose Syndrome (a fungal disease caused by an introduced pathogen) has devastated populations of each species across their ranges. The fungus causes hibernating individuals to become dehydrated, leading to excessive arousal, depleted fat reserves, and ultimately emaciation and/or death.

Treed communities within the Significant Woodland in the western portion of the Subject Property (FOCM4-1, FODM7-3, WODM5, SWDM4-1, SWMO1-1) could provide suitable roosting and foraging habitat for the above three bat species.

4.4.4 Black Ash

Black Ash was identified within the Subject Property within the PSW and moister pockets within the deciduous forest west of the Site. Black Ash is designated as Endangered in Ontario per O. Reg. 230/08 pursuant to the ESA. In Ontario, Black Ash is predominantly found in wetlands but is also known to occur in moist woods, floodplains and riparian areas, seepages and fens. Like most Ash species (*Fraxinus* spp.), Black Ash has been negatively impacted by the Emerald Ash Borer (*Agrilus planipennis*). Per O. Reg. 23/33, Sections 9 (1) and 10 (1) of the ESA, which prohibit killing, harming, possessing, transporting, etc. living or dead species and/or damaging or destroying their habitats, have been suspended until January 26, 2024. As such, the protections afforded Threatened and Endangered species under the ESA are currently not applicable to Black Ash.

A small number of locations where Black Ash were documented by Terrastory during the 2022 fieldwork program are shown in **Figure 3**. These locations represent larger individuals and/or those which are situated closer to the forest edge (dripline). Note that Black Ash is relatively widespread throughout the riparian corridor flanking Caddy Creek west of the Site, and there are several locations documented by Terrastory which are not shown on **Figure 3**.

4.5 Fish Habitat

Caddy Creek / Humphrey Municipal Drain is a permanent coldwater watercourse. According to the provincial ARA spatial dataset, which characterizes watercourse segments containing relatively consistent biophysical parameters (e.g., water temperature, depth, fish community), the fish community is expected to contain Brook Trout and Brown Trout, as well as a variety of coolwater

and warmwater fish species including Blacknose Dace (*Rhinichthys atratulus*), Blackside Darter (*Percina maculata*), Bluntnose Minnow (*Pimephales notatus*), Brook Stickleback (*Culaea inconstans*), Central Mudminnow (*Umbra limi*), Central Stoneroller (*Campostoma anomalum*), Common Shiner (*Luxilus cornutus*),Creek Chub (*Semotilus atromaculatus*), Emerald Shiner (*Notropis atherinoides*), Fantail Darter (*Etheostoma flabellare*), Fathead Minnow (*Pimephales promelas*),Greenside Darter (*Etheostoma blennioides*), Hornyhead Chub (*Nocomis biguttatus*), and Johnny Darter (*Etheostoma nigrum*). It is unknown if these species have been confirmed as present within Caddy Creek as it flows through the Subject Property, or (alternatively) if they have been documented in downstream reaches only (and assumed to occur further upstream based on an absence of barriers to fish passage).

Thermal monitoring of Caddy Creek / Humphrey Municipal Drain was performed at surface water stations SW1 and SW2 as part of the Hydrogeological Assessment (EXP). Surface water temperature at SW1 was consistently around 1°C warmer than SW2, which may reflect the prevailing open conditions at SW2 compared to closed/forested conditions at SW2. Temperature monitoring between August 4 and September 14 revealed a maximum temperature of 20°C at SW1 (19°C at SW2), which occurred in early August on a date with a maximum daily temperature reading of 31°C. This temperature data is considered in the context of methodologies for classifying thermal regime (Chu et al. 2009) and empirical studies of fish assemblages from neighbouring jurisdictions (Lyons et al. 2009). The methodology provided by Chu et al. (2009), and in the absence of additional information (e.g., results of a recent electrofishing survey), suggests that Caddy Creek (as it flows through the Study Area) is best described as a coolwater system (see **Chart 1** below). It is expected that reaches lacking woody vegetation (including reaches well upstream of the Subject Property) are allowing thermal loadings which are elevating the surface water temperature.

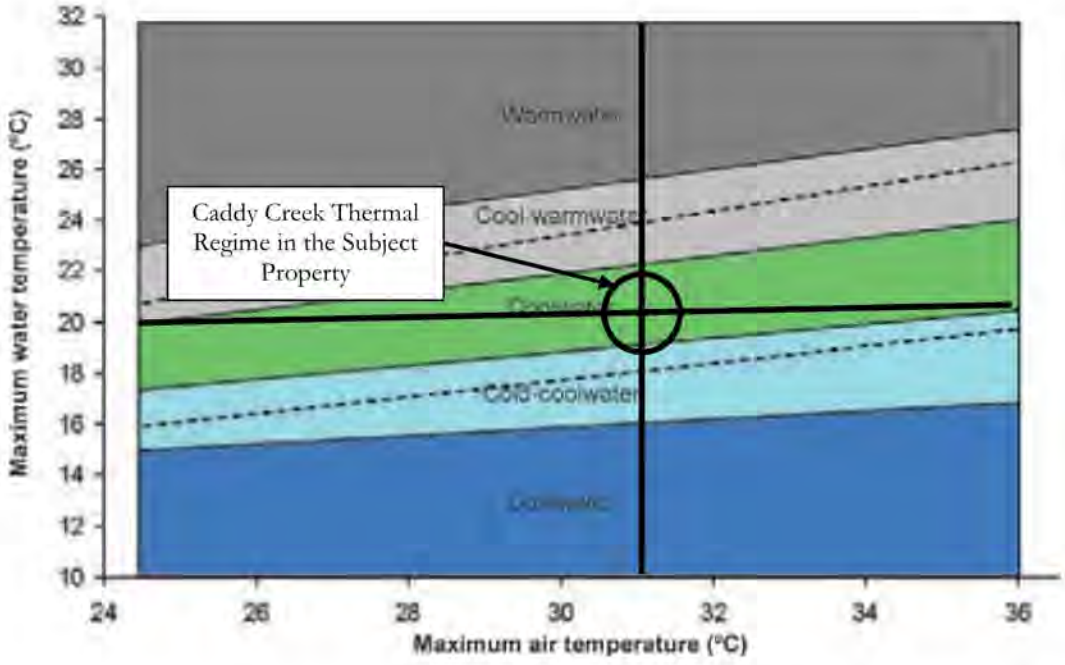

Chart 1. Caddy Creek Thermal Regime (Nomogram from Chu et. al 2009).

4.6 County Natural System

There are a number of significant natural features described in **Section 4** above which form part of the County Natural System (e.g., PSW, Significant Woodland). The wooded riparian area west of the Site is expected to overlap with a flood hazard associated with Caddy Creek (i.e., Natural Hazard) and contains groundwater with an upward hydraulic gradient (i.e., Groundwater Resources); Natural Hazards and Groundwater Resources also form part of the County's Natural System.

5 PHASING, OPERATIONS, AND REHABILITATION PLANS

The Applicant is applying for a new Class A pit licence to facilitate below-water pit extraction within the Site. The proposed ARA site plans are provided in **Appendix 7**. The total area to be licensed, extracted, and rehabilitated is as follows:

- Total area to be licensed: 20.7 hectares
- Total area to be extracted: 17.8 hectares
- Total area to be rehabilitated within the extraction area: 17.8 hectares, including:
    - Open Water Pond: 12.9 ha
    - Wetland: 1.4 ha
    - Sideslope/Meadow: 3.4 ha

Extraction will proceed above-water first, followed-by below-water. Below-water extraction will occur via dragline (or equivalent); therefore, no dewatering is required. It is understood that excavation will likely extend to 269 masl, or a maximum of 11 m bgs. Maximum expected tonnage per year is 500,000. The back-flooded pond will be 12.9 ha in size with an average water level elevation of 274.25 masl.

6 EFFECTS ASSESSMENT AND MITIGATION

The purpose of this NER is to present a biophysical characterization of the Study Area to identify the potential for adverse effects on the natural environment and natural heritage features stemming from the proposed pit extraction activities. Several significant natural features and species were documented (or may occur) within the Site pursuant to the assessments in **Section 4**. The following effects assessment provides an evaluation of the potential for the proposed pit operations to result in negative effects to such environmental components and offers technical recommendations to mitigate such effects where warranted. Certain technical recommendations offered herein apply to several natural features and/or species simultaneously; as such, all technical recommendations should be read and considered in their entirety. The baseline or existing conditions against which the application is assessed are treated as the state of the Site at the time of the site assessments. The effects assessment herein is based on the Site Plans provided in **Appendix 7**.

All pits and quarries in Ontario are subject to a set of standards and conditions which are outlined in both O. Reg. 244/97and the Site Plan Standards (August 2020) per the compiled Aggregate Resources of Ontario Standards. The effects assessment herein assumes that all pit operations within the Site will be undertaken consistent with these requirements, which pertain to both Class A and Class B licences. Such conditions and standards that have bearing on protection of the natural environment are not duplicated as technical recommendations herein as they already represent licence requirements. Relevant standards per subsections 0.12 and 0.13 of O. Reg. 244/97 include the following:

- Dust will be mitigated, and the use of dust suppressants will be applied to internal haul roads and processing areas as required.
- A Spills Contingency Program will be developed prior to site operations and followed during operations.
- Fuel storage tanks will be installed and maintained according to the *Technical Standards and Safety Act*.
- If required, an Environmental Compliance Approval will be secured to carry out operations.
- If required, a Permit to Take Water will be secured.
- Topsoil will be stripped sequentially prior to aggregate extraction.
- Topsoil and overburden stripped during the operation will be stored separately with vegetated slopes to promote stability and control erosion.
- Adequate vegetation will be established and maintained to control erosion of any berm or stockpile.
- Scrap may only be stored temporarily and cannot be located within 30 m of any body of water or 30 metres from the boundary of the Site.
- Excavation is to be set back 15 metres from the boundaries of the Site and 30 metres from any body of water that is not the result of excavation below the water table.
- All excavation faces are to be stabilized to prevent erosion.
- All stripped topsoil or overburden will be used in the rehabilitation of the Site.
- Adequate vegetation is established and maintained to control erosion of any topsoil or overburden replaced for rehabilitation purposes.
- Rehabilitation will ensure adequate drainage and vegetation is provided and any compaction is alleviated.

Technical recommendations above and beyond the aforementioned conditions and standards are offered in **Section 6** to avoid and/or minimize the potential for impacts to the significant natural features identified. Certain technical recommendations apply to several natural features and/or species simultaneously; as such, all technical recommendations should be read and considered in their entirety. All technical recommendations offered herein are incorporated into the ARA Site Plans provided in **Appendix 7** while the recommended feature and habitat setbacks are also shown on **Figure 3**.

6.1 Provincially Significant Wetlands (and other Adjoining Wetlands)

Where development and/or site alteration activities are proposed adjacent to wetlands, adverse effects may occur via the following pathways:

- Alterations to surface water and/or groundwater contributions to the wetland from construction (e.g., dewatering, etc.), grading that modifies the existing topography or drainage, and/or increased coverage of impervious surfaces (e.g., roads, roofs, etc.);
- Increased sediment loadings and/or nutrient enrichment within the wetland via runoff exiting from development areas during and post construction. This may alter wetland water quality and vegetation communities via increased turbidity, eutrophication, contamination by toxic substances, negative impacts to fish from increased sediment, changes in pH, etc.
- Noise and/or light pollution that may adversely affect the ability of wetland wildlife to successfully carry out their life processes (e.g., breeding, feeding, etc.).

- Increased human activity (i.e., encroachment) within the wetland which may result in soil compaction, dumping, etc.
- Potential for fuel spills; and
- Increased potential for introducing invasive species including both animals and plants.

Terrastory delineated the boundary of the PSW during the 2022 fieldwork program consistent with OWES protocols (see **Figure 3**). The Site Plans (**Appendix 7**) directly incorporate a 30 m extraction setback measured from the outer edge of wetland conditions as delineated by Terrastory.

The Rehabilitation Plan (see **Appendix 7**) includes a wetland design (i.e., 10:1 sloping) along the edges of the future pit pond, totaling 1.4 ha. These wetland edges (particularly along the southwestern side, which is adjacent to the PSW) will serve to enhance the values of the protected wetland on-site.

A comprehensive impact assessment to the PSW (and Caddy Creek) was incorporated into the Hydrogeological Assessment (EXP). The pre- and post-extraction water balance found minimal difference between overall total infiltration and runoff directed towards the PSW and watercourse under existing conditions (168,121 m^3/year) compared to post-extraction conditions (160,523 m^3/year). The Hydrogeological Assessment also found negligible daily drawdown (i.e., short-term groundwater table effects) in the range of up to 4 cm, which would recover within 24 hours. In the context of potential long-term impacts to groundwater levels, the Hydrogeological Assessment concluded that "impacts to groundwater levels are expected to be minimal west of the pond with negligible drawdown" (p. 25). The back-flooded pit pond will further be surrounded by berms which will prevent direct flow between the pond and adjacent natural features.

Technical recommendations to protect the PSW are offered as follows, and have also been incorporated onto the Site Plan:

- **The 30 m setback from the PSW and other adjoining wetlands will be well-marked under the direction of a qualified ecologist prior to the commencement of adjacent pit operations.**
- **Operational activities and other disturbances are prohibited within the 30 m setback from the wetland, which will become natural, self-sustaining vegetation (no mow or agricultural uses).**

6.2 Significant Woodlands

Where development and/or site alteration activities are proposed adjacent to forests or woodlands, adverse effects may occur via the following pathways:

- Mechanical injury to the trunk, roots, branches, and/or foliage of retained woody vegetation.
- Soil compaction from the use of heavy machinery.
- Smothering or exposure of roots due to changes in grade.
- Noise and/or light pollution that may adversely affect the ability of woodland wildlife to successfully carry out their life processes (e.g., breeding, feeding, etc.).
- Increased human activity (i.e., encroachment) within or adjacent to the woodland which may result in soil compaction, dumping, etc.

Wooded areas flanking Caddy Creek (including forests, woodlands, and treed swamps) are shown as Significant Woodland per Appendix 1 of the Municipality's OP and Schedule C of the County's OP. The dripline of the Significant Woodland was delineated by Terrastory on-site and is shown on **Figure 3**. The Operations Plan incorporates a 15 m setback from the dripline of the Significant Woodland.

Technical recommendations to protect the Significant Woodland are offered as follows, and have also been incorporated onto the Site Plan:

- **The 15 m setback from the dripline of the Significant Woodland will be well-marked under the direction of a qualified ecologist prior to the commencement of adjacent pit operations.**
- **Operational activities and other disturbances are prohibited within the 15 m setback from the wetland boundary, which will become natural, self-sustaining vegetation (no mow or agricultural uses).**
- **Any necessary lighting to support pit operations will be directed away from the Significant Woodland (i.e., eastward or northward) to the extent practicable.**

6.3 Significant Wildlife Habitat

Per the assessment in **Section 4.3**, a total of six (6) SWH types were considered further through this study:

- Seasonal Concentration Areas of Animals
    1. Bat Maternity Colonies (**candidate**)
    2. Reptile Hibernacula (**candidate**)
- Rare Vegetation Communities or Specialized Habitats for Wildlife
    3. Amphibian Breeding Habitat (Wetlands) (**candidate**)
    4. Seepage Areas and Springs (**confirmed**)
- Habitat of Species of Conservation Concern
    5. Special Concern and Rare Wildlife Species (**candidate**)
- Animal Movement Corridors
    6. Amphibian Movement Corridors (**candidate**)

Also based on this assessment, a total of five (5) Special Concern or provincially rare species are considered to have a possible likelihood of occurrence on the Subject Property given their habitat associations and current distribution in southern Ontario (or were confirmed during the fieldwork program):

1) Eastern Wood-pewee (*Contopus virens*)
2) Wood Thrush (*Hylocichla mustelina*)
3) Monarch (*Danaus plexippus*)
4) Yellow-banded Bumble Bee (*Bombus terricola*)
5) Snapping Turtle (*Chelydra serpentina*)

Candidate and confirmed SWH types are restricted to the wooded riparian corridor flanking Caddy Creek in the western portion of the Subject Property. Establishment of the recommended 30 m

setback from the PSW/wetlands and 15 m setback from the Significant Woodland, along with other technical recommendations made herein, is considered sufficient to protect all overlapping SWH types therein from impact during pit operations.

6.4 Habitat of Endangered and Threatened Species

Per the assessment in **Appendix 6**, a total of four (4) Endangered or Threatened species are considered to have a possible likelihood of occurrence on the Subject Property given their habitat associations and current distribution in southern Ontario (or were confirmed through the fieldwork program):

1) Bank Swallow (*Riparia riparia*) (**confirmed**)
2) Barn Swallow (*Hirundo rustica*) (**confirmed**)
3) Little Brown Myotis (*Myotis lucifugus*) (**possible**)
4) Northern Myotis (*Myotis septentrionalis*) (**possible**)
5) Tri-colored Bat (*Perimyotis subflavus*) (**possible**)
6) Black Ash (**confirmed**)

No impacts to the above-noted Threatened/Endangered species or their associated habitats during implementation of the proposed pit operations are anticipated for the following reasons:

Bank Swallow: No suitable nesting sites are currently present within the Site for this species. Notwithstanding this, Bank Swallow are known to occur in relatively high densities in the local landscape and were documented during Terrastory's breeding bird surveys in 2022. This species frequently nests in vertical or near-vertical (i.e., above 75°) aggregate stockpiles and pit faces containing sandy overburden. If any Bank Swallow colonies occupy future aggregate stockpiles or pit faces during active extraction within the Site during the nesting season (i.e., approximately April to late August for this species), this would likely result in the need for temporary cessation of nearby pit operations until the birds have completed nesting. To avoid impacts to this threatened species, the following measure is recommended:

- **All aggregate operations within the Site will be undertaken consistent with the document titled "Best Management Practices for the Protection, Creation and Maintenance of Bank Swallow Habitat in Ontario" (OMNRF 2017).**

Barn Swallow: A Barn Swallow nest with young was observed approximately 6 m west of the Site boundary underneath a concrete bridge on a nearby residential driveway (see **Figure 3**). This species has a high site fidelity and typically returns to the same nesting habitat the following year. As per the MNRF General Habitat Description (see **Section 4.4.2**), Category 3 Barn Swallow habitat extends between 5 and 200 m of the nest and is considered to have relatively a high tolerance to alteration. The species depends upon open areas and waterbodies for good sources of flying insects, that would include Caddy Creek, woodland edges, and nearby agricultural fields. The proposed area of extraction will be a minimum of 35 m from the nest given the 30 m setback from the bankfull channel of Caddy Creek (see **Section 6.5**) and 15 m setback from the western licence boundary. The minimum 35 m setback from the Barn Swallow nest is considered sufficient. No further recommendations related to Barn Swallow are warranted.

Endangered Bats: Suitable roosting habitat for Endangered bats (including both individuals and maternity colonies) is present within the Significant Woodland, which will be protected by a 15 m dripline setback. It is possible that minor woody vegetation removal could be required (outside of the Significant Woodland) at some point during pit operations. As such, a timing restriction on vegetation removal is advised. To simplify the site plan requirements, the tree removal timing window recommended below combines both the principal bat activity period and bird nesting period (in Ecoregion 7E) to address requirements of the *Migratory Birds Convention Act*. It should also be noted that trees planted within the 30 m riparian corridor (see **Section 6.5** below) will provide future roosting opportunities for bats. To avoid impacts to roosting bats (and nesting birds), the following recommendation is offered:

- **Any necessary removal of natural vegetation to support pit operations will be completed outside the primary bird nesting and bat activity periods (i.e., to be completed between October 1 and March 31).**

Black Ash: This species was observed within several locations in the western portion of the Subject Property (only a small number of which are shown on **Figure 3**). The 30 m wetland setback and 15 m Significant Woodland setbacks are considered sufficient to protect this species from adverse effects. While protection of this species under the ESA has been suspended until (at least) 26 January 2024 per O. Reg. 23/22, the ESA applies irrespective of a project's planning approval status or active development stage.

6.5 Fish Habitat

The shallow groundwater aquifer within the Site is interconnected with flows within the adjacent Caddy Creek / Humphrey Municipal Drain, as established through the Hydrogeological Assessment (EXP). The following potential impacts were identified and considered through the Hydrogeological Assessment:

- Potential for short-duration localized effects on the groundwater level being lowered near the perimeter of the pit pond during below-water extraction.
- Potential change in water budget due to the increase in evaporation from an open water body and increased surface runoff into the pit pond.
- Potential changes to the groundwater elevation and/or flow gradient within the Site.
- Potential changes to the thermal profile of the groundwater, which is hydrologically connected to Caddy Creek.

While potential impacts to fish habitat in Caddy Creek (and the PSW, see **Section 6.1**) were largely considered negligible through the Hydrogeological Assessment, the greatest potential for impact is associated with thermal loadings from the future pit pond, which could raise the groundwater temperature discharging to the watercourse. The Hydrogeological Assessment suggested that the potential for thermal impacts to Caddy Creek would be mitigated due to 1) the time required for infiltration into the subgrade soils and lateral flow to the watercourse (allowing the groundwater temperature sufficient time to adjust to background levels), and 2) mixing of groundwater emanating from the pit pond and the prevailing groundwater table that has not been thermally affected.

As described in **Section 4.5**, Caddy Creek is a permanent coldwater watercourse with expected presence of sensitive species including Brook Trout, Brown Trout, and Greenside Darter. The

extraction limit will be setback 30 m from the bankfull channel of Caddy Creek and no site alteration (e.g., storage berms, acoustic berms) are proposed within this area (which is to become restored with trees and shrubs and be left as natural, self-sustaining vegetation; see below). The extraction limit will be isolated by silt fence and maintained as required to function effectively to minimize the potential for sediment-laden runoff from entering Caddy Creek during the spring freshet or storm events. The proposed site plans (see **Appendix 7**) directly incorporate a 30 m setback measured from the bankfull channel of Caddy Creek, as delineated by Terrastory. This 30 m setback will maximize both groundwater mixing and the time required for groundwater emanating from the pit pond to reach Caddy Creek, facilitating the mitigating effects noted in the Hydrogeological Assessment.

In addition to the mitigating effects described above, Terrastory recommends the following measures to minimize the potential for thermal impacts to Caddy Creek:

- **The 30 m setback from the bankfull channel of Caddy Creek / Humphrey Municipal Drain will be well-marked under the direction of a qualified ecologist prior to the commencement of adjacent pit operations.**
- **Operational activities and other disturbances are prohibited within the 30 m setback from Caddy Creek / Humphrey Municipal Drain, which will become natural, self-sustaining vegetation (no mow or agricultural uses).**
- **The 30 m setback will become natural, self-sustaining vegetation (i.e., no vegetation maintenance or human activities is permitted).**
- **Erosion and sediment control measures (e.g., installation of silt fencing) will be implemented outside the 30 m setback of Caddy Creek / Humphrey Municipal Drain and be regularly maintained as required to function effectively.**
- **A Riparian Corridor Enhancement Plan for the 30 m setback from the Caddy Creek / Humphrey Municipal Drain will be prepared for the area north of the Site, which incorporates the following elements (minimum):**
    - **Tree and shrub installations (native to Middlesex County) to be installed within 5 m of the bankfull channel.**
    - **Application of a native seed mixture suited to moist, upland conditions to cover the 30 m setback.**
    - **Implementation of a monitoring plan for the purposes of determining the success of the woody plant installations and seed application for a period of no less than three (3) growing seasons.**
- **A Surface Water Monitoring Plan will be prepared by a qualified professional for Caddy Creek / Humphrey Municipal Drain to assess thermal conditions and is to be implemented during the lifetime of operations.**

7 APPLICABLE NATURAL HERITAGE AND ENVIRONMENTAL POLICIES

The following sections summarize the various municipal, provincial, and federal environmental policies that apply to the proposed pit operations plan and describe how the recommendations provided in this study will address these policies (where applicable). The overall intent of the NER is to satisfy applicable natural heritage policies.

7.1 Municipality of Thames Centre Official Plan (October 2020 consolidation)

The Municipality's OP is a legal document prepared as required under section 14.7(3) of the *Planning Act*. An OP sets out goals, objectives, and policies that direct and manage land-use and future development activities and their effects on the social and natural environment of a municipality. Provincial plans that offer direction on matters of provincial interest are implemented principally through the Municipality's OP. Provided herein is a description of relevant environmental and natural heritage policies contained within the Municipality's OP and an assessment of whether the application addresses such policies.

The Site is primarily maintained for agricultural purposes (cash crops) and is designated "Agricultural" per Schedule A of the Municipality's Official Plan (OP). The western portion of the lands overlapping with the PSW are designated "Natural Area" while the broader surrounding woodland is designated "Protection Area".

A list of key natural heritage provisions of the Municipality's OP that pertain to the pit application considered herein is provided below.

- **Section 3.2** outlines the Natural Heritage Feature and Natural Hazard Area policies.
- **Section 3.2.1** outlines the components of the Thames Centre "Green-space" System, which includes:
    a) Group A Features – Provincially Significant Wetlands, Habitat for Endangered and Threatened Species, and Fish Habitat.
        a) Development or site alteration is generally prohibited in Group A Features.
    b) Group B Features – Regionally Significant Woodlands, Significant Woodlands and woodland patches identified by the Middlesex Natural Heritage Study, Significant Valleylands, Significant Wildlife Habitat, Provincially Significant ANSIs, Regionally Significant ANSIs, and ESAs.
        a) Development and site alteration may be permitted in Group B Features provided no negative impacts to the features or their associated functions.
    c) Group C Features – Stream Corridors and Floodplains, natural hazard lands.
        a) Development and site alteration may be permitted where compliance with the natural heritage and hazard policies of the OP can be demonstrated and Conservation Authority requirements are addressed.
- **Section 3.2.2** offers the goals of the Natural Heritage "Green-Space" System, including (amongst others) 1) the identification, protection, and enhancement of natural and environmental features and functions, and 2) recognition that natural heritage and environmental features relate to one another and are best protected through a landscape approach.

- **Section 3.2.3.1** requires the submission of an Environmental Impact Study (EIS) in support of proposals for new development or site alteration where such applications are near or within the general locations of all Group A, B, or C Features.

The results of this study have confirmed the presence of the following Natural Heritage "Green-Space" System components:

- Candidate habitat for Endangered bats in the Significant Woodland (Group A Feature).
- Provincially Significant Wetland (Group A Feature).
- Fish Habitat (Group A Feature).
- Significant Woodland and candidate Significant Wildlife Habitat (Group B Feature).
- Stream Corridor (Group C Feature).

Terrastory reviewed potential impacts to the identified Green-space System components in **Section 6** of this NER. The Site Plan includes a 15 m setback (extraction and site alteration) from the dripline of the Significant Woodland, a 30 m setback from the Provincially Significant Wetland (and other adjoining wetlands), and a 30 m setback from the bankfull channel of Caddy Creek. Extraction and site alteration will be restricted from all Group A, B, and C Features, along with appropriate setbacks. Provided that Terrastory's recommended mitigation measures are implemented in full (per **Section 6**), no negative impacts are anticipated to any natural feature that forms part of the Municipality's Green-Space System.

7.2 Middlesex County Official Plan (OPA No. 3, June 2022 consolidation)

A list of key provisions from Middlesex County's OP that pertain to the protection of natural heritage features and areas are provided below.

- **Section 2.2.1** identifies the components of the Country's Natural Environment including the following:
    - Natural Hazards (e.g., steep slope hazards, unstable soils, fill regulated areas, flood regulated watercourses and associated floodplains);
    - Natural Heritage System (e.g., woodlands, thickets, meadows, wetlands, watercourses and water bodies, connected vegetation features, significant wildlife habitat, significant valleylands, aquatic ecosystems including fish habitat, habitat supporting Species at Risk, and ANSI's); and
    - Groundwater Features (e.g., significant groundwater recharge areas, highly vulnerable aquifers, well head protection areas).
- **Section 2.2.1.2** provides general policies for the County's Natural Environment, including the need to direct new development away from the Natural Environment (where possible) and the need to prepare a Development Assessment Report (DAR) which summarizes the proposed development, on-site natural features, potential impacts, and recommended mitigation measures.
- **Section 2.2.1.3** provides more specific policies for the County's Natural Heritage System, including:
    - The need for a DAR to determine the significance and protection needs of needs of the following where present:

        - Natural heritage features not currently included in the Natural Heritage System are considered candidates for significance until a DAR is completed to assess their significance.
        - Fish habitat as identified by the DFO and require the completion of appropriate studies to ensure compliance with the *Fisheries Act.*
        - Significant habitat of Endangered and Threatened species as identified by the Province, in accordance with the *Endangered Species Act*, 2007.
        - Significant Wildlife Habitat identified and evaluated in consultation with the MNRF.
    - That the County's Natural Heritage System is to be designated in local municipalities Official Plans and permitted uses should generally be restricted to:
        - Existing uses, including limited expansions where it has been demonstrated that such expansion will have no negative impact upon the natural features or their ecological functioning;
        - Agricultural uses and normal farm practices;
        - Conservation;
        - Forestry, fisheries and wildlife management;
        - Passive recreation'
        - Public parks and trails, and;
        - Horticulture.
- **Section 2.2.3.2** states that consideration of the expansion of existing aggregate operations and of new aggregate extraction areas shall include an evaluation on the impact on the Natural Heritage System including ground and surface waters.
- **Section 2.2.3.3** identifies that prior to making a decision on an amendment to a local official plan or zoning by-law to permit a new extractive use, or to allow the expansion of an existing extractive use, the local municipality shall consult with the County, the Conservation Authority, and the Province to ensure the effects on any Natural Heritage System are property considered.

The Significant Woodland is shown as part of the County's Natural Heritage System per Schedule C of the County's OP, which contains overlapping PSW, candidate/confirmed SWH, coldwater fish habitat, and habitat of Endangered/Threatened species. The aforementioned natural features form part of the County Natural Heritage System. Development in the vicinity of the County Natural Heritage System is subject to applicable Natural System Policies of the County OP.

The County's natural heritage policies are generally consistent with the Municipality's OP as described in **Section 7.1**. Given that Terrastory's technical recommendations have been incorporated into the ARA site plans, no impacts to any significant natural heritage feature protected by the County's OP are anticipated.

7.3 *Aggregate Resources Act*, R.S. O. 1990, c. A.8

The information and recommendations provided in this report satisfy the requirements for completion of a Natural Environment Report pursuant to Section 2.2 of the compiled Aggregate Resources of Ontario Standards. The following significant natural features per ARA policies were identified within the Study Area:

- Provincially Significant Wetland (North Dorchester Swamp UT 24)

- Significant Woodland
- Candidate Significant Wildlife Habitat, including:
    - Bat Maternity Colonies (candidate)
    - Reptile Hibernacula (candidate)
    - Amphibian Breeding Habitat – Wetlands (candidate)
    - Habitats for Species of Conservation Concern:
        - Eastern Wood-pewee (confirmed)
        - Wood Thrush (confirmed)
        - Monarch (candidate)
        - Yellow-banded Bumble Bee (candidate)
        - Snapping Turtle (candidate)
    - Amphibian Movement Corridor (candidate)
- Candidate or Confirmed Habitat of Endangered and Threatened Species, including:
    - Bank Swallow (Adjacent Lands only)
    - Barn Swallow (nesting confirmed along the boundary of the Site)
    - Little Brown Myotis (candidate)
    - Northern Myotis (candidate)
    - Tri-colored Bat (candidate)
    - Black Ash (confirmed)
- Fish Habitat (Caddy Creek / Humphrey Municipal Drain).

Terrastory reviewed potential impacts to the documented natural heritage features components in **Section 6** of this NER. The Site Plan incorporates a 30 m setback from the bankfull channel of Caddy Creek, a 30 m setback from the PSW, and a 15 m setback from the dripline of the Significant Woodland. A comprehensive mitigation and enhancement framework is also provided per the technical recommendations in **Section 6** (which have been incorporated directly onto the Site Plan), which includes a timing restriction on vegetation removal, naturalization of agricultural lands adjacent to Caddy Creek, and ongoing thermal monitoring. Implementation of the technical recommendations allow for appropriate protection of all significant natural features consistent with relevant ARA standards.

7.4 Provincial Policy Statement 2020, pursuant to the *Planning Act*, R.S.O. 1990, c. P. 13

The Provincial Policy Statement (PPS) is promulgated under the authority of the *Planning Act* and came into effect on 1 May 2020. The PPS provides direction to municipalities on land-use matters of provincial interest and sets the policy framework for regulating the use and development of land. Municipal OP's must be consistent with the PPS. Per its preamble, the PPS *provides for appropriate development while protecting resources of provincial interest, public health and safety, and the quality of the natural and built environment.*

The principal PPS policies that apply to natural heritage protection are outlined in section 2.1. While recognizing that the natural heritage protection framework is not intended to limit the ability of agricultural uses to continue (Policy 2.1.9), the PPS instructs that *natural features and areas shall be protected for the long term* (Policy 2.1.1) and that their diversity and connectivity be *maintained, restored or, where possible, improved* (Policy 2.1.2). In Ecoregions 6E and 7E the PPS separates significant features into three categories:

1) Those in which development and site alteration are not permitted, including 1) Provincially Significant Wetlands and 2) Significant Coastal Wetlands (Policy 2.1.4);
2) Those in which development and site alteration are not permitted unless it can be demonstrated that no negative impacts on the significant natural feature and/or its functions will occur, including: 1) Significant Woodlands, 2) Significant Valleylands, 3) Significant Wildlife Habitat, 4) Significant Areas of Natural and Scientific Interest, 5) Non-significant Coastal wetlands, and 6) Adjacent Lands (Policy 2.1.5 and 2.1.8).
3) Those in which development and site alteration are not permitted except in accordance with federal/provincial requirements, including: 1) fish habitat (Policy 2.1.6) and 2) habitat of Endangered and Threatened Species (Policy 2.1.7).

In considering the aforementioned PPS policies, it has been determined that the proposed pit operations plan addresses relevant natural heritage provisions of the PPS for the following reasons:

- Per **Table 4** of this report, no Significant Valleylands or Significant Areas of Natural or Scientific Interest are present within the Study Area.
- Per **Section 6** of this report, no negative impacts to the Significant Woodlands, Provincially Significant Wetlands, or candidate/confirmed Significant Wildlife Habitat are anticipated given the setbacks incorporated into the proposed pit operations plan.
- Per **Section 6** of this report, Fish Habitat and Habitat of Endangered and Threatened Species will be protected consistent with provincial and federal requirements.

7.5 Provincial *Endangered Species Act*, S.O. 2007, c. 6

The *Endangered Species Act* (ESA) is administered by MECP and protects designated Endangered and Threatened species in Ontario from being killed, harmed, or harassed (s. 9) or having their habitat damaged or destroyed (s. 10). The protection afforded to Endangered and Threatened species "habitat" is either prescribed by O. Reg. 832/21, or (for those species that lack regulated habitat) is defined as *an area on which the species depends, directly or indirectly, to carry on its life processes, including life processes such as reproduction, rearing, hibernation, migration or feeding.* Activities that constitute habitat damage and/or destruction can only proceed subject to the requirements of ESA section 17, a notice of activity registration per O. Reg. 242/08 or O. Reg. 830/21 (where applicable), or (in limited circumstances) payment of a species conservation charge per O. Reg. 830/21.

A detailed assessment of confirmed and potential Endangered and Threatened habitats within the Study Area is provided in **Appendix 6**. Per this assessment, and provided that relevant technical recommendations outlined in **Section 6** are implemented in full, impacts to Bank Swallow, Barn Swallow, and Endangered bats (or their habitat) will be avoided.

7.6 Federal *Fisheries Act*, R.S.C. 1985, c. F-14

The amended federal *Fisheries Act* (Bill C-68) received Royal Assent in June 2019 while the updated fish and fish habitat protection provisions came into force in August 2019. Subsection 34.4(1) of the amended *Fisheries Act* prohibits all work, undertaking, or activity from causing the death of fish (other than fishing). Subsection 35(1) requires that project activities not result in the "*harmful alteration, disruption or destruction of fish habitat*" (HADD) unless undertaken in accordance with the requirements of a statutory exemption per subsection 35(2). Based on the Fish and Fish Habitat Protection Policy Statement (August 2019), HADD is interpreted by DFO to include "*any temporary*

or permanent change to fish habitat that directly or indirectly impairs the habitat's capacity to support one or more life processes of fish".

The proposed extraction limit is setback 30 m from the bankfull channel of Caddy Creek. A naturalized riparian corridor to be established north of the Site (within an area currently maintained for agricultural purposes) will contain natural, self-sustaining vegetation and offer enhanced buffering to aquatic habitats once cultivation for cash crops ceases and the area is planted and seeded with native species (through the Riparian Corridor Enhancement Plan).

7.7 Federal *Migratory Birds Convention Act*, S.C. 1994, c. 22

Section 6 of the Migratory Birds Regulations under the *Migratory Birds Convention Act, 1994* (MBCA) prohibits the disturbance or destruction of nests, eggs, or nest shelters of a migratory bird. The provincial *Fish and Wildlife Conservation Act, 1997* extends the protection of bird nests and eggs to certain species not listed under the Migratory Birds Regulations (e.g., Corvids, Strigids, Accipitrids, etc.).

Provided that the recommendations outlined in **Section 6** are implemented in full (i.e., prohibition on vegetation removal during the bird breeding season), no impacts to breeding birds or bird nests protected by the MBCA or FWCA are anticipated.

8 CONCLUSIONS

In accordance with application standards for Class A pit licences pursuant to the *Aggregate Resources Act*, the preceding Natural Environment Report provides a detailed characterization of the natural environment occurring within and adjacent to the proposed Elgin Road Pit. This NER has been prepared in support of the ARA licence application along with Official Plan Amendment and Zoning By-law Amendment applications to the Municipality of Thames Centre. Included herein is a comprehensive approach to identifying the presence or absence of several significant natural features afforded varying degrees of protection by applicable environmental policies, particularly the ARA Provincial Standards, PPS, County OP, *Endangered Species Act*, and *Fisheries Act*. Potential negative impacts to the documented significant natural features are described with mitigation measures and technical recommendations offered to avoid or minimize such impacts and/or offer enhancements as appropriate.

Based on the findings presented in this report, the following natural features with ecological and/or policy significance have been identified within the Study Area:

- **Significant Woodland** and overlapping **Significant Wildlife Habitat (candidate and confirmed)** within a riparian corridor associated with **Caddy Creek** (a permanent coldwater watercourse).
- **Provincially Significant Wetland (North Dorchester Swamp UT 24 Wetland Complex)** and other adjoining wetlands along the edge of the PSW as currently mapped.
- **Coldwater Fish Habitat in Caddy Creek** flowing westward and southward through the Subject Property.
- **Endangered/Threatened Species Habitats** including for Bank Swallow (Adjacent Lands only), Barn Swallow (confirmed), Endangered Bats (candidate), and Black Ash (confirmed).

The extraction limit incorporates a 30 m setback from the bankfull channel of Caddy Creek, a 30 m setback from the PSW, and a 15 m setback from the dripline of the Significant Woodland. No extraction, site alteration, or other disturbances associated with pit operations (e.g., storage berms, acoustic berms) are proposed within the aforementioned setbacks, while ongoing cultivation of cash crops (corn, soybeans) will cease within these areas. The segment of Caddy Creek flowing through croplands near the northern boundary of the Site will be seeded with a native seed mix and be subject to native woody plantings as part of a broader Riparian Corridor Enhancement Plan, which will offer shading to the coldwater system. Additional technical recommendations (e.g., timing restriction on vegetation removal) are further offered herein and have been incorporated onto the proposed ARA Site Plans.

Overall, it has been determined that no negative impacts to the above-noted significant natural features will occur provided that all technical recommendations offered in **Section 6** are implemented in full. The ARA Site Plan that directs and constrains pit operations (**Appendix 7**) incorporates all technical recommendations made herein.

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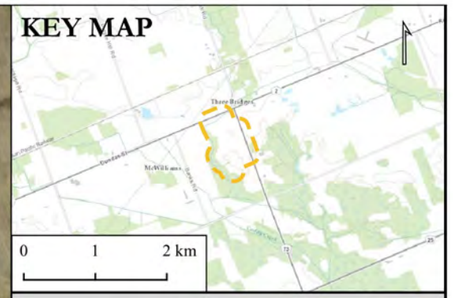
KEY MAP



Legend

Study Area
- Subject Property
- Site (Area Proposed to be Licensed)
- Study Area (Site + 120 m)

GENERAL NOTES:
-Features depicted herein should not be used in place of a professional survey.
-Numeric scale is for a 11x17 inch print.

TERRASTORY
environmental consulting inc.
info@terrastoryenviro.com 905.745.5398

N | 1:7,000 | 0 50 100 150 200 m

Location:
Elgin Road Pit,
Municipality of Thames Centre

Project No.: 21092
Date: 2023-01-25
By: TK **Checked:** --
Orthophotograph Date: 2015 (SWOOP)

Figure 1:
Location of the Site

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Legend

Study Area
- Subject Property
- Site (Area Proposed to be Licensed)
- Study Area (Site + 120 m)

Survey Stations
- Breeding Bird Survey Stations
- OSAP Channel Morphology Stations

Biophysical Conditions - Terrastory
- Vegetation Communities

Terrain
- Runoff Direction
- Topographic Contours (0.5 m; derived from 2015 SWOOP DTM)

Surface Water Drainage Features
- Caddy Creek / Humphrey Municipal Drain (Permanent Coldwater Watercourse)
- Roulston Drain #2 (Intermittent Watercourse)

ELC Vegetation Community Codes

UPLAND
FOCM4-1: Fresh - Moist White Cedar Coniferous Forest
FODM7-3: Fresh - Moist Lowland Deciduous Forest
CUP3: Coniferous Plantation
CUP3-3: Scots Pine Coniferous Plantation
WODM4-1: Hawthorn / Apple Deciduous Woodland
WODM5: Fresh - Moist Deciduous Woodland
MEFM1-1: Goldenrod Forb Meadow
MEGM3-5: Smooth Brome Graminoid Meadow

WETLAND
SWDM4-1: Willow Mineral Deciduous Swamp
SWDM4-5: Poplar Mineral Deciduous Swamp
SWMO1-1: White Cedar - Hardwood Organic Mixed Swamp
SWTM3-6: Mixed Willow Mineral Deciduous Thicket Marsh
MAMM1-12: Common Reed Graminoid Mineral Meadow Marsh
MAMM2-4: Mixed Forb Mineral Meadow Marsh

GENERAL NOTES:
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-Numeric scale is for a 11x17 inch print.

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info@terrastoryenviro.com 905.745.5398

N | 1:4,500 | 0 50 100 150 m

Location:
Elgin Road Pit,
Municipality of Thames Centre

Project No.: 21092
Date: 2023-01-25
By: TK **Checked:** --
Orthophotograph Date: 2015 (SWOOP)

Figure 2:
Biophysical Features and Conditions

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Legend

Study Area
- Subject Property
- Site (Area Proposed to be Licensed)
- Study Area (Site + 120 m)

Significant Natural Features - Agency Identified
- Provincially Significant North Dorchester Swamp (UT 24) Wetland Complex

Significant Natural Features - Terrastory

Surface Water Drainage Features
- Caddy Creek / Humphrey Municipal Drain (Permanent Coldwater Watercourse)
- Roulston Drain #2 (Intermittent Watercourse)

Species and/or Habitats of Conservation Interest
- Black Ash (Fraxinus nigra)
- Barn Swallow (Hirundo rustica) - Nesting Site
- Eastern Wood-pewee (Contopus virens)
- Wood Thrush (Hylocichla mustelina)

Significant Natural Feature Boundaries
- Dripline
- Wetland Boundary (OWES)
- Top of Bank

Significant Natural Features
- Wetland
- Significant Woodland

Mitigation Measures Recommended
- 15 m Setback from Dripline of Significant Woodland
- 30 m Setback from PSW and Adjoining Wetlands
- 30 m Setback from Top of Bank of Coldwater Watercourse and Fish Habitat
- Riparian Corridor Enhancement Plan Area

GENERAL NOTES:
-Features depicted herein should not be used in place of a professional survey.
-Numeric scale is for a 11x17 inch print.

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N | 1:4,500 | 0 50 100 150 m

Location:
Elgin Road Pit,
Municipality of Thames Centre

Project No.: 21092
Date: 2023-01-26
By: TK **Checked:** --
Orthophotograph Date: 2015 (SWOOP).

Figure 3:
Significant Natural Features

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Appendix 1. Curriculum Vitae

TERRASTORY
environmental consulting inc.

Tristan L. Knight, M.E.S., M.Sc.
Senior Ecologist / President
Curriculum Vitae

CAREER HISTORY AND EDUCATION

2018–Present	**Senior Ecologist / President, Terrastory Environmental Consulting Inc.**
2014 – 2018	Ecologist / Botanist, RiverStone Environmental Solutions Inc.
2013–2014	Watershed Restoration Technician, Credit Valley Conservation Authority
2012–2013	Terrestrial Ecologist, Aquafor Beech Ltd.
2011–2012	Wetland Biologist / Asst. SAR Biologist, Ontario Ministry of Natural Resources
2009–2011	Master of Science, SUNY College of Environmental Science and Forestry, Syracuse, NY, USA
2007–2009	Master of Environmental Studies, York University, Toronto, ON
2003–2007	Hons. Bachelor of Arts, University of Western Ontario, London, ON

RELEVANT CERTIFICATIONS AND TRAINING

2021	ISA Tree Risk Assessment Qualification (TRAQ) Renewal
2019	Butternut Health Assessor (#268) Renewal
2016	Managed Forest Plan Approver (#421)
2015	Vegetation Sampling Protocol
2014	Ontario Stream Assessment Protocol (OSAP)
2014	Fish Identification "Level 2"
2014	Electrofishing "Class 2"
2013	ISA Certified Arborist #ON-1663A
2012	Ontario Benthos Biomonitoring Network (OBBN)
2012	Ontario Wetland Evaluation System (OWES) Instructor
2011	Family-level Benthic Invertebrate ID Workshop
2011	Ontario Wetland Evaluation System (OWES)
2011	Ecological Land Classification (ELC)

PROFESSIONAL EXPERIENCE

Tristan has over ten years of experience as an environmental professional acting in diverse private- and public-sector roles. He applies intimate knowledge of the environmental policy context guiding development in Ontario to projects large and small. Tristan's regular client base spans the entire development industry and includes land developers, aggregate producers, municipal infrastructure, and green energy. Tristan is also a highly accomplished field ecologist with professional training in innumerable provincial collection protocols including Ecological Land Classification, Ontario Wetland Evaluation System, Ontario Stream Assessment Protocol, Ontario Benthos Biomonitoring Network, and Vegetation Sampling Protocol. He is an ISA-certified Arborist, ISA-qualified Tree Risk Assessor, Butternut Health Assessor, and Managed Forest Plan approver. He is also a former instructor of the Ontario Wetland Evaluation System certification course and a current instructor with the Ontario Master Naturalist Program (Lakehead University, Orillia Campus) and Ontario Natural Certification Course (Kortright Centre). Drawing on a diverse mixture of project management and field expertise, he is single-mindedly focused on generating high-quality deliverables that exceed expectations. Above all, Tristan undertakes his work with utmost integrity, objectiveness, and concern for detail.

The following is a selected list of Tristan's consulting project experience since founding Terrastory in February 2018.

Environmental Impact Studies for Land Development (Large Applications)

2018-present **Environmental Impact Statement** in the Township of Severn in support of an estate residential subdivision.

- Three-season ecological surveys and assessments (amphibians, vascular plants, vegetation mapping, bats, etc.).
- Graphics, reporting, policy conformity assessments.

2019-present **Environmental Impact Statement** in the City of Welland for an 870 unit residential and mixed-use subdivision.

- Three-season ecological surveys and assessments (amphibians, breeding birds, bat acoustic monitoring, vascular plants, vegetation mapping, etc.).
- Wetland and woodland enhancement/compensation plans.
- Rare species relocation plans and implementation.
- Graphics, reporting, policy conformity assessments.

2019 **Environmental Impact Statement** in the City of Orillia in support of a waterfront community.

- Three-season ecological surveys and assessments (e.g., breeding birds, vascular plants, vegetation mapping, bat habitat, aquatic habitat, etc.).
- Graphics, reporting, policy conformity assessments.

2020 **Environmental Impact Statement** in the City of Orillia in support of a waterfront community.

- Three-season ecological surveys and assessments (e.g., breeding birds, vascular plants, vegetation mapping, bat habitat, aquatic habitat, etc.).
- Butternut Health Assessment.
- Graphics, reporting, policy conformity assessments.

2020-present **Environmental Impact Statement** in the Township of Wainfleet in support of an estate residential community.

- Ecological assessments and species at risk surveys.
- Graphics, reporting, policy conformity assessments.

2020-present **Subwatershed Impact Study** in the Town of Halton Hills in support of a multi-phase warehouse distribution centre.

- Three-season ecological surveys and assessments (amphibians, breeding birds, owls, vascular plants, hawthorns, vegetation mapping, headwater drainage features, odonates, butterflies, etc.).
- Arborist Report and Tree Protection Plan.
- Graphics, reporting, policy conformity assessments.
- Review and integration of other technical disciplines including fluvial geomorphology, hydrogeology, hydrology and hydraulics, stormwater management, landscape architecture.

Environmental Impact Studies for Land Development (Small Applications)

2018 **Environmental Impact Statement** in the City of Kawartha Lakes in support of a site plan and Kawartha Conservation permit application.

- Ecological and species at risk surveys.
- Wetland delineation.
- Graphics, reporting, policy conformity assessments.

2018 **Environmental Impact Statement** in the Township of Ramara in support of a severance application.

- Ecological and species at risk surveys.
- Wetland staking.
- Graphics, reporting, policy conformity assessments.

2018 **Environmental Impact Statement** in the City of Orillia in support of a site plan application.
- Ecological and species at risk surveys.
- Graphics, reporting, policy conformity assessments.

2018-2019 **Natural Heritage Evaluation** in the City of Burlington in support of a severance application and Niagara Escarpment development permit.
- Ecological and species at risk surveys.
- Woodland dripline staking with agency staff.
- Graphics, reporting, policy conformity assessments.

2019 **Environmental Impact Statement** in the Town of Gravenhurst in support of a site plan application.
- Ecological and species at risk surveys.
- Graphics, reporting, policy conformity assessments.

2019 **Environmental Impact Statement** in the Township of Severn in support of a site plan application.
- Ecological and species at risk surveys.
- Graphics, reporting, policy conformity assessments.

2019 **Natural Heritage Evaluation** in the Town of Caledon in support of a site plan application.
- Ecological and species at risk surveys.
- Graphics, reporting, policy conformity assessments.

2019 **Natural Heritage Evaluation** in the Town of Whitchurch-Stouffville in support of a site plan and TRCA permit application.
- Ecological and species at risk surveys.
- Graphics, reporting, policy conformity assessments.

2019 **Environmental Impact Statement** in the Township of Wainfleet in support of a site plan application.
- Ecological and species at risk surveys.
- Graphics, reporting, policy conformity assessments.

2019 **Environmental Impact Statement** in the Township of Chatsworth in support of a site plan application.
- Ecological and species at risk surveys.
- Graphics, reporting, policy conformity assessments.

2020 **Environmental Impact Statement** in the City of Kawartha Lakes in support of a site plan application.
- Ecological and species at risk surveys.
- Wetland compensation plan.
- Graphics, reporting, policy conformity assessments.

2021-present **Environmental Impact Statement** in the Town of Whitby in support of a site plan application and Conservation Authority permit.
- Three-season biophysical assessments and surveys.
- Graphics, reporting, policy conformity assessments.

Environmental Impact Studies for Land Development (Other)

2018-2019 **Environmental Impact Statement** in the Township of Woolwich in support of a site plan application and GRCA permit application to construct a boardwalk trail.
- Three-season ecological surveys and assessments (e.g., breeding birds, vascular plants, wetland delineation, vegetation mapping, etc.).
- Wetland delineation with GRCA staff.
- Graphics, reporting, policy conformity assessments.

2018-2019 **Environmental Impact Statement** in the Town of Whitchurch-Stouffville in support of a site plan application to expand an existing cemetery.

- Tree inventory, terrestrial/wetland/aquatic surveys, Butternut Health Assessment.
- Graphics, reporting, policy conformity assessments.

2018 **Environmental Impact Statement** in the City of Welland in support of a site plan application to construct a storage facility.

- Ecological and species at risk surveys.
- Graphics, reporting, policy conformity assessments.

Natural Environment Reports for Aggregate Applications

2019-2020 **Natural Environment Report** in the Municipality of Thames Centre in support of an *Aggregate Resources Act* application and related *Planning Act* applications.

- Ecological and species at risk surveys (e.g., breeding birds, vegetation mapping, vascular plants, etc.).
- Graphics, reporting, policy conformity assessments.

2019-2020 **Natural Environment Report** in the Township of Huron East in support of an *Aggregate Resources Act* application.

- Ecological and species at risk surveys.
- Graphics, reporting, policy conformity assessments.

2019 **Natural Environment Report** in the County of Haldimand (Hagersville) in support of an *Aggregate Resources Act* application.

- Ecological and species at risk surveys.
- Graphics, reporting, policy conformity assessments.

2020 **Natural Environment Report** in the Municipality of Thames Centre (Thorndale) in support of an *Aggregate Resources Act* application and related *Planning Act* applications.

- Ecological and species at risk surveys (e.g., breeding birds, vegetation mapping, vascular plants, etc.).
- Graphics, reporting, policy conformity assessments.

Arborist Report and Tree Preservation Plans

2018 **Arborist Report and Tree Preservation Plan** in the Town of Whitchurch-Stouffville in support of a cemetery expansion.

- Tree inventory, health assessment, structural assessment.
- Graphics, reporting, policy conformity assessments.

2018 **Arborist Report and Tree Preservation Plan** in the City of Hamilton in support of a condominium development.

- Tree inventory, health assessment, structural assessment.
- Graphics, reporting, policy conformity assessments.

2018 **Arborist Report and Tree Preservation Plan** in the City of Toronto in support of a cemetery expansion.

- Tree inventory, health assessment, structural assessment.
- Graphics, reporting, policy conformity assessments.

2018 **Arborist Report and Tree Preservation Plan** in the Town of Milton in support of a new school and block development plan.

- Tree inventory, health assessment, structural assessment.
- Graphics, reporting, policy conformity assessments.

2019 **Arborist Report and Tree Preservation Plan** in the Town of Caledon in support of a site plan application.

- Tree inventory, health assessment, structural assessment.
- Graphics, reporting, policy conformity assessments.

2019 **Tree Saving Plan** in the City of Thorold in support of a residential subdivision.

- Tree inventory, health assessment, structural assessment.

- Graphics, reporting, policy conformity assessments.

2019 **Arborist Report and Tree Preservation Plan** in the Town of Ajax in support of a condominium development.
- Tree inventory, health assessment, structural assessment.
- Graphics, reporting, policy conformity assessments.

2019 **Arborist Report and Tree Preservation Plan** in the City of Toronto in support of a condominium development.
- Tree inventory, health assessment, structural assessment.
- Graphics, reporting, policy conformity assessments.

2019 **Arborist Report and Tree Preservation Plan** in the City of Hamilton in support of an Enbridge gas pipeline expansion.
- Tree inventory, health assessment, structural assessment.
- Graphics, reporting, policy conformity assessments.

2020 **Arborist Report and Tree Preservation Plan** in the City of Kitchener in support of a church conversion to residential purposes.
- Tree inventory, health assessment, structural assessment.
- Graphics, reporting, policy conformity assessments.

2020 **Arborist Report and Tree Preservation Plan** in the City of Toronto in support of a large distribution centre.
- Tree inventory, health assessment, structural assessment.
- Graphics, reporting, policy conformity assessments.

2020 **Arborist Report and Tree Preservation Plan** in the City of Burlington in support of a residential apartment building.
- Tree inventory, health assessment, structural assessment.
- Graphics, reporting, policy conformity assessments.

2020 **Arborist Report and Tree Preservation Plan** in the Town of Oakville in support of a school construction.
- Tree inventory, health assessment, structural assessment.
- Graphics, reporting, policy conformity assessments.

2020 **Tree Management Plan** in the Town of Oakville in support of a school construction.
- Tree inventory, health assessment, structural assessment.
- Graphics, reporting, policy conformity assessments.

Municipal Class Environmental Assessments

2020-ongoing **Municipal Class Environmental Assessment (Schedule A)** in the Township of Severn in support of a culvert replacement.
- Ecological and species at risk surveys (e.g., fish habitat assessment, vegetation surveys, etc.).
- Ecological input to alternatives assessment.
- Graphics, reporting, policy conformity assessments.

2020 **Natural Heritage Review** in support of an Environmental Assessment of a proposed new Forcemain to an existing Wastewater Treatment plan in the City of Port Colborne.
- Ecological and species at risk surveys (e.g., fish habitat assessment, vegetation surveys, etc.).
- Ecological input to alternatives assessment.
- Graphics, reporting, policy conformity assessments.

Natural Heritage Constraints Analyses

2018 **Natural Heritage Constraints Analysis** in the Town of Bracebridge to assess development potential.
- Site reconnaissance assessment.
- Graphics, reporting, policy assessments.

2018 **Natural Heritage Constraints Analysis** in the Township of Puslinch to assess development potential.
- Site reconnaissance assessment.
- Graphics, reporting, policy assessments.

2018 **Natural Heritage Constraints Analysis** in the Town of East Gwillimbury to assess development potential.
- Site reconnaissance assessment.
- Graphics, reporting, policy assessments.

2018 **Natural Heritage Constraints Analysis** in the County of Brant to assess potential to construct a wind turbine and secure a future Renewable Energy Approval.
- Site reconnaissance assessment.
- Graphics, reporting, policy assessments.

2018 **Natural Heritage Constraints Analysis** in the City of Hamilton to assess development potential.
- Site reconnaissance assessment.
- Graphics, reporting, policy assessments.

2019 **Natural Heritage Constraints Analysis** in the City of Kawartha Lakes to assess development potential to expand an existing aggregate quarry.
- Terrestrial/wetland/aquatic surveys, species at risk surveys.
- Graphics, reporting, policy assessments.

2019 **Natural Heritage Constraints Analysis** in the Town of Oakville to assess development potential.
- Site reconnaissance assessment.
- Graphics, reporting, policy assessments.

2019 **Natural Heritage Constraints Analysis** in the City of Welland to assess development potential for a large-scale residential condominium application.
- Site reconnaissance assessment.
- Graphics, reporting, policy assessments.

2019 **Natural Heritage Constraints Analysis** in the City of Kawartha Lakes to assess development potential for a large-scale residential subdivision.
- Site reconnaissance assessment.
- Graphics, reporting, policy assessments.

2019 **Natural Heritage Constraints Analysis** in the City of Welland to assess development potential on a brownfield for a large-scale residential subdivision.
- Site reconnaissance assessment.
- Graphics, reporting, policy assessments.

Species at Risk Surveys and Recovery

2018 **Kentucky Coffee-tree Assessment** in the Town of Niagara-on-the-Lake in support of a residential subdivision.
- Inventory for Kentucky Coffee-tree.
- Graphics, reporting.
- Submission of Information Gathering Form to MNRF.

2018 **Species at Risk Assessment** in the County of Haldimand in support of a severance application.
- Species at Risk surveys (e.g., vascular plants, habitat-based assessment for other taxa).
- Graphics, reporting.
- Correspondence with MNRF.

2018 **Butternut Health Assessment** in the Town of Whitchurch-Stouffville in support of a cemetery expansion.
- Butternut Health Assessment.
- Submission of relevant reporting and correspondence with MNRF.

2018 **Golden-eye Lichen (Great Lakes population) Recovery Strategy** for the Ministry of the

Environment, Conservation, and Parks.

2019 **Chimney Swift Surveys** in the City of Hamilton in support of a redevelopment plan.
- Chimney Swift entrance surveys.
- Graphics, reporting.

2019 **Bat Habitat Assessment** in the City of Hamilton in support of a site plan application.
- Habitat-based surveys.
- Graphics, reporting.

2021-present **Spoon-leaved Moss Recovery Strategy** for the Ministry of the Environment, Conservation, and Parks.

Fish Habitat Impact Assessments

2018 **Fish Habitat Impact Assessment** in the Township of Muskoka Lakes in support of a site plan application.
- Aquatic habitat assessment.
- Graphics, reporting, policy conformity assessment.

2019 **Fish Habitat Impact Assessment** in the Township of Georgian Bay in support of a site plan application.
- Aquatic habitat assessment.
- Graphics, reporting, policy conformity assessment.

2020 **Fish Habitat Impact Assessment** in the Town of Huntsville in support of a severance application.
- Aquatic habitat assessment and fish habitat mapping.
- Graphics, reporting, policy conformity assessment.

2021 **Fish Habitat Impact Assessment** in the Town of Huntsville in support of a severance application.
- Aquatic habitat assessment and fish habitat mapping.
- Graphics, reporting, policy conformity assessment.

Peer Review

2019 **Peer Review** in the Municipality of Clarington in reference to a subdivision application.
- Critical assessment of EIS in support of the subdivision.
- Presentation to Council (Oct. 2019).

2020-ongoing **Peer Review** in the Town of Huntsville in reference to an island-based development application.
- Critical assessment of EIS in support of the subdivision.
- Presentation of expert opinion to LPAT.

Managed Forest Plans

2019 **Managed Forest Plan** in the City of Hamilton (Stoney Creek) for a private client.

2020 **Managed Forest Plan** in the City of Hamilton (Flamborough) for a private client.

2020 **Managed Forest Plan** in the Town of Erin for a private client.

Instruction

2018-ongoing **Instructor** in Bryophyte Identification and Lichen Identification courses at the Master Naturalist Program at Lakehead University (Orillia campus).

2019-ongoing **Instructor** in Bryophyte Identification at the Ontario Natural Certification Course in the Kortright Centre (City of Vaughan).

2021-ongoing **Workshop Development** for Niagara Peninsula Conservation Authority staff to provide training in vascular plant identification in sensitive habitats (e.g., marshes, swamps, dunes).

TERRASTORY
environmental consulting inc.

April E. McCrum, B.Sc.
Ecologist
Curriculum Vitae

CAREER HISTORY AND EDUCATION

2022	**Ecologist, Terrastory Environmental Consulting Inc.**
2019 – 2021	Intermediate Ecologist, McIntosh Perry
2018 – 2019	Ecologist, AECOM
2016 – 2017	Biologist (Contract) FRi Ecological Services
2010 – 2016	Branch Manager/Ecologist, EcoTec Environmental Consultants
2009	Species at Risk Field Technician (Contract), Department of National Defence (CFB Petawawa)
2004 – 2008	Field Technician (Contract), Ducks Unlimited Canada
2007 – 2010	Bachelor of Science in Biology, Trent University
1997 – 2000	Terrain and Water Resources Technology Diploma, Sir Sandford Fleming College

RELEVANT CERTIFICATIONS AND TRAINING

2021	Canadian Certified Inspector of Sediment and Erosion Control (CAN-CISEC 340)
2021	Class 2 Backpack Crew Leader Electrofishing Course
2019	Ontario Reptile and Amphibian Survey Course
2013	Ecological Land Classification (ELC)
2012	MTO/DFO/OMNR Protocol Training
1999	Ontario Wetland Evaluation System (OWES)

PROFESSIONAL EXPERIENCE

April has over fifteen years of experience working in the environmental field, which has included over 10 years working as an environmental consultant. She has certifications in Ecological Land Classification (ELC), Ontario Wetland Evaluation System (OWES) protocols, is a Certified Inspector for Sediment and Erosion Control (CISEC) and is a Ministry of Transportation (MTO) RAQS Qualified Fisheries Compliance during Construction Specialist.

April has organized and managed several projects and has extensive experience conducting targeted species at risk surveys, breeding bird surveys, fisheries inventories, aquatic habitat assessments, vegetation community classification and identification of significant wildlife habitat for residential development, aggregate pits, mining and renewable energy projects throughout various regions of Ontario. April has also completed various Class Environmental Assessments for the MTO and has conducted construction monitoring for several MTO projects. April works collaboratively with various clients and regulatory agencies and experienced with provincial and federal legislation relating to the natural environment.

The following is a selected list of April's consulting project experience since working for Terrastory in May 2022 and additional experience related to Natural Environment Reports in support of Aggregate Permit Applications.

Natural Environment Reports for Aggregate Applications

2022 **Natural Environment Report** in the Municipality of Thames Centre in support of an *Aggregate Resources Act* application and related *Planning Act* applications.

- Ecological and species at risk surveys (e.g. breeding birds, spring vascular plants, wetland

delineation, etc.).
- Reporting

2022 **Natural Environment Report** in the City of London in support an *Aggregate Resources Act* application and related *Planning Act* applications.
- Ecological and species at risk surveys (e.g. breeding birds, spring vascular plants, wetland delineation, etc.).

2022 **Wetland Technical Memo** in the County of Oxford in support of a Major Site Plan Amendment under the *Aggregate Resources Act.*
- Thorough review of ecological surveys and background information
- Reporting, graphics, and policy conformity assessments.

2017 **Natural Environment Report** in the District of Parry Sound (Powassan, ON) in support of an *Aggregate Resources Act* application.
- Ecological and species at risk surveys (e.g. breeding birds, bat acoustic monitoring, vascular plants, vegetation mapping, snake surveys)
- Reporting and graphics

2016 **Natural Environment Report** in the County of Haliburton in support of an *Aggregate Resources Act* application.
- Ecological and species at risk surveys (e.g. breeding birds, bat acoustic monitoring, vascular plants, vegetation mapping, turtle and snake surveys)
- Reporting, graphics and communications with MNRF regarding species at risk mitigation

Environmental Impact Studies

2022 **Scoped Environmental Impact Study** in the Municipality of Hastings Highlands (Lake St. Peter) in support of a minor variance application.
- Ecological site reconnaissance (e.g. vegetation mapping, vascular plants, bats, incidental wildlife observations etc.).
- Reporting, graphics and policy conformity assessments.

2022 **Scoped Environmental Impact Study** in the Municipality of Hastings Highlands (Lake St. Peter) in support of a minor variance application.
- Ecological site reconnaissance (e.g. shoreline assessment, vegetation mapping, vascular plants, bats, incidental wildlife observations etc.).

2022 **Scoped Environmental Impact Study** in the Municipality of Hastings Highlands (Big Mink Lake) in support of a minor variance application.
- Ecological site reconnaissance (e.g. shoreline assessment, vegetation mapping, vascular plants, bats, incidental wildlife observations etc.).
- Reporting, graphics and policy conformity assessments.

2022 **Scoped Environmental Impact Study** in the Township of Ramara in support of a minor variance application.
- Ecological site reconnaissance (e.g. breeding birds, wetland delineation, vegetation mapping, vascular plants, bats, incidental wildlife observations etc.).

2022 **Scoped Environmental Impact Study** in the Township of Ramara in support of a minor variance application.
- Ecological site reconnaissance (e.g. shoreline assessment, breeding birds, wetland delineation, vegetation mapping, vascular plants, bats, incidental wildlife observations etc.).

2022 **Scoped Environmental Impact Study** in the Town of Gravenhurst (Kahshe Lake) in support of a minor variance application.
- Ecological site reconnaissance (e.g. shoreline assessment, vegetation mapping, vascular plants, bats, incidental wildlife observations etc.).
- Reporting, graphics and policy conformity assessments.

2022 **Scoped Environmental Impact Study** in the Town of Gravenhurst (Kahshe Lake) in support of a minor variance application.

- Ecological site reconnaissance (e.g. shoreline assessment, vegetation mapping, vascular plants, bats, incidental wildlife observations etc.).

Natural Environment Report in the City of Hamilton to in support of partial redevelopment of an urban park for consideration by the Niagara Escarpment Commission and Hamilton Conservation Authority.

- Thorough review of ecological surveys and background information
- Reporting, graphics and policy conformity assessments

Species at Risk Assessments

2022 **Species at Risk and Wildland Fire Assessment** in the Town of Gravenhurst in support of a multi-lot severance application.

- Ecological and species at risk surveys (e.g. breeding birds, vascular plant surveys, vegetation mapping, etc.).
- Reporting, graphics and policy conformity assessments

2022 **Species at Risk Assessment** in the City of Orillia in support of a Zoning By-law amendment application and consent to sever application.

- Ecological and species at risk surveys (e.g. breeding birds, bats, vascular plant surveys, vegetation mapping, incidental wildlife observations, etc.).
- Reporting, graphics and policy conformity assessments

Natural Heritage Constraints Analyses and Other Analyses

2022 **Natural Heritage Constraints Analysis** in the Town of Bradford West Gwillimbury to assess development potential.

- Site reconnaissance assessment.

2022 **Habitat Restoration Analysis and Advice** in the Town of Innisfil related to a fill restoration plan.

- Site reconnaissance assessment.
- Recommendation of restoration plantings
- Review of engineering drawings
- DFO Request for Review

2022 **Natural Capital Inventory** for the District of Muskoka

- Site Investigations and field verification of vegetation and wildlife

Appendix 2. Representative Photographs

Photo 1. Northern portion of the Site (08 June 2022).

Photo 2. Southwestern limits of the Site, showing Significant Woodland (08 June 2022).

Photo 3. Southeastern portion of the Site (06 July 2022).

Photo 4. Southwestern portion of the Site (08 June 2022).

Photo 5. Deciduous forest west of the Site (08 August 2022).

Photo 6. Deciduous forest west of the Site (08 August 2022).

Photo 7. Mixed swamp (part of the Provincially Significant Wetland) located west of the Site (08 August 2022).

Photo 8. Mixed swamp (part of the Provincially Significant Wetland) located west of the Site (08 August 2022).

Photo 9. Poplar Deciduous Swamp (02 August 2022).

Photo 10. Mixed Forb Meadow Marsh and Mixed Willow Thicket Swamp (02 August 2022).

Photo 11. Forb Meadow Marsh, Mixed Willow Thicket and Poplar Deciduous Swamp (08 June 2022).

Photo 12. Common Reed Meadow Marsh (08 June 2022).

Photo 13. Caddy Creek (Humphrey Drain) flowing through agricultural lands on northern portion of the Site (08 June 2022).

Photo 14. Caddy Creek (Humphrey Drain) located on the northern portion of the Site (14 September 2022).

Photo 15. Location of Barn Swallow (*Hirundo rustica*) and Cliff Swallow (*Petrochelidon pyrrhonota*) nests underneath concrete bridge at northwestern limit of the Site (08 June 2022).

Photo 16. Barn Swallow and Cliff Swallow nests observed (06 July 2022).

Photo 17. Caddy Creek (Humphrey Drain) located within the Provincially Significant Wetland west of the Site (02 August 2022).

Photo 18. Watercress (*Nasturtium officinale*) noted along the edge of Caddy Creek (Humphrey Drain) suggesting groundwater influence (02 August 2022).

Appendix 3. Vascular Plant List

Scientific Name	Common Name	Family	S-Rank (per NHIC)	Local Rank (per Oldham 2017)	Coefficient of Conservatism	Coefficient of Wetness
Abutilon theophrasti	Velvetleaf	Malvaceae	SNA	IC	n/a	3
Acer saccharum	Sugar Maple	Aceraceae	S5	C	4	3
Acer x freemanii	Freeman's Maple	Aceraceae	SNA	HYB	6	-5
Achillea millefolium	Common Yarrow	Asteraceae	SNA	N/A	n/a	3
Actaea rubra	Red Baneberry	Ranunculaceae	S5	C	6	3
Agrimonia gryposepala	Hooked Agrimony	Rosaceae	S5	C	2	3
Ambrosia artemisiifolia	Common Ragweed	Asteraceae	S5	C	0	3
Ambrosia trifida	Great Ragweed	Asteraceae	S5	C	0	0
Amelanchier laevis	Smooth Serviceberry	Rosaceae	S5	U	5	5
Amphicarpaea bracteata	American Hog-peanut	Fabaceae	S5	C	4	0
Anemonastrum canadense	Canada Anemone	Ranunculaceae	S5	C	3	-3
Apocynum androsaemifolium	Spreading Dogbane	Apocynaceae	S5	C	3	5
Apocynum cannabinum	Hemp Dogbane	Apocynaceae	S5	C	3	0
Aralia nudicaulis	Wild Sarsaparilla	Araliaceae	S5	C	4	3
Arctium lappa	Great Burdock	Asteraceae	SNA	IR	n/a	3
Arctium minus	Common Burdock	Asteraceae	SNA	IC	n/a	3
Arisaema triphyllum	Jack-in-the-pulpit	Araceae	S5	C	5	-3
Asclepias syriaca	Common Milkweed	Asclepiadaceae	S5	C	0	5
Athyrium filix-femina	Common Lady Fern	Dryopteridaceae	S5	X	4	0
Betula alleghaniensis	Yellow Birch	Betulaceae	S5	X	6	0
Bidens cernua	Nodding Beggarticks	Asteraceae	S5	X	2	-5
Boehmeria cylindrica	False Nettle	Urticaceae	S5	X	4	-5
Bromus inermis	Smooth Brome	Poaceae	SNA	IC	n/a	5
Carduus acanthoides	Spiny Plumeless Thistle	Asteraceae	SNA	IR	n/a	5
Carex arctata	Drooping Woodland Sedge	Cyperaceae	S5	C	5	5
Carex bromoides	Brome-like Sedge	Cyperaceae	S5	C	7	-3
Carex gracillima	Graceful Sedge	Cyperaceae	S5	C	4	3
Carex intumescens	Bladder Sedge	Cyperaceae	S5	C	6	-3
Carex lacustris	Lake Sedge	Cyperaceae	S5	C	5	-5
Carex pedunculata	Long-stalked Sedge	Cyperaceae	S5	C	5	3
Carex radiata	Eastern Star Sedge	Cyperaceae	S5	C	4	0
Carex scabrata	Eastern Rough Sedge	Cyperaceae	S5	U	8	-5
Carpinus caroliniana ssp. virginiana	Blue-beech	Betulaceae	S5	C	6	0
Catalpa speciosa	Northern Catalpa	Bignoniaceae	SNA	N/A	n/a	3
Chenopodium album	White Goosefoot	Chenopodiaceae	SNA	IX	n/a	3
Cicuta maculata	Spotted Water-hemlock	Apiaceae	S5	X	6	-5
Circaea canadensis	Broad-leaved Enchanter's Nightshade	Onagraceae	S5	X	2	3
Cirsium arvense	Canada Thistle	Asteraceae	SNA	IC	n/a	3
Clematis virginiana	Virginia Virgin's-bower	Ranunculaceae	S5	C	3	0
Coptis trifolia	Goldthread	Ranunculaceae	S5	X	7	-3
Cornus alternifolia	Alternate-leaved Dogwood	Cornaceae	S5	X	6	3
Cornus obliqua	Pale Dogwood	Cornaceae	S5	X	2	-3

Scientific Name	Common Name	Family	S-Rank (per NHIC)	Local Rank (per Oldham 2017)	Coefficient of Conservatism	Coefficient of Wetness
Cornus racemosa	Gray Dogwood	Cornaceae	S5	X	2	0
Cornus sericea	Red-osier Dogwood	Cornaceae	S5	C	2	-3
Cystopteris bulbifera	Bulblet Fern	Dryopteridaceae	S5	X	5	-3
Dactylis glomerata	Orchard Grass	Poaceae	SNA	IC	n/a	3
Daucus carota	Wild Carrot	Apiaceae	SNA	IC	n/a	5
Dianthus armeria	Deptford Pink	Caryophyllaceae	SNA	IX	n/a	5
Digitaria sanguinalis	Hairy Crabgrass	Poaceae	SNA	IX	n/a	3
Dryopteris intermedia	Evergreen Wood Fern	Dryopteridaceae	S5	**R**	5	0
Echinochloa crus-galli	Large Barnyard Grass	Poaceae	SNA	IC	n/a	-3
Echinocystis lobata	Wild Mock-cucumber	Cucurbitaceae	S5	X	3	-3
Elodea canadensis	Canada Waterweed	Hydrocharitaceae	S5	X	4	-5
Elymus repens	Creeping Wildrye	Poaceae	SNA	IC	n/a	3
Epipactis helleborine	Eastern Helleborine	Orchidaceae	SNA	IX	n/a	3
Equisetum arvense	Field Horsetail	Equisetaceae	S5	C	0	0
Erigeron annuus	Annual Fleabane	Asteraceae	S5	C	0	3
Erigeron canadensis	Canada Horseweed	Asteraceae	S5	C	0	3
Eutrochium maculatum var. maculatum	Spotted Joe Pye Weed	Asteraceae	S5	C	3	-5
Fragaria virginiana ssp. virginiana	Wild Strawberry	Rosaceae	S5	C	2	3
Frangula alnus	Glossy Buckthorn	Rhamnaceae	SNA	IU	n/a	0
Fraxinus nigra	Black Ash	Oleaceae	S4	X	7	-3
Fraxinus pennsylvanica	Green Ash	Oleaceae	S4	C	3	-3
Geranium robertianum	Herb-Robert	Geraniaceae	S5	C	2	3
Geum aleppicum	Yellow Avens	Rosaceae	S5	X	2	0
Geum canadense	White Avens	Rosaceae	S5	X	3	0
Geum urbanum	Wood Avens	Rosaceae	SNA	IR	n/a	5
Glechoma hederacea	Ground Ivy	Lamiaceae	SNA	IX	n/a	3
Glyceria striata	Fowl Mannagrass	Poaceae	S5	X	3	-5
Helianthus tuberosus	Jerusalem Artichoke	Asteraceae	SU	X	1	0
Hesperis matronalis	Dame's Rocket	Brassicaceae	SNA	IX	n/a	3
Hypericum perforatum	Common St. John's-wort	Clusiaceae	SNA	IC	n/a	5
Ilex verticillata	Black Holly	Aquifoliaceae	S5	X	5	-3
Impatiens capensis	Spotted Jewelweed	Balsaminaceae	S5	C	4	-3
Juglans nigra	Black Walnut	Juglandaceae	S4?	C	5	3
Juncus effusus ssp. effusus	Soft Rush	Juncaceae	SNA	X	n/a	-5
Juniperus virginiana	Eastern Red Cedar	Cupressaceae	S5	X	4	3
Leucanthemum vulgare	Oxeye Daisy	Asteraceae	SNA	IC	n/a	5
Lindera benzoin	Spicebush	Lauraceae	S4	X	6	-3
Lobelia siphilitica	Great Blue Lobelia	Campanulaceae	S5	X	6	-3
Lonicera tatarica	Tartarian Honeysuckle	Caprifoliaceae	SNA	IX	n/a	3
Lysimachia ciliata	Fringed Loosestrife	Primulaceae	S5	X	4	-3
Maianthemum canadense ssp. canadense	Wild Lily-of-the-valley	Liliaceae	S5	X	5	3
Maianthemum stellatum	Star-flowered False Solomon's Seal	Liliaceae	S5	X	6	0

Scientific Name	Common Name	Family	S-Rank (per NHIC)	Local Rank (per Oldham 2017)	Coefficient of Conservatism	Coefficient of Wetness
Malus pumila	Common Apple	Rosaceae	SNA	IX	n/a	5
Medicago sativa ssp. sativa	Alfalfa	Fabaceae	SNA	IC	n/a	5
Mentha canadensis	Canada Mint	Lamiaceae	S5	X	3	-3
Nasturtium officinale	Watercress	Brassicaceae	SNA	IX	n/a	-5
Nepeta cataria	Catnip	Lamiaceae	SNA	IC	n/a	3
Oenothera biennis	Common Evening Primrose	Onagraceae	S5	X	0	3
Onoclea sensibilis	Sensitive Fern	Dryopteridaceae	S5	X	4	-3
Osmunda regalis	Royal Fern	Osmundaceae	S5	X	7	-5
Osmundastrum cinnamomeum	Cinnamon Fern	Osmundaceae	S5	X	7	-3
Oxalis stricta	Upright Yellow Wood-sorrel	Oxalidaceae	S5	X	0	3
Panicum capillare	Common Panicgrass	Poaceae	S5	X	0	0
Parthenocissus quinquefolia	Virginia Creeper	Vitaceae	S4?	X	6	3
Parthenocissus vitacea	Thicket Creeper	Vitaceae	S5	X	4	3
Phalaris arundinacea	Reed Canary Grass	Poaceae	S5	X	0	-3
Phegopteris connectilis	Northern Beech Fern	Thelypteridaceae	S5	**R**	8	3
Phleum pratense	Common Timothy	Poaceae	SNA	IC	n/a	3
Phragmites australis ssp. australis	European Reed	Poaceae	SNA	IC	n/a	-3
Pilea pumila	Dwarf Clearweed	Urticaceae	S5	X	5	-3
Plantago lanceolata	English Plantain	Plantaginaceae	SNA	IC	n/a	3
Populus grandidentata	Large-toothed Aspen	Salicaceae	S5	X	5	5
Populus tremuloides	Trembling Aspen	Salicaceae	S5	X	2	0
Potamogeton crispus	Curly-leaved Pondweed	Potamogetonaceae	SNA	IX	n/a	-5
Potentilla recta	Sulphur Cinquefoil	Rosaceae	SNA	IX	n/a	5
Prunus serotina	Black Cherry	Rosaceae	S5	C	3	3
Prunus virginiana	Choke Cherry	Rosaceae	S5	C	2	3
Quercus bicolor	Swamp White Oak	Fagaceae	S4	X	8	-3
Ranunculus acris	Tall Buttercup	Ranunculaceae	SNA	IC	n/a	0
Rhamnus cathartica	Common Buckthorn	Rhamnaceae	SNA	IC	n/a	0
Rhus typhina	Staghorn Sumac	Anacardiaceae	S5	C	1	3
Ribes rubrum	Northern Red Currant	Grossulariaceae	SNA	IR	n/a	5
Rosa multiflora	Multiflora Rose	Rosaceae	SNA	IX	n/a	3
Rubus idaeus ssp. strigosus	Wild Red Raspberry	Rosaceae	S5	X	2	3
Rubus pubescens	Dewberry	Rosaceae	S5	X	4	-3
Rudbeckia hirta var. pulcherrima	Black-eyed Susan	Asteraceae	S5	C	0	3
Rumex obtusifolius	Bitter Dock	Polygonaceae	SNA	IX	n/a	-3
Sagittaria latifolia	Broad-leaved Arrowhead	Alismataceae	S5	C	4	-5
Salix eriocephala	Heart-leaved Willow	Salicaceae	S5	X	4	-3
Salix nigra	Black Willow	Salicaceae	S4	X	6	-5
Salix x fragilis	(Salix alba X Salix euxina)	Salicaceae	SNA	HYB	n/a	0
Setaria viridis	Green Foxtail	Poaceae	SNA	IX	n/a	5
Silene noctiflora	Night-flowering Catchfly	Caryophyllaceae	SNA	IX	n/a	5
Solanum dulcamara	Bittersweet Nightshade	Solanaceae	SNA	IC	n/a	0

Scientific Name	Common Name	Family	S-Rank (per NHIC)	Local Rank (per Oldham 2017)	Coefficient of Conservatism	Coefficient of Wetness
Solidago altissima var. altissima	Eastern Tall Goldenrod	Asteraceae	S5	U	1	3
Solidago canadensis var. canadensis	Canada Goldenrod	Asteraceae	S5	X	1	3
Solidago patula	Round-leaved Goldenrod	Asteraceae	S4	X	8	-5
Solidago rugosa ssp. rugosa	Northern Rough-stemmed Goldenrod	Asteraceae	S5	X	4	0
Sonchus arvensis ssp. arvensis	Glandular Field Sow-thistle	Asteraceae	SNA	IX	n/a	3
Spiraea alba	White Meadowsweet	Rosaceae	S5	X	3	-3
Symphyotrichum ericoides var. ericoides	White Heath Aster	Asteraceae	S5	C	4	3
Symphyotrichum firmum	Glossy-leaved Aster	Asteraceae	S4?	X	4	-3
Symphyotrichum lanceolatum	Panicled Aster	Asteraceae	S5	C	3	-3
Symphyotrichum lateriflorum	Calico Aster	Asteraceae	S5	C	3	0
Symphyotrichum novae-angliae	New England Aster	Asteraceae	S5	C	2	-3
Symphyotrichum puniceum	Swamp Aster	Asteraceae	S5	X	6	-5
Symphyotrichum urophyllum	Arrow-leaved Aster	Asteraceae	S4	X	6	5
Symplocarpus foetidus	Skunk Cabbage	Araceae	S5	C	7	-5
Taraxacum officinale	Common Dandelion	Asteraceae	SNA	IC	n/a	3
Thalictrum pubescens	Tall Meadow-rue	Ranunculaceae	S5	X	5	-3
Thelypteris noveboracensis	New York Fern	Thelypteridaceae	S4S5	X	7	0
Thuja occidentalis	Eastern White Cedar	Cupressaceae	S5	X	4	-3
Tiarella cordifolia	Heart-leaved Foam-flower	Saxifragaceae	S5	X	6	3
Toxicodendron radicans var. radicans	Eastern Poison Ivy	Anacardiaceae	S5	C	2	0
Trifolium pratense	Red Clover	Fabaceae	SNA	IX	n/a	3
Tussilago farfara	Colt's-foot	Asteraceae	SNA	IC	n/a	3
Typha latifolia	Broad-leaved Cattail	Typhaceae	S5	X	1	-5
Ulmus americana	American Elm	Ulmaceae	S5	C	3	-3
Urtica dioica ssp. gracilis	Slender Stinging Nettle	Urticaceae	S5	C	2	0
Verbascum thapsus	Common Mullein	Scrophulariaceae	SNA	IC	n/a	5
Verbena urticifolia	White Vervain	Verbenaceae	S5	X	4	0
Veronica anagallis-aquatica	Water Speedwell	Scrophulariaceae	SNA	IX	n/a	-5
Viburnum lentago	Nannyberry	Caprifoliaceae	S5	C	4	0
Viburnum opulus ssp. trilobum	Highbush Cranberry	Caprifoliaceae	S5	X	5	-3
Vitis riparia	Riverbank Grape	Vitaceae	S5	C	0	0

Appendix 4. Breeding Bird Survey Results

1 BREEDING BIRD SURVEY METHODOLOGY

Two breeding bird surveys were conducted following Ontario Breeding Bird Atlas (OBBA) protocols (Bird Studies Canada et al. 2001). The surveys occurred within the appropriate season (May 24–July 10), time of day (between dawn and 5 hours after dawn), and weather conditions (no rain, wind speed ≤3 on the Beaufort Wind Scale). The station was surveyed for a minimum duration of ten (10) minutes.

Ten (10) survey stations were established and situated systematically to cover the variety of bird habitats on-site, particularly habitats with a high potential to support significant bird species and those that occur within or adjacent to proposed areas of disturbance. The locations of all point count stations and significant bird species were recorded in the field with a high-accuracy GPS.

Signs of breeding activity accompanied each bird record (e.g., singing male, probable pair, agitation, carrying nest material, etc.). The OBBA provides four (4) breeding categories to accompany each observation:

> ***Observed:*** Species observed during its breeding season (no evidence of breeding).
>
> ***Possible Breeding:*** Includes any of the following observation types: 1) species observed in its breeding season in suitable nesting habitat, and 2) singing male present, or breeding calls heard, in its breeding season in suitable nesting habitat.
>
> ***Probable Breeding:*** Includes any of the following observation types: 1) pair observed in their breeding season in suitable nesting habitat, 2) permanent territory presumed through registration of territorial song on at least 2 days, a week or more apart, at the same place, 3) courtship or display between a male and a female or 2 males, including courtship feeding or copulation, 4) visiting probable nest site, 5) agitated behaviour or anxiety calls of an adult, 6) brood patch on adult female or cloacal protuberance on adult male, and 7) nest-building or excavation of nest hole.
>
> ***Confirmed Breeding:*** Includes any of the following observation types: 1) distraction display or injury feigning, 2) used nest or egg shells found (occupied or laid within the period of the study), 3) recently fledged young or downy young, including young incapable of sustained flight, 4) adults leaving or entering nest site in circumstances indicating occupied nest, 5) adult carrying faecal sac, 6) adult carrying food for young, 7) nest containing eggs, and 8) nest with young seen or heard.

2 RESULTS

Table 1 . Results of Breeding Bird Surveys.

Common Name	Scientific Name	Breeding Bird Stations[1] and Breeding Status[2]									
		BI-1	BI-2	BI-3	BI-4	BI-5	BI-6	BI-7	BI-8	BI-9	BI-10
American Crow	*Corvus brachyrhynchos*	Po		Po							
American Goldfinch	*Spinus tristis*			Po	Po						Po
American Redstart	*Setophaga ruticilla*		Pr	Po							
American Robin	*Turdus migratorius*	Po	Po					Po	Po	Po	Co
Bank Swallow	***Riparia riparia***									**O**	
Barn Swallow	***Hirundo rustica***						**Co**	**Pr**		**Po**	**Po**
Black-capped Chickadee	*Poecile atricapillus*										Po
Blue Jay	*Cyanocitta cristata*							Po			
Brown-headed Cowbird	*Molothrus ater*	Po									
Cedar Waxwing	*Bombycilla cedrorum*							Po			
Chipping Sparrow	*Spizella passerine*										Po
Cliff Swallow	*Petrochelidon pyrrhonota*						O				
Common Grackle	*Quiscalus quiscula*							Po			
Common Yellowthroat	*Geothlypis trichas*	Po									
Eastern Wood-pewee	***Contopus virens***				**Po**						
European Starling	*Sturnus vulgaris*	Po					Po			Po	O
Field Sparrow	*Spizella pusilla*					Po					
Gray Catbird	*Dumetella carolinensis*		Pr								
Great Crested Flycatcher	*Myrarchus crinitus*			Pr							
House Sparrow	*Passer domesticus*							Po		Po	
House Wren	*Troglodytes aedon*	Po		Pr							
Indigo Bunting	*Passerina cyanea*		Po					Pr			
Killdeer	*Charadrius vociferus*					Po	Co				
Mourning Dove	*Zenaida macroura*						Po			Po	
Northern Cardinal	*Cardinalis cardinalis*	Pr									
Red-eyed Vireo	*Vireo olivaceus*				Pr						
Red-winged Blackbird	*Agelaius phoeniceus*	Pr	Po				Po	Po			
Savannah Sparrow	*Passerculus sandwichensis*		Po								
Song Sparrow	*Melospiza melodia*	Pr	Pr		Po					Po	
Turkey Vulture	*Cathartes aura*									O	
Warbling Vireo	*Vireo gilvis*									Po	

Common Name	Scientific Name	Breeding Bird Stations[1] and Breeding Status[2]									
		BI-1	BI-2	BI-3	BI-4	BI-5	BI-6	BI-7	BI-8	BI-9	BI-10
Willow Flycatcher	*Empidonax traillii*	Pr	Pr								
Yellow Warbler	*Setophaga petechia*	Pr	Pr	Po							

1 Locations of breeding bird survey stations are indicated on **Figure 2**.

2 Co = Confirmed Breeder; Pr = Probable Breeder; Po = Possible Breeder; O = Observed (no evidence of breeding). Breeding status determined based on the results of the formal breeding bird surveys; where a higher level of breeding status was documented incidentally (i.e., during other field surveys), this is noted in within the main body of the report (where applicable).

Appendix 5. Significant Wildlife Habitat Assessment

Table 1. Results of the Significant Wildlife Habitat Assessment.

Ecoregion 7E	Do any Features, Habitats, or Areas on the Subject Property or Adjacent Lands meet relevant criteria (Ecoregion 7E Criteria Schedule) as Candidate SWH?	Do any Features, Habitats, or Areas on the Subject Property or Adjacent Lands meet relevant criteria (Ecoregion 7E Criteria Schedule) as Confirmed SWH?	Likelihood that Negative Effects to SWH (i.e., "degradation that threatens the health and integrity" as defined in the 2020 PPS) will occur based on the Proposed Development Plan and any related Site Alteration Activities.
Seasonal Concentration Areas of Animals			
Waterfowl Stopover and Staging Areas (Terrestrial)	**No.** Meadows, fields, and/or thickets that annually flood during spring and could support significant congregations of migrating waterfowl are absent.	--	--
Waterfowl Stopover and Staging Areas (Aquatic)	**No.** Large surface water features (e.g., ponds, lakes, bays, coastal inlets, large watercourses, etc.) and/or wetlands that annually flood during spring that could support significant congregations of migrating waterfowl are absent.	--	--
Shorebird Migratory Stopover Areas	**No.** Unvegetated open areas adjacent to surface water features (e.g., shorelines, beaches, mudflats, etc.) that could support significant congregations of migrating shorebirds are absent.	--	--
Raptor Wintering Areas	**No.** While forest and meadow habitats are present within the Site and the broader Subject Property, which may occasionally support wintering raptors, such habitats are too small to support significant congregations.	--	--
Bat Hibernacula	**No.** Natural features and habitats that could support hibernating bats (e.g., caves, mine shafts, crevices, karsts, etc.) are absent.	--	--
Bat Maternity Colonies	**Yes.** Mature deciduous and mixed forests with a high-density (i.e., >10/ha) of large-diameter (i.e., ≥25 cm DBH) trees containing cracks/cavities may be present.	**Unknown.** Bat roosting habitat assessment was not undertaken and/or acoustic monitoring devices were not deployed as part of this study.	**Negligible.** The limit of extraction will be set back a minimum of 15 m from the dripline of the Significant Woodland, which has the greatest likelihood of supporting maternity colonies of Big Brown Bat or Silver-haired Bat. Any necessary removal of trees outside the Significant Woodland, which in general will be very limited and unlikely to support bat maternity roosts, will be subject to a timing restriction. See report for greater details.
Turtle Wintering Areas	**No.** Surface water features and/or wetlands with soft muddy substrate which do not freeze to the bottom during winter are absent.	--	--
Reptile Hibernaculum	**Yes.** Features (e.g., small mammal burrows, rock crevices, etc.) and/or habitats that could provide snakes with access below the frost line are present within the Significant Woodland and the vicinity of Caddy Creek.	**Unknown.** Spring emergence surveys to determine whether snake overwintering is occurring within the Site or Adjacent Lands was not undertaken as part of this study.	**Negligible.** Areas proposed for extraction are maintained for cash crops and unlikely to have a high potential to support significant congregations of overwintering snakes.
Colonially - Nesting Bird Breeding Habitat (Bank and Cliff)	**No.** Features that could support nesting by Cliff Swallow and Northern Rough-winged swallow (e.g., eroding banks, sandy hills, borrow pits, steep slopes, cliff faces, etc.) according to the SWH criteria are absent.	--	--
Colonially - Nesting Bird Breeding Habitat Breeding Habitat (Tree/Shrubs)	**No.** Swamps and fens that could support colonial nesting birds are absent.	--	--
Colonially - Nesting Bird Breeding Habitat (Ground)	**No.** Rocky islands or peninsulas along lakes or large rivers are absent.	--	--
Migratory Butterfly Stopover Areas	**No.** A mixture of fields and forests within 5 km from the shoreline of Lake Erie or Lake Ontario are absent	--	--

Ecoregion 7E	Do any Features, Habitats, or Areas on the Subject Property or Adjacent Lands meet relevant criteria (Ecoregion 7E Criteria Schedule) as Candidate SWH?	Do any Features, Habitats, or Areas on the Subject Property or Adjacent Lands meet relevant criteria (Ecoregion 7E Criteria Schedule) as Confirmed SWH?	Likelihood that Negative Effects to SWH (i.e., "degradation that threatens the health and integrity" as defined in the 2020 PPS) will occur based on the Proposed Development Plan and any related Site Alteration Activities.
Landbird Migratory Stopover Areas	**No.** While migrating landbirds may temporarily stopover to feed and rest, the Subject Property is unlikely to support significant congregations of migrating landbirds.	--	--
Deer Winter Congregation Areas	**No.** MNRF has not identified any deer yarding areas and the Subject Property lacks vegetation communities that could provide thermal cover and lower snow depths in winter (e.g., coniferous woodlands and plantations, etc.).	--	--
Rare Vegetation Communities or Specialized Habitats for Wildlife			
Cliffs and Talus Slopes	**No.** Cliffs and talus slope communities are absent.	--	--
Sand Barren	**No.** Sand barren communities are absent.	--	--
Alvar	**No.** Flora characteristic of alvars are absent.	--	--
Old Growth Forest	**No.** Based on a review of historical aerial photographs, much of the deciduous forest/swamp has emerged recently and would not be expected to exhibit old-growth characteristics (e.g., old trees, abundant snags and downed woody debris, canopy gaps caused by species turnover, limited disturbance, etc.).	--	--
Savannah	**No.** Flora characteristic of savannahs are absent.	--	--
Tallgrass Prairie	**No.** Flora characteristic of tallgrass prairies are absent.	--	--
Other Rare Vegetation Community	**No.** Provincially rare vegetation communities are absent.	--	--
Waterfowl Nesting Area	**No.** The forested area and wetland habitats west of the Site do not meet the criteria as a potential waterfowl nesting area.	--	--
Bald Eagle and Osprey Nesting, Foraging and Perching Habitat	**No.** Forest communities adjacent to large surface water features are absent.	--	--
Woodland Raptor Nesting Habitat	**No.** Forest communities are not of sufficient size to support nesting raptors.	--	--
Turtle Nesting Areas	**No.** Exposed mineral soils adjacent to surface water features (e.g., lakes, ponds, etc.) and/or wetlands that may support turtles are absent.	--	--
Seeps and Springs	**Yes.** Areas where groundwater emerges at the surface and may support specialized habitat for plants and wildlife may be present.	**Presumed.** Several vascular plant indicators of groundwater seepage (Watercress, Skunk Cabbage, Eastern Rough Sedge) were documented within the wooded riparian corridor of Caddy Creek. Results of the Hydrogeological Assessment (EXP) further confirm an upward hydraulic gradient and broader groundwater/surface water interactions within Caddy Creek.	**Negligible.** The PSW located west of the proposed extraction area has been afforded a minimum 30 m setback while the dripline of the Significant Woodland has been afforded a minimum 15 m extraction setback. The results of the Hydrogeological Assessment do not indicate a high potential for impacts to adjacent groundwater resources. See report for greater details.
Amphibian Breeding Habitat (Woodland)	**No.** Forests with wetlands, ponds, and/or pools that may support significant congregations of breeding amphibians are absent.	--	--

Ecoregion 7E	Do any Features, Habitats, or Areas on the Subject Property or Adjacent Lands meet relevant criteria (Ecoregion 7E Criteria Schedule) as Candidate SWH?	Do any Features, Habitats, or Areas on the Subject Property or Adjacent Lands meet relevant criteria (Ecoregion 7E Criteria Schedule) as Confirmed SWH?	Likelihood that Negative Effects to SWH (i.e., "degradation that threatens the health and integrity" as defined in the 2020 PPS) will occur based on the Proposed Development Plan and any related Site Alteration Activities.
Amphibian Breeding Habitat (Wetlands)	**Yes.** Wetlands and surface water features (e.g., ponds, lakes, etc.) that may support significant congregations of breeding amphibians is present within the adjacent deciduous swamp.	**Unknown.** Anuran surveys were not undertaken as part of this study due to the timing in which the study commenced (i.e., late spring 2022).	**Negligible.** The wetland (deciduous swamp) located west of the extraction has been afforded a minimum 30 m setback.
Woodland Area-Sensitive Bird Breeding Habitat	**No.** Interior Forest interior conditions (i.e., >200 m from edge) are absent.	–	–
Habitat for Species of Conservation Concern			
Marsh Bird Breeding Habitat	**No.** Wetlands with shallow water and emergent aquatic vegetation are absent.	–	–
Open Country Bird Breeding Habitat	**No.** Meadow habitats of sufficient size are absent.	–	–
Shrub/Early Successional Bird Breeding Habitat	**No.** Shrub/early-successional habitats of sufficient size are absent.	–	–
Terrestrial Crayfish	**No.** Marsh and swamp communities and/or wet fields are absent.	–	–
Special Concern and Rare Wildlife Species	**Yes.** See **Table 2** below.	–	–
Animal Movement Corridors			
Amphibian Movement Corridors	**Yes.** Anuran movements may occur through the natural area west of the Site.	**Unknown.** Anuran surveys were not undertaken as part of this study due to the timing in which the study commenced (i.e., late spring 2022).	**Negligible.** The wetland located west of the proposed extraction area has been afforded a minimum 30 m setback while the dripline of the Significant Woodland has been afforded a minimum 15 m extraction setback. These setbacks will maintain the function of candidate anuran breeding west of the Site.

Table 2. Results of the Special Concern and Provincially Rare Species Assessment.

Species	Status per O. Reg. 230/08 under the ESA and/or NHIC	Rationale for Consideration in this Study	General Description of Habitats and Features which the Species is Known to Occupy or Use within the Ecoregion in which this Study is Located	Likelihood that the Species Occupies the Area within or adjacent to proposed Development or Site Alteration[1]	Likelihood that Negative Effects to the Species or its Habitat (i.e., "degradation that threatens the health and integrity" as defined in the 2020 PPS) will occur based on the Proposed Development Plan and any related Site Alteration Activities.
Birds					
Eastern Wood-pewee (*Contopus virens*)	SC	OBBA	• Breeds and forages in relatively open, deciduous and mixed forests of various sizes (including urban forest fragments) and along forest edges.	**Confirmed.** Species was documented within the woodland west of the Site during breeding bird surveys. Suitable breeding habitat is absent from the Site.	**Negligible.** The limit of extraction will be set back a minimum of 15 m from the dripline of the Significant Woodland.
Red-headed Woodpecker (*Melanerpes erythrocephalus*)	SC	OBBA	• Breeds and forages in open forests, savannahs, and forest edges that tend to contain large, mature trees.	**Negligible**. Species not documented during breeding bird surveys.	–
Grasshopper Sparrow (*Ammodramus savannarum*)	SC	OBBA	• Breeds and forages in hayfields, savannahs, pastures, meadows, grasslands, and prairies.	**Negligible** While there is potential that this species could periodically occur within pastures or hayfields on Adjacent Lands, suitable breeding habitat is absent from the Site.	–
Wood Thrush (*Hylocichla mustelina*)	SC	OBBA	• Breeds and forages in second-growth and mature deciduous and mixed forests with a well-developed understory.	**Confirmed.** Species was documented within the woodland west of the Site incidentally on 06 July 2022. Suitable breeding habitat is absent from the Site.	**Negligible.** The limit of extraction will be set back a minimum of 15 m from the dripline of the Significant Woodland.
Insects					
Monarch (*Danaus plexippus*)	SC	iNaturalist; Ontario Butterfly Atlas	• Oviposits on Milkweeds (*Asclepias* spp.). • Generalist foraging that nectars in most areas with wildflowers.	**Possible.** Ovipositing sites (i.e., species in the genus *Asclepias*) are absent, however this species may forage on the Site.	**Negligible**. Highest-quality foraging habitat within the Site would be located along the edge of Caddy Creek, which will have a 30 m buffer implemented.
Yellow Banded Bumble Bee (*Bombus terricola*)	SC	Habitat and distribution	• Occupies a range of open areas with nectaring sites. • Nests underground in abandoned rodent burrows or decomposing logs.	**Possible.** Species is a habitat generalist and occupies a wide range of areas.	**Negligible.** Highest-quality foraging habitat within the Site would be located along the edge of Caddy Creek, which will have a 30 m buffer implemented.
Mussels					
Purple Wartyback (*Cyclonaias tuberculata*)	S2	iNaturalist NHIC Project	• Occupies small to large rivers in medium to swift current with various substrates • Known to exist in Thames River and Lake Erie and recently in Ausable River and Black Creek	**Unlikely.** Species is known from the Middle Thames River but has not been mapped from Caddy Creek / Humphrey Municipal Drain by DFO.	–
Plants					
Lizard's Tail (*Saururus cernuus*)	S3	iNaturalist NHIC Project	• Grows in wet areas and/or within shallow water • Present within Thames Centre	**Negligible.** Suitable habitat for this species is present within the deciduous swamp, however this species was not documented during vascular plant surveys.	–
Reptiles					

Species	Status per O. Reg. 230/08 under the ESA and/or NHIC	Rationale for Consideration in this Study	General Description of Habitats and Features which the Species is Known to Occupy or Use within the Ecoregion in which this Study is Located	Likelihood that the Species Occupies the Area within or adjacent to proposed Development or Site Alteration[1]	Likelihood that Negative Effects to the Species or its Habitat (i.e., "degradation that threatens the health and integrity" as defined in the 2020 PPS) will occur based on the Proposed Development Plan and any related Site Alteration Activities.
Snapping Turtle (*Chelydra serpentina*)	SC	Ontario Reptile and Amphibian Atlas	• Occupies a variety of aquatic habitats with slow moving water. • Nests in exposed, usually coarse, friable substrate. • Known to make long-distance overland movements (i.e., several kilometers) between habitats.	**Possible.** This species may use Caddy Creek as a travel corridor to access nesting sites, however wetlands suitable for hibernation and foraging are limited nearby.	**Negligible.** The watercourse flows through a wetland and Significant Woodland which are afforded a minimum 30 m and 15 m extraction setback, respectively.

[1] Likelihood categories should be interpreted as follows:

Negligible: so limited that the assessed species can be assumed absent.

Unlikely: while theoretically conceivable, species presence very improbable or temporary based on available information (e.g., habitat conditions, range, abundance in local landscape, etc.).

Possible: species presence plausible based on available information; no convincing evidence suggesting species could not occur on-site.

Probable: while not confirmed, available information suggests species has a high likelihood of being present.

Confirmed: species observed and/or evidence of occupation (e.g., tracks, etc.) documented.

Appendix 6. Endangered and Threatened Species Assessment

Species	Status per O. Reg. 230/08 of the ESA	Rationale for Consideration in this Study	General Description of Habitats and Features which the Species is Known to Occupy within the Ecoregion in which this Study is Located	Likelihood that the Species Occupies the Area within or adjacent to proposed Development or Site Alteration[1]	Likelihood that Negative Effects to the Species or its Habitat (i.e., "Damage" or "Destruction" as defined in the ESA) will occur based on the Proposed Development Plan and any related Site Alteration Activities
Birds					
Bank Swallow (*Riparia riparia*)	THR	OBBA	• Nests in natural or anthropogenically derived exposed, sandy substrates on vertical or steep surfaces. • Forages in a variety of open areas including agricultural lands, meadows, prairies, woodland clearings, marshes, and above waterbodies.	**Confirmed.** This species was observed foraging within Adjacent lands. The Site does not currently contain suitable nesting habitat for Bank Swallow.	**Negligible.** There is no suitable nesting habitat within the Site.
Barn Swallow (*Hirundo rustica*)	THR	OBBA	• Nests in barns, bridge/culvert undersides, awnings/overhangs on sides of buildings, and (historically) tree cavities. • Forages in a variety of open areas including agricultural lands, meadows, prairies, woodland clearings, marshes, and above waterbodies.	**Confirmed.** A Barn Swallow nest was observed with live young underneath a bridge located at the western perimeter of the Site, and adults were observed foraging on the Site.	**Negligible.** This area will not be disturbed during extraction activities. The bridge where the nest is situated is a minimum of 35 metres from the extraction limit.
Bobolink (*Dolichonyx oryzivorus*)	THR	OBBA	• Breeds and forages in hayfields, pastures, meadows, grasslands, and prairies which are often (but not always) greater 4 ha. • May be found in more marginal habitats (e.g., shrubby fields, smaller fields, etc.) during migration or following disturbance to breeding habitats (e.g., hay cutting).	**Negligible.** Suitable breeding habitat is absent from the Site.	–
Chimney Swift (*Chaetura pelagica*)	THR	OBBA	• Nests in large, uncapped chimneys and (historically) tree cavities. • May forage above a wide variety of anthropogenic (e.g., cities, towns) and natural (e.g., fields, forests) areas.	**Negligible.** This species may forage over open areas on the Site, however suitable breeding habitat is absent.	–
Eastern Meadowlark (*Sturnella magna*)	THR	OBBA	• Breeds and forages in hayfields, savannahs, pastures, meadows, grasslands, prairies, and shrubby fields.	**Negligible.** Suitable breeding habitat is absent from the Site.	–
Red-headed Woodpecker (*Melanerpes erythrocephalus*)	END	OBBA	• Breeds and forages in deciduous forests and woodlots with large, mature trees with little understory with the presence of snags.	**Negligible.** Suitable breeding habitat is absent from the Site and none were identified during breeding bird surveys.	–
Mammals					
Eastern Small-footed Myotis (*Myotis leibii*)	END	On-site habitats and distribution in southern Ontario.	• Maternal roosting sites include exposed rock outcrops, crevices, and cliffs. • Overwinters in caves and mines that maintain temperatures above 0°C.	**Unlikely.** While this species may forage above open habitats on the Site or Adjacent Lands, potential maternal roosting habitat (e.g., rock outcrops, cliffs, etc.) is absent.	–
Little Brown Myotis (*Myotis lucifugus*)	END	On-site habitats and distribution in southern Ontario.	• Maternity roosts sites most often include buildings and large diameter trees with cracks, crevices, and/or exfoliating bark. • Overwinters in caves and mines that maintain temperatures above 0°C.	**Possible.** Species may roost and/or feed in the Woodland located west of the extraction area and may also feed along the woodland edges.	**Negligible.** The Significant Woodland will be protected by a 15 m extraction setback. A timing window restriction will be applied to tree removal activities outside the woodland to avoid impacting roosting bats (individuals or maternity colonies). See report for greater details.
Northern Myotis (*Myotis septentrionalis*)	END	On-site habitats and distribution in southern Ontario.	• Maternity roosts most often include large diameter trees with cracks, crevices, and/or exfoliating bark (buildings rarely used). • Overwinters in caves and mines that maintain temperatures above 0°C.	**Possible.** Species may roost and/or feed in the Woodland located west of the extraction area and may also feed along the woodland edges.	**Negligible.** The Significant Woodland will be protected by a 15 m extraction setback. A timing window restriction will be applied to tree removal activities outside the woodland to avoid impacting

Species	Status per O. Reg. 230/08 of the ESA	Rationale for Consideration in this Study	General Description of Habitats and Features which the Species is Known to Occupy within the Ecoregion in which this Study is Located	Likelihood that the Species Occupies the Area within or adjacent to proposed Development or Site Alteration[1]	Likelihood that Negative Effects to the Species or its Habitat (i.e., "Damage" or "Destruction" as defined in the ESA) will occur based on the Proposed Development Plan and any related Site Alteration Activities
					roosting bats (individuals or maternity colonies). See report for greater details.
Tri-colored Bat (*Perimyotis subflavus*)	END	On-site habitats and distribution in southern Ontario.	• Maternal roosting sites include Maple (*Acer* spp.) and Oak (*Quercus* spp.) with dead/dying leaf clusters. • Overwinters in caves and mines that maintain temperatures above 0°C.	**Possible.** Species may roost and/or feed in the Woodland located west of the extraction area and may also feed along the woodland edges.	**Negligible.** The Significant Woodland will be protected by a 15 m extraction setback. A timing window restriction will be applied to tree removal activities outside the woodland to avoid impacting roosting bats (individuals or maternity colonies). See report for greater details.
Plants					
American Ginseng (*Panax quinquefolius*)	END	Known from Middlesex County.	• Occupies rich, relatively undisturbed deciduous forests.	**Negligible.** Species was not documented during vascular plant surveys.	–
Black Ash (*Fraxinus nigra*)	END	Observed on-site	• Occupies deciduous swamps (often peaty), floodplains, and wet woods.	**Negligible.** Species was documented during vascular plant surveys within the deciduous swamp/woodland west of the Site.	**Negligible.** No tree clearing or extraction will occur within the deciduous swamp/woodland. A 30 m and 15 m extraction setback will be implemented from the wetland and woodland boundaries, respectively.
Butternut (*Juglans cinerea*)	END	Known from Middlesex County.	• Occupies a variety of treed habitats including mature forests, early-successional forests, and hedgerows.	**Negligible.** Species was not documented during vascular plant surveys.	–
Goldenseal (*Hydrastis canadensis*)	THR	Known from Middlesex County.	• Occupies rich deciduous forests.	**Negligible.** Species was not documented during vascular plant surveys.	–
Wood-poppy (*Stylophorum diphyllum*)	END	Known from Middlesex County.	• Occupies rich mixed and deciduous woodlands, forested ravines and slopes.	**Negligible.** Species was not documented during vascular plant surveys.	–
Reptiles					
Blanding's Turtle (*Emydoidea blandingii*)	THR	Ontario Reptile and Amphibian Atlas	• Occupies freshwater lakes, permanent or temporary pools, slow-flowing streams, marshes, and swamps. • Nests in exposed, usually coarse, friable substrate. • Known to make long-distance overland movements (i.e., several kilometers) between habitats.	**Negligible.** There is a low likelihood of this species being present, although this species is known to make long distance overland movements and uses watercourses as a habitat corridor. This species has last been observed in the general area in 1997 and it is expected that this individual is no longer present in the area.	–

[1] Likelihood categories are to be interpreted as follows:

Negligible: so limited that the assessed species can be assumed absent.

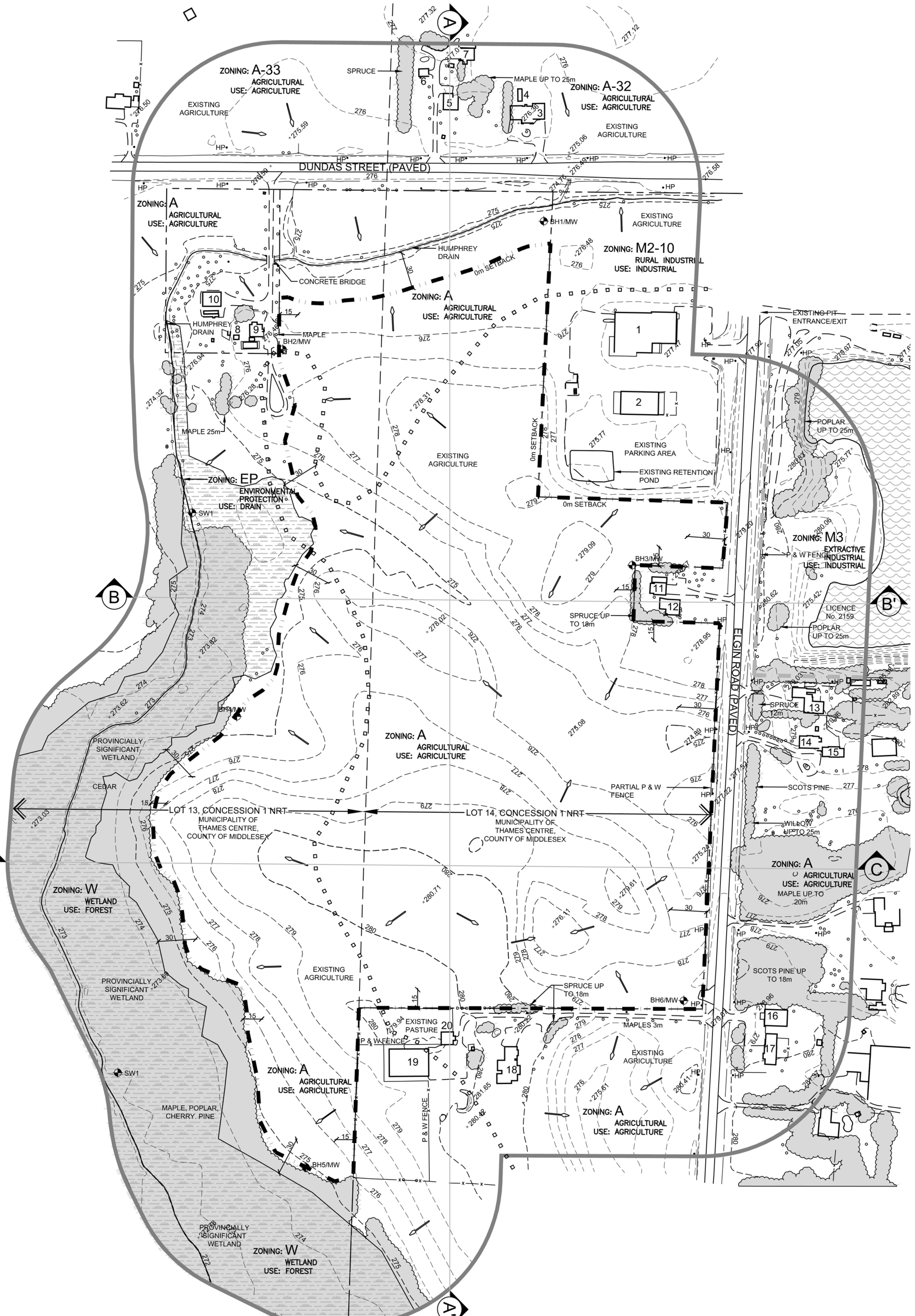
Low/Unlikely: while theoretically conceivable, species presence very improbable or temporary based on available information (e.g., habitat conditions, range, abundance in local landscape, etc.).

Possible: species presence plausible based on available information; no convincing evidence suggesting species could not occur on-site.

Probable: while not confirmed, available information suggests species has a high likelihood of being present.

Confirmed: species observed and/or evidence of occupation (e.g., tracks, etc.) documented.

Appendix 7. Site Plans



EXISTING FEATURES NOTES

GENERAL SITE PLAN INFORMATION

1. THIS SITE PLAN CONSIST OF 5 DRAWINGS AND MUST BE READ COLLECTIVELY.
2. ALL MEASUREMENTS SHOWN ON THIS SITE PLAN ARE IN METRES.
3. THIS SITE PLAN IS PREPARED FOR SUBMISSION TO THE MINISTRY OF NATURAL RESOURCES AND FORESTRY UNDER THE AGGREGATE RESOURCES ACT FOR A CLASS 'A' LICENCE, PIT BELOW THE WATER TABLE.

LICENCE INFORMATION

4. APPLICANT:
   BRANTAM EXCAVATING INC.
   9334 GLENDON DRIVE
   MOUNT BRYDGES, ON
   N0L 1W0

5. TOTAL AREA TO BE LICENCED: 20.7 ha
   TOTAL AREA TO BE EXTRACTED: 17.8 ha
   TOTAL AREA TO REHABILITATED: 17.8 ha

BASE INFORMATION

6. TOPOGRAPHIC INFORMATION WAS OBTAINED FROM FROM TOPOGRAPHIC SURVEY PROVIDED FIRST BASE SOLUTIONS, DATED SEPTEMBER 2022.

   THE SITE WAS FIELD CHECKED BY HARRINGTON MCAVAN LTD., OCTOBER 18, 2022

   REGULATED AREA LINE OBTAINED FROM UTRCA REGULATED AREA SCREENING MAP, OCTOBER 2022.

   WETLAND BOUNDARIES OBTAINED FROM NATURAL ENVIRONMENT REPORT BY TERRASTORY ENVIRONMENTAL CONSULTING, DATED DECEMBER 2022.

7. ZONING INFORMATION OBTAINED FROM MIDDLESEX COUNTY, MIDDLESEX MAPS ONLINE, OCTOBER 2022. PROPOSED LICENCE IS PRESENTLY ZONED A (AGRICULTURE). A ZBA WILL BE APPLIED FOR TO CHANGE A TO M3 (EXTRACTIVE INDUSTRIAL).

HYDROGEOLOGICAL INFORMATION

8. HYDROGEOLOGICAL INFORMATION INCLUDING GROUNDWATER ELEVATION WAS OBTAINED FROM REPORT BY EXP DATED FEBRUARY 2023.
9. THE WATER TABLE ELEVATION VARIES ACROSS THE PROPERTY BETWEEN 273.42 TO 274.64m ABOVE SEA LEVEL (A.S.L.).
10. SOURCE WATER PROTECTION POLICIES DO NO NOT APPLY TO THIS SITE (REFER TO HYDROGEOLOGICAL REPORT)

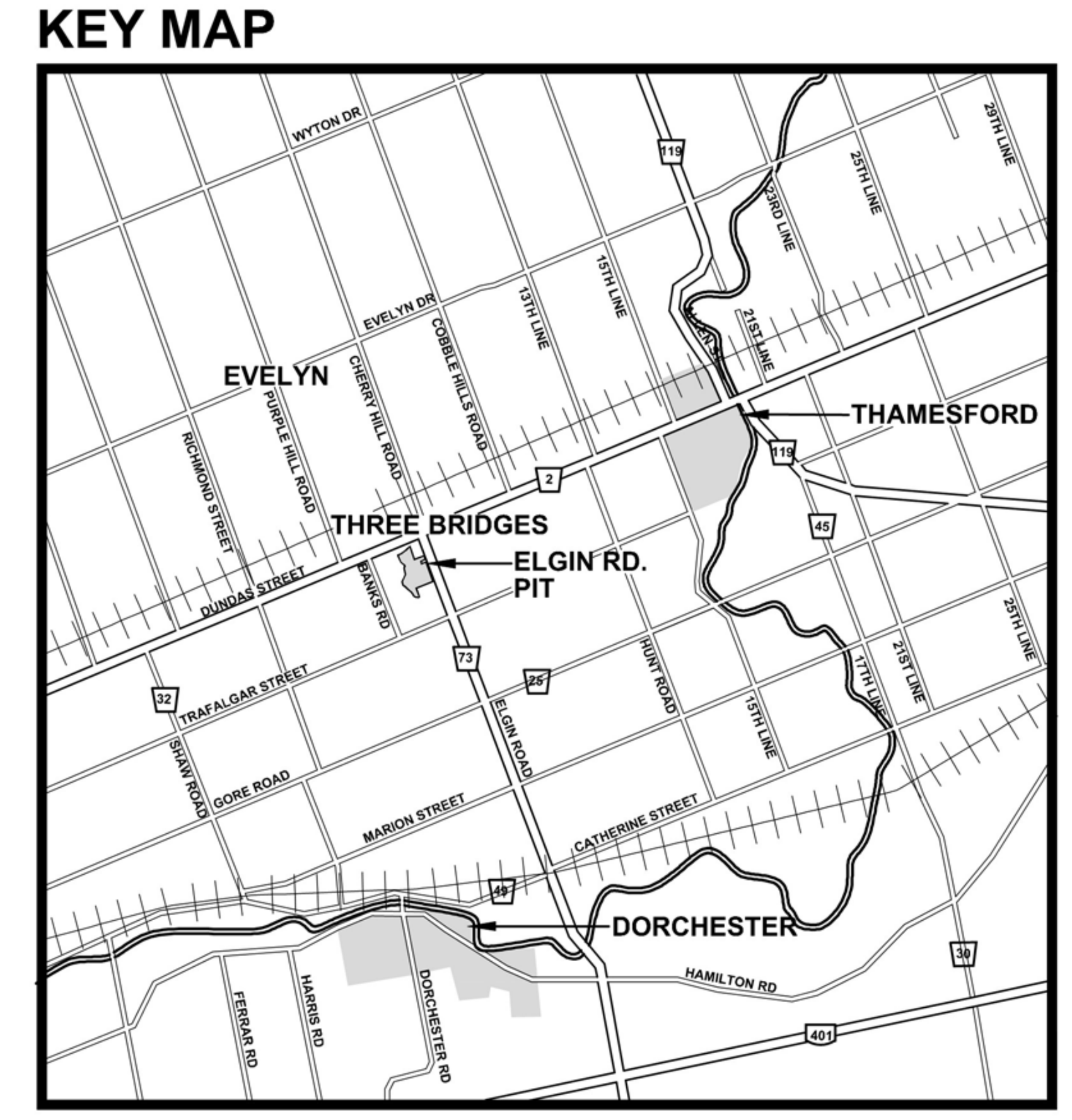
TECHNICAL REPORTS

11. HYDROGEOLOGICAL INFORMATION WAS OBTAINED FROM REPORT BY EXP DATED FEBRUARY 2023 (REFER TO SHEET 4 OF 5 FOR TECHNICAL RECOMMENDATIONS).
12. NATURAL ENVIRONMENT INFORMATION WAS OBTAINED FROM REPORT BY TERRASTORY ENVIRONMENTAL CONSULTING DATED FEBRUARY 2023 (REFER TO SHEET 4 OF 5 FOR TECHNICAL RECOMMENDATIONS).
13. ARCHAEOLOGICAL INFORMATION WAS OBTAINED FROM REPORT BY LINCOLN ENVIRONMENTAL CONSULTING CORP. DATED NOVEMBER 2021 (REFER TO SHEET 4 OF 5 FOR TECHNICAL RECOMMENDATIONS).
14. ACOUSTIC INFORMATION WAS OBTAINED FROM REPORT BY AERCOUSTICS DATED FEBRUARY 2023 (REFER TO SHEET 4 OF 5 FOR TECHNICAL RECOMMENDATIONS).

LEGEND

- BOUNDARY OF PROPOSED LICENCE
- BOUNDARY OF EXISTING LICENCED AREA
- 120m INFORMATION BOUNDARY
- PROPERTY LINES
- REGULATORY SETBACK AND LIMIT OF EXTRACTION
- LOT LINE
- UTRCA REGULATED AREA LINE
- EXISTING FENCE
- 285 EXISTING 5m ASL CONTOUR LINE
- 284 EXISTING 1m ASL CONTOUR LINE
- 283.95 EXISTING SPOT ELEVATION m ASL
- EXISTING VEGETATION
- EXISTING WATER
- EXISTING WETLAND
- A LOCATION OF SECTION
- 1 EXISTING BUILDING AND NUMBER
- HP EXISTING HYDRO POLE
- DIRECTION OF SURFACE WATER DRAINAGE
- BH/MW BOREHOLE LOCATION AND NUMBER DRILLED AND MONITORING WELL INSTALLED JUNE 15-16, 2021 BY EXP.
- EXISTING ENTRANCE/EXIT

KEY MAP



BUILDING LIST

No.	
1.	DEALERSHIP
2.	WORKSHOP
3.	HOUSE
4.	SHED
5.	HOUSE
6.	GARAGE
7.	SHED
8.	SHED
9.	HOUSE
10.	GARAGE
11.	GARAGE
12.	HOUSE
13.	HOUSE
14.	HOUSE
15.	GARAGE
16.	GARAGE
17.	HOUSE
18.	HOUSE
19.	BARN
20.	SHED

NO.	DATE	REVISIONS	OWNER	HM	MNR

Pre Licence Review

NO.	DATE	REVISIONS	OWNER	HM	MNR

Site Plan Amendments

Harrington McAvan Ltd
41 Main Street, Unit 102
Unionville, Ontario L3R 2E5
Tel: 905-294-8282 Fax: 905-294-7623
www.harringtonmcavan.com

Project Name

BRANTAM EXCAVATING

ELGIN ROAD PIT

PART LOT 13 & 14, CONCESSION 1 NRT
MUNICIPALITY OF THAMES CENTRE (FORMERLY TOWNSHIP OF NORTH DORCHESTER, COUNTY OF MIDDLESEX

Scale 1:2000

0 10 50 80m

North

Stamp

DRAFT

Drawing Status

SUBMITTED FOR APPROVAL

Drawn SB

Checked RM

Issue Date FEB 2023

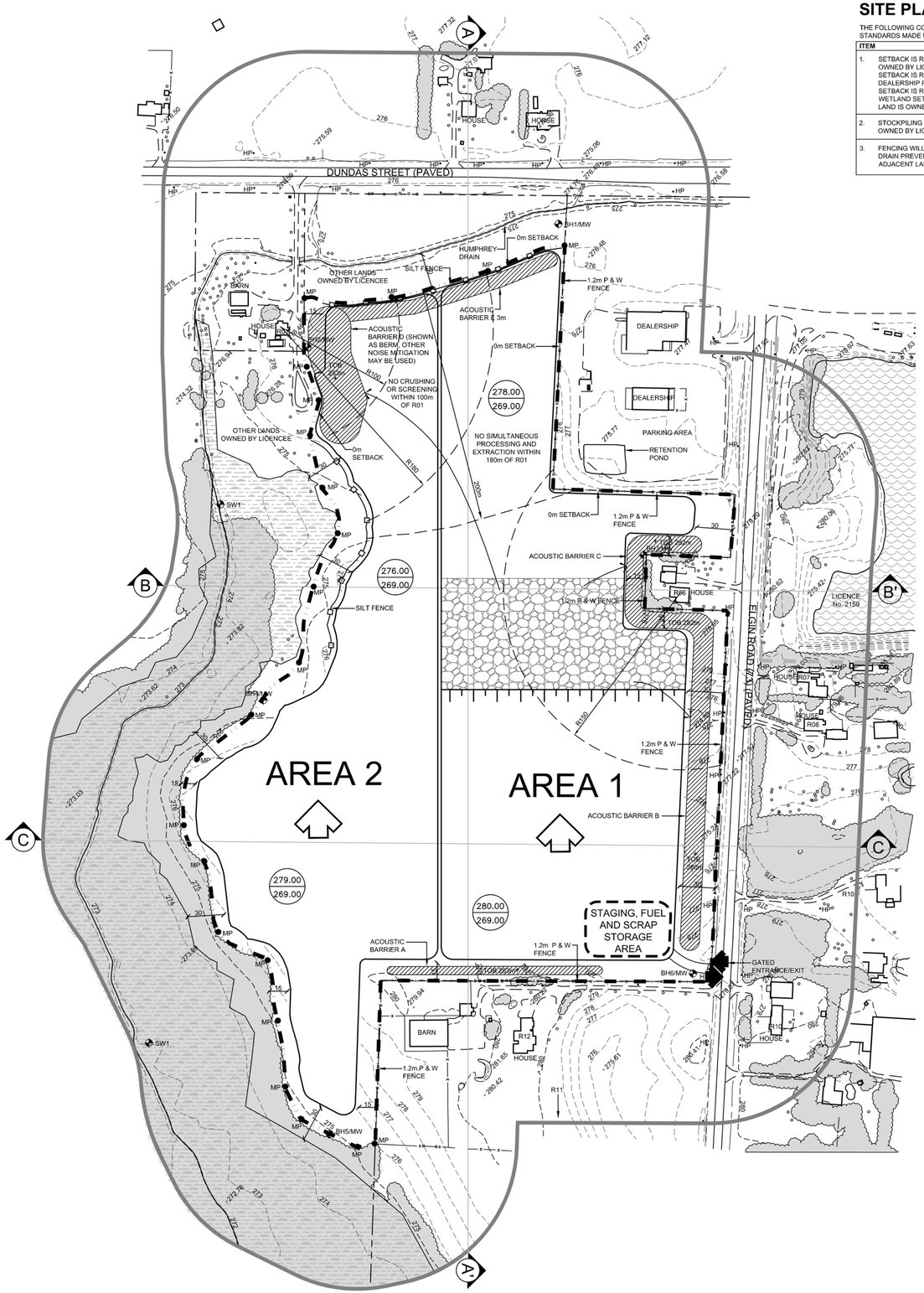
Drawing Title

EXISTING FEATURES PLAN

Project Number 22-22

Drawing Number 1 OF 5

FILE NAME: 22-22/COMP/2222-1.DWG
PLOT DATE: FEBRUARY 15, 2023



SITE PLAN VARIANCES

THE FOLLOWING CONDITIONS ILLUSTRATED ON THESE PLANS VARY FROM THE OF THE PROVINCIAL STANDARDS MADE UNDER THE AGGREGATE RESOURCES ACT

ITEM		SECTION
1.	SETBACK IS REDUCED TO 0m ALONG THE NORTH BOUNDARY, ADJACENT LAND IS OWNED BY LICENSEE. SETBACK IS REDUCED TO 0m ALONG EAST BOUNDARY AROUND JOHN DEER DEALERSHIP PER AGREEMENT WITH ADJACENT LANDOWNER. SETBACK IS REDUCED TO 0m ALONG WEST BOUNDARY BETWEEN THE SIGNIFICANT WETLAND SETBACK AND SETBACK AROUND NORTHWEST RESIDENCE, ADJACENT LAND IS OWNED BY LICENSEE.	**0.13(1)10i**
2.	STOCKPILING MAY OCCUR WITHIN 30m OF THE NORTH BOUNDARY, ADJACENT LANDS OWNED BY LICENSEE.	**0.13(1)13i**
3.	FENCING WILL BE OMITTED FROM THE NORTH BOUNDARY, EXISTING MUNICIPAL DRAIN PREVENTS ACCESS AND ALONG THE WEST BOUNDARY PER AGREEMENT WITH ADJACENT LANDOWNER AND LICENSEE OWNS ADJACENT LAND.	**0.13(3)a**

PHASE A

PHASE A NOTES

1. **ESTABLISH THE ENTRANCE EXIT AND HAUL ROAD INTO THE SITE AT ELGIN ROAD, ACCORDING TO THE APPROPRIATE MUNICIPAL STANDARDS.**
2. **PRIOR TO ANY ON SITE OPERATIONS, CONSTRUCT OR UPGRADE THE FENCING ON THE LICENCED BOUNDARIES TO THE STANDARDS OF THE AGGREGATE RESOURCES ACT (1.2m HIGH WIRE FENCE), EXCEPT WHERE SITE PLAN VARIANCES ARE NOTED AND INSTALL MARKER POSTS. ALL FENCING SHALL BE MAINTAINED.**
3. **PRIOR TO EXTRACTION IN AREA 1, STRIP TOPSOIL AND OVERBURDEN SEPARATELY AND USE THE MATERIALS TO CONSTRUCT ACOUSTICAL BARRIERS A, B, AND C TO RECOMMENDED SPECIFICATIONS FOR PHASE A. EXCESS OVERBURDEN AND TOPSOIL MAY BE STORED IN PILES ON THE PIT FLOOR.**
4. **BEGIN ABOVE WATER EXTRACTION OF AREA 1 IN DIRECTION SHOWN. STOCKPILING AREA MAY BE TEMPORARILY LOCATED NEAR THE PIT FACE DURING THE INITIAL EXCAVATION OF AGGREGATE.**
5. **PRIOR TO EXTRACTION WITHIN 200m OF NORTH EXTRACTION LIMIT CONSTRUCT ACOUSTIC BARRIER D AND E TO RECOMMENDED SPECIFICATIONS.**
6. **UNDISTURBED PORTIONS OF AREAS 1 AND 2 REMAIN IN AGRICULTURAL USE.**
7. **MAINTAIN ALL VEGETATION IN A HEALTHY, VIGOROUS GROWING CONDITION**

OPERATIONS NOTES

GENERAL INFORMATION

1. THIS PLAN DEPICTS A SCHEMATIC OPERATIONS AND REHABILITATION SEQUENCE FOR THIS PROPERTY BASED ON THE BEST INFORMATION AVAILABLE AT THE TIME OF PREPARATION. PHASES SHOWN ARE SCHEMATIC AND WILL BE OPERATED ACCORDING TO MATERIAL QUALITY, SITE HYDROLOGY AND HYDROGEOLOGY OR MARKET DEMAND. PHASES DO NOT REPRESENT ANY SPECIFIC OR EQUAL TIME PERIOD.

   EXTRACTION SHALL FOLLOW THE SEQUENCE SHOWN. WHEN PARTIAL REHABILITATION OF A PHASE IS POSSIBLE IT SHALL BE CARRIED OUT. DEMAND FOR CERTAIN PRODUCTS OR BLENDING OF MATERIALS WILL REQUIRE SOME DEVIATION IN THE EXTRACTION AND REHABILITATION PHASING. ANY DEVIATIONS FROM THE OPERATIONS SEQUENCE SHOWN WILL REQUIRE APPROVAL FROM NDMNRF.

2. SITE PLAN VARIANCES ARE LISTED IN THE SITE PLAN VARIANCE TABLE SHOWN ON THIS PAGE.

EXTRACTION/PROCESSING/HAULING INFORMATION

3. TOTAL AREA TO BE EXTRACTED IS 17.8 HECTARES.

4. MAXIMUM NUMBER OF TONNES OF AGGREGATE TO BE REMOVED FROM THE SITE IN ANY CALENDAR YEAR IS 500,000 TONNES.

   EXTRACTION OF SAND AND GRAVEL ABOVE WATER TABLE WILL TAKE PLACE IN TWO BENCHES, WITH A MAXIMUM HEIGHT OF 4 METRES AND WILL COMPLY WITH OHSA REGULATIONS REGARDING FACE HEIGHTS. THE GROUNDWATER TABLE IS ESTIMATED TO BE BETWEEN ± 273.42 TO 274.64m ASL (SEE REPORT BY EXP). FRONT END LOADERS WILL BE USED TO EXTRACT MATERIAL AND HAUL TRUCKS OR CONVEYORS WILL CARRY MATERIAL VIA HAUL ROADS TO THE PLANT FOR FURTHER PROCESSING. REFER TO SECTIONS A-A', B-B', AND C-C' ON DRAWING 4 OF 5 FOR FURTHER DETAILS.

   PORTABLE PROCESSING EQUIPMENT, FOR CRUSHING AND SCREENING WILL BE USED ON SITE AND WILL BE LOCATED ON THE PIT FLOOR CLOSE TO THE PIT FACE AT START UP. IN ADDITION TO PROCESSING, SITE ACTIVITIES WILL INCLUDE STRIPPING AND REHABILITATION, OPERATIONAL EQUIPMENT MAY INCLUDE TRUCKS, LOADERS, EXCAVATOR, BACKHOES, BULLDOZERS, SCRAPERS, CONVEYORS, WASH PLANTS, AND OTHER RELATED EQUIPMENT. PROCESSING EQUIPMENT, STACKERS AND PRODUCT STOCKPILES WILL NOT EXCEED ±15 METRES IN HEIGHT AND WILL BE LOCATED IN THE AREAS SHOWN AND/OR CLOSE TO PIT FACES.

   MATERIAL FROM OTHER PROPERTIES MAY BE IMPORTED INTO THE SITE FOR BLENDING, CUSTOM PRODUCTS AND/OR RESALE. THIS MAY INCLUDE AGGREGATE AND/OR PEAT AND TOPSOIL (IN AREA 2).

5. EQUIPMENT, SCRAP AND MACHINERY ASSOCIATED WITH THE EXTRACTION OPERATIONS WILL BE REMOVED UPON COMPLETION OF EXTRACTION.

HYDROGEOLOGICAL INFORMATION

6. THE WATER TABLE ELEVATION VARIES ACROSS THIS LICENCE FROM APPROXIMATELY **273.42 TO 274.64m** ABOVE SEA LEVEL (A.S.L.), BASED ON THE EXP HYDROGEOLOGICAL REPORT (SEE ABOVE). REFER TO SECTIONS ON SHEET 4 OF 5.

7. SURFACE DRAINAGE WILL BE DIRECTED TO POND/LOW AREAS FOR WATER TO INFILTRATE INTO THE GRANULAR MATERIALS ON THE PIT FLOOR. THERE WILL BE NO OFF-SITE DITCHING/ DISCHARGE.

NOISE MITIGATION INFORMATION

8. HOURS OF OPERATION:

SITE PREPARATION AND REHABILITATION:	07:00-19:00 WEEKDAYS; 07:00 - NOON SATURDAYS
EXCAVATION AND PROCESSING	07:00-19:00 WEEKDAYS; 07:00 - NOON SATURDAYS
SHIPPING:	07:00-19:00 WEEKDAYS; 07:00 - NOON SATURDAYS

AIR QUALITY INFORMATION

9. WATER OR CALCIUM CHLORIDE WILL BE APPLIED TO INTERNAL HAUL ROADS AND PROCESSING AREAS AS OFTEN AS REQUIRED TO MITIGATE DUST.

SITE MANAGEMENT INFORMATION

MAINTENANCE/ PROTECTION OF VEGETATION INFORMATION

10. EXISTING VEGETATION WITHIN THE LICENCED AREA SHALL BE MAINTAINED IN A HEALTHY VIGOROUS GROWING CONDITION UNTIL SEQUENTIAL STRIPPING BEGINS OR UNTIL THE REHABILITATION IS COMPLETE. ANY VEGETATION PLANTED AS PART OF SITE IMPROVEMENTS OR PROGRESSIVE AND FINAL REHABILITATION WILL ALSO BE MAINTAINED IN A HEALTHY, VIGOROUS GROWING CONDITION.

FENCING INFORMATION

11. BOUNDARIES OF THE AREA TO BE LICENCED THAT ARE PRESENTLY FENCED ARE SHOWN ON DRAWING 1 OF 5 EXISTING FEATURES. PRIOR TO ANY STRIPPING OR PREPARATION, FENCING ON THE LICENCED BOUNDARIES WILL BE UPGRADED TO 1.2m HIGH WIRE TO COMPLY WITH THE AGGREGATE RESOURCES ACT WHERE REQUIRED. UNFENCED BOUNDARIES SHALL BE DEMARCATED WITH HIGHLY VISIBLE MARKER POSTS AT INTERVISIBLE INTERVALS. SILT/EROSION CONTROL FENCING WILL BE CONSTRUCTED ONCE STRIPPING OCCURS WITHIN 50m OF THE SETBACK ADJACENT TO THE HUMPHREY DRAIN AND THE NATURAL FEATURES AND SHALL BE MAINTAINED UNTIL ADJACENT AREA IS STABLE AND VEGETATED. ALL FENCING SHALL BE MAINTAINED.

TOPSOIL/SUBSOIL/OVERBURDEN STORAGE INFORMATION

12. TOPSOIL AND OVERBURDEN SHALL BE STRIPPED AND STORED SEPARATELY IN BERMS WHERE SHOWN AND IN THE STOCKPILING AREA AS SHOWN.

BERM INFORMATION

13. BERMS SHALL BE CONSTRUCTED AS SPECIFIED IN THE AERCOUSTICS NOISE ASSESSMENT REPORT DATED FEBRUARY 2023 AND SHOWN ON OPS PLAN. BERMS SHALL NOT EXCEED 2:1. REFER TO TYPICAL BERM CROSS SECTION ON DRAWING 3 OF 5. ALL BERMS SHALL BE SEEDED (USING GRASS/ LEGUME MIXTURE, SEE REHABILITATION PLAN, NOTE #7) IMMEDIATELY UPON COMPLETION TO MINIMIZE NOISE, DUST AND EROSION.

14. ON COMPLETION OF THE BERMS, EXCESS ON-SITE OVERBURDEN WILL BE USED TO PROGRESSIVELY BACKFILL AND REHABILITATE THE SITE. TOPSOIL CAN BE TEMPORARILY STOCKPILED ON THE PIT FLOOR.

SCRAP STORAGE INFORMATION

15. ALL SCRAP, USED MACHINERY AND STUMPS GENERATED THROUGH THE OPERATIONS WITHIN THIS LICENCE WILL BE STORED IN THE STAGING AREA AS SHOWN, A MINIMUM OF 30m FROM THE BOUNDARY OF THE SITE AND NOT WITHIN 30m OF ANY BODY OF WATER AND SHALL BE DISPOSED OF ON AN ONGOING BASIS. STUMPS/ WOODY MATERIAL MAY BE CHIPPED AND USED FOR SOIL ENHANCEMENT DURING PROGRESSIVE REHABILITATION. TREES WILL BE HARVESTED AND SOLD AS LUMBER OR UTILIZED FOR FIREWOOD AND/ OR THEIR BEST USE. UPON COMPLETION OF EXTRACTION, ALL SCRAP EQUIPMENT AND USED MACHINERY SHALL BE REMOVED.

PETROLEUM STORAGE INFORMATION

16. FUEL, OIL, RADIATOR AND HYDRAULIC FLUID, AND OTHER CHEMICALS NEEDED FOR THE MAINTENANCE AND FUNCTIONING OF ON-SITE AGGREGATE PROCESSING EQUIPMENT SHALL BE APPROPRIATELY STORED IN ABOVE-GROUND CONTAINERS AND SHALL MEET THE REQUIREMENTS OF THE GASOLINE HANDLING ACT, AS AMENDED, AND THE GASOLINE HANDLING CODE AND REGULATIONS, AS AMENDED BY THE TECHNICAL STANDARDS AND SAFETY ACT (TSSA) AND LIQUID FUELS HANDLING CODE, AND IN ACCORDANCE WITH THE MINISTRY OF THE ENVIRONMENT, CONSERVATION, AND PARK'S CHEMICAL STORAGE GUIDELINES. ALL REFUELING SHALL BE WITHIN A CONTAINMENT PAD. ALL SPILLS TO THE ENVIRONMENT MUST BE REPORTED TO THE SPILLS ACTION CENTRE OF MECP. ANY SPILL SHALL BE REMOVED AND DISPOSED OF AT AN APPROPRIATE MECP APPROVED FACILITY.

LEGEND

- BOUNDARY OF PROPOSED LICENCE
- BOUNDARY OF EXISTING LICENCED AREA
- 120m INFORMATION BOUNDARY
- PROPERTY LINES
- REGULATORY SETBACK AND LIMIT OF EXTRACTION
- EXISTING FENCE
- EXISTING 5m ASL CONTOUR LINE
- EXISTING 1m ASL CONTOUR LINE
- EXISTING SPOT ELEVATION m ASL
- EXISTING VEGETATION
- EXISTING WETLAND
- EXISTING OPEN WATER
- EXTRACTION FACE
- BERM (MIN. HEIGHT AS SHOWN)
- UNDISTURBED AREA
- AREA STRIPPED OF TOPSOIL AND OVERBURDEN
- SILT FENCE
- MP — PROPOSED MARKER POST
- 1 — EXISTING BUILDING AND NUMBER
- HP — EXISTING HYDRO POLE
- DIRECTION OF SURFACE WATER DRAINAGE
- BH/MW — BOREHOLE LOCATION AND NUMBER DRILLED AND MONITORING WELL INSTALLED JUNE 15-16, 2021
- ENTRANCE/ EXIT
- DIRECTION OF EXTRACTION
- DIRECTION OF TOPSOIL AND OVERBURDEN MOVEMENT
- R03 — LOCATION OF NOISE RECEPTOR
- 296.00 / 286.00 — EXISTING ELEVATION / PROPOSED ELEVATION
- A — LOCATION OF SECTION

NO.	DATE	REVISIONS	OWNER	HM	MHR

Pre Licence Review

NO.	DATE	REVISIONS	OWNER	HM	MHR

Site Plan Amendments

Harrington McAvan Ltd
41 Main Street, Unit 102
Unionville, Ontario **L3R 2E5**
Tel: 905-294-8282 Fax: 905-294-7623
www.harringtonmcavan.com

Project Name

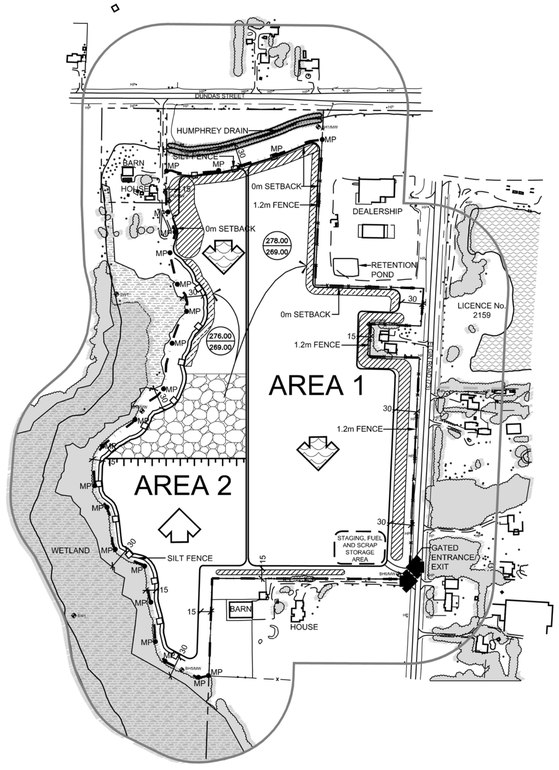
BRANTAM EXCAVATING

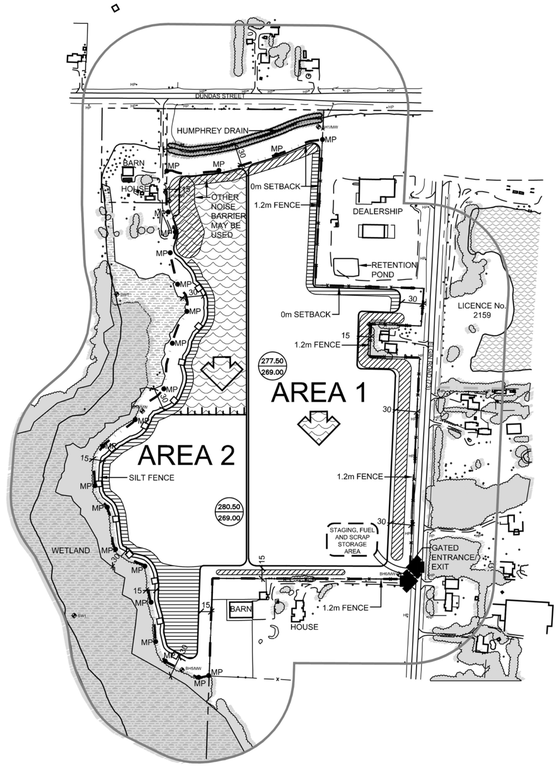
ELGIN ROAD PIT

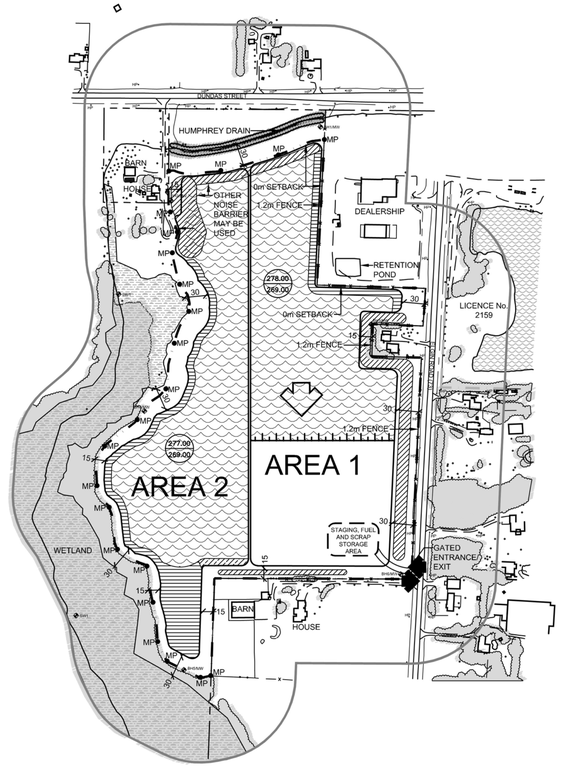
PART LOT 13 & 14, CONCESSION 1 NRT
MUNICIPALITY OF THAMES CENTRE (FORMERLY TOWNSHIP OF NORTH DORCHESTER, COUNTY OF MIDDLESEX

Scale 1:2000 (0 10 50 80m)	**North**	**Stamp** DRAFT
Drawing Status SUBMITTED FOR APPROVAL		
Drawn SB	**Checked** RM	**Issue Date** FEB 2023
Drawing Title OPERATIONAL PLAN PHASE A		**Project Number** 22-22 **Drawing Number** 2 OF 5

FILE NAME: 22-22/COMP/2222-2.DWG
PLOT DATE: FEBRUARY 15, 2023







LEGEND

- BOUNDARY OF PROPOSED LICENCE
- BOUNDARY OF EXISTING LICENCED AREA
- 120m INFORMATION BOUNDARY
- PROPERTY LINES
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- EXISTING VEGETATION
- EXISTING WETLAND
- EXISTING OPEN WATER
- EXTRACTION FACE
- BERM (MIN. HEIGHT AS SHOWN)
- UNDISTURBED AREA
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- PROGRESSIVE REHABILITATION
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- R03 — LOCATION OF NOISE RECEPTOR
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- MP — PROPOSED MARKER POST
- A — LOCATION OF SECTION

PHASE B

1. COMPLETE ABOVE WATER EXTRACTION OF AREA 1.
2. STRIP TOPSOIL AND OVERBURDEN SEPARATELY FROM AREA 2 AND USE THE MATERIAL TO BEGIN PROGRESSIVE REHABILITATION OF AREA 1 SIDE SLOPES AS SHOWN. EXCESS MATERIAL MAY BE STOCKPILED ON THE PIT FLOOR.
3. BEGIN ABOVE WATER EXTRACTION OF AREA 2 IN DIRECTION SHOWN. SHIP MATERIAL TO TEMPORARY PLANT SITE (NOT SHOWN, PORTABLE PROCESSING EQUIPMENT TO BE USED).
4. BEGIN REHABILITATION OF AREA 2 SIDE SLOPES AS EXTRACTION PROCEEDS SOUTH USING MATERIAL STRIPPED IN AREA 2.
5. UNDISTURBED PORTION OF AREA 2 TO REMAIN IN AGRICULTURAL USE.
6. MAINTAIN ALL VEGETATION IN A HEALTHY, VIGOROUS CONDITION.

PHASE C

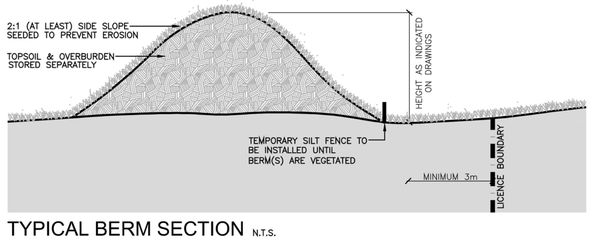
1. COMPLETE ABOVE WATER EXTRACTION OF AREA 2.
2. COMPLETE REHABILITATION OF AREAS SHOWN.
3. BEGIN BELOW WATER EXTRACTION OF AREA 2 IN DIRECTION SHOWN. MATERIAL EXTRACTED FROM BELOW WATER WILL BE PLACED IN WINDROWS ON THE PIT FLOOR TO DRAIN BEFORE BEING TRANSPORTED FOR PROCESSING. SHIP MATERIAL TO TEMPORARY PLANT SITE (NOT SHOWN, PORTABLE PROCESSING EQUIPMENT TO BE USED).
4. COMPLETE BELOW WATER EXTRACTION OF AREA 2.
5. MAINTAIN ALL VEGETATION IN A HEALTHY, VIGOROUS CONDITION.

PHASE D

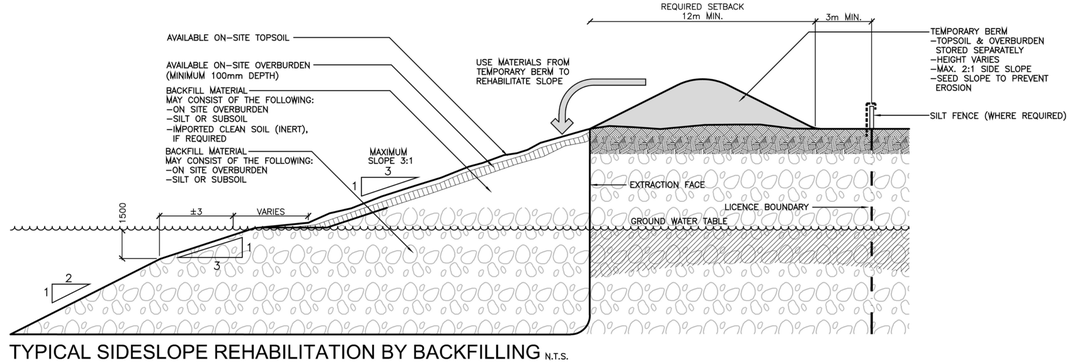
1. BEGIN BELOW WATER EXTRACTION OF AREA 1 IN DIRECTION SHOWN.
2. CONTINUE PROGRESSIVE REHABILITATION OF AREA 2 SIDESLOPES AS SHOWN.
3. COMPLETE BELOW WATER EXTRACTION IN AREA 1.
4. MAINTAIN ALL VEGETATION IN A HEALTHY, VIGOROUS CONDITION.

PHASE E (NOT SHOWN)

1. REMOVE ALL EQUIPMENT, STRUCTURES, STOCKPILES AND SCRAP FROM THE SITE AND REHABILITATE ALL HAUL ROADS USING TOPSOIL AND OVERBURDEN STOCKPILED IN BERMS.
2. COMPLETE REHABILITATION OF ALL REMAINING AREAS USING MATERIAL IN ACOUSTIC BERMS.
3. MAINTAIN ALL VEGETATION IN A HEALTHY, VIGOROUS CONDITION.



TYPICAL BERM SECTION N.T.S.



TYPICAL SIDESLOPE REHABILITATION BY BACKFILLING N.T.S.

NO.	DATE	REVISIONS	OWNER	HM	MNR

Pre Licence Review

NO.	DATE	REVISIONS	OWNER	HM	MNR

Site Plan Amendments

Harrington McAvan Ltd
41 Main Street, Unit 102
Unionville, Ontario L3R 2E5
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Project Name

BRANTAM EXCAVATING

ELGIN ROAD PIT

PART LOT 13 & 14, CONCESSION 1 NRT
MUNICIPALITY OF THAMES CENTRE (FORMERLY TOWNSHIP OF NORTH DORCHESTER, COUNTY OF MIDDLESEX

Scale 1:4000
0 50 100 150m

North

Stamp: DRAFT

Drawing Status: PRELIMINARY FOR DISCUSSION

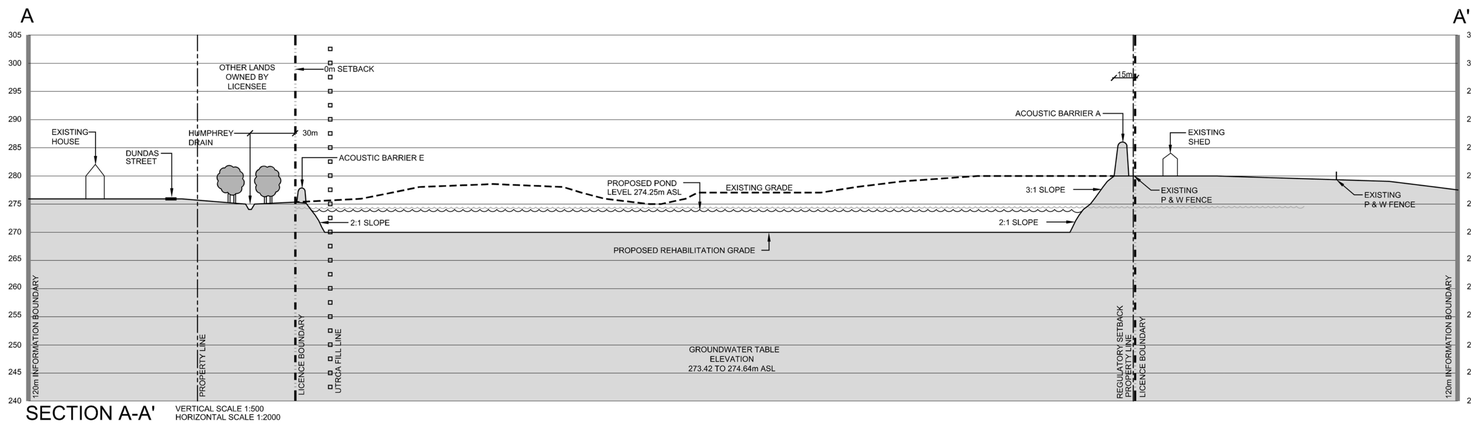
Drawn SB | Checked RM | Issue Date FEB 2023

Drawing Title: OPERATIONAL PLAN PHASES B-E AND DETAILS

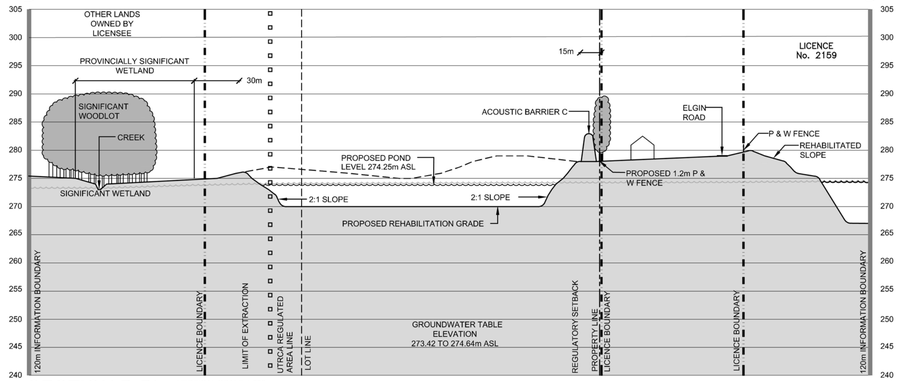
Project Number: 22-22

Drawing Number: 3 OF 5

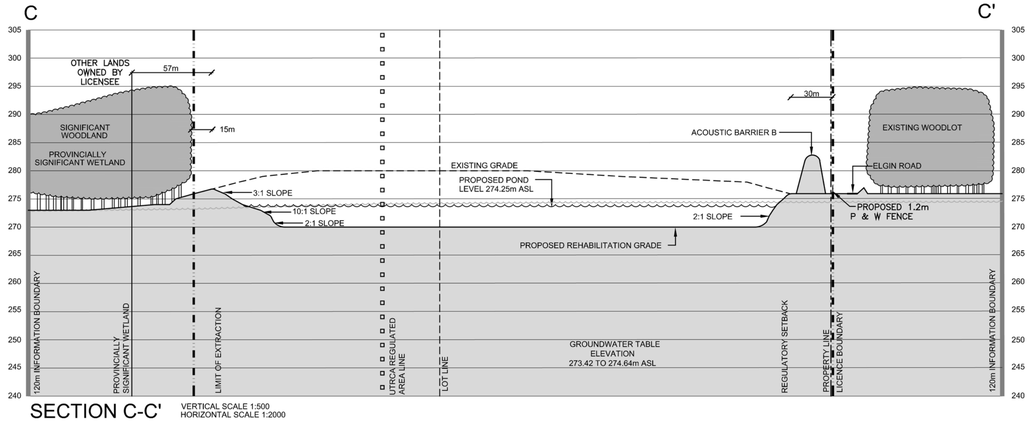
FILE NAME: 22-22/COMP/2222-3.DWG
PLOT DATE: FEBRUARY 15, 2023



SECTION A-A' VERTICAL SCALE 1:500 HORIZONTAL SCALE 1:2000



SECTION B-B' VERTICAL SCALE 1:500 HORIZONTAL SCALE 1:2000



SECTION C-C' VERTICAL SCALE 1:500 HORIZONTAL SCALE 1:2000

NOISE ASSESSMENT - AERCOUSTICS - DATED FEBRUARY 2023

1. THE PROPOSED HOURS OF EXTRACTION, PROCESSING, AND SHIPPING OPERATIONS SHALL BE LIMITED TO THE DAYTIME HOURS ONLY (07:00 TO 19:00).

2. THE EXTRACTION, PROCESSING, AND SHIPPING EQUIPMENT OPERATING IN THE PIT IS LIMITED TO:
   - ONE EXTRACTION LOADER OR SURGE PILE LOADER
   - ONE DRAG LINE OR EXCAVATOR
   - ONE SHIPMENT LOADER
   - ONE PROCESSING PLANT (CRUSHING AND SCREENING)
   - HIGHWAY TRUCKS
   - OFF-ROAD TRUCKS

3. THE AGGREGATE PIT EQUIPMENT SHALL SATISFY THE NOISE EMISSION LEVELS LISTED IN THE BELOW TABLE:

EQUIPMENT	REFERENCE SOUND PRESSURE LEVEL AT 30m
PROCESSING PLANT	80
DRAG LINE	73
SHIPPING/ SURGE PILE LOADER	67[1]
EXTRACTION LOADER	70
HIGHWAY TRUCK 20 km/h	71
OFF ROAD TRUCK 30 km/h	80

1- THE SHIPMENT LOADER AND SURGE PLE LOADERS WERE ASSUMED TO OPERATE AT A 50% DUTY CYCLE.

4. THE SOUND EMISSIONS OF ALL CONSTRUCTION EQUIPMENT INVOLVED IN SITE PREPARATION AND REHABILITATION ACTIVITIES SHALL COMPLY WITH THE SOUND LEVEL LIMITS SPECIFIED IN THE MECP PUBLICATION NPC-115 "CONSTRUCTION EQUIPMENT".

5. NEW EQUIPMENT TECHNOLOGY OR DIFFERENT CONFIGURATIONS MAY ALLOW PROPOSED CHANGES TO ANY PORTION OF THE EXTRACTION AND PROCESSING OPERATIONS INCLUDING ADDITIONAL EQUIPMENT TO OPERATE ON THE SITE, EQUIPMENT TO BE SUBSTITUTED, AND/OR DIFFERENT BERM HEIGHTS, WHILE STILL MEETING THE APPLICABLE SOUND LEVEL LIMITS. CHANGES MAY BE PERMITTED TO THE SITE OPERATIONS AND NOISE CONTROLS PROVIDED THAT THE CHANGES STILL MEET THE SOUND LEVEL LIMITS, AS CONFIRMED THROUGH DOCUMENTATION PREPARED BY A PROFESSIONAL ENGINEER SPECIALIZING IN NOISE CONTROL.

6. AN ACOUSTIC BARRIER IS REQUIRED TO BE SOLID, WITH NO GAPS OR OPENINGS, AND SHALL SATISFY A MINIMUM AREA DENSITY OF 20 KG/M$_2$. IT COULD TAKE THE FORM OF A WORKING FACE, STOCKPILE, ACOUSTIC FENCE, ISO CONTAINERS, A COMBINATION OF THESE, OR ANY CONSTRUCTION SATISFYING THE REQUIREMENTS OF AN ACOUSTIC BARRIER.

7. PRIOR TO EXTRACTION OPERATIONS, THE FOLLOWING ACOUSTICAL BARRIERS SHALL BE ESTABLISHED AS NOTED BELOW AND AS SHOWN ON THE OPERATION PLAN. THESE BARRIERS SHALL REMAIN IN PLACE FOR THE LIFETIME OF THE PIT.

   - BARRIER A - TOP-OF-BARRIER ELEVATION OF 283 MASL WITH APPROXIMATE LENGTH OF 175 M
   - BARRIER B - TOP-OF-BARRIER ELEVATION OF 280 MASL WITH APPROXIMATE LENGTH OF 275 M
   - BARRIER C - TOP-OF-BARRIER OF ELEVATION 282 MASL WITH APPROXIMATE LENGTH OF 150 M

8. PRIOR TO EXTRACTION OR PROCESSING OPERATIONS WITHIN 200 M OF THE NORTHMOST EXTRACTION LIMIT, THE FOLLOWING ACOUSTICAL BARRIERS SHALL BE ESTABLISHED AS NOTED BELOW AND AS SHOWN ON THE OPERATION PLAN. THESE BARRIERS SHALL REMAIN IN PLACE FOR THE LIFETIME OF THE PIT.

   - BARRIER D - TOP-OF-BARRIER ELEVATION OF 283 MASL WITH APPROXIMATE LENGTH OF 100 M
   - BARRIER E - RELATIVE HEIGHT OF 3 M WITH RESPECT TO EXISTING GRADE, WITH APPROXIMATE LENGTH OF 215 M.

9. AN ACOUSTICAL BARRIER SHALL BE ESTABLISHED WITHIN 30 M OF THE PROCESSING PLANT, BREAKING THE LINE OF SIGHT TO THE RECEPTOR LISTED IN TABLE A2, WITH A MINIMUM HEIGHT BASED ON THE RECEPTOR'S DISTANCE FROM THE PROCESSING PLANT AS SPECIFIED IN TABLE BELOW:

TOP OF BARRIER HEIGHT (MASL)	8 M SHIELDING REQUIRED	10 M SHIELDING REQUIRED
R01	WITHIN 400 M	WITHIN 180 M
R06	WITHIN 400 M	WITHIN 150 M
R07-R11	WITHIN 400 M	NEVER
R12	WITHIN 400 M	NEVER

10. THE PROCESSING PLANT SHALL NOT OPERATE WITHIN 100 M OF RECEPTOR R01.

11. EXTRACTION OPERATIONS AND PROCESSING OPERATIONS MAY NOT OCCUR SIMULTANEOUSLY WITHIN 180 M OF RECEPTOR R01.

TECHNICAL RECOMMENDATIONS

THE FOLLOWING ARE THE TECHNICAL RECOMMENDATIONS FROM ALL OF THE EXPERTS' REPORTS AS OF MARCH 2022. ADDITIONAL RECOMMENDATIONS MAY BE INCLUDED AS A RESULT OF THE LICENCE REVIEW PROCESS.

NATURAL ENVIRONMENT ASSESSMENT - TERRASTORY ENVIRONMENTAL CONSULTING INC. DATED FEBRUARY 2023

PROVINCIALLY SIGNIFICANT WETLAND AND OTHER ADJOINING WETLANDS

1. THE 30 M SETBACK FROM THE PSW AND OTHER ADJOINING WETLANDS WILL BE WELL-MARKED UNDER THE DIRECTION OF A QUALIFIED ECOLOGIST PRIOR TO THE COMMENCEMENT OF ADJACENT PIT OPERATIONS.

2. OPERATIONAL ACTIVITIES AND OTHER DISTURBANCES ARE PROHIBITED WITHIN THE 30 M SETBACK FROM THE WETLAND, WHICH WILL BECOME NATURAL, SELF-SUSTAINING VEGETATION (NO MOW OR AGRICULTURAL USES).

SIGNIFICANT WOODLANDS

3. THE 15 M SETBACK FROM THE DRIPLINE OF THE SIGNIFICANT WOODLAND WILL BE WELL-MARKED UNDER THE DIRECTION OF A QUALIFIED ECOLOGIST PRIOR TO THE COMMENCEMENT OF ADJACENT PIT OPERATIONS.

4. OPERATIONAL ACTIVITIES AND OTHER DISTURBANCES ARE PROHIBITED WITHIN THE 15 M SETBACK FROM THE WETLAND BOUNDARY, WHICH WILL BECOME NATURAL, SELF-SUSTAINING VEGETATION (NO MOW OR AGRICULTURAL USES).

5. ANY NECESSARY LIGHTING TO SUPPORT PIT OPERATIONS WILL BE DIRECTED AWAY FROM THE SIGNIFICANT WOODLAND (I.E., EASTWARD OR NORTHWARD) TO THE EXTENT PRACTICABLE.

HABITAT OF ENDANGERED AND THREATENED SPECIES

6. ALL AGGREGATE OPERATIONS WITHIN THE SITE WILL BE UNDERTAKEN CONSISTENT WITH THE DOCUMENT TITLED "BEST MANAGEMENT PRACTICES FOR THE PROTECTION, CREATION AND MAINTENANCE OF BANK SWALLOW HABITAT IN ONTARIO" (OMNRF 2017).

7. ANY NECESSARY REMOVAL OF VEGETATION TO SUPPORT PIT OPERATIONS WILL BE COMPLETED OUTSIDE THE PRIMARY BIRD NESTING AND BAT ACTIVITY PERIODS (I.E., TO BE COMPLETED BETWEEN OCTOBER 1 AND MARCH 31).

FISH HABITAT

8. THE 30 M SETBACK FROM THE BANKFULL CHANNEL OF CADDY CREEK / HUMPHREY MUNICIPAL DRAIN WILL BE WELL-MARKED UNDER THE DIRECTION OF A QUALIFIED ECOLOGIST PRIOR TO THE COMMENCEMENT OF ADJACENT PIT OPERATIONS.

9. OPERATIONAL ACTIVITIES AND OTHER DISTURBANCES ARE PROHIBITED WITHIN THE 30 M SETBACK FROM CADDY CREEK / HUMPHREY MUNICIPAL DRAIN, WHICH WILL BECOME NATURAL, SELF-SUSTAINING VEGETATION (NO MOW OR AGRICULTURAL USES).

10. EROSION AND SEDIMENT CONTROL MEASURES (E.G., INSTALLATION OF SILT FENCING) WILL BE IMPLEMENTED OUTSIDE THE 30 M SETBACK OF CADDY CREEK / HUMPHREY MUNICIPAL DRAIN AND BE REGULARLY MAINTAINED AS REQUIRED TO FUNCTION EFFECTIVELY.

11. A RIPARIAN CORRIDOR ENHANCEMENT PLAN FOR THE 30 M SETBACK FROM THE CADDY CREEK / HUMPHREY MUNICIPAL DRAIN WILL BE PREPARED FOR THE AREA NORTH OF THE SITE, WHICH INCORPORATES THE FOLLOWING ELEMENTS (MINIMUM):
    - TREE AND SHRUB INSTALLATIONS (NATIVE TO MIDDLESEX COUNTY) TO BE INSTALLED WITHIN 5 M OF THE BANKFULL CHANNEL.
    - APPLICATION OF A NATIVE SEED MIXTURE SUITED TO MOIST, UPLAND CONDITIONS TO COVER THE 30 M SETBACK.
    - IMPLEMENTATION OF A MONITORING PLAN FOR THE PURPOSES OF DETERMINING THE SUCCESS OF THE WOODY PLANT INSTALLATIONS AND SEED APPLICATION FOR A PERIOD OF NO LESS THAN THREE (3) GROWING SEASONS.

12. A SURFACE WATER MONITORING PLAN WILL BE PREPARED BY A QUALIFIED PROFESSIONAL FOR CADDY CREEK / HUMPHREY MUNICIPAL DRAIN TO ASSESS THERMAL CONDITIONS AND IS TO BE IMPLEMENTED DURING THE LIFETIME OF OPERATIONS.

HYDROGEOLOGICAL ASSESSMENT - EXP SERVICE INC. - FEBRUARY 2023

1. IN ORDER TO MAINTAIN THE WATER LEVELS IN THE NATURAL FEATURES ON SITE, THE FINAL POND WATER LEVEL SHOULD REMAIN HIGHER THAN THE LEVELS OBSERVED IN THE DRAIN AND PSW TO PREVENT SURFACE WATER RUNOFF FROM THE FEATURES TOWARDS THE PROPOSED PIT. TO ALLOW FOR SEASONAL VARIABILITY AND HIGHER WATER LEVELS DURING THE WET SEASON, THE POND SHALL BE ABLE TO CONTAIN FINAL WATER LEVELS OF 274.25 M AMSL.

2. MEASURES TO MITIGATE TEMPERATURE IMPACTS TO THE GROUNDWATER AND NATURAL FEATURES ON SITE SHALL INCLUDE:
    - MAINTAINING A SUFFICIENT BUFFER BETWEEN THE FEATURES AND THE PROPOSED POND;
    - APPLYING PLANTING STRATEGIES TO SHADE THE PROPOSED POND AND/OR DRAIN; AND
    - COMPLETING AN ON-GOING MONITORING PROGRAM THROUGHOUT EXTRACTION ACTIVITIES.

3. RESIDENTS WITHIN 150 M OF THE SITE SHALL BE PROVIDED WITH A 24-HOUR EMERGENCY CONTACT INFORMATION TO FACILITATE REPORTING OF PERCEIVED WATER SUPPLY IMPACTS.

4. DURING THE SITE GRADING WORK, SUITABLE SEDIMENTATION CONTROLS WILL BE REQUIRED TO HELP CONTROL AND REDUCE THE TURBIDITY OF RUNOFF WATER.

5. A BMP AND SPILL CONTINGENCY PLAN (INCLUDING A SPILL ACTION RESPONSE PLAN) SHALL BE IN PLACE FOR FUEL HANDLING, STORAGE AND ONSITE EQUIPMENT MAINTENANCE ACTIVITIES TO MINIMIZE THE RISK OF CONTAMINANT RELEASES AS A RESULT OF THE PROPOSED CONSTRUCTION ACTIVITIES.

6. THE EXISTING MONITORING WELLS AND SURFACE WATER STATIONS LOCATED AROUND THE PERIMETER OF THE PROPOSED PIT SHALL BE MAINTAINED AND PROTECTED DURING OPERATIONS.

7. IN ORDER TO ASSESS POTENTIAL IMPACTS TO GROUNDWATER AND SURFACE WATER ON SITE, A PROPOSED MONITORING PROGRAM ON AN ADJUSTED FREQUENCY WILL BE IMPLEMENTED IN THE EXISTING MONITORING WELL AND SURFACE WATER STATIONS INCLUDING MONITORING WATER LEVELS, TURBIDITY, TSS AND WATER TEMPERATURE. DURING THE FIRST YEAR OF OPERATIONS, MONITORING WILL BE COMPLETED ON A MONTHLY BASIS. IN THE SECOND YEAR OF OPERATIONS, MONITORING WILL BE COMPLETED ON A QUARTERLY BASIS UNTIL OPERATIONS ARE CONCLUDED.

LEGEND

- BOUNDARY OF PROPOSED LICENCE
- BOUNDARY OF EXISTING LICENCED AREA
- 120m INFORMATION BOUNDARY
- REGULATORY SETBACK AND LIMIT OF EXTRACTION
- LOT LINE
- EXISTING VEGETATION
- EXISTING GRADE
- GROUNDWATER TABLE PROPOSED LEVEL IN POND
- PROPOSED GRADE
- PROPOSED REFORESTATION

SECTION NOTES

GENERAL INFORMATION

1. SECTION LINES ARE INDICATED ON DRAWINGS 1, 2 AND 5.

TECHNICAL RECOMMENDATIONS

THE FOLLOWING ARE THE TECHNICAL RECOMMENDATIONS FROM ALL OF THE EXPERTS' REPORTS AS OF MARCH 2022. ADDITIONAL RECOMMENDATIONS MAY BE INCLUDED AS A RESULT OF THE LICENCE REVIEW PROCESS.

ARCHAEOLOGICAL ASSESSMENT

SHOULD PREVIOUSLY UNDOCUMENTED ARCHAEOLOGICAL RESOURCES BE DISCOVERED, THEY MAY BE A NEW ARCHAEOLOGICAL SITE AND THEREFORE SUBJECT TO SECTION 48(1) OF THE ONTARIO HERITAGE ACT. THE PROPONENT OR PERSON DISCOVERING THE ARCHAEOLOGICAL RESOURCES MUST CEASE ALTERATION OF THE SITE IMMEDIATELY AND ENGAGE A LICENSED CONSULTANT ARCHAEOLOGIST TO CARRY OUT ARCHAEOLOGICAL FIELDWORK, IN COMPLIANCE WITH SECTION 48(1) OF THE ONTARIO HERITAGE ACT.

THE CEMETERIES ACT, R.S.O. 1990 C. C.4 AND THE FUNERAL, BURIAL AND CREMATION SERVICES ACT, 2002, S.O. 2002, C.33 (WHEN PROCLAIMED IN FORCE) REQUIRE THAT ANY PERSON DISCOVERING HUMAN REMAINS MUST NOTIFY THE POLICE OR CORONER AND THE REGISTRAR OF CEMETERIES AT THE MINISTRY OF CONSUMER SERVICES.

NO.	DATE	REVISIONS	OWNER	HM	MHR

Pre Licence Review

NO.	DATE	REVISIONS	OWNER	HM	MHR

Site Plan Amendments

Harrington McAvan Ltd

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Project Name

BRANTAM EXCAVATING

ELGIN ROAD PIT

PART LOT 13 & 14, CONCESSION 1 NRT
MUNICIPALITY OF THAMES CENTRE (FORMERLY TOWNSHIP OF NORTH DORCHESTER, COUNTY OF MIDDLESEX

Scale 1:4000
0 50 100 150m

North

Stamp
DRAFT

Drawing Status
PRELIMINARY FOR DISCUSSION

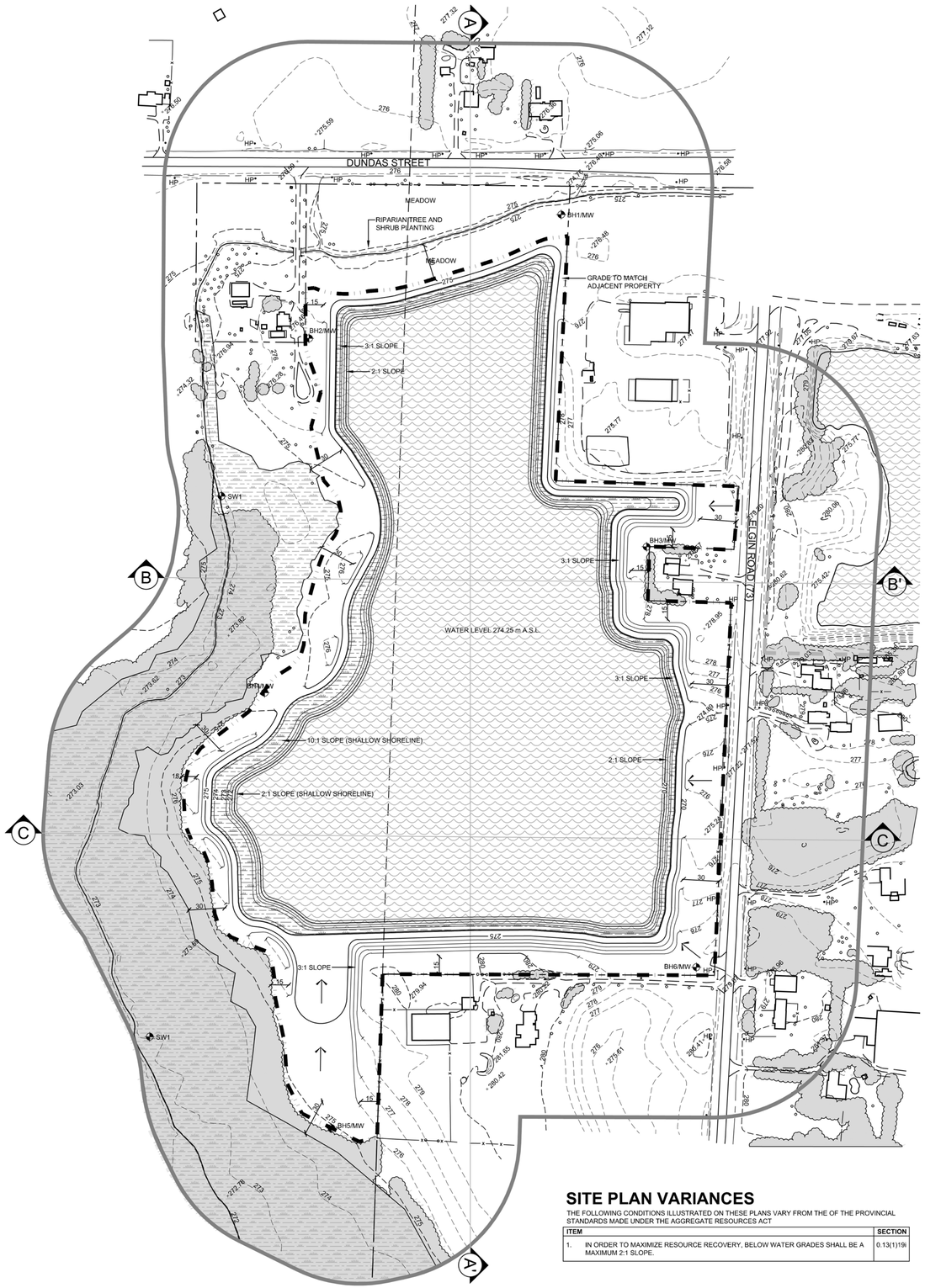
Drawn SB | Checked RM | Issue Date FEB 2023

Drawing Title
SECTIONS AND TECHNICAL RECOMMENDATIONS

Project Number
22-22

Drawing Number
4 OF 5

FILE NAME: 22-22/COMP/2222-4.DWG
PLOT DATE: FEBRUARY 15, 2023



SITE PLAN VARIANCES

THE FOLLOWING CONDITIONS ILLUSTRATED ON THESE PLANS VARY FROM THE OF THE PROVINCIAL STANDARDS MADE UNDER THE AGGREGATE RESOURCES ACT

ITEM		SECTION
1.	IN ORDER TO MAXIMIZE RESOURCE RECOVERY, BELOW WATER GRADES SHALL BE A MAXIMUM 2:1 SLOPE.	0.13(1)19i

NOTES CONTINUED

SIDESLOPE/ MEADOW REHABILITATION INFORMATION

GRADING INFORMATION

5. REHABILITATED SLOPES WITHIN THE LICENCED AREA WILL BE CONSTRUCTED AS SHOWN ON THE CROSS SECTIONS. REHABILITATION OF ABOVE WATER SLOPES SHALL BE BY BACKFILLING (MINIMUM 3:1) AND/OR CUT AND FILL METHOD USING AVAILABLE ON-SITE OVERBURDEN AND TOPSOIL FROM WITHIN THE LICENSED AREA AND/OR CLEAN INERT IMPORTED FILL.

IMPORTATION OF FILL INFORMATION

EXCESS SOIL, AS DEFINED IN ONTARIO REGULATION 406/19 UNDER THE ENVIRONMENTAL PROTECTION ACT, MAY BE IMPORTED TO THIS SITE TO FACILITATE THE FOLLOWING REHABILITATION:

i. CREATION OF 3:1 SLOPES
ii. TOP DRESSING TO ESTABLISH VEGETATION

THE QUALITY OF EXCESS SOIL IMPORTED TO THE SITE FOR FINAL PLACEMENT MUST NOT EXCEED THE APPLICABLE EXCESS SOIL QUALITY STANDARDS IN ACCORDANCE WITH O. REG 406/19 AS AMENDED FROM TIME TO TIME AND MUST BE CONSISTENT WITH THE SITE CONDITIONS AND THE END USE IDENTIFIED IN THE APPROVED REHABILITATION PLAN.

EXCESS SOIL IMPORTED TO FACILITATE REHABILITATION AS DESCRIBED SHALL BE UNDERTAKEN IN ACCORDANCE WITH THE "RULES FOR SOIL MANAGEMENT AND EXCESS SOIL QUALITY STANDARDS" PUBLISHED BY THE MINISTRY OF THE ENVIRONMENT, CONSERVATION AND PARKS UNDER O.REG. 406/19, AS AMENDED FROM TIME TO TIME.

THE MAXIMUM TOTAL AMOUNT OF EXCESS SOIL THAT MAY BE IMPORTED TO THIS SITE FOR REHABILITATION PURPOSES IS 40,000 M3.

SAMPLING AND TESTING OF ALL IMPORTED MATERIAL SHALL BE PERFORMED AT SOURCE PRIOR TO THE IMPORTATION OF MATERIAL ONTO THE LICENSED SITE BY A QP UNDER EPA. A QP SHALL ALSO DESIGN A FILL MONITORING PROGRAM.

THE LICENSEE SHALL KEEP DETAILED RECORDS OF THE AMOUNT OF MATERIAL BROUGHT ON SITE FOR REHABILITATION AND THE TESTING RESULTS OF ALL SAMPLES. ALL RECORDS AND TESTING RESULTS SHALL BE AVAILABLE UPON REQUEST BY MNRF OR MECP.

AVAILABLE OVERBURDEN REPLACED WILL BE APPROXIMATELY 100mm THICK.

REFER TO DRAWING 3 AND 4 OF 5, FOR MORE INFORMATION ON BACKFILLING AND CREATION OF REHABILITATED SIDESLOPES.

TOPSOILING INFORMATION

6. ALL AVAILABLE TOPSOIL ON THE SITE WILL REMAIN TO BE USED FOR REHABILITATION OF THIS SITE.

VEGETATION STABILIZATION INFORMATION

7. BERMS SHALL BE SEEDED WITH A MIXTURE OF GRASSES AND LEGUMES THAT MAY INCLUDE THE FOLLOWING AT A RATE OF APPROXIMATELY 125KG/HA:

BUCKWHEAT	RED CLOVER	WHITE CLOVER
TALL FESCUE	ANNUAL RYE	

MEADOW AND SIDE SLOPES SHALL BE SEEDED WITH AVAILABLE SEED SOURCES THAT HAVE BEEN USED IN THE LOCAL AREA EXCLUDING INVASIVE AND NON-NATIVE SPECIES.

OPEN WATER POND REHABILITATION INFORMATION

8. THE AVERAGE WATER LEVEL IN THE POST-EXTRACTION POND IS ESTIMATED TO BE 274.25 m ASL.
9. THE SHAPE AND GRADING OF THE PROPOSED POND IS APPROXIMATE, BASED ON THE BEST AVAILABLE INFORMATION AT THE TIME OF LICENSING. ACTUAL EXTRACTION WILL FOLLOW THE BELOW WATER DEPOSIT AND REHABILITATION SHALL FOLLOW THE CONCEPT ILLUSTRATED.

WETLAND AND TURTLE POND REHABILITATION INFORMATION

10. AREAS SHALL BE REHABILITATED TO WETLAND HABITAT AS FOLLOWS:
- UNDERWATER SLOPES WILL BE FORMED WITH ON-SITE FILL
- UNDERWATER SLOPES SHALL BE A MAXIMUM OF 2:1

11. RESTORATION OF THE NEARSHORE, SHALLOW WETLAND ZONE AS SHOWN ON THE TYPICAL SHALLOW SHORELINE SECTION, SHEET 5 OF 5, WILL GENERALLY BE ACCOMPLISHED AS FOLLOWS:

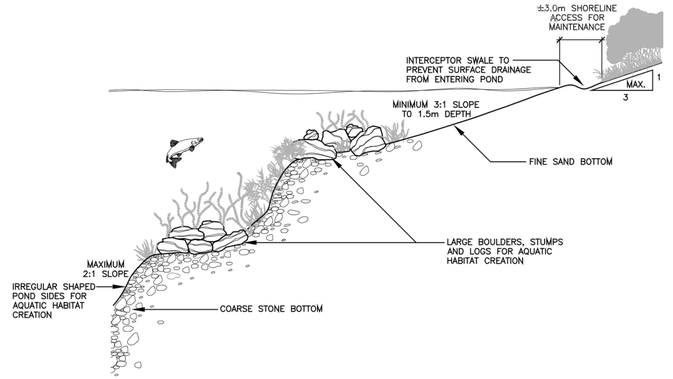
- EXTRACTION AND ROUGH GRADING WILL CREATE A NEARSHORE SHORELINE AREA AT A SLOPE OF 10:1
- FINAL SLOPING OF THE SHORELINE TO CREATE PHYSICAL DIVERSITY BY SCALLOPING THE SHORELINE AND ADDING STRUCTURES.
- WOODY DEBRIS- BRANCHES, TREE TRUNKS, STUMPS, ETC. CLEARED IN THE EXTRACTION PROCESS WILL BE SALVAGED WHERE POSSIBLE, FOR USE IN SHORELINE RESTORATION/ UNDERWATER HABITAT ENHANCEMENT.
- STUMPS, LOGS, BRUSH BUNDLES, ETC. SHALL BE INSTALLED ±30m O.C. ALONG THE SHORELINE IN THE SHALLOW ZONE TO CREATE PHYSICAL DIVERSITY.
- OVERSIZE ROCKS NOT UTILIZED IN THE AGGREGATE OPERATIONS WILL ALSO BE PLACED IN THE SHALLOW ZONE TO CREATE PHYSICAL DIVERSITY.
- THE INITIAL SHORELINE RESTORATION AREA WILL BE SPORADICALLY PLANTED WITH TREES AND SHRUBS.SPECIES MAY INCLUDE THE FOLLOWING NATIVE PLANTS:

RED MAPLE	PUSSY WILLOW	SILVER MAPLE	RED OSIER
DOGWOOD	STAGHORN SUMAC	SPECKLED ALDER	LARCH
WHITE CEDAR	CHOKE CHERRY	SMOOTH SERVICEBERRY	
COMMON NINEBARK	GRAY DOGWOOD	COMMON ELDERBERRY	

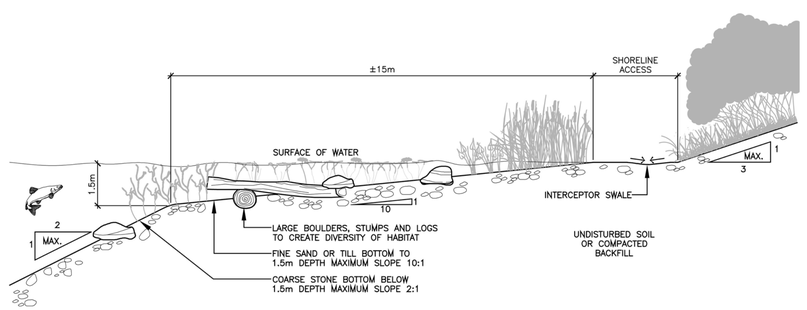
12. INITIAL SHORELINE WETLAND AREAS SHALL BE PLANTED WITH CLUMPS OF EMERGENT AND SUBMERGENT NATIVE WETLAND PLANTS TO INITIATE COLONIZATION OF THE SITE AS NUTRIENT LEVELS INCREASE TO SUPPORT THEM. NATIVE WETLAND PLANTS SUCH AS:

FLOATING PONDWEED	COONTAIL
BROAD LEAVED ARROWHEAD	PICKERELWEED WATER-LILY
COMMON WOOLY BULRUSH	SOFTSTEM BULRUSH
GREEN-FRUITED BURREED	RIVER BULRUSH
BROAD LEAVED ARROWHEAD	DARK GREEN BULRUSH
SWAMP MILKWEED	

WILL BE PLANTED IN CLUSTERS OF 5 AT APPROPRIATE DEPTHS TO BEGIN THE COLONIZATION.



TYPICAL SHORELINE - DEEP SECTION N.T.S.



TYPICAL SHORELINE - WETLAND EDGE N.T.S.

LEGEND

- BOUNDARY OF PROPOSED LICENCE
- BOUNDARY OF EXISTING LICENCED AREA
- 120m INFORMATION BOUNDARY
- PROPERTY LINES
- REGULATORY SETBACK AND LIMIT OF EXTRACTION
- LOT LINE
- EXISTING FENCE
- EXISTING BUILDING AND NUMBER
- EXISTING 5m ASL CONTOUR LINE
- EXISTING HYDRO POLE
- EXISTING 1m ASL CONTOUR LINE
- EXISTING SPOT ELEVATION m ASL
- DIRECTION OF SURFACE WATER DRAINAGE
- PROPOSED 5m CONTOUR LINE
- LOCATION OF SECTION
- PROPOSED 1m CONTOUR LINE
- PROPOSED SPOT ELEVATION
- EXISTING VEGETATION
- EXISTING WETLAND
- PROPOSED WETLAND
- EXISTING OPEN WATER
- PROPOSED OPEN WATER

REHABILITATION NOTES

GENERAL INFORMATION

1. REFER TO SHEET 4 OF 4 FOR SECTIONS, SHEET 2 AND 3 OF 4 FOR OPERATIONS AND PHASING DIAGRAMS AND NOTES AND SHEET 4 OF 4 FOR FINAL REHABILITATION AND NOTES.
2. PROPERTY SHALL BE REHABILITATED TO:

OPEN WATER POND	12.9 HA
WETLAND	1.4 HA
SIDESLOPE/ MEADOW	3.5 HA
FOR A TOTAL OF	17.8 HECTARES.

HYDROGEOLOGICAL INFORMATION

3. HYDROGEOLOGICAL INFORMATION INCLUDING GROUNDWATER ELEVATION WAS OBTAINED FROM REPORT BY EXP DATED JANUARY 2022.
4. THE MAXIMUM PREDICTED WATER TABLE ELEVATION WITHIN THE SITE IS ESTIMATED TO BE BETWEEN 273.42 AND 274.64m ABOVE SEA LEVEL (A.S.L.) BASED ON ABOVE REPORT.

NO.	DATE	REVISIONS	OWNER	HM	MHR
		Pre Licence Review			

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Scale 1:2000 (0 10 50 80m)	North	Stamp: DRAFT
Drawing Status: SUBMITTED FOR APPROVAL		
Drawn SB	Checked RM	Issue Date FEB 2023
Drawing Title: REHABILITATION PLAN		Project Number 22-22
		Drawing Number 5 OF 5

FILE NAME: 22-22/COMP/2222-2.DWG
PLOT DATE: FEBRUARY 15, 2023