Natural Environment Technical Report (NETR) and Environmental Impact Statement (EIS)

Proposed Edworthy West Pit
Cambridge Aggregates
Township of North Dumfries

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Submitted to:

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PROPOSED EDWORTHY WEST PIT

NATURAL ENVIRONMENT TECHNICAL REPORT (NETR) AND ENVIRONMENTAL IMPACT STATEMENT (EIS)

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1.0 INTRODUCTION

1.1 Background

Goodban Ecological Consulting Inc. (GEC) was retained by Cambridge Aggregates Inc. to prepare a Natural Environment Technical Report (NETR) and an Environmental Impact Statement (EIS) for a Class A Licence application for their proposed Edworthy West Pit.

The proposed Edworthy West Pit (the "site") is located on the corner of Spragues Road and Greenfield Road (Part of Lots 16-18, Concession 9), in the Township of North Dumfries (**Figure 1**). Land uses in the vicinity are a mix of agricultural operations and fields, rural residential properties, natural areas and a gravel pit. The landscape context is shown on **Figure 2**. The site is approximately 44.3 ha in size and it is primarily used for agricultural purposes. The site comprises portions of three separate properties (West Property, Central Property and East Property); the property boundaries are shown on **Figure 3**. There are no buildings or structures within the proposed licence boundary.

Cambridge Aggregates Inc. currently operates another gravel pit nearby in the Township of North Dumfries (Licence #607701) at 1182 Alps Road. The proposed Edworthy West Pit will replace depleted reserves at the existing operation. The proposed pit will be accessed via Spragues Road. The proposed extraction area is approximately 35.2 ha and aggregate material is proposed to be extracted from above the water table, with no processing occurring onsite.

In addition to the need to fulfill the requirements for a Natural Environment Technical Report (NETR) under the *Aggregate Resources Act*, there is a requirement to prepare an Environmental Impact Statement (EIS) under the *Planning Act*. This report serves as both a NETR and an EIS.

1.2 Natural Environment Technical Report (NETR) Requirements under the Aggregate Resources Act (ARA)

Under the *Aggregate Resources Act* there is a requirement to complete a Natural Environment Report to identify any of the following natural heritage features and areas that exist on the site and within 120 metres 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).

The Aggregate Resources of Ontario: Technical Reports and Information Standards issued under O. Reg. 466/20 sets the standards for how the technical reports must be prepared. The standards provide the following guidance in preparing the Natural Environment Report:

> *"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."*

1.3 Environmental Impact Statement (EIS)

The Natural Environment Technical Report also serves as an Environmental Impact Assessment (EIA) for the purpose of the Planning Act and it will consider the natural heritage policies and related mapping of features identified in the following:

- Provincial Policy Statement (2020);
- Growth Plan for the Greater Golden Horseshoe (2020);
- Region of Waterloo Official Plan (Office Consolidation 2015); and,
- Township of North Dumfries Official Plan (Office Consolidation 2018).

The following subsections provide a summary of the key policy considerations from each of the above noted plans.

1.3.1 Provincial Policy Statement (PPS 2020)

The Provincial Policy Statement (2020) requires consideration of the following natural heritage policies:

- 2.1.1 Natural features and areas shall be protected for the long term.

- 2.1.2 The diversity and connectivity of natural features in an area, and the long-term *ecological function* and biodiversity of *natural heritage systems*, should be maintained, restored or, where possible, improved, recognizing linkages between and among *natural heritage features and areas*, *surface water features* and *ground water features*.

- 2.1.3 *Natural heritage systems* shall be identified in Ecoregions 6E & 7E1*,* recognizing that *natural heritage systems* will vary in size and form in *settlement areas*, *rural areas*, and *prime agricultural areas*.

- 2.1.4 *Development* and *site alteration* shall not be permitted in:

    a) *significant wetlands* in Ecoregions 5E, 6E and 7E1; and,

b) *significant coastal wetlands*.

- 2.1.5 *Development* and *site alteration* shall not be permitted in:

  a) *significant wetlands* in the Canadian Shield north of Ecoregions 5E, 6E and 7E1;
  b) *significant woodlands* in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River);
  c) *significant valleylands* in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River);
  d) *significant wildlife habitat*;
  e) *significant areas of natural and scientific interest*; and,
  f) *coastal wetlands* in Ecoregions 5E, 6E and 7E1 that are not subject to policy 2.1.4(b) unless it has been demonstrated that there will be no *negative impacts* on the natural features or their *ecological functions*.

- 2.1.6 *Development* and *site alteration* shall not be permitted in *fish habitat* except in accordance with *provincial and federal requirements*.

- 2.1.7 *Development* and *site alteration* shall not be permitted in *habitat of endangered species and threatened species*, except in accordance with *provincial and federal requirements*.

- 2.1.8 *Development* and *site alteration* shall not be permitted on *adjacent lands* to the *natural heritage features and areas* identified in policies 2.1.4, 2.1.5, and 2.1.6 unless the *ecological function* of the *adjacent lands* has been evaluated and it has been demonstrated that there will be no *negative impacts* on the natural features or on their *ecological functions*.

1.3.2 Growth Plan for the Greater Golden Horseshoe (2020)

The Growth Plan for the Greater Golden Horseshoe ("Growth Plan") was issued under the Places to Grow Act, 2005. The Growth Plan was most recently amended in August 2020. The Growth Plan is a Provincial Plan that applies to the Greater Golden Horseshoe are of Southern Ontario and builds on the Provincial Policy Statement (PPS) to establish a unique land use planning framework for the *GGH* that supports the achievement of *complete communities*, a thriving economy, a clean and healthy environment, and social equity.

The Growth Plan includes a Natural Heritage System which is a defined as a system made up of *natural heritage features and areas*, and linkages intended to provide connectivity (at the regional or site level) and support natural processes which are necessary to maintain biological and geological diversity, natural functions, viable populations of indigenous species, and ecosystems. The system can include *key natural heritage features*, *key hydrologic features*, federal and provincial parks and conservation reserves, other *natural heritage features and areas*, lands that have been restored or have the potential to be restored to a natural state, associated areas that support *hydrologic functions*, and working landscapes that enable *ecological functions* to continue

The proposed Edworthy West Pit is not located in the Growth Plan Natural Heritage System.

Section 4.2.8 of the Growth Plan deals with Mineral Aggregate Resources. Policy 4.2.8.4 reads as follows:

> For rehabilitation of new *mineral aggregate operation* sites, the following apply:
>
> a) the disturbed area of a site will be rehabilitated to a state of equal or greater *ecological value* and, for the entire site, long-term *ecological integrity* will be maintained or enhanced; aquatic rehabilitation will meet the intent of policy 4.2.8.4 b); and
>
> d) outside the *Natural Heritage System for the Growth Plan*, and except as provided in policies 4.2.8.4 a), b) and c), final rehabilitation will appropriately reflect the long-term land use of the general area, taking into account applicable policies of this Plan and, to the extent permitted under this Plan, existing municipal and provincial policies. In *prime agricultural areas*, the site will be rehabilitated in accordance with policy 2.5.4 of the PPS, 2020.

1.3.3 Regional Official Plan (2015)

An Environmental Impact Statement (EIS) is required to address the relevant policies of the Region of Waterloo Official Plan (2015) and the Township of North Dumfries Official Plan (2018). **Figure 4** provides an excerpt from *Map 4 Greenlands Network* in the Region of Waterloo Official Plan (2015). **Figure 5** provides an excerpt from *Map 5A Greenlands Network* in the Township of North Dumfries Official Plan (2018).

The relevant policies from the Regional Official Plan are repeated below:

> **7.A.6** Interpretation of the boundaries of Landscape Level Systems and Core Environmental Features, as required to support the review of development applications, will be achieved through the completion of Environmental Impact Statements or other appropriate studies in accordance with the policies in Section 7.G.
>
> **7.B.1** Landscape Level Systems are recognized within the Greenlands Network as large-scale environmental features or as significant concentrations of environmental features. Landscape Level Systems are designated as shown on Map 4 and comprise: (a) Environmentally Sensitive Landscapes; (b) Significant Valleys; (c) Regional Recharge Areas; and (d) Provincial Greenbelt Natural Heritage System.
>
> **7. B 12**. Where development or site alteration is proposed on lands within or contiguous to an Environmentally Sensitive Landscape, the owner/applicant will be required to submit an Environmental Impact Statement which addresses landscape impacts in addition to any other requirements in accordance with the policies in Section 7.G.
>
> **7.B.13** Where review of an Environmental Impact Statement required in accordance with Policy 7.B.12 has demonstrated to the Region that the proposed development or site alteration would have no adverse environmental impact upon

the environmental features and ecological functions of the Environmentally Sensitive Landscape, the Region may, subject to appropriate conditions, approve or recommend approval of the application.

7.C.10 Development or site alteration will only be permitted on lands contiguous to a Core Environmental Feature where an Environmental Impact Statement, or similar study, submitted in accordance with the policies in Section 7.G has determined to the satisfaction of the Region, Area Municipalities, the Grand River Conservation Authority and/or the Province, as appropriate, that approval of the proposed development or site alteration would not result in adverse environmental impacts on the features and ecological functions of the Core Environmental Feature. The Region may require conditions of approval to implement such recommendations.

7.C.11 An Environmental Impact Statement submitted in accordance with Policies 7.C.9 or 7.C.10 will identify appropriate buffers to Core Environmental Features, to the satisfaction of the Region, in consultation with Area Municipalities and the Grand River Conservation Authority. Such buffers will not only serve to protect Core Environmental Features from adverse environmental impacts but will also provide opportunities for net habitat enhancement to enhance or, wherever feasible, restore the ecological functions of the Core Environmental Feature. The location, width, composition and use of buffers will be in accordance with the approved Environmental Impact Statement, with buffers being a minimum of 10 metres as measured from the outside boundary of the Core Environmental Feature and established and maintained as appropriate self-sustaining native vegetation.

7.E.6 The Region, Area Municipalities, Grand River Conservation Authority and other stakeholders will identify linkages through watershed studies, Natural Heritage Inventories, Environmental Impact Statements or other appropriate studies. These areas are intended to provide opportunities for plant and animal movement among environmental features, support hydrological and nutrient cycling, and contribute to the overall ecological integrity of the Greenlands Network.

7.G Environmental Impact Statements

9.C.10 New mineral aggregate operations, or wayside pits and quarries, may be permitted within Environmentally Sensitive Landscapes where it can be demonstrated to the satisfaction of the Region, in consultation with the Province, Area Municipalities and the Grand River Conservation Authority that:

(a) notwithstanding Policies 7.B.12, 7.B.13 and 7.B.14, where extraction is proposed contiguous to a Core Environmental Feature, there will be no significant adverse environmental impacts to their features or landscape level ecological functions and connectivity;

(b) where extraction is proposed within or contiguous to the following features, which are not included within a Core Environmental Feature: i) rivers, stream

valleys, floodplains, or associated hazardous lands or hazardous sites; ii) fish habitat; iii) meromictic and kettle lakes; iv) significant wildlife habitat; or v) savannas, tallgrass prairies, rare woodland types, cliffs, alvars, sand barrens, marl seeps, bogs and fens; there will be no significant adverse environmental impacts to their features or landscape level ecological functions and connectivity, although extraction may be considered in habitats which can be effectively replaced or restored in a short to medium time scale such as areas of crop or pasture land, young plantation, early successional woodland, small areas of non-provincially significant marsh or thicket wetland, old field meadow, hedgerows and drainage swales; and

(c) the quantity and quality of local surface water and groundwater regimes can be maintained or enhanced.

9.C.11 Where a new mineral aggregate operation is proposed on lands designated as an Environmentally Sensitive Landscape as shown on Map 4, the Region will recommend to the Province that the Natural Environment Report required under the Aggregate Resources Act also address the following objectives:

(a) natural habitat that would be lost from the site will be replaced with equivalent habitat on the property or on adjacent lands, and no less than 35 per cent of the licensed area remaining above the water table after extraction will be rehabilitated to sustainable natural woodland habitat representative of the landscape in which it is located;

(c) the health, diversity, size, ecological function and connectivity of major natural features remaining within the proposed licensed area will be maintained and, where possible, enhanced before, during and after the extraction of aggregate resources;

(d) the rehabilitated area will be maximized and the disturbed area minimized on an ongoing basis during the life-cycle of the pit operation; and

(e) rehabilitation of any area once occupied by natural features or identified as potential enhancement/restoration and/or corridor/linkage areas is completed as early as possible in the life of the extraction operation.

The Township of North Dumfries Official Plan essentially repeats the relevant Regional Official Plan Policies.

1.4 Agency Consultation

Regional Municipality of Waterloo's Ecological and Environmental Advisory Committee (EEAC)

The proposed Edworthy West Pit is located adjacent to an area identified as a Core Environmental Feature in the Regional Official Plan (**Figure 2**). The Regional Municipality of Waterloo's Ecological and Environmental Advisory Committee (EEAC) was provided with preliminary information about the proposed Edworthy West Pit by the proponent in late 2021.

This information included a Terms of Reference for a Natural Environment Technical Report (NETR) and Environmental Impact Statement (EIS) prepared by GEC, dated November 25, 2021.

The Region's pre-submission comments were provided in a document dated December 20, 2021. At their January 31, 2022 meeting, EEAC considered the proposed Edworthy West Pit and related information. EEAC report EEAC-22-02 included the following recommendations:

That the Ecological and Environmental Advisory Committee take the following actions with respect to the proposed "Edworthy West Pit" on land within an Environmentally Sensitive Landscape (ESL) and contiguous to a Core Environmental Feature (Significant Woodland):

1. *Advise Community Planning staff that the "Terms of Reference for a Natural Environment Technical Report (NETR) & Environmental Impact Statement (EIS), Proposed Edworthy West Pit, Township of North Dumfries" prepared by Goodban Ecological Consulting Inc. (November 25, 2021), for the EIS required in support of a Zoning By-law amendment application is generally acceptable in that it addresses the following:*

    a. *a biophysical survey to identify natural habitats and/or populations of Regionally significant plant and animal species in the natural areas on the subject lands that might be adversely affected by the proposed aggregate operation;*

    b. *identification of ecological enhancement, restoration and long-term stewardship opportunities on the subject lands to be incorporated in the site rehabilitation plan;*

    c. *content of an ecological and groundwater monitoring program for the proposed aggregate operation;*

    d. *evaluation of relevant regional and provincial policies;*

2. *Advise the applicant that the EIS must also include the following items which are not explicitly included in the Terms of Reference:*

    a. *confirmation of an ecologically appropriate boundary of the Core Environmental Feature (Significant Woodland) on the subject lands;*

    b. *delineation and design of a suitable buffer between the Core Environmental Feature and the proposed aggregate extraction operation within the subject lands;*

    c. *demonstrate maintenance of the quantitative and qualitative aspects of the hydrological and hydrogeological regimes sustaining the natural features on, and around, the subject lands;*

    d. *evaluate opportunities to enhance the Core Environmental Feature (Significant Woodland) on the subject lands;*

e. *provide an evaluation of potential for cumulative impacts of the proposed aggregate operation in accordance with ROP Policy 9.C.4; and*

f. *provide an evaluation of the criteria of ROP Policy 9.C.11 (new mineral aggregate operations on lands designated as Environmentally Sensitive Landscape).*

3. *Confirm membership of a working group to review the scoped Environmental Impact Statement for the proposed aggregate operation when it is submitted.*

4. *That the EIS consider the Bat Habitat Assessment Criteria follow the provincial MNRF protocol and that the Significant Wildlife Habitat Criteria schedules be considered along with the technical guide in determining the presence of significant wildlife habitat.*

Grand River Conservation Authority (GRCA)

GRCA were circulated with the proponent's pre-consultation information. GRCA prepared a Plan Review Report (PC-22/21) dated December 17, 2021.

GRCA's main comment was as follows:

> *In support of the future Planning Act applications, the Grand River Conservation Authority (GRCA) would require the submission of a scoped Environmental Impact Study and hydrogeological study. Additional detailed comments are provided below.*

GRCA provided further detailed comments, as repeated below:

> *According to the submitted application, the applicants indicate that no Core Environmental Features are included within the proposed limits of aggregate extraction. However, we note that a small woodlot within the vacant parcel along Spragues Road would be impacted by the proposed extraction limits. The GRCA has further determined that there may be a small, wetland pocket located within the edge of the field on the parcel identified as 1354 Spragues Road. While our current on-line mapping does not identify this feature, GRCA staff has reviewed air photos between 2000 and 2020 and this feature is present on the landscape. In order to further consider supporting the proposed extraction within this area, the GRCA requires that the identified wetland area be evaluated and its significance determined in accordance with GRCA and Provincial policies. If this feature is determined and confirmed to be a wetland and is significant, the wetland feature will need to be retained on the landscape and an appropriate buffer would be required from any proposed development. Any new development adjacent to this wetland area would need to further demonstrate no negative impacts on this natural feature or its ecological function. Please further note that any development/site alteration within or adjacent to a wetland may require a permit from the GRCA under Ontario Regulation 150/06.*

We would further recommend that the applicants contact both the Ministry of Northern Development, Mining, Natural Resources and Forestry (MNDMNRF) and the Ministry of the Environment, Conservation and Parks (MECP) to confirm the presence of any endangered/threatened species on the subject lands. This confirmation will need to be identified and addressed in the EIS in consultation with the MNRF and the MECP.

Based on the foregoing, the applicants will need to demonstrate that the proposed new above water table pit will not have a negative hydrological and ecological impact on the identified natural heritage features. In support of the Planning Act applications, they will need to submit a scoped Environmental Impact Study (EIS) and scoped hydrogeological study. In consultation with the Region of Waterloo and the Township of North Dumfries, we would recommend that the proponent's consultants submit a draft terms of reference for this EIS and hydrogeological studies to be reviewed and approved by the GRCA prior to initiating these studies.

1.5 Organization of this Report

This Natural Environment Technical Report and EIS is organized under the following headings:

- 2.0 Natural Heritage Screening
- 3.0 Study Approach and Methods
- 4.0 Existing Conditions
- 5.0 Habitat of Endangered Species and Threatened Species
- 6.0 Significant Woodlands
- 7.0 Significant Wildlife Habitat
- 8.0 Summary of Significant Natural Heritage Features
- 9.0 Description of the Proposed Extraction and Operational Plan, and the Ecological Management Plan (EMP) and Rehabilitation Plan (RP)
- 10.0 Potential Effects on Significant Natural Heritage Features
- 11.0 Environmental Impact Statement (EIS)
- 12.0 Conclusions
- 13.0 Literature Cited

2.0 NATURAL HERITAGE SCREENING

2.1 Natural Heritage Screening Methods

The study area is defined as the proposed licensed area and the surrounding 120 m (adjacent lands), as shown on **Figure 2**. The Natural Heritage Screening involved a review of available background information and ecological field surveys from 2020 to 2022. The details of the field surveys are provided below in **Section 4.1**.

Background information sources included the following:

- Schedules from the Region of Waterloo and Township of North Dumfries Official Plans.

- Lands Information Ontario (LIO) and GRCA online mapping.

- Natural Heritage Information Centre (NHIC) database.

- Information provided by the owners of the West Property regarding their use of the property, wildlife observations, etc.

2.2 Significant Wetlands and Significant Coastal Wetlands

A review of Land Information Ontario (LIO) and GRCA online natural heritage mapping indicates that there are no Significant Wetlands within the study area. Furthermore, no wetland features were observed within the study by GEC during the field surveys.

GRCA's December 17, 2021, pre-consultation comments included the following with respect to wetlands:

> *The GRCA has further determined that there may be a small, wetland pocket located within the edge of the field on the parcel identified as 1354 Sprague Road. While our current on-line mapping does not identify this feature, GRCA staff has reviewed air photos between 2000 and 2020 and this feature is present on the landscape.*

GEC has examined the feature identified by GRCA in some detail and determined that the feature in question is not a wetland pocket. This is discussed in **Section 4.3.1** of this NETR and EIS.

The site is distant from the shorelines of the Great Lakes and, as such, there are no Significant Coastal Wetlands present.

2.3 Habitat of Endangered Species and Threatened Species

The presence of Butternut (Endangered) and Barn Swallow (Threatened) was confirmed within the study area during the field surveys. Butternut occurs on adjacent land and on the licence boundary

In addition, it is likely that Little Brown Myotis (Endangered) and Northern Myotis (Endangered) occur within the study area. It is probable that both of these species forage over the proposed extraction area on occasion.

In **Sections 5.0** and **10.1**, discussion is provided on the Butternut, Barn Swallow, Little Brown Myotis and Northern Myotis and their habitats. In Section **10.1**, discussion is provided on potential effects of the proposed pit on habitat of Endangered species and Threatened species.

2.4 Fish Habitat

There are no watercourses within the study area. There is no fish habitat within the study area. No aquatic features were observed during the field surveys.

2.5 Significant Woodlands

As shown on **Figures 2** and **4**, one portion of the study area is mapped as part of the Region of Waterloo's Greenlands System. The Core Environmental Feature (CEF) associated with the West Property is located outside the proposed Licence Area. The Region's pre-consultation comments indicate that the CEF was identified on the basis that it is a Significant Woodland.

Significant Woodlands will be discussed further in **Section 6.0**.

2.6 Significant Valleylands

No Significant Valleylands have been identified within the study area. There are no valley features within the study area.

2.7 Significant Wildlife Habitat (SWH)

No Significant Wildlife Habitat was identified within the study area.

Significant Wildlife Habitat is discussed further in **Section 7.0**.

2.8 Significant Areas of Natural and Scientific Interest

Significant Areas of Natural and Scientific Interest (ANSI) are defined in the PPS (2020) as an area identified as provincially significant by the Ontario Ministry of Natural Resources and Forestry using evaluation procedures established by the Province, as amended from time to time.

GEC reviewed Land Information Ontario (LIO) mapping and determined that there are no Significant Areas of Natural and Scientific Interest (ANSI) within the study area.

2.9 Region of Waterloo Greenlands Network & Township of North Dumfries Greenlands Network

The study area falls within the *Dumfries Carolinian Environmentally Sensitive Landscape (ESL)* which is identified on Map 4 of the Region of Waterloo Official Plan (2015) and Map 5A of the Township of North Dumfries Official Plan.

Immediately adjacent to the site, on the West Property, there is an area identified as a Core Environmental Feature on Map 4 of the Region of Waterloo Official Plan (2015) and Map 5A of the Township of North Dumfries Official Plan.

See **Figures 4** and **5**.

2.10 Natural Heritage Screening: Conclusions and Recommendations

Of the potential natural heritage features that are identified under the PPS, 2020 and listed above in **Section 1.2**, one occurs within the study area.

The Habitat of Endangered Species and Threatened Species is discussed in more detail in **Sections 5.0** and **10.1** of this report. In addition, the proposed gravel pit is described and its potential effects upon these features and their functions is discussed.

The site falls within the Dumfries Carolinian Environmentally Sensitive Landscape (ESL) and it is adjacent to a Core Environmental Feature (CEF). The Dumfries Carolinian ESL and the CEF are discussed further in **Sections 4.1.8** and **11.0**.

3.0 STUDY APPROACH AND METHODS

This section describes the methods used to conduct the details surveys of vegetation, flora and wildlife and outlines the resulting natural environment input provided to the proposed extraction footprint, Operational Plan, Ecological Enhancement Plan and Rehabilitation Plan.

3.1 Vegetation and Flora

Surveys of vegetation and flora were completed between 2019 and 2022. The dates and details of the various site visits are provided in **Table 1**.

Vegetation communities were classified and mapped following Lee et al.'s (1998) *Ecological Land Classification for Southern Ontario: A First Approximation* and the updated *Vegetation Type List* (Lee 2008).

Vascular plant species status was assessed for Ontario (Oldham and Brinker 2009) and the Regional Municipality of Waterloo (RMOW 1999).

3.2 Wildlife

The wildlife groups that were inventoried included selected orders of invertebrates, amphibians, reptiles, birds, and mammals. The dates and details of the various site visits are provided in **Table 1**.

Notes were made on each species as to whether it occurred within the proposed extraction area, licence area and/or on adjacent lands.

Invertebrates

The invertebrate groups that were studied included odonates and butterflies. The invertebrate inventory was completed primarily by documenting all species observed while conducting the other ecological surveys.

Amphibians

There is no water or wetlands on the site or within the study area, and therefore there are no areas within the study area that have the potential to provide breeding habitat for amphibians.

Reptiles

No reptiles that are species of conservation concern are known to occur in the general area or would be expected within the study area. Consequently, no detailed studies on reptiles were undertaken, such as snake-board surveys. Snakes were looked for while conducting other aspects of the inventories. Several surveys were completed along fencelines that contain rock piles, during periods of warm, sunny weather during the spring emergence period.

Locations of potential snake hibernacula within the proposed extraction area were surveyed several times during early periods of warm weather in 2020 and 2021 (e.g., April and May). Snake visual encounter surveys were conducted on mild spring mornings (i.e., minimum 8°C on sunny days or 15°C on overcast days, no greater than 25°C) between 8 am and 5 pm. Target sites included rock/stone piles along field boundaries, with sunny exposures. Otherwise, snakes were searched for on an opportunistic basis.

Due to the lack of water on and adjacent to the site, there is no suitable habitat for turtles.

Birds

Birds were the most intensively studied group of wildlife, with the emphasis on the breeding season. Breeding bird surveys were conducted during the 2020 and 2021 breeding seasons. Three surveys were completed in 2020 and two surveys were completed in 2021. Survey details (dates, times, weather, etc.) are provided in **Table 1**.

A total of 13 Point Count Stations were established, at the locations shown on **Figure 6**. The stations were established along the edges of the agricultural fields and the edges of the Core Environmental Feature, to provide good coverage of the area and habitats, and to minimize disturbance to avian activity. The point count surveys followed the Ontario Breeding Bird Atlas 5-minute passive listening point count protocol (Cadman et al. 2007). Point Count Stations 1 to 7 were sampled in 2020. Point Count Stations 1 to 13 were sampled in 2021.

A wandering transect survey was completed when moving between point count stations. Surveys commenced early in the morning and continued until no later than 10 am (approximately).

The breeding evidence codes from the 2nd OBBA (Cadman et al. 2007) were used only if there was suitable breeding habitat within the study area.

Mammals

Mammals were searched for on every visit. Presence of mammal species was determined through direct observations and signs such as tracks, burrows, nests, and scats.

A bat maternity roost survey was undertaken on March 29, 2022 prior to leaf-out. The survey was conducted only in the proposed extraction area where tree removal will occur. There is no treed habitat within the proposed extraction area, which consists predominantly of active agricultural land with a few hedgerows, shrub thickets and a small portion of a Red Pine plantation. The focus was on the hedgerows on the West Property that are within the proposed extraction area. General observations were also made of trees in perimeter hedgerows, i.e.,

those outside the proposed extraction area, and tree clusters within the Core Environmental Feature (CEF).

Because trees are of limited occurrence within the proposed extraction area, GEC examined every tree that met the minimum size criterion for potential bat roosts (25 cm diameter at breast height [DBH]). This is consistent with the protocol for surveying for potential bat roosts within treed habitats (Martin 2021; Ministry of Environment, Conservation and Parks [MECP] undated). GEC also examined each tree between 10 and 25 cm DBH, as requested by Waterloo Region's EEAC.

For every tree that qualified under the size criterion, it was searched for features that had the potential to provide a roost. These included cavities, splits in the trunk or large limbs, and loose bark. If any of these features were found, regardless of how likely they were to support a roost, additional information was collected. This included the species of tree, its DBH, its location to approximately 5 m accuracy, and its stage of decay (Watt and Caceres 1999). A photograph was taken of each tree for which detailed data were collected. For each tree, it was determined if it was one of the tallest trees present if it had cavities, scars, or woodpecker holes; if it had the largest DBH in the community; if the cavity or crevice was more than 10 m from the ground; if it was within the area of highest densities of snags; if it had large areas of loose, peeling bark; and if the canopy was open. These parameters are consistent with the recommendations provided by OMNRF (2017) for surveying for potential roosts for the little brown myotis (*Myotis lucifugus*) and northern myotis (*Myotis septentrionalis*).

A very conservative approach was applied to the identification of potential roost trees.

GEC did not conduct exit and acoustical surveys at the potential roost trees as recommended in the various protocols. The reasons for this were:

1. After identifying the potential roost trees within the proposed extraction area, it was concluded that the potential for all of these trees to support a maternal roost was extremely low.

2. Tree removal will occur during a period when bats are absent, so no harm will occur to bats in the event that one of these trees were used as a roost. Tree cover is not a limiting factor for bats in North Dumfries.

3. Mr. Christopher Martin (2021) of MECP's Species at Risk Branch (SARB) stated in an email that if a proposed activity would remove a small number of potential maternity or day roosts but that the timing of tree removal will avoid the active bat season, then there is no need to conduct species at risk bat surveys.

4. The exit surveys are highly inefficient at detecting bats and are not reliable for determining presence or absence of roosting bats.

3.3 Input to Proposed Extraction Footprint, Operational Plan, Ecological Management Plan and Rehabilitation Plan

GEC mapped the limit of the Core Environmental Feature (CEF), as shown on the Site Plans, as well as many of the figures in this report. GEC also provided a series of recommendations that were incorporated into the Site Plans. The recommendations are also provided later in this report, in **Section 9.2**. Details for an Ecological Enhancement Plan (EEP) for lands that will not be extracted and a Rehabilitation Plan for lands that will be extracted are provided in **Sections 9.3** and **9.4** of this NETR and EIS, and cross-referenced on the Site Plans.

4.0 EXISTING CONDITIONS

4.1 Terrain Setting

The terrain setting for the proposed Edworthy West Pit is described below under the following headings:

- 4.1.1 Physiography
- 4.1.2 Drainage
- 4.1.3 Surficial Geology
- 4.1.4 Bedrock Geology
- 4.1.5 Study Area Hydrogeology
- 4.1.6 Study Area Hydrology
- 4.1.7 Soils
- 4.1.8 Landscape Setting
- 4.1.9 Site Setting

4.1.1 Physiography

The regional till moraines are classified as part of the Horseshoe Moraines physiographic region, and in particular the Paris and Galt moraines (Chapman and Putnam 1984). The Paris and Galt moraine region stretches a distance of approximately 130 kilometres (km) from Caledon to Lake Erie, are upwards of 11 km in width, and have relief of upwards of 30 m.

The regional physiography and distribution of unconsolidated sediments, including sand and gravel deposits, are largely the result of glacial activity that took place in the late Wisconsinan substage of the Pleistocene Epoch, which ended approximately 10,000 years ago (OGS 1998). Glacial activity in this area has created subsurface conditions that can be very variable over short distances. The most prominent glacial features in the area are till moraines and spillways.

4.1.2 Drainage

The Site is primarily located within the Cedar Creek Sub-catchment. Cedar Creek is a Tributary of the Nith River, which ultimately flows into the Grand River. A small area of the southern portion of the Site is directly within the Grand River Watershed.

There are no watercourses or wetlands within the study area, which encompasses the site and 120 m beyond it. There is one minor creek (Glenburn Creek) and two provincially significant wetlands located within 500 m of the site. The Taylors Lake Wetland is located east of the site while the Galt Ridge Sudden Bog is located to the south. Additionally, three unnamed ponds that include unevaluated wetlands are located northeast of the site (**Figure 2**).

The North Dumfries area receives approximately 919 millimetres (mm) of precipitation annually, as referenced from the Roseville, Ontario climatic station approximately 8 km to the northwest of the Site (Environment Canada 2020).

4.1.3 Surficial Geology

Extensive glaciofluvial pitted outwash deposits of gravel and sand, as well as ice-contact stratified deposits, dominate the regional surficial geology. The overburden deposits are regionally approximately 60 to 100 m in thickness (Miller et al. 1979). The glaciofluvial outwash gravels and sands are present with varying components of silt and clay. The ice-contact deposits are often partially to completely buried by the glaciofluvial outwash sediments. Beneath the outwash and ice-contact deposits are fine-grained deposits, which are classified regionally as various drifts and tills (Bajc and Shirota 2007). Most of the site contains glaciofluvial gravel deposits.

Most of the West Property is located within the much larger 492.2 ha Cottrel Lake Esker Regional Earth Science ANSI, according to LIO mapping. This esker feature was deposited by meltwaters from the Wentworth ice (Port Bruce Stadial) which moved out of the Lake Ontario basin. It consists of a simple esker ridge and other ablation features associated with the formation of the Tillsonburg Moraine (NHIC General Natural Areas Report, November 24, 2021).

Ridges that resemble an esker occur on the site next to Shouldice Sideroad and there is a better-defined esker ridge that snakes across the agricultural field on the west side of the road. The Core Environmental Feature appears to be an ice ablation feature, with complex topography.

4.1.4 Bedrock Geology

Regionally bedrock is at an elevation of approximately 230 to 270 m AMSL, or approximately 60 to 100 m below ground surface (bgs) (Karrow 1987; Miller et al. 1979). The site is underlain by dolostone of the Guelph Formation, which is an Upper Silurian-aged, massive and thick-bedded brown and grey dolostone.

4.1.5 Study Area Hydrogeology

MTE Consultants Inc. (MTE) installed nine monitoring wells in 2020. Seventeen (17) boreholes were drilled in 2021. MTE used data from the monitoring wells, boreholes and nearby MECP well records to characterize the sand and gravel deposit at the site. The sand and gravel deposit extends approximately ground surface to a depth of 26-30 m. Below this deposit there is a >30 m deposit of fine-grained material that acts as an aquitard between the underlying bedrock and the unconfined aquifer above. Cross-sections prepared by MTE indicate that the sand and gravel deposit ranges in depth from 26-29 m (MTE 2022a).

MTE (2022a) determined that the highest water table elevation measured during the monitoring period was 307.37 mAMSL and, conservatively, MTE estimated the maximum predicted water table elevation to be 307.75 mASL onsite.

MTE (2022a) prepared groundwater flow mapping using groundwater elevation data from November 16, 2021. Groundwater was interpreted to flow north to south. The horizontal hydraulic gradient was calculated to be very low (0.0006 m/m).

4.1.6 Study Area Hydrology

Drainage of precipitation from the proposed Edworthy West Pit is primarily via infiltration into the groundwater flow system with little to no surface water runoff. Due to the prevalence of sand and gravel deposits in the shallow overburden and a considerable depth to groundwater, precipitation infiltrates the ground relatively easily.

There are no surface water features or drainage pathways on the subject lands.

4.1.7 Soils

Soils information for the site was obtained from *The Soils of Waterloo County* (Presant and Wicklund 1971) and the *Soil Survey and Canada Land Inventory Classification for Concession 9, Part Lots 16, 17 and 18, Township of North Dumfries, Regional Municipality of Waterloo*, which was prepared for the site by DBH Soil Services Inc. (2022):

The onsite soil survey completed by DBH Soil Services Inc. (2022) identified eight soil series on the site. The eight series were identified as: Burford; Caledon; Camilla; Floradale; Heidelberg; Mannheim; St. Jacobs; and Waterloo. Soils and Canada Land Inventory (CLI) mapping (Figure 2) from the DBH report is provided in **Attachment B**, for ease of reference. DBH Soil Services Inc. mapped the locations of field stone piles onsite, which mainly occur along fencelines and hedgerows.

A description of each soil series is provided below, taken verbatim from the *Soil Survey and Canada Land Inventory Classification* by DBH Soil Services Inc. (2022):

> *The Burford soils are the well-drained member of the Burford soil catena. These soils developed on glaciofluvial or outwash deposits of sands, gravelly sands, gravel textures or cobbly parent materials. These soils usually consist of 15 to 20 cm of loam or silt loam with varying degrees of gravels in the surface horizon. The B horizons are generally loamy with the C horizons as calcareous gravelly coarse sandy materials. Burford soils occur on terraces and outwash areas bordering the Grand, Speed and Conestogo Rivers. There are also large areas of Burford soils on gravelly outwash areas. Burford soils are often found in association with Brisbane soils. Burford soils may have inclusions of stony Dumfries soils and coarse/medium sandy soils.*
>
> *Caledon soils are the well-drained member of the Caledon soil catena. Caledon soil developed in sandy loam sediments overlying gravel deposits. The surface horizons are often low in organic matter. The Bt horizons usually develop near*

the boundary between the sands and gravels. Caledon soils have low water holding capacity, low inherent fertility and may be located on steep and complex topography.

Camilla soils are the imperfectly drained member of the Caledon soil catena. These soils developed from sandy loam sediments overlying gravel materials, usually between 25 and 100 cm deep. These soils have low inherent fertility and a seasonally high-water table.

Floradale soils are the imperfectly drained member of the St. Jacobs soil catena. The Floradale soils developed from loam and silt loam sediments overlying gravel materials, usually between 25 and 100 cm deep. These soils have a low water holding capacity, low inherent fertility and may be found on steep and complex slopes.

Heidelberg soils are the imperfectly drained member of the Waterloo soil catena. Heidelberg soils developed on very fine and fine sandy loam materials of alluvial and lacustrine origin. These soils are typically found in low-lying areas and with sandy moraines. The Heidelberg soils are often underlain by gravel deposits. The surface horizons have medium amounts of organic matter. These soils may have a seasonally high-water table.

Mannheim soils are the well-drained member of the Mannheim soil catena. The Mannheim soils developed from loam and silt loam sediments overlying stony loam till materials. These soils are generally stone free between 25 and 100 cm in depth. These soils may be found on moderately steep or complex slopes and may have a relatively low water holding capacity.

St. Jacobs soils are the well-drained member of the St. Jacobs soil catena. These soils have developed on loam and silt loam materials overlying gravel deposits. In relation to the Subject Lands, these soils are found within the Galt and Paris Moraines. The St. Jacobs soils are found on moderately steeply sloping and complex topography. These soils have low natural fertility and low water holding capacity.

Waterloo soils are the well-drained member of the Waterloo soil catena. The Waterloo soils developed on deposits of fine and very fine sandy loam materials. The Waterloo soils occur in the Waterloo Sandhills and in the Galt and Paris Moraines. These soils may occur on steep slopes, however, if they occur on level and gently sloping areas, they will have deeper A horizons. Waterloo soils may be limited by excessively steep slopes or complex topography and low water holding capacity.

Some areas not under cultivation or outside the proposed licence area were not mapped by DBH Soil Services Inc. (2022). Most of the areas that were not under cultivation (i.e., treed areas, shrub thickets, etc.) correspond with areas mapped as Burford gravelly loam by Presant and Wicklund (1971).

4.1.8 Landscape Setting

The subject property is located in Ecodistrict 7-6, which is part of the larger Ecoregion 7 or Deciduous Forest Region, also commonly referred to as the Carolinian Zone. Ecodistrict 7-6 has been more recently called the London Ecodistrict by Wester et al. (2018), who describe its location, extent and forest vegetation as follows:

> *Ecodistrict 7E-6 forms a narrow band from the community of Coldstream in the west to the community of St. George in the east. The northern extent occurs near the community of Ayr and stretches southward to the community of Mapleton. The ecodistrict encompasses 225,181 ha (10.3% of the ecoregion, 0.2% of the province). The gently rolling landscape changes in elevation from 213 m above sea level south of the community of Paris to 371 m above sea level northeast of the community of Ayr...*
>
> *...The London Ecodistrict is associated with the Eastern Temperate Deciduous Forest Vegetation Zone (Baldwin et al. 2018) and the Niagara Section (D.1) of the Deciduous Forest Region. A small band along the northeastern boundary occurs in the Huron-Ontario Section (L.1) of the Great Lakes Forest Region (Rowe 1972). Much of the ecodistrict has been converted to pasture and cropland... Large areas of deciduous forests grow in river valleys... Tree species commonly found in these forests include sugar maple, American beech, white ash, yellow birch, red maple, northern red oak, pin cherry, white oak, bur oak, American basswood, eastern hop-hornbeam, black cherry, bitternut hickory, paper birch, trembling aspen, large-toothed aspen, balsam poplar, and butternut. On moist sites, silver maple, black ash, green ash, American elm, and occasionally Manitoba maple may occur.*
>
> *Mixed forests dominate in the northeast and small areas of coniferous forests can be found throughout the area. A few larger coniferous forests can be found on poorly drained, wet substrates east of the community of London. Coniferous tree species typical of the ecodistrict include eastern white pine on dry sites, eastern hemlock on cooler-than-normal, humid conditions and on wet sites American larch and eastern white cedar. Eastern red cedar occurs along the Grand River (Hanna 1984d). Marshes are limited, occurring adjacent to rivers or associated with kettle depressions including sites north of the Grand River and west of the Nith River. Small areas of bog and fen complexes occur in poorly drained areas. Bog complexes are typically cooler-than-normal sites that support species with northern affinities (e.g., black spruce, large cranberry) ...*

Only a small portion of Waterloo Region is within Ecodistrict 7-6, in the Township of North Dumfries. The Regional Municipality of Waterloo (RMOW) has identified a portion of North Dumfries as the *Dumfries Carolinian Environmentally Sensitive Landscape (ESL)*, which generally corresponds with Ecodistrict 7-6.

The draft site summary prepared for the Dumfries Carolinian ESL (RMOW 2012) includes the following general description:

> *The Dumfries Carolinian Environmentally Sensitive Landscape occupies the central core of North Dumfries Township on either side of the Grand River. The eastern*

portion is drained by Alder Creek, and the western portion, for the most part, is traversed by the lower reach of Cedar Creek and its associated tributaries which drain to the Nith River. The landscape was extensively shaped by glacial action, as evidenced by the numerous moraine features and the Cedar Creek Spillway. The Grand River flows through a well-defined valley cut through the moraine. The area is underlain by rich resources of sand and gravel which have been exploited for many years.

The permeable nature of the soils results in significant infiltration which in turn supports groundwater discharge to coldwater aquatic ecosystems, most notably Cedar Creek. In addition, the moraine landscape is punctuated by numerous depressions which contain small lakes or wetlands.

The landscape is located at the northern extent of the Carolinian Life Zone in this part of Ontario. While it does not contain all the typical array of "Carolinian species," it does contain the northernmost native occurrence of many characteristic species such as Sassafras, Black Oak, and Pignut Hickory. Its location and varied topography sustain a number of rare and unusual habitats such as oak savannas, tallgrass prairies, marl seeps, and sphagnum bogs. These ecosystems provide habitats for many native plants, breeding birds, waterfowl, and herpetofauna.

The landscape contains many fine old stone houses dating back to the early Scottish settlers who cleared the original farms. It features a number of scenic rural roads and sweeping vistas of the Grand River valley. As soil quality and topography posed challenges for agriculture, there is a relatively high proportion of native cover in the landscape.

Forest cover has been reported at several scales, as follows:

- Region of Waterloo: 13.6% (138,364 ha)
- Township of North Dumfries: 23.01% (19,104 ha)
- Dumfries Carolinian Environmentally Sensitive Landscape (ESL): 23.9% (8654 ha)

4.1.9 Site Setting

The proposed Edworthy West Pit extraction area is located adjacent to a Core Environmental Feature (CEF) identified in the Regional and Local Official Plans (see **Figures 2**, **4** and **5**). The landscape context is shown on **Figure 2** and the site context is shown on **Figure 3**. Land uses in the vicinity are a mix of agriculture, rural residential, natural areas and aggregate extraction.

The site comprises all or portions of three separate properties as shown on **Figure 3**. For discussion purposes, they are referred to in this report as the West Property, Central Property and East Property. Almost the entire site is presently in active agricultural use, under crop rotation. There are farm buildings located adjacent to the site on the West Property and East Property.

On the West Property there are a few hedgerows that mark property boundaries or field compartments within the proposed licence area. The owners of the West Property have gradually removed dead and seriously declining trees, mainly Black Cherry, from the various

hedgerows on the property. There is a small Red Pine (*Pinus resinosa*) plantation alongside Spragues Road; it falls partially within the proposed extraction area on the Central Property. Immediately adjacent to the proposed licence area there is a 5.9 ha Core Environmental Feature (CEF) on the West Property, just north of Greenfield Road. The CEF is a shrub thicket feature that contains several Butternut (*Juglans cinerea*) trees/seedlings. Butternut is listed as Endangered in Ontario.

There are no other Core Environmental Features within 120 m of the site. The nearest wetlands are approximately 370 m to the northwest, 180 m to the northeast and 330 m to the south southeast. The CEF adjacent to the site is relatively isolated from other natural features by roads and agricultural land uses.

4.2 Aquatic Habitat

There are no aquatic habitats within the study area.

4.3 Terrestrial Habitat

4.3.1 Vegetation Communities

Almost the entire site is in active agricultural use (crop rotation). There are farm buildings located adjacent to the site on the West Property and East Property. All of the buildings are outside the proposed licence area and will be retained. The main natural feature is a Core Environmental Feature (CEF) located on the West Property, outside of the proposed licence area (**Figure 2**).

Summary descriptions of vegetation communities observed within the study area are listed in **Table 2** and described below, under the headings Core Environmental Feature (CEF) and Other Features. Vegetation community polygons are mapped on **Figure 7**. A series of representative site photographs taken by GEC in 2021 and 2022 are presented in **Attachment C**. Photo references are provided in the community descriptions below. Non-native plant species are denoted below with a plus sign in parentheses (+). All of the community types described below are common and widespread in southern Ontario.

Historic aerial photography from 1954 is shown on **Figure 8**. The 1954 imagery shows that almost the entire site and adjacent lands were in active agricultural use. Areas that are presently shrub thickets with tree clusters appear to have been used for pasture circa 1954.

- **Core Environmental Feature (CEF)**

CUT1a Mineral Cultural Thicket Ecosite

The 5.45 ha Core Environmental Feature (CEF) is mapped as Unit CUT1a. The CEF is a large shrub thicket, dominated by tall shrubs such as Common Buckthorn (+), hawthorns and Gray Dogwood. Although the CEF (Unit CUT1a) is primarily a large shrub thicket, there are clusters of trees, as well as small pockets of old field vegetation scattered throughout. In portions of the CEF with denser shrub cover, the groundcovers are dominated by shade-tolerant Common Buckthorn (+) seedlings and alien invasive species such as Garlic Mustard (+). There is a Butternut tree and two seedlings in growing within this unit; all are affected by Butternut Canker.

The trees are limited to individual stems, tree clusters and remnant hedgerows. The main species are open-grown White Pine and Black Cherry. The CEF was mapped as a shrub thicket community because, overall, tree cover is far less than 25%. The CEF also appears to lack the number of tree stems required to meet the Forestry Act definition of woodland.

There is an extensive network of trails within the CEF, which are used by the owner for hiking, snowshoeing, skiing and, in some areas, snowmobiling.

- **Other Features**

FOD2-4a Dry-Fresh Oak-Hardwood Deciduous Forest Type

Unit FOD2-4a is a small forested ridge that runs along the east side of Shouldice Sideroad, at the west limit of the West Property. The trees are a mix of Red Oak, White Oak, Black Cherry, Red Maple, Sugar Maple and Trembling Aspen. Common Buckthorn (+) forms thick patches under the tree canopy.

CUP2a Mixed Plantation

To the northeast of the proposed extraction area there is a Mixed Plantation (Unit CUP2a). The main tree species are White Pine, Red Pine, Scots Pine (+), Sugar Maple, Black Walnut and Norway Maple (+). There are some well-used trails within the Mixed Plantation. There are a number of Hackberry seedlings and saplings growing along the edges of the trails and elsewhere.

CUP3-1a Red Pine Coniferous Plantation Type

On the Central Property there is a small Red Pine Conifer Plantation (Unit CUP3-1) beside Spragues Road. Unit CUP3-1a is even-aged stand with low plant diversity.

CUP3-9a Norway Spruce Coniferous Plantation Type

East of Shouldice Sideroad, straddling the north limit of the West Property, there is a narrow strip of Norway Spruce (+) Conifer Plantation (Unit CUP3-9a). The strip of conifers is densely planted.

CUM1-1a Dry-Moist Old Field Meadow Type

A small patch of old field meadow (Unit CUM1-1a) is associated with the Red Pine Plantation (CUP3-1a) beside Spragues Road. This unit is strongly dominated by Smooth Brome (*Bromus inermis* +). Plant species diversity is low.

CUT1b Mineral Cultural Thicket Ecosite (Common Buckthorn +)

Unit CUT1b is a variable unit that includes dense patches of Common Buckthorn (+), Staghorn Sumac and Gray Dogwood. The scattered trees are mainly young White Pine, Red Cedar and White Ash regeneration. White Pine regeneration has spread from a few larger open-grown

trees at the top of a low ridge. There is also a remnant hedgerow strip of declining Black Cherry.

CUT1c Mineral Cultural Thicket Ecosite (Common Buckthorn +)

Unit CUT1c is a shrub thicket unit located mostly on the Township of North Dumfries Roads Department Yard. The shrubs are mainly Common Buckthorn (+), Staghorn Sumac and Gray Dogwood, overgrown with Riverbank Grape. The trees are mainly Black Cherry and planted Red Pine and Scots Pine (+).

CUT1-1a Sumac Cultural Thicket Type

Unit CUT1-1a is a small patch of Staghorn Sumac growing in what appears to be an old borrow pit. Many of the shrubs are covered in Riverbank Grape. There is some farm refuse dumped in this small depression.

Unit CUT1-1a was raised by GRCA as a possible wetland feature. The bottom of this small depression is located well above the water table, it contains no standing water and it only supports upland plant species. It is not a wetland feature.

CUT1-1b Sumac Cultural Thicket Type

Unit CUT1-1b is a small patch of Staghorn Sumac located on the East Property, beyond the east limit of the proposed Licence Area.

CUHCa Coniferous Hedgerow

Unit CUHC is a narrow strip of White Spruce and Norway Spruce (+) planted as a windbreak beside Spragues Road on the East Property.

CUHDa Deciduous Hedgerow

Unit CUHDa is located along the east side of Shouldice Sideroad, at the west limit of the West Property. The trees are mainly Red Oak, Sugar Maple, Black Cherry, White Pine and Trembling Aspen. The oaks were heavily infested by the Ldd Moth in 2021. There is dense shrub growth of Gray Dogwood, Common Buckthorn (+) and Staghorn Sumac.

CUHDb Deciduous Hedgerow

The main tree species in Unit CUHDb are mainly Red Oak and Black Cherry. Common Buckthorn (+) grows in dense patches along this hedgerow. The oaks were heavily infested by the Ldd Moth in 2021.

CUHDc Deciduous Hedgerow

The main tree species in Unit CUHDc are mainly Red Oak, Black Oak and Black Cherry. The oaks were heavily infested by Ldd moths in 2021. The hedgerow contains dense growths of Common Buckthorn (+).

CUHDd Deciduous Hedgerow

Unit CUHDd contains a small cluster of Hackberry, Black Cherry and Black Walnut.

CUHDe Deciduous Hedgerow

The main trees in Unit CUHDe are Red Oak, Black Oak and Black Cherry. Common Buckthorn (+) forms dense patches along the hedgerow. The oaks were heavily infested by the Ldd Moth in 2021.

CUHDf Deciduous Hedgerow

Unit CUHDf is a short section of hedgerow dominated by Black Cherry, with Common Buckthorn (+) and Staghorn Sumac.

CUHDg Deciduous Hedgerow

Unit CUHDg is a deciduous hedgerow on the boundary between the West Property and the Central Property. The trees are a mix of Black Cherry, Red Oak and Manitoba Maple. Patches of shrubs are dominated by Common Buckthorn (+), Gray Dogwood and Staghorn Sumac. The oaks were heavily infested by the Ldd Moth in 2021.

CUHDh Deciduous Hedgerow

The main trees in Unit CUHDh are Red Oak and Black Cherry. Dense growth of Common Buckthorn (+) is present in this hedgerow. The oaks were heavily infested by the Ldd Moth in 2021.

CUHSa Shrub Hedgerow

Unit CUHSa is dominated by shrubs such as Common Buckthorn (+), Staghorn Sumac and Gray Dogwood. It is located on the Central Property at the north property limit. The scattered trees are mainly Red Oak and Black Cherry. The oaks were heavily infested by the Ldd Moth in 2021.

4.3.2 Plant Species

A checklist of the vascular plants recorded during the field surveys completed by GEC is provided in **Attachment D**. A total of 227 vascular plant taxa have been recorded to date. One hundred and eleven (111) taxa, or 48.9% of the flora, are considered non-native and introduced to southern Ontario. The very high proportion of non-native plant species is a reflection of the disturbed nature of the study area.

Several Butternut (*Juglans cinerea*) trees and seedlings were recorded from the study area (see **Figure 9** for Butternut locations. This species is considered Endangered in Ontario. Further discussion is provided in **Section 5.1**.

The following plant species recorded from the study area were originally considered significant in the Regional Municipality of Waterloo (RMOW 1999):

- Black Oak (*Quercus velutina*) – Hedgerow Units CUHDc, CUHDd and CUHDh; and,

- Hackberry (*Celtis occidentalis*) – Numerous locations within the CEF, various hedgerows, Unit CUP2a, etc.

These 2 species are discussed further in **Section 7.3.1**.

4.4 Wildlife

The lists of wildlife species that were observed within the study area are presented in **Tables 3** to **5**. The lists include the common and scientific names for all species that were observed. In the text of this report, scientific names of wildlife species are included only for those not listed in **Tables 3** to **5**.

A total of 82 wildlife species were observed, including 2 odonates, 14 butterflies, 1 bumble bee, 2 amphibians, 51 birds, and 12 mammals.

Invertebrates

A total of 17 invertebrate species were seen within the study area. The invertebrates included 2 odonates, 14 butterflies, and a single species of bumble bee.

Odonates

Only 2 dragonfly species were observed; no damselflies were seen. The low diversity of odonates is not surprising, considering the complete absence of waterbodies or wetlands within the study area. Dragonflies require permanent water for breeding because their aquatic nymphs typically take a year or occasionally more to transform into adults. There is no breeding habitat for odonates on the site or the adjacent lands.

The 2 dragonflies that were observed are both common to abundant in southern Ontario. The Black Saddlebags has an S-Rank of S4 indicating that it is common and apparently secure in the province. The Common Green Darner has an S-Rank of S5 indicating that it is very common to abundant and secure in the province.

Butterflies

A total of 14 butterfly species was observed in the study area. Most were observed in the interface between the agricultural fields and other features such as hedgerows and the Core Environmental Feature, where there tends to be more wildflowers.

Two (2) of the species observed, the European Skipper and Cabbage White, are non-native species. Two (2) species have an S-rank of S4, indicating that they are common and apparently secure in Ontario. These were the Silver-spotted Skipper and Monarch. The remaining native species have an S-rank of S5 indicating that they are very common to abundant and secure in Ontario.

On July 31, 2021 a search of the study area was made for milkweed plants and Monarch caterpillars but few milkweeds were found and no caterpillars were observed.

The local status of butterflies in Waterloo Region was checked based on the work by Linton (2012). Three (3) species are considered uncommon within the region: Northern Crescent, Silver-spotted Skipper and White Admiral. The remaining 9 species are all common to very common in the region.

Bumble Bees

The Common Eastern Bumble Bee was the only bumble bee observed, and it was seen both within the proposed extraction area on the West Property and in adjacent lands. This is currently the most abundant bumble bee species in southern Ontario.

Amphibians

There is no water and, consequently, no breeding habitat within the study area for most amphibians. Two (2) amphibians were observed. One was the American Toad (*Anaxyrus americanus*), which was observed in the Core Environmental Feature (CEF). The toad has thick skin which helps to prevent dehydration/desiccation, allowing them to use drier habitats than would be suitable for many other amphibians. The other was the Eastern Red-backed Salamander (*Plethodon cinereus*) which was observed in the woodland beside Shouldice Sideroad; this species lays its eggs in rotting stumps or logs and it does not require pools vernal pools or wetlands for breeding habitat.

Reptiles

No snakes were observed within the study area, despite several focused searches for them. The owners of the West Property, which includes the Core Environmental Feature (CEF), indicated that they have never seen any snakes on their property since they moved there in 2003.

Within the study area there is a lack of water features and wetlands, making the area generally unsuitable for turtles.

Birds

A total of 51 bird species were observed, including 27 within the proposed extraction area, 36 within the licence area and 36 in adjacent lands. Forty-two (42) species were observed in 2020 and 41 were observed in 2021. Ten (10) species were recorded only once during the survey period.

Non-breeding Bird Species

Three (3) of the observed bird species were determined to not be breeding within the study area. These were the Sandhill Crane (2020), Great Blue Heron (2021) and Turkey Vulture (2020 and 2021).

Breeding Bird Species

A total of 48 bird species were observed from the study area that were considered to be either possible, probable or confirmed breeders. As described in **Sections 4.1.9** and **4.3.1**, the habitats within the study area are primarily agricultural fields, with some hedgerows around the perimeter of the site and between field compartments on the West Property, shrub thickets associated with the Core Environmental Feature (CEF), remnant woodland beside Shouldice Sideroad and a Red Pine plantation beside Spragues Road. The breeding bird community reflected these habitat conditions.

The 10 most abundantly recorded species were Song Sparrow, American Robin, American Crow, House Wren, Baltimore Oriole, Northern Cardinal, Field Sparrow, House Sparrow, Vesper Sparrow and European Starling, in descending order of abundance. Based on the number of point count stations where each bird species was recorded, the 10 most widespread species were Song Sparrow, Red-winged Blackbird, American Crow, American Robin, American Goldfinch, Baltimore Oriole, Field Sparrow, House Wren, Northern Cardinal and Indigo Bunting.

The areas with larger active agricultural fields were dominated by species such as Horned Lark, Vesper Sparrow and Song Sparrow. The western and southern portions of the site contained more hedgerows and tree clusters, with a dense shrub layer; these areas were dominated by species such as American Robin, Baltimore Oriole, House Wren, Field Sparrow and Indigo Bunting.

Four (4) species of aerial insectivores were observed foraging over the cropped fields. These were Barn Swallow, Northern Rough-winged Swallow, Tree Swallow and Purple Martin. Only the Barn Swallow was observed on more than one occasion.

The Barn Swallow was regularly observed foraging over the agricultural fields. This species is listed as Special Concern in Canada (COSEWIC) and as Threatened in Ontario (COSSARO). There are no structures at all within the proposed licence area and extraction area that would be suitable for Barn Swallow nesting. The Barn Swallow is discussed further in **Sections 5.1** and **10.0**.

Two (2) bird species listed as Special Concern in Ontario were observed during the breeding bird surveys. Eastern Wood Pewee was observed in hedgerow Unit CUHDe in 2021. Grasshopper Sparrow was observed on the East Property in 2020, when the agricultural field was in hay. Both species are discussed further in **Section 7.3.1**.

Of the 51 bird species recorded from the study area, 3 are not native to Canada or North America: these are Rock Pigeon, European Starling and House Sparrow. The 48 native bird species all have S-ranks of S4 or S5, indicating that they are all common to very common in Ontario and are apparently secure or secure in the province.

Mammals

The 12 species of mammals that were observed within the study area are all very common to abundant in Ontario, with an S-rank of S5. The owners of the West Property regularly observe Red Fox, Coyotes, Racoons and White-tailed Deer.

The owners of the West Property also indicated that they regularly see bats flying at night during the summer months. They have not noted any bat roosts in their barn or outbuildings, but they observed that a few bats do roost in their house.

5.0 HABITAT OF ENDANGERED SPECIES AND THREATENED SPECIES

The discussion on habitat of endangered and threatened species is divided into two sections to deal with those species that were confirmed during the field inventories and those that were not observed (unconfirmed). The unconfirmed species that are discussed are those in the Natural Heritage Information Centre (NHIC) database with records from 1 km x 1 km squares in the vicinity of the study area.

5.1 Confirmed Endangered and Threatened Species

- **Butternut (*Juglans cinerea*) – Endangered**

During the 2019-2022 field surveys, Butternut (*Juglans cinerea*) trees and seedlings were identified within the study area (**Figure 9**). Although still relatively common in southern Ontario, Butternut is listed as Endangered in Ontario due to its rapid population decline resulting from a fungal disease called Butternut Canker (*Sirococcus clavigignenti-juglandacearum*). The most obvious signs of Butternut Canker are elongated, sunken cankers which commonly originate at leaf scars, buds, or wounds. In the springtime an inky-black fluid seeps out of cracks in the canker, while in the summer the cankers appear as black sooty patches. Infection usually begins in the lower crown and then downward as spores from the cankers are washed down. Trees of all ages and sizes on all sites are infected by the disease. Older cankers provide an entrance site for decay, other harmful fungi and insect pests. The cankers spread around branches and trunks, eventually girdling and killing the tree (MNRF Butternut Factsheet).

Four (4) live Butternuts were observed at the locations shown on **Figure 9**: 2 trees (BN01 and BN04) and four seedlings (BN02 and BN03). See **Attachment C: Photos 31** and **32**.

The potential effects of the proposed Edworthy West Pit on Butternut are discussed in **Section 10.0**.

- **Barn Swallow (*Hirundo rustica*) – Threatened**

The Barn Swallow was regularly observed foraging over the agricultural fields during the ecological field surveys. The owners of the West Property indicated that there approximately 20 nests in their barn that are regularly used and another building is also used by Barn Swallows for nesting.

The OMNRF (2013a) has defined the general habitat for the Barn Swallow that should be considered habitat under the ESA. It consists of active nests (Category 1 habitat), a 5-m radius around active nests which represents the defended territory area (Category 2 habitat), and the area 5-200 m around the nest which is typically used for foraging (Category 3 habitat).

Although the Barn Swallow typically forages within 200 m of its nest, it may occasionally travel considerable distances to forage. This most often occurs during cool, windy weather and it

usually seeks water bodies at these times to forage because these habitats are most productive for insects. Under these adverse weather conditions, New York birds foraged as far as 6 km from the nesting colony (Shields 1984).

Within the proposed extraction area there is no Category 1 or 2 Barn Swallow habitat, but Category 3 habitat does extend into the extraction area. Although Barn Swallows were also observed foraging outside of the Category 3 habitat, these areas are not technically considered habitat for the species under the Endangered Species Act (ESA).

5.2 Unconfirmed Endangered and Threatened Species

This section of the report discusses unconfirmed Endangered and Threatened Species that have been reported from the general vicinity of the site through the Natural Heritage Information Centre (NHIC) database. NHIC records from the following 1 km x 1 km squares were considered:

- 17NH5197
- 17NH5297
- 17NH5397
- 17NH5195
- 17NH5196
- 17NH5295
- 17NH5296
- 17NH5396

The site overlaps with the following 1 km squares: 17NH5196, 17NH5296 and 17NH5297. All of the 1 km squares listed above also overlap with portions of various ANSIs, Significant Woodlands and Significant Wetlands that are outside of the study area. It should be noted that some of the NHIC's records do not have specific location data and many older records are repeated in a series of 1 km squares.

The NHIC database contains records of the following Endangered and Threatened species from the general vicinity of the site, in 1 km squares that either include or are adjacent to the study area:

- Fern-leaved Yellow False Foxglove (*Aureolaria pedicularia*) - Threatened
- Gattinger's False Foxglove (*Agalinia gattingeri*) - Endangered
- Jefferson Salamander (*Ambystoma jeffersonianum*) - Endangered
- Unisexual *Ambystoma* (Jefferson Salamander dependent population) (*Ambystoma laterale - (2) jeffersonianum*) – Endangered
- Bobolink (*Dolichonyx oryzivorus*) – Threatened
- Eastern Meadowlark (*Sturnella magna*) – Threatened
- Louisiana Waterthrush (*Parkesia motacilla*) - Threatened

Each of these 3 Endangered species and 4 Threatened species are discussed below. In addition, discussion is also provided on 2 Endangered bat species that occur widely in southern Ontario, the little brown myotis and northern myotis

- **Fern-leaved Yellow False Foxglove (*Aureolaria pedicularia*) – Threatened**

Fern-leaved Yellow False Foxglove is a hemi-parasitic annual closely associated with Black Oak (*Quercus velutina*). Its habitat is typically open oak savanna and oak woodland.

COSEWIC (2018) listed only 2 records of Fern-leaved Yellow False Foxglove from Waterloo Region and it was presumed extirpated at both sites. One (1) record was based on a 1978 observation of 5 plants near Little Turnbull Lake. This site was searched in 2015 and 2016 during field work undertaken for the COSEWIC assessment for Fern-leaved Yellow False Foxglove and 2 other *Aureolaria* species. The other record is based on an 1893 collection by Herriot from Veitch's Lake; it was reported by Montgomery (1944) and now presumed to be extirpated at this location.

There are some Black Oak trees in some hedgerows within the study area, but they are choked with Common Buckthorn (+) and they are not open oak savanna or oak woodland. There is no suitable habitat for Fern-leaved Yellow False Foxglove within the study area.

- **Gattinger's False Foxglove (*Agalinia gattingeri*) - Endangered**

Gattinger's False Foxglove is a hemi-parasitic annual closely associated with tallgrass prairies and alvar communities (Jones 2015).

The *Recovery strategy for the Gattinger's Agalinis (Agalinis gattingeri) in Ontario* (Jones 2015) states:

> *In Ontario, Gattinger's Agalinis occurs in both tallgrass prairie and alvar habitats. The species is found on and around Manitoulin Island, on the Bruce Peninsula, and on Walpole Island.*

The Recovery Strategy does not list any records for Gattinger's False Foxglove from Waterloo Region. The NHIC database does include a record from 1 km square 17NH5391 (which is on the Grand River) dated September 1, 1952, and Gattinger's False Foxglove is considered extirpated from that site.

There is no suitable habitat for Gattinger's False Foxglove in the study area.

- **Jefferson Salamander (*Ambystoma jeffersonianum*) – Endangered**
- **Unisexual *Ambystoma* (Jefferson Salamander dependent population) (*Ambystoma laterale - (2) jeffersonianum*) – Endangered**

In southern Ontario the diploid Jefferson Salamander (JJ) is usually found with the all-female Unisexual Ambystoma (Jefferson Salamander dependent population) (LJJ), so the two taxa are discussed together here. Jefferson Salamanders inhabit deciduous or mixed upland forests that contain or are in close proximity to suitable ponds for breeding. Breeding ponds must have a suitable hydroperiod to allow salamander larvae to mature and transform into terrestrial juveniles; the pools must contain standing water well into July or August. The pools generally have egg attachment sites (e.g., branches with fine twigs), provide breeding habitat for other amphibian species and lack predatory fish. In southern Ontario, radio-telemetry studies found

that 90 percent of adults stay in the deciduous forest habitats within 300 m of their breeding pond (Linton et al. 2018).

The Habitat Regulation for the Jefferson Salamander reads as follows:

For the purposes of clause (a) of the definition of "habitat" in subsection 2(1) of the act, the following areas are prescribed as the habitat of the Jefferson salamander:

1. *In the City of Hamilton, the counties of Brant, Dufferin, Elgin, Grey, Haldimand, Norfolk and Wellington and the regional municipalities of Halton, Niagara, Peel, Waterloo and York,*

    i. *a wetland, pond or vernal or other temporary pool that is being used by a Jefferson salamander or Jefferson dominated polyploid or was used by a Jefferson salamander or Jefferson dominated polyploid at any time during the previous five years,*

    ii. *an area that is within 300 metres of a wetland, pond or vernal or other temporary pool described in subparagraph i, and that provides suitable foraging, dispersal, migration or hibernation conditions for Jefferson salamanders or Jefferson dominated polyploids,*

    iii. *a wetland, pond or vernal or other temporary pool that,*

        A. *would provide suitable breeding conditions for Jefferson salamanders or Jefferson dominated polyploids,*

        B. *is within one kilometre of an area described in subparagraph i, and*

        C. *is connected to the area described in subparagraph i by an area described in subparagraph iv, and*

    iv. *an area that provides suitable conditions for Jefferson salamanders or Jefferson dominated polyploids to disperse and is within one kilometre of an area described in subparagraph i.*

With the exception of a small wooded area alongside Shouldice Sideroad (Unit FOD2-4a), there are no deciduous or mixed forest communities within the study area. There are no confirmed or suitable breeding pools within 300 m of Unit FOD2-4a. The study area mainly comprises active agricultural lands, residences, farm buildings, a municipal yard, a gravel pit, roads, shrub thickets, hedgerows and a conifer plantation. The study area does not provide suitable habitat for the dispersal of Jefferson Salamander and Unisexual Ambystoma.

Clause 1.i of the Habitat Regulation does not apply to the proposed Edworthy West Pit because there is no aquatic habitat on the site or within the study area that could be used by a Jefferson salamander or Unisexual Ambystoma. There are no confirmed or suitable breeding pools for Jefferson Salamander and Unisexual Ambystoma within the study area.

Clause 1.ii of the Habitat Regulation also does not apply to the proposed Edworthy West Pit because any confirmed ponds are more than 300 m from Unit FOD2-4a on the site.

Clause 1.iii does not apply either, because there are no suitable breeding pools within the study area. Also, as shown on **Figure 2**, the site is not situated between any potential breeding ponds (confirmed or suitable) that are separated by one another by a distance of 1 km or less. For context, a 500 m offset from the site is shown on **Figure 2**.

Clauses iii and iv would affect the proposed Edworthy Pit if there was a confirmed breeding pond within 1 km of the site, there was another confirmed breeding pond or suitable breeding pond within 1 km of the confirmed pond and the proposed pit was in between the confirmed and suitable ponds. This is not the case with the Edworthy West Pit.

Clause 1.iv also does not apply to the site because active agricultural lands are generally unsuitable for dispersal of mole salamanders and the site is not located in between confirmed and/or suitable breeding pools that are within 1 km of each other.

Linton et al. (2018) listed exceptions to the Habitat Regulation, noting that the following features should not be included within the habitat regulation:

- Existing houses, buildings, and structures that are within 300 m of a breeding pond;

- Open areas such as agricultural fields that are within 1 km of a breeding pond that do not directly separate the pond from forested areas or other breeding ponds and therefore do not serve as corridors between habitats and/or breeding areas.

In GEC's opinion there is no habitat for Jefferson Salamander and Unisexual Ambystoma (Jefferson Salamander dependent population) on the site or within the study area.

- **Bobolink (*Dolichonyx oryzivorus*) – Threatened**
- **Eastern Meadowlark (*Sturnella magna*) – Threatened**

The Bobolink and Eastern Meadowlark both rely upon grassland habitats for breeding, have similar ranges in Ontario, often are found in the same fields, have similar population trends and face similar threats. Because of this, an Ontario Recovery Strategy was prepared that covers both species (McCracken et al. 2013).

Bobolinks in New York were found to prefer hayfields that are eight or more years old since establishment (but still cut annually), followed by lightly-grazed pastures, fallow fields, old fields, and young hayfields (Bollinger and Gavin 1992, Bollinger 1995). They also commonly nest in old fields that have been abandoned (cultural meadows).

The Eastern Meadowlark is a grassland species that is most abundant in native grasslands, pastures, and savannas. It may also nest in hayfields, weedy meadows, young orchards, golf courses, young plantations, and at grassy airports. In hayfields, it prefers older sites with higher litter cover, plant species diversity, and vegetation patchiness than occurs in younger fields. It has been estimated in some areas that a minimum of 5 ha are required to support this species whereas it shows no evidence of area sensitivity in other areas. Optimal conditions include moderately tall grasses (25 to 50 cm), a high proportion of grass, moderate to high forb density,

low shrub and woody vegetation cover (less than 5%; more than 35% is too dense), and a low percentage of bare ground. Grass cover is important because females build nests at the base of grass clumps and use litter to build a roof and two side walls (Savignac 2011; Wiens 1969).

Breeding bird surveys following the MNR (2010b) protocol were completed in 2020, when there were a few hayfields on the site. Bobolink and Eastern Meadowlark were not observed in 2020 during the 3 surveys that were completed and GEC concludes that these species were absent from the site at that time. In fall 2020 the hayfields were cultivated and all of the agricultural fields on the site are presently in crop rotation (corn, soy beans, winter wheat).

The onsite habitats are unsuitable for the Bobolink and Eastern Meadowlark.

- **Louisiana Waterthrush (*Parkesia motacilla*) - Threatened**

The Louisiana Waterthrush is typically found in steep, forested ravines with fast-flowing streams. Although it prefers running water, particularly clear, coldwater streams, it may also inhabit heavily wooded, deciduous swamps with large pools of open water. It nests among the roots of fallen trees, along stream banks, and in or under mossy logs. None of these habitat and habitat features occur within the study area and it is concluded that the Louisiana Waterthrush is absent.

- **SAR Bats**
    - **Little Brown Myotis (*Myotis lucifugus*) – Endangered**
    - **Northern Myotis (*Myotis septentrionalis*) – Endangered**

Although the NHIC database did not contain records of Little Brown Myotis and Northern Myotis, it is assumed that they occur in the general vicinity of the site since both species are still relatively common in southern Ontario.

As described in **Section 3.2**, a survey of potential bat roost trees was completed on March 29, 2022 prior to leaf-out. The survey was conducted only in the proposed extraction area where tree removal will occur. There is no treed habitat within the proposed extraction area, which consists predominantly of active agricultural land with a few hedgerows, shrub thickets and a small portion of a Red Pine plantation. The focus was on the hedgerows on the West Property that are within the proposed extraction area. General observations were also made of trees in perimeter hedgerows, i.e., those outside the proposed extraction area, and tree clusters within the Core Environmental Feature (CEF).

Eleven (11) trees were conservatively identified as having some potential to support roosting bats. This potential was considered very low and it is unlikely that any of these trees provided suitable roosting areas, particular for pregnant or nursing females. Eight (8) of the 11 trees were Black Cherry. Larger Black Cherry specimens typically have bark that may provide cover for bats, but the potential of them being used is extremely low, particularly as maternal roosts. The other trees included 2 Black Oak and 1 Red Oak. Details for these 11 trees are provided in **Attachment F**. Ten (10) of the 11 trees were in an early stage of decay (Class 1 to 2) and 3 trees had been damaged (e.g., split trunk, leaning, top snapped off, etc.).

No exit surveys or acoustic surveys were undertaken for bats during the inventories for the proposed Edworthy West Pit. This is because the extraction area contains only a few treed

hedgerows. In contrast, the surrounding area contains many treed hedgerows and woodlots. Forest cover in the Township of North Dumfries was estimated to be 23.01% (19,104 ha). Forest cover in the Dumfries Carolinian Environmentally Sensitive Landscape (ESL) was estimated to be 23.9% (8,654 ha). Trees are not a limiting factor for bats in this vicinity.

The owners of the West Property indicated that bats roost in the residence on their property, but they have not observed bats roosting in the barn or other buildings. The bats roosting in the house are likely Little Brown Myotis. This species may use barns and other buildings for maternal roosts, male swarming sites, stopover areas during migration, and resting areas between nocturnal foraging bouts. Trees within the woodlot also have the potential to provide these habitats, but usage of individual tree roosts occurs for only one or two days whereas anthropogenic roosts may be used traditionally for numerous years (Morningstar 2017). Despite its recent decline due to White Nose Syndrome (*Pseudogymnoascus destructans*), the Little Brown Myotis remains common in southern Ontario. Even if the residence was not functioning as a roost for this species, an acoustic survey would undoubtedly reveal that this bat forages at least on occasion over the proposed extraction area. This species regularly travels at least 2 km each evening while foraging, so an acoustic survey would eventually record this species. It is concluded that the Little Brown Myotis forages over the proposed extraction area at least on occasion, but that there is no significant habitat within the proposed extraction area for this species.

The Northern Myotis is still fairly common in southern Ontario. It seldom uses buildings for roosting, except that it may use them as temporary resting areas between nocturnal foraging bouts. During spring migration, it may temporarily use buildings as diurnal resting areas. It most frequently roosts within tree cavities, and typically uses them for only one or two nights before moving to a different roost (Foster and Kurta 1999). It forages predominantly under forest canopy, but also forages out in the open to some extent. An acoustic survey would undoubtedly eventually record the Northern Myotis at the proposed Edworthy West Pit, simply because it is a widespread species that may forage over large areas. Although this species may occasionally forage over the proposed extraction area, it provides no significant habitat for the Northern Myotis.

While trees are not a limiting factor to bats in the Township of North Dumfries, in order to avoid potential impacts on roosting bats it is important that any tree removals occur outside of the active period for bats. See **Section 9.2** for details on the proposed tree-clearing window for the Edworthy West Pit.

5.3 Summary of Habitat of Endangered and Threatened Species

The ecological field surveys completed by GEC confirmed that 2 Species at Risk (SAR) occur within the study area: Butternut (Endangered) and Barn Swallow (Threatened).

It is probable that Little Brown Myotis (Endangered) and Northern Myotis (Endangered) forage over the proposed extraction area, at least on occasion.

The potential effects of the proposed Edworthy West Pit on Butternut, Barn Swallow, Little Brown Myotis and Northern Myotis and their habitats are discussed in **Section 10.1**.

6.0 SIGNIFICANT WOODLANDS

The Core Environmental Feature (CEF) was identified on the basis that it is a Significant Woodland. In the Terms of Reference prepared for this report (GEC, November 25, 2021), GEC initially proposed to undertake tree density surveys, to determine if the CEF meets the *Forestry Act* definition of "woodland" using stem density values and to determine if a particular area is an *early successional* woodland. The CEF is 5.45 ha in size, so if it is a "woodland" it would meet the Region's 4 ha criterion for woodland significance.

During the preconsultation with Regional planning staff and the Ecological and Environmental Advisory Committee (EEAC), Staff Report EEAC-22-02 included the following statement:

> *"The Terms of Reference indicates that a number of Butternut trees are present in the Core Environmental Feature on the subject lands, and the applicant is proposing to assess whether the area meets the criteria of a Significant Woodland. Rather than assess whether the woodland meets the density and species criteria for a Significant Woodland, staff suggest that opportunities to enhance the feature instead be explored through the EIS. Enhancement of the feature is consistent with the ROP policies cited in the Terms of Reference and could provide opportunities to protect the Butternut trees on the subject lands."*

As a result, GEC did not complete any tree density surveys. The Ecological Enhancement Plan (EEP) presented in **Section 9.3** includes 3 enhancement areas within the Core Environmental Feature (CEF) that will expand woodland conditions, increase species diversity and improve conditions for Butternut. The proposed buffers to the CEF will be naturalized, which will expand the size of the feature. The Rehabilitation Plan (**Section 9.4**) will also improve connections between the CEF and other natural features in the vicinity.

As described in **Section 4.3.**1, the Core Environmental Feature (CEF) is a large shrub thicket, dominated by tall shrubs such as Common Buckthorn (+), hawthorns and Gray Dogwood. There are clusters of trees, as well as small pockets of old field vegetation scattered throughout. The trees are limited to individual stems, tree clusters and remnant hedgerows. The main species are open-grown White Pine and Black Cherry. The CEF was mapped as a shrub thicket community because, overall, tree cover is far less than 25%. See **Attachment C: Photos 15** to **32**.

There are no Significant Woodlands in the study area.

7.0 SIGNIFICANT WILDLIFE HABITAT

The primary resource for determining what qualifies as Significant Wildlife Habitat is the Significant Wildlife Habitat Technical Guide (SWHTG) prepared by OMNR (2000). OMNRF (2015) has also prepared Significant Wildlife Habitat Ecoregion Criteria Schedules (SWHECS) that may be used to assist in determining what constitutes Significant Wildlife Habitat. The Natural Heritage Reference Manual (NHRM) (OMNR 2010) states that the SWHECS are a resource that may be used to determine which features qualify as Significant Wildlife Habitat, but that the SWHTG "is still the authoritative source for the identification and evaluation of Significant Wildlife Habitat".

For the purposes of this study, GEC has relied upon the SWHTG to determine what constitutes Significant Wildlife Habitat. As stated above, this is consistent with the recommendations in the NHRM. There are also several significant problems with the SWHECS that provide additional rationale for not using it. It is inconsistent with some of the key planning policy and support documents, including the Provincial Policy Statement, the NHRM, and the SWHTG. In addition, the scientific credibility of the SWHECS is questionable. It is not defensible to identify a single threshold for significance for a feature over an area as large and diverse as an ecoregion; in some cases, the same threshold has been used for the entire province. Some of the information within the SWHECS is simply incorrect, with the section on area-sensitive breeding birds being particularly inaccurate. The SWHECS uses criteria and minimum thresholds to define Significant Wildlife Habitat. If a habitat meets the minimum threshold, then it should be considered Significant Wildlife Habitat. For example, the SWHCS states that every example of a provincially significant species should be identified as Significant Wildlife Habitat. This can be particularly onerous in areas where some provincially significant species are widespread and relatively common. It is also problematic if a provincially significant species occurrence does not represent a viable population. In addition, the SWHECS are designed to be used at a larger scale than the SWHTG and are therefore less relevant. The SWHECS are used at the scale of ecoregions whereas the SWHTG is used at the scale of individual municipalities. This is important because the mandate for Significant Wildlife Habitat rests with planning authorities and not the MNRF. Nevertheless, GEC has considered the SWHECS when appropriate and references to them are provided in this section of the report.

The NHRM and the SWHTG identify four main types of Significant Wildlife Habitat: seasonal concentrations of animals; rare and specialized habitats for wildlife; habitats of species of conservation concern; and animal movement corridors. These are discussed below in relation to the natural features within the MQEE study area.

7.1 Seasonal Concentrations of Animals

The SWHTG identifies 14 types of seasonal concentrations of animals that may be considered Significant Wildlife Habitat. They are as follows:

- winter deer yards;
- moose late winter habitat;
- colonial bird nesting sites;
- waterfowl stopover and staging areas;
- waterfowl nesting areas;
- shorebird migratory stopover areas;
- landbird migratory stopover areas;
- raptor winter feeding and roosting areas;
- Wild Turkey winter range;
- Turkey Vulture summer roosting areas;
- reptile hibernacula;
- bat hibernacula;
- bullfrog concentration areas; and,
- migratory butterfly stopover areas.

None of these types of seasonal concentrations of animals occur within the study area. There are no identified winter deer yards in the area; moose do not occur at this latitude; colonial bird nesting areas apply only to herons, gulls, terns, and swallow species not found within the study area; there is no suitable habitat for waterfowl stopover and nesting; shorebird, landbird, and butterfly migratory stopover areas are typically associated with areas within 5 km of the shores of the Great Lakes; the row-crop agricultural lands are unsuitable raptor winter feeding and roosting areas because they do not support small rodent populations; winter range for Wild Turkeys typically includes conifers and seeps, habitat that is lacking in the study area; there are no Turkey Vulture summer roosting areas in the study area; there appear to be no suitable reptile hibernacula; there is no suitable habitat for bat hibernacula; and the bullfrog is absent within the study area.

7.2 Rare and Specialized Habitats

7.2.1 Rare Habitats

Rare habitats are considered to be those vegetation communities that are considered rare in Ontario. Generally, these are communities that have been ascribed an S-rank of S1 to S3 by the NHIC. There are no cliffs and talus slopes, sand barrens, alvars, tallgrass prairies or savannas within the study area. No vegetation communities with S-ranks of S1 to S3 by Bakowsky (1996) and/or the NHIC were identified within the study area.

All of the vegetation communities described above in **Section 4.3.1** are common and widespread in southern Ontario.

7.2.2 Specialized Habitats

The SWHTG defines 14 specialized habitats that may be considered Significant Wildlife Habitat. They are as follows:

- habitat for area-sensitive species;
- forests providing a high diversity of habitats;
- old-growth or mature forest stands;
- foraging areas with abundant mast;
- amphibian woodland breeding ponds;
- turtle nesting habitat;
- specialized raptor nesting habitat;
- Moose calving areas;
- Moose aquatic feeding areas;
- mineral licks;
- Mink, Otter, Marten, and Disher denning sites;
- highly diverse areas;
- cliffs; and
- seeps and springs.

Some of these categories of specialized habitat can be eliminated from occurring within the study area without further discussion. These include amphibian woodland breeding ponds;

turtle nesting habitat; Moose calving and aquatic feeding areas; mineral licks; Mink, Otter, Marten and Fisher denning sites; cliffs; and seeps and springs.

Three of the specialized habitats relate to the quality of forest cover: forests providing a high diversity of habitats, old-growth or mature forest stands, and foraging areas with abundant mast. These categories of significant wildlife habitat are not recognized in the SWHECS, probably because they are subjective and difficult to quantify. The only forest community within the study area is Unit FOD2-4a on the east side of Shouldice Sideroad. Considering its small size and disturbed condition, it clearly does not qualify for any of these categories of specialized habitat.

Given the limited extent of forest cover in the study area, there is no habitat for woodland area-sensitive breeding birds.

Specialized raptor nesting habitat refers to nesting by those hawk and owl species that both nest and forage within forest habitat. These include the three accipiters, and the Red-shouldered Hawk (*Buteo lineatus*), Broad-winged Hawk (*Buteo platypterus*), Barred Owl (*Strix varia*), and Northern Saw-whet Owl (*Aegolius acadicus*). Forest cover is limited in the study area and none of these hawk and owl species occur within the study area.

Highly diverse area is another rather subjective category of Significant Wildlife Habitat that is not considered significant in the SWHECS. The study area does not qualify as a highly diverse area because it is primarily in agricultural use and natural cover is very limited.

The SWHECS lists other types of specialized habitats, including waterfowl nesting areas, Bald Eagle and Osprey nesting, foraging and perching habitat. Neither of these 2 types of specialized habitat occur in the study area.

7.3 Species of Conservation Concern

Habitats of Species of Conservation Concern include wildlife species that are listed as Special Concern or rare, that are declining, or are featured species. Habitats of Species of Conservation Concern do not include Endangered or Threatened species as identified by the Ontario *Endangered Species Act (2007)*.

Three groups of wildlife may be considered species of conservation concern:

- species that have a significant proportion of their population in Ontario and that are rare in the planning area;
- species that are exhibiting a statistically significant decline in Ontario; and
- species that are rare or designated significant at some level.

<u>Species with a Significant Proportion of their Global Population in Ontario</u>

There are numerous species in Ontario that have limited representation outside of the province. Habitat for these species may be considered significant wildlife habitat if the species is also rare or significantly declining within the planning area.

None of the species observed during this study have a significant proportion of their global population in Ontario.

Species Declining Significantly in Ontario

Generally, good data are currently available only for birds. The NHIC has taken into account some of these declines in recent revisions to the S-ranks that it has ascribed various species. Some of the declining species have recently had their S-ranks changed from S5 (secure) to S4 (apparently secure) to reflect these declines.

The SWHECS also list certain habitats of species of conservation concern, as outlined below:

- Marsh breeding bird habitat: there are no wetlands in the study area.

- Open country bird breeding habitat: row crops and hayfields are not considered as Significant Wildlife Habitat. The old field patches are tiny and far below the 30 ha size threshold.

- Shrub/Early successional bird breeding habitat: CUT1a is far below the 10 ha size threshold the indicator species, e.g., Brown Thrasher and Clay-coloured Sparrow, were not observed in the study area.

- Terrestrial Crayfish: the site is relatively dry and regularly cultivated. There is no suitable habitat for terrestrial crayfish.

Rare or Significant Species

Significance is defined at six levels:

- globally significant (with a G-rank of G1 to G3);
- nationally significant (designated Endangered, Threatened or Special Concern by the Committee on the Status of Endangered Wildlife in Canada);
- provincially significant (with an S-rank of S1 to S3 and S3?, if the latter type of species is being tracked by the OMNRF; species designated Special Concern by the OMNRF);
- regionally significant (within an Ecoregion, or within one of the old OMNR administrative regions);
- locally significant (within an Ecodistrict);
- within a planning authority's jurisdiction.

The above is the order of priority that should be given to protection of species of conservation concern.

Of note is the fact that the SWHECS does not consider species that are rare at the global, national, regional, or local levels to qualify as Significant Wildlife habitat. According to the SWHECS, only provincially significant species can qualify as Significant Wildlife Habitat. GEC concurs that globally and nationally significant species that are not provincially significant should not be considered Significant Wildlife Habitat and this is consistent with the NHRM. Consistent with the SWHTG, GEC concurs that regionally and locally significant species may qualify as Significant Wildlife Habitat in some circumstances. The mandate for identifying Significant Wildlife Habitat lies with local planning authorities and not the MNRF. Consequently, municipalities should be able to certain habitats for species that are significant within their

jurisdiction as Significant Wildlife Habitat. For this reason, GEC has considered locally significant species when assessing Significant Wildlife Habitat, especially if viable populations of such species occur in relatively intact natural habitats.

The discussion on rare or significant species is divided into two sections. The first deals with species that were observed during the inventories and the second discusses species that have been found in the general area, based on records in the NHIC database.

7.3.1 Confirmed Rare or Significant Species

Three (3) species listed as Special Concern at the federal and provincial level were observed within the study area. The monarch has been identified as being Endangered nationally but is still listed as Special Concern in the SARA list; it is designated special concern in Ontario. The Eastern Wood Pewee and Grasshopper Sparrow are listed Special Concern both nationally and provincially.

SPECIAL CONCERN SPECIES

- **Monarch (*Danaus plexippus*) – Special Concern, S4BS2N** (apparently secure during the breeding season, imperilled during the nonbreeding season)

The Monarch was not common within the study area and it was only recorded on a few occasions during the ecological surveys. The Monarch was typically seen along fencelines at the edges of agricultural fields. The focused search for Monarch caterpillars on milkweed plants was negative, due to the quite limited extent of Common Milkweed (*Asclepias syriaca*) within the study area.

Due to the relative scarcity and irregular occurrence of the Monarch, the fact that it is apparently secure during the breeding season, and the limited extent of milkweed plants for caterpillars, it is concluded that the study area does not provide Significant Wildlife Habitat for the Monarch.

- **Eastern Wood Pewee (*Contopus virens*) – Special Concern, S4B** (apparently secure)

Eastern Wood Pewee was observed in hedgerow Unit CUHDe in 2021. A calling individual were recorded June 11 in the mature treed hedgerow, more than 100 m to the west of Station 5. On July 4 a calling individual was recorded calling in the mature treed hedgerow at Station 5. It was likely the same individual calling on both occasions.

In Ontario the Eastern Wood Pewee typically breeds in deciduous and mixed forests. It has a preference for open space near the nest, so it is often found near forest edges, clearings, water features and roadways (Peck and James 1987). The nest is usually built on a branch of a deciduous tree, well out from the trunk and usually high up (4.5 to 9 m) (Peck and James 1987). North Dumfries is located within an area of relative high abundance for this species, which is in a band from Toronto to Wellington County and down to Long Point (McLaren 2007).

Since Hedgerow Unit CUHDe is not typical nesting habitat for the Eastern Wood Pewee and only a single individual was heard calling there in 1 of 2 years, it is concluded that the site does not provide Significant Wildlife Habitat for Eastern Wood Pewee. Hedgerow Unit CUHDe will be retained and protected.

- **Grasshopper Sparrow (*Ammodramus savannarum*) – Special Concern, S4B** (apparently secure)

During the 2020 breeding bird surveys, a single singing Grasshopper Sparrow was observed on 2 of the 3 survey visits on the East Property. The agricultural field on the East Property was in hay at that time. Grasshopper Sparrow was not observed on June 17. It was first noted more than 100 m south of Station 3 on June 25. It was then noted just over 100 m north of Station 2 on July 2. Grasshopper Sparrow was considered a possible breeder in 2020. At most there was 1 pair of Grasshopper Sparrows, but only a single bird was ever observed. This species was not observed during the 2021 breeding bird surveys.

The Grasshopper Sparrow prefers anthropogenic habitats such as hayfields and pastures, recently abandoned agricultural fields, grassed fields at airports, young plantations and restored mine and aggregate sites with herbaceous cover, provided the various habitat components are present (Savignac 2013). A variety of structural elements of the habitat are important, including moderate vegetation height (25-50 cm on average), relatively low bare soil cover, relatively large areas of dead and live herbaceous vegetation and a moderately thick litter layer. Perches, such as Common Mullein (*Verbascum thapsus*) and short scattered shrubs are often present (Savignac 2013). In southern Québec, Jobin et al. (2008) described the Grasshopper Sparrow's habitat as fields on poor, dry soils, sometimes recently abandoned, that are not grazed or regularly mown, and having a sparse and varied structure.

The Grasshopper Sparrow may also nest in annual row crops such as corn, wheat and barley, although densities are lower than in uncultivated habitats (Savignac 2013). Grassland habitats seldom used by the Grasshopper Sparrow include old fields where the density of small shrubs and other vegetation is too high, and "enriched" cropland, such as dense hayfields or intensively grazed seeded pasture with few perches (Wiens 1969).

The Grasshopper Sparrow has highly variable site fidelity from one year to another. The maximum return rate that has been recorded for adult males is 50%, but most estimates range from 15 to 35%. Birds may nest in one area within a general region in a given year and select another area the following year (Jones et al. 2010; Kaspari and O'Leary 1988; Savignac 2013; Vickery 1996). The Grasshopper Sparrow has territory sizes that have been reported to range from 0.16 to 4.8 ha (Vickery 1996; Wiens 1969). Mean territory sizes range from 0.37 to 1.38 ha (Jones 2011; Smith 1963). Earley (2007) noted that Grasshopper Sparrows prefer grasslands greater than 30 ha in size.

In discussions with expert birders from the Waterloo area, GEC learned that Grasshopper Sparrow is not a locally rare species. Instead, it is uncommon across the Region of Waterloo and locally rather common. GEC also reviewed June-July 2020-2022 eBird Canada records of Grasshopper Sparrow records from North Dumfries. It appears that the core of the Grasshopper Sparrow population in North Dumfries is located approximately 2.5 km south of the site, along Shouldice Sideroad in the vicinity of Grass Lake.

Considering that only a single pair of Grasshopper Sparrows, at most, used an active hayfield in 2020 and that this field was converted to crop rotation later in the year, and the main North Dumfries population is located 2.5 km to the south, the former hayfield is not considered Significant Wildlife Habitat for a species of conservation concern.

LOCALLY RARE AND SIGNIFICANT SPECIES

As noted in **Section 4.3.2**, 2 plant species recorded from the study area were originally considered significant in the Regional Municipality of Waterloo (RMOW 1999):

- Black Oak (*Quercus velutina*) – Hedgerow Units CUHDc, CUHDd and CUHDh; and,

- Hackberry (*Celtis occidentalis*) – Numerous locations within the CEF, various hedgerows, Unit CUP2a, etc.

Mr. Anthony Goodban (GEC) was a member of the volunteer committee that worked with the Region of Waterloo to update their Significant Species List (Native Vascular Plants) circa 1997-1998. The Region's *Significant Species List: Native Vascular Plant Component* was issued in 1999 and it has not been updated since then. Hybrids were not considered significant.

It is noted that both Black Oak and Hackberry were listed as significant, but with an asterisk (*). The annotation accompanying the asterisk was *"significant but with the expectation that additional research may prove otherwise."*

- **Black Oak (*Quercus velutina*) - S4** (apparently secure)

Since the late 1990's, GEC has encountered Black Oak at numerous locations in North Dumfries. In GEC's opinion, Black Oak is not significant in the Region of Waterloo. However, Black Oak is certainly a characteristic species of the Dumfries Carolinian Environmentally Sensitive Landscape (ESL).

Black Oak occurs in several hedgerows, including Units CUHDc, CUHDd and CUHDh. A portion of Unit CUHDc falls within the extraction area but a portion will be retained; Units CUHDd and CUHh will both be retained and protected. Black Oak is one of the species selected for planting as part of the Ecological Enhancement Plan (EEP) and Rehabilitation Plan, as described in **Sections 9.3** and **9.4** respectively.

- **Hackberry (*Celtis occidentalis*) - S4** (apparently secure)

It appears that Hackberry is rapidly spreading in the Region of Waterloo and especially in North Dumfries. Seeds of this species are dispersed by birds that eat the berries and, as a result, Hackberry regularly occurs along fencelines and in hedgerows. In GEC's opinion, Hackberry is not significant in the Region of Waterloo.

Hackberry was noted in numerous locations within the study area, including various hedgerows, plantations and the Core Environmental Feature (CEF). Hackberry is one of the species selected for planting as part of the Ecological Enhancement Plan (EEP) and Rehabilitation Plan, as described in **Sections 9.3** and **9.4** respectively.

7.3.2 Unconfirmed Rare or Significant Species

This section of the report discusses those species listed by the NHIC as occurring within the general vicinity of the study area, but that were not observed. The discussion is limited to those species and does not include all rare and significant species that have been detected within the entire Region of Waterloo.

PROVINCIALLY RARE AND SIGNIFICANT SPECIES

Vascular Plants

- **Carolina Vetch (*Vicia caroliniana*) – S2** (imperilled)

Habitats for Carolina Vetch include dry oak woods, thickets and prairies (Oldham and Brinker 2009). This species was not observed during the ecological surveys.

- **Hill's Oak/Northern Pin Oak (*Quercus ellipsoidalis*) – S3** (vulnerable)

Habitats for Hill's Oak include dry, sandy or rocky woods, roadsides and fencerows (Oldham and Brinker 2009). North Dumfries is a significant area for Hill's Oak in southern Ontario (Ball 1982). Not observed during the ecological surveys but present in the general area.

- **Green Arrow Arum (*Peltandra virginica*) – S3** (vulnerable)

Habitat is shallow waters of streams, rivers and marshes (Oldham and Brinker 2009). Not reported for Waterloo Region by Oldham and Brinker (2009). No suitable habitat is present in the study area.

- **Pignut Hickory (*Carya glabra*) – S3** (vulnerable)

Waldron (2003) described the habitat of *Carya glabra* as *"... restricted to the better drained sands, gravels and limestone ridges ... Such sites are generally droughty."* Some of the habitat onsite is suitable for *Carya glabra* but it was not observed during the field surveys. Pignut Hickory is a characteristic species of the Dumfries Carolinian Environmentally Sensitive Landscape (ESL).

- **Rue-anemone (*Thalictrum thalictroides*) – S3** (vulnerable)

Habitats for Rue-anemone are typically dry open deciduous woods (Oldham and Brinker 2009), especially oak woodlands, which are absent from the study area. Rue-anemone was not observed during the ecological surveys.

Butterflies

- **Purplish Copper (*Lycaena helloides*) – S3** (vulnerable)

Habitat for the Purple Copper is typically moist areas where various species of Docks and Knotweed, the Purplish Copper's host plants, occur. The most recent records have been in North Dumfries Township in 1977 and a 1996 collection from Cambridge by Larry Lamb (Linton

2012). There is no typical habitat for the Purplish Copper in the study area; this species was not observed during the ecological surveys.

Reptiles

- **Midland Painted Turtle (*Chrysemys picta marginata*) – Special Concern**, **S4** (apparently secure)

The *Ontario Reptile and Amphibian Atlas* webpage for Midland Painted Turtle shows that the 10 km square 17TNH59, which contains the Edworthy West Pit study area, has records from 1976 to 2018. A total of 113 records are listed for this 10 km square, including 28 records since 2010.

The Midland Painted Turtle inhabits a wide variety of waterbodies and wetlands, including ponds, lakes, slow-moving creeks and marshes that have a soft bottom and provide abundant basking sites and aquatic vegetation.

There are no waterbodies or wetlands within the study area.

- **Snapping Turtle (*Chelydra serpentina*) – Special Concern**, **S4** (apparently secure)

The *Ontario Reptile and Amphibian Atlas* webpage for Snapping Turtle shows that the 10 km square 17TNH59, which contains the Edworthy West Pit study area, has records from 1977 to 2019. A total of 77 records are listed for this 10 km square, including 33 records since 2010.

The Snapping Turtle occurs in most waterbodies and wetlands, though it is most frequently observed in slow-moving water with a soft mud or sand bottom and abundant vegetation. This species may inhabit surprisingly small habitats.

There are no waterbodies or wetlands within the study area.

- **Eastern Ribbonsnake (*Thamnophis sauritus*) – Special Concern**, **S4** (apparently secure)

The *Ontario Reptile and Amphibian Atlas* webpage for Eastern Ribbonsnake shows that the 10 km square 17TNH59, which contains the Edworthy West Pit study area, has records from before 1977 to 2019. A total of 39 records are listed for this 10 km square, including 10 records since 2010.

The Eastern Ribbonsnake is mainly restricted to open wetlands such as marshes, bogs and fens, where it feeds mainly on amphibians and amphibian larvae, as well as small fish. The wetlands that Eastern Ribbonsnakes inhabit are usually near forests and they may rely on forested areas for overwintering and birthing sites.

There are no wetlands or marshes within the study area and no Eastern Ribbonsnakes were observed during the ecological field surveys from 2019 to 2022.

Birds

- **Canada Warbler (*Cardellina canadensis*) – Special Concern**, **S5B** (secure)

The Canada Warbler is typically found in moist mixed forests with a well-developed understorey, particularly in habitats such as cedar woods and swamps, and alder thickets (McLaren 2007). There are no White Cedar stands or Speckled Alder (*Alnus incana* ssp. *rugosa*) thicket swamps in the study area; there is not suitable habitat for the Canada Warbler. This species was not recorded during the 2020-2021 breeding bird surveys, nor was it observed during any other ecological survey visits.

- **Wood Thrush (*Hylocichla mustelina*) – Special Concern**, **S4B** (apparently secure)

In Ontario the Wood Thrush occupies woodlots as small as 3 ha. The presence of tall trees with a dense understorey are the main habitat requirements. The nest is typically built 2 to 5 m off the ground, usually within a dense patch of tall shrubs and/or saplings (Friesen 2007).

Tree cover is limited within the Edworthy West Pit study area and the only deciduous forest patch is Unit FOD2-4a, which is a tiny 0.41 ha remnant woodland. The Wood Thrush was not recorded during the 2020-2021 breeding bird surveys, nor was it observed during any other ecological survey visits.

7.4 Animal Movement Corridors

The SWHTG defines animal movement corridors as elongated, naturally vegetated parts of the landscape used by animals to move from one habitat to another. To qualify as significant wildlife habitat, these corridors should be a critical link between habitats that are regularly used by wildlife.

The study area primarily comprises active agricultural lands, farmsteads, rural residences and other land uses (e.g., municipal yard, aggregate pit). Natural cover is limited and no animal movement corridors were identified. A focus of the Ecological Enhancement Plan (EEP) and Rehabilitation Plan is to establish ecological linkages that are connected to the Core Environmental Feature (CEF), as described in **Sections 9.3** and **9.4**, respectively.

7.5 Summary of Significant Wildlife Habitat

No significant concentrations of animals, rare habitats, or animal movement corridors occur within the study area. The analysis of Significant Wildlife Habitat concluded that no types of Significant Wildlife Habitat occur within the Edworthy West Pit study area.

8.0 SUMMARY OF SIGNIFICANT NATURAL HERITAGE FEATURES

8.1 Habitat of Endangered Species and Threatened Species

Habitats for Butternut (Endangered) and Barn Swallow (Threatened) were confirmed within the study area. It is assumed that the Little Brown Myotis (Endangered) and Northern Myotis (Endangered) forage at least occasionally over the proposed extraction area.

Potential effects of the proposed Edworthy West Pit on Endangered and Threatened species are discussed below in **Section 10.0**.

8.2 Dumfries Carolinian Environmentally Sensitive Landscape (ESL) & Core Environmental Feature (CEF)

As identified on **Figures 4** and **5**, the study area falls within the Dumfries Carolinian Environmentally Sensitive Landscape (ESL) and a 5.45 ha Core Environmental Feature (CEF) is located on the West Property, outside of the proposed licence area.

Potential effects of the proposed Edworthy West Pit on the Dumfries Carolinian Environmentally Sensitive Landscape (ESL) and the Core Environmental Feature (CEF) are discussed below in **Section 11.0**.

9.0 DESCRIPTION OF THE PROPOSED EXTRACTION, OPERATIONAL PLAN, ECOLOGICAL ENHANCEMENT PLAN (EEP) AND REHABILITATION PLAN

The *Aggregate Resources Act* Site Plans for the proposed Edworthy West Pit comprise 3 sheets, as follows:

- Sheet 1 of 3 – Existing Features & Cross Sections
- Sheet 2 of 3 - Operational Plan
- Sheet 3 of 3 – Rehabilitation Plan

GEC provided a series of recommendations to Cambridge Aggregates Inc. that were incorporated into the Site Plans prepared for the proposed Edworthy West Pit. The recommendations related to the proposed extraction footprint, ecological buffers, fencing, tree-clearing, ecological enhancements and progressive and final rehabilitation.

Section 9.2 describes the natural environment technical recommendations on Site Plan Sheet 2 of 3 (Operational Plan). **Sections 9.3** (Ecological Enhancement Plan [EEP]) and **9.4** (Rehabilitation Plan) provide the detailed recommendations for buffer creation, ecological enhancements and pit rehabilitation.

9.1 Description of Proposed Extraction and Operational Plan

The site to be licensed is 44.3 ha, of which approximately 35.2 ha is proposed for the extraction area. The site is located east of Shouldice Sideroad, north of Greenfield Road and northwest of Spragues Road (Regional Road 75), as shown on **Figures 1** to **3**. The legal address of the site is Part of Lots 16, 17 & 18, Concession 9 (Geographic Township of Dumfries), Township of North Dumfries, Regional Municipality of Waterloo.

Cambridge Aggregates Inc. currently operates another gravel pit nearby in the Township of North Dumfries (Licence #607701) at 1182 Alps Road. The proposed Edworthy West Pit will replace depleted reserves at the existing operation and serve as an extension to the Main Pit. Aggregate materials will be extracted from the proposed pit and trucked via Regional Roads to the Main Pit for processing and shipment to market. A new truck entrance onto Sprague Road will be constructed in accordance with Region of Waterloo standards.

Goods movement in Waterloo Region is primarily by commercial trucks, including the hauling of aggregate resources. Spragues Road is a Regional Road that is identified by the Region as being part of the Regional Truck Network. Heavy trucks are permitted on Regional Roads and these roads are designed and constructed to accommodate goods movement via heavy truck traffic or long vehicles. The proposed Edworthy West Pit will operate between 7:00 AM and 5:00 PM, and is anticipated to generate a maximum of 40 truck trips during the peak hour. The Transportation Impact Assessment concluded that all intersections in the study area are forecast to operate at accessible levels of service without improvements.

Figure 10 shows the proposed operations and phasing.

The aggregate material is proposed to be extracted from above the water table, with no processing occurring onsite. The annual allowable tonnage is 1,000,000 tonnes per year. Aggregate will be removed above the water table in 3 phases. The depth of excavation will be in the range of 20 m to 25 m below ground surface. The pit will be rehabilitated back to predominately an agricultural condition with ecological enhancements.

The proposed hours of operation for the full operation (extraction, loading and shipping) of the Edworthy West Pit are Monday to Friday, from 7:00 AM to 5:00 PM. Shipping may occur Monday to Friday 6:00 AM to 5:00 PM (excluding statutory holidays). Extraction, loading and shipping will primarily occur between April 1 and November 15. Site preparation, stripping and rehabilitation will mainly occur between November 15 and March 31, although some ecological enhancement activities like tree-planting may occur at different times.

9.2 Operational Plan and Rehabilitation Plan: Natural Environment Notes and Details

9.2.1 Operational Plan: Natural Environment Notes and Details

GEC made the following natural environment technical recommendations that were incorporated onto Site Plan Sheet 2 of 3 (Operational Plan):

- **Demarcation of Limits of Disturbance**

In some of the open field areas that will not be extracted, a range of ecological enhancements are proposed as part of the Ecological Enhancement Plan (EEP). Therefore, it is important that any operational activities are restricted to the proposed extraction area, yard and entrance. The limits of disturbance must be clearly demarcated in the field with monument markers, silt fencing, etc., as necessary, to prevent encroachment into adjacent habitats and future Ecological Enhancement Plan (EEP) units and avoid erosion/sedimentation issues in areas to be retained and enhanced. The installation of monument markers should occur gradually as the pit develops and in coordination with farming activities, i.e., markers should be installed following the final crop harvest in a particular area, prior to site preparation for extraction. Agricultural uses should be encouraged to continue until site preparation is required, in order to prevent fields left fallow from becoming infested with annual weeds over time.

- **Recommended Site Plan Note** (Demarcation of Limits of Disturbance)

The limit of extraction shall be clearly demarcated with monument markers (e.g., metal T-bars or equivalent). In proximity to the Core Environmental Feature (CEF) and Ecological Enhancement Plan (EEP) Units, the maximum spacing between monument markers shall be 15 m and signage stating “Ecological Area – No Disturbance” or equivalent wording shall be installed. Monument markers should be installed following the final crop harvest in a particular area, prior to site preparation for extraction.

- **Silt/Exclusion Fencing**

The recommended silt/exclusion fence layout is shown on the Operational Plan. The silt/exclusion fencing is intended to serve two purposes: a) prevent/minimize the movement of sediment into areas that are to be protected; and, b) to prevent small wildlife from encroaching into the extraction area.

The exclusion fencing make take the form of heavy-duty silt fencing which must be periodically maintained and potentially replaced, or a more permanent form of wildlife fencing such as Animex Wildlife Fencing or equivalent.

The installation of silt/exclusion fencing should occur gradually as the pit develops and in coordination with farming activities, i.e., silt/exclusion fencing should be installed following the final crop harvest in a particular area, prior to site preparation for extraction. Agricultural uses should be encouraged to continue until site preparation is required, in order to prevent future Ecological Enhancement Plan (EEP) Units from becoming infested with annual weeds over time, before they can be seeded with custom native seed mixes.

- **Recommended Site Plan Note** (Silt/Exclusion Fencing)

Silt/Exclusion fencing will be installed per the layout shown on the Site Plan: Operational Plan. Silt/exclusion fencing should be installed following the final crop harvest in a particular area, prior to site preparation for extraction.

Silt/Exclusion fencing may be heavy-duty silt fencing or Animex Wildlife Fencing or equivalent. The condition of the fencing must be monitored on a regular basis and it must be promptly repaired as necessary.

- **Timing of Tree-clearing Operations**

Tree-clearing in hedgerows and part of the Red Pine plantation should be timed to avoid the active period for bats and the bird breeding season. Some bat species may use cavity trees as roosts and many species of birds may nest in hedgerow trees and conifer plantations.

- **Recommended Site Plan Note** (Timing of Tree-clearing Operations)

Tree-clearing will not occur during the active period for bats and the bird breeding season, i.e., no tree-clearing between April 1 and October 31. This will avoid potential contraventions of the

Migratory Bird Convention Act, Fish and Wildlife Conservation Act and the Endangered Species Act.

- **Salvage of Woody Material, Weathered Rock, etc.**

Most of the former agricultural fields have had field stones removed over the years, so large areas contain relatively few rocks or rock piles, except where they had been deposited by the early farmers along fencelines and in individual piles. During clearing and stripping operations, boulders, rocks and cobbles will be salvaged and repurposed as rock piles in the various Ecological Enhancement Plan (EEP) Units. In addition, boulders, rocks and cobbles may be salvaged directly from the extraction area as stripping occurs.

The removal of hedgerows provides a potential source of logs, stumps, root wads, branches, etc., that will be salvaged for use in the various Ecological Enhancement Plan (EEP) Units and future pit rehabilitation. Stone piles are mapped on Figure 2 of the *Soil Survey and Canada Land Inventory Classification* prepared by DBH Soil Services Inc. (2022).

The salvage of boulders, rocks and cobbles, and woody debris (logs, stumps, root wads, branches, etc.) will provide an essential source of materials to be used to create habitat features as part of the Ecological Enhancement Plan (EEP) and future pit rehabilitation. These materials should be stockpiled within the extraction area and/or yard area.

- **Recommended Site Plan Notes** (Salvage of Woody Material, Weathered Rock, etc.)

Boulders, rocks and cobbles will be salvaged from fencelines and stone piles within the extraction area. Rocky material may also be salvaged during stripping operations. This material will be stockpiled within the extraction area and/or yard area for use as part of the Ecological Enhancement Plan (EEP) and future pit rehabilitation.

Logs, stumps, root wads and branches will be salvaged during clearing and grubbing operations. Tree tops may be chipped. The salvaged woody material and wood chips will be stockpiled within the extraction area for use as part of the Ecological Enhancement Plan (EEP) and future pit rehabilitation.

9.2.2 Rehabilitation Plan: Natural Environment Notes and Details

GEC made the following natural environment technical recommendations that were incorporated onto Site Plan Sheet 3 of 3 (Rehabilitation Plan):

- **Recommended Site Plan Note** (Ecological Enhancement Plan [EEP] and Rehabilitation Plan [Natural Environment] Details)

Detailed prescriptions for the Ecological Enhancement Plan (EEP) and Rehabilitation Plan (Natural Environment) Units are provided in Tables 1 and 2 on the Rehabilitation Plan. Further detail is provided in the Natural Environment Technical Report & EIS (Goodban Ecological Consulting Inc. [GEC] 2022).

- **Recommended Site Plan Note** (Maintenance/Tending of Plantings)

Wood chip mulch and/or COCODISC weed control mats/disks (min. 50 cm diameter) will be installed to control herbaceous competition around planted seedlings and to improve moisture retention.

Where suitable site access is available, during the first year of establishment, plantings will be watered during dry periods, defined as when less than 25 cm of precipitation occurs within a 14-day period between late April and early October.

- **Recommended Site Plan Note** (Ecological Monitoring)

An annual ecological monitoring program will be undertaken in order to verify that the components of the Ecological Enhancement Plan and Rehabilitation Plan are being successfully implemented.

A network of fixed-point photo-monitoring stations will be established and monitoring will occur several times each year, following commencement of Ecological Enhancement Plan (EEP) activities (e.g., tree-planting). Percent survivorship in the various planting areas will be generally assessed as part of the annual ecological monitoring program. EEP units and Rehabilitation units that experience high mortality of plantings will be replanted as necessary. If certain species exhibit high mortality, they may be substituted with species that are performing better at this site.

Ecological Enhancement Plan (EEP) Units and Rehabilitation Units will be monitored for invasive plant species and management strategies will be developed and implemented as necessary.

- **Recommended Site Plan Note** (Ecological Reporting)

Upon commencement of ecological enhancement activities, a biennial ecological monitoring report shall be completed and kept on file. The ecological monitoring report will be made available to the MNRF, Regional Municipality of Waterloo, Township of North Dumfries and GRCA upon request. The monitoring report should document the ecological management and rehabilitation activities completed during the two preceding calendar years and demonstrate that the components of the Ecological Enhancement Plan and Rehabilitation Plan are being successfully implemented. The monitoring report will also include any recommendations that may increase the success of management and rehabilitation measures in subsequent years.

9.3 Ecological Enhancement Plan (EEP)

Within and adjacent to the proposed licence area, an Ecological Enhancement Plan (EEP) will be implemented that covers approximately 3.79 ha of land that will not be extracted. Ecological enhancements will include reforestation using native species well suited to the local landscape, management of existing woody vegetation in some areas and the placement of habitat features such as rock piles, stumps/root wads and other woody debris. Implementation of the EEP will increase the size of the Core Environmental Feature (CEF) and enhance 1.0 ha by controlling invasive woody species, promoting natural regeneration of White Pine and Butternut, and planting suitable tree species.

The various EEP Units are mapped on **Figure 11**. A summary of the EEP Units is provided in **Table 6**. Details and prescriptions for the EEP Units are provided in **Table 7A**. Details for custom seed mixes are provided in **Table 7B**.

9.3.1 Objectives for the Ecological Enhancement Plan (EEP) and Rehabilitation Plan (Natural Environment)

The main objectives of the Edworthy West Pit Ecological Enhancement Plan (EEP) and Rehabilitation Plan are as follows:

- Enhance the Core Environmental Feature (CEF), by controlling invasive woody species, promoting natural regeneration of White Pine and Butternut, and planting suitable tree species;
- Increase the size of the CEF through the ecological restoration of proposed woodland buffers that are currently in active agricultural use;
- Create patches of tallgrass prairie and/or oak savanna vegetation;
- Increase biological and habitat diversity;
- Enhance wildlife habitat;
- Establish and enhance linkages between the CEF and other nearby natural features; and,
- Implement ecological enhancement measures that are complementary to the Dumfries Carolinian Environmentally Sensitive Landscape (ESL).

9.3.2 Enhancements to the Core Environmental Feature (CEF)

Three (3) areas within the Core Environmental Feature (CEF) were identified as ecological enhancement areas, covering 1.0 ha in total. The locations of EEP Units CEF1, CEF2 and CEF3 are shown on **Figure 11** and on Sheet 3 (Rehabilitation Plan) of the Site Plans. Details are provided in **Table 7A**.

The areas within the CEF selected for enhancement contain open grown White Pine and Black Cherry. Dense shrub thickets occur around these clusters of trees. Common Buckthorn and other undesirable woody competition will be removed between November 1 and March 31, and the stumps will be treated with Glyphosate or Garlon 4 herbicide to reduce resprouting. The woody material cut down will either be repurposed as brush piles for wildlife or burned onsite (subject to obtaining a Burn Permit from the Fire Department). Removal of Buckthorn and other shrubs should promote natural regeneration of White Pine and other tree species. Some planting of White Pine and Red Oak will also occur.

Unit CEF2 is 0.78 ha in size and it contains several clusters of open grown White Pine surrounded by dense shrub thickets. This area also contains a Butternut tree (BN01) and 2 Butternut saplings (BN02, BN03). Butternut locations are shown on **Figure 9** and Sheet 3 of the Site Plans. Controlling Buckthorn and other woody competition should release the Butternut

saplings from competition and promote Butternut regeneration with more open conditions. Some planting of Butternut will also occur.

Units CEF1 and CEF3 are both 0.11 ha in size and they contain smaller clusters of open grown White Pine and Black Cherry.

The enhancements to the Core Environmental Feature (CEF) must commence within 2 years of licence issuance and be completed within 5 years of licence issuance.

9.3.3 Establishment of Naturalized Buffers for the Core Environmental Feature (CEF)

As shown on **Figure 11**, Units TP-NT1 to TP-NT5 are intended to provide a buffer between the proposed extraction area and the Core Environmental Feature. The buffers are a *minimum* of 15 m wide and vary from 15 m to more than 45 m in width. Naturalization of Units TP-NT1 to TP-NT5 will increase the size of the Core Environmental Feature (CEF) by 1.79 ha.

Reforestation strategies vary depending on site-specific environmental conditions such as aspect/sunlight, moisture regime, topographic position, and surrounding habitat types and their woody species composition. The woody species selected for planting and the community types targeted are complementary to and reflective of the surrounding landscape. Tree planting will occur in open areas with little woody cover, as well as in a few areas where some tree and shrub establishment is occurring. The woody species selections for each EEP Unit are provided in **Table 7A**.

Habitat features such as woody debris features and rock piles (boulders, rocks, cobbles). Details are provided below in **Section 9.3.5**

Ecological enhancement seeding/planting activities will be coordinated with farming activities, i.e., seed with native seed mix in late fall following final crop harvest prior to site preparation for extraction. Custom seed mix details are outlined below in **Section 9.3.6** and in **Table 7B**. Trees and shrubs would be planted the following spring and a cover crop (oats) would be seeded at that time. Trees will be planted in clusters, on 2.0 m x 2.0 m spacing. Trees and shrubs will include a mix of 1 gallon (or larger) container stock and plugs. Plantings will occur in nodes, with access routes being left open to allow access for maintenance (e.g., watering, weed control, replacement plantings, etc.).

Prior to planting, any non-native woody species such as Common Buckthorn and other non-desirable species will be removed and stumps treated with herbicide to prevent re-sprouting. Suitable native woody regeneration will be retained. In some areas, control of herbaceous vegetation (e.g., field goldenrods) may be necessary to create suitable conditions for tree planting. Planting will occur during early spring or late fall, to minimize transplant shock, with spring planting being preferred. Wood chip mulch and/or COCODISC weed control mats/disks (min. 50 cm diameter) will be installed to control herbaceous competition around planted seedlings and to improve moisture retention. Nursery stock will be derived from local seed sources, i.e., from Seed Zone 37, to the extent feasible. However, if sufficient nursery stock is not available, stock from adjacent MNRF Seed Zones may be utilized (e.g., Seed zones 32, 34 and 38).

Where suitable site access is available, during the first year of establishment, plantings will be watered during dry periods, defined as when less than 25 cm of precipitation occurs within a 14-day period between late April and early October.

The timeline for planting Units TP-NT1 to TP-NT5 is as follows:

- TP-NT1: Planting will occur within 18 months of licence issuance.
- TP-NT2: Area within Phase 1 to be planted within 18 months of licence issuance. Area within Phase 2 to be planted prior to commencement of site preparation in Phase 2.
- TP-NT3 to TP-NT5: To be planted prior to Phase 2 site preparation occurring within 50 m of each unit.

9.3.4 Property Setback Tree Planting Unit TP-PS8

Hedgerow Unit CUHDh will be enhanced by planting a staggered row or two trees will be established on 2.0 m spacing. A minimum of 100 trees will be planted. A mix of Bur Oak, Red Oak, White Oak and White Pine will be planted, subject to availability. Unit TP-PS8 will be planted prior to commencement of Phase 3 site preparation. See **Figure 11** and **Table 7A**.

9.3.5 Habitat Features

Boulders, rocks and cobbles will be used to create rock piles for wildlife habitat. Oversize material may also be used to create rock piles. The minimum dimensions of the rock piles are 2.0 m x 2.0 m x 1.0 m.

Logs, stumps, root wads and branches will be used to create woody debris features for wildlife habitat. Stumps and root wads may be keyed back into the ground. The minimum dimensions of the woody debris features are 2.0 m x 2.0 m x 1.0 m.

9.3.6 Seed Mix Details

A custom native seed mix will be used in the portions of Units TP-NT1 to TP-NT5, and TP-PS8, that are presenting in agricultural use. The seed mix will comprise 50% Canada Wild-rye (*Elymus canadensis*) and 50% Virginia Wild-rye (*Elymus virginicus*), subject to availability. The application rate is 22.6 kg/ha. The optimal timing for seeding the custom native seed mix is late fall, in order to allow for cold stratification of the seeds. A cover crop will also be planted; oats can be planted in the spring, winter wheat in the fall, depending on timing.

Wildflowers will be established through direct seeding and/or planting plugs. See **Table 7B** for species selections.

9.3.7 Monitoring and Reporting

An annual ecological monitoring program will be undertaken in order to verify that the components of the Ecological Enhancement Plan and Rehabilitation Plan are being successfully implemented. A network of fixed-point photo-monitoring stations will be established and monitoring will occur several times each year, following commencement of Ecological

Enhancement Plan (EMP) activities (e.g., tree-planting) and continuing until final rehabilitation. If monitoring indicates that some management or maintenance is required, e.g., controlling weedy competition, staking, treatment for pests (e.g., Ldd Moth), etc., then appropriate measures will be promptly taken. Ecological Enhancement Plan (EEP) Units and Rehabilitation Units will be monitored for invasive plant species and management strategies will be developed and implemented as necessary.

Percent survivorship in the various planting areas will be generally assessed as part of the annual ecological monitoring program. Ecological Management units and Rehabilitation units that experience high mortality of plantings will be replanted as necessary. If certain species exhibit high mortality, they may be substituted with species that are performing better at this site.

Upon commencement of ecological enhancement activities, a biennial ecological monitoring report shall be completed and kept on file. The ecological monitoring report will be made available to the MNRF, Regional Municipality of Waterloo, Township of North Dumfries and GRCA upon request. The monitoring report should document the ecological management and rehabilitation activities completed during the two preceding calendar years and demonstrate that the components of the Ecological Enhancement Plan and Rehabilitation Plan are being successfully implemented. The monitoring report will also include any recommendations that may increase the success of management and rehabilitation measures in subsequent years.

9.4 Rehabilitation Plan (Natural Environment)

Within the proposed 35.2 ha Edworthy West Pit extraction area, the Rehabilitation Plan will be implemented, as shown on Sheet 3 of the Site Plans. The main focus of the Rehabilitation Plan is to restore agricultural land uses in the rehabilitated pit. Recommendations for rehabilitation to agricultural uses are provided in the Agricultural Impact Assessment and included on the Site Plans.

In order to maximize the area that can be both extracted and rehabilitated to agricultural uses, some of the rehabilitated side slopes will be at a slope of 2.1:1, as discussed further in **Section 9.4.1**.

There is also a natural environment component to the Rehabilitation Plan, as described here in **Section 9.4**, detailed in **Table 7A** and shown on **Figures 12** to **14**. Details for custom seed mixes are provided in **Table 7B**.

The Rehabilitation Plan includes 1.91 ha of ecological linkages that will better connect the Core Environmental Feature (CEF) to perimeter hedgerows to the north and the wooded area (Unit FOD2-4a) located to the west, alongside Shouldice Sideroad. Some areas within the 30 m road setbacks and 15 m property setbacks will be planted with trees and shrubs; this will occur as part of the final pit rehabilitation when several berms will be removed. The natural environment components of the progressive and final rehabilitation of the Edworthy West Pit are described below in **Sections 9.4.2** to **9.4.4**. A summary of the combined Ecological Enhancement Plan (EEP) and Rehabilitation Plan (Natural Environment) is provided in **Section 9.4.5**.

9.4.1 Rehabilitation of 2.1:1 Side Slopes

MTE Consultants Inc. (MTE) was retained by Cambridge Aggregate Services Inc. to complete a geotechnical slope assessment for the proposed Edworthy West Pit. In order to optimize the gravel resource available for extraction and to maximize the area available for rehabilitation to agricultural uses, final side slopes with an angle of 2 Horizontal to 1 Vertical (2H:1V) were proposed during the pit rehabilitation stage, instead of the traditional 3H:1V side slopes. MTE assessed the global stability of the proposed sidewalls from a geotechnical perspective and provided geotechnical recommendations with respect to the proposed 2H:1V side slopes.

Based on their analyses, MTE determined that the slopes achieve a factor of safety of 1.5 at 2.1H:1V. The Site Plans were updated so that the steepest slopes were set at 2.1:1.

MTE's other geotechnical are provided below in italics, verbatim:

- *No additional fill shall be placed at the crest or face of the slope. No infiltration or stormwater management infrastructure shall be placed within the slope areas;*

- *If significant deposits of the silt/clay/fine sand deposits are encountered, it will be necessary to flatten portions of the slope in localized areas;*

- *The slopes shall be vegetated as soon as possible in order to help stabilize the face of the slope. Hydroseeding is ideal as it allows planting of a large area within a relatively short period of time and is particularly useful for inaccessible locations such as slope faces;*

- *Periodic planting might be required to maintain vegetation across the slope face; and,*

- *Annual inspections shall be carried out by a qualified geotechnical consultant to inspect the slopes and check for signs of potential instability.*

GEC reviewed the recommendations made by MTE (2022b) and prepared the following note for inclusion on the Edworthy West Pit Site Plan Sheet 3 (Rehabilitation Plan):

> Side slopes shall be top-dressed with 10-15 centimetres of topsoil. Hydroseeding application shall be used to establish groundcover on rehabilitated side slopes. Slopes shall be seeded with the Ministry of Transportation - Ontario (MTO) Standard Roadside Mix (OPSS.MUNI 804) to establish vegetation quickly and reduce the potential for erosion. The MTO Standard Roadside Mix is comprised of 50% Creeping Red Fescue (*Festuca rubra*), 35% Perennial Ryegrass (*Lolium perenne*), 10% Kentucky Bluegrass (*Poa pratensis*) and 5% White Clover (*Trifolium repens*). The MTO Standard Roadside Mix shall be applied at an application rate of 130 kilograms per hectare.

9.4.2 Ecological Linkage Unit EL1

Ecological Linkage Unit EL1 is located to the west of the Core Environmental Feature (CEF), as shown on **Figures 11** to **13**. Details for Unit EL1 are provided in **Tables 7A** and **7B**, and shown on **Figure 13**. The intent is to establish patches of tallgrass prairie and/or oak savanna

vegetation and create an ecological linkage between the CEF and areas to the west, e.g., forest Unit FOD2-4a beside Shouldice Sideroad.

Ecological Linkage EL1 is approximately 90 m wide and, between EEP Unit TP-NT5 and Unit FOD2-4a, 140 long. It is approximately 1.26 ha in size. The original grade will be more or less reinstated and the fill material will be top-dressed with at least 30 cm of sandy/gravelly soil.

A custom native tallgrass prairie seed mix will be used, along with a suitable nurse crop. Tree species selected for Unit EL1 include Black Oak, White Oak, Hill's Oak, Shagbark Hickory, White Pine and Red Cedar, subject to availability. Shrubs will include American Hazel, Fragrant Sumac, New Jersey Tea and Prairie Willow, subject to availability. At least 12 rock piles will be installed prior to seeding/planting.

9.4.3 Ecological Linkage Units EL2-EL5

Ecological Linkage Unit EL2-EL5 is located to the north of the Core Environmental Feature (CEF), straddling the property line between the West Property and the Central Property, as shown on **Figures 11**, **12** and **14**. The entire linkage is 40 m wide and covers approximately 0.66 ha.

Details for Units EL2 to EL5 are provided in **Tables 7A** and **7B**, and shown on **Figure 14**. The intent is to create an ecological linkage between the CEF and hedgerow features located to the north. It will incorporate rehabilitated side slopes and small sections of the pit floor. A 5 m wide farm access will be provided between Units EL3 and EL4, and a 5 m wide strip on either side of the access will be planted with native grasses and wildflowers. This will provide a 15 m wide clearance zone for farm equipment to get between the new field compartments that will be created as part of the pit rehabilitation.

For this ecological linkage, Units EL2 and EL5 cover the side slopes which will be 3:1 (see **Figure 12**). This will provide a gentler slope more suitable for establishing woody vegetation and native groundcovers.

Unit EL2 is a north-facing slope that will be planted with a custom native seed mix and suitable cover crop. Trees to be planted include Hackberry, White Birch, Red Cedar, White Cedar and White Pine, subject to availability.

Units EL3 and EL4 are located on the pit floor. They planted with a custom native seed mix and suitable cover crop. Trees to be planted include Hackberry, White Birch, Red Cedar, White Cedar and White Pine, subject to availability. Shrubs to be planted include Staghorn Sumac, Chokecherry, Gray Dogwood, Red-osier Dogwood and Round-leaved Dogwood, subject to availability. Habitat features including rock piles and woody debris piles will be installed in these 2 units.

Unit EL5 is a south-facing rehabilitation side slope that will be top-dressed with at least 30 cm of sandy/gravelly soil. The intent is to create a patch of tallgrass prairie and savanna. The slope will be seeded with a custom native tallgrass prairie seed mix and suitable cover crop. Trees to be planted include a mix of Black Oak, Bur Oak, Hill's Oak, Pignut Hickory, White Oak and White Pine, subject to availability. Shrubs to be planted include American Hazel, Fragrant Sumac, New Jersey Tea and Prairie Willow.

9.4.4 Property Setback Plantings – Units SP-PS1 & TP-PS7

Unit SP-PS1 is located beside Shouldice Sideroad. It will be planted with shrubs as part of the final rehabilitation, when an acoustic berm is removed. Shrubs were selected for planting because a hydro line runs through this unit. Shrubs to be planted include Staghorn Sumac, Chokecherry, Gray Dogwood and Round-leaved Dogwood.

Unit TP-PS7 is located near the north property boundary on the West Property. It will be planted with trees as part of the final rehabilitation, when an acoustic berm is removed. Trees to be planted include Bur Oak, Red Oak, White Oak and White Pine.

9.4.5 Ecological Enhancement Plan (EEP) & Rehabilitation Plan Summary

The implementation of the Ecological Enhancement Plan (EEP) and Rehabilitation Plan (Natural Environment) will result in the following:

- Enhancement of 1.0 ha of the Core Environmental Feature (CEF), including Butternut habitat;
- Naturalization of Units TP-NT1 to TP-NT5, increasing the size of the Core Environmental Feature (CEF) by 1.79 ha;
- Creation of 1.29 ha Ecological Linkage EL1 as a patch of tallgrass prairie and oak savanna, connecting the CEF to habitats alongside Shouldice Sideroad;
- Creation of 0.66 Ecological Linkage EL2-EL5, including a 0.22 ha patch of tallgrass prairie and oak savanna on a south-facing slope, connecting the CEF to hedgerow features to the north;
- Planting of trees and shrubs within property setbacks, covering approximately 1.0 ha;
- Planting of 6175 trees and 885 shrubs;
- Installation of 81 habitat features, including 37 rock piles and 44 woody debris features.

10.0 POTENTIAL EFFECTS ON SIGNIFICANT NATURAL HERITAGE FEATURES

10.1 Habitats of Endangered Species and Threatened Species

During the ecological surveys, habitats for Butternut (Endangered) and Barn Swallow (Threatened) were identified within the study area. It was also assumed that Little Brown Myotis (Endangered) and Northern Myotis (Endangered) at least occasionally forage over the proposed extraction area. Potential effects on each of these four Species at Risk are discussed below.

- **Butternut (Endangered)**

Four (4) Butternut stems were observed within the study area. One (1) tree and 2 seedlings were recorded from the Core Environmental Feature (CEF) and 1 tree was recorded from the fenceline on the east side of Shouldice Sideroad. All of these Butternuts exhibited signs of Butternut Canker; the 2 trees had many open cankers and sooty cankers, but their crowns were still greater than 50% live. The locations are shown on **Figure 9**. The Butternuts were located between 25 m and 31 m from the proposed limit of extraction and no negative impacts are anticipated due to the extraction of aggregate.

The 0.78 CEF enhancement Unit CEF2 encompasses Butternuts BN01, BN02 and BN03. The proposed enhancements include removing invasive shrubs such as Common Buckthorn. Removal of undesirable woody competition should release the Butternut seedlings and encourage natural regeneration of Butternut. Planting additional Butternut seedlings will also occur. This will result in an overall enhancement of habitat for Butternut within the CEF.

- **Barn Swallow (Threatened)**

In **Section 5.1** it was concluded that Category 3 foraging habitat for the threatened Barn Swallow extended into the proposed extraction area.

Observations on the Barn Swallow revealed that it foraged mostly around the farm buildings outside of the proposed licence area on the West Property, but it also regularly foraged over the Central and East Properties as well. The Barn Swallow will still be able to forage over the proposed extraction area while extraction is taking place. It is possible that the density of insects over the extracted area might be somewhat lower than under current conditions, but row-crop fields are typically managed to minimize the presence of insects. The primary foraging areas around the buildings and adjacent lands will still be available for this species. After extraction is complete, the site will be restored to agricultural uses, with some areas to be naturalized as described above in **Sections 9.3** and **9.4**. The plantings will initially increase the local density of insects which may enhance foraging conditions for the Barn Swallow.

In the event that some areas become forested, swallows are unlikely to forage directly above them, but the edges of the wooded areas will provide enhanced foraging conditions. It is concluded that the primary foraging areas of the Barn Swallow will be unaffected by the proposed extraction and that limited foraging above the site will continue through extraction and after the site is rehabilitated. There may be a slight decline in arthropod availability during the extraction phase and a slight increase after rehabilitation, but these changes are likely to be very minor and of no consequence to the Barn Swallow.

- **Little Brown Myotis (Endangered)**

The Little Brown Myotis forages in open habitats, and greatly prefers to forage over water bodies and large rivers. It is much less likely to forage over row crop agricultural land than the more abundant Big Brown Bat (*Eptesicus fuscus*). Nonetheless, due to the fact that the Little Brown Myotis is still fairly common and widespread, it is probable that it occasionally forages over the proposed extraction area. This will avoid potential contraventions of the Endangered Species Act. Effects of the extraction on the Little Brown Myotis are predicted to be identical to those of the Barn Swallow. Although there may be a slight decline in arthropod abundance

during extraction and a slight increase after rehabilitation, these effects will be minor and will have no effect on the Little Brown Myotis.

Tree-clearing will not occur during the active period for bats, i.e., no tree-clearing between April 1 and October 31.

- **Northern Myotis (Endangered)**

The Northern Myotis is less likely to forage over the proposed extraction area than the Little Brown Myotis for two reasons: it is not as common as the little brown myotis, and it prefers to forage under the canopy of intermediate-aged to mature forests that do not have a well-developed subcanopy. It does forage in open habitat, but this is not its preferred habitat. This species likely forages in the adjacent deciduous forests (FOD2-4a) and mixed plantation (CUP2a) on occasion and is therefore likely to wander out over the agricultural fields.

Tree-clearing will not occur during the active period for bats, i.e., no tree-clearing between April 1 and October 31. This will avoid potential contraventions of the Endangered Species Act.

Given that the proposed extraction area is marginal foraging habitat for the Northern Myotis, any small changes in arthropod abundance during and after extraction will have no effect on it.

It is concluded that the proposed extraction of the Edworthy West Pit will have no negative effects on any Endangered or Threatened species or their habitats. The proposed ecological enhancements to the Core Environmental Feature (CEF) will likely benefit Butternut, by reducing invasive woody competitors and planting additional Butternut seedlings.

10.2 Potential Effects on the Dumfries Carolinian Environmentally Sensitive Landscape (ESL) & Core Environmental Feature (CEF)

As described earlier in **Sections 2.9** and **4.1.8** and shown on **Figures 4** and **5**, the site is located within the Dumfries Carolinian Environmentally Sensitive Landscape (ESL). The proposed 35.2 ha extraction area is mainly in crop rotation at present. The following features will be removed from the extraction area:

- 0.25 ha of Red Pine Coniferous Plantation (CUP3-1);
- 0.2 ha of Cultural Meadow (CUM1-1);
- 0.65 ha of Cultural Thicket (CUT1); and,
- 0.52 ha of Deciduous Hedgerow (CUHD).

A total of 1.62 ha of semi-natural habitats will be removed to allow for aggregate extraction.

As described above in **Sections 9.3** and **9.4**, a series of ecological enhancement and rehabilitation measures are proposed that focus on enhancing existing features and creating new naturalized features. The Ecological Enhancement Plan (EEP) and Rehabilitation Plan (Natural Environment) will create 4.7 ha of new naturalized features that are complementary to the Dumfries Carolinian Environmentally Sensitive Landscape (ESL). Examples include planting a mix of oak and hickory species, and creating patches of tallgrass prairie and oak savanna, all of which are complementary to the ESL.

As described above in **Sections 2.9** and **4.1.9**, the proposed licence area is adjacent to a Core Environmental Feature (CEF) identified on the Regional and Local Official Plan Schedules (see **Figures 4** and **5**). The Site Plans require the clear demarcation of the limit of disturbance and the installation of silt/exclusion fencing. Buffers ranging in width from 15 m to 45 m in width are proposed. Reforestation of buffer areas TP-NT1 to TP-NT5, which are primarily in agricultural use at present, will increase the size of the CEF by 1.79 ha.

The proposed Ecological Enhancement Plan (EEP) and Rehabilitation Plan (Natural Environment) measures will result in the enhancement of 1.0 ha of the CEF. Habitats created through pit rehabilitation will form 2 ecological linkages that cover 1.91 ha which will improve connectivity between the CEF and wooded areas along Shouldice Sideroad to the west and hedgerow features to the north.

At least 6175 trees and 885 shrubs will be planted and at least 81 habitat features (rock piles, woody debris features) will be installed.

It is concluded that there will be no negative impacts on the Dumfries Carolinian Environmentally Sensitive Landscape or the Core Environmental Feature (CEF), as a result of the proposed Edworthy West Pit. The implementation of the Ecological Enhancement Plan (EEP) and Rehabilitation Plan (Natural Environment) measures will result in an overall net environmental gain.

11.0 ENVIRONMENTAL IMPACT STATEMENT (EIS)

At their January 31, 2022 meeting, the Regional Municipality of Waterloo's Ecological and Environmental Advisory Committee (EEAC) considered the Terms of Reference for the Natural Environment Technical Report (NETR) and Environmental Impact Statement (EIS) for the proposed Edworthy West Pit and related information. EEAC report EEAC-22-002 (January 31, 2022) included the following recommendations:

That the Ecological and Environmental Advisory Committee take the following actions with respect to the proposed "Edworthy West Pit" on land within an Environmentally Sensitive Landscape (ESL) and contiguous to a Core Environmental Feature (Significant Woodland):

1. *Advise Community Planning staff that the "Terms of Reference for a Natural Environment Technical Report (NETR) & Environmental Impact Statement (EIS), Proposed Edworthy West Pit, Township of North Dumfries" prepared by Goodban Ecological Consulting Inc. (November 25, 2021), for the EIS required in support of a Zoning By-law amendment application is generally acceptable in that it addresses the following:*

    a. *a biophysical survey to identify natural habitats and/or populations of Regionally significant plant and animal species in the natural areas on the subject lands that might be adversely affected by the proposed aggregate operation;*

b. *identification of ecological enhancement, restoration and long-term stewardship opportunities on the subject lands to be incorporated in the site rehabilitation plan;*

c. *content of an ecological and groundwater monitoring program for the proposed aggregate operation;*

d. *evaluation of relevant regional and provincial policies;*

2. *Advise the applicant that the EIS must also include the following items which are not explicitly included in the Terms of Reference:*

   a. *confirmation of an ecologically appropriate boundary of the Core Environmental Feature (Significant Woodland) on the subject lands;*

   b. *delineation and design of a suitable buffer between the Core Environmental Feature and the proposed aggregate extraction operation within the subject lands;*

   c. *demonstrate maintenance of the quantitative and qualitative aspects of the hydrological and hydrogeological regimes sustaining the natural features on, and around, the subject lands;*

   d. *evaluate opportunities to enhance the Core Environmental Feature (Significant Woodland) on the subject lands;*

   e. *provide an evaluation of potential for cumulative impacts of the proposed aggregate operation in accordance with ROP Policy 9.C.4; and*

   f. *provide an evaluation of the criteria of ROP Policy 9.C.11 (new mineral aggregate operations on lands designated as Environmentally Sensitive Landscape).*

Each EEAC recommendation is repeated below in *blue italics* and an explanation of how each recommendation has been addressed is provided:

1a) a biophysical survey to identify natural habitats and/or populations of Regionally significant plant and animal species in the natural areas on the subject lands that might be adversely affected by the proposed aggregate operation;

Section 3.0 describes the methods used to complete the ecological surveys used to identify natural habitats and/or populations of provincially and/or regionally significant plant and animal species on and adjacent to the subject lands that could potentially be adversely affected by the proposed aggregate operation. **Section 4.1** describes the terrain setting, **Section 4.3** describes the vegetation communities and flora, and **Section 4.4** describes the wildlife communities.

1b) identification of ecological enhancement, restoration and long-term stewardship opportunities on the subject lands to be incorporated in the site rehabilitation plan;

Ecological enhancement and restoration opportunities are described at length in **Sections 9.3** and **9.4**, shown on **Figures 11** to **14**, and detailed in **Tables 6**, **7A** and **7B**. The licence area will ultimately be returned to the existing landowners who are the long-term stewards of these lands.

1c) content of an ecological and groundwater monitoring program for the proposed aggregate operation;

The ecological monitoring program for the Ecological Enhancement Plan (EEP) and Rehabilitation Plan (Natural Environment) is described in **Section 9.3.7**.

MTE Consultants Inc. (MTE 2022a) recommended the following *Groundwater Monitoring Program*:

1. *Manual water levels shall be collected on a seasonal basis, three times per year, once in the spring, summer and fall, at all on-Site monitoring wells and participating domestic wells.*

2. *An annual groundwater monitoring program shall extend throughout the life of the operation so that confirmatory water table elevations can be obtained as the pit develops.*

3. *The results of the monitoring shall be retained on-file by Cambridge Aggregates so that it can be made available upon request by agencies such as the NDMNRF, MECP, Region of Waterloo or Township of North Dumfries.*

4. *Monitoring wells that may be destroyed by extraction activities shall be decommissioned according to the Wells Regulation (O.Reg. 903) and subsequently replaced (with the exception of MW102-20 and MW106-20) at a location that will ensure the new monitoring wells will remain intact to allow groundwater monitoring to continue.*

5. *MW101-20, MW103-20, MW104-20, MW107-20, MW108-20 & MW109-20 shall be sampled for water quality once per year during the summer for the life of the proposed pit to track trends in water quality. Samples shall be analyzed for general chemistry including select metals, petroleum hydrocarbons (PHC) in the F1 through F4 fraction, and benzene, toluene, ethylbenzene, and xylenes (BTEX).*

1d) evaluation of relevant regional and provincial policies;

In GEC's opinion, the relevant provincial and regional policy requirements described above in **Sections 1.3.1** (PPS), **1.3.2** (Growth Plan) and **1.3.3** (Region OP and Township OP) have been satisfied with respect to the natural environment.

2a) confirmation of an ecologically appropriate boundary of the Core Environmental Feature (Significant Woodland) on the subject lands;

GEC delineated the boundary of the Core Environmental Feature (CEF) on the basis of detailed air photo interpretation and ground-truthing. The boundary of the CEF is shown on **Figures 3** and **12**.

2b) delineation and design of a suitable buffer between the Core Environmental Feature and the proposed aggregate extraction operation within the subject lands;

Buffers ranging in width from 15 m to 45 m in width are proposed, as shown on **Figures 11** and **12**. Reforestation of buffer areas TP-NT1 to TP-NT5, which are primarily in agricultural use at present, will increase the size of the CEF by 1.79 ha.

2c) demonstrate maintenance of the quantitative and qualitative aspects of the hydrological and hydrogeological regimes sustaining the natural features on, and around, the subject lands;

Section 8.3 of MTE's Maximum Predicted Water Table Report (MTE 2022a) provides their wetland impact assessment, which is presented below in italics, verbatim:

> *The Galt Ridge Sudden Bog is located approximately 300 m south of the Site. Based on groundwater mapping completed by MTE the Galt Ridge Sudden Bog is located down gradient with respect to groundwater flow from the Site (Figure 13). As this application is for an above water table pit, MTE does not predict any change to the local groundwater flow pattern. In regards to surface water flow, based on catchment area mapping as presented in Appendix G and Figure 13, the vast majority of the Site is within the Cedar Creek Catchment and does not contribute surface water flow to the Galt Sudden Ridge Bog. Additionally, the presence of Spragues Road prevents the direct connection of any surface water flow on-Site to the Galt Ridge Sudden Bog. As such, MTE does not predict any negative impacts to the Galt Ridge Sudden Bog as a result of proposed pit.*
>
> *The Taylors Lake Wetland is located approximately 400 m southeast of the Site. Based on groundwater mapping completed by MTE the Taylors Lake Wetland is located cross gradient with respect to groundwater flow from the Site (Figure 13). As this application is for an above water table pit, MTE does not predict any change to the local groundwater flow pattern. In regards to surface water flow, based on catchment area mapping as presented in Appendix G and Figure 13, the vast majority of the Site is within the Cedar Creek Watershed and does not contribute surface water flow to the Taylors Lake Wetland. Additionally, the presence of Spragues Road prevents the direct connection of any surface water flow on-Site to the Taylors Lake Wetland. As such, MTE does not predict any negative impacts to the Taylors Lake Wetland as a result of proposed pit.*

2d) evaluate opportunities to enhance the Core Environmental Feature (Significant Woodland) on the subject lands;

As part of the Ecological Enhancement Plan (EEP), enhancements to the Core Environmental Feature (CEF) are described in **Section 9.3.1** and shown on **Figure 11**.

2e) provide an evaluation of potential for cumulative impacts of the proposed aggregate operation in accordance with ROP Policy 9.C.4;

This Natural Environment Technical Report (NETR) and Environmental Impact Statement (EIS) the potential for cumulative impacts that may result from a proposed new mineral aggregate operation when added to other past, present and proposed future mineral aggregate operations in the vicinity of the proposed new operation.

A 42.8 ha above water gravel pit is located east of the site, on the opposite side of Sprague Road. This site is known as the Greenfield Rd Pit (Licence 625482) operated by "Al's Stone Service Inc.", with a maximum allowable tonnage of 350,000 tonnes. Based on a review of aerial photography, this pit is in a relatively early stage of development. The licence area includes land in between the Taylors Lake area and natural areas on the north side of Sprague Road.

Cambridge Aggregates Inc.'s existing 95.58 ha North Dumfries Pit (Licence 607701) is located approximately 1.2 km northeast of the proposed Edworthy West Pit and separated by a natural area containing ponds and wetlands. The above water North Dumfries Pit is situated just beyond the urban boundary of the City of Cambridge. This pit will be substantially depleted and progressively rehabilitated prior to the operation of the Edworthy West Pit.

The extraction area of the proposed Edworthy West Pit is mainly agricultural land under crop rotation. No negative impacts on the local hydrological and hydrogeological regimes are anticipated. MTE (2022a) concluded that "*No cumulative impacts with respect to water quantity or quality are anticipated."* Within the proposed extraction area, a total of 1.62 ha of semi-natural habitats (e.g., Red Pine plantation, old field, shrub thicket, deciduous hedgerow) will be removed. These features will be replaced with 4.7 ha of new naturalized features that are complementary to the Dumfries Carolinian Environmentally Sensitive Landscape (ESL). Approximately 1.0 ha of the Core Environmental Feature (CEF) adjacent to the Edworthy West Pit will be enhanced. Landscape connectivity between the CEF and areas to the west and north will be enhanced. Overall, from a natural environment perspective, the Edworthy West Pit will result in a net environmental gain.

In GEC's opinion, from a natural environment perspective and considering the existing Greenfield Road Pit and the existing North Dumfries Pit, the proposed Edworthy West Pit will not result in any additional negative cumulative impacts.

2f) provide an evaluation of the criteria of ROP Policy 9.C.11 (new mineral aggregate operations on lands designated as Environmentally Sensitive Landscape).

Regarding ROP Policy 9.C.11.(a), it is not feasible to rehabilitate 35% of the licence area to "sustainable natural woodland habitat". There are other planning policies that require the protection of agricultural land, hence the focus of the Rehabilitation Plan on restoring much of

the site to agricultural use. Ecological enhancement and restoration opportunities are described at length in **Sections 9.3** and **9.4**, shown on **Figures 11** to **14**, and detailed in **Tables 6**, **7A** and **7B**.

Since the proposed Edworthy West Pit will involve above water extraction, ROP Policy 9.C.11.(b), is not applicable.

To the extent that they apply, in GEC's opinion the ROP Policies 9.C.11.(c) to 9.C.11.(e) have been addressed through the phasing, Ecological Enhancement Plan (EEP) and Rehabilitation Plan.

12.0 SUMMARY AND RECOMMENDATIONS

A Natural Environment Technical Report (NETR) was prepared under the *Aggregate Resources Act* for the proposed Edworthy West Pit. The report also serves as an Environmental Impact Statement (EIS) that addresses the Region of Waterloo's requirements, as described in the January 31, 2021 EEAC subcommittee report.

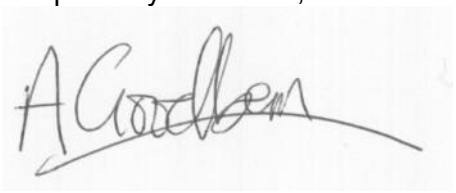
The proposed Edworthy West Pit (the "site") is located on the corner of Spragues Road and Greenfield Road (Part of Lots 16-18, Concession 9), in the Township of North Dumfries. The site is approximately 44.3 ha in size and it is primarily used for agricultural purposes. The site comprises portions of three separate properties (West Property, Central Property and East Property). There are no buildings or structures within the proposed licence boundary.

Cambridge Aggregates Inc. currently operates another gravel pit nearby in the Township of North Dumfries (Licence #607701) at 1182 Alps Road. The proposed Edworthy West Pit will replace depleted reserves at the existing operation. The proposed Class A licenced pit will be accessed via Spragues Road. The proposed extraction area is approximately 35.2 ha and aggregate material is proposed to be extracted from above the water table, with no processing occurring onsite.

Within the proposed extraction area, a total of 1.62 ha of semi-natural habitats (e.g., Red Pine plantation, old field, shrub thicket, deciduous hedgerow) will be removed. Through the implementation of the Ecological Enhancement Plan (EEP) and Rehabilitation Plan (Natural Environment), these semi-natural features will be replaced with 4.7 ha of new naturalized features that are complementary to the Dumfries Carolinian Environmentally Sensitive Landscape (ESL). Approximately 1.0 ha of the Core Environmental Feature (CEF) adjacent to the Edworthy West Pit will be enhanced. Landscape connectivity between the CEF and areas to the west and north will be enhanced.

If the recommendations made in this report with respect to the extraction footprint, operational plan, Ecological Enhancement Plan (EEP) and Rehabilitation Plan (Natural Environment) are implemented as shown on the Site Plans and detailed in this report, it is concluded that the proposed Edworthy West Pit will have no negative effects on Endangered and Threatened species, Dumfries Carolinian Environmentally Sensitive Landscape (ESL) and Core Environmental Feature (CEF). Overall, from a natural environment perspective, the Edworthy West Pit will result in a net environmental gain.

Respectfully submitted,



Anthony G. Goodban, B.Sc., M.E.S.(Pl.), MCIP, RPP
Consulting Ecologist and Natural Heritage Planner

GOODBAN ECOLOGICAL CONSULTING INC. (GEC)

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Figure 1
Location Map

LEGEND

Subject Site

DATE:	April, 2022
SCALE:	1: 50,000
FILE:	1896C
DRAWN:	PL

north

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West Edworthy Pit
Part of Lot 16, 17, and 18, Concession 9
(former geographic Township of Dumfries)
Township of North Dumfries
Regional Municipality of Waterloo

Source: Google Map

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Figure 2
Landscape Context

LEGEND

- Licence Boundary
- 120m Offset
- 500m Offset
- Regional Greenlands System
- NDMNRF Wetland - Evaluated (Significant)
- NDMNRF Wetland - Unevaluated

DATE:	April, 2022
SCALE:	1:12,500
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DRAWN:	PL

north

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West Edworthy Pit
Part of Lot 16, 17, and 18, Concession 9
(former geographic Township of Dumfries)
Township of North Dumfries
Regional Municipality of Waterloo

Notes:
- Produced using information under License with Province of Ontario
- Source: Region of Waterloo Official Plan Map 4 Greenlands Network
  2020 Aerial Photography from Region of Waterloo

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Figure 3
Site Context

West Edworthy Pit
Part of Lot 16, 17 and 18, Concession 9
(former geographic Township of Dumfries)
Regional Municipality of Waterloo

LEGEND

- Licence Boundary
- Limit of Extraction
- Potential Site Entrace / Exit
- Core Environmental Feature

Spragues Road

Shouldice Side Road

Greenfield Road

Date:	January, 2023
Scale:	1: 4,000
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Drawn:	PL

north

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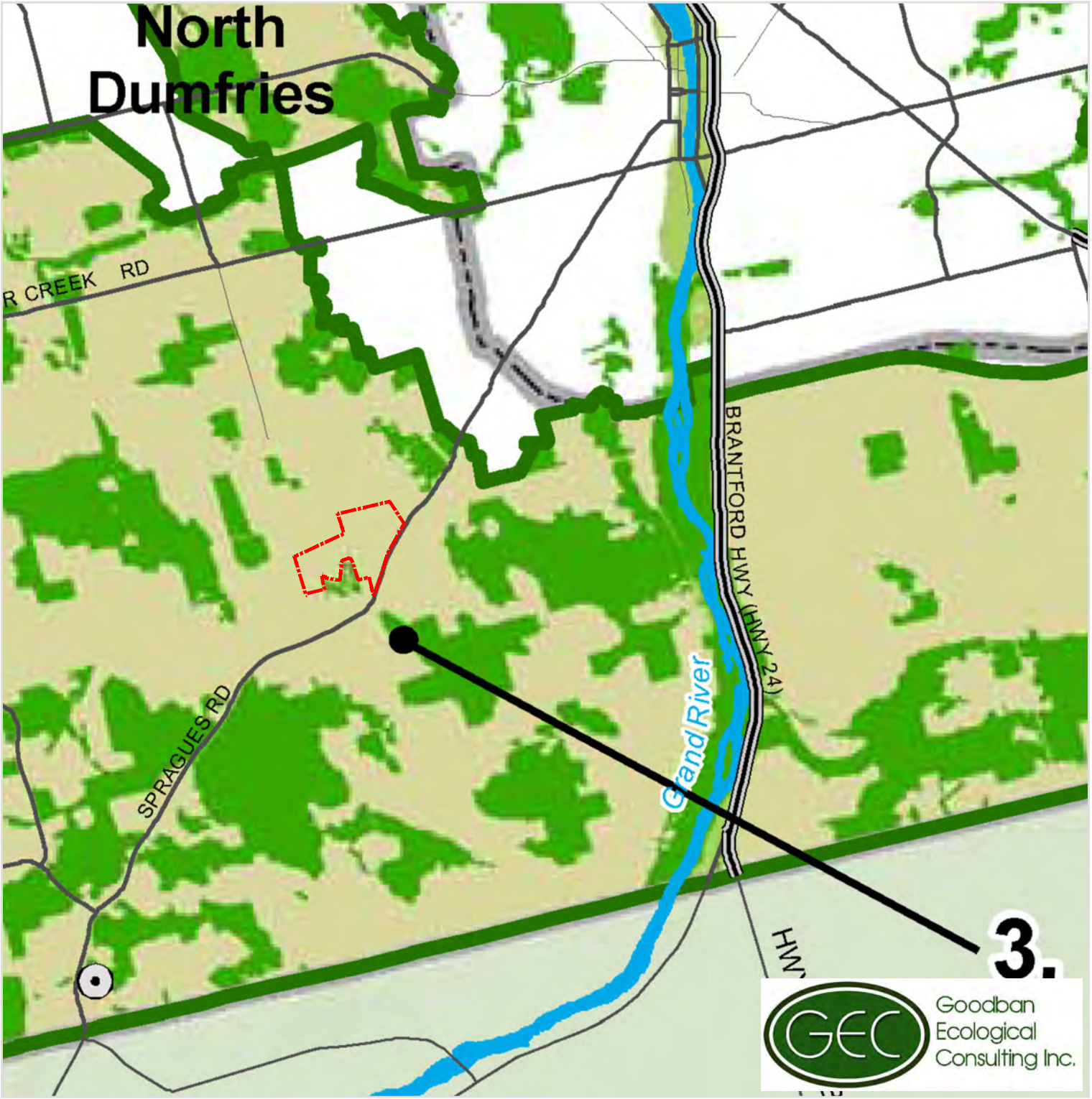

Figure 4
Region of Waterloo
Official Plan (2015):
Map 4 Greenlands Network

LEGEND

License Boundary

Significant Valleys

Environmentally Sensitive Landscape
3. Dumfries Carolinian

Core Environmental Features
include: Provincially Significant Wetlands; Environmentally Sensitive Policy Areas; Regional Forests; Forests greater than 4 ha; and Significant Valley Features

DATE:	April, 2022
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north

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West Edworthy Pit
Part of Lot 16, 17, and 18, Concession 9
(former geographic Township of Dumfries)
Township of North Dumfries
Regional Municipality of Waterloo

Source: Region of Waterloo

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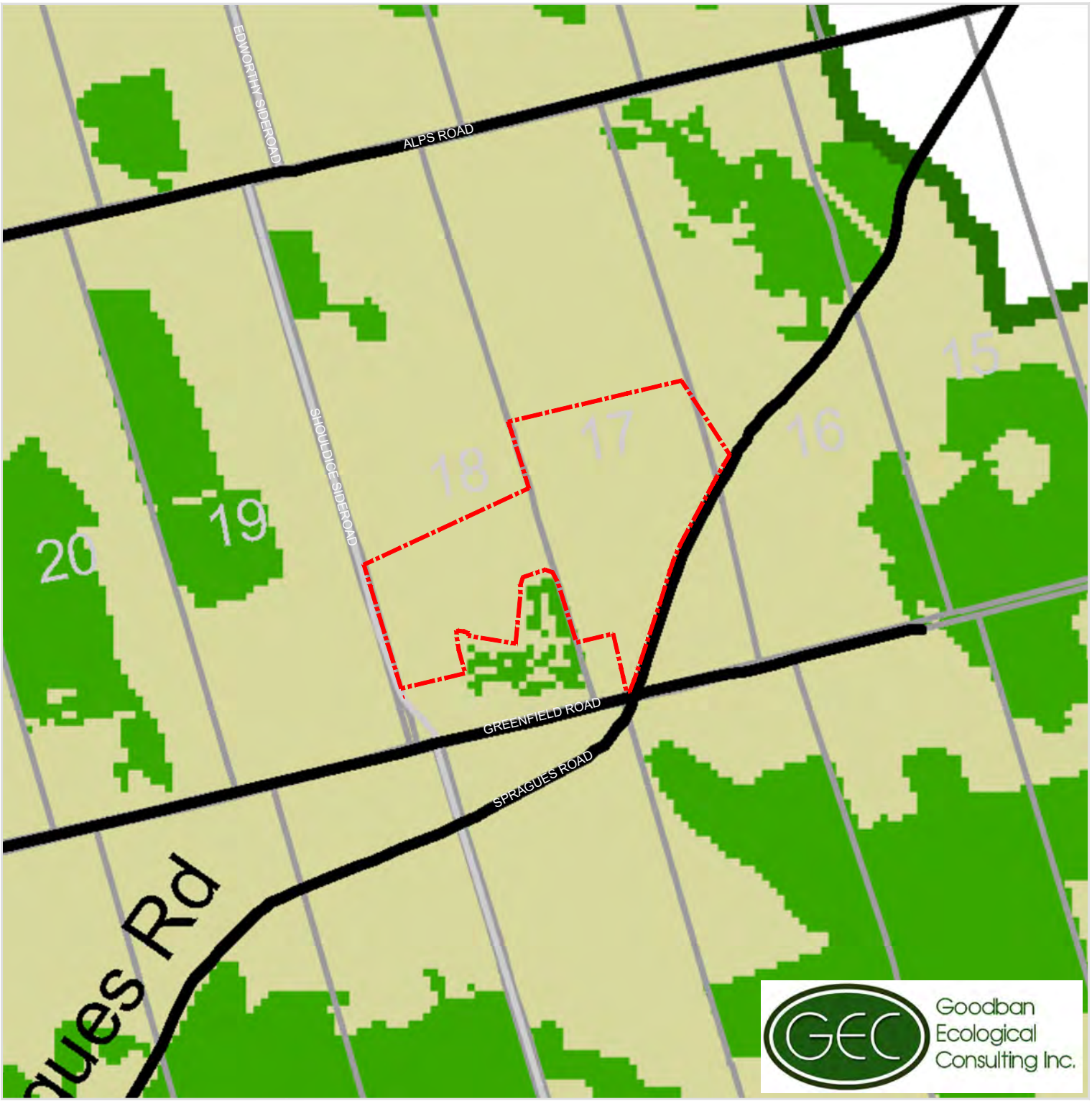

Figure 5
Township of North Dumfries Official Plan (2018):
Map 5A Greenlands Network

West Edworthy Pit
Part of Lot 16, 17, and 18, Concession 9
(former geographic Township of Dumfries)
Township of North Dumfries
Regional Municipality of Waterloo

LEGEND

- Subject Lands
- Environmentally Sensitive Landscape
- Core Environmental Features

Source: Township of North Dumfries

DATE:	April, 2022
SCALE:	1:15,000
FILE:	1896C
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north

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Figure 6
Wildlife Survey Stations - Breeding Birds

LEGEND

Subject Site

Point Count Station

DATE:	April, 2022
SCALE:	1: 7,500
FILE:	1896C
DRAWN:	PL

north

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West Edworthy Pit
Part of Lot 16, 17, and 18, Concession 9
(former geographic Township of Dumfries)
Township of North Dumfries
Regional Municipality of Waterloo

Source: Google Map

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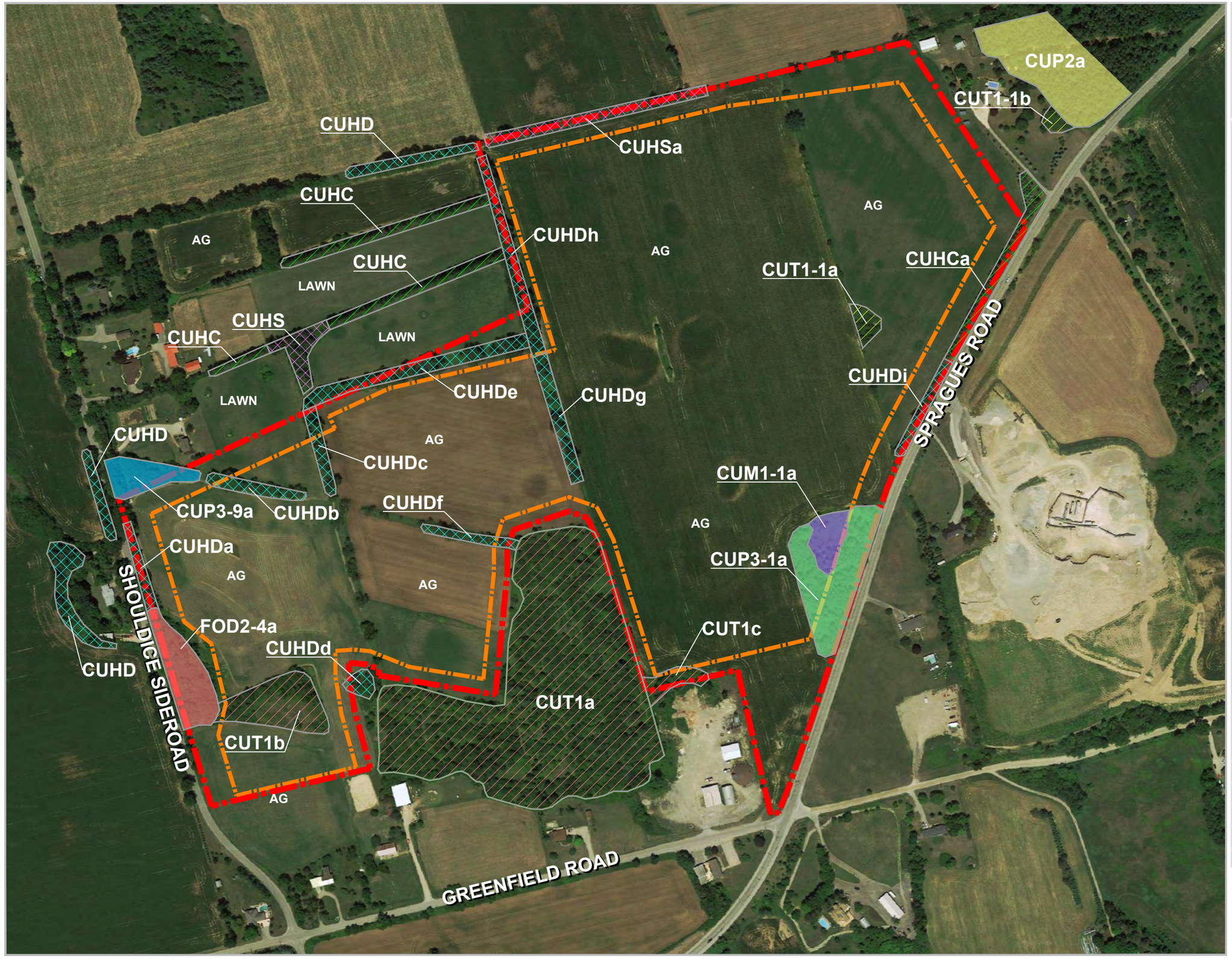
Figure 7
Vegetation Communities

West Edworthy Pit
Part of Lot 16, 17 and 18, Concession 9
(former geographic Township of Dumfries)
Regional Municipality of Waterloo



LEGEND

- Licence Boundary
- Limit of Extraction
- FOD2-4a — Dry-Fresh Oak-Hardwood Deciduous Forest Type
- CUP2a — Mixed Plantation
- CUP3-1a — Red Pine Coniferous Plantation Type
- CUP3-9a — Norway Spruce Coniferous Plantation Type
- CUM1-1a — Dry-Moist Old Field Meadow Type
- CUT1 — (CUT1a to CUT1c) Mineral Cultural Thicket Ecosite
- CUT1-1 — (CUT1-1a and CUT1-1b) Sumac Cultural Thicket Type
- CUHC* — Coniferous Hedgerow
- CUHD* — (CUHD, CUHDa to CUHDi) Deciduous Hedgerow
- CUHS* — (CUHS and CUHAa) Shrub Hedgerow

Note:
* Not in Lee et al. (1998).
Source: Google Satellite Imagery

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Date:	January 2023
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Figure 8
1954 Aerial Photograph

LEGEND

- Licence Boundary
- 120m Study Area

DATE:	April, 2022
SCALE:	1:10,000
FILE:	1896C
DRAWN:	PL

north

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West Edworthy Pit
Part of Lot 16, 17, and 18, Concession 9
(former geographic Township of Dumfries)
Township of North Dumfries
Regional Municipality of Waterloo

Note:
- Contains information licensed under the open government licence - Ontario
- Source: 1954 Air Photos of Southern Ontario, University of Toronto Libraries

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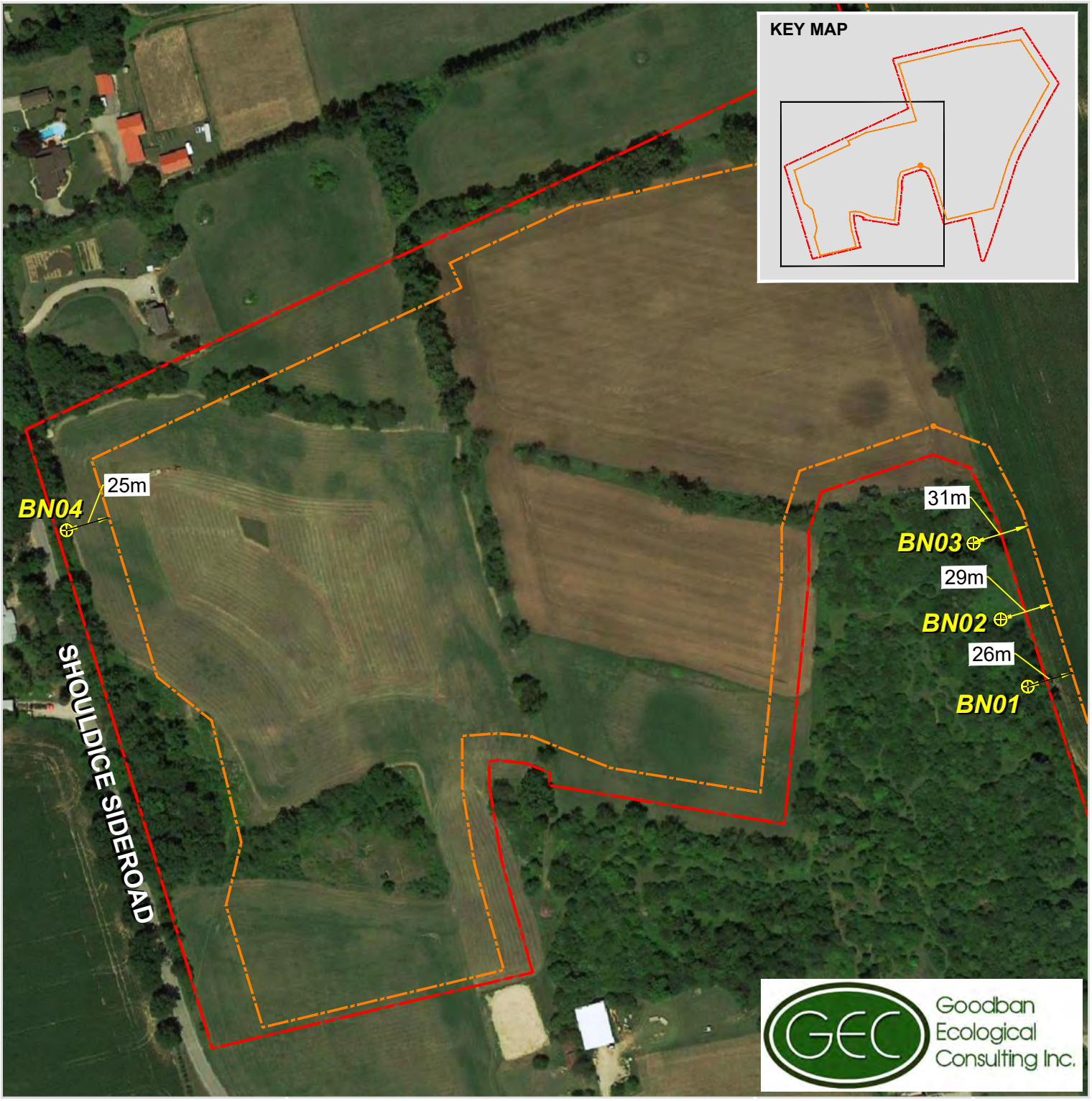

Figure 9
Butternut

LEGEND

Licence Boundary

Butternut Locations

DATE:	January, 2023
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DRAWN:	PL

north

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West Edworthy Pit
Part of Lot 16, 17, and 18, Concession 9
(former geographic Township of Dumfries)
Township of North Dumfries
Regional Municipality of Waterloo

Source: Google satellite Imagery

MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE
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Figure 10
Operations / Phasing

West Edworthy Pit
Part of Lot 16, 17 and 18, Concession 9
(former geographic Township of Dumfries)
Regional Municipality of Waterloo

Phase 3
Phase 1
Phase 2
Berm D
328 masl
Berm B
335 masl
Berm A
333 masl
Berm C
335 masl
3.0m High
Visual Berm
3.0m High
Visual Berm
Spragues Road
Shouldice Side Road
Greenfield Road

LEGEND

- Licence Boundary - 44.3 hectares
- Limit of Extraction - 35.2 hectares
- Extraction Sequence - Phase Boundary (white)
- Extraction Sequence - General Direction (white)
- Potential Site Entrace / Exit
- Acoustic Berm
- Existing Berm
- Visual Berm

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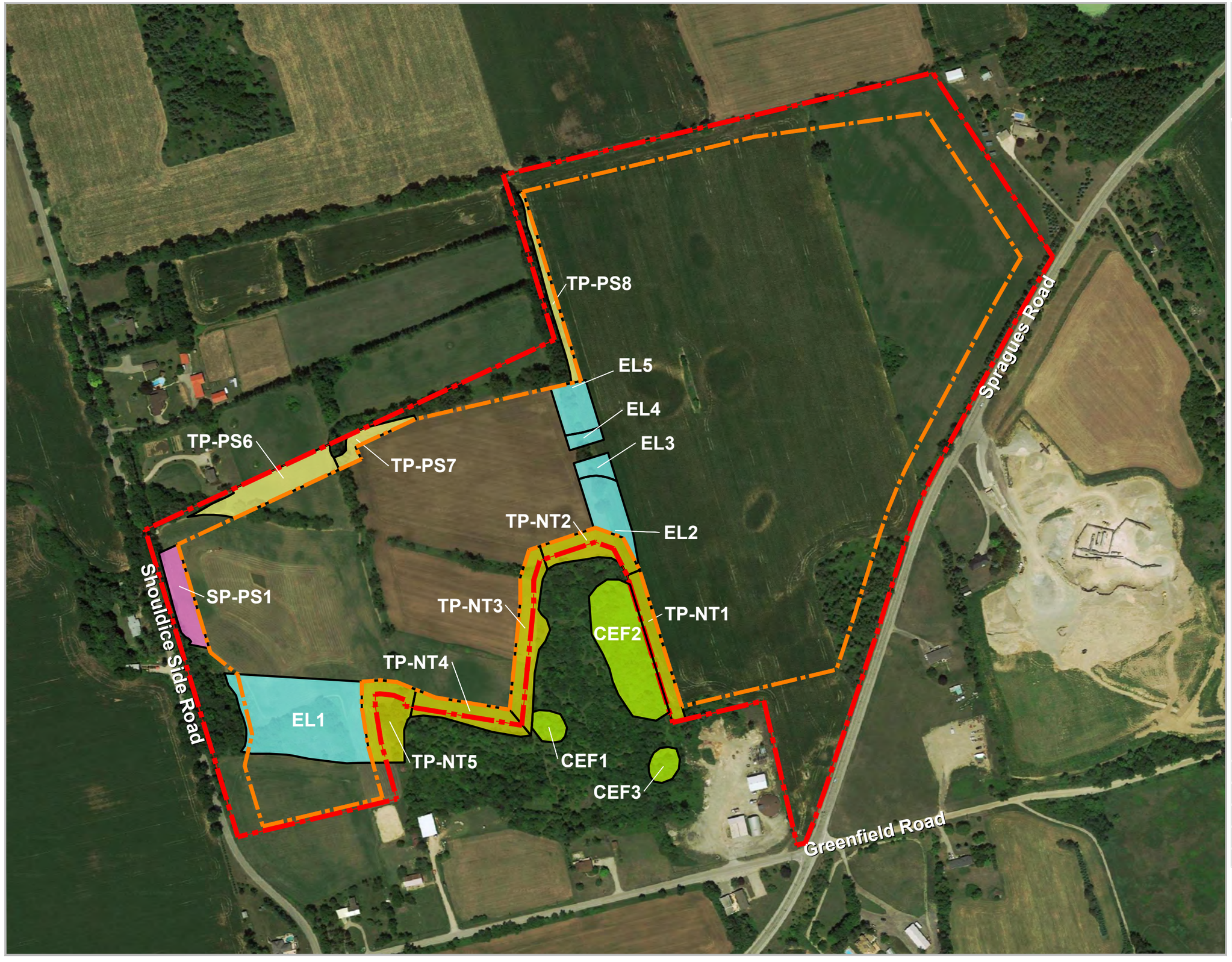
Figure 11

Ecological Enhancement Plan & Rehabilitation Plan (Natural Environment)

West Edworthy Pit

Part of Lot 16, 17 and 18, Concession 9 (former geographic Township of Dumfries) Regional Municipality of Waterloo



LEGEND

- Licence Boundary
- Limit of Extraction
- Shrub-planting - Propoerty Setback (SP-PS1)
- Tree-planting - No Touch Buffer (TP-NT1 to TP-NT5)
- Tree-planting - Property Setback (TP-PS6 to TP-PS8)
- Core Environmental Feature - Enhancement Area (CEF1 to CEF4)
- Ecological Linkage (EL1 to EL5)

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north

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Figure 12
Rehabilitation Plan

West Edworthy Pit
Part of Lot 16, 17 and 18, Concession 9
(former geographic Township of Dumfries)
Regional Municipality of Waterloo

LEGEND

- Licence Boundary
- Limit of Extraction
- Potential Site Entrace / Exit
- Core Environmental Feature
- Shrub-planting - Propoerty Setback (SP-PS1)
- Tree-planting - No Touch Buffer (TP-NT1 to TP-NT5)
- Tree-planting - Property Setback (TP-PS6 to TP-PS8)
- Core Environmental Feature - Enhancement Area (CEF1 to CEF4)
- Ecological Linkage (EL1 to EL5)
- Existing Berm

Goodban Ecological Consulting Inc.

Date:	January, 2023
Scale:	1: 4,000
File:	1896C
Drawn:	PL

north

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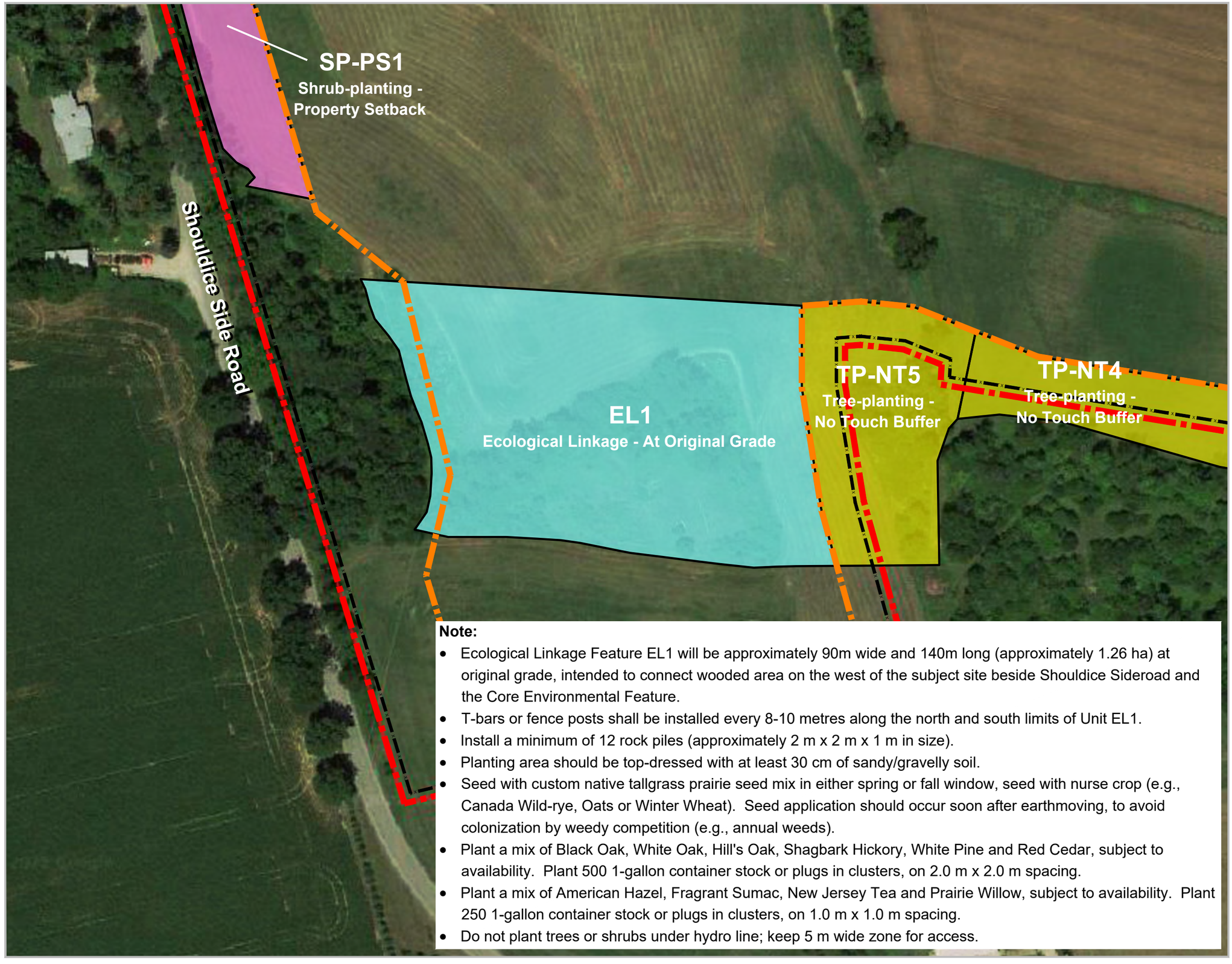

Figure 13
Details for Ecological Linkage EL1

West Edworthy Pit
Part of Lot 16, 17 and 18, Concession 9 (former geographic Township of Dumfries) Regional Municipality of Waterloo

LEGEND

- Licence Boundary
- Limit of Extraction
- Shrub-planting -Property Setback (SP-PS1)
- Tree-planting - No Touch Buffer (TP-NT4 and TP-NT5)
- Ecological Linkage (EL1)
- Fence

Note:

- Ecological Linkage Feature EL1 will be approximately 90m wide and 140m long (approximately 1.26 ha) at original grade, intended to connect wooded area on the west of the subject site beside Shouldice Sideroad and the Core Environmental Feature.
- T-bars or fence posts shall be installed every 8-10 metres along the north and south limits of Unit EL1.
- Install a minimum of 12 rock piles (approximately 2 m x 2 m x 1 m in size).
- Planting area should be top-dressed with at least 30 cm of sandy/gravelly soil.
- Seed with custom native tallgrass prairie seed mix in either spring or fall window, seed with nurse crop (e.g., Canada Wild-rye, Oats or Winter Wheat). Seed application should occur soon after earthmoving, to avoid colonization by weedy competition (e.g., annual weeds).
- Plant a mix of Black Oak, White Oak, Hill's Oak, Shagbark Hickory, White Pine and Red Cedar, subject to availability. Plant 500 1-gallon container stock or plugs in clusters, on 2.0 m x 2.0 m spacing.
- Plant a mix of American Hazel, Fragrant Sumac, New Jersey Tea and Prairie Willow, subject to availability. Plant 250 1-gallon container stock or plugs in clusters, on 1.0 m x 1.0 m spacing.
- Do not plant trees or shrubs under hydro line; keep 5 m wide zone for access.

Goodban Ecological Consulting Inc.

Date:	January, 2023
Scale:	1: 1,250
File:	1896C
Drawn:	PL

north

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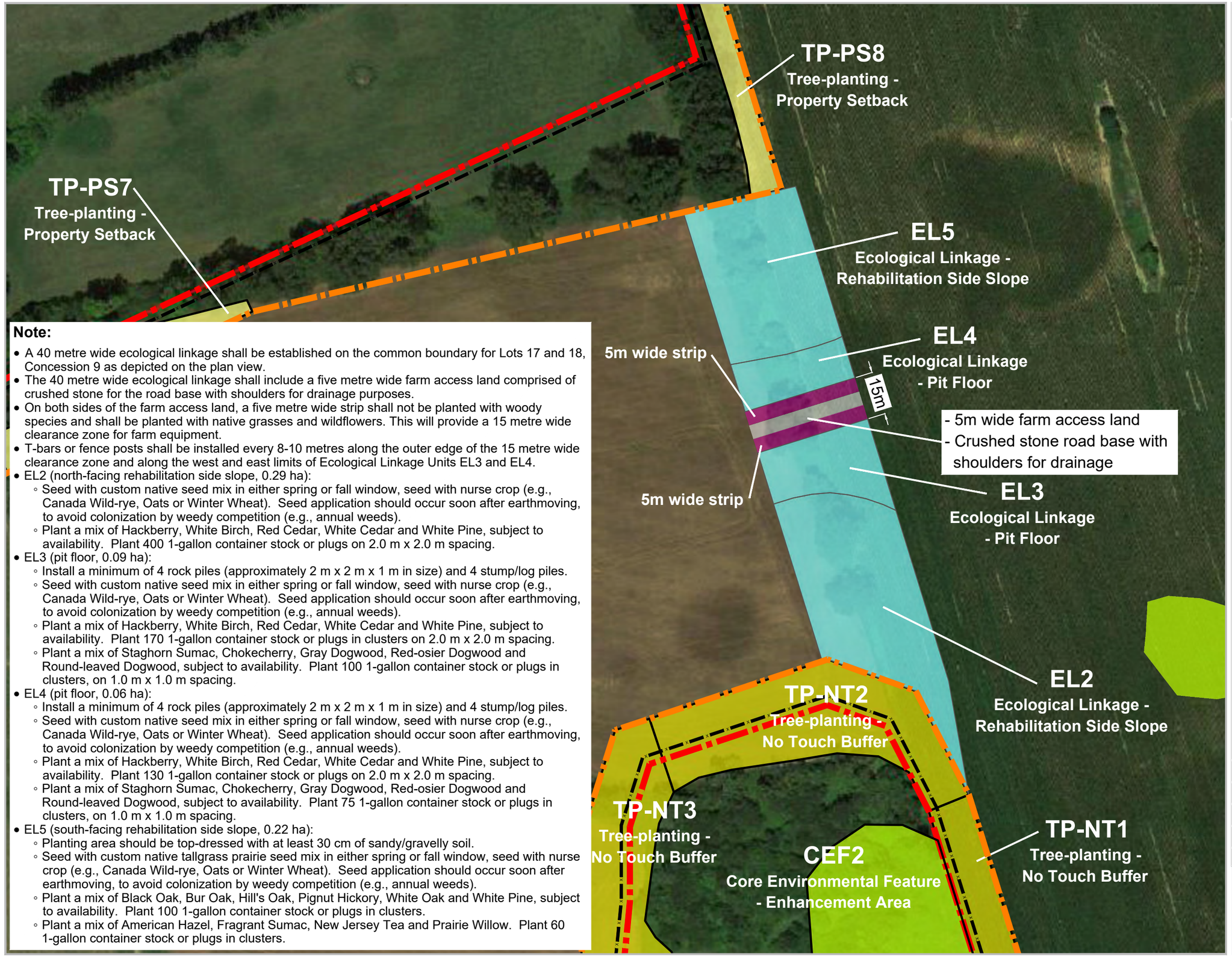
Figure 14

Details for Ecological Linkage EL2-EL5

West Edworthy Pit
Part of Lot 16, 17 and 18, Concession 9 (former geographic Township of Dumfries) Regional Municipality of Waterloo



Note:

- A 40 metre wide ecological linkage shall be established on the common boundary for Lots 17 and 18, Concession 9 as depicted on the plan view.
- The 40 metre wide ecological linkage shall include a five metre wide farm access land comprised of crushed stone for the road base with shoulders for drainage purposes.
- On both sides of the farm access land, a five metre wide strip shall not be planted with woody species and shall be planted with native grasses and wildflowers. This will provide a 15 metre wide clearance zone for farm equipment.
- T-bars or fence posts shall be installed every 8-10 metres along the outer edge of the 15 metre wide clearance zone and along the west and east limits of Ecological Linkage Units EL3 and EL4.
- EL2 (north-facing rehabilitation side slope, 0.29 ha):
  - Seed with custom native seed mix in either spring or fall window, seed with nurse crop (e.g., Canada Wild-rye, Oats or Winter Wheat). Seed application should occur soon after earthmoving, to avoid colonization by weedy competition (e.g., annual weeds).
  - Plant a mix of Hackberry, White Birch, Red Cedar, White Cedar and White Pine, subject to availability. Plant 400 1-gallon container stock or plugs on 2.0 m x 2.0 m spacing.
- EL3 (pit floor, 0.09 ha):
  - Install a minimum of 4 rock piles (approximately 2 m x 2 m x 1 m in size) and 4 stump/log piles.
  - Seed with custom native seed mix in either spring or fall window, seed with nurse crop (e.g., Canada Wild-rye, Oats or Winter Wheat). Seed application should occur soon after earthmoving, to avoid colonization by weedy competition (e.g., annual weeds).
  - Plant a mix of Hackberry, White Birch, Red Cedar, White Cedar and White Pine, subject to availability. Plant 170 1-gallon container stock or plugs in clusters on 2.0 m x 2.0 m spacing.
  - Plant a mix of Staghorn Sumac, Chokecherry, Gray Dogwood, Red-osier Dogwood and Round-leaved Dogwood, subject to availability. Plant 100 1-gallon container stock or plugs in clusters, on 1.0 m x 1.0 m spacing.
- EL4 (pit floor, 0.06 ha):
  - Install a minimum of 4 rock piles (approximately 2 m x 2 m x 1 m in size) and 4 stump/log piles.
  - Seed with custom native seed mix in either spring or fall window, seed with nurse crop (e.g., Canada Wild-rye, Oats or Winter Wheat). Seed application should occur soon after earthmoving, to avoid colonization by weedy competition (e.g., annual weeds).
  - Plant a mix of Hackberry, White Birch, Red Cedar, White Cedar and White Pine, subject to availability. Plant 130 1-gallon container stock or plugs on 2.0 m x 2.0 m spacing.
  - Plant a mix of Staghorn Sumac, Chokecherry, Gray Dogwood, Red-osier Dogwood and Round-leaved Dogwood, subject to availability. Plant 75 1-gallon container stock or plugs in clusters, on 1.0 m x 1.0 m spacing.
- EL5 (south-facing rehabilitation side slope, 0.22 ha):
  - Planting area should be top-dressed with at least 30 cm of sandy/gravelly soil.
  - Seed with custom native tallgrass prairie seed mix in either spring or fall window, seed with nurse crop (e.g., Canada Wild-rye, Oats or Winter Wheat). Seed application should occur soon after earthmoving, to avoid colonization by weedy competition (e.g., annual weeds).
  - Plant a mix of Black Oak, Bur Oak, Hill's Oak, Pignut Hickory, White Oak and White Pine, subject to availability. Plant 100 1-gallon container stock or plugs in clusters.
  - Plant a mix of American Hazel, Fragrant Sumac, New Jersey Tea and Prairie Willow. Plant 60 1-gallon container stock or plugs in clusters.

LEGEND

- Licence Boundary
- Limit of Extraction
- Tree-planting - No Touch Buffer (TP-NT1 to TP-NT3)
- Tree-planting - Property Setback (TP-PS7 to TP-PS8)
- Core Environmental Feature - Enhancement Area (CEF2)
- Ecological Linkage (EL2 to EL5)
- Fence

Goodban Ecological Consulting Inc.

Date:	November, 2022
Scale:	1: 1,250
File:	1896C
Drawn:	PL

north

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Table 1: Ecological Survey Details – 2019 to 2022
Proposed Edworthy West Pit
Goodban Ecological Consulting Inc. (GEC)

Date	Surveyors[1]	Time	Purpose	Weather Conditions[2]	Notes
2019-06-21	AG		• Field Reconnaissance		Initial field reconnaissance visit.
2019-07-05	AG		• Field Reconnaissance		Initial field reconnaissance visit.
2020/04/09	AG	1310-1620	• Spring Vegetation and Flora • Snake Emergence • General Wildlife	T = 9ºC, BWS = 1, CC = 50	Multi-purpose visit.
2020/05/13	AG	1235-1540	• Spring Vegetation and Flora • Snake Emergence • General Wildlife	T = 12ºC, BWS = 2, CC = 50	Multi-purpose visit.
2020/06/17	TH	0520-0650	• Breeding Bird Survey • General Wildlife	T = 8ºC, BWS = 1, CC = 100	1st breeding bird survey.
2020/06/25	TH	0825-0955	• Breeding Bird Survey • General Wildlife	T = 19ºC, BWS = 1, CC = 70	2nd breeding bird survey.
2020/06/19	AG	1050-1630	• Late spring/early summer vegetation and flora. • General wildlife.		Multi-purpose visit.
2020/07/02	TH	0820-0950	• Breeding Bird Survey • General Wildlife	T = 24ºC, BWS = 3, CC = 0	3rd breeding bird survey.
2020/09/26	AG	1305-1640	• Fall Vegetation and Flora • General Wildlife		Multi-purpose visit.

Table 1: Ecological Survey Details – 2019 to 2022
Proposed Edworthy West Pit
Goodban Ecological Consulting Inc. (GEC)

Date	Surveyors[1]	Time	Purpose	Weather Conditions[2]	Notes
2021/03/29	AG	1330-1620	• Vegetation • Snake Emergence • General Wildlife	T = 9ºC, BWS = 1, CC = 25	Multi-purpose visit.
2021/05/10	AG	1245-1540	• Spring Vegetation and Flora • Snake Emergence • General Wildlife	T = 12ºC, BWS = 1, CC = 20	Multi-purpose visit.
2021/06/11	TH	0545-0805	• Breeding Bird Survey • General Wildlife	T = 15ºC, BWS = 2, CC = 40	1st breeding bird survey.
2021/07/04	TH	0740-0955	• Breeding Bird Survey • General Wildlife	T = 19ºC, BWS = 1, CC = 100	2nd breeding bird survey.
2021/07/31	AG		• Milkweed/Monarch Caterpillar Survey • Summer Vegetation and Flora • General Wildlife		Multi-purpose visit.
2021/09/18	AG		• Fall Vegetation and Flora • General Wildlife		Multi-purpose visit.
2022/02/01	AG, JJ		• Assess CEF for “woodland” conditions • Winter wildlife		Winter, leaf-off, multi-purpose visit.
2022/03/29	AG		• Cavity Tree Assessment (Bat Maternity Roost Survey)		An assessment of potential bat maternal roosting habitat (e.g., snags, cavity trees) within the proposed extraction area was completed.

Table 1: Ecological Survey Details – 2019 to 2022
Proposed Edworthy West Pit
Goodban Ecological Consulting Inc. (GEC)

Date	Surveyors[1]	Time	Purpose	Weather Conditions[2]	Notes

TABLE 1 NOTES:

[1]**Surveyors**

AG – Anthony Goodban (Goodban Ecological Consulting Inc.)
JJ – Jeremy Jackson (Jackson Arboriculture Inc.)
TH – Tyler Hoar (Ornithologist and Wildlife Biologist)

[2]**Weather Conditions** (Information provided for weather-dependent wildlife surveys)
T - Temperature (°C)
BWS - Beaufort Wind Scale (0 to 12)
CC - Cloud Cover (%)

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TABLE 2: VEGETATION COMMUNITIES (ELC UNITS)
Edworthy West Pit, Township of North Dumfries

ELC Code[1]	Community Type[1]	Dominant Species	Tree Size Class[2] (cm DBH)	Cover Code[3]	Soils / Drainage	Area (ha) in Licence Area	Area (ha) in Extraction Area	Photo Numbers[4]	General Description
FOD2-4a	Dry-Fresh Oak-Hardwood Deciduous Forest Type	Red Oak >> Black Cherry – White Oak – Trembling Aspen – White Pine – Red Maple – Sugar Maple / Common Buckthorn (+)	25-50 >50	>60%	Burford gravelly loam / well drained	0.41	-	7	A small forested ridge runs along the east side of Shouldice Sideroad. The trees are a mix of oaks, Black Cherry, maples and Trembling Aspen (Unit FOD2-4a). Common Buckthorn (+) forms thick patches under the tree canopy. This feature will be retained.
CUP2a	Mixed Plantation	White Pine – Red Pine – Scots Pine (+) – Sugar Maple – Black Walnut – Norway Maple (+) / Common Buckthorn (+)	10-24 25-50	>60%	Burford gravelly loam / well drained	-	-	8, 9	To the northeast of the proposed extraction area there is a Mixed Plantation (Unit CUP2a). The main tree species are White Pine, Red Pine, Scots Pine (+), Sugar Maple, Black Walnut and Norway Maple (+). There are some well-used trails within the Mixed Plantation. There are a number of Hackberry seedlings and saplings growing along the edges of the trails and elsewhere.
CUP3-1a	Red Pine Coniferous Plantation Type	Red Pine / Common Buckthorn (+)	10-24 25-50	>60%	Burford gravelly loam / well drained	0.75	0.26	10-12	On the Central Property there is a small Red Pine Conifer Plantation (Unit CUP3-1) beside Spragues Road. Unit CUP3-1a is even-aged. A portion of this unit will be retained within the 30 m setback along Spragues Road.
CUP3-9a	Norway Spruce Coniferous Plantation Type	Norway Spruce (+)	10-24	>60%	Camilla sandy loam / imperfectly drained	0.07	-	13	East of Shouldice Sideroad, straddling the north limit of the West Property, there is a narrow strip of Norway Spruce (+) Conifer Plantation (Unit CUP3-9a).
CUM1-1a	Dry-Moist Old Field Meadow Type	Smooth Brome (*Bromus inermis* +) – Kentucky Bluegrass (*Poa pratensis* +) – Quackgrass (*Elymus repens* +) / Staghorn Sumac – Common Buckthorn (+) / Red Pine	n/a	n/a	Burford gravelly loam / well drained	0.21	0.2	14	A small patch of old field meadow (Unit CUM1-1a) is associated with the Red Pine Plantation (CUP3-1a) beside Spragues Road.

TABLE 2: VEGETATION COMMUNITIES (ELC UNITS)
Edworthy West Pit, Township of North Dumfries

ELC Code[1]	Community Type[1]	Dominant Species	Tree Size Class[2] (cm DBH)	Cover Code[3]	Soils / Drainage	Area (ha) in Licence Area	Area (ha) in Extraction Area	Photo Numbers[4]	General Description
CUT1a	Mineral Cultural Thicket Ecosite	Common Buckthorn (+) – Hawthorns – Gray Dogwood / Black Cherry – White Pine	10-24 25-50	n/a	Burford gravelly loam / well drained St. Jacobs loam / well drained	-	-	15-32	The 5.45 ha Core Environmental Feature (CEF) is mapped as Unit CUT1a. The CEF is a large shrub thicket, dominated by tall shrubs such as Common Buckthorn (+), hawthorns and Gray Dogwood. Although the CEF (Unit CUT1a) is primarily a large shrub thicket, there are clusters of trees, as well as small pockets of old field vegetation scattered throughout. In portions of the CEF with denser shrub cover, the groundcovers are dominated by shade-tolerant Common Buckthorn (+) seedlings and alien invasive species such as Garlic Mustard (+). There is a Butternut tree and two seedlings in growing within this unit; all are affected by Butternut Canker. The trees are limited to individual stems, tree clusters and remnant hedgerows. The main species are open-grown White Pine and Black Cherry. The CEF was mapped as a shrub thicket community because, overall, tree cover is far less than 25%. The CEF also appears to lack the number of tree stems required to meet the *Forestry Act* definition of woodland. There is an extensive network of trails within the CEF, which are used by the owner for hiking, snowshoeing, skiing and, in some areas, snowmobiling.
CUT1b	Mineral Cultural Thicket Ecosite	Common Buckthorn (+) – Staghorn Sumac – White Pine / White Pine – Black Cherry	25-50	n/a	Burford gravelly loam / well drained	0.55	0.54	33-37	Unit CUT1b is a variable unit that includes dense patches of Common Buckthorn (+), Staghorn Sumac and Gray Dogwood. The scattered trees are mainly young White Pine, Red Cedar and White Ash regeneration. White Pine regeneration has spread from a few larger open-grown trees at the top of a low ridge. There is also a remnant hedgerow strip of declining Black Cherry.
CUT1c	Mineral Cultural Thicket Ecosite	Common Buckthorn (+) – Hawthorns – Gray Dogwood / Scots Pine (+)	25-50	n/a	Burford gravelly loam / well drained	0.11	0.009	38	Unit CUT1c is a shrub thicket unit located mostly on the Township of North Dumfries Roads Department Yard. The shrubs are mainly Common Buckthorn (+), Staghorn Sumac and Gray Dogwood, overgrown with Riverbank Grape. The trees are mainly Black Cherry and planted Red Pine and Scots Pine (+).

TABLE 2: VEGETATION COMMUNITIES (ELC UNITS)
Edworthy West Pit, Township of North Dumfries

ELC Code[1]	Community Type[1]	Dominant Species	Tree Size Class[2] (cm DBH)	Cover Code[3]	Soils / Drainage	Area (ha) in Licence Area	Area (ha) in Extraction Area	Photo Numbers[4]	General Description
CUT1-1a	Sumac Cultural Thicket Type	Staghorn Sumac	n/a	n/a	St. Jacobs loam / well drained	0.098	0.098	39-41	Unit CUT1-1a is a small patch of Staghorn Sumac growing in what appears to be an old borrow pit. Many of the shrubs are covered in Riverbank Grape. There is some farm refuse dumped in this small depression. Unit CUT1-1a was raised by GRCA as a possible wetland feature. The bottom of this small depression is located well above the water table, it contains no standing water and it only supports upland plant species. It is not a wetland feature.
CUT1-1b	Sumac Cultural Thicket Type	Staghorn Sumac	n/a	n/a	St. Jacobs loam / well drained	-	-		Unit CUT1-1b is a small patch of Staghorn Sumac located on the East Property, beyond the east limit of the proposed Licence Area.
CUHCa*	Coniferous Hedgerow	White Spruce – Norway Spruce (+)	10-24	n/a	n/a	0.14	-	51	Unit CUHC is a narrow strip of White Spruce and Norway Spruce (+) planted as a windbreak beside Spragues Road on the East Property.
CUHD*	Deciduous Hedgerow	Black Cherry – Oaks – Hackberry / Common Buckthorn (+) – Staghorn Sumac	10-25 25-50 >50	n/a	n/a	1.2	0.52	42-51	The deciduous hedgerows are concentrated on the West Property, both along some of the property boundaries and between various field compartments. The trees are mainly Black Cherry, oaks and Hackberry. There are some patches of Common Buckthorn (+) and Staghorn Sumac in some of the hedgerows. A number of the Black Cherry trees are declining. Riverbank Grape and Virginia Creeper has infested some of the trees.
CUHSa*	Shrub Hedgerow	Common Buckthorn (+) – Staghorn Sumac – Hawthorns / Black Cherry - Oaks	25-50	n/a	n/a	0.18	-	52	Unit CUHSa is a shrubby hedgerow located along the north limit of the Central Property. The main shrub species are Common Buckthorn (+), Staghorn Sumac and hawthorns. The trees are Black Cherry and oaks.

Table 1 - Notes:

[1]ELC codes and community types are based on Lee et al. (1998).

Lee, H.T., W.D. Bakowsky, J.L. Riley, J. Bowles, M. Puddister, P. Uhlig and S. McMurray. 1998. Ecological Land Classification for Southern Ontario: First Approximation and Its Application. Ontario Ministry of Natural Resources, Southcentral Science Section, Science Development and Transfer Branch. SCSS Field Guide FG-02. 225 pp.

*Not included in Lee et al. (1998).

[2]Tree Size Class: <10 cm dbh; 10-24 cm dbh; 25-50 cm dbh; >50 cm

[3]Cover Code: 0 = none; 1 = 0-10%; 2 = 11-25%; 3 = 26-60%; 4 = >60%

[4]See **Attachment C** for representative site photographs.

Table 3: Insect observations made between 2020 and 2022
Proposed Edworthy West Pit, Township of North Dumfries

Scientific Name	Common Name	S-Rank	N-Rank	Exotic Status
Tramea lacerata	Black Saddlebags	S4	N4B,NNRM	
Anax junius	Common Green Darner	S5	N5B,NNRN,N5M	
Bombus impatiens	Common Eastern Bumble Bee	S5	N5	
Celastrina sp.	Azure			
Papilio polyxenes	Black Swallowtail	S5	N5	
Pieris rapae	Cabbage White	SNA	NNA	SE
Coenonympha tullia	Common Ringlet	S5	N5	
Thymelicus lineola	European Skipper	SNA	NNA	SE
Speyeria cybele	Great Spangled Fritillary	S5	N5	
Danaus plexippus	Monarch	S2N,S4B	N3B,NNRM	
Nymphalis antiopa	Mourning Cloak	S5	N5	
Phyciodes cocyta	Northern Crescent	S5	N5	
Colias eurytheme	Orange Sulphur	S5	N5B,N5M	
Vanessa atalanta	Red Admiral	S5B	N5B,N5M	
Limenitis arthemis astyanax	Red-spotted Purple	S5	N5	
Epargyreus clarus	Silver-spotted Skipper	S4	N5	
Limenitis archippus	Viceroy	S5	N5	
Limenitis arthemis arthemis	White Admiral	S5	N5	

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Table 4: Bird observations made during the 2020 and 2021 breeding seasons Proposed Edworthy West Pit, Township of North Dumfries							
Common Name	**Scientific Name**	**Breeding Evidence**	**2020**	**2021**	**Licence Area**	**Extraction Area**	**Adjacent Lands**
GALLIFORMES: Phasianidae							
Wild Turkey	*Meleagris gallopavo*	Possible	X		X	X	
COLUMBIFORMES: Columbidae							
Rock Pigeon	*Columba livia*	Possible	X				X
Mourning Dove	*Zenaida macroura*	Probable	X	X	X	X	X
CUCULIFORMES: Cuculidae							
Yellow-billed Cuckoo	*Coccyzus americanus*	Possible		X	X		
Black-billed Cuckoo	*Coccyzus erythropthalmus*	Possible	X	X	X		X
GRUIFORMES: Gruidae							
Sandhill Crane	*Antigone canadensis*	No Evidence	X				X
CHARADRIIFORMES: Charadriidae							
Killdeer	*Charadrius vociferus*	Confirmed	X	X	X	X	X
PELECANIFORMES: Ardeidae							
Great Blue Heron	*Ardea herodias*	No Evidence		X			X
CATHARTIFORMES: Cathartidae							
Turkey Vulture	*Cathartes aura*	No Evidence	X	X			X
ACCIPITRIFORMES: Accipitridae							
Red-tailed Hawk	*Buteo jamaicensis*	Possible	X		X		X
PICIFORMES: Picidae							
Red-bellied Woodpecker	*Melanerpes carolinus*	Confirmed		X	X	X	
Downy Woodpecker	*Dryobates pubescens*	Possible	X	X	X		X
Northern Flicker	*Colaptes auratus*	Probable	X	X		X	X
PASSERIFORMES: Tyrannidae							
Eastern Wood-Pewee	*Contopus virens*	Possible		X	X		

Table 4: Bird observations made during the 2020 and 2021 breeding seasons Proposed Edworthy West Pit, Township of North Dumfries							
Common Name	**Scientific Name**	**Breeding Evidence**	**2020**	**2021**	**Licence Area**	**Extraction Area**	**Adjacent Lands**
Eastern Phoebe	*Sayornis phoebe*	Possible	X	X			X
Great Crested Flycatcher	*Myiarchus crinitus*	Probable	X	X	X		
Eastern Kingbird	*Tyrannus tyrannus*	Confirmed	X	X	X	X	
PASSERIFORMES: Vireonidae							
Warbling Vireo	*Vireo gilvus*	Possible	X	X			
Red-eyed Vireo	*Vireo olivaceus*	Possible	X	X	X		X
PASSERIFORMES: Corvidae							
Blue Jay	*Cyanocitta cristata*	Possible	X	X			
American Crow	*Corvus brachyrhynchos*	Possible	X	X	X	X	
PASSERIFORMES: Paridae							
Black-capped Chickadee	*Poecile atricapillus*	Possible	X	X	X		X
PASSERIFORMES: Alaudidae							
Horned Lark	*Eremophila alpestris*	Probable	X	X	X	X	X
PASSERIFORMES: Hirundinidae							
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	Possible	X			X	
Purple Martin	*Progne subis*	Possible	X			X	
Tree Swallow	*Tachycineta bicolor*	Possible	X		X	X	
Barn Swallow	*Hirundo rustica*	Possible	X	X	X	X	X
PASSERIFORMES: Sittidae							
White-breasted Nuthatch	*Sitta carolinensis*	Possible		X	X		
PASSERIFORMES: Troglodytidae							
House Wren	*Troglodytes aedon*	Confirmed	X	X	X	X	X
PASSERIFORMES: Sturnidae							
European Starling	*Sturnus vulgaris*	Confirmed	X	X	X		X

Table 4: Bird observations made during the 2020 and 2021 breeding seasons Proposed Edworthy West Pit, Township of North Dumfries							
Common Name	**Scientific Name**	**Breeding Evidence**	**2020**	**2021**	**Licence Area**	**Extraction Area**	**Adjacent Lands**
PASSERIFORMES: Mimidae							
Gray Catbird	*Dumetella carolinensis*	Probable	X	X	X	X	X
Brown Thrasher	*Toxostoma rufum*	Possible	X				X
PASSERIFORMES: Turdidae							
American Robin	*Turdus migratorius*	Confirmed	X	X	X	X	X
PASSERIFORMES: Bombycillidae							
Cedar Waxwing	*Bombycilla cedrorum*	Possible	X	X	X		X
PASSERIFORMES: Passeridae							
House Sparrow	*Passer domesticus*	Confirmed	X	X			X
PASSERIFORMES: Fringillidae							
American Goldfinch	*Spinus tristis*	Possible	X	X	X	X	X
PASSERIFORMES: Passerellidae							
Grasshopper Sparrow	*Ammodramus savannarum*	Possible	X		X		
Chipping Sparrow	*Spizella passerina*	Probable	X	X		X	X
Field Sparrow	*Spizella pusilla*	Confirmed	X	X	X	X	X
Vesper Sparrow	*Pooecetes gramineus*	Confirmed	X	X	X	X	X
Savannah Sparrow	*Passerculus sandwichensis*	Confirmed	X	X	X	X	X
Song Sparrow	*Melospiza melodia*	Confirmed	X	X	X	X	X
Eastern Towhee	*Pipilo erythrophthalmus*	Possible		X			X
PASSERIFORMES: Icteridae							
Baltimore Oriole	*Icterus galbula*	Confirmed	X	X	X	X	X
Red-winged Blackbird	*Agelaius phoeniceus*	Probable	X	X	X	X	X
Brown-headed Cowbird	*Molothrus ater*	Probable		X	X	X	X
Common Grackle	*Quiscalus quiscula*	Possible	X	X	X		

Table 4: Bird observations made during the 2020 and 2021 breeding seasons Proposed Edworthy West Pit, Township of North Dumfries							
Common Name	**Scientific Name**	**Breeding Evidence**	**2020**	**2021**	**Licence Area**	**Extraction Area**	**Adjacent Lands**
PASSERIFORMES: Parulidae							
Common Yellowthroat	*Geothlypis trichas*	Possible	X	X	X	X	X
Yellow Warbler	*Setophaga petechia*	Possible		X			X
PASSERIFORMES: Cardinalidae							
Northern Cardinal	*Cardinalis cardinalis*	Confirmed	X	X	X	X	X
Indigo Bunting	*Passerina cyanea*	Confirmed	X	X	X	X	X
Overall Total Number of Species = 51	Total Number of Species		43	41	36	27	36

Table 5: Mammal Observations made between 2019 and 2022
Proposed Edworthy West Pit, Township of North Dumfries

Scientific Name	Common Name	S-Rank	N-Rank
Canis latrans	Coyote	S5	N5
Tamias striatus	Eastern Chipmunk	S5	N5
Sylvilagus floridanus	Eastern Cottontail	S5	N5
Sciurus carolinensis	Eastern Gray Squirrel	S5	N5
Microtus pennsylvanicus	Meadow Vole	S5	N5
Procyon lotor	Northern Raccoon	S5	N5
Blarina brevicauda	Northern Short-tailed Shrew	S5	N5
Vulpes vulpes	Red Fox	S5	N5
Tamiasciurus hudsonicus	Red Squirrel	S5	N5
Mephitis mephitis	Striped Skunk	S5	N5
Didelphis virginiana	Virginia Opossum	S4	N4N5
Odocoileus virginianus	White-tailed Deer	S5	N5

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TABLE 6: ECOLOGICAL MANAGEMENT PLAN (EMP) & REHABILITATION PLAN UNIT SUMMARY		
UNIT	**FEATURE**	**AREA (ha)**
Ecological Management Plan (EMP) – areas that will not be extracted		
CEF1	Core Environmental Feature – Enhancement Area	0.11
CEF2	Core Environmental Feature – Enhancement Area	0.78
CEF3	Core Environmental Feature – Enhancement Area	0.11
	Total Area (ha) for Enhancements to Core Environmental Feature	1.00
SP-PS1	Shrub-planting – Property Setback	0.27
TP-NT1	Tree-planting - No Touch Buffer	0.26
TP-NT2	Tree-planting - No Touch Buffer	0.30
TP-NT3	Tree-planting - No Touch Buffer	0.49
TP-NT4	Tree-planting – No Touch Buffer	0.31
TP-NT5	Tree-planting – No Touch Buffer	0.43
TP-PS6	Tree-planting – Property Setback	0.43
TP-PS7	Tree-planting – Property Setback	0.13
TP-PS8	Tree-planting – Property Setback	0.17
	Total Area (ha) for Tree and Shrub Plantings	2.79
	Total Area (ha) for Ecological Enhancements	**3.79**
Pit Rehabilitation (Natural Environment) – areas that will be rehabilitated following extraction		
EL1	Ecological Linkage	1.25
EL2	Ecological Linkage – Rehabilitation Sideslope	0.29
EL3	Ecological Linkage – Pit Floor	0.09
EL4	Ecological Linkage – Pit Floor	0.06
EL5	Ecological Linkage – Rehabilitation Sideslope	0.22
	Total Area (ha) for Pit Rehabilitation (Natural Environment)	**1.91**
	Overall Total (ha) Ecological Enhancements and Pit Rehabilitation (Natural Environment)	**5.70**

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TABLE 7A: EDWORTHY WEST PIT - ECOLOGICAL ENHANCEMENT PLAN (EEP) AND REHABILITATION PLAN (NATURAL ENVIRONMENT): UNIT DETAILS

Unit	Feature	Area (ha)	Timing	Main Species Selections[1]	Planting #'s[2]	Habitat Features[3]	Seed Mix[4]	Notes
Ecological Enhancement Plan (EEP) for land that will not be extracted								
CEF1	Core Environmental Feature – Enhancement Area	0.11	Enhancement activities to commence within 2 years of licence issuance and be completed within 5 years of licence issuance.	White Pine and Red Oak.	10	N/A	N/A	• Between November 1 and March 31, cut Common Buckthorn and other undesirable woody competition (identified using marking paint) and treat stumps with Glyphosate or Garlon 4 herbicide. The woody material cut down will either be repurposed as brush piles for wildlife or burned onsite (subject to obtaining a Burn Permit from the Fire Department). • Trees will be planted during the subsequent spring or fall planting windows.
CEF2	Core Environmental Feature – Enhancement Area	0.78	Enhancement activities to commence within 2 years of licence issuance and be completed within 5 years of licence issuance.	White Pine and Red Oak. Butternut.	45 5	N/A	N/A	• Blue marking paint and/or flagging tape will be used to identify Butternuts BN01, BN02 and BN03 in the field. These Butternuts will be protected from accidental damage during EEP activities. • Between November 1 and March 31, Common Buckthorn and other undesirable woody competition (identified using marking paint) will be cut and stumps will be treated with Glyphosate or Garlon 4 herbicide. The woody material cut down will either be repurposed as brush piles for wildlife or burned onsite (subject to obtaining a Burn Permit from the North Dumfries Fire Department). • Trees will be planted during the subsequent spring or fall planting windows.
CEF3	Core Environmental Feature – Enhancement Area	0.11	Enhancement activities to commence within 2 years of licence issuance and be completed within 5 years of licence issuance.	White Pine and Red Oak.	10	N/A	N/A	• Between November 1 and March 31, cut Common Buckthorn and other undesirable woody competition (identified using marking paint) and treat stumps with Glyphosate or Garlon 4 herbicide. The woody material cut down will either be repurposed as brush piles for wildlife or burned onsite (subject to obtaining a Burn Permit from the Fire Department). • Trees will be planted during the subsequent spring or fall planting windows.
	Subtotal	1.00	CEF Enhancements		70	N/A		

TABLE 7A: EDWORTHY WEST PIT - ECOLOGICAL ENHANCEMENT PLAN (EEP) AND REHABILITATION PLAN (NATURAL ENVIRONMENT): UNIT DETAILS

Unit	Feature	Area (ha)	Timing	Main Species Selections[1]	Planting #'s[2]	Habitat Features[3]	Seed Mix[4]	Notes
SP-PS1	Shrub-planting – Property Setback	0.27	As part of progressive and final rehabilitation; following removal of acoustic berm.	Staghorn Sumac, Chokecherry, Gray Dogwood and Round-leaved Dogwood.	400 shrubs	N/A	Custom Native Mix	• Located in the 30 m setback off Shouldice Sideroad; in crop rotation in 2022. Will accommodate an acoustic berm during operations. • Tree-planting will occur following removal of berm. Ground may need to be ripped to lessen soil compaction. • This unit will be planted with a variety of native shrubs that provide cover, browse and soft mast for wildlife. • Only shrubs were selected because a hydro line runs through this unit. A 5 m wide strip below the hydro line will not be planted with shrubs, for maintenance access if necessary. • Plant shrubs in clusters, on 1.0 m x 1.0 m spacing.
TP-NT1	Tree-planting - No Touch Buffer	0.26	Planting will occur within 18 months of licence issuance.	Hackberry, Bur Oak, Red Oak, White Pine and Red Cedar.	650 trees	6 WDF 3 RP	Custom Native Mix	• 15 m minimum width buffer along the east side of the Core Environmental Feature. East exposure. • Ecological enhancement seeding/planting activities will be coordinated with farming activities, i.e., seed with native seed mix in late fall following final crop harvest prior to site preparation for extraction. Plant trees/shrubs and sow cover crop (oats) the following spring. • Plant trees in clusters, on 2.0 m x 2.0 m spacing.
TP-NT2	Tree-planting - No Touch Buffer	0.30	Area within Phase 1 to be planted within 18 months of licence issuance. Area within Phase 2 to be planted prior to commencement of site preparation in Phase 2.	Hackberry, White Birch, White Cedar and White Pine.	750 trees	6 WDF 3 RP	Custom Native Mix	• 15-25 m wide buffer along the north side of the Core Environmental Feature. North exposure. • Ecological enhancement seeding/planting activities will be coordinated with farming activities, i.e., seed with native seed mix in late fall following final crop harvest prior to site preparation for extraction. Plant trees/shrubs and sow cover crop (oats) the following spring. • Plant trees in clusters, on 2.0 m x 2.0 m spacing.
TP-NT3	Tree-planting - No Touch Buffer	0.49	To be planted prior to Phase 2 site preparation occurring within 50 m of this unit.	Hackberry, Bur Oak, Red Oak, White Pine and Red Cedar.	1225 trees	10 WDF 5 RP	Custom Native Mix	• 20-25+ m wide buffer along a section of the west side of the Core Environmental Feature. West exposure. • Ecological enhancement seeding/planting activities will be coordinated with farming activities, i.e., seed with native seed mix in late fall following final crop harvest prior to site preparation for extraction. Plant trees/shrubs and sow cover crop (oats) the following spring. • Plant trees in clusters, on 2.0 m x 2.0 m spacing.

TABLE 7A: EDWORTHY WEST PIT - ECOLOGICAL ENHANCEMENT PLAN (EEP) AND REHABILITATION PLAN (NATURAL ENVIRONMENT): UNIT DETAILS

Unit	Feature	Area (ha)	Timing	Main Species Selections[1]	Planting #'s[2]	Habitat Features[3]	Seed Mix[4]	Notes
TP-NT4	Tree-planting – No Touch Buffer	0.31	To be planted prior to Phase 2 site preparation occurring within 50 m of this unit.	Hackberry, White Birch, White Cedar and White Pine.	775 trees	6 WDF 3 RP	Custom Native Mix	• 15-25 m wide buffer along the north side of the Core Environmental Feature. North exposure. • Ecological enhancement seeding/planting activities will be coordinated with farming activities, i.e., seed with native seed mix in late fall following final crop harvest prior to site preparation for extraction. Plant trees/shrubs and sow cover crop (oats) the following spring. • Plant trees in clusters, on 2.0 m x 2.0 m spacing.
TP-NT5	Tree-planting – No Touch Buffer	0.43	To be planted prior to Phase 2 site preparation occurring within 50 m of this unit.	Red Oak, Shagbark Hickory, Basswood, Black Cherry, White Pine and Red Cedar.	750 trees	8 WDF 3 RP	Custom Native Mix	• 21-43+ m wide buffer along the west side of the Core Environmental Feature. West aspect/exposure. • For those portions of Unit TP-NT5 under cultivation, ecological enhancement seeding/planting activities will be coordinated with farming activities, i.e., seed with native seed mix in late fall following final crop harvest prior to site preparation for extraction. Plant trees/shrubs and sow cover crop (oats) the following spring. • Retain existing Hackberry, Black Walnut and Black Cherry. Remove Common Buckthorn and treat stumps with Glyphosate or Garlon 4 herbicide. • Plant trees in clusters, on 2.0 m x 2.0 m spacing.
TP-PS6	Tree-planting – Property Setback	0.43	As part of progressive and final rehabilitation; following removal of acoustic berm.	Bur Oak, Red Oak, White Oak and White Pine.	480 trees	N/A	Custom Native Mix	• Portion of the north 15 m property setback that will accommodate an acoustic berm. • Tree-planting will occur following removal of berm. Ground may need to be ripped to lessen soil compaction. • Plant trees on 3.0 m x 3.0 m spacing.
TP-PS7	Tree-planting – Property Setback	0.13	As part of progressive and final rehabilitation; following removal of acoustic berm.	Bur Oak, Red Oak, White Oak and White Pine.	145 trees	N/A	Custom Native Mix	• Portion of the north 15 m property setback that will accommodate an acoustic berm. • Tree-planting will occur following removal of berm. Ground may need to be ripped to lessen soil compaction. • Plant trees on 3.0 m x 3.0 m spacing.
TP-PS8	Tree-planting – Property Setback	0.17	To be planted prior to commencement of Phase 3 site preparation.	Bur Oak, Red Oak, White Oak and White Pine.	100 trees	N/A	Custom Native Mix	• Narrow strip within the 15 m property setback. Adjacent to mature oak and Black Cherry hedgerow. • Ecological enhancement seeding/planting activities will be coordinated with farming activities, i.e., seed with native seed mix in late fall following final crop harvest prior to site preparation for extraction. Plant trees and sow cover crop (oats) the following spring.

TABLE 7A: EDWORTHY WEST PIT - ECOLOGICAL ENHANCEMENT PLAN (EEP) AND REHABILITATION PLAN (NATURAL ENVIRONMENT): UNIT DETAILS

Unit	Feature	Area (ha)	Timing	Main Species Selections[1]	Planting #'s[2]	Habitat Features[3]	Seed Mix[4]	Notes
								• A staggered row or two trees will be established on 2.0 m spacing; a minimum of 100 trees will be planted.
	Subtotal	2.79	Tree and Shrub Plantings		4875 trees 400 shrubs	36 WDF 17 RP		
	Total	3.79	CEF Enhancements, Tree and Shrub Plantings		4945 trees 400 shrubs	36 WDF 17 RP		
Rehabilitation Plan (Natural Environment) - for land that will be extracted								
EL1	Ecological Linkage	1.25	Progressive and final rehabilitation.	Black Oak, White Oak, Hill's Oak, Shagbark Hickory White Pine and Red Cedar American Hazel, Fragrant Sumac, New Jersey Tea and Prairie Willow	500 trees 250 shrubs	12 RP	Custom Tallgrass Prairie Mix	• Ecological Linkage Feature EL1 will be approximately 90m wide and 140m long and match the surrounding grades, intended to connect wooded area on the west of the subject site beside Shouldice Sideroad and the Core Environmental Feature (CEF). • T-bars or fence posts shall be installed every 8-10 metres along the north and south limits of Unit EL1. • Install a minimum of 12 rock piles (approximately 2 m x 2 m x 1 m in size). • Planting area should be top-dressed with at least 30 cm of sandy/gravelly soil. • Seed with custom native tallgrass prairie seed mix in either spring or fall window (fall preferred), seed with nurse crop (e.g., Canada Wild-rye, Oats or Winter Wheat; only sow oats after risk of frost). Seed application should occur soon after earthmoving, to avoid colonization by weedy competition (e.g., annual weeds). • Plant trees in clusters, on 2.0 m x 2.0 m spacing. • Plant shrubs in clusters, on 1.0 m x 1.0 m spacing. • No planting of trees or shrubs will occur under hydro line; keep 5 m wide zone open for maintenance access.

TABLE 7A: EDWORTHY WEST PIT - ECOLOGICAL ENHANCEMENT PLAN (EEP) AND REHABILITATION PLAN (NATURAL ENVIRONMENT): UNIT DETAILS

Unit	Feature	Area (ha)	Timing	Main Species Selections[1]	Planting #'s[2]	Habitat Features[3]	Seed Mix[4]	Notes
EL2	Ecological Linkage – Rehabilitation Side Slope	0.29	Progressive and final rehabilitation.	Hackberry, White Birch, White Cedar, White Pine and Red Cedar.	400 trees	N/A	Custom Native Mix	• Northeast-facing pit rehabilitation side slope. • Seed with custom native seed mix in either spring or fall window, seed with nurse crop (e.g., Canada Wild-rye, Oats or Winter Wheat). Seed application should occur soon after earthmoving, to avoid colonization by weedy competition (e.g., annual weeds). • Plant trees in clusters, on 2.0 m x 2.0 m spacing.
EL3	Ecological Linkage – Pit Floor	0.09	Progressive and final rehabilitation.	Hackberry, White Birch, Red Cedar, White Cedar and White Pine. Staghorn Sumac, Chokecherry, Gray Dogwood, Red-osier Dogwood and Round-leaved Dogwood.	170 trees 100 shrubs	4 WDF 4 RP	Custom Native Mix	• Seed with custom native seed mix in either spring or fall window, seed with nurse crop (e.g., Canada Wild-rye, Oats or Winter Wheat). Seed application should occur soon after earthmoving, to avoid colonization by weedy competition (e.g., annual weeds). • Plant trees in clusters, on 2.0 m x 2.0 m spacing. • Plant shrubs in clusters, on 1.0 m x 1.0 m spacing.
EL4	Ecological Linkage – Pit Floor	0.06	Progressive and final rehabilitation.	Hackberry, White Birch, Red Cedar, White Cedar and White Pine. Staghorn Sumac, Chokecherry, Gray Dogwood, Red-osier Dogwood and Round-leaved Dogwood.	130 trees 75 shrubs	4 WDF 4 RP	Custom Native Mix	• Install a minimum of 4 rock piles (approximately 2 m x 2 m x 1 m in size) and 4 stump/log piles. • Seed with custom native seed mix in either spring or fall window, seed with nurse crop (e.g., Canada Wild-rye, Oats or Winter Wheat). Seed application should occur soon after earthmoving, to avoid colonization by weedy competition (e.g., annual weeds). • Plant trees in clusters, on 2.0 m x 2.0 m spacing. • Plant shrubs in clusters, on 1.0 m x 1.0 m spacing.

TABLE 7A: EDWORTHY WEST PIT - ECOLOGICAL ENHANCEMENT PLAN (EEP) AND REHABILITATION PLAN (NATURAL ENVIRONMENT): UNIT DETAILS

Unit	Feature	Area (ha)	Timing	Main Species Selections[1]	Planting #'s[2]	Habitat Features[3]	Seed Mix[4]	Notes
EL5	Ecological Linkage – Rehabilitation Side Slope	0.22	Progressive and final rehabilitation.	Black Oak, Bur Oak, Hill's Oak, Pignut Hickory, White Oak and White Pine. American Hazel, Fragrant Sumac, New Jersey Tea and Prairie Willow	100 trees 60 shrubs	N/A	Custom Tallgrass Prairie Mix	• South-facing pit rehabilitation side slope. • Planting area should be top-dressed with at least 30 cm of sandy/gravelly soil. • Seed with custom native tallgrass prairie seed mix in either spring or fall window, seed with nurse crop (e.g., Canada Wild-rye, Oats or Winter Wheat). Seed application should occur soon after earthmoving, to avoid colonization by weedy competition (e.g., annual weeds). • Plant trees in clusters, on 2.0 m x 2.0 m spacing. • Plant shrubs in clusters, on 1.0 m x 1.0 m spacing.
	Subtotal	1.91	Rehabilitation Plan (Natural Environment)		1300 trees 485 shrubs	8 WDF 20 RP		
	Overall Total	**5.70**	Ecological Enhancement Plan (EEP) & Rehabilitation Plan (Natural Environment)		6175 trees 885 shrubs	44 WDF 37 RP		

Notes:

[1] Main Species Selections: Subject to availability, suitable native substitutions are acceptable. Species that perform better at this site may be planted in larger proportions in later-timed plantings.

[2] Planting #'s: Nursery stock may be 1-gallon or larger container grown stock, plugs or bare root whips. Container-grown stock and plugs are preferable.

[3] WDF = Woody Debris Features (log piles, stumps, root wads, brush piles). Minimum dimensions are 2.0 m x 2.0 m x 1.0 m.
RP = Rock Piles (boulders, rocks, cobbles). Minimum dimensions are 2.0 m x 2.0 m x 1.0 m.

[4] Seed Mixes include Custom Native Seed Mix, Custom Tallgrass Prairie Seed Mix and MTO Standard Roadside Mix. Seed mix details are provided separately on the Rehabilitation Plan.

TABLE 7B: EDWORTHY WEST PIT - ECOLOGICAL ENHANCEMENT PLAN (EEP) AND REHABILITATION PLAN: SEED MIX DETAILS

Custom Native Seed Mix	**Custom Tallgrass Prairie Seed Mix**
Grasses 50% Canada Wild-rye (*Elymus canadensis*) 50% Virginia Wild-rye (*Elymus virginicus*) Application Rate: 22.6 kg/ha The optimal timing for seeding the custom native seed mix is late fall, in order to allow for cold stratification of the seeds. A cover crop will also be planted; oats can be planted in the spring, winter wheat in the fall, depending on timing.	Grasses 20% Big Bluestem (*Andropogon gerardii*) 30% Canada Wild-rye (*Elymus canadensis*) 20% Indian Grass (*Sorghastrum nutans*) 30% Little Bluestem (*Schizachyrium scoparium*) Application Rate: 22.6 kg/ha The optimal timing for seeding the custom native seed mix is late fall, in order to allow for cold stratification of the seeds. A cover crop will also be planted; oats can be planted in the spring, winter wheat in the fall, depending on timing.
Suitable Wildflowers • Common Milkweed (*Asclepias syriaca*) • Wild Bergamot (*Monarda fistulosa*) • Black-eyed Susan (*Rudbeckia hirta*) • Early Goldenrod (*Solidago juncea*) • Gray Goldenrod (*S. nemoralis*) • Frost Aster (*Symphyotrichum pilosum* [*Aster pilosum*]) • Arrow-leaved Aster (*Symphyotrichum urophyllum* [*Aster urophyllus*]) • Other suitable native plant species of open habitats Wildflowers will be established through direct seeding and/or planting plugs. Local seed collection may also be used to augment wildflower species composition. Optimal timing for seeding is late fall. Plugs should be planted when the risk of frost is low.	Suitable Wildflowers • Common Milkweed (*Asclepias syriaca*) • Butterfly-weed (*Ascelpias tuberosa*) • Showy Tick-trefoil (*Desmodium canadense*) • Woodland Sunflower (*Helianthus divaricatus*) • Round-headed Bush-clover (*Lespedeza capitata*) • Wild Bergamot (*Monarda fistulosa*) • Hairy Beardtongue (*Penstemon hirsutus*) • Black-eyed Susan (*Rudbeckia hirta*) • Early Goldenrod (*Solidago juncea*) • Gray Goldenrod (*S. nemoralis*) • Frost Aster (*Symphyotrichum pilosum* [*Aster pilosum*]) • Smooth Aster (*Symphyotrichum laeve* [*Aster laevis*]) • Arrow-leaved Aster (*Symphyotrichum urophyllum* [*Aster urophyllus*]) • Other suitable native plant species of tallgrass prairies and other open habitats Wildflowers will be established through direct seeding and/or planting plugs. Local seed collection may also be used to augment tallgrass prairie wildflower species composition. Optimal timing for seeding is late fall. Plugs should be planted when the risk of frost is low.

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ATTACHMENT A:

Résumé of Anthony G. Goodban, B.Sc., M.E.S.(Pl.), MCIP, RPP

Consulting Ecologist and Natural Heritage Planner
Goodban Ecological Consulting Inc. (GEC)

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Goodban Ecological Consulting Inc.

ANTHONY G. GOODBAN, B.Sc., M.E.S.(Pl.), MCIP, RPP

Consulting Services in Field Botany, Ecology and Natural Heritage Planning

EDUCATION

1995 M.E.S.(Planning), Environmental Planning, York University, North York, Ontario

1992 Honours B.Sc., Ecology, University of Guelph, Guelph, Ontario

PROFESSIONAL ASSOCIATIONS

Ontario Professional Planners Institute - Full Member
Canadian Institute of Planners - Full Member

PROFESSIONAL TRAINING

2017 Completed the 3-day *Ontario Reptile & Amphibian Field Survey Course* presented by Blazing Star Environmental, NRSI, Ontario Ministry of Natural Resources and Forestry (MNRF). The course was held on Beausoleil Island in Georgian Bay.

2014 Completed the 2-day RX-100 *Low Complexity Prescribed Burn (LCPB) Worker Course* provided by Tallgrass Ontario in Bloomingdale, Ontario.

2013 Completed the Trees Ontario 2-day *Ontario Tree Seed Collector Training Course* in Angus, Ontario.

2013 Completed the Ministry of Natural Resources and Forestry (MNRF) Butternut Health Assessment "Refresher" Training at the Royal Botanical Gardens (RBG), Burlington, Ontario.

2009 Completed the MNRF *Butternut Health Assessment Workshop* at the Royal Botanical Gardens, Burlington, Ontario.

2008 Completed the MNRF 5-day training course in the use of the *Ecological Land Classification System for Southern Ontario* (ELC) at Ball's Falls Conservation Area, Jordan, Ontario.

1994 Completed the MNRF 5-day training course in the use of the *Ontario Wetlands Evaluation System: Southern Manual* (Third Edition) in Tweed, Ontario.

PROFESSIONAL EXPERIENCE

1999-Present	Consulting Ecologist and Natural Heritage Planner, Goodban Ecological Consulting Inc.
1992-1998	Ecologist and Natural Heritage Planner, Ecoplans Limited
1991-1992	Botanist and Ecologist, Hamilton-Wentworth Natural Areas Inventory Project
1990	Field Botanist, Hamilton Region Conservation Authority and Hamilton Naturalists' Club

PROFILE

Mr. Anthony Goodban's academic background is in botany, ecology and environmental planning at the undergraduate and graduate level and he has over 31 years of field and professional experience. He has expert knowledge of the vegetation and flora of southern Ontario, being especially familiar with the flora of the Hamilton and Halton Region. Mr. Goodban has been the principal of Goodban Ecological Consulting Inc. since 1999 and he works either as an independent consultant or as a subconsultant to other firms. Past and present clients include other consulting firms, aggregate companies, developers, municipalities, conservation authorities, provincial ministries, institutions, naturalist clubs and private citizens. Mr. Goodban has worked on a broad variety of projects involving species at risk, including many different plant and wildlife species. He often undertakes detailed field ecological field surveys for a wide range of projects, including Official Plan updates, aggregate applications, land development projects, park planning exercises, natural areas inventories, restoration and monitoring projects. Mr. Goodban has worked on many wetland projects, including wetland evaluations, boundary delineations, impact assessments and monitoring programs. He provides project input relating to planning matters such as the natural heritage components of the Provincial Policy Statement, Greenbelt Plan and the Endangered Species Act, and has prepared numerous environmental impact statements for a wide variety of development proposals. Mr. Goodban prepared and updated the Flora of Hamilton, in association with the Hamilton Conservation Authority. He has expertise dealing with rare vegetation communities, including alvars and prairies, and has written several papers and reports on prairie and savanna vegetation in the Hamilton and Halton areas. He is certified to complete wetland evaluations under the *Ontario Wetland Evaluation System: Southern Manual (3rd Edition)* and to use the *Ecological Land Classification System for Southern Ontario* (ELC). Mr. Goodban has appeared as an expert witness before the Ontario Municipal Board and the Joint Board.

PROJECT EXPERIENCE

Species at Risk (SAR)

- Mr. Goodban has worked on many projects involving Threatened and Endangered Species in recent years. Projects dealing with wildlife species include Jefferson Salamander, Butler's Gartersnake, Eastern Foxsnake, Gray Ratsnake, Bank Swallow, Barn Swallow, Bobolink, Chimney Swift, Eastern Meadowlark, SAR bats and Mottled Duskywing. Projects dealing with plant species include American Chestnut, American Columbo, American Ginseng, Butternut and Flowering Dogwood.

- Mr. Goodban has completed a series of detailed studies of the Endangered Jefferson Salamander and its habitats. Work has included detailed monitoring of six breeding pools from 2004 to the present (including frog call surveys, egg mass surveys, fixed-point photography, water temperature, vegetation, etc), egg mass surveys of 30+ breeding pools in Halton, Hamilton, Peel, Waterloo and Wellington, spring migration studies with drift fencing and pitfall traps, larval surveys in breeding pools, etc. In 2014, Mr. Goodban began monitoring almost 1 km of drift fence and 60+ pitfall traps set up to capture salamanders migrating to breeding pools in the early spring.

- Mr. Goodban is a certified Ontario Butternut Health Assessor (BHA) who has completed many Butternut Health Assessments in recent years. In 2014 he assessed 27 Butternut trees on the Oro Moraine, of which 6 were retainable (Category 2) trees, and 6 Butternut trees on the Niagara Escarpment in Halton Hills which were all non-retainable (Category 1). Mr. Goodban has also overseen compensatory Butternut planting programs required by *Endangered Species Act* Stewardship Agreements and through the registry process allowed under O.Reg 242/08 and O.Reg 830/21.

Resource Management - Watersheds and Natural Heritage System Planning

- Responsible for the development of Natural Heritage Systems for the Sixteen Mile Creek watershed, Township of Oro-Medonte and North Oakville.

Resource Management – Wetlands, ANSI's and ESA's

- Responsible for numerous wetland evaluations and impact assessments for a range of development proposals across Ontario, including such wetlands as: Dorchester Swamp, Strasburg Creek Wetland Complex, Forks of the Credit Wetland Complex, Creditview Swamp, Victoria Point Wetland Complex and Halton Escarpment Wetland Complex. Many of these projects required the preparation of environmental impact studies/assessments, often including the detailed review and integration of water resources (hydrogeology, hydrology, stormwater engineering) and ecological (wetlands, fisheries) data.

- Main environmental consultant to the City of Orillia during an OMB hearing that focused on the issue of large-scale development within a Provincially Significant Wetland (Victoria Point Bog).

- Main environmental consultant to local residents in the Town of Essex during a 2002 OMB hearing that examined an 18-hole golf course proposal within a Provincially Significant Wetland (Marshfield Woods).

- Participant in evaluations and impact assessments for development proposals adjacent to Environmentally Sensitive Areas (ESAs) across southern Ontario, including: Sixteen Mile Creek Valley (ESA 16) and Hilton Falls Complex (ESA 25) in Halton Region, Doon Pinnacle Hill (ESPA 35) in Waterloo Region, Major Spink Area (ESA No. 97) in Durham Region and Hayesland Complex (ESA No. 28) in Hamilton.

Transportation Projects

- Participated in the preparation of a number of highway Environmental Assessments, including: the Bradford Bypass, the Leslie Street Extension in Toronto, the Parry Sound and Mactier sections of Highway 69 and Highway 7 from Kitchener to Guelph.

- Participant in Class Environmental Assessments for sensitive river, wetland and valley crossings, including: the northerly and southerly crossings of Twelve Mile Creek in Oakville, the Mountainview Road crossing of Silver Creek in Georgetown and Sixth Line crossing of Sixteen Mile Creek in Milton.

Aggregates

- Participant in multi-disciplinary studies in support of sand and gravel pit license applications, including the Lockyer Brothers pit in Mono Township and Armbro Pinchin Pit in Caledon. Responsible for several MTO wayside permit applications (one quarry and three pits) in eastern Ontario.

- Participant in multi-disciplinary studies in support of limestone/dolostone quarry license applications, including the Tomlinson Brothers quarry in Stittsville, Holmenin quarry near Buckhorn, Dufferin Aggregates' Milton Quarry and Acton Quarry Extensions and James Dick Construction Limited's proposed Rockfort Quarry in Caledon.

- Responsible for the development and implementation of wetland vegetation monitoring programs adjacent to aggregate operations, as components of adaptive management plans (AMP).

- Consulting Botanist/Ecologist to aggregate companies for biodiversity plans, enhancement plans and rehabilitation plans at a number of pits and quarries in southern Ontario.

Vegetation and Flora - Inventory, Management and Monitoring

- Responsible for completing detailed botanical inventories of numerous sites in southern Ontario, including Bronte Creek Provincial Park (Halton), the Red Hill Valley (Hamilton-Wentworth) and the Dundas Valley (Hamilton-Wentworth).

- Consulting botanist and ecologist to Natural Areas Inventory Projects in southern Ontario, including Hamilton (2001-2002; 2010-2014), Halton (2003-2004) and Niagara (2006-2008).

- Developed vegetation management plans and strategies for a number of significant natural areas and communities, including:

    - Ontario Hydro's right-of-way at Bronte Creek Provincial Park (Oakville)
    - prairie and other vegetation at Bronte Creek Provincial Park (Oakville)
    - prairie and oak woodland vegetation at Spencer Gorge Wilderness Area (Dundas/Flamborough)
    - prairie vegetation at the Ancaster Prairie (Ancaster)

- rare species and significant communities in the Albion Falls - Buttermilk Falls portion of the Red Hill Valley (Hamilton)

RELATED EXPERIENCE AND COMMUNITY INVOLVEMENT

1995 to present

Mr. Goodban is the first author of a research paper on the historical and present extent and floristic composition of prairie and savanna vegetation in the vicinity of Hamilton, Ontario, prepared with the assistance of two other authors (W.D. Bakowsky and B.D. Bricker). This paper was presented at the 23rd Natural Areas, 15th North American Prairie, and Indiana Dunes Ecosystems Conferences held at St. Charles, Illinois, on October 26, 1996. It was published in the Proceedings of the 15th North American Prairie Conference (1999). Mr. Goodban is currently undertaking further research on prairie, savanna and oak woodland vegetation in the western Lake Ontario region of Ontario. He has authored several papers and studies on the prairie and oak woodland vegetation at Bronte Creek Provincial Park.

1995 to 1999

Mr. Goodban was a participant in the **International Alvar Conservation Initiative** or **'Alvar Working Group'**. This was a collaborative project aimed at documenting and protecting alvar sites in the Great Lakes basin. Participants from across eastern North America examined sites in Michigan, New York, Ohio and Ontario. Mr. Goodban's masters level research on alvar vegetation on the Flamborough Plain was integrated into this broader study. He prepared the text for a 24-page full color brochure and poster for the Federation of Ontario Naturalists, as one of the products generated by the Alvar Working Group, entitled *Great Lakes Alvars*. Mr. Goodban has studied alvar vegetation in all of the main alvar regions in Ontario. He has also visited alvar sites in New York and Ohio.

1991 to present

Mr. Goodban has led numerous naturalist and field botanist field trips in southern Ontario on behalf of the Field Botanists of Ontario. He has given presentations on rare vegetation communities (e.g., prairies, alvars) at conferences, meetings and naturalist club events.

1991 to present

Mr. Goodban has worked in collaboration with the Hamilton Region Conservation Authority to document the flora of the City of Hamilton. The first edition of *The Vascular Plant Flora of the Regional Municipality of Hamilton-Wentworth, Ontario,* was produced in 1995. Mr. Goodban prepared a Second Edition of the Flora in 2003 and a Third Edition in 2014, documenting more than 1400 vascular plant taxa in the City of Hamilton.

1995 to 2000

Member of the Regional Municipality of Hamilton-Wentworth's **ENVIRONMENTALLY SIGNIFICANT AREA IMPACT EVALUATION GROUP** (ESAIEG). ESAIEG considers development proposals located within or adjacent to Environmentally Significant Areas (ESAs) and provides advice to planning staff.

1991 to 1995

Member of the Regional Municipality of Halton's **ECOLOGICAL AND ENVIRONMENTAL ADVISORY COMMITTEE** (EEAC). The basic function of EEAC is to provide technical advice, through the Planning and Development Department, to staff and Council on all environmental matters affecting Halton.

SELECTED PUBLICATIONS AND REPORTS

Goodban, A.G. 2014. The Vascular Plants of Hamilton, Ontario. pp. 1 to 91, In: Schwetz, N. (ed.), Hamilton Natural Areas Inventory Project 3rd Edition, Nature Counts 2, Species Checklist Document. Hamilton Conservation Authority, Ancaster, Ontario.

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Goodban, A.G. *In prep.* Bronte Creek Provincial Park (North Section): Grasslands Study. Bronte Creek Provincial Park, Burlington, Ontario Parks.

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Goodban, A.G., W.D. Bakowsky and B.D. Bricker. 1999. The historical and present extent and floristic composition of prairie and savanna vegetation in the vicinity of Hamilton, Ontario. pp. 87-103. In: Proceedings of the 15th North American Prairie Conference. *Edited by* C. Warwick. Natural Areas Association, Bend, Oregon.

SELECTED PUBLICATIONS AND REPORTS (continued)

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Goodban, A.G. 1997. A survey of the rare vascular plant flora of the Albion Falls - Buttermilk Falls area in the City of Hamilton, Ontario. Hamilton Region Conservation Authority, Ancaster, Ontario. 14 pp. + appendix + map.

Goodban, A.G. 1996. The vegetation and flora of the Red Hill Valley and environs. pp. 17-66. In: Biological Inventory of the Red Hill Valley, Hamilton Naturalists' Club (eds.), Hamilton, Ontario.

Goodban, A.G. 1995. Alvar Vegetation on the Flamborough Plain: Ecological Features, Planning Considerations and Conservation Recommendations. Major Paper. Faculty of Environmental Studies, York University, North York, Ontario. 88 pp. + appendices.

Goodban, A.G. 1994. *Carex virescens* (Cyperaceae) new to the Regional Municipality of Hamilton-Wentworth. Field Botanists of Ontario Newsletter 7(1): 11-12.

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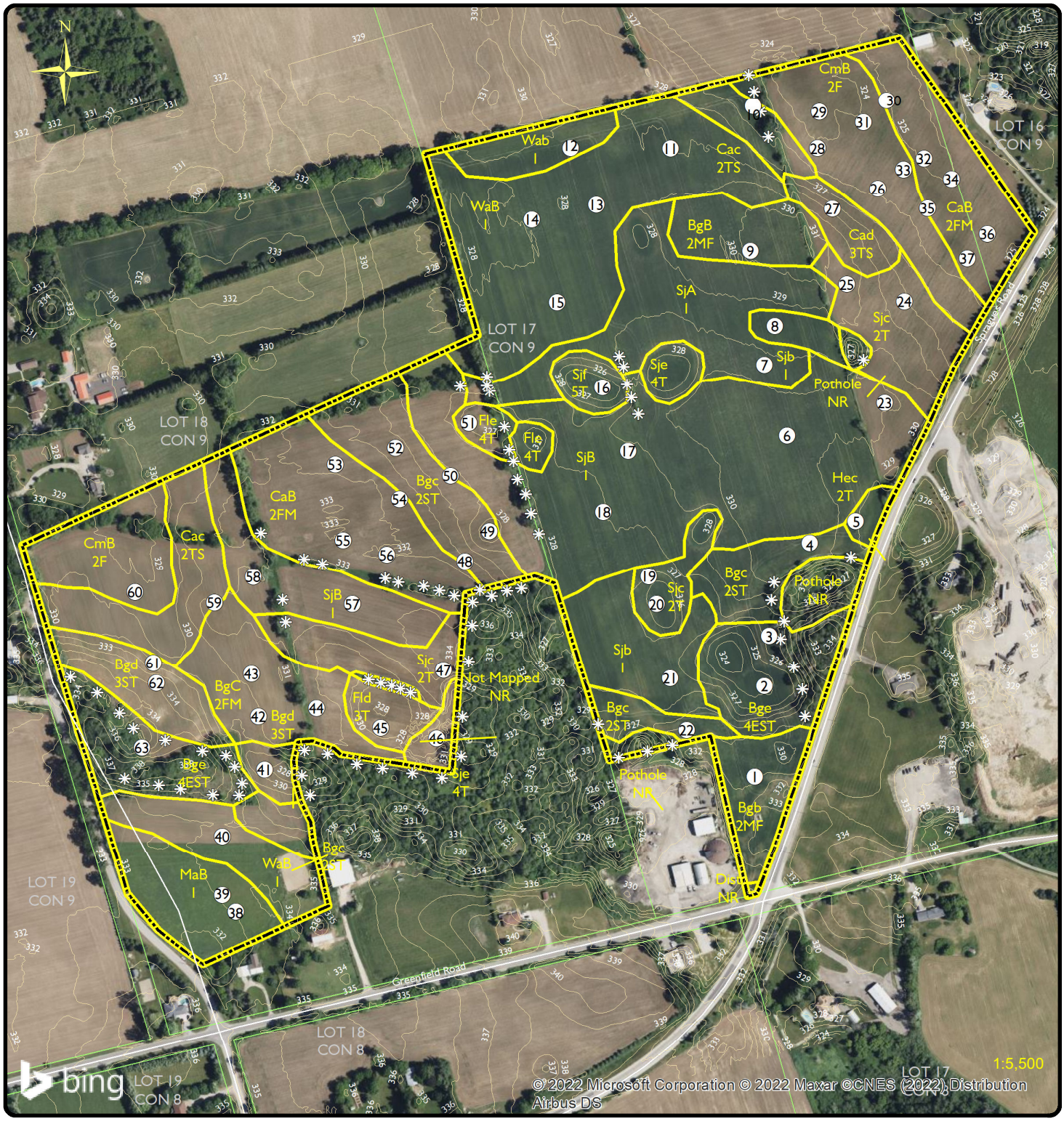
ATTACHMENT B



Legend

- Soil Inspection Site
- Stone Pile
- Contour Line (MHBC)
- Roads (MNRF)
- Lot Lines (MNRF)
- Soil Polygon Boundary
- Potential License Boundary (45.6 ha)

Soil Code

Bg - Burford gravelly loam
Ca - Caledon sandy loam
Cm - Camilla sandy loam
Fl - Floradale loam
He - Heidelberg fine sandy loam
Ma - Mannheim loam
Sj - St. Jacobs loam
Wa - Waterloo fine sandy loam
Dist = Disturbed Area
Pothole/NR - Not Rated

Soil Code / Slope Code
Bgb
2MF
CLI Class / CLI Subclass

Slope Class

Aa = 0.0 - 0.5%
Bb = 0.5 - 2.0%
Cc = 2.0 - 5.0%
Dd = 5.0 - 9.0%
Ee = 9.0 - 15.0%

Lower case = Slope length < 50 m
Upper case = Slope length > 50 m

CLI Subclass Limitation

E - Erosion
F - Fertility
M - Moisture
S - Adverse Soil Characteristics
T - Topography

Figure 2

Soils and
Canada Land Inventory (CLI)
Edworthy Pit West

DBH Soil Services Inc.

August 4, 2021

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Attachment C:

Proposed Edworthy West Pit

Representative site photographs taken by GEC in 2021 and 2022

Goodban Ecological Consulting Inc. (GEC)

January 2023

Photo 1: Partial view of West Property, looking westwards from property line. The fields on this property were under crop rotation in 2021 (corn, soybeans). GEC 2021-07-31

Photo 2: View looking south towards the Core Environmental Feature (Unit CUT1a) on the West Property. The field in the foreground was planted with corn in 2021 and soybeans in 2022. GEC 2022-03-29

Photo 3: View of West Property, looking towards Shouldice Sideroad. The field was planted with winter wheat in 2021-2022. In the distance are Units CUT1b (left), FOD2-4a (middle) and CUHDa (right). GEC 2022-06-13

Photo 4: Almost all of the Central Property is in crop rotation. This view shows the expansive field that covers almost all of this property, after the crop of winter wheat had been harvested. GEC 2021-07-31

Photo 5: View of the Central Property, looking southwards along the eastern edge of the Core Environmental Feature (CEF). A 15 m strip of agricultural land will be naturalized to provide a buffer for the CEF. The building in the distance is located in the Township of North Dumfries Roads Department's yard. GEC 2021-07-31

Photo 6: View looking northeast across the East Property. The field is under crop rotation; the crop was soybeans in 2021. GEC 2021-07-31

Photo 7 – A small forested ridge runs along the east side of Shouldice Sideroad. The trees are a mix of oaks, Black Cherry, maples and Trembling Aspen (Unit FOD2-4a). Common Buckthorn (+) forms thick patches under the tree canopy. This feature will be retained. GEC 2022-03-29

Photo 8: To the northeast of the proposed extraction area there is a Mixed Plantation (Unit CUP2a). The main tree species are White Pine, Red Pine, Scots Pine (+), Sugar Maple, Black Walnut and Norway Maple (+). GEC 2021-07-31

Photo 9 – There are some well-used trails within the Mixed Plantation. (Unit CUP2a). There are a number of Hackberry seedlings and saplings growing along the edges of the trails and elsewhere. GEC 2021-07-31

Photo 10 – On the Central Property there is a small Red Pine Conifer Plantation (CUP3-1) beside Spragues Road. GEC 2021-07-31

Photo 11 – View looking southwest towards the Red Pine Conifer Plantation (CUP3-1) on the Central Property. GEC 2021-07-31

Photo 12: The Red Pine Conifer Plantation (CUP3-1) is even-aged. A portion of this unit will be retained within the 30 m setback along Spragues Road. GEC 2022-03-29

Photo 13: East of Shouldice Sideroad, straddling the north limit of the West Property, there is a narrow strip of Norway Spruce (+) Conifer Plantation (Unit CUP3-9a). GEC 2022-03-29

Photo 14: There is a small patch of old field meadow (Unit CUM1-1a) associated with the Red Pine Plantation (CUP3-1a) beside Spragues Road. GEC 2022-03-29

Photo 15 - Looking southwest towards north end of the Core Environmental Feature (CEF). There are relatively few trees within the CEF, which is dominated by tall shrubs such as Common Buckthorn (+), hawthorns and Gray Dogwood. GEC 2022-02-01

Photo 16: Winter view of part of the CEF (Unit CUT1a). This feature is dominated by tall shrubs such as Common Buckthorn (+), hawthorns and Gray Dogwood. GEC 2022-02-01

Photo 17: Although the CEF (Unit CUT1a) is primarily a large shrub thicket, there are clusters of trees, as well as small pockets of old field vegetation scattered throughout. Note the cluster of White Pine in the distance. GEC 2022-02-01

Photo 18: Another winter view of the CEF (Unit CUT1a). There is an extensive network of trails within the CEF, which are used by the owner for hiking, snowshoeing, skiing and, in some areas, snowmobiling. GEC 2022-02-01

Photo 19: The CEF (Unit CUT1a) contains small tree clusters and scattered trees, but is dominated by shrubs. The more open patches are gradually filling in with shrubs. GEC 2022-02-01

Photo 20: Some shrub patches within the CEF (Unit CUT1a) are dense and almost impenetrable. GEC 2022-02-01

Photo 21: Winter view of the CEF (Unit CUT1a) showing the patchy nature of the vegetation, including openings, dense shrub thickets and scattered trees and tree clusters. GEC 2022-02-01

Photo 22: View looking along one of the larger trails within the CEF (Unit CUT1a). GEC 2022-02-01

Photo 23: View looking northeast from the highest point in the CEF (Unit CUT1a). The CEF exhibits complex topography. GEC 2022-02-01

Photo 24: Cluster of open-grown White Pine within the CEF (Unit CUT1a). GEC 2021-02-01

Photo 25: In portions of the CEF (Unit CUT1a) with denser shrub cover, the groundcovers are dominated by shade-tolerant Common Buckthorn (+) seedlings and alien invasive species such as Garlic Mustard (+). GEC 2021-07-31

Photo 26: The open portions of the CEF (Unit CUT1a) are gradually filling in with shrubs such as Common Buckthorn (+). The numerous Common Buckthorn (+) seedlings indicate that this process will continue. GEC 2021-07-31

Photo 27: View of the Central Property, looking southwards along the eastern edge of the CEF (Unit CUT1a). Note the row of Black Cherry trees growing along what was originally a hedgerow. A 15 m strip of agricultural land will be naturalized to provide a buffer for the CEF. GEC 2021-07-31

Photo 28: View of open-grown White Pines in the CEF (Unit CUT1a). GEC 2022-02-01

Photo 29: View of an open-grown White Pine in the CEF (Unit CUT1a), surrounded by shrubby vegetation. The Ecological Management Plan (EMP) includes enhancements to the CEF, such as controlling Common Buckthorn (+) around clusters of White Pine, and planting Red Oak and White Pine in their place. GEC 2022-02-01

Photo 30: View of the western property, looking south towards the CEF (Unit CUT1a). GEC 2022-03-29

Photo 31: Butternut tree BN01 in the CEF (Unit CUT1a). This tree shows signs of Butternut Canker. GEC 2021-07-31

Photo 32: View of Butternut seedling BN02 in the CEF (Unit CUT1a). GEC 2021-07-31

Photo 33: View of Shrub Thicket (Unit CUT1b). The scattered trees are mainly young White Pine, Red Cedar and White Ash regeneration. The shrubs are mainly Staghorn Sumac, Common Buckthorn (+) and Gray Dogwood. GEC 2022-03-29

Photo 34: White Pine regeneration has spread in parts of Unit CUT1b, from a few larger open-grown trees at the top of a low ridge. GEC 2022-03-29

Photo 35: Unit CUT1b includes a patch of old field vegetation, partially surrounded by shrubby growth and scattered trees. Panorama – Left. GEC 2022-03-29

Photo 36: Unit CUT1b is located on a gravelly ridge. Panorama – Right. GEC 2022-03-29

Photo 37: View showing the dense tangle of shrubby growth in parts of Unit CUT1b. The shrubs are mainly Common Buckthorn (+) and the trees are mostly Black Cherry in poor condition. GEC 2022-03-29

Photo 38: View towards Shrub Thicket (Unit CUT1c) located on the Township Roads Department property. Many of the shrubs and trees are overgrown with Riverbank Grape. The trees are mainly Black Cherry and planted Red Pine and Scots Pine (+). GEC 2021-07-31

Photo 39: View of Staghorn Sumac Shrub Thicket (CUT1-1a).
GEC 2022-03-29

Photo 40: Unit CUT1-1a was raised by GRCA as a possible wetland feature. The bottom of this small depression is located well above the water table, it contains no standing water and it only supports upland plant species. It is not a wetland feature.
GEC 2022-03-29

Photo 41: Summertime view of Staghorn Sumac Shrub Thicket (Unit CUT1-1a). Many of the shrubs are covered in Riverbank Grape. This depression may be an old borrow pit. GEC 2021-07-31

Photo 42: View looking north along Hedgerow Unit CUHDa, which is located along the east side of Shouldice Sideroad. The trees are mainly Red Oak, Sugar Maple, Black Cherry, White Pine and Trembling Aspen. There is dense shrub growth of Gray Dogwood, Common Buckthorn (+) and Staghorn Sumac. GEC 2022-03-29

Photo 43: View looking north across the West Property towards Hedgerow Unit CUHDb. The trees are mainly Red Oak and Black Cherry. Common Buckthorn (+) grows in dense patches along this hedgerow. GEC 2022-03-29

Photo 44: View looking west across the West Property, towards Hedgerow Unit CUHDc. The trees are mainly Red Oak, Black Oak and Black Cherry. The oaks were heavily infested by Ldd moths in 2021. The hedgerow contains dense growths of Common Buckthorn (+). GEC 2021-07-31

Photo 45: Hedgerow Unit CUHDd contains a cluster of Hackberry, Black Cherry and Black Walnut. GEC 2022-03-29

Photo 46: Hedgerow Unit CUHDd is a small feature shown in the left of this photo. The CEF is in the background and the building to the right is a barn/shop on the West Property. GEC 2022-03-29

Photo 47: View looking north northwest across the West Property, towards Hedgerow Unit CUHDe. The main trees are Red Oak, Black Oak and Black Cherry. Common Buckthorn (+) forms dense patches along the hedgerow. GEC 2022-03-29

Photo 48: View looking northeast across the West Property towards Hedgerow Unit CUHDf. This short section of hedgerow is dominated by Black Cherry, with Common Buckthorn (+) and Staghorn Sumac. GEC 2022-06-13

Photo 49: View looking southwards along Hedgerow Unit CUHDg, towards the CEF. The trees are a mix of Black Cherry, Red Oak and Manitoba Maple. Patches of shrubs are dominated by Common Buckthorn (+), Gray Dogwood and Staghorn Sumac.
GEC 2022-03-29

Photo 50: View looking south along Hedgerow Unit CUHDh. The main trees are Red Oak and Black Cherry. Dense growth of Common Buckthorn (+) is present in CUHDh.
GEC 2021-07-31

Photo 51: View looking northeast across a portion of the East Property, towards Hedgerow Units CUHDi and CUHCa alongside Spragues Road. GEC 2021-07-31

Photo 52: Hedgerow Unit CUHSa is dominated by shrubs such as Common Buckthorn (+), Staghorn Sumac and Gray Dogwood. It is located on the Central Property at the north property limit. The scattered trees are mainly Red Oak and Black Cherry. The oaks were heavily infested by the Ldd Moth in 2021. GEC 2021-07-31

ATTACHMENT D: VASCULAR PLANT LIST (2019-2022) – PROPOSED EDWORTHY WEST PIT
GOODBAN ECOLOGICAL CONSULTING INC. (GEC)

Scientific Name	Common Name	S-Rank	Exotic Status	CC	CW	Ext. Area	Lic. Area	Adj. Land	CEF
Acer negundo	Manitoba Maple	S5		0	0	X	X	X	X
Acer platanoides	Norway Maple	SNA	SE5		5			X	
Acer rubrum	Red Maple	S5		4	0		X		
Acer saccharum	Sugar Maple	S5		4	3		X	X	
Achillea borealis	Woolly Yarrow	S5		0	3	X	X	X	X
Actaea pachypoda	White Baneberry	S5		6	5		X		
Aegopodium podagraria	Goutweed	SNA	SE5		0		X	X	
Agrimonia gryposepala	Hooked Agrimony	S5		2	3		X	X	X
Alliaria petiolata	Garlic Mustard	SNA	SE5		0	X	X	X	X
Alopecurus pratensis	Meadow Foxtail	SNA	SE5		-3		X	X	
Amaranthus hybridus	Smooth Amaranth	SNA	SE5?		5	X	X		
Amaranthus retroflexus	Redroot Amaranth	SNA	SE5		3	X	X		
Ambrosia artemisiifolia	Common Ragweed	S5		0	3	X	X	X	X
Amphicarpaea bracteata	American Hog-peanut	S5		4	0		X		
Anemone virginiana	Tall Anemone	S5		4	3		X	X	X
Apocynum androsaemifolium	Spreading Dogbane	S5		3	5	X	X	X	X
Arctium lappa	Great Burdock	SNA	SE5		3	X	X	X	
Arctium minus	Common Burdock	SNA	SE5		3	X	X	X	X
Asclepias syriaca	Common Milkweed	S5		0	5	X	X	X	X
Asparagus officinalis	Garden Asparagus	SNA	SE5		3		X	X	X
Barbarea vulgaris	Bitter Wintercress	SNA	SE5		0	X	X		
Berberis vulgaris	Common Barberry	SNA	SE5		3		X	X	X
Betula papyrifera	Paper Birch	S5		2	3		X	X	X
Brassica nigra	Black Mustard	SNA	SE5		5	X	X		
Bromus inermis	Smooth Brome	SNA	SE5		5	X	X	X	X
Bromus tectorum	Downy Brome	SNA	SE5		5	X	X		
Campanula rapunculoides	Creeping Bellflower	SNA	SE5		5	X	X		
Capsella bursa-pastoris	Common Shepherd's Purse	SNA	SE5		3	X	X		
Carex blanda	Woodland Sedge	S5		3	0		X		

ATTACHMENT D: VASCULAR PLANT LIST (2019-2022) – PROPOSED EDWORTHY WEST PIT
GOODBAN ECOLOGICAL CONSULTING INC. (GEC)

Scientific Name	Common Name	S-Rank	Exotic Status	CC	CW	Ext. Area	Lic. Area	Adj. Land	CEF
Carex communis	Fibrous-root Sedge	S5		6	5		X		
Carex gracillima	Graceful Sedge	S5		4	3		X	X	
Carex pensylvanica	Pennsylvania Sedge	S5		5	5		X	X	X
Carex rosea	Rosy Sedge	S5		2	5		X		
Carex spicata	Spiked Sedge	SNA	SE5		3	X	X	X	X
Carya ovata	Shagbark Hickory	S5		6	3		X		
Celtis occidentalis	Hackberry	S4		8	0	X	X	X	X
Centaurea jacea	Brown Knapweed	SNA	SE5		5	X	X		
Centaurea stoebe	Spotted Knapweed	SNA	SE5		5	X	X		
Cerastium fontanum ssp. vulgare	Common Mouse-ear Chickweed	SNA	SE5		3	X	X		
Chelidonium majus	Greater Celandine	SNA	SE5		5		X	X	X
Chenopodium album	Common Lamb's-quarters	SNA	SE5		3	X	X		
Cichorium intybus	Wild Chicory	SNA	SE5		5	X	X	X	X
Circaea canadensis ssp. *canadensis*	Canada Enchanter's Nightshade	S5		2	3		X		
Cirsium arvense	Canada Thistle	SNA	SE5		3		X	X	X
Cirsium vulgare	Bull Thistle	SNA	SE5		3			X	
Clematis virginiana	Virginia Clematis	S5		3	0			X	X
Clinopodium vulgare	Wild Basil	S5		4	5			X	X
Convolvulus arvensis	Field Bindweed	SNA	SE5		5	X	X		
Cornus alternifolia	Alternate-leaved Dogwood	S5		6	3		X		X
Cornus racemosa	Grey Dogwood	S5		2	0	X	X	X	X
Cornus sericea	Red-osier Dogwood	S5		2	-3			X	X
Corylus cornuta	Beaked Hazel	S5		5	3			X	X
Crataegus coccinea	Scarlet Hawthorn	S5		4	5			X	X
Crataegus monogyna	English Hawthorn	SNA	SE4		3		X	X	X
Crataegus punctata	Dotted Hawthorn	S5		4	5	X	X	X	X
Crepis tectorum	Narrow-leaved Hawksbeard	SNA	SE5		5	X	X		

ATTACHMENT D: VASCULAR PLANT LIST (2019-2022) – PROPOSED EDWORTHY WEST PIT
GOODBAN ECOLOGICAL CONSULTING INC. (GEC)

Scientific Name	Common Name	S-Rank	Exotic Status	CC	CW	Ext. Area	Lic. Area	Adj. Land	CEF
Dactylis glomerata	Orchard Grass	SNA	SE5		3	X	X	X	X
Danthonia spicata	Poverty Oatgrass	S5		5	5			X	X
Daucus carota	Wild Carrot	SNA	SE5		5	X	X	X	X
Dianthus armeria	Deptford Pink	SNA	SE5		5	X	X	X	X
Dichanthelium implicatum	Slender-stemmed Panicgrass	S5		3	0			X	X
Digitaria sanguinalis	Hairy Crabgrass	SNA	SE5		3	X	X		
Dipsacus fullonum	Common Teasel	SNA	SE5		3	X	X	X	X
Dryopteris carthusiana	Spinulose Wood Fern	S5		5	-3		X	X	
Echinochloa crus-galli	Large Barnyard Grass	SNA	SE5		-3	X	X		
Echinocystis lobata	Wild Cucumber	S5		3	-3	X	X	X	X
Echium vulgare	Common Viper's Bugloss	SNA	SE5		5	X	X	X	X
Elaeagnus angustifolia	Russian Olive	SNA	SE3		3			X	X
Elymus repens	Quackgrass	SNA	SE5		3	X	X	X	X
Endotropis alnifolia	Alder-leaved Buckthorn	S5		7	-5	X	X	X	X
Epipactis helleborine	Broad-leaved Helleborine	SNA	SE5		3	X	X	X	X
Equisetum arvense	Field Horsetail	S5		0	0	X	X		
Eragrostis cilianensis	Stinkgrass	SNA	SE5		3	X	X		
Erigeron annuus	Annual Fleabane	S5		0	3	X	X	X	X
Erigeron canadensis	Canada Horseweed	S5		0	3	X	X		
Erigeron philadelphicus var. *philadelphicus*	Philadelphia Fleabane	S5		1	-3	X	X	X	X
Erysimum cheiranthoides	Wormseed Wallflower	S5?			3	X	X		
Erythronium americanum ssp. *americanum*	Yellow Trout-lily	S5		5	5		X		
Euonymus obovatus	Running Strawberry-bush	S4		6	5		X		
Euphorbia cyparissias	Cypress Spurge	SNA	SE5		5	X	X		
Euthamia graminifolia	Grass-leaved Goldenrod	S5		2	0			X	X
Fallopia convolvulus	Eurasian Black Bindweed	SNA	SE5		3	X	X		
Festuca rubra	Red Fescue	S5			3			X	X

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GOODBAN ECOLOGICAL CONSULTING INC. (GEC)

Scientific Name	Common Name	S-Rank	Exotic Status	CC	CW	Ext. Area	Lic. Area	Adj. Land	CEF
Fragaria vesca	Woodland Strawberry	S5		4	3		X		
Fragaria virginiana	Wild Strawberry	S5		2	3	X	X	X	X
Fraxinus americana	White Ash	S4		4	3	X	X	X	X
Galeopsis tetrahit	Common Hemp-nettle	SNA	SE		3	X	X		
Galium aparine	Common Bedstraw	S5		4	3		X		
Galium mollugo	Smooth Bedstraw	SNA	SE5		5	X	X	X	X
Galium triflorum	Three-flowered Bedstraw	S5		4	3		X		
Geranium robertianum	Herb-Robert	S5		2	3		X		X
Geum aleppicum	Yellow Avens	S5		2	0			X	X
Geum canadense	Canada Avens	S5		3	0		X	X	X
Geum urbanum	Wood Avens	SNA	SE3		5		X	X	X
Hesperis matronalis	Dame's Rocket	SNA	SE5		3	X	X	X	X
Hordeum jubatum	Foxtail Barley	S5?		0	0	X	X		
Hydrophyllum virginianum	Virginia Waterleaf	S5		6	0		X		
Hypericum perforatum	Common St. John's-wort	SNA	SE5		5	X	X	X	X
Juglans cinerea	Butternut	S2?		6	3		X	X	X
Juglans nigra	Black Walnut	S4?		5	3	X	X	X	X
Juncus bufonius	Toad Rush	S5		1	-3	X	X		
Juncus tenuis	Path Rush	S5		0	0	X	X		
Juniperus virginiana	Eastern Red Cedar	S5		4	3	X	X	X	X
Lactuca serriola	Prickly Lettuce	SNA	SE5		3	X	X		
Lapsana communis	Common Nipplewort	SNA	SE5		3	X	X	X	X
Leonurus cardiaca ssp. *cardiaca*	Common Motherwort	SNA	SE5		5		X	X	X
Lepidium campestre	Field Peppergrass	SNA	SE5		5	X	X		
Lepidium densiflorum	Common Peppergrass	SNA	SE5		3	X	X		
Leucanthemum vulgare	Oxeye Daisy	SNA	SE5		5	X	X	X	X
Ligustrum vulgare	European Privet	SNA	SE5		3			X	X
Linaria vulgaris	Butter-and-eggs	SNA	SE5		5	X	X	X	X

ATTACHMENT D: VASCULAR PLANT LIST (2019-2022) – PROPOSED EDWORTHY WEST PIT
GOODBAN ECOLOGICAL CONSULTING INC. (GEC)

Scientific Name	Common Name	S-Rank	Exotic Status	CC	CW	Ext. Area	Lic. Area	Adj. Land	CEF
Lithospermum officinale	European Gromwell	SNA	SE5		5			X	X
Lolium perenne	Perennial Ryegrass	SNA	SE4		3	X	X		
Lonicera tatarica	Tatarian Honeysuckle	SNA	SE5		3	X	X	X	X
Lotus corniculatus	Garden Bird's-foot Trefoil	SNA	SE5		3	X	X	X	X
Maianthemum canadense	Wild Lily-of-the-valley	S5		5	3		X		
Maianthemum racemosum	Large False Solomon's Seal	S5		4	3		X		
Malus pumila	Common Apple	SNA	SE4		5	X	X	X	X
Medicago lupulina	Black Medick	SNA	SE5		3	X	X	X	X
Medicago sativa	Alfalfa	SNA	SE5		5	X	X		
Melilotus albus	White Sweet-clover	SNA	SE5		3	X	X	X	X
Melilotus officinalis	Yellow Sweet-clover	SNA	SE5		3			X	X
Monarda fistulosa	Wild Bergamot	S5		6	3			X	X
Nepeta cataria	Catnip	SNA	SE5		3	X	X	X	X
Oenothera parviflora	Small-flowered Evening-primrose	S5		1	3			X	X
Ostrya virginiana	Eastern Hop-hornbeam	S5		4	3		X		
Oxalis stricta	Upright Yellow Wood-sorrel	SNA	SE5		3	X	X	X	X
Panicum capillare	Common Panicgrass	S5		0	0	X	X		
Parthenocissus vitacea	Thicket Creeper	S5		4	3	X	X	X	X
Persicaria maculosa	Spotted Lady's-thumb	SNA	SE5		-3	X	X	X	X
Phalaris arundinacea	Reed Canary Grass	S5		0	-3	X	X		
Phleum pratense	Common Timothy	SNA	SE5		3	X	X	X	X
Picea abies	Norway Spruce	SNA	SE3		5		X	X	X
Picea glauca	White Spruce	S5		6	3		X	X	X
Pilosella aurantiaca	Orange Hawkweed	SNA	SE5		5	X	X	X	X
Pilosella officinarum	Mouse-ear Hawkweed	SNA	SE5		5	X	X	X	X
Pilosella piloselloides	Tall Hawkweed	SNA	SE5		5			X	X
Pinus resinosa	Red Pine	S5		8	3			X	X
Pinus strobus	Eastern White Pine	S5		4	3			X	X
Pinus sylvestris	Scots Pine	SNA	SE5		3			X	X

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GOODBAN ECOLOGICAL CONSULTING INC. (GEC)

Scientific Name	Common Name	S-Rank	Exotic Status	CC	CW	Ext. Area	Lic. Area	Adj. Land	CEF
Plantago lanceolata	English Plantain	SNA	SE5		3	X	X	X	X
Plantago major	Common Plantain	SNA	SE5		3	X	X	X	X
Poa annua	Annual Bluegrass	SNA	SE5		3	X	X		
Poa compressa	Canada Bluegrass	SNA	SE5		3			X	X
Poa pratensis	Kentucky Bluegrass	S5		0	3	X	X	X	X
Podophyllum peltatum	May-apple	S5		5	3		X		
Polygonatum pubescens	Hairy Solomon's Seal	S5		5	5		X		
Populus grandidentata	Large-toothed Aspen	S5		5	5		X	X	X
Populus tremuloides	Trembling Aspen	S5		2	0	X	X	X	X
Populus X *canadensis*	Carolina Poplar (*Populus deltoides* X *Populus nigra*)	SNA						X	
Potentilla norvegica	Rough Cinquefoil	S5		0	0			X	X
Potentilla recta	Sulphur Cinquefoil	SNA	SE5		5	X	X	X	X
Prunella vulgaris ssp. *lanceolata*	Lance-leaved Self-heal	S5		0	0		X	X	X
Prunus pensylvanica	Pin Cherry	S5		3	3			X	X
Prunus serotina	Black Cherry	S5		3	3	X	X	X	X
Prunus virginiana	Chokecherry	S5		2	3	X	X	X	X
Pteridium aquilinum	Bracken Fern	S5		2	3		X	X	X
Quercus alba	White Oak	S5		6	3	X	X	X	
Quercus macrocarpa	Bur Oak	S5		5	3		X	X	
Quercus rubra	Northern Red Oak	S5		6	3	X	X	X	
Quercus velutina	Black Oak	S4		8	5	X	X	X	
Ranunculus acris	Common Buttercup	SNA	SE5		0	X	X	X	X
Rhus typhina	Staghorn Sumac	S5		1	3	X	X	X	X
Ribes cynosbati	Eastern Prickly Gooseberry	S5		4	3		X	X	X
Ribes rubrum	European Red Currant	SNA	SE5		5			X	X
Rosa blanda	Smooth Rose	S5		3	3			X	X
Rosa multiflora	Multiflora Rose	SNA	SE5		3	X	X	X	X

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Scientific Name	Common Name	S-Rank	Exotic Status	CC	CW	Ext. Area	Lic. Area	Adj. Land	CEF
Rubus allegheniensis	Allegheny Blackberry	S5		2	3		X	X	X
Rubus idaeus ssp. *strigosus*	North American Red Raspberry	S5		2	3	X	X	X	X
Rubus occidentalis	Black Raspberry	S5		2	5		X	X	X
Rudbeckia hirta	Black-eyed Susan	S5		0	3	X	X	X	X
Rumex acetosella	Sheep Sorrel	SNA	SE5		3	X	X		
Rumex crispus	Curled Dock	SNA	SE5		0	X	X	X	X
Sambucus canadensis	Common Elderberry	S5		5	-3		X		
Sanguinaria canadensis	Bloodroot	S5		5	3		X		
Saponaria officinalis	Bouncing-bet	SNA	SE5		3	X	X	X	X
Senecio vulgaris	Common Ragwort	SNA	SE5		5	X	X		
Setaria pumila	Yellow Foxtail	SNA	SE5		0	X	X		
Setaria viridis	Green Foxtail	SNA	SE5		5	X	X		
Silene latifolia	White Campion	SNA	SE5		5	X	X	X	
Silene vulgaris	Bladder Campion	SNA	SE5		5	X	X		
Sisymbrium officinale	Common Tumble Mustard	SNA	SE5		5	X	X		
Solanum dulcamara	Climbing Nightshade	SNA	SE5		0	X	X	X	X
Solidago altissima	Tall Goldenrod	S5		1	3	X	X	X	X
Solidago caesia	Blue-stemmed Goldenrod	S5		5	3		X		
Solidago canadensis	Canada Goldenrod	S5		1	3			X	X
Solidago flexicaulis	Zigzag Goldenrod	S5		6	3		X		
Solidago juncea	Early Goldenrod	S5		3	5			X	X
Solidago nemoralis	Grey-stemmed Goldenrod	S5		2	5	X	X	X	X
Sonchus arvensis	Field Sow-thistle	SNA	SE5		3	X	X		
Sonchus asper	Prickly Sow-thistle	SNA	SE5		3	X	X		
Sonchus oleraceus	Common Sow-thistle	SNA	SE5		3	X	X		
Sorbus aucuparia	European Mountain-ash	SNA	SE4		5			X	X
Symphyotrichum cordifolium	Heart-leaved Aster	S5		5	5		X	X	X
Symphyotrichum ericoides	White Heath Aster	S5		4	3	X	X	X	X

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Scientific Name	Common Name	S-Rank	Exotic Status	CC	CW	Ext. Area	Lic. Area	Adj. Land	CEF
Symphyotrichum novae-angliae	New England Aster	S5		2	-3	X	X	X	X
Syringa vulgaris	Common Lilac	SNA	SE5		5			X	X
Tanacetum vulgare	Common Tansy	SNA	SE5		5	X	X		
Taraxacum officinale	Common Dandelion	SNA	SE5		3	X	X	X	X
Thalictrum dioicum	Early Meadow-rue	S5		6	3		X		
Thlaspi arvense	Field Pennycress	SNA	SE5		5	X	X		
Tilia americana	Basswood	S5		4	3	X	X	X	X
Toxicodendron radicans var. *radicans*	Eastern Poison Ivy	S5		2	0		X	X	X
Toxicodendron radicans var. *rydbergii*	Western Poison Ivy	S5		2	0		X		
Tragopogon dubius	Yellow Goatsbeard	SNA	SE5		5	X	X		
Tragopogon pratensis	Meadow Goatsbeard	SNA	SE5		5	X	X		
Trifolium hybridum	Alsike Clover	SNA	SE5		3	X	X	X	X
Trifolium pratense	Red Clover	SNA	SE5		3	X	X	X	X
Trifolium repens	White Clover	SNA	SE5		3	X	X	X	X
Trillium grandiflorum	White Trillium	S5		5	3		X		
Tussilago farfara	Coltsfoot	SNA	SE5		3	X	X	X	X
Ulmus americana	White Elm	S5		3	-3	X	X	X	X
Urtica gracilis	Slender Stinging Nettle	S5						X	X
Verbascum blattaria	Moth Mullein	SNA	SE5		3			X	X
Verbascum thapsus	Common Mullein	SNA	SE5		5	X	X	X	X
Verbena urticifolia	White Vervain	S5		4	0	X	X	X	X
Veronica arvensis	Corn Speedwell	SNA	SE5		5	X	X		
Veronica officinalis	Common Speedwell	SNA	SE5		5		X	X	X
Veronica serpyllifolia	Thyme-leaved Speedwell	SU			0	X	X		
Viburnum lentago	Nannyberry	S5		4	0			X	X

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GOODBAN ECOLOGICAL CONSULTING INC. (GEC)

Scientific Name	Common Name	S-Rank	Exotic Status	CC	CW	Ext. Area	Lic. Area	Adj. Land	CEF
Viburnum opulus var. *americanum*	Highbush Cranberry	S5		5	-3			X	X
Vicia cracca	Tufted Vetch	SNA	SE5		5	X	X	X	X
Vicia tetrasperma	Four-seed Vetch	SNA	SE5		5	X	X		
Vinca minor	Lesser Periwinkle	SNA	SE5		5			X	
Viola pubescens	Yellow Violet	S5		5	3		X		
Viola sororia	Woolly Blue Violet	S5		4	0		X		
Vitis riparia	Riverbank Grape	S5		0	0	X	X	X	X

PLANT LIST NOTES:

Taxonomy and Nomenclature

The taxonomy and nomenclature used in this list generally follows that used by the Ontario Natural Heritage Information Centre (NHIC).

Table Column Information

S-Rank	Provincial (subnational) conservation status rank assigned by NHIC; S1 to S5 based on decreasing level of conservation concern.
Exotic Status	Provincial (provincial) exotic status rank assigned by NHIC, SE1 to SE5 based on increasing abundance.
SNA	S-Rank not available/applicable.
CC	Coefficient of Conservatism (Oldham et al. 1995).
CW	Coefficient of Wetness (Oldham et al. 1995).
Ext. Area	Extraction Area
Lic. Area	Licence Area
Adj. Land	Adjacent Land
CEF	Core Environmental Feature

ATTACHMENT E:

Edworthy West Pit: 2020-2021 Point Count Data

Station 1

June 17 2020		
Species	<100m	>100m
American Crow		3
Black-capped Chickadee	1	
House Wren	3	
Northern Cardinal	1	
Red-winged Blackbird		1
Song Sparrow	1	
Vesper Sparrow	1	

June 25 2020		
Species	<100m	>100m
Eastern Kingbird		1
House Wren	1	
Killdeer		1
Mourning Dove		1
Northern Cardinal	1	
Red-winged Blackbird	1	
Song Sparrow	1	1

July 2 2020		
Species	<100m	>100m
American Crow	1	2
American Goldfinch	1	
American Robin	1	
House Sparrow	2	
House Wren	1	

June 11 2021		
Species	<100m	>100m
American Crow		1
Eastern Kingbird	1	
Field Sparrow		1
Gray Catbird	1	
House Sparrow		1
House Wren		1
Song Sparrow	1	

July 4 2021		
Species	<100m	>100m
American Crow	2	1
American Goldfinch	1	1
American Robin	1	1
Chipping Sparrow	1	
Common Yellowthroat	1	1
Gray Catbird		1
House Wren	1	1
Indigo Bunting	1	
Song Sparrow	1	1

Station 2

June 17 2020		
Species	<100m	>100m
American Crow		1
American Robin		1
Baltimore Oriole		1
Eastern Kingbird	1	
Field Sparrow		2
Great Crested Flycatcher		1
Horned Lark	1	
Northern Cardinal		1
Red-winged Blackbird		1
Song Sparrow	1	1

June 25 2020		
Species	<100m	>100m
American Crow		1
American Goldfinch	2	
American Robin		1
Gray Catbird		1
Killdeer		1
Northern Cardinal		2
Red-eyed Vireo		1
Savannah Sparrow	1	
Song Sparrow	1	

July 2 2020		
Species	<100m	>100m
American Goldfinch		1
American Robin		1
Baltimore Oriole	1	
Grasshopper Sparrow	1	
Horned Lark	1	
Northern Cardinal		1
Savannah Sparrow	2	1
Song Sparrow		1
Vesper Sparrow	1	1

June 11 2021		
Species	<100m	>100m
American Goldfinch	1	
Baltimore Oriole	2	
Field Sparrow		1
Gray Catbird	1	
house wren		1
Indigo Bunting	2	2
Red-winged Blackbird		1
Savannah Sparrow	2	
Song Sparrow	1	

July 4 2021		
Species	<100m	>100m
American Robin		1
Baltimore Oriole	6	
Eastern Kingbird	1	
Gray Catbird	1	
House Wren		1
Song Sparrow	1	

Station 3

June 17 2020		
Species	<100m	>100m
American Crow		1
American Goldfinch	1	
American Robin		2
Baltimore Oriole	1	
Eastern Kingbird	1	
European Starling		1
Field Sparrow	1	
Gray Catbird		1
Great Crested Flycatcher		1
house wren		1
Northern Cardinal		2
Red-winged Blackbird		1
Savannah Sparrow	1	3
Song Sparrow	1	

June 25 2020		
Species	<100m	>100m
American Crow		2
American Robin	1	1
Baltimore Oriole	1	
Barn Swallow	2	
Eastern Kingbird		1
European Starling	6	
Grasshopper Sparrow		1
Gray Catbird		1
Horned Lark	2	
Red-winged Blackbird	2	1
Savannah Sparrow		2
Song Sparrow		1
Vesper Sparrow		1

July 2 2020		
Species	<100m	>100m
American Goldfinch	1	
American Robin		1
Barn Swallow		2
Blue Jay		1
Common Grackle	2	
House Wren		1
Savannah Sparrow	1	
Song Sparrow	1	2
Tree Swallow	1	
Vesper Sparrow	1	1

June 11 2021		
Species	<100m	>100m
American Crow	1	1
Baltimore Oriole		1
Horned Lark		1
House Wren		1
Savannah Sparrow	1	1
Song Sparrow	2	2
Vesper Sparrow	1	

July 4 2021		
Species	<100m	>100m
Baltimore Oriole	1	
Barn Swallow	1	
Blue Jay		1
House Wren		2
Northern Cardinal	1	
Red-winged Blackbird	1	
Savannah Sparrow	1	
Vesper Sparrow	1	

Station 4

June 17 2020		
Species	<100m	>100m
American Crow		1
American Robin		3
Baltimore Oriole		1
Black-billed Cuckoo		1
Black-capped Chickadee	1	1
Cedar Waxwing		3
Common Grackle		1
Downy Woodpecker	1	
Eastern Kingbird	1	
Field Sparrow	1	1
House Wren		3
Mourning Dove		1
Northern Cardinal		1
Northern Flicker		1
Red-winged Blackbird		1
Sandhill Crane		1
Song Sparrow		2
Vesper Sparrow	1	1

June 25 2020		
Species	<100m	>100m
American Robin		1
Baltimore Oriole	1	
Black-capped Chickadee		1
Chipping Sparrow	1	
Common Yellowthroat		1
Field Sparrow		1
Gray Catbird		1
Indigo Bunting		1
Savannah Sparrow	1	1
Song Sparrow	2	1
Vesper Sparrow	3	

July 2 2020		
Species	<100m	>100m
Field Sparrow		1
Savannah Sparrow		1
Turkey Vulture	1	
Vesper Sparrow	1	1

June 11 2021		
Species	<100m	>100m
American Crow		1
American Goldfinch		1
Baltimore Oriole	1	
Black-capped Chickadee	1	
Savannah Sparrow		1
Song Sparrow		1
Vesper Sparrow		1
Warbling Vireo	1	
Yellow-billed Cuckoo	1	

July 4 2021		
Species	<100m	>100m
American Goldfinch	1	
American Robin		1
Baltimore Oriole	1	1
Black-billed Cuckoo		1
Brown-headed Cowbird	1	
Indigo Bunting	1	2
Northern Cardinal	1	
Northern Flicker	1	
Warbling Vireo		1

Station 5

June 17 2020		
Species	<100m	>100m
American Crow		1
American Robin	1	4
Baltimore Oriole		1
Eastern Kingbird	1	
Field Sparrow	1	2
Horned Lark		1
Indigo Bunting		1
Mourning Dove		1
Northern Cardinal	1	2
Savannah Sparrow		1
Song Sparrow		3
Vesper Sparrow	1	1

June 25 2020		
Species	<100m	>100m
American Crow		1
American Robin		3
Black-billed Cuckoo	1	
Field Sparrow		1
Indigo Bunting		1
Northern Cardinal	1	1
Red-tailed Hawk		1
Song Sparrow	1	1
Vesper Sparrow		1
Warbling Vireo		1
Wild Turkey		6

July 2 2020		
Species	<100m	>100m
Northern Rough-winged Swallow	7	
American Crow		1
American Goldfinch		1
American Robin		1
Barn Swallow	1	
Downy Woodpecker	1	
Field Sparrow		2
Purple Martin	1	
Red-winged Blackbird	1	
Song Sparrow	1	

June 11 2021		
Species	<100m	>100m
Common Grackle		1
Downy Woodpecker	1	
Eastern Wood Pewee	1	
Field Sparrow	1	
Gray Catbird	1	
Red-winged Blackbird	1	
Savannah Sparrow		1
Song Sparrow		2

July 4 2021		
Species	<100m	>100m
Baltimore Oriole	1	
Eastern Wood Pewee	1	
Indigo Bunting	1	1
Song Sparrow	2	1
Vesper Sparrow	1	

Station 6

June 17 2020		
Species	<100m	>100m
American Robin		1
Brown Thrasher		1
European Starling	1	
Field Sparrow		1
Gray Catbird	1	
Great Crested Flycatcher		1
house wren		1
Indigo Bunting	2	
Mourning Dove		1
Northern Cardinal	1	2
Song Sparrow	1	2
Vesper Sparrow		2

June 25 2020		
Species	<100m	>100m
American Crow		2
American Goldfinch		1
American Robin		1
Horned Lark	1	
House Sparrow		1
House Wren	1	
Indigo Bunting	1	
Killdeer		1
Song Sparrow		1
Vesper Sparrow	1	
Wild Turkey		7

July 2 2020		
Species	<100m	>100m
American Crow		1
American Goldfinch	1	
American Robin		1
Gray Catbird		1
Indigo Bunting	1	
Song Sparrow	1	1

June 11 2021		
Species	<100m	>100m
American Crow		1
American Robin	1	1
Barn Swallow	1	
Common Yellowthroat	1	
Field Sparrow		1
Gray Catbird	1	2
Great Crested Flycatcher		1
Northern Cardinal	1	1
Red-winged Blackbird	1	
Song Sparrow		3

July 4 2021		
Species	<100m	>100m
American Crow		1
American Goldfinch	1	
American Robin	1	1
Baltimore Oriole	1	
Field Sparrow		1
Gray Catbird	1	1
Indigo Bunting		1
Northern Cardinal		1
Savannah Sparrow	1	
Song Sparrow	1	1

Station 7

June 17 2020		
Species	<100m	>100m
American Crow	4	
Black-capped Chickadee		1
Brown Thrasher		1
Cedar Waxwing		1
Field Sparrow		2
Gray Catbird	1	
House Sparrow	1	
Indigo Bunting		2
Mourning Dove	2	
Mourning Dove	2	
Northern Cardinal		1
Northern Flicker		1
Red-winged Blackbird		1
Song Sparrow		2
Vesper Sparrow		1

June 25 2020		
Species	<100m	>100m
American Robin		1
House Sparrow	2	
House Wren		1
Killdeer	1	
Red-eyed Vireo		1
Red-tailed Hawk		1
Red-tailed Hawk		1
Rock Pigeon	12	
Song Sparrow	1	1

July 2 2020		
Species	<100m	>100m
American Robin		1
Cedar Waxwing	1	
Eastern Kingbird		1
European Starling	2	
House Sparrow	4	
House Wren		1
Mourning Dove		1
Northern Cardinal	1	1

June 11 2021		
Species	<100m	>100m
American Crow		1
American Goldfinch	1	
American Robin		1
Blue Jay		2
European Starling	1	
House Sparrow	11	
House Wren	1	
Indigo Bunting		1
Mourning Dove		2
Song Sparrow	1	

July 4 2021		
Species	<100m	>100m
American Crow	1	1
American Robin		1
Brown-headed Cowbird	2	
Cedar Waxwing		2
House Sparrow	5	3
Killdeer	1	
Northern Cardinal		1
Northern Flicker		1
Song Sparrow	1	
Song Sparrow	2	1

Station 8

June 11 2021		
Species	<100m	>100m
American Robin	1	1
Barn Swallow		4
Blue Jay	1	
Brown-headed Cowbird	1	
Field Sparrow		1
Gray Catbird	1	
Great Crested Flycatcher		1
House Wren		1
Killdeer		1
Red-winged Blackbird		1
Song Sparrow	1	1

July 4 2021		
Species	<100m	>100m
American Crow		1
American Goldfinch	2	1
American Robin	1	1
Baltimore Oriole	2	1
Cedar Waxwing	1	
Chipping Sparrow	2	
Eastern Kingbird	1	
Eastern Towhee	1	
Field Sparrow	1	2
Gray Catbird	1	
Indigo Bunting	1	
Northern Cardinal	1	
Red-bellied Woodpecker	1	
Red-eyed Vireo		1
Song Sparrow	1	1
Yellow Warbler	1	

Station 9

June 11 2021		
Species	<100m	>100m
American Robin		3
Baltimore Oriole	1	
Brown-headed Cowbird	1	
House Wren		1
Northern Cardinal		1
Red-winged Blackbird		1
Song Sparrow	1	1

July 4 2021		
Species	<100m	>100m
American Robin	1	1
Common Yellowthroat	1	1
Field Sparrow		1
Red-bellied Woodpecker	2	1
Song Sparrow	4	1

Station 10

June 11 2021		
Species	<100m	>100m
American Goldfinch	1	
American Robin	1	1
Baltimore Oriole		1
Brown-headed Cowbird	1	
Chipping Sparrow	1	1
Field Sparrow		1
House Wren	1	
Northern Cardinal	1	1
Vesper Sparrow		1

July 4 2021		
Species	<100m	>100m
American Crow		1
American Robin	1	
Black-billed Cuckoo		1
Downy Woodpecker	1	
Mourning Dove	1	
Northern Flicker	1	
Song Sparrow	1	1
Vesper Sparrow	1	
White-breasted Nuthatch	2	

Station 11

June 11 2021		
Species	<100m	>100m
American Goldfinch	1	
American Robin		1
Baltimore Oriole	1	1
Barn Swallow	2	
Chipping Sparrow		1
Eastern Wood Pewee		1
Field Sparrow	1	
Gray Catbird	1	
Great Blue Heron		1
Horned Lark	1	
Northern Cardinal		1
Red-winged Blackbird		1

July 4 2021		
Species	<100m	>100m
American Crow		1
American Goldfinch		1
American Robin	2	
Field Sparrow		1
Indigo Bunting		1
Red-eyed Vireo		1
Song Sparrow	2	1
White-breasted Nuthatch		1

Station 12

June 11 2021		
Species	<100m	>100m
American Crow		1
American Robin		2
Baltimore Oriole		1
Brown-headed Cowbird	1	
Chipping Sparrow	1	
Eastern Phoebe	1	
European Starling	1	1
Great Crested Flycatcher		1
House Wren	1	
Indigo Bunting		1
Red-winged Blackbird	1	1
Song Sparrow	1	1
Vesper Sparrow		1

July 4 2021		
Species	<100m	>100m
American Crow		1
American Robin	1	
Blue Jay	1	
Chipping Sparrow		1
Great Crested Flycatcher		1
House Wren	1	2
Indigo Bunting	1	
Killdeer		1
Northern Flicker	1	
Savannah Sparrow	1	1
Song Sparrow		1

Station 13

June 11 2021		
Species	<100m	>100m
American Crow	1	
Barn Swallow		1
Black-capped Chickadee	1	
Chipping Sparrow	2	
Eastern Kingbird	1	
Eastern Phoebe		1
House Wren		2
House Wren		1
Red-winged Blackbird	1	2

July 4 2021		
Species	<100m	>100m
American Goldfinch		2
Baltimore Oriole	4	1
Chipping Sparrow	1	
Eastern Kingbird	1	
European Starling	18	
House Wren	1	
Indigo Bunting		1
Song Sparrow	1	

Attachment F: Potential Bat Roost Trees in Hedgerows Located Within Proposed Extraction Area
Edworthy West Pit

Tree No.	Feature	Species	Notes	DBH (cm) (>10cm only)	Tree height (m)	Cavity Height (m)	UTM (NAD83; Zone 17)	One of tallest trees in community	Exhibits cavities / crevices/scars/ woodpecker holes	Largest DBH in community	Cavity or crevice is high up in tree (>10 m)	Within highest density or cluster of cavity trees	Large amount of loose, peeling bark	Open canopy	Early stages of decay (class 1-3)
001		Black Cherry	3-stem	48	14	8	551973 4796415		X					X	1-2
002		Black Cherry	2-stem	46	12	6	552054 4796427		X					X	1-2
003		Black Cherry	Cluster of 4 large and 3 small Black Cherry trees.	35-55	14	7	552048 4796466		X					X	1-2
004		Black Cherry	2-stem	38	14	5	552039 4796507		X					X	1-2
005		Black Cherry	Damaged, split trunk, leaning.	50	12	6	552009 4796615		X					X	1-2
006		Black Oak		46	14	4	552004 4796629		X					X	1-2
007		Black Oak		48	15	9	551997 4796663		X					X	1-2
008		Black Cherry	Multi-stem; some stems cut.	70+	14	4-11	552272 4796669		X					X	1-2
009		Black Cherry	Top gone, snapped off.	73	9	2-8	552067 4796598		X					X	4
010		Black Cherry	3-stem	43	15	6-9	552048 4796601		X					X	1-2
011		Red Oak	2-stem	61	>15	3-9	551893 4796632		X					X	1

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