Whistle Bare Pit Expansion
Natural Environment Report
Environmental Impact Study

Prepared for:
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Aquatic, Terrestrial and Wetland Biologists

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1.0 Introduction

Natural Resource Solutions Inc. (NRSI) was retained in May 2019 by Mike and Shawn Milloy to complete an Environmental Impact Study (EIS) for a proposed expansion of the existing Tullis-Whistle Bare Aggregate Pit on Whistle Bare Road in North Dumfries Township, Ontario. Lands to the immediate west of the existing aggregate pit were recently purchased by the proponent for expansion of their aggregate extraction operation. The existing pit and pit expansion proposed are above the water table. The location of the Subject Property is shown on Map 1.

The proposed expansion site contains unevaluated wetlands but is otherwise cleared agricultural land with sparse hedgerows along the field boundaries. The wetland area is regulated by the Grand River Conservation Authority (GRCA) and has been identified as hazard lands in the Regional Official Plan (Region of Waterloo 2015) and the Township of North Dumfries Official Plan (2018). An EIS is required by the Township, the GRCA, the Region and the Ministry of Natural Resource and Forestry (MNRF) in support of an application to obtain approval under the provincial Aggregate Resources Act (ARA) (OMNRF 2018) and for a local zoning by-law amendment.

This report summarizes background information on natural heritage features, as well as results of original field surveys of breeding birds, herpetofauna, vascular flora, butterflies, odonata, and mammals for the subject property. This report contains the detailed characterization of existing natural features, the identification of natural feature constraints and an assessment of potential impacts associated with the proposed pit expansion as well as mitigation and avoidance measures.

1.1 Project Scoping

The Subject Property proposed for the expansion of the pit is 41.67 ha in size and fronts onto Whistle Bare Road as shown on Map 1. The existing Tullis-Whistle Bare Pit occupies the 20.66 ha parcel of land to the east of the subject property. The subject property is currently zoned Agricultural Zone 1 and proposed to be amended to Extraction Zone 14. Adjacent lands to the subject property include farmland, golf courses and a recreational campground. Habitat within the subject property is largely agricultural fields including forage (hay), pasture and annual row crops (corn and wheat).

The majority of the subject property is located within the Upper Cedar Creek Subwatershed; a small area of the northern portion of the subject property is located within the Blair-Bechtel-Bauman Creeks Subwatershed. Two small unevaluated wetlands are present at the south end of the subject property. These wetland areas are regulated by the GRCA and are identified as hazard lands in the Regional and Township Official Plans. The nearest evaluated wetland is the Cedar Creek Tributary Provincially Significant Wetland complex located approximately 125 m south of the subject property. The subject property is located within Ecoregion 6E.

In this report, the "Subject Property" is the parcel of land owned by the Milloys that is proposed for the pit expansion. The term "Study Area" refers to the subject property plus adjacent lands within 120m in accordance with the *Aggregate Resources Act,1990* (ARA), as well as the 1-10km squares overlapping the property from which legacy data was collected from agencies and wildlife atlases. This study area was chosen to ensure that all surrounding natural features and species were considered.

In order to determine a study approach for the EIS, existing natural heritage information was gathered and reviewed to identify key natural heritage features and species that are known or have potential to occur within the study area. Background information on the natural environmental features within the study area was gathered from the following sources:

- Natural Heritage Information Centre significant species database 1km squares overlapping the study area (OMNRF 2019);
- Ontario Ministry of Natural Resources and Forestry (MNRF), Guelph District;
- Region of Waterloo;
- Grand River Conservation Authority (GRCA);
- Upper Cedar Creek Scoped Subwatershed Study (Matrix Solutions Inc. et al 2019);
- Blair, Bechtel, and Bauman Creeks Subwatershed Study (CH2M Gore and Storrie, et al. 1997),
- 10km squares overlapping the subject property of the various wildlife atlases, as listed below.

Initial wildlife species lists were compiled to provide information on species reported from the vicinity of the subject property (10km radius) using various atlases; including the Ontario Mammal Atlas (Dobbyn 1994), the Ontario Reptile and Amphibian Atlas (Ontario Nature 2016), the Ontario Butterfly Atlas (MacNaughton et al. 2019), and the Ontario Odonata Atlas (Ontario Odonata Atlas Database 2005). Data on breeding birds in the area was extracted from the Ontario Breeding Bird Atlas (BSC et al. 2009). Since this atlas provides data based on 10x10 km survey squares, information on breeding birds from the square that overlaps the study area (17NJ40) was compiled. These initial species lists were used to guide the scope and type of wildlife field surveys required.

For the purposes of this report, Species at Risk (SAR) include species listed as 'Threatened' or 'Endangered' on the provincial *Endangered Species Act* (ESA), or on Schedule 1 of the federal *Species at Risk Act* (SARA).

In Ontario, provincial Species of Conservation Concern (SCC) include:

- species designated under the ESA as 'Special Concern' within Ontario,
- species that have been assigned a conservation status (S-Rank) of S1 to S3 or SH by the Natural Heritage Information Centre,
- species that have a high percentage of their global population in Ontario, and
- species that are identified federally as 'Threatened' or 'Endangered' by the Committee for the Status of Endangered Wildlife in Canada (COSEWIC), but are not protected provincially by the ESA.

Species of Conservation Concern are discussed further within the context of Significant Wildlife Habitat (SWH).

Based on these initial species lists, a total of 11 Species at Risk (SAR) and 11 Species of Conservation Concern (SCC) were identified as having records from the study area. A preliminary screening exercise was conducted to identify which of these species have suitable habitat within the study area. This involved cross-referencing the preferred habitat for reported SAR/SCC (OMNR 2000) against habitats known to occur on the subject property or adjacent lands. This screening was completed to ensure that the

potential presence of all SAR and SCC within the study area was adequately assessed in this EIS.

Based on results of the preliminary SAR and SCC screening, 7 SAR and 6 SCC have the potential to occur within the vicinity of the study area. This includes 1 SAR and 1 SCC plant species, 3 SAR bird species, 2 SCC herpetofaunal species, 2 SAR mammal species, and 1 SAR and 4 SCC insect species. The field studies were scoped with consideration for the SAR and SCC potentially present within the study area. Full results of the SAR and SCC screening exercise are provided in Appendix I.

Based on the findings described above, a Terms of Reference (TOR) for the EIS was prepared by NRSI and submitted to the GRCA and the Township of North Dumfries on May 24, 2019 for review and comment. The Terms of Reference and comments received are appended to this report (Appendix I). This EIS was prepared in accordance with the TOR and the guidance of the Upper Cedar Creek Scoped Subwatershed Study (UCCSSWS) and the Blair-Bechtel-Bauman Creeks Subwatershed Plan. Although this proposal is above-water, the Cumulative Effects Assessment Best Practices Paper for Below-water Sand and Gravel Extraction (GRCA 2010) was reviewed for pertinent recommendations and guidance.

2.0 Relevant Policies, Legislation, and Planning Studies

For the purposes of this EIS report, information on the natural heritage features within the subject property was collected and assessed for significance. To help inform suitable land-use concepts, guide the layout of development, and identify areas to be protected, these features were evaluated against the following relevant policies, legislation, and planning studies outlined in Table 1.

Table 1. Relevant Policies, Legislation and Planning Studies

Policy/Legislation/Planning Study	Description	Project Relevance

Provincial Policy Statement (OMMAH 2014).	• Issued under the authority of Section 3 of the Planning Act and came into effect on April 30, 2014, replacing the 2005 PPS.
	• Section 2.1 of the PPS – Natural Heritage establishes an ecosystem approach to the protection of resources that have been identified as 'significant'.
	• The Natural Heritage Reference Manual (OMNR 2010) and the Significant Wildlife Habitat Technical Guide (OMNR 2000, OMNR 2012) provide guidance on identifying significant natural features and in interpreting the Natural Heritage sections of the PPS.
		• Based on a preliminary analysis, several natural features afforded consideration within the PPS are identified within the study area which include:
		  • Unevaluated wetlands;
		  • Significant Wildlife Habitat; and
		  • potential habitat for endangered and threatened species.

Endangered Species Act, 2007	• The original ESA (1971) underwent a year-long review which resulted in a number of changes which came into force in 2007. • The ESA prohibits killing, harming, harassing or capturing Species at Risk (SAR) and protects their habitats from damage and destruction.	• Based on a preliminary analysis, several SAR are identified as having the potential to occur within the study area based on habitat present. • These include plants, birds, amphibians, reptiles, mammals and insects.
Canadian Fisheries Act, 1985	• The Act prohibits "serious harm to fish" including destruction of habitat • DFO has developed an online, self-assessment tool, where proponents can determine whether their projects require DFO review based on the type of water body the work is occurring in and the nature of the proposed activity.	• The proposed expansion is not expected to directly impact fish or fish habitat. • Potential for indirect impacts resulting from changes in surface water patterns and groundwater recharge/discharge.

Policy/Legislation/Planning Study	Description	Project Relevance
Aggregate Resources Act, 2019	• Aggregate Resources Act (1990) was last significantly updated in 2019. • Provides for the management of aggregate resources in Ontario and controls and regulates aggregate operations on Crown and private lands. • The MNRF is responsible for administering this Act and its regulations.	• Requires that adverse impacts on the environment with respect to aggregate operations are minimized. • Provides specific requirements for restoration and rehabilitation.
Region of Waterloo Official Plan (2015)	• The Region of Waterloo Official Plan (ROP) 2015 outlines current policies for the protection of natural features within the Region (Region of Waterloo 2015). • It provides a detailed policy framework that protects environmental features and guidance for delineating and protecting Core Environmental Features.	• Core Environmental Features identified within the study area include: • Provincially Significant Wetland • The Official Plan also outlines the guidelines for managing Mineral Aggregate Resources in the Region.

Township of North Dumfries Official Plan (2018)	• The Township of North Dumfries Official Plan (2018) outlines policies for the protection of the Township's natural heritage resources including those resources identified in the Region of Waterloo Official Plan.	• Policies speak to the protection of natural features within the study area including:
		  • The Greenlands Network;
		  • Environmentally Constrained Lands;
		  • Hazard Lands; and
		  • Mineral Aggregate Areas.

GRCA Regulation 150/06 (2013)	• Regulation issued under *Conservation Authorities Act,* R.S.O. 1990. • Through this regulation, the GRCA regulates activities in natural and hazardous areas (i.e., areas in and near rivers, streams, floodplains, wetlands, and slopes). • GRCA requires that an EIS be undertaken in accordance with their *EIS Guidelines and Submission Standards for Wetlands* where development is proposed within 120m of PSW or 30m of non-PSW (GRCA 2005).	• The GRCA regulates a portion of the study area due to the presence of unevaluated wetlands within the subject property and the Cedar Creek Tributary Wetland complex located within the study area. • The GRCA does not issue permitting for aggregate activities but does review the EIS and provides an advisory role to the Region and Township.

3.0 Field Methods

The type and scope of study methods was determined in consultation with the Township of North Dumfries and the GRCA, and is detailed in a Terms of Reference which is appended to this report (Appendix I). Table 2 outlines the field surveys completed, the date of completion, surveyors present and the general weather conditions on the date of survey.

Table 2. Field Survey Summary

Survey Type	Protocol	Dates	Observers
2019			
Anuran Call Survey #1	Marsh Monitoring Program (BSC 2009)	April 22, 2019	Elaine Gosnell, Ethan Gosnell
Bat Habitat Assessment	MNRF (2017)	May 6, 2019	Elaine Gosnell
Anuran Call Survey #2	Marsh Monitoring Program (BSC 2009)	May 21, 2019	Elaine Gosnell
ELC, Spring Vegetation Inventory and Breeding Bird Survey #1	Lee et al.(1998); Systematic search by ELC polygon; OBBA (2001)	May 30, 2019	Elaine Gosnell, Hashveenah Manoharan
Anuran Call Survey #3	Marsh Monitoring Program (BSC 2009)	June 17, 2019	Ryan Archer, Sam Catry
Breeding Bird Survey #2	OBBA (2001)	June 24, 2019	Elaine Gosnell
Wetland Boundary Delineation, Barn Swallow Habitat Investigation and Description Survey and Summer Vegetation Inventory	Ontario Wetland Evaluation System (OMNR 2014)	July 4, 2019	Andrew Dean, Marissa Zago
Wetland Boundary Confirmation with GRCA (Tony Zammit)	Ontario Wetland Evaluation System (OMNR 2014)	July 16, 2019	Elaine Gosnell
ELC Verification and Refinement	Lee et al. (1998)	July 19, 2019	Elaine Gosnell
Summer Vegetation Inventory	Systematic search by ELC polygon	September 30, 2019	Pat Deacon, Jenna Phillips
Bat Habitat Assessment	MNRF (2017, 2018)	December 2, 2019	Christy Humphrey, Amy Reinert
2020			
Anuran Call Survey #1	Marsh Monitoring Program (BSC 2009)	April 28, 2020	Pat Deacon, Gina MacVeigh
Anuran Call Survey #2	Marsh Monitoring Program (BSC 2009)	May 21, 2020	Liz Milne, Jenn Pedersen
Anuran Call Survey #3	Marsh Monitoring Program (BSC 2009)	June 24, 2020	Liz Milne, Laura Hockley

Barn Swallow Structure Monitoring and Breeding Bird Survey #1	OBBA (2001), Ontario Regulation 242/08 (2007)	June 12, 2020	Kayla MacLlellan, Shelby Hofstetter
Barn Swallow Structure Monitoring and Breeding Bird Survey #2	OBBA (2001) Ontario Regulation 242/08 (2007)	June 26, 2020	Kathryn Hoo, Josh Pickering
2021			
Anuran Call Survey #1	Marsh Monitoring Program (BSC 2009)	April 13, 2021	Elizabeth Milne Sam Catry
Anuran Call Survey #2	Marsh Monitoring Program (BSC 2009)	May 13, 2021	Amy Reinert Faith Rahman
Anuran Call Survey #3	Marsh Monitoring Program (BSC 2009)	June 22, 2021	Pat Deacon
Breeding Bird Survey #1	OBBA (2001)	May 31, 2021	Elaine Gosnell
Breeding Bird Survey #2	OBBA (2001)	June 14, 2021	Elaine Gosnell

3.1 Terrestrial Field Surveys

Terrestrial field surveys were undertaken within the subject property to characterize natural features and identify significant and sensitive natural heritage features and species that have potential to be adversely affected by the proposed development. A total of 21 field visits were carried out during between 2019 and 2021. Field survey methods are described in detail below. Surveys were undertaken in accordance with provincial and local guidance documents as indicated below.

3.1.1 Vegetation Surveys

Vegetation community delineation was completed using aerial photography and through investigations in the field on May 30, 2019. The standard Ecological Land Classification (ELC) System for southern Ontario was applied (Lee et al. 1998). Details of vegetation communities were recorded including species composition, dominance, uncommon species or features, evidence of human impact, and surficial soil characterization. A verification of ELC community delineation was completed on July 19, 2019.

A three-season detailed botanical survey was completed on May 30, July 4 and September 30, 2019. All observed species of vascular flora were recorded during these field surveys.

The wetland boundaries, within the confines of the subject property, were flagged in the field on July 9, 2019 for subsequent surveying. NRSI biologists met with staff of the GRCA, Tony Zammit, to confirm the wetland and ESPA boundary delineations on July 16, 2019. The wetland boundaries were subsequently surveyed by NRSI on the same day and are shown on all plans and maps.

3.1.2 Breeding Bird Surveys

Breeding bird surveys were completed on May 30 and June 24, 2019, June 12 and 24, 2020, and May 31 and June 14, 2021. Data on birds observed was recorded using standard OBBA call codes (Ontario Breeding Birds Atlas 2001). Surveys consisted of area searches by habitat type (ELC community) and occurred between dawn and 1000hrs. All visual and auditory observations of birds were recorded as well as the highest level of breeding evidence exhibited for each recorded species. In addition, incidental sightings of birds were recorded during other field surveys completed.

Barn Swallow Nesting Structure

In the early spring of 2020, the barn on the property was demolished due to its hazardous state. The barn had previously been documented as housing a number of nesting barn swallows which are a Species At Risk. In accordance with the Ontario Regulation 242/08, the proponent prepared a Barn Swallow mitigation plan (NRSI 2020) and followed mitigative measures to ensure that barn swallows were not harmed during the demolition. A replacement nesting structure was installed in April 2020 prior to the return of barn swallows from their wintering grounds. The nest structure is to be monitored annually for 3 years following its installation as per Ontario Regulation 242/08. The nest structure was monitored during the breeding bird surveys in 2020 and will be monitored in 2021 and 2022.

3.1.3 Herpetofaunal Surveys

Anuran Call Surveys

Evening anuran (frog and toad) call surveys were conducted in April, May and June each year between 2019 and 2021 using the Marsh Monitoring Program protocol (BSC 2009) at two stations (Map 2). Monitoring focused on calling frogs and toads during a 3 minute call count survey, which included call intensity and an estimated number of

individuals. Additional information, including survey time, air and water temperature, pH, wind speed, and cloud cover were recorded at each survey station.

All observations of amphibians and reptiles were recorded during all field visits, including a search of natural area habitats and rock piles for snakes.

3.1.4 Mammal Surveys

Bat Habitat Assessment

Cavity trees were investigated on December 2, 2019 to assess the potential for bat habitat presence within the study area. This work was completed within woodland habitat and hedgerows within the subject lands. Assessment methodology followed the Guelph District MNRF *Survey Protocol for Species at Risk Bats within Treed Habitat* (OMNRF 2017). Each woodland community was thoroughly searched during the leaf-off period for the presence of cavity trees that might be impacted by the proposed undertaking as a means of determining potential for impacts to SAR bats (i.e., Little Brown Myotis (*Myotis lucifugus*) and Northern Myotis (*Myotis septentrionalis*)). The presence of sugar maple and oak trees was noted in terms of potential to provide habitat for Tri-coloured bat (*Perimyotis subflavus*). The buildings on-site were also assessed for their potential to house roosting or hibernating bats.

All observations of mammals were recorded during all visits to the site as well as signs of wildlife presence (i.e. tracks, scats, dens, nests etc.).

3.1.5 Additional Wildlife

All observations of additional wildlife including insects were documented on all field visits. This included actual direct observations of individuals, as well as signs of wildlife presence (i.e. tracks, scats, dens, nests etc.).

4.0 Existing Conditions

4.1 Soils, Terrain and Drainage

Background information indicates that the subject property is located within the Waterloo Hills Physiographic Region (Chapman and Putnam 1984). The dominant substrate types found within this region are fine sands and sandy loam (Chapman and Putnam 1984). The subject property is located within a spillway system which contains more uniform sandy and gravelly soils (Chapman and Putnam 1984). On-site test pits and borehole data undertaken by Chung and Vander Doelen (CVD) indicates that the property is underlain mostly by sand and gravel with some cobbles (2020).

The subject property is located at the topographic divide between the Blair Creek and Upper Cedar Creek watersheds, as shown in the Hydrogeolocial Report by CVD (2020). At their closest, Blair Creek is approximately 600m to the north of the subject property and Cedar Creek is approximately 200m to the southwest. The topography of the subject property is relatively flat, but hummocky with several low knolls and numerous shallow depressions. Drainage generally flows to the north or the south, but due the complex topography of the site, it is expected that little to no surface water runs off the site. Runoff is directed to the depressions where it evapotranspires or infiltrates (CVD 2020). The largest depression is a series of wetlands/pond at the south property boundary, extending onto the golf course property. The golf course uses water from this wetland/pond for irrigation and for a well (CVD 2020).

The sand and gravel underlying the site contain an upper water table aquifer zone which is hydraulically connected to local creeks and wetlands. A low permeability aquitard separates this upper aquifer from a deeper aquifer zone associated with deeper sand and gravel deposits and bedrock. The water table varies across the property dependent upon topography and seasonal fluctuations, being higher in spring and beneath the southern wetlands where it can be 0-0.5m below the ground surface. Overall groundwater flow is towards the north, with minor seasonal flows towards the on-site wetlands. The water table elevation is monitored by CVD and is presented in their report (2020).

4.2 Designated Natural Areas

There are no designated natural areas on the subject property. Wetlands on-site are unevaluated at this time. As the property is located at the divide between two watersheds, wetlands to the north are part of the Blair Creek provincially significant wetland complex, while wetlands to the south are part of the Cedar Creek Tributary provincially significant wetland. Wetlands and woodlands to the north are part of the Blair Swamp Environmentally Sensitive Policy Area (ESPA) and form part of the larger Blair-Bechtel-Cruikston Environmentally Sensitive Landscape (ESL). These features are shown on Map 1.

4.3 Vegetation

4.3.1 Vegetation Communities

The predominant land use on and in the vicinity of the subject property is agricultural, with golf courses, a campground and aggregate extraction located on adjacent properties. Natural features on-site are unevaluated wetlands, hedgerows, meadow and small woodlands. The proposed aggregate pit expansion area is predominantly within the agricultural fields. Details of ELC communities identified within the subject property are provided in Table 3. ELC communities are shown on Map 2.

Table 3. Vegetation Communities Identified within the Study Area

ELC Ecosite Type	ELC Description	Environmental Characteristics
Cultural		
CUM1-1	Dry-Moist Old Field Meadow Type	A pioneer tableland community that is present around the perimeter of the wetland and forest communities in the south part of the subject property and to the west of the residence in the northeast of the subject property. Groundcover: Smooth Brome (*Bromus inermis*), Canada Goldenrod (*Solidago canadensis*), Alfalfa (*Medicago sativa*), Sweet Clover (*Melilotus albus*).
CUT1	Mineral Cultural Thicket Ecosite	A pioneer tableland thicket community around the periphery of the wetland communities. Canopy: Crack Willow (*Salix fragilis*) Understorey: European Buckthorn (*Rhamnus cathartica)*

ELC Ecosite Type	ELC Description	Environmental Characteristics
		Groundcover: Field Horsetail (*Equisetum arvense*), Spotted Touch-me-not (*Impatiens capensis*), European Stinging Nettle (*Urtica dioica ssp. dioica*)
Forest		
FOD5	Dry-Fresh Sugar Maple Deciduous Forest Ecosite	Mature Sugar Maple dominated linear shaped deciduous forest remnant along the south boundadry of the subject property. Canopy cover is approximately 60%. Canopy: Sugar Maple (Acer saccharum), American Beech Sub-canopy: Sugar Maple, Black Cherry, European Buckthorn Understorey: Sugar Maple, Red Panicled Dogwood (*Cornus foemina ssp.* racemose), European Buckthorn Groundcover: Avens sp. (*Geum sp.*), Motherwort (*Leonurus cardiaca*), Bloodroot (*Sanguinaria canadensis*), Wild Leek (*Allium burdickii*) One regionally significant species, Wild Leek, was observed within this vegetation community.
FOD8-1	Fresh-Moist Poplar Deciduous Forest Type	Mature Trembling Aspen and Balsam Poplar (*Populus balsamifera*) dominated deciduous forest community located adjacent to the wetland. Canopy: Trembling Aspen, Bur Oak (*Quercus macrocarpa*), White Elm (*Ulmus americana*) Sub-canopy: Balsam Poplar, Black Walnut (*Juglans nigra*) Understorey: European Buckthorn, Downy Juneberry (*Amelanchier arborea*) Groundcover: Yellow Dog's-tooth Violet (*Erythronium americanum*), Bloodroot, False Solomon's Seal (*Maianthemum racemosum ssp. racemosum*), Virginia Water-leaf (*Hydrophyllum virginianum*) One regionally significant species, Eastern Cottonwood, was observed within this vegetation community.
Wetland		
MAM2-2	Reed-Canary Grass Mineral Marsh Meadow Type	This community comprises the majority of the wetland units within the subject property and is dominated by Reed Canary Grass (*Phalaris arundinacea*). Groundcover: Reed Canary Grass, Narrow-leaved Cattail (*Typha angustifolia*) Three regionally significant species, Floating Manna Grass (Glyceria septentrionalis), Blunt-leaved Bedstraw (*Galium obtusum*) and Water Smartweed (*Persicaria amphibia*), were observed within this community.

ELC Ecosite Type	ELC Description	Environmental Characteristics
MAM2-10	Forb Mineral Meadow Marsh Type	A few small wetland patches are comprised of this community. Canopy: Crack Willow Sub-canopy: European Buckthorn Understorey: Red-osier Dogwood (*Cornus stolonifera*), Peach-leaved Willow (*Salix amygdaloides*), Pussy Willow (*Salix discolor*) Groundcover: Field Horsetail, Purple Loosestrife (*Lythrum salicaria*), Spotted Touch-me-not
Hedgerow		
H1	Deciduous Hedgerow	A sparse mixed deciduous hedgerow located along the western edge of the subject property. Canopy: Manitoba Maple (*Acer negundo*), Black walnut (*Juglans nigra*), Common Hackberry (*Celtis occidentalis*) Sub-canopy: European Buckthorn, Trembling Aspen (*Populus tremuloides*), Cherry sp. (*Prunus sp*.) Understorey: European Buckthorn Groundcover: Avens sp. (*Geum sp.*), Common Burdock (*Arctium minus*), Common Dandelion (*Taraxacum officinale*), Canada Goldenrod One regionally significant species, Common Hackberry, was observed within this community.
H2	Shrub Hedgerow	Shrub dominated hedgerows located between agricultural fields in the centre, east and south of the subject property. Sub-canopy: European Buckthorn Understorey: Red Panicled Dogwood Groundcover: Avens sp., Common Dandelion (*Taraxacum officinale*), Mortherwort, Canada Goldenrod One regionally significant species, Common Hackberry, was observed within this community.
H3	Norway Spruce Hedgerow	A mature planted hedgerow located in the northeast corner of the subject property. Canopy cover is approximately 70%. Canopy: Norway Spruce (*Picea abies*)

4.3.2 Vascular Flora

A total of 165 species of plants was recorded during detailed vegetation inventories within the subject property. A complete list of these species is included in Appendix II. This included 40% non-native species which is typical of agricultural and altered human

landscapes. The highest species diversity was observed within the wetland communities, including a number of regionally rare species of plants.

No SAR plants were observed. Regionally rare plants in the wetland included Water Smartweed (*Persicaria punctata*), Blunt-leaved bedstraw (*Galium obtusum*) and Floating manna grass (*Glyceria septentrionalis*) as well as Eastern Cottonwood, White Spruce and Black Walnut found in the wetland and the hedgerow communities. In the Region of Waterloo, several of these species are rare, but only if determined to be indigenous or with the expectation that additional research will prove otherwise (Richardson and Martin 1999). Given the agricultural nature of the site and the location of these individuals in field hedgerows it is unlikely that the Eastern Cottonwood, Black Walnut and White Spruce are of native origin, and they should not be considered significant in this setting.

4.4 Wildlife

4.4.1 Birds

A total of 103 bird species are reported from the vicinity of the study area based on the OBBA (Square 17NJ40) (BSC et al. 2008). The data found in the OBBA includes those species that have been observed in the area (10 x 10km range), are known to nest in the area, and/or have exhibited some evidence of breeding in the area. Two additional species not recorded in the OBBA were observed on the subject property by NRSI biologists, Black-throated Blue Warbler (*Setophaga caerulescens*) and Bobolink (*Dolichonyx oryzivorus*). A total of 55 avian species were documented within the subject property during all field surveys completed by NRSI biologists. Of the species observed, a total of 46 exhibited signs of breeding, such as males singing, females carrying food or nest materials, and the presence of fledged young. Nine species, Killdeer (*Charadrius vociferus*), Barn Swallow (*Hirundo rustica*), American Robin (*Turdus migratorius*), European Starling (*Sturnus vulgaris*), Cedar Waxwing (*Bombycilla cedrorum*), House Sparrow (*Passer domesticus*), Red-winged Blackbird (*Agelaius phoeniceus*), Common Grackle (*Quiscalus quiscula*), and Baltimore Oriole (*Icterus galbula*), were confirmed to be breeding. Of the remaining species exhibiting breeding evidence, 21 showed signs of possible breeding and 16 showed signs of probable breeding. Refer to Appendix III for a list of bird species found in the study area and vicinity as well as breeding evidence.

One regulated bird SAR, Barn Swallow was observed on the subject property and was confirmed to be breeding within the barn on-site. Barn Swallow is listed as Threatened both provincially and federally, and as such, individuals and habitat for this species are afforded protection under the ESA.

Barn Swallow is typically found in farmlands and rural areas near bodies of water, they most often nest in buildings and other human-made structures such as barns and outbuildings. Barn Swallows were observed in the vicinity of the residence and barn during the breeding bird surveys conducted on May 30 and June 24, 2019. They were also observed foraging over the agricultural fields on May 24, 2019. During the first breeding bird survey Barn Swallows were observed entering the barn the northeast of the subject property, a nest was observed to be under construction on a wooden beam. As a result of this observation and subsequent observations of Barn Swallows an investigation of the interior of the barn was completed on July 4, 2019. This survey was completed to assess the number of Barn Swallows and active nests and to determine which buildings were occupied. Four adult Barn Swallow were observed within the barn, and additional eight adults were observed flying around the outside of the barn. A total of 8 active nests was documented within the barn. No nests were observed in the shed or residence.

Of the species observed within the study area, 12 are considered regionally significant (Region of Waterloo 1985a), see Map 3. Eight of these species exhibited signs of breeding within the subject property; Pileated Woodpecker (*Dryocopus pileatus*), Black-billed Cuckoo (*Coccyzus erythropthalmus*), Green Heron (*Butorides virescens*), Belted Kingfisher (*Megaceryle alcyon*), Least Flycatcher (*Empidonax minimus*), Pine Warbler (*Setophaga pinus*), American Redstart (*Setophaga ruticilla*), and Brown Thrasher (*Toxostoma rufum*). In addition, 24 species observed are considered Conservation Priority Species by the GRCA (Couturier 1999). Of these species, 16 exhibited signs of breeding within the subject property.

4.4.2 Herpetofauna

According to the Ontario Amphibian and Reptile Atlas (Ontario Nature 2016), 18 species of herpetofauna are reported from within 10km of the study area. NRSI field investigations confirmed the presence of 6 species within the study area. A complete list

of herpetofauna reported from the study area, based on background information and observations made as part of this study, is included in Appendix IV. The results of species-specific surveys are detailed in the following sections.

Anurans (Frogs and Toads)

In total 6 species of anuran were recorded during the call surveys in 2019 to 2021. Spring Peeper and Gray Treefrog were the most abundantly recorded anurans. A summary of the highest results of the anuran call surveys are presented in Table 4 below. The detailed results of the call surveys are provided in Appendix IV.

No herpetofauna regulated SAR or SCC were observed within the study area during field surveys.

Table 4. Anuran Call Survey Highest Results (2019-2021)

Anuran Call Station	Species	Anuran Call Survey[1]		
		1	2	3
ANR-001	American Toad		Code 2(3)	
	Spring Peeper	Code 3	Code 2(6)	
	Gray Treefrog		Code 2(2)	Code 1(2)
	Northern Leopard Frog		Code 1(1)	
	Northern Green Frog		Code 1(1)	
	Wood Frog	Code 1(1)		
ANR-002	American Toad		Code 1(2)	
	Spring Peeper	Code 2(4)	Code 2(3)	
	Gray Treefrog		Code 2(6)	Code 2(5)
	Northern Leopard Frog	Code 2(5)		
	Northern Green Frog			Code 1(2)
	Wood Frog	Code 1(3)		

[1]Marsh monitoring anuran call code with estimated number of individuals in brackets.

4.4.3 Mammals

According to the Mammal Atlas of Ontario (Dobbyn 1994), 30 mammal species are reported from within 10km of the study area. Although targeted mammal surveys were

not completed within the study area, 4 mammal species were observed or showed signs of presence within the study area. Evidence of mammals present within the study area included direct observations, tracks and scat. Eastern Gray Squirrel (*Sciurus carolinensis*), Eastern Chipmunk (*Tamias striatus*) and Coyote (*Canis latrans*) were directly observed within the study area during field surveys. White-tailed Deer (*Odocoileus virginianus*) showed signs of presence within the study area including an abundance of tracks and scat. All of these species are common throughout Ontario. Appendix V provides a complete list of mammal species reported from the study area.

No mammal regulated SAR or SCC were observed within the study area. One species, Coyote, is considered regionally scarce (Region of Waterloo 1985b).

During the leaf-off bat habitat assessment 23 trees with cavities, crevices, knot holes, loose bark or other potential bat roost features were documented on the property. Many of these trees (19 of 23) are in the natural area at the south of the property associated with the wetland and woodlands, with the remaining four in the hedgerows within the property or near to the existing house. The location of candidate bat habitat trees is shown on Map 4. Trees that are most suitable for bats have multiple roost features and are in fairly good condition (ie. not in an advanced state of decay). These trees have the potential to provide habitat for the SAR Little Brown Myotis and Northern Myotis.

The house, barn and outbuildings were inspected inside and out, as was safe to do so, for evidence of use by bats and for their suitability to house roosting bats. The barn and sheds are in poor shape with the interior quite exposed and drafty with less desirable conditions and low potential for housing bats. The house is an older farmhouse with a stone foundation and exterior brick walls. The walls and foundation contain cracks and gaps which could provide bat hibernation sites or access to interior areas for hibernation. The roofline also contains various gaps which could allow access to interior voids for maternity roosting. During the inspection of the house (including the interior) no bats were observed and no evidence of use by bats, such as guano or staining, was observed. The basement is unfinished and its interior consists of the stone foundation walls and support beams; during the inspection no bats were observed hibernating in the basement. Although no bats were observed, the condition of the house is such that the potential for its use by SAR bats cannot be ruled out.

4.4.4 Insects

Butterflies

According to the Ontario Butterfly Atlas (Layberry and MacNaughton 2016), 76 butterfly species are reported to occur within the study area. No targeted butterfly surveys were completed for the study area. NRSI biologists incidentally observed 3 species of butterfly during field surveys, including Northern Eyed Brown (*Lethe eurydice*), Red Admiral (*Vanessa atalanta*) and Monarch (*Danaus plexippes*). A complete list of species known to occur within the study area is provided in Appendix VI.

Monarch is an SCC as it is listed as Special Concern provincially and Endangered federally. General habitat for this species in Ontario is not protected under the ESA, it is to be considered against the Habitat for Species of Conservation Concern type of Significant Wildlife Habitat (SWH) under the MNRF's guidelines (OMNR 2000; MNRF 2015a). Adult Monarch are found in diverse habitats and nectar on a variety of wildflowers. Caterpillars are found in meadows and open habitats where milkweed species (*Asclepias sp*.), their host plant, are found. During field surveys only adult Monarchs were observed foraging within the subject property in meadow habitat in the south of the property. Limited amounts of common Milkweed (*Ascelpias syriaca*) and Swamp Milkweed (*Asclepias incarnata var. incarnata*) are both present within the Dry – Moist Old Field Meadow (CUM1-1) and the Reed-canary Grass Mineral Meadow Marsh (MAM2-2), respectively.

Odonata

According to the Ontario Odonata Summary Atlas (MNRF 2005), 7 odonate (dragonfly and damselfly) species are reported from the study area. Although no targeted odonate surveys were completed for the study area, NRSI biologists incidentally observed three species during field surveys completed within the study area. A complete list of species observed is provided in Appendix VII.

No odonata regulated SAR or SCC were observed within the study area. No species observed are considered to be regionally significant.

5.0 Significance and Sensitivity

5.1 Wetlands

5.1.1 **Wetland Water Balance**

Wetlands are defined as “Lands that are seasonally or permanently flooded by shallow water as well as lands where the water table is close to the surface; in either case, the presence of abundant water has caused the formation of hydric soils and has favoured the dominance of either hydrophytic or water tolerant plants (OMNR 2014).” Wetlands receive water through precipitation, surface inflow, groundwater inflow, and lose water through evapotranspiration, surface and groundwater outflow. Through the hydrogeological study, it has been determined that the on-site wetlands are supported by groundwater and surface water flowing northward from the catchments to the south (ie. from the off-site golf course property), the immediately adjacent catchment on the north side of the wetland (ie. on-site), water pumped seasonally from the golf course into the wetland open water pond and to a lesser extent by recharge to the groundwater table at the local depressions on the subject property. CVD (2020) has recommended a catchment limit which encompasses the surface water and groundwater contributions which are important to maintaining the wetlands.

5.1.2 **Wetland Significance**

Wetlands on-site have not been evaluated as to their significance by any authority. To aid in identifying those wetlands that are significant at the provincial level, the MNRF developed and administers the Ontario Wetland Evaluation System (OWES). Through this system, the biological, hydrological, social and special features values of a wetland are assessed to determine if it meets a threshold of significance. Wetland communities can be grouped together as a complex when they are located in close proximity and are related in a functional way, that is, as a group they tend to have similar or complementary biological, social and/or hydrological functions (OMNR 2014). In their review of the TOR, the GRCA requested that as part of this EIS the on-site wetland be assessed to determine its significance. Due to its proximity to the Cedar Creek Tributary provincially significant wetland, the on-site wetland was evaluated to determine if it should be included as part of that complex, and thereby also considered provincially significant.

The on-site wetland is a series of small depressions that can be connected to one another during spring when the water level is high, but become semi/isolated when water levels subside over the summer. Individually these wetland pockets are very small, and grouped together they only total 0.6ha. Under the OWES, small wetlands (under 2ha in area) are typically not included in a wetland complex, unless they have important characteristics or ecological functions that warrant them being considered to be evaluated or included in a wetland complex. The MNRF provides guidance as to when small wetlands should be included in a wetland complex and evaluated. These characteristics include things like rarity of wetlands in the landscape, presence of significant species, connections to other wetlands or habitats and distance to nearest significant wetland (MNRF 2014, MNRF 2016). Although the wetlands are 5 separate units, they are all very close together and connected hydrologically to one another, and so were treated as one wetland when considering whether it should be evaluated or not. To be complexed with the Cedar Creek Tributary PSW, the on-site wetland must be within 750m of it.

The on-site wetland is found to meet a number of the suggested factors to be considered for evaluating small wetlands as shown in Table 5, including the following:

- Rarity in the landscape
- Presence of regionally rare species
- Amphibian breeding habitat
- Significant wildlife habitat
- Located in a headwater area.

Table 5. Assessment of On-site Wetlands

Wetland polygon # (see Map 3)	**1**	**2**	**3**	**4**	**5**
ELC Codes	MAM2-10	MAM2-10	MAM2-10, MAM2-2, OA	MAM2-10	OA
Distance from PSW (m)	254	314	255	359	400
Wetland Area (ha)	0.021	0.015	0.538	0.005	0.047
Rarity of wetland within landscape score (6E-1)	60				
Site Type	isolated	palustrine	palustrine	palustrine	isolated
Wetland Type	Marsh	Marsh	Marsh	Marsh	Marsh

Rarity of wetland type score (6E-1)	40				
# of vegetation communities	1	1	3	1	1
Part of a natural corridor overland or riparian	No	No	No	No	No
Open water present?	Yes seasonally	Yes seasonally	Yes seasonally	Yes seasonally	Yes
Substrate	mineral	mineral	mineral	mineral	mineral
Amphibian breeding area	Yes	Yes	Yes	Yes	Yes
Waterfowl migratory stopover, summer feeding area or breeding area	No	No	No	No	No
Contain native fish	not sampled	not sampled	not sampled	not sampled	not sampled
Contain native turtles	none observed	none observed	none observed	none observed	none observed
Headwater area or groundwater seepage	Yes	Yes	Yes	Yes	Yes
Hydrologically connected to other wetlands	No	Yes	Yes	Yes	No
Provide intervening wetland habitat between larger wetlands	Yes	Yes	Yes	Yes	Yes
Part of, but fragmented from a larger wetland	No	No	No	No	No
Kettle wetland, found on moraines	Yes	Yes	Yes	Yes	Yes
Coastal wetland	No	No	No	No	No
SWH present	No	No	Yes	No	No
SAR present	No	No	No	No	No
Provincially rare species present	No	No	No	No	No
Regionally rare species present	No	No	Yes	No	Yes
Invasive species	Infrequent	Infrequent	Infrequent	infrequent	Infrequent
Notes	Dominated by forbs	Dominated by forbs	Dominated by reed canary grass	Dominated by forbs	Manmade/ altered by excavation

Based on this analysis, it is recommended that the wetland on-site provides sufficient ecological value despite its small size, that it should be included in the Cedar Creek Tributary wetland complex. The on-site wetland is within 750m of Cedar Creek Tributary wetland complex which is a provincially significant wetland, and thereby the on-site wetlands are to be considered PSW as well.

5.1.3 **Wetland Buffer**

A 30m buffer from the wetland outer boundary is recommended to protect the wetland during the aggregate extraction process. This 30m dimension is in accordance with the impact management strategy recommended in the Upper Cedar Creek Scoped Subwatershed Study (Matrix et al 2019) to protect provincially significant wetlands from direct, indirect and cumulative impacts such as from aggregate production. This physical buffer setback is one component of the strategy to protect the wetland and its ecological function of providing habitat for plants, amphibians and breeding birds. Maintaining the existing pattern and volume of water to the wetland units is also important to continue to sustain it through the development and operation of the pit. As the wetland is primarily supported by localized surface runoff, shallow groundwater table and direct rainfall (CVD 2020), it will be important to preserve the adjacent catchment area to continue this contribution.

5.2 Watercourses

As noted above, the subject property is located at the divide between the Blair Creek and the Upper Cedar Creek watersheds. Surface runoff from the site to either watercourse does not occur, but the site does function to infiltrate water and to recharge the shallow groundwater table. The hydrogeological report prepared by CVD indicates that the water balance is heavily proportioned towards recharge based on the very permeable granular soils and also the hummocky topography that directs surface water to the on-site depressions. The vegetated wetland depressions result in higher evapotranspiration from the saturated soils and wetland vegetation.

5.3 Significant Wildlife Habitat

The Significant Wildlife Habitat Technical Guide (SWHTG) is a guideline document that outlines the types of habitats that the MNRF considers significant in Ontario as well as criteria to identify these habitats (OMNR 2000, MNRF 2015). The SWHTG groups SWH into four broad categories: seasonal concentration areas, rare vegetation communities and specialized wildlife habitat, habitats of SCC, and animal movement corridors. Information collected through a background review, agency consultation, and vegetation community mapping was used to screen for/identify candidate SWH types within the

study area based on the PPS, the Natural Heritage Reference Manual (OMNR 2010) and the SWHTG (OMNR 2000, MNRF 2015).

Based on the results of the SWH screening exercise, the following SWH types have been identified as candidate or confirmed within the study area:

- Bat Maternity Colonies (Candidate)
- Marsh Breeding Bird Habitat (Confirmed)

Habitat for Species of Conservation Concern SWH for Monarch butterfly has been considered for the subject property based on field observations. Due to lack of expansive stands of Milkweed throughout the subject property, as well as abundance of nectaring sources and habitat availability throughout southern Ontario, SWH for Monarch is not present within the subject property.

Development or site alteration is not permitted within SWH unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions as outlined in Section 2.1.5 of the PPS (OMMAH 2014). SWH is shown on Map 3. SWH screening tables are provided in Appendix VIII.

<u>Seasonal Concentration Areas – Bat Maternity Colonies (Candidate)</u>

Bat maternity (or nursery) colonies are day roosts inhabited solely by females and juveniles/subadults and are used for giving birth and raising young (OMNR 2011). They can range in size from tens to hundreds of adult females and their young (OMNR 2011). Maternity colonies can be located in human structures (e.g., barns and attics), in tree cracks and hollows, and under loose tree bark. Guidelines for identifying candidate significant bat maternity colonies are outlined by the MNRF (OMNR 2011) and the SWHTG (OMNR 2000, MNRF 2015d). These documents recommend that all deciduous or mixed forest communities (FOD or FOM) should be assessed for cavity trees ≥25cm dbh (diameter at breast height) which may be suitable for roosting bats, and that woodlands with >10 suitable cavity trees per hectare be considered significant Bat Maternity Colony habitat. The cavity tree inventory undertaken in the two contiguous areas of FOD on-site identified a density of 17.5 (7 trees/0.4ha) in the western communities and 7.1 (4 trees/0.56ha) suitable cavity trees per hectare in the eastern

communities, and as such the western FOD community is considered candidate significant wildlife habitat for bat maternity colonies.

Habitat for Species of Conservation Concern – Marsh Bird Breeding Habitat (Confirmed)

Wetlands such as marshes, submerged aquatic communities, bogs and fens can provide habitat for marsh bird breeding. All wetland habitats are to be considered as long as there is shallow water with emergent aquatic vegetation present. The marsh habitats on-site are suitable for nesting for a number of marsh birds, including Green heron which was observed in the wetland on several occasions during breeding season, and was given a level of breeding evidence of possible. Its habitat is at the edge of water such as sluggish streams, ponds and marshes sheltered by shrubs and trees. Any wetland with 1 or more Green Heron nesting is considered SWH, according to the criteria (MNRF 2015). Therefore, this type of SWH is confirmed for the wetlands on-site.

5.4 Habitat for Endangered and Threatened Species

Based on the results of wildlife-specific field surveys detailed in Section 4.0, 1 Species at Risk was confirmed to be present within the subject property.

Barn Swallow

Barn Swallow is listed as Threatened both provincially and federally, and as such, individuals and habitat for this species are afforded protection under the ESA. Eight active nests were found in the barn on the subject property. The barn was in hazardous condition and was removed by the owner in early spring 2020 while it was unoccupied by barn swallow, as they had not yet returned to southern Ontario from their wintering grounds. Prior to the barn being demolished, a Notice of Activity was filed with MECP, a barn swallow mitigation record was prepared by NRSI and a replacement nesting structure was constructed and installed on the property.

SAR Bats

Little Brown Myotis, Northern Myotis and Tri-coloured bat are all listed as Endangered both provincially and federally (MNRF 2019, Government of Canada 2019), and have potential to be found on the subject property. None of these species were observed within the subject lands by NRSI during field work, but suitable roosting habitat may be

present in the treed vegetation communities and isolated trees. The house may also provide suitable roosting habitat, including for maternity colonies.

A number of trees have been identified, primarily within the wetland and hedgerows at the rear of the property as shown on Map 4. If removal of these trees is required for the site alteration, further study and liaison with MECP will need to be completed. The house was also inspected and found to have cracks and crevices that could be used by bats for maternity roosting by SAR bats. Although no evidence of current use by bats was observed, the house has potential to be occupied by bats and should be re-assessed prior to demolition.

6.0 Impact Analysis

6.1 Description of the Proposed Undertaking

An expansion of the Whistle Bare Aggregate Pit is proposed from the existing pit, working in an easterly direction into the subject property. The Extraction Plan has been prepared by Walter Fedy (2022) and is included in this EIS as Map 5. The proposed extraction area avoids the on-site wetlands and their catchment area as well as areas where the depth to the water table is a constraint. Similarly, the extraction area has been adjusted to avoid an archeological area discovered on-site (Map 5). An area to the northwest of the wetlands (Stage 4 extraction area on Map 5) will be extracted to 1.5m above the water table and then soil replaced and graded to existing elevation. Aggregate extraction across the site will be limited to an elevation of 1.5 m above the water table.

Further details of the proposed removals, extraction and the plan for restoration are provided on the site plans prepared by Walter Fedy (2022). The existing house, barns, silo, sheds and trees within the interior of the property will be removed. Hedgerows along the south and east property boundaries will be retained. The hydro towers will remain in their current locations. A 3.0m high screening berm will be constructed along Whistle Bare Road and planted with coniferous and deciduous trees as a visual barrier. The lifespan of the pit is expected to be about 30 years. Upon completion of the extraction, the lands will be rehabilitated back to agriculture by applying a 0.3m layer of silty loam topped with a 0.3m layer topsoil. Slopes will be graded to meet the existing topography on all sides. The outer berms may be removed if desired and the screening plantings will be repaired and replaced if necessary. A Rehabilitation Plan has been prepared by GSP Group.

6.2 Approach to Impact Assessment

Potential impacts arising from the proposed expansion of the pit were determined by comparing the details of the proposed extraction with the sensitivities of the natural features and ecological functions. The following types of impacts were considered as part of the impact assessment:

- Direct impacts to natural features associated with disruption or displacement as a result of the actual proposed ‘footprint’ of the undertaking.

- Indirect impacts to natural features associated with changes in site conditions such as drainage and water quantity/quality.

6.3 Direct Impacts

The approach in this EIS to identify and delineate important natural features and apply a buffer avoids direct impacts that can arise as a result of aggregate extraction. The proposed extraction area limits are outside of the wetland and its buffer and its surface water catchment resulting in the wetland being well protected within the plan. The deciduous hedgerow at the south property boundary is also outside of the extraction limit and will be retained. The cultural meadow adjacent to the wetland, and a large part of the perennial crop (hay) field and annual crop (corn) field will also be retained as this is an area with a relatively higher water table and is not feasible for extraction. Combined, these areas form a large block of retained habitat. Direct impacts are limited to the following:

- Removal of vegetation including cultural meadow, and deciduous trees and shrubs from sparse hedgerows between the agricultural fields and the western property boundary,
- Removal of the barn that was used by barn swallow for nesting (already occurred),
- Removal of house, other buildings and nearby trees that could provide habitat for SAR bats.

<u>Removal of Vegetation</u>

Vegetation will be removed from the extraction area which includes the agricultural fields, cultural meadow at Whistle Bare Road and hedgerows (H1 and H2) of deciduous trees and shrubs. A portion of the cultural meadow at Whistle Bare Road will be removed but some will be retained in association with the hydro tower to provide access. H1 is sparse hedgerow with Manitoba Maple, Black Walnut and several Hackberry trees. H2 hedgerows are mainly European Buckthorn. There are 7 Hackberry and 1 Eastern Cottonwood tree which will be removed as extraction proceeds. These two tree species are listed as regionally significant, but only in circumstances where they are considered to be of native origin. Given the hedgerow location of these trees, they are not expected to be native populations, and are not considered significant.

Mitigation: Vegetation should be retained wherever possible. The berm and setback along Whistle Bare Road will be vegetated with a meadow community and planted with a mixture of deciduous and coniferous trees for screening. Native species should be considered for plantings, including sugar maple, American beech, Eastern cottonwood and hackberry.

Bird Nest Destruction

The *Migratory Birds Convention Act* (2013) protects migratory birds, their eggs and nests from being harmed or destroyed. Since the habitat to be removed is entirely agricultural fields, small area of meadow, hedgerow trees and shrubs as well as landscape plantings around the existing buildings, a reduced window of nest protection from May 1 to July 31 has been proposed based on the nesting timing calendar of CWS (2013).

Mitigation: During the core time period from May 1 to July 31 it is recommended that no clearing of vegetation occur. The Canadian Wildlife Service (CWS) advises that, nest searches, as a means of mitigating nest destruction during the core breeding period, may be undertaken in "simple" habitats such as isolated landscape trees, bridges, or other constructed features where the potential to observe all active nests is relatively high (CWS 2013). If land clearing must occur during this time period, nest searches by a qualified biologist are a feasible strategy to identify nests on this property due to the simplicity of the habitats to be removed.

Removal of House and Buildings

Based on the inspection carried out during this study, no evidence of bats using the house or other buildings was observed. The house does have features such as cracks and crevices in the stone walls and foundation that could be used by bats. Guidance from MNRF recommends that the buildings proposed for removal be surveyed visually for bats, as per standardized protocol (A. McAllister, pers. comm. 2016). Since it will be several years before the removal of the house and buildings, it is recommended that they be re-assessed at that time to ensure compliance with the *Endangered Species Act* (2007) and any updated guidance on SAR bats.

Mitigation: SAR Bat use of the buildings will be monitored and will be addressed according to the ESA at the time when building demolition is proposed, and in consultation with MECP, as appropriate.

Removal of Isolated Trees as SAR Bat Habitat

Two trees near the house were identified as having cavities suitable for roosting bats, including SAR bats. As these trees are not associated with a woodland community, they can be removed outside of the active bat season without targeted exit surveys for bats (MECP 2020). Prior to removal this approach should be confirmed with MECP.

Mitigation: Removal of trees around the house is to occur outside of the active bat season of April 1 to September 30. This approach should be confirmed at the time to ensure it is compliant with the ESA, and in consultation with MECP, as appropriate.

6.4 Indirect Impacts

Indirect impacts are those associated with changes in site conditions, such as changes in site drainage and sedimentation and erosion. Changes in surface drainage and groundwater infiltration patterns have been analyzed and discussed in detail within the hydrogeology report by CVD (2020). The reader is recommended to refer to the hydrogeology report for further details. Other potential indirect impacts may arise as a result of sediment transport and operational impacts such as dust and noise.

6.4.1 Surface Drainage

The proposed construction of berms and site grading will contain the site such that there is no off-site runoff from the pit. The CVD report indicates that due to the soil type and the hummocky nature of the subject property, there is no direct drainage from the site; to Blair Creek or Cedar Creek, as drainage is internal in the existing condition. Very little, if any, surface water flows off-site, as it is mainly captured by the local depressions and infiltrated.

Maintaining surface runoff to the wetland is an important consideration in its protection within this proposal. As the wetland is primarily supported by localized surface runoff, shallow groundwater table and direct rainfall, it will be important to preserve the adjacent catchment area to continue this contribution. The proposed approach to meet this

requirement is to maintain the catchment areas and the closest depressions surrounding the wetlands (CVD 2020). An extraction limit was delineated based on containing the lands which contribute drainage to the wetland and is shown on the Excavation Plan prepared by Walter Fedy (2022) (Map 5). A low berm (0.3m) at the edge of the excavation limit is proposed to ensure that all rainfall that lands on the retained tablelands flows towards the wetland.

6.4.2 Groundwater Infiltration Patterns

As mentioned above and described in the hydrogeological report, the water balance on this property is primarily weighted toward recharge to groundwater, as is characteristic of this area and documented in the Upper Cedar Creek Scoped Subwatershed Study (Matrix Solutions Inc. et al 2019). The UCCSSWS recommends that,

- groundwater infiltration be maintained to provide for existing recharge,
- broader scale groundwater flow directions and divides, as well as existing recharge-discharge linkages, be maintained,
- depressional features, or the significance of the features on the subwatershed's hydrologic impacts, should be maintained.

Under the proposed aggregate extraction, groundwater infiltration will increase within the pit. It is predicted that during the pit development and operation the rate of groundwater recharge will increase, due to the removal of vegetation and topsoil from the site which currently contributes to removing water from the system by evapotranspiration. Due to the high transmissivity of the aquifer, no significant effects to the water table are expected. No water quantity impacts are expected to Blair Creek or Cedar Creek in this regard (CVD 2020). The hydrogeology report provides design guidance for the pit excavation in order to protect groundwater and maintain an extraction separation distance of 1.5m above the high-water table across the site.

The excavation limit excludes the nearest topographic depressions to the wetland such that this infiltration function is maintained. The delineated limit will maintain direct surface runoff to the wetlands and thereby the shallow groundwater table.

This proposed approach ensures that the contribution of groundwater to the wetland will be maintained and also that the groundwater management objectives of the UCCSSWS are met or enhanced.

6.4.3 Water Taking

No changes in water taking will be required as a result of the proposed aggregate pit expansion and a new Permit to Take Water will therefore not be necessary.

6.4.4 Erosion and Sediment Control

During topsoil stripping, berm construction and grading of the site, areas of bare soil will be exposed which have the potential to erode and result in sediment transport off-site and to adjacent natural features. The wetlands and adjacent retained lands will be topographically higher than the pit and will not be receivers of any pit runoff. A low bern will be constructed at the limit of extraction such that all rainfall on the tablelands flows towards the wetland. A sediment and erosion control plan should be developed.

6.4.5 Wildlife Impacts

The retention of the wetlands and a large block of adjacent land will protect and retain the wildlife habitat function of this area from potential impacts due to the proposed extraction. Potential indirect impacts to wildlife may arise from noise, dust, and unnatural lighting associated with aggregate extraction. Noise and unnatural lighting can result in habitat avoidance by various wildlife species, the disruption of bird nesting activities, and interference with bird and anuran breeding calls. High levels of dust can result in impacts to vegetation and habitat. In order to avoid indirect impacts to wildlife, aggregate construction activities should be restricted to daylight hours only and the use of artificial lighting should be avoided. A dust mitigation plan should be prepared.

6.5 Opportunities for Ecological Enhancement and Restoration

The provision of buffers from the wetland as well as the retention of surface and groundwater contributing lands adjacent to the wetland is an opportunity for enhancing and restoring natural cover and wildlife habitat on the subject property. A portion of this retained block is currently in agricultural use for hay and annual crop production. The Upper Cedar Creek Scoped Subwatershed Study (Matrix et al. 2019) recommends restoration consider lands within the provincial natural heritage system that are outside

of buffers, or where the opportunity exists, to naturalize agricultural land. The following are recommendations for enhancements on-site prior to and during pit operation, and can be considered in conjunction with the long-term rehabilitation plan for the pit. A Rehabilitation Plan has been prepared by GSP Group and has been used to prepare a Stewardship Plan, as shown on Map 6.

Buffers

Currently the wetland buffer is cultural meadow vegetation. It is recommended that the buffer remain in this state and be allowed to naturalize without additional intervention. There are minor instances of dumping noted in and around the wetland (ie. tires, couch, debris) which could be cleaned up, but none were considered significant.

Hay Field

The hay field provides a perennial meadow type vegetation cover which is used by open country birds and small wildlife. The hay field could be enhanced for this purpose by prescriptive seeding to promote a more natural diversity of plant species, one that is favoured by grassland birds. Once this land is removed from the cycle of harvesting, it will provide more productive habitat for birds and wildlife, as nesting birds and other small wildlife will not be interrupted or destroyed inadvertently by mowing and removal of the hay.

Corn Field

The portion of the corn field that will be retained outside of the extraction limit can also be converted to a more natural cover such as meadow. It is recommended to be seeded with a native meadow mix of grasses and forbs in a ratio suitable for birds and wildlife. This should be done as soon as the land is no longer in production, so that it does not regenerate with weeds and undesirable species. The meadow seeding can be enhanced with the plantings of nodes of shrubs and trees. The goal is to provide open country habitat and some thicket, and to allow natural regeneration to proceed.

6.6 Rehabilitation Plan

The final land use of the proposed extraction area is to return the lands to agriculture, as shown in the Rehabilitation Plan prepared by GSP Group (2020). The lifespan of the pit is expected to be approximately 30 years, with rehabilitation beginning once extraction is

complete. Rehabilitation will start with grading and the placement of 0.3m of silty loam and 0.3m of topsoil across the floor of the pit. The outer screening berm may be removed and redistributed across the site during rehabilitation. The low berm around the wetland will be maintained to ensure that any surface water continues to flow to the wetland. Following the application of topsoil, slopes and non-farmable areas of bare soil will be seeded and planted as shown on the Rehabilitation Plan. The existing natural areas and their buffer and other retained lands will be maintained throughout extraction and rehabilitation and will not be converted back to agriculture. The Stewardship Plan (Map 6) shows the future concept of how the lands will be managed once extraction and rehabilitation is complete.

7.0 Monitoring

Based on the findings of this EIS and the proposed aggregate expansion, the following biological monitoring is recommended prior to, during and post-extraction:

- Amphibian monitoring to continue annually in April, May and June,
- Breeding bird surveys to continue annually in peak breeding season late May to early July.
- Monitor barn swallow nesting structure for 2 more years (2020-2022). Monitoring results are to be kept on file and to be reported to MECP if asked.
- Monitor house prior to demolition, and any suitable bat habitat trees to be removed, for use by bats. Correspond with MECP regarding appropriate measures to take at the time and in compliance with the ESA.
- Undertake regular inspections of the erosion and sediment control fencing and any tree protection fencing.
- Monitor the establishment of desirable native vegetation on the berms and in the retained fields in years 1, 3 and 5 after enhancement measures.

Further details of the monitoring plan can be determined once approvals have been received and once timing of activities is known. These monitoring recommendations are to be considered in combination with groundwater and surface water monitoring as well as other compliance and mitigation monitoring proposed by others on the study team.

8.0 Conclusion

Natural Resource Solutions Inc. was retained in 2019 by Mike and Shawn Milloy to complete an EIS for a proposed expansion of the existing Tullis-Whistle Bare Aggregate Pit in the Township of North Dumfries, Ontario. This report characterizes natural features and species on the subject property and adjacent through the use of background information, as well as results of original field surveys completed within the study area.

The characterization of existing natural features was combined with information from the hydrogeological study to understand the significance and sensitivity of natural features within the study area and identify constraints to development. The onsite wetland was evaluated in accordance with the OWES and it was determined that it is warranted to be included in the Cedar Creek Tributary provincially significant wetland. Therefore, the on-site wetland is also provincially significant. SAR barn swallow and several regionally significant species were found on-site. The wetland was found to provide Marsh Breeding Bird SWH, and treed areas may provide SWH for bat maternity colonies as well as suitable habitats for SAR bats. Protection measures are recommended including a wetland ecological buffer of 30m. The ecological buffer was combined with the surface water and groundwater catchment of the wetland to delineate a limit of excavation that protects this natural feature and the hydrology and hydrogeology that support it. Mitigation and protection measures have been provided for Barn Swallow and for potential SAR bats.

The wetland and its buffer as well as additional agricultural land are outside of the extraction limit and will be retained and enhanced during the operation of the pit and maintained following completion of extraction. Based on the proposed extraction plan and the anticipated enhanced infiltration water balance, no negative impacts to the wetland, its habitat; or the local watercourses Blair Creek and Upper Cedar Creek, are expected as a result of the proposed aggregate pit expansion. Mitigation measures are recommended for construction and operation as well as ongoing biological monitoring. Opportunities for enhancement and restoration of natural cover and habitats have been identified and should be taken into account with the long-term Rehabilitation Plan.

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Blair-Bechtel-Cruikston ESL
Blair Creek Wetland
Grand Valley Golf Course
WHISTLE BARE RD
Proposed Whistle Bare Pit Expansion
HWY 401
Existing Tullis - Whistle Bare Pit
Grand Valley Golf Course
ROSEVILLE RD
Cedar Creek Tributary Wetland Complex
Dumfries Carolinian ESL

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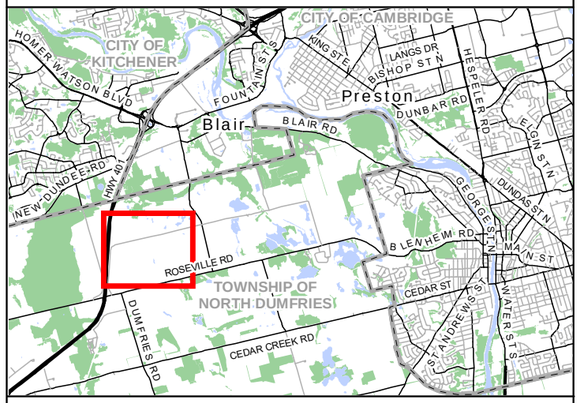
Map 1

Whistle Bare Pit Expansion

Study Area



Legend

- Study Area
- Subject Property
- Utility Line
- Permanent Watercourse
- Intermittent Watercourse
- Provincially Significant Wetland (PSW)
- Unevaluated Wetland
- Environmentally Senstive Landscape (ESL) (ROW 2015)

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project: 2259
Date: September, 2020

NAD83 - UTM Zone 17
Size: 11x17"
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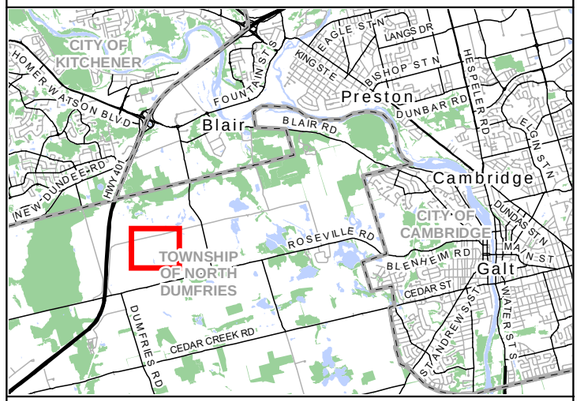
Map 2

Whistle Bare Pit Expansion

Existing Conditions and Monitoring Locations



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WHISTLE BARE RD

Resident / barns

CUM1-1

Annual Row Crop (corn, wheat)

Proposed Whistle Bare Pit Expansion

Perennial Crop (hay)

H3

H2

H1

Existing Tullis - Whistle Bare Pit

CUT1

ANR-002

ANR-001

Disturbed

FOD8-1

OA

MAM2-2

MAM2-10

FOD5

Legend

- Subject Properties
- Anuran Call Station (ANR)
- Staff Gauge
- Mini Piezometer
- Monitoring Well
- Utility Line
- Permanent Watercourse
- Unevaluated Wetland
- Regulation Limit (GRCA)
- Ecological Land Classification (ELC)

(CUM1-1) Dry - Moist Old Field Meadow Type
(CUT1) Mineral Cultural Thicket Ecosite
(FOD5) Dry - Fresh Sugar Maple Deciduous Forest Ecosite
(FOD8-1) Fresh - Moist Poplar Deciduous Forest Type
(H1) Deciduous Hedgerow
(H2) Shrub Hedgerow
(H3) Norway Spruce Hedgerow
(MAM2-10) Forb Mineral Meadow Marsh Type
(MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type
(OA) Open Water

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Project: 2259
Date: August 2020

NAD83 - UTM Zone 17
Size: 11x17"
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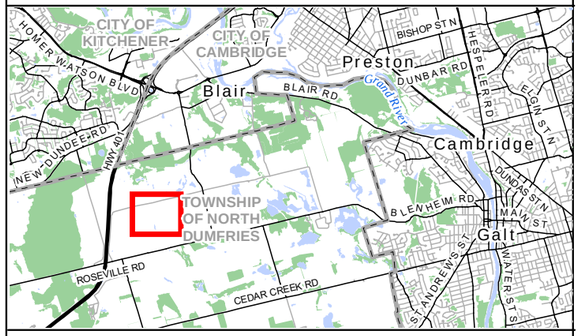
Map 3

Whistle Bare Pit Expansion

Constraints



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Legend

- Subject Properties
- Utility Line
- Permanent Watercourse
- Wetland Buffer (30m)
- Ecological Land Classification (ELC)

(CUM1-1) Dry - Moist Old Field Meadow Type

(CUT1) Mineral Cultural Thicket Ecosite

(FOD5) Dry - Fresh Sugar Maple Deciduous Forest Ecosite

(FOD8-1) Fresh - Moist Poplar Deciduous Forest Type

(H1) Deciduous Hedgerow

(H2) Shrub Hedgerow

(H3) Norway Spruce Hedgerow

(MAM2-10) Forb Mineral Meadow Marsh Type

(MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type

(OA) Open Water

Significant Wildlife Habitat (SWH)

- SWH - Marsh Breeding Birds
- Candidate SWH - Bat Maternity Colonies

Provincially Significant Species

- Barn Swallow (*Hirundorustica*)

Regionally Significant Species

- Hackberry (*Celtis occidentalis*)
- Eastern Cottonwood (*Populus deltoides*)
- **Wetland**

American Redstart *(Setophaga ruticilla)*

Belted Kingfisher *(Megaceryle alcyon)*

Black-billed Cuckoo *(Coccyzus erythropthalmus)*

Blunt-leaved Bedstraw *(Galium obtusum)*

Brown Thrasher *(Toxostoma rufum)*

Green Heron *(Butorides virescens)*

Least Flycatcher *(Empidonax minimus)*

Pine Warbler *(Setophaga pinus)*

Water Smartweed *(Persicaria amphibia)*

- **FOD5**

Pileated Woodpecker *(Dryocopus pileatus)*

Brown Thrasher *(Toxostoma rufum)*

Black-billed Cuckoo *(Coccyzus erythropthalmus)*

Wild Leek *(Allium tricoccum)*

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Project: 2259
Date: August 2020

NAD83 - UTM Zone 17
Size: 11x17"
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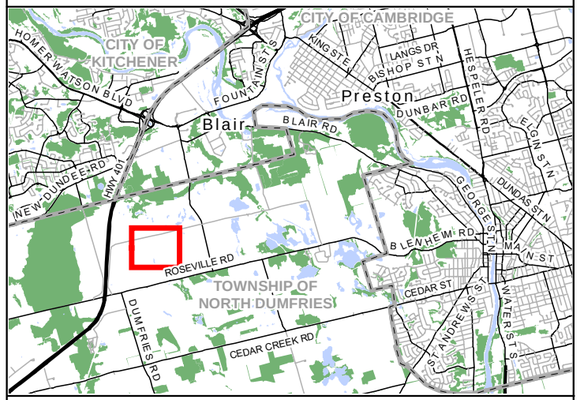
Map 4

Whistle Bare Pit Expansion

Bat Habitat Assessment Results



Legend

- Subject Properties
- SAR Bat Cavity Tree - Candidate
- SAR Bat Habitat - Candidate
- Utility Line
- Permanent Watercourse
- Wetland Buffer (30m)
- Ecological Land Classification (ELC)

(CUM1-1) Dry - Moist Old Field Meadow Type
(CUT1) Mineral Cultural Thicket Ecosite
(FOD5) Dry - Fresh Sugar Maple Deciduous Forest Ecosite
(FOD8-1) Fresh - Moist Poplar Deciduous Forest Type
(H1) Deciduous Hedgerow
(H2) Shrub Hedgerow
(H3) Norway Spruce Hedgerow
(MAM2-10) Forb Mineral Meadow Marsh Type
(MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type
(OA) Open Water

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Aquatic, Terrestrial and Wetland Biologists

Project: 2259
Date: September, 2020

NAD83 - UTM Zone 17
Size: 11x17"
1:3,250

0 40 80 120 160 200 Metres

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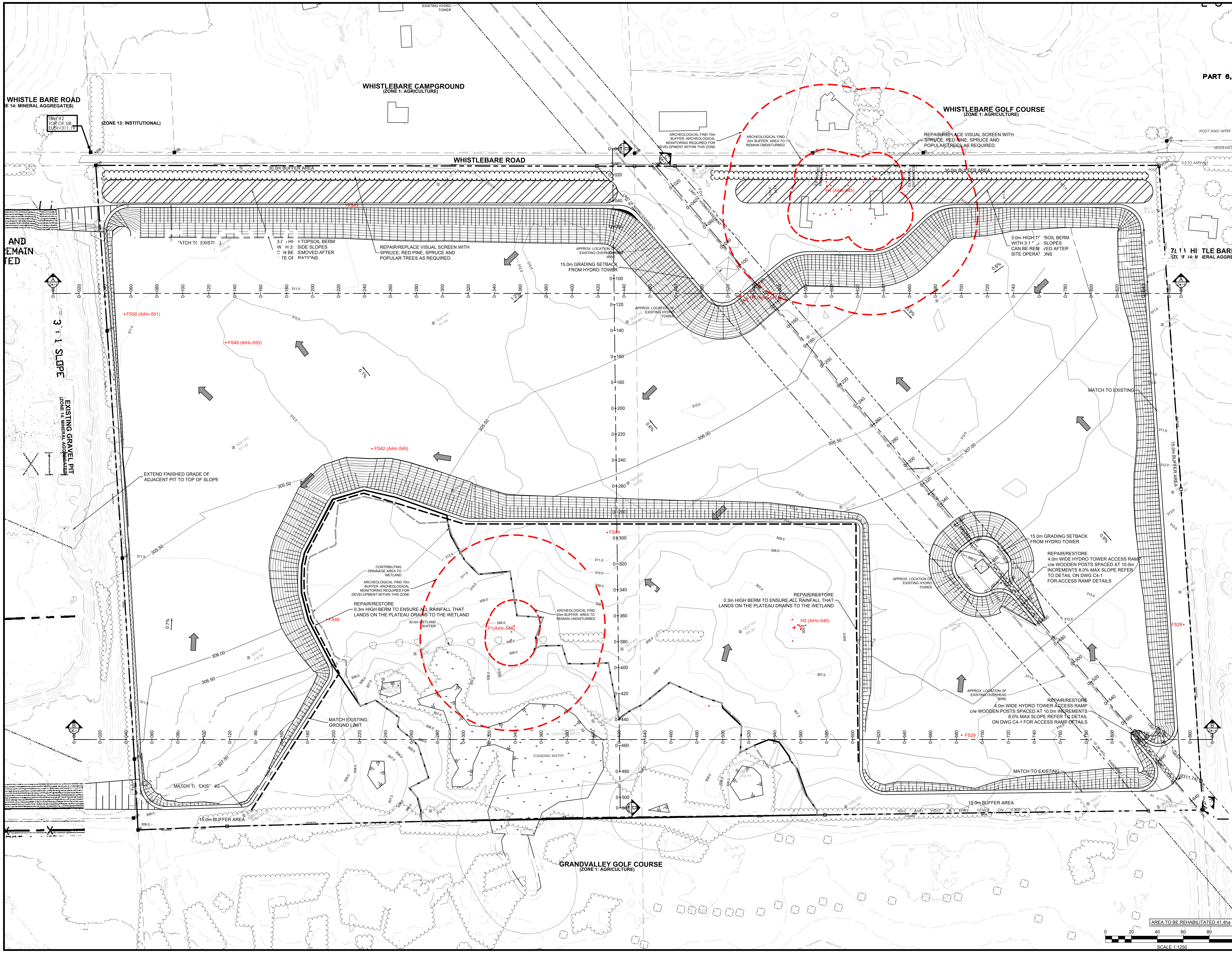
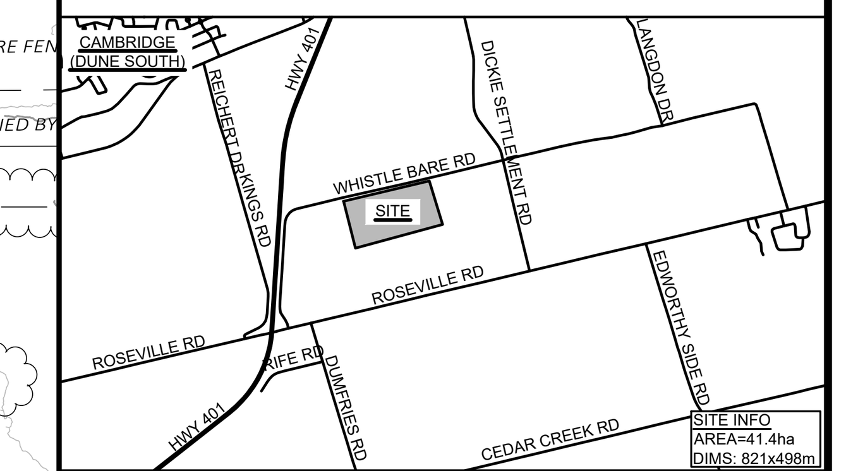
WHISTLE BARE RD
Resident / barns
BAH-001
BCT-023
BAH-002
CUM1-1
H3
Annual Row Crop (corn, wheat)
Proposed Whistle Bare Pit Expansion
Perennial Crop (hay)
H2
H1
Existing Tullis - Whistle Bare Pit
Perennial Crop (hay)
Annual Row Crop (corn, wheat)
H2
CUT1
BCT-019
BCT-018
CUT1
BCT-017
BCT-016
CUM1-1
BCT-015
BCT-014
BCT-013
Disturbed
FOD8-1
OA
BCT-022
BCT-021
H2
MAM2-2
BCT-012
FOD8-1
BCT-002
MAM2-10
CUT1
BCT-011
BCT-001
BCT-003
OA
FOD5
FOD8-1
MAM2-10
BCT-010
BCT-007
BCT-008
BCT-009
BCT-004
BCT-020
BCT-005
BCT-006
FOD5
Grand Valley Golf Course


WHISTLEBARE CAMPGROUND
(ZONE 1: AGRICULTURE)
WHISTLE BARE ROAD
(ZONE 13: INSTITUTIONAL)
WHISTLEBARE ROAD
WHISTLEBARE GOLF COURSE
(ZONE 1: AGRICULTURE)
PART 6
30.0m BUFFER AREA
ARCHEOLOGICAL FIND 70m BUFFER. ARCHEOLOGICAL MONITORING REQUIRED FOR DEVELOPMENT WITHIN THIS ZONE
ARCHEOLOGICAL FIND 20m BUFFER. AREA TO REMAIN UNDISTURBED
REPAIR/REPLACE VISUAL SCREEN WITH SPRUCE, RED PINE, SPRUCE AND POPULAR TREES AS REQUIRED.
15.0m GRADING SETBACK FROM HYDRO TOWER
APPROX. LOCATION OF EXISTING HYDRO TOWER
FS50 (AiHc-551)
FS49 (AiHc-550)
FS42 (AiHc-549)
EXISTING GRAVEL PIT
(ZONE 14: MINERAL AGGREGATES)
3:1 SLOPE
EXTEND FINISHED GRADE OF ADJACENT PIT TO TOP OF SLOPE
MATCH TO EXISTING
CONTRIBUTING DRAINAGE AREA TO WETLAND
REPAIR/RESTORE 0.3m HIGH BERM TO ENSURE ALL RAINFALL THAT LANDS ON THE PLATEAU DRAINS TO THE WETLAND
30.0m WETLAND BUFFER
P1(AiHc-548)
H2 (AiHc-546)
FS48
FS44
FS28
MATCH EXISTING GROUND LIMIT
STANDING WATER
15.0m BUFFER AREA
REPAIR/RESTORE 4.0m WIDE HYDRO TOWER ACCESS RAMP c/w WOODEN POSTS SPACED AT 10.0m INCREMENTS 8.0% MAX SLOPE REFER TO DETAIL ON DWG C4-1 FOR ACCESS RAMP DETAILS
APPROX. LOCATION OF EXISTING OVERHEAD WIRE
GRANDVALLEY GOLF COURSE
(ZONE 1: AGRICULTURE)
AREA TO BE REHABILITATED 41.4ha
SCALE 1:1250



North

date	issuance	no.
YYYY.MM.DD	ISSUED FOR...	

LEGEND

[123.45]	PROPOSED GRADE
[123.45]EX	EXISTING GRADE
(arrow)	PROPOSED OVERLAND FLOW ROUTE
	PROPOSED EMBANKMENT (3:1 MAX UNLESS OTHERWISE NOTED)
—x—x—x—	PROPOSED CHAINLINK FENCE
325.0	EXISTING CONTOUR
325.0	EXISTING LIDAR CONTOURS SWOOP 2016-2018
325.00	PROPOSED CONTOURS
H3 (AiHc-547)	ARCHEOLOGICAL FIND SPOTS & CLUSTERS

NOTE:
1. SITE IS TO BE RESTORED WITH 0.30m OF SILTY LOAM AND 0.30m OF TOPSOIL OVER THE EXCAVATION LIMITS

BENCHMARKS:
1. ELEVATIONS ARE BASED ON GPS OBSERVATIONS FROM PERMANENT REFERENCE STATIONS IN THE NAD83 (CSRS-2010) COORDINATE SYSTEM, WITH HEIGHTS CONVERTED TO ORTHOMETRIC ELEVATIONS ON THE CGVD28 DATUM (1978 ADJUSTMENT WITH GEOID MEDEL HTV2.0, AS SUPPLIED BY NATURAL RESOURCES CANADA.
2. TEMPORARY BENCHMARK #1: TOP OF SIB AT THE MOST SOUTH EASTERN CORNER OF THE PROPERTY, HAVING AN ELEVATION OF 312.27.
3. TEMPORARY BENCHMARK #2: TOP OF SIB AT THE SOUTH WEST CORNER OF PART 1, PLAN 58R-1113, HAVING AN ELEVATION OF 311.19.

customer
GATEMAN MILLOY INC.
270 Shoemaker Street
Kitchener, Ontario, N2E 3E1

project
GATEMAN MILLOY LOT 27/28 CONCESSION 12, NORTH DUMFRIES
North Dumfries, Ontario

title
RESTORATION PLAN
SHEET 3 OF 5

WALTERFEDY
675 Queen Street South, Suite 111
Kitchener, Ontario, Canada N2M 1A1
T 519.576.2150 F 519.576.5499
walterfedy.com

scale:	1:1250
date:	2022.01.03
job no.:	2018-0495-10
CAD file:	2018-0495-10_C-REST_PLT
drawn by:	KDB
checked by:	MN

sheet no.: C2-2

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WHISTLE BARE RD

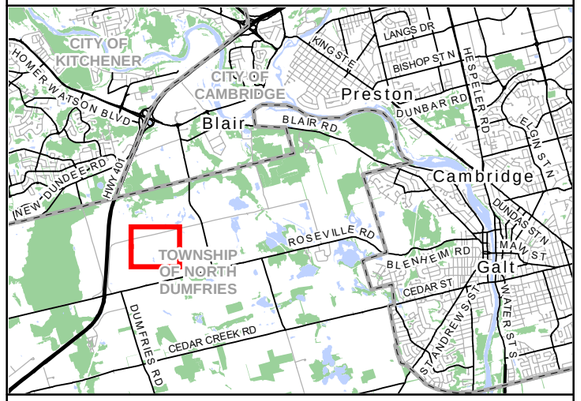
Proposed
Whistle Bare
Pit Expansion

Existing Tullis -
Whistle Bare Pit

Map 6

Whistle Bare Pit Expansion

Stewardship Plan



Legend

- Subject Properties
- Utility Line
- Permanent Watercourse
- Hedgerow
- Wetland
- Wetland Buffer (30m)
- (CUM1-1) Dry - Moist Old Field Meadow Type
- (CUT1) Mineral Cultural Thicket Ecosite
- (FOD5) Dry - Fresh Sugar Maple Deciduous Forest Ecosite
- (FOD8-1) Fresh - Moist Poplar Deciduous Forest Type
- (H1) Deciduous Hedgerow
- (H2) Shrub Hedgerow
- (H3) Norway Spruce Hedgerow
- (MAM2-10) Forb Mineral Meadow Marsh Type
- (MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type
- (OA) Open Water

Stewardship Plan

- Existing Natural Area to Remain
- Native Prairie Meadow Seeding
- Early Successional/Wet Meadow Seeding + Trees and Shrubs
- Mixed Treed Buffer/Berm
- Extraction Limit to be Returned to Agriculture

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project: 2259
Date: December 02, 2020

NAD83 - UTM Zone 17
Size: 11x17"
1:3,250

0 40 80 120 160 200 Metres

N

Path: X:\2259_WhistleBare_PitExpansion\NRSI_2259_Map6_StewardshipPlan_4K_2020_12_02_LEH.mxd

APPENDIX I

Terms of Reference
Agency Comments
SAR/SCC Screening Tables

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

June 14, 2019 Project No. 2259

Ms. Michelle Schaefle
Township of North Dumfries
2598 Greenfield Road
PO Box 1060
Ayr, Ontario N0B 1E0

Dear Ms. Schaefle,

Re: Whistle Bare Pit Expansion, North Dumfries, Ontario
Environmental Impact Study – Terms of Reference

Natural Resource Solutions Inc. (NRSI) has been retained by Mike and Shawn Milloy to prepare an Environmental Impact Study (EIS) for an expansion to their existing aggregate pit on Whistle Bare Road in North Dumfries Township. They have recently purchased the lands to the west of the existing pit, and plan to expand extraction into that property. See Map 1 for location of the site. The pit is proposed to be above water table.

The expansion property contains 2 unevaluated wetland areas but is otherwise cleared agricultural land with a few hedgerows along the field boundaries. The wetland areas are regulated by the Grand River Conservation Authority (GRCA) and are identified as hazard lands in the Region and Township Official Plans. The property is primarily within the Upper Cedar Creek Subwatershed with a small area of the northern portion of the property being within the Blair-Bechtel-Bauman Creeks Subwatershed.

An EIS is required by the Township, the GRCA, the Region of Waterloo and the Ministry of Natural Resources and Forestry (MNRF) in support of an application to obtain approval under the provincial Aggregate Resources Act (ARA) and for a local zoning by-law amendment. The attached Terms of Reference (TOR) outlines our approach to complete the EIS for the proposed expansion in accordance with the Township, the Region of Waterloo, and GRCA EIS Guidelines (2005), and consultation with the MNRF.

I trust the information provide within the TOR provides an adequate description of our proposed studies necessary to complete this EIS. Please provide any input you may have on the methods outlined at your earliest convenience.

Sincerely,
Natural Resource Solutions Inc.

Elaine Gosnell

Elaine Gosnell, B.Sc.
Senior Biologist

Whistle Bare Road Aggregate Pit Expansion
Environmental Impact Study Terms of Reference
June 14, 2019

Introduction

The subject property is approximately 41.67 ha in area and fronts onto Whistle Bare Road as shown on Map 1. The existing pit occupies the 20.66 ha parcel of land to the east. Surrounding lands include farmland, golf courses and recreational vehicle campground. Habitat within the subject property is comprised of agricultural fields including forage (hay), pasture and row crops (soybeans). Two small wetlands are located at the back of the property and are unevaluated. The wetland areas are regulated by the Grand River Conservation Authority (GRCA) and are identified as hazard lands in the Region and Township Official Plans. The property is primarily within the Upper Cedar Creek Subwatershed with a small area of the northern portion of the property being within the Blair-Bechtel-Bauman Creeks Subwatershed.

Associated Studies

In addition to the EIS, a variety of studies and reporting will be prepared by the consulting team to provide detailed information on site topography, drainage, hydrology, soils and hydrogeological conditions. This will be used to supplement the natural heritage characterization to be completed by NRSI and will assist in the impact analysis. The study team includes GSP Group (planning), Walter Fedy (engineering), Chung and Vander Doelen (CVD) Engineering (hydrology, hydrogeology, geotechnical).

Characterization

Collection and Review of Background Information

Background information will be collected for the study area that includes the subject property as well as the adjacent lands within 120m of the property boundary. This area is considered sufficient to characterize the neighbouring natural features that may be influenced by on-site development. The following background information sources will be reviewed in the preparation of the EIS:

- Grand River Conservation Authority (GRCA);
- Natural Heritage Information Centre database;
- Ministry of Natural Resources (MNRF);
- Ministry of Environment Conservation and Parks (MECP);
- The Township of North Dumfries and Region of Waterloo Official Plans;
- Cedar Creek Subwatershed Study (in draft) and Blair, Bechtel and Bauman Creeks Subwatershed Plan (1997);
- Government of Canada SARA Registry;
- Ontario Breeding Bird Atlas;
- Ontario Reptile and Amphibian Atlas;
- Ontario Odonata Atlas;
- Mammal Atlas of Ontario; and
- Ontario Butterfly Atlas

Screening for Species at Risk

A screening for potential Species at Risk (SAR) that may be present on-site will be undertaken using the background information collected and a preliminary site investigation. SAR with

occurrence records in the vicinity will be screened based on comparing their habitat preferences against habitat conditions known on the subject property. NRSI will provide the screening to the MECP and consult with them regarding the need for targeted surveys for SAR based on the availability of appropriate habitat. An initial screening (see Appendix I) found the following Species at Risk (SAR) and Species of Conservation (SCC) to have potential to occur within the subject property:

- Northen Bobwhite (Colinus virginianus) – provincially and federally Endangered
- Barn Swallow (*Hirundo rustica*) – provincially and federally Threatened
- Bobolink (*Dolichonyx oryzivorus*) – provincially and federally Threatened
- Eastern Meadowlark (*Sturnella magna*) – provincially and federally Threatened
- Wood Thrush (*Hylocichla mustelina*) – provincially Special Concern and federally Threatened
- Snapping Turtle (*Chelydra serpentina serpentina*) and Ribbonsnake (*Lampropeltis triangulum*) –provincially and federally Special Concern
- Little Brown Myotis and Northern Myotis – federally and provincially Endangered
- Monarch (*Danaus plexippus*) – provincially Special Concern and federally Endangered
- Tawny Emperor *(Asterocampa clyton*) – provincially S2S3

These species will be addressed in the field program and the EIS.

Review of Potential Significant Wildlife Habitat (SWH)

Based on the preliminary SWH screening, the potential SWH types which may be present within the subject property include the following:

- Special Concern and Rare Wildlife Species
- Amphibian Breeding Habitat (wetland)

Field Surveys

Field surveys will be undertaken in spring and summer of 2019, building on the background information collected. The following is a description of the surveys that will be conducted by NRSI:

Vegetation Community Mapping

Vegetation communities on-site will be characterized and mapped in the spring and summer of 2019 using the Ecological Land Classification (ELC) for Southern Ontario (Lee et al. 1998). Details on the vegetation communities will be recorded including species composition, dominance, uncommon species or features. Wetland boundaries will be flagged according to the Ontario Wetland Evaluation System for southern Ontario, and will be reviewed and confirmed in the field with GRCA.

Vascular Flora Inventories

Spring, summer and fall vascular flora inventories will be conducted within each ELC community. Any rare species or vegetation communities identified and their location(s) will be recorded with a handheld GPS unit.

Bird Surveys

Three breeding bird surveys will be conducted during the peak breeding season (late May – early July) in accordance with Ontario Breeding Bird Atlas (OBBA) methodology and the protocol for surveys for Barn Swallow, Bobolink and Eastern Meadowlark. Point

counts and area surveys will be conducted within all habitat types. Standard breeding evidence will be recorded during both early morning surveys. Structures and buildings will be investigated for the presence of nesting birds, such as barn swallow, where accessible.

Amphibians

Three amphibian call surveys at the on-site wetlands will be completed with one survey during each of April, May and June, according to the Marsh Monitoring Program methodology.

Bats

An assessment of the suitability of the habitats on the subject property for bats will be completed, including leaf-off cavity tree assessments and investigation of barns and other buildings for evidence of bat use (e.g., presence of guano), where accessible.

Incidental Wildlife

In addition to the targeted surveys noted above, all wildlife species will be recorded during all field surveys. This includes direct observations, as well as signs such as dens, tracks, scats, etc. Area searches for reptiles will be carried out where habitat is suitable and during other surveys.

The background information will be integrated with original field data collected by NRSI and other study team members during the 2019 field surveys to form the characterization component of the EIS. This will include species lists and maps.

Hydrogeological Investigations

A summary of the work plan for the hydrogeological study prepared by CVD is provided here:

Field investigations will include (as shown on the attached map):

- 8, 30-foot monitoring wells to be installed across the property,
- One day of deep test pits for detailed characterization of the potential aggregate materials and to provide a rough estimate of the depth to the water table,
- Laboratory analysis of 15 soil samples for wash-sieve aggregate characterization
- Installation and monitoring of 3 drive-point piezometers at the edge of the on-site wetlands, and a T-bar staff gauge in the pond that straddles the property line with the golf course,
- Two-year seasonal water level monitoring including 3 water level loggers to monitor water table, wetland and pond water levels on a continuous basis,
- desk top and door-to-door survey of neighbouring water supply wells.

Significance and Sensitivity Analysis

Significant and sensitive biological features on the subject property will be identified according to relevant natural heritage policies, federal, provincial and local species listings, and wildlife habitats. The presence of any SAR or SCC and their habitat, or other SWH will be identified and discussed. The wetlands on-site will be accurately delineated and verified in the field with GRCA staff in order to recommend buffers and set extraction limits. Wetlands will be considered for inclusion in the nearby Cedar Creek Swamp provincially significant wetland complex, according to the methods of the Ontario Wetland Evaluation System for southern Ontario. Information from the hydrogeological monitoring will be incorporated to understand the functioning of the wetland and its connection to other wetlands and water bodies. The

hydrogeological study will describe the local and regional setting, complete a pre and post development water balance and characterize the groundwater/surface water relationship with the on-site wetlands and shared pond.

Features and species that are significant will be shown on a map as constraints to the development and will be provided to the study team for consideration in the plan for pit expansion. NRSI and the study team will work together to protect and avoid impacts to natural features where warranted.

Impact Analysis

The details of the site alteration including the proposed aggregate extraction limits and construction/disturbance limits and the results of the hydrogeological study will be reviewed and compared to the existing natural features and habitats in the study area. Anticipated impacts will be discussed where there are any areas of conflict between significant features or ecological functions and the proposed land use.

The analysis of impacts will be divided into:

- **Direct impacts** associated with disruption or displacement caused by the actual proposed 'footprint' of the pit, direct impacts to vegetation, wildlife and/or their habitats.

- **Indirect impacts** associated with changes in site conditions such as alterations to surface drainage and groundwater in terms of quantity and quality. The hydrogeological study will determine where the site fits into the regional setting and evaluate any wetland/pond impacts. This will also include potential disturbances to vegetation and wildlife arising from pit operation such as noise, vibration, and dust.

- **Cumulative impacts** associated with additive negative influences on receptor features or habitats, spatially or temporally, that the proposed site alteration may contribute to in the context of other existing stressors on the landscape. The *Cumulative Effects Assessment (Water Quality and Quantity) Best Practices Paper for Below-Water Table Sand and Gravel Extraction Operations in Priority Subwatersheds in the Grand River Watershe*d prepared by GRCA (2010) will be referred to for useful methods for assessing cumulative impacts.

- Recommendations to avoid, or otherwise minimize or mitigate impacts to the natural features will be made and opportunities for enhancement will be highlighted. If necessary, negative impact on significant natural heritage features will be assessed taking into account planned post-extraction rehabilitation of the pit. Chung and Vander Doelen will complete a thorough review of the two subwatershed studies and their objectives/recommendations to determine if and how the pit may impact the watersheds. They will provide recommendations to avoid negative impacts to the water balance regime of wetlands.

Recommendations & Monitoring

Measure for avoidance and mitigation of construction, operation and any residual impacts will be provided. Opportunities for enhancement of natural features will be highlighted. Site-specific restoration needs, as well as recommended monitoring to track the effectiveness of or compliance with mitigation measures, will also be prepared in collaboration with the study team.

The EIS will discuss recommendations for buffer enhancements and restoration where appropriate.

Reporting

The EIS report will be prepared in digital and hard copy format including appropriate mapping (study area, existing conditions, monitoring locations, extraction/operation/rehabilitation plans) and appendices (TOR, species lists, pertinent agency correspondence, analysis tables, etc.).

References

Bird Studies Canada, Environment Canada's Canadian Wildlife Service, Ontario Nature, Ontario Field Ornithologists and Ontario Ministry of Natural Resources. 2006. Ontario Breeding Bird Atlas Database, 31 January 2008. http://www.birdsontario.org/atlas/aboutdata.jsp?lang=en (Accessed May 2019).

CH2M Gore and Storrie Limited, Gartner Lee Limited, Mark Dorfman and Schroeter and Associates. 1997. Blair, Bechtel and Bauman Creeks Subwatershed Plan. Prepared for the Grand River Conservation Authority.

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Government of Canada. 2011. Species at Risk Public Registry: Species Search. https://wildlife-species.canada.ca/species-risk-registry/search/advSearchResults_ (Accessed May 2019).

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Grand River Conservation Authority (GRCA). 2010. Cumulative Effects Assessment (Water Quality and Quantity) Best Practices Paper for Below-Water Sand and Gravel Extraction Operations in Priority Subwatersheds in the Grand River Watershed. 27pp.

Jones, C., R. Layberry, and A. Macnaughton. 2018. Ontario Butterfly Atlas Online. Toronto Entomologists' Association. http://www.ontarioinsects.org/atlas_online.htm. (Accessed May 2019).

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Lee, H.T., W.D. Bakowsky, J. 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.

Michigan Flora Online. A. A. Reznicek, E. G. Voss, & B. S. Walters. February 2011. University of Michigan. Web. April 4, 2018. http://michiganflora.net/species.aspx?id=633.

Ontario Nature. 2018. Reptiles and Amphibians of Ontario Range Maps. http://www.ontarioinsects.org/herpatlas/herp_online.html (Accessed May 2019).

Ontario Ministry of Natural Resources (OMNR). 2000. Significant Wildlife Habitat Technical Guide, Appendix G. October 2000.

Ministry of Natural Resources and Forestry (MNRF). 2015. Significant Wildlife Habitat Ecoregion 7E Criterion Schedule: Addendum to Significant Wildlife Habitat Technical Guide.

Ontario Ministry of Natural Resources and Forestry (MNRF). 2019. Species at Risk in Ontario (SARO) List. Last updated May 19, 2019. https://www.ontario.ca/page/species-risk-ontario (Accessed May 2019).

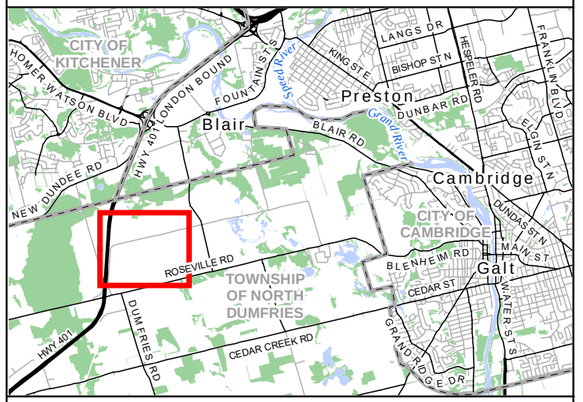
Ontario Ministry of Natural Resources and Forestry (MNRF). 2019. Natural Heritage Information Centre, Ontario Ministry of Natural Resources and Forestry.

MAPS

Map 1

Whistle Bare Pit Expansion

Study Area



Legend

- Subject Properties
- Utility Line
- Permanent Watercourse
- Intermittent Watercourse
- Provincially Significant Wetland (PSW)
- Unevaluated Wetland

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project: 2259 Date: May 9, 2019	NAD83 - UTM Zone 17 Size: 11x17" **1:6,000**

0 100 200 300 400 Metres

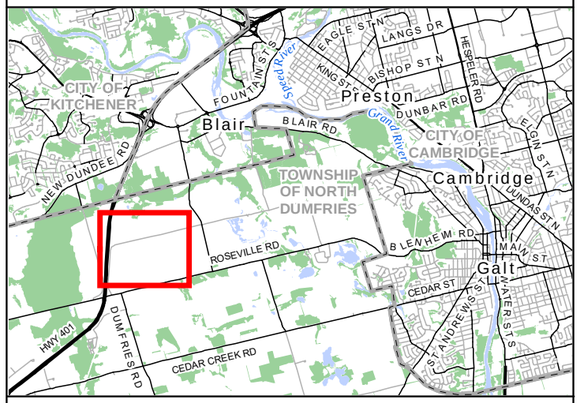
N

Path: X:\2259_WhistleBare_PitExpansion\NRSI_2259_Map1_StudyArea_Extents_2019_05_08_KEF.mxd

Map 2

Whistle Bare Pit Expansion

Monitoring Locations



Legend

- Subject Properties
- Staff Gauge
- Mini Piezometer
- Monitoring Well
- Anuran Call Station (ANR)
- Utility Line
- Permanent Watercourse
- Intermittent Watercourse
- Provincially Significant Wetland (PSW)
- Unevaluated Wetland

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project: 2259 Date: June 11, 2019	NAD83 - UTM Zone 17 Size: 11x17" **1:6,000**

0 100 200 300 400 Metres

N

Path: X:\2259_WhistleBare_PitExpansion\NRSI_2259_Map2_MonitoringLocations_6K_2019_06_11_JAS.mxd

APPENDIX I
SAR and SCC Screening Table

Appendix I. SAR and SCC Screening
Whistle Bare Pit Expansion EIS Project #2259

Scientific Name	Common Name	S-RANK[1]	ESA/ COSSARO[3]	COSEWIC[2]	SARA	Background Source	Observed by NRSI	Habitat Preference[4,5]	Suitable Habitats within Subject Property	Carried Forward to EIS?	Rationale
Birds											
Chaetura pelagica	Chimney Swift	S4B, S4N	THR	T	Schedule 1	BSC et al. 2006		Commonly found in urban areas near buildings; nests in hollow trees, crevices of rock cliffs, chimneys; highly gregarious; feeds over open water	No	No	Subject property is rural; house, buildings and trees not suitable habitat.
Chordeiles minor	Common Nighthawk	S4B	SC	T	Schedule 1	BSC et al. 2006		Open ground; clearings in dense forests; ploughed fields; gravel beaches or barren areas with rocky soils; open woodlands; flat gravel roofs	No	No	No open gravel or rocky areas, or flat gravel roofs.
Colinus virginianus	Northern Bobwhite	S1	END	E	Schedule 1	NHIC 2016		Grassland, prairie or hay fields with woody cover in form of thickets, tangles of vines, shrubs; fence rows or woodland edges; cropland growing corn, soybeans or small grains and clover or grass; well-drained sandy or loamy soil; pond edges.	Yes	Yes	The study area contains hay fields, meadows with woody cover nearby; open water is present in wetlands. Any observations will be documented in the breeding bird surveys.
Melanerpes erythrocephalus	Red-headed Woodpecker	S4B	SC	T	Schedule 1	OBBA 2016		Open, deciduous forest with little understory; fields or pasture lands with scattered large trees; wooded swamps; orchards, small woodlots or forest edges; groves of dead or dying trees; feeds on insects and stores nuts or acorns for winter; loss of habitat is limiting factor; requires cavity trees with at least 40 cm dbh; require about 4 ha for a territory.	No	No	Open, scattered large deciduous trees are not present on-site, but may be present on the adjacent golf course property.
Riparia riparia	Bank Swallow	S4B	THR	T	-	OBBA 2016		Sand, clay or gravel river banks or steep riverbank cliffs; lakeshore bluffs of easily crumbled sand or gravel; gravel pits, road-cuts, grassland or cultivated fields that are close to water; nesting sites are limiting factor for species presence.	No	No	The subject property does not contain steep banks, but these could be present on the existing pit property adjacent to the west. Any observations of Bank Swallow will be recorded in the breeding bird surveys.
Hirundo rustica	Barn Swallow	S4B	THR	T	-	OBBA 2016, NHIC 2016		Farmlands or rural areas; cliffs, caves, rock niches; buildings or other man-made structures for nesting; open country near body of water.	Yes	Yes	Man-made structures are present with open meadow habitats. Any observations will be documented in the breeding bird surveys.
Hylocichla mustelina	Wood Thrush	S4B	SC	T	-	OBBA 2016		Carolinian and Great Lakes-St. Lawrence forest zones; undisturbed moist mature deciduous or mixed forest with deciduous sapling growth; near pond or swamp; hardwood forest edges; must have some trees higher than 12 m.	No	No	Suitable habitat not present in the study area.
Sturnella magna	Eastern Meadowlark	S4B	THR	T	No Schedule	OBBA 2016		Open, grassy meadows, farmland, pastures, hayfields or grasslands with elevated singing perches; cultivated land and weedy areas with trees; old orchards with adjacent, open grassy areas >10 ha in size.	Yes	Yes	Meadow, pasture, hayfields are present on-site. Polygons are approximately 5-10ha in area individually, but could be considered larger if fields are planted in grain or hay crop.
Herpetofauna											
Chelydra serpentina serpentina	Common Snapping Turtle	S3	SC	SC	Schedule 1	Ontario Nature 2012		Permanent or semi-permanent fresh water; marshes, swamps or bogs; rivers and streams with soft muddybanks or bottoms. The species often uses soft soil or clean dry sand on south-facing slopes for nest sites and may nest at some distance from water.	Yes	Yes	Study area includes open water ponds and wetlands. All observations of turtles will be recorded.
Thamnophis sauritus septentrionalis	Eastern Ribbonsnake (Great Lakes population)	S3	SC	SC	Schedule 1	Ontario Nature 2012		Sunny grassy areas with low dense vegetation near bodies of shallow permanent quiet water; wet meadows grassy marshes or sphagnum bogs; borders of ponds, lakes or streams; hibernates in groups	Yes	Yes	Study area provides suitable habitat on the border of ponds and meadows. Area searches for snakes will be conducted for the EIS.

Scientific Name	Common Name	S-RANK[1]	ESA/ COSSARO[3]	COSEWIC[2]	SARA	Background Source	Observed by NRSI	Habitat Preference[4,5]	Suitable Habitats within Subject Property	Carried Forward to EIS?	Rationale
Ambystoma jeffersonianum	Jefferson Salamander	S2	END	E	Schedule 1	Coulson *et al.* 1986		Damp shady deciduous forest, swamps, moist pasture, lakeshores; temporary woodland pools for breeding; hides under leaf litter, stones or in decomposing logs	No	No	No suitable combination of deciduous forest and temporary woodland pools in study area
Ambystoma sp.	Jefferson/Blue-spotted Salamander Complex	S2	-	-	-	Ontario Nature 2012		Damp shady deciduous forest, swamps, moist pasture, lakeshores; temporary woodland pools for breeding; hides under leaf litter, stones or in decomposing logs	No	No	No suitable combination of deciduous forest and temporary woodland pools in study area
Mammals											
Myotis lucifungus	Little Brown Myotis	S5	END	E	Schedule 1	Ontario Mammal Atlas 1994		Uses caves, quarries, tunnels, hollow trees or buildings for roosting; winters in humid caves; maternity sites in dark warm areas such as attics and barns; feeds primarily in wetlands, forest edges	Yes	Yes	Trees, buildings, forest edges and wetland habitat are present on the subject property.
Myotis septentrionalis	Northern Myotis	S3?	END	E	Schedule 1	Ontario Mammal Atlas 1994		Hibernates during winter in mines or caves; during summer males roost alone and females form maternity colonies of up to 60 adults; roosts in houses, man-made structures but prefers hollow trees or under loose bark; hunts within forest, below canopy	Yes	Yes	Trees and manmade structures are present on the subject property.
Insects											
Danaus plexippus	Monarch	S4	SC	SC	-	TEA 2012		Open areas with host plant, milkweed species (*Asclepias spp.*)	Yes	Yes	Limited areas of common milkweed are present on the subject property if suitable host plants and habitat are present for this species.
Erynnis martialis	Mottled Duskywing	S2	END	E	-	TEA 2016		This species is usually seen nectaring or on wet sandy roads in the company of other species of Erynnis, and usually outnumbered by them. Host Plant: New Jersey Tea.	Candidate	Yes	Vegetation surveys will aid in determining if suitable host plants and habitat are present for this species.
Euphyes conspicua	Black Dash	S3	-	-	-	TEA 2016		Found in or near sedge patches, nectaring on flowers including milkweeds (Asclepias spp.) and thistles (Cirsium spp. And Carduus spp.) Host Plant - Carex stricta (Hall et al. 2014)	Candidate	Yes	Vegetation surveys will aid in determining if suitable host plants and habitat are present for this species.
Pholisora catullus	Common Sootywing	S3	-	-	-	TEA 2016		Open habitat, mostly disturbed areas. Host Plant - Amaranthaceae and Chenopodiaceae (esp Lamb's quarters) (Hall et al. 2014)	Candidate	Yes	Vegetation surveys will aid in determining if suitable host plants and habitat are present for this species.
Asterocampa clyton	Tawny Emperor	S2S3	-	-	-	Butterflies of Canada 2002		This is essentially a woodland species in Canada, never straying far from the larval foodplant, hackberry. It flies with the Hackberry Emperor (A. celtis) but, according to Wormington (1983), tends to fly and rest higher in the trees than that species.	Yes	Yes	Hackberry is present on the subject property and may provide habitat for this species.

Subject: RE: Whistle Bare Pit expansion - boundary review proj2259
From: John Brum <jbrum@grandriver.ca>
Date: 7/3/2019, 2:35 PM
To: Elaine Gosnell <egosnell@nrsi.on.ca>, Jane Gurney Region of Waterloo <jgurney@regionofwaterloo.ca>
CC: Michelle Schaefle Township of North Dumfries <mschaefle@northdumfries.ca>, Tony Zammit <tzammit@grandriver.ca>

Hi Elaine:

Tony Zammit of our office recently provided me with the following comments with regards to our draft EIS Terms of Reference:

> *The terms of reference prepared by NRSI are generally acceptable. It is requested that ELC datasheets be scanned and attached to the EIS report. Until a detailed vegetation inventory and related habitat assessments have been completed, it would be premature to conclude that habitat on the subject lands is not suitable for Red-headed Woodpecker.*

With regards to your request to confirm wetland boundaries, I would recommend that you contact Tony directly to make those arrangements and to keep me in the loop. Tony is away on vacation this week, but is scheduled to be back in the office next week.

I trust this helps.

Thanks,

John Brum | Resource Planner
Grand River Conservation Authority
400 Clyde Road, PO Box 729, Cambridge, Ontario N1R 5W6
Tel: 519-621-2763 x2233 | Fax: 519-621-4945 | Toll free: 1-866-900-4722
jbrum@grandriver.ca

From: Elaine Gosnell <egosnell@nrsi.on.ca>
Sent: Wednesday, July 3, 2019 1:51 PM
To: John Brum <jbrum@grandriver.ca>; Jane Gurney Region of Waterloo <jgurney@regionofwaterloo.ca>
Cc: Michelle Schaefle Township of North Dumfries <mschaefle@northdumfries.ca>
Subject: Whistle Bare Pit expansion - boundary review proj2259

Hello John, Jane and Michelle,

NRSI is working with GSP Group and CVD Engineering to prepare an EIS for the proposed expansion of the Whistle Bare Pit on Whistle Bare Road in North Dumfries. A Terms of Reference for the study was recently submitted and we have been carrying out seasonal field surveys this spring. We have flagged the wetland boundary on the site and would like to have it reviewed with GRCA ecologist; other staff are welcome to attend if desired.

John, can you advise as to dates available for wetland review?

I've attached a map of the site for your reference. Thank you.

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Elaine Gosnell B.Sc. P.Biol.
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Scientific Name	Common Name	S-RANK[1]	SARO[1]	COSEWIC[2]	SARA[2]	SARA Schedule[2]	Background Source	Habitat Preference[2]	Suitable Habitats within Subject Property	Carried Forward to EIS?	Rationale
Birds											
Chaetura pelagica	Chimney Swift	S3B	THR	T	T	Schedule 1	BSC et al. 2006	Commonly found in urban areas near buildings; nests in hollow trees, crevices of rock cliffs, chimneys; highly gregarious; feeds over open water	No	No	Subject property is rural; house, buildings and trees not suitable habitat.
Chordeiles minor	Common Nighthawk	S4B	SC	SC	T	Schedule 1	BSC et al. 2006	Open ground; clearings in dense forests; ploughed fields; gravel beaches or barren areas with rocky soils; open woodlands; flat gravel roofs	No	No	No open gravel or rocky areas, or flat gravel roofs.
Colinus virginianus	Northern Bobwhite	S1?B	END	E	E	Schedule 1	NHIC 2019	Grassland, prairie or hay fields with woody cover in form of thickets, tangles of vines, shrubs; fence rows or woodland edges; cropland growing corn, soybeans or small grains and clover or grass; well-drained sandy or loamy soil; pond edges.	Yes	Yes	The study area contains hay fields, meadows with woody cover nearby; open water is present in wetlands. Northern Bobwhite has been extirpated from much of its historic range in Ontario. The only known remnant population is found on Walpole Island, as such, any birds observed in the vicinity of the study area in recent years likely represent released individuals.
Melanerpes erythrocephalus	Red-headed Woodpecker	S3	SC	E	E	Schedule 1	BSC et al. 2006	Open, deciduous forest with little understory; fields or pasture lands with scattered large trees; wooded swamps; orchards, small woodlots or forest edges; groves of dead or dying trees; feeds on insects and stores nuts or acorns for winter; loss of habitat is limiting factor; requires cavity trees with at least 40 cm dbh; require about 4 ha for a territory.	No	No	Open, scattered large deciduous trees are not present on-site, but may be present on the adjacent golf course property.
Empidonax virescens	Acadian Flycatcher	S1B	END	E	E	Schedule 1	eBird 2020	Mature, shady, deciduous forests; heavily wooded ravines; creek bottoms or river swamps; availability of good quality habitat is limiting factor; needs at least 30 ha of forest.	No	No	Mature deciduous forests, wooded ravines or river swamps of a suitable size and composition are not present within the subject property.
Riparia riparia	Bank Swallow	S4B	THR	T	T	Schedule 1	BSC et al. 2006	Sand, clay or gravel river banks or steep riverbank cliffs; lakeshore bluffs of easily crumbled sand or gravel; gravel pits, road-cuts, grassland or cultivated fields that are close to water; nesting sites are limiting factor for species presence.	No	No	The subject property does not contain steep banks, but these could be present on the existing pit property adjacent to the west.
Hirundo rustica	Barn Swallow	S4B	THR	SC	T	Schedule 1	BSC et al. 2006; NHIC 2019	Farmlands or rural areas; cliffs, caves, rock niches; buildings or other man-made structures for nesting; open country near body of water.	Yes	Yes	Man-made structures are present with open meadow habitats. Barn Swallow was confirmed to be nesting within the barn to the northeast of the subject property.
Hylocichla mustelina	Wood Thrush	S4B	SC	T	T	Schedule 1	BSC et al. 2006	Carolinian and Great Lakes-St. Lawrence forest zones; undisturbed moist mature deciduous or mixed forest with deciduous sapling growth; near pond or swamp; hardwood forest edges; must have some trees higher than 12 m.	No	No	Suitable habitat not present in the study area.
Sturnella magna	Eastern Meadowlark	S4B, S3N	THR	T	T	Schedule 1	BSC et al. 2006	Open, grassy meadows, farmland, pastures, hayfields or grasslands with elevated singing perches; cultivated land and weedy areas with trees; old orchards with adjacent, open grassy areas >10 ha in size.	Yes	Yes	Meadow, pasture, hayfields are present on-site. Polygons are approximately 5-10ha in area individually, but could be considered larger if fields are planted in grain or hay crop.

Scientific Name	Common Name	S-RANK[1]	SARO[1]	COSEWIC[2]	SARA[2]	SARA Schedule[2]	Background Source	Habitat Preference[2]	Suitable Habitats within Subject Property	Carried Forward to EIS?	Rationale
Ammodramus savannarum	Grasshopper Sparrow	S4B	SC	SC	SC	Schedule 1	eBird 2020	Open grasslands with well drained soil. Will also sometimes nest in hayfields and pasture as well as grain crops.	Possible	Yes	Meadow, pasture and hayfields are present on site, majority of agricultural fields are, however, row crops. Grasshopper Sparrow typically requires at least 10 ha of suitable habiat, appropriate habitat of this size is not found within the study area.
Asio flammeus	Short-eared Owl	S4?B, S2S3N	SC	T	SC	Schedule 1	eBird 2020	Grasslands, open areas or meadows that are grassy or bushy; marshes, bogs or tundra; both diurnal and nocturnal habits; ground nester; destruction of wetlands by drainage for agriculture is an important factor in the decline of this species; home range 25 -125 ha; requires 75-100 ha of contiguous open habitat.	No	No	Small areas of meadow and grassland are present within the subject property; however they are not of suitable size and composition for Short-eared Owl.
Herpetofauna											
Chelydra serpentina serpentina	Common Snapping Turtle	S4	SC	SC	SC	Schedule 1	Ontario Nature 2019	Permanent or semi-permanent fresh water; marshes, swamps or bogs; rivers and streams with soft muddybanks or bottoms. The species often uses soft soil or clean dry sand on south-facing slopes for nest sites and may nest at some distance from water.	Yes	Yes	Study area includes open water ponds and wetlands.
Thamnophis sauritus septentrionalis	Eastern Ribbonsnake (Great Lakes population)	S4	SC	SC	SC	Schedule 1	Ontario Nature 2019	Sunny grassy areas with low dense vegetation near bodies of shallow permanent quiet water; wet meadows grassy marshes or sphagnum bogs; borders of ponds, lakes or streams; hibernates in groups	Yes	Yes	Study area provides suitable habitat on the border of ponds and meadows.
Ambystoma jeffersonianum	Jefferson Salamander	S2	END	E	E	Schedule 1	Coulson *et al.* 1986	Damp shady deciduous forest, swamps, moist pasture, lakeshores; temporary woodland pools for breeding; hides under leaf litter, stones or in decomposing logs	No	No	No suitable combination of deciduous forest and temporary woodland pools in study area
Ambystoma sp.	Jefferson/Blue-spotted Salamander Complex	S2	END	E	NS	No Schedule	Ontario Nature 2019	Damp shady deciduous forest, swamps, moist pasture, lakeshores; temporary woodland pools for breeding; hides under leaf litter, stones or in decomposing logs	No	No	No suitable combination of deciduous forest and temporary woodland pools in study area
Mammals											
Myotis lucifungus	Little Brown Myotis	S3	END	E	E	Schedule 1	Ontario Mammal Atlas 1994	Uses caves, quarries, tunnels, hollow trees or buildings for roosting; winters in humid caves; maternity sites in dark warm areas such as attics and barns; feeds primarily in wetlands, forest edges	Yes	Yes	Trees, buildings, forest edges and wetland habitat are present on the subject property.
Myotis septentrionalis	Northern Myotis	S3?	END	E	E	Schedule 1	Ontario Mammal Atlas 1994	Hibernates during winter in mines or caves; during summer males roost alone and females form maternity colonies of up to 60 adults; roosts in houses, man-made structures but prefers hollow trees or under loose bark; hunts within forest, below canopy	Yes	Yes	Trees and manmade structures are present on the subject property.
Insects											
Danaus plexippus	Monarch	S2N, S4B	SC	E	SC	Schedule 1	TEA 2019	Open areas with host plant, milkweed species (*Asclepias spp.*)	Yes	Yes	Limited areas of common milkweed are present on the subject property, a single Monarch was observed during field surveys,
Erynnis martialis	Mottled Duskywing	S2	END	E	NS	No Schedule	TEA 2019	This species is usually seen nectaring or on wet sandy roads in the company of other species of Erynnis, and usually outnumbered by them. Host Plant: New Jersey Tea.	Candidate	Yes	Suitable host plants for Mottled Duskywing were not observed from the subject property during vegetation surveys.

Scientific Name	Common Name	S-RANK[1]	SARO[1]	COSEWIC[2]	SARA[2]	SARA Schedule[2]	Background Source	Habitat Preference[2]	Suitable Habitats within Subject Property	Carried Forward to EIS?	Rationale
Euphyes conspicua	Black Dash	S3	-	-		-	TEA 2019	Found in or near sedge patches, nectaring on flowers including milkweeds (Asclepias spp.) and thistles (Cirsium spp. And Carduus spp.) Host Plant - Carex stricta (Hall et al. 2014)	Candidate	Yes	Suitable host plants for Black Dash were not observed from the subject property during vegetation surveys.
Pholisora catullus	Common Sootywing	S3	-	-		-	TEA 2019	Open habitat, mostly disturbed areas. Host Plant - Amaranthaceae and Chenopodiaceae (esp Lamb's quarters) (Hall et al. 2014)	Candidate	Yes	Suitable host plants were observed within the subject propery; however, no Common Sootywing were observed.
Asterocampa clyton	Tawny Emperor	S2S3	-	-		-	Butterflies of Canada 2002; iNaturalist 2020	This is essentially a woodland species in Canada, never straying far from the larval foodplant, hackberry. It flies with the Hackberry Emperor (A. celtis) but, according to Wormington (1983), tends to fly and rest higher in the trees than that species.	Yes	Yes	Hackberry is present on the subject property and may provide habitat for this species; however, Tawny Emperor was not observed during field surveys.
Plants											
Conioselinum chinense	Chinese Hemlock-Parsley	S2	-	-		-	NHIC 2019; iNaturalist 2020	This species is most often found in swamps with deciduous trees, cedar and tamarack; along springy river banks; stream borders and streams. It is usually in places where seepage is coming to the surface (Reznicek et al 2011).	Candidate	Yes	Potentiallly suitable swamp habitat is present within the unevaluated wetlands to the south of the subject property. This species was not identified during vegetation surveys conducted by NRSI botanists.
Castanea dentata	American Chestnut	S1, S2	END	E	E	Schedule 1	NHIC 2019	Formerly a common species in upland forests in Ontario, this species was heavily impacted by Chestnut Blight and is now rare throughout Ontario.	Candidate	Yes	American Chestnut was not observed during vegetation surveys conducted on the subject property.
Valeriana edulis ssp. ciliata	Taprooted Valerian	S1	-	-		-	NHIC 2019	This species is typically found in fens, meadows and wet prairies.	No	No	Suitable fens, wet meadows and wet prairies are not found within the study area. This species was not identified during vegetation surveys condutcted on the subject property.

APPENDIX II

Vascular Flora Reported from the Study Area

Appendix II
#2259A Whistle Bare Pit Expansion
Vascular Plant Species Reported From the Study Area

Scientific Name	Common Name	SRANK[1]	SARO[2]	COSEWIC[3]	SARA Schedule[3]	Waterloo Region	NHIC Data[1]	NRSI Observed				
								Meadow	Hedgerow	Wetland	Plantation	Entire Site
Pteridophytes	**Ferns & Allies**											
Dryopteridaceae	**Wood Fern Family**											
Onoclea sensibilis	Sensitive Fern	S5						X		X		1
Equisetaceae	**Horsetail Family**											
Equisetum arvense	Field Horsetail	S5						X		X		1
Thelypteridaceae	**Beech Fern Family**											
Thelypteris palustris var. pubescens	Marsh Fern	S5								X		1
Gymnosperms	**Conifers**											
Cupressaceae	**Cypress Family**											
Thuja occidentalis	White Cedar	S5							X			1
Pinaceae	**Pine Family**											
Picea abies	Norway Spruce	SE3									X	1
Picea glauca	White Spruce	S5				R+			X			1
Pinus strobus	Eastern White Pine	S5									X	1
Pinus sylvestris	Scots Pine	SE5									X	1
Dicotyledons	**Dicots**											
Aceraceae	**Maple Family**											
Acer negundo	Manitoba Maple	S5							X		X	1
Acer platanoides	Norway Maple	SE5								X	X	1
Acer saccharum ssp. saccharum	Sugar Maple	S5							X	X	X	1
Amaranthaceae	**Amaranth Family**											
Amaranthus retroflexus	Green Amaranth	SE5							X			1
Anacardiaceae	**Sumac or Cashew Family**											
Rhus typhina	Staghorn Sumac	S5							X			1
Apiaceae	**Carrot or Parsley Family**											
Cicuta virosa	Water-hemlock	S4S5								X		1
Conioselinum chinense	Chinese Hemlock-parsley	S2				R	X					
Daucus carota	Wild Carrot	SE5						X				1
Pastinaca sativa	Wild Parsnip	SE5								X		1
Apocynaceae	**Dogbane Family**											
Apocynum androsaemifolium ssp. androsaemifoliu	Spreading Dogbane	S5								X		1
Asclepiadaceae	**Milkweed Family**											
Asclepias incarnata ssp. incarnata	Swamp Milkweed	S5								X		1
Asclepias syriaca	Common Milkweed	S5						X	X			1
Cynanchum rossicum	Swallow-wort	SE5								X		1
Asteraceae	**Composite or Aster Family**											
Achillea millefolium ssp. millefolium	Common Yarrow	SE?								X		1
Ambrosia artemisiifolia	Common Ragweed	S5									X	1

Ambrosia trifida	Giant Ragweed	S5									X	1
Arctium minus ssp. minus	Common Burdock	SE5							X		X	1
Artemisia vulgaris	Common Mugwort	SE5						X				1
Bidens cernua	Stick-tight	S5								X		1
Bidens frondosa	Devil's Beggar-ticks	S5						X		X		1
Carduus nutans ssp. nutans	Musk Thistle	SE?						X				1
Centaurea sp.	Knapweed Species							X				1
Cichorium intybus	Chicory	SE5						X				1
Cirsium arvense	Canada Thistle	SE5								X		1
Conyza canadensis	Horseweed	S5							X			1
Erigeron annuus	Daisy Fleabane	S5						X				1
Eupatorium perfoliatum	Perfoliate Thoroughwort	S5								X		1
Euthamia graminifolia	Flat-topped Bushy Goldenrod	S5						X		X		1
Rudbeckia hirta	Black-eyed Susan	S5									X	1
Solidago canadensis	Canada Goldenrod	S5						X	X	X	X	1
Symphyotrichum lanceolatum	Panicled Aster	S5						X		X	X	1
Symphyotrichum lateriflorum var. lateriflorum	Calico Aster	S5							X	X		1
Symphyotrichum novae-angliae	New England Aster	S5							X	X	X	1
Symphyotrichum pilosum var. pilosum	Hairy Aster	S5						X				1
Symphyotrichum puniceum	Purple-stemmed Aster	S5								X		1
Tanacetum vulgare	Common Tansy	SE5						X				1
Taraxacum officinale	Common Dandelion	SE5						X	X			1
Tragopogon pratensis ssp. pratensis	Meadow Goat's-beard	SE5						X				1
Tussilago farfara	Coltsfoot	SE5						X				1
Balsaminaceae	**Touch-me-not Family**											
Impatiens capensis	Spotted Touch-me-not	S5							X	X		1
Betulaceae	**Birch Family**											
Ostrya virginiana	Hop Hornbeam	S5							X	X		1
Boraginaceae	**Borage Family**											
Echium vulgare	Blueweed	SE5						X				1
Brassicaceae	**Mustard Family**											
Alliaria petiolata	Garlic Mustard	SE5						X		X	X	1
Barbarea vulgaris	Yellow Rocket	SE5						X				1
Berteroa incana	Hoary Alyssum	SE5									X	1
Brassica rapa	Wild Turnip	SE5									X	1
Capsella bursa-pastoris	Shepherd's Purse	SE5							X			1
Erysimum cheiranthoides ssp. cheiranthoides	Wormseed Mustard	SE5								X	X	1
Caprifoliaceae	**Honeysuckle Family**											
Lonicera tatarica	Tartarian Honeysuckle	SE5								X		1
Sambucus racemosa ssp. pubens	Red-berried Elderberry	S5									X	1
Viburnum lentago	Nannyberry	S5								X		1
Caryophyllaceae	**Pink Family**											
Silene latifolia	Bladder Campion	SE5						X	X			1
Chenopodiaceae	**Goosefoot Family**											
Chenopodium album var. album	Lamb's-quarters	SE5									X	1
Cornaceae	**Dogwood Family**											
Cornus amomum ssp. obliqua	Silky Dogwood	S5								X		1
Cornus foemina ssp. racemosa	Red Panicled Dogwood	S5						X	X	X		1
Cornus stolonifera	Red-osier Dogwood	S5							X	X		1
Cucurbitaceae	**Gourd Family**											

Echinocystis lobata	Prickly Cucumber	S5							X	X		1
Dipsacaceae	**Teasel Family**											
Dipsacus fullonum ssp. sylvestris	Wild Teasel	SE5						X				1
Elaeagnaceae	**Oleaster Family**											
Elaeagnus umbellata	Autumn Olive	SE3								X		1
Fabaceae	**Pea Family**											
Coronilla varia	Variable Crown-vetch	SE5						X				1
Medicago sativa ssp. sativa	Alfalfa	SE5						X	X	X	X	1
Melilotus alba	White Sweet-clover	SE5						X			X	1
Melilotus officinalis	Yellow Sweet-clover	SE5						X				1
Trifolium pratense	Red Clover	SE5						X			X	1
Vicia cracca	Tufted Vetch	SE5						X				1
Fagaceae	**Beech Family**											
Castanea dentata	American Chestnut	S2	END	E	Schedule 1	R	X					
Fagus grandifolia	American Beech	S5							X	X		1
Quercus macrocarpa	Bur Oak	S5								X		1
Quercus rubra	Red Oak	S5						X				1
Guttiferae	**St. John's-wort Family**											
Hypericum perforatum	Common St. John's-wort	SE5							X	X		1
Hippocastanaceae	**Buckeye Family**											
Aesculus hippocastanum	Horse Chestnut	SE2								X		1
Hydrophyllaceae	**Water-leaf Family**											
Hydrophyllum virginianum	Virginia Water-leaf	S5							X			1
Juglandaceae	**Walnut Family**											
Juglans nigra	Black Walnut	S4				R+*			X	X		1
Lamiaceae	**Mint Family**											
Lamium purpureum	Purple Dead-nettle	SE3						X			X	1
Leonurus cardiaca ssp. cardiaca	Common Motherwort	SE5							X		X	1
Mentha arvensis ssp. borealis	American Wild Mint	S5								X		1
Prunella vulgaris ssp. lanceolata	Heal-all	S5								X	X	1
Scutellaria galericulata	Hooded Skullcap	S5								X		1
Lythraceae	**Loosestrife Family**											
Lythrum salicaria	Purple Loosestrife	SE5								X		1
Magnoliaceae	**Magnolia Family**											
Liriodendron tulipifera	Tulip Tree	S4						X	X			1
Moraceae	**Mulberry Family**											
Morus alba	White Mulberry	SE5						X				1
Oleaceae	**Olive Family**											
Fraxinus americana	White Ash	S5								X		1
Onagraceae	**Evening-primrose Family**											
Circaea alpina	Smaller Enchanter's Nightshade	S5									X	1
Ludwigia palustris	Marsh Purslane	S5								X		1
Oenothera biennis	Common Evening-primrose	S5						X			X	1
Oenothera parviflora	Small-flowered Evening-primrose	S5?						X				1

Papaveraceae	**Poppy Family**											
Chelidonium majus	Celandine	SE5								X	X	1
Sanguinaria canadensis	Bloodroot	S5							X			1
Plantaginaceae	**Plantain Family**											
Plantago lanceolata	Ribgrass	SE5						X	X			1
Plantago major	Common Plantain	SE5							X		X	1
Polygonaceae	**Smartweed Family**											
Persicaria punctata	Water Smartweed	S5				R*				X		1
Polygonum persicaria	Lady's-thumb	SE5								X		1
Rumex crispus	Curly-leaf Dock	SE5							X			1
Primulaceae	**Primrose Family**											
Lysimachia thyrsiflora	Tufted Loosestrife	S5								X		1
Ranunculaceae	**Buttercup Family**											
Actaea rubra	Red Baneberry	S5							X			1
Rhamnaceae	**Buckthorn Family**											
Rhamnus cathartica	European Buckthorn	SE5						X	X	X	X	1
Frangula alnus	Glossy Buckthorn	SE5								X	X	1
Rosaceae	**Rose Family**											
Amelanchier arborea	Downy Juneberry	S5							X			1
Crataegus species	Hawthorn species								X	X		1
Filipendula ulmaria ssp. ulmaria	Meadow-sweet	SE1								X		1
Fragaria virginiana	Wild Strawberry	S5						X				1
Geum aleppicum	Yellow Avens	S5							X			1
Malus pumila	Common Crabapple	SE5							X	X		1
Potentilla recta	Rough-fruited Cinquefoil	SE5						X	X			1
Prunus serotina	Black Cherry	S5							X	X		1
Prunus virginiana ssp. virginiana	Choke Cherry	S5							X			1
Rubus idaeus ssp. idaeus	Red Raspberry	SE1						X	X	X		1
Rubus occidentalis	Black Raspberry	S5								X		1
Rubiaceae	**Madder Family**											
Galium mollugo	White Bedstraw	SE5						X				1
Galium obtusum	Blunt-leaved Bedstraw	S4S5				R*				X		1
Galium palustre	Marsh Bedstraw	S5								X		1
Salicaceae	**Willow Family**											
Populus balsamifera ssp. balsamifera	Balsam Poplar	S5						X	X	X		1
Populus deltoides ssp. deltoides	Eastern Cottonwood	S5				R+			X	X		1
Populus tremuloides	Trembling Aspen	S5						X	X	X		1
Salix amygdaloides	Peach-leaved Willow	S5						X		X		1
Salix discolor	Pussy Willow	S5								X		1
Salix fragilis	Crack Willow	SE5							X	X		1
Scrophulariaceae	**Figwort Family**											
Linaria vulgaris	Butter-and-eggs	SE5							X			1
Mimulus ringens	Square-stemmed Monkey-flower	S5								X		1
Verbascum thapsus	Common Mullein	SE5							X	X		1
Solanaceae	**Nightshade Family**											
Solanum dulcamara	Bitter Nightshade	SE5						X	X	X		1
Tiliaceae	**Linden Family**											

Tilia americana	American Basswood	S5								X		1
Ulmaceae	**Elm Family**											
Celtis occidentalis	Common Hackberry	S4				R*			X			1
Ulmus americana	White Elm	S5								X		1
Urticaceae	**Nettle Family**											
Boehmeria cylindrica	False Nettle	S5						X		X	X	1
Urtica dioica ssp. dioica	European Stinging Nettle	SE2								X		1
Valerianaceae	**Valerian Family**											
Valeriana edulis ssp. ciliata	Taprooted Valerian	S1				R	X					
Verbenaceae	**Vervain Family**											
Verbena hastata	Blue Vervain	S5								X		1
Verbena urticifolia	White Vervain	S5								X		1
Violaceae	**Violet Family**											
Viola sororia	Woolly Blue Violet	S5						X				1
Vitaceae	**Grape Family**											
Parthenocissus vitacea	Woodbine	S5							X	X		1
Parthenocissus quinquefolia	Virginia-creeper	S4?				R+			X		X	1
Vitis riparia	Riverbank Grape	S5						X				1
Monocotyledons	**Monocots**											
Alismataceae	**Water-plantain Family**											
Alisma plantago-aquatica	Common Water-plantain	S5								X		1
Cyperaceae	**Sedge Family**											
Carex lacustris	Lake-bank Sedge	S5								X		1
Carex retrorsa	Retrorse Sedge	S5								X		1
Carex utriculata	Beaked Sedge	S5								X		1
Scirpus cyperinus	Wool-grass	S5								X		1
Iridaceae	**Iris Family**											
Iris prismatica	Slender Blue-flag	SE1								X		1
Iris versicolor	Multi-coloured Blue-flag	S5								X		1
Lemnaceae	**Duckweed Family**											
Lemna minor	Lesser Duckweed	S5								X		1
Liliaceae	**Lily Family**											
Allium burdickii	Wild Leek	S1?				R			X			1
Asparagus officinalis	Garden Asparagus	SE5						X	X	X		1
Erythronium americanum ssp. americanum	Yellow Dog's-tooth Violet	S5							X			1
Maianthemum racemosum ssp. racemosum	False Solomon's Seal	S5							X		X	1
Polygonatum pubescens	Hairy Solomon's Seal	S5							X			1
Trillium grandiflorum	White Trillium	S5							X			1
Poaceae	**Grass Family**											
Bromus inermis ssp. inermis	Awnless Brome	SE5						X	X			1
Dactylis glomerata	Orchard Grass	SE5							X		X	1
Digitaria ischaemum	Small Crabgrass	SE5							X			1
Echinochloa crusgalli	Common Barnyard Grass	SE5								X		1
Glyceria septentrionalis	Floating Manna Grass	S4				R*				X		1
Leersia oryzoides	Rice Cut Grass	S5								X	X	1
Phalaris arundinacea	Reed Canary Grass	S5								X	X	1
Phleum pratense	Timothy	SE5						X				1

Setaria italica	Foxtail Millet	SE1							X			1
Setaria viridis	Green Foxtail	SE5							X			1
Sparganiaceae	**Bur-reed Family**											
Sparganium eurycarpum	Broad-fruited Bur-reed	S5								X		1
Typhaceae	**Cattail Family**											
Typha angustifolia	Narrow-leaved Cattail	S5								X		1
Typha latifolia	Broad-leaved Cattail	S5								X		1
					Total	**12**	**0**	**52**	**62**	**90**	**37**	**165**

[1]MNRF 2019a; [2]MECP 2019; [3]Government of Canada 2019; MNRF 2019b

LEGEND
SRANK
S1 Critically Imperiled
S2 Imperiled
S3 Vulnerable
S4 Apparently Secure
S5 Secure
S#? Rank Uncertain
COSSARO
END Endangered
COSEWIC
E Endangered
SARA Schedule
Schedule 1 Officially Protected under SARA
Waterloo Region
R Native, Present and Rare
R* Native, Present and Rare, additional research may prove otherwise
R+ Native, Present and Rare if demonstrably indigenous

APPENDIX III

Birds Reported from the Study Area

Bird Species Reported from the Study Area - Whistle Bare Pit Expansion (Project #2259A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Region of Waterloo Status	OBBA*	NHIC Data**	NRSI Observed: Highest Level of Breeding Evidence	Incidentals
		MNRF 2021a	MNRF 2021a	Government of Canada 2021	Government of Canada 2021	Government of Canada 2021	Martin 1996	BSC et al. 2006	MNRF 2021b	NRSI Results from 2019-2021	
Anatidae	**Ducks, Geese & Swans**										
Aix sponsa	Wood Duck	S5B, S3N					√*	CO			
Anas platyrhynchos	Mallard	S5						CO		**PR**	OB
Anas rubripes	American Black Duck	S4					√	CO			
Branta canadensis	Canada Goose	S5						CO			
Mergus merganser	Common Merganser	S5					√	PR			
Odontophoridae	**New World Quails**										
Colinus virginianus	Northern Bobwhite	S1?B	END	E	E	Schedule 1	√	PO			
Phasianidae	**Partridges, Grouse & Turkeys**										
Meleagris gallopavo	Wild Turkey	S5						CO			
Columbidae	**Pigeons & Doves**										
Columba livia	Rock Pigeon	SNA						CO			
Zenaida macroura	Mourning Dove	S5						CO		**PR**	OB
Cuculiformes	**Cuckoos & Anis**										
Coccyzus erythropthalmus	Black-billed Cuckoo	S4S5B					√	PO		**PO**	
Caprimulgidae	**Goatsuckers**										
Chordeiles minor	Common Nighthawk	S4B	SC	SC	T	Schedule 1	√*	PO			
Apodidae	**Swifts**										
Chaetura pelagica	Chimney Swift	S3B	THR	T	T	Schedule 1		PO			
Trochilidae	**Hummingbirds**										
Archilochus colubris	Ruby-throated Hummingbird	S5B					√	PR			
Rallidae	**Rails, Gallinules & Coots**										
Porzana carolina	Sora	S5B					√	PO			
Rallus limicola	Virginia Rail	S4S5B					√	PR			
Charadriidae	**Plovers & Lapwings**										
Charadrius vociferus	Killdeer	S4B						CO		**CO**	
Scolopacidae	**Sandpipers & Allies**										
Actitis macularia	Spotted Sandpiper	S5B						CO			
Scolopax minor	American Woodcock	S4B						PO			
Ardeidae	**Herons & Bitterns**										
Ardea herodias	Great Blue Heron	S4					√	CO		**OB**	OB
Butorides virescens	Green Heron	S4B					√	PO		**PO**	OB
Cathartidae	**Vultures**										
Cathartes aura	Turkey Vulture	S5B, S3N					√	CO		**OB**	OB
Accipitridae	**Hawks, Kites, Eagles & Allies**										
Accipiter cooperii	Cooper's Hawk	S4	NAR	NAR	NS	No schedule	√	CO			
Accipiter striatus	Sharp-shinned Hawk	S5	NAR	NAR	NS	No schedule	√	PR			
Buteo jamaicensis	Red-tailed Hawk	S5	NAR	NAR	NS	No schedule		CO		**PO**	OB
Circus hudsonius	Northern Harrier	S5B, S4N	NAR	NAR	NS	No schedule	√	PR			
Strigidae	**Typical Owls**										
Bubo virginianus	Great Horned Owl	S4						CO			
Megascops asio	Eastern Screech-Owl	S4	NAR	NAR	NS	No schedule		PR			
Alcedinidae	**Kingfishers**										
Megaceryle alcyon	Belted Kingfisher	S5B, S4N					√	CO		**PR**	OB
Picidae	**Woodpeckers**										
Colaptes auratus	Northern Flicker	S5						CO		**PO**	OB
Dryobates pubescens	Downy Woodpecker	S5						CO		**PO**	
Dryobates villosus	Hairy Woodpecker	S5						CO			
Dryocopus pileatus	Pileated Woodpecker	S5					√	PR		**PO**	
Melanerpes carolinus	Red-bellied Woodpecker	S5					√	CO			
Melanerpes erythrocephalus	Red-headed Woodpecker	S3	SC	E	E	Schedule 1	√	PR			
Sphyrapicus varius	Yellow-bellied Sapsucker	S5B, S3N					√	PR			
Falconidae	**Caracaras & Falcons**										
Falco sparverius	American Kestrel	S4						PR			
Tyrannidae	**Tyrant Flycatchers**										

Contopus virens	Eastern Wood-Pewee	S4B	SC	SC	SC	Schedule 1		PR			
Empidonax alnorum	Alder Flycatcher	S5B					√	PO			
Empidonax minimus	Least Flycatcher	S5B					√	CO		**PO**	
Empidonax traillii	Willow Flycatcher	S4B						CO			
Myiarchus crinitus	Great Crested Flycatcher	S5B						CO		**PO**	
Sayornis phoebe	Eastern Phoebe	S5B						CO		**PO**	
Tyrannus tyrannus	Eastern Kingbird	S4B						CO		**PR**	
Vireonidae	**Vireos**										
Vireo gilvus	Warbling Vireo	S5B						PR		**PR**	OB
Vireo olivaceus	Red-eyed Vireo	S5B						CO			
Corvidae	**Crows & Jays**										
Corvus brachyrhynchos	American Crow	S5						CO		**PO**	
Cyanocitta cristata	Blue Jay	S5						CO		**PO**	OB
Alaudidae	**Larks**										
Eremophila alpestris	Horned Lark	S4						PR		**PR**	OB
Hirundinidae	**Swallows**										
Hirundo rustica	Barn Swallow	S4B	THR	SC	T	Schedule 1		CO	X	**CO**	OB
Petrochelidon pyrrhonota	Cliff Swallow	S4S5B					√*	CO			
Riparia riparia	Bank Swallow	S4B	THR	T	T	Schedule 1		CO			
Stelgidopteryx serripennis	Northern Rough-winged Swallow	S4B						CO		**PO**	OB
Tachycineta bicolor	Tree Swallow	S4S5B						CO		**PO**	
Paridae	**Chickadees & Titmice**										
Baeolophus bicolor	Tufted Titmouse	S3					√	PR			
Poecile atricapillus	Black-capped Chickadee	S5						CO		**PO**	OB
Sittidae	**Nuthatches**										
Sitta canadensis	Red-breasted Nuthatch	S5					√	CO			
Sitta carolinensis	White-breasted Nuthatch	S5						CO		**PO**	OB
Certhiidae	**Creepers**										
Certhia americana	Brown Creeper	S5					√	CO			
Troglodytidae	**Wrens**										
Thryothorus ludovicianus	Carolina Wren	S4					√	PR			
Troglodytes aedon	House Wren	S5B						CO		**PR**	
Polioptilidae	**Gnatcatchers**										
Polioptila caerulea	Blue-gray Gnatcatcher	S4B					√	PO			
Regulidae	**Kinglets**										
Regulus satrapa	Golden-crowned Kinglet	S5					√	CO			
Turdidae	**Thrushes**										
Catharus fuscescens	Veery	S5B					√	PO			
Hylocichla mustelina	Wood Thrush	S4B	SC	T	T	Schedule 1		PR			
Sialia sialis	Eastern Bluebird	S5B, S4N	NAR	NAR	NS	No schedule	√	CO			
Turdus migratorius	American Robin	S5						CO		**CO**	OB
Mimidae	**Mockingbirds, Thrashers & Allies**										
Dumetella carolinensis	Gray Catbird	S5B, S3N						CO		**PR**	
Toxostoma rufum	Brown Thrasher	S4B					√	CO		**PO**	
Sturnidae	**Starlings**										
Sturnus vulgaris	European Starling	SNA						CO		**CO**	OB
Bombycillidae	**Waxwings**										
Bombycilla cedrorum	Cedar Waxwing	S5						CO		**CO**	OB
Passeridae	**Old World Sparrows**										
Passer domesticus	House Sparrow	SNA						CO		**CO**	
Fringillidae	**Finches & Allies**										
Haemorhous mexicanus	House Finch	SNA						CO		**PR**	
Spinus pinus	Pine Siskin	S5					√	PR			
Spinus tristis	American Goldfinch	S5						CO		**PR**	OB
Emberizidae	**New World Sparrows & Allies**										
Ammodramus savannarum	Grasshopper Sparrow	S4B	SC	SC	SC	Schedule 1	√	PR			
Melospiza georgiana	Swamp Sparrow	S5B, S4N						PR			
Melospiza melodia	Song Sparrow	S5						CO		**PR**	OB
Passerculus sandwichensis	Savannah Sparrow	S5B, S3N						CO		**PR**	OB
Pipilo erythrophthalmus	Eastern Towhee	S4B, S3N						PO		**OB**	OB
Pooecetes gramineus	Vesper Sparrow	S4B					√	PR			
Spizella passerina	Chipping Sparrow	S5B, S3N						CO		**PR**	OB
Spizella pusilla	Field Sparrow	S4B, S3N						CO		**OB**	OB
Zonotrichia albicollis	White-throated Sparrow	S5					√	PR		**OB**	OB
Icteridae	**Troupials & Allies**										
Agelaius phoeniceus	Red-winged Blackbird	S5						CO		**CO**	OB

Dolichonyx oryzivorus	Bobolink	S4B	THR	T	T	Schedule 1				**OB**	
Icterus galbula	Baltimore Oriole	S4B						CO		**CO**	
Molothrus ater	Brown-headed Cowbird	S5						CO		**PR**	OB
Quiscalus quiscula	Common Grackle	S5						CO		**CO**	OB
Sturnella magna	Eastern Meadowlark	S4B, S3N	THR	T	T	Schedule 1		CO	X	**OB**	OB
Parulidae	**Wood Warblers**										
Geothlypis philadelphia	Mourning Warbler	S5B					√	PO			
Geothlypis trichas	Common Yellowthroat	S5B, S3N						PR		**PO**	
Parkesia noveboracensis	Northern Waterthrush	S5B					√	PR			
Seiurus aurocapilla	Ovenbird	S5B					√	CO			
Setophaga caerulescens	Black-throated Blue Warbler	S5B								**OB**	OB
Setophaga coronata	Yellow-rumped Warbler	S5B, S4N					√	PR		**OB**	OB
Setophaga pensylvanica	Chestnut-sided Warbler	S5B					√	CO			
Setophaga petechia	Yellow Warbler	S5B						CO		**PO**	
Setophaga pinus	Pine Warbler	S5B, S3N					√	PR		**PO**	OB
Setophaga ruticilla	American Redstart	S5B					√	PR		**PR**	
Vermivora cyanoptera	Blue-winged Warbler	S4B					√	PO			
Cardinalidae	**Cardinals, Grosbeaks & Allies**										
Cardinalis cardinalis	Northern Cardinal	S5						CO		**PR**	OB
Passerina cyanea	Indigo Bunting	S5B						CO		**PO**	
Pheucticus ludovicianus	Rose-breasted Grosbeak	S5B						CO		**PO**	
Piranga olivacea	Scarlet Tanager	S5B					√	PR			
Total								**102**	**2**	**55**	**33**

*OBBA Atlas Square: 17NJ40

**NHIC Atlas Squares: 17NJ4801, 17NJ4800

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APPENDIX IV

Herpetofauna Reported from the Study Area

Reptile and Amphibian Species Reported from the Study Area - Whistle Bare Pit Expansion EIS (Project #2259A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	ORAA*	NHIC Data**	NRSI Observed	Anuran Call Survey	Anuran Call Survey	Anuran Call Survey
		MNRF 2021a	MNRF 2021a	Government of Canada 2021	Government of Canada 2021	Government of Canada 2021	Ontario Nature 2019	MNRF 2021b	NRSI Results from 2019-2021	2019	2020	2021
Turtles												
Chelydra serpentina	Snapping Turtle	S4	SC	SC	SC	Schedule 1	X	X				
Chrysemys picta marginata	Midland Painted Turtle	S4		SC	SC	Schedule 1	X					
Snakes												
Lampropeltis triangulum	Milksnake	S4	NAR	SC	SC	Schedule 1	X					
Opheodrys vernalis	Smooth Greensnake	S4					X					
Nerodia sipedon sipedon	Northern Watersnake	S5	NAR	NAR	NS	No schedule	X					
Storeria dekayi	Dekay's Brownsnake	S5	NAR	NAR	NS	No schedule	X					
Storeria occipitomaculata	Red-bellied Snake	S5					X					
Thamnophis sirtalis sirtalis	Eastern Gartersnake	S5					X					
Salamanders												
Ambystoma jeffersonianum	Jefferson Salamander	S2	END	E	E	Schedule 1	X					
Ambystoma maculatum	Spotted Salamander	S4					X					
Notophthalmus viridescens viridescens	Red-spotted Newt	S5					X					
Plethodon cinereus	Eastern Red-backed Salamander	S5					X					
Frogs and Toads												
Anaxyrus americanus	American Toad	S5					X		**X**		**X**	**X**
Hyla versicolor	Gray Treefrog	S5					X		**X**	**X**	**X**	
Pseudacris crucifer	Spring Peeper	S5					X		**X**	**X**	**X**	**X**
Lithobates catesbeianus	American Bullfrog	S4					X					
Lithobates clamitans	Green Frog	S5					X		**X**	**X**	**X**	
Lithobates palustris	Pickerel Frog	S4	NAR	NAR	NS	No schedule	X					
Lithobates pipiens	Northern Leopard Frog	S5	NAR	NAR	NS	No schedule	X		**X**	**X**	**X**	**X**
Lithobates sylvaticus	Wood Frog	S5					X		**X**	**X**		
Total							**20**	**1**	**6**	**5**	**5**	**3**

*ORAA Atlas Square: 17NJ40

**NHIC Atlas Squares: 17NJ4801, 17NJ4800

Anuran Pre-Construction Monitoring Data: Whistle Bare Pit 2019 - 2021

		Call Code (# of individuals)			Call Code (# of individuals)			Call Code (# of individuals)		
Station ANR-001		**2019**			**2020**			**2021**		
Common Name	**Scientific Name**	April 22	May 21	June 17	April 28	May 21	June 24	April 13	May 13	June 22
American Toad	*Anaxyrus americanus*					2 (3)			1(3)	
Northern Spring Peeper	*Pseudarcris crucifer*	3	2 (6)			2(3)			1(1)	
Tetraploid Gray Treefrog	*Hyla versicolor*			1 (2)		2 (2)				
Western Chorus Frog	*Pseudacris triseriata*									
Northern Leopard Frog	*Lithobates pipiens*					1 (1)				
Pickerel Frog	*Lithobates palustris*									
Green Frog	*Lithobates clamitans*					1 (1)				
Mink Frog	*Lithobates septentrionalis*									
American Bullfrog	*Lithobates catesbeianus*									
Wood Frog	*Lithobates sylvaticus*	1 (1)								
	Beaufort Wind Scale	0	3	1	1	1	1	1	1	0
	%Cloud Cover	10	80	30	25	0	5	25	20	75
	Air temp. (^{o}C)	18	16	16	9	15	17	12	13	15
	Water temp. (^{o}C)	14	N/A	16	13	19	18	11	13	15
	Precipitation?	None	None	None	None	None	None	None	None	None

		Call Code (# of individuals)			Call Code (# of individuals)			Call Code (# of individuals)		
Station ANR-002		**2019**			**2020**			**2021**		
Common Name	**Scientific Name**	April 22	May 22	June 17	April 28	May 21	June 24	April 13	May 13	June 22
American Toad	*Anaxyrus americanus*					1 (2)				
Northern Spring Peeper	*Pseudarcris crucifer*	1 (2)			2 (4)	2 (3)		2(2)		
Tetraploid Gray Treefrog	*Hyla versicolor*		2 (6)	2 (5)		1 (1)				
Western Chorus Frog	*Pseudacris triseriata*									
Northern Leopard Frog	*Lithobates pipiens*	2 (5)						1(1)		
Pickerel Frog	*Lithobates palustris*									
Green Frog	*Lithobates clamitans*			1 (2)			1 (1)			
Mink Frog	*Lithobates septentrionalis*									
American Bullfrog	*Lithobates catesbeianus*									
Wood Frog	*Lithobates sylvaticus*	1 (3)								
	Beaufort Wind Scale	0	3	1	1	1	1	1	1	0
	%Cloud Cover	10	80	60	25	0	5	25	20	75
	Air temp. (^{o}C)	18	16	16	9	15	17	12	15	15
	Water temp. (^{o}C)	16	N/A	17	11	19	20	16	13	20
	Precipitation?	None	None	None	None	None	None	None	None	None

Call Level Codes
1 Calls not overlapping; calling individuals can be counted
2 Calls somewhat overlapping; calling individuals can be counted
3 Full chorus; number of calling individuals cannot be estimated

APPENDIX V

Mammals Reported from the Study Area

Appendix V
#2259A Whistle Bare Pit Expansion EIS
Mammal Species Reported From the Study Area

Scientific Name	Common Name	SRANK[1]	SARO[2]	COSEWIC[3]	SARA Schedule[4]	Region of Waterloo Status[5]	Ontario Mammal Atlas[6]	NHIC Data[7]	NRSI Observed
Didelphimorphia	**Opossums**								
Didelphis virginiana	Virginia Opossum	S4				R	X		
Insectivora	**Shrews and Moles**								
Blarina brevicauda	Northern Short-tailed Shrew	S5					X		
Condylura cristata	Star-nosed Mole	S5					X		
Sorex cinereus	Masked Shrew	S5				G	X		
Sorex fumeus	Smoky Shrew	S5				R	X		
Chiroptera	**Bats**								
Eptesicus fuscus	Big Brown Bat	S4					X		
Myotis lucifugus	Little Brown Myotis	S4	END	E	Schedule 1		X		
Myotis septentrionalis	Northern Myotis	S3	END	E	Schedule 1		X		
	Unidentified bat species (fly-over)								X
Lagomorpha	**Rabbits and Hares**								
Lepus europaeus	European Hare	SNA					X		
Sylvilagus floridanus	Eastern Cottontail	S5					X		
Rodentia	**Rodents**								
Castor canadensis	Beaver	S5				S	X		
Erethizon dorsatum	Porcupine	S5				S	X		
Marmota monax	Woodchuck	S5					X		
Microtus pennsylvanicus	Meadow Vole	S5					X		
Napaeozapus insignis	Woodland Jumping Mouse	S5					X		
Ondatra zibethicus	Muskrat	S5					X		
Peromyscus leucopus	White-footed Mouse	S5					X		
Peromyscus maniculatus	Deer Mouse	S5					X		
Rattus norvegicus	Norway Rat	SNA					X		
Sciurus carolinensis	Eastern Gray Squirrel	S5					X		X
Tamiasciurus hudsonicus	Red Squirrel	S5					X		
Tamias striatus	Eastern Chipmunk	S5					X		X
Zapus hudsonius	Meadow Jumping Mouse	S5					X		
Carnivora	**Carnivores**								
Canis latrans	Coyote	S5				S	X		X
Mephitis mephitis	Striped Skunk	S5					X		
Mustela erminea	Ermine	S5					X		
Mustela vison	American Mink	S4				S	X		
Procyon lotor	Northern Raccoon	S5					X		X
Vulpes vulpes	Red Fox	S5					X		
Artiodactyla	**Deer and Bison**								
Odocoileus virginianus	White-tailed Deer	S5					X		X
						Total	30	0	5

[1]MNRF 2019a; [2]MECP 2019; [3]COSEWIC 2019; [4]Government of Canada 2019; [5]Regional Municipality of Waterloo 1985; [6]Dobbyn 1994; [7]MNRF 2019b

Legend
SRANK
S3 Vulnerable
S4 Apparently Secure
S5 Secure
SNA Unranked
COSSARO
END Endangered
COSEWIC
E Endangered
SARA Schedule
Schedule 1 Officially Protected under SARA
Region of Waterloo Status
G General
S Scarce
R Rare

APPENDIX VI

Butterflies Reported from the Study Area

Appendix VI
#2259 Whistle Bare Pit Expansion EIS
Butterfly Species Reported From the Study Area

Scientific Name	Common Name	SRANK[1]	SARO[2]	COSEWIC[3]	SARA Schedule[3]	Region of Waterloo Status[4]	TEA Atlas[5] (Square 17NJ40)	NRSI Observed
Hesperiidae	**Skippers**							
Anatrytone logan	Delaware Skipper	S4				C	X	
Ancyloxypha numitor	Least Skipper	S5				UC	X	
Carterocephalus palaemon	Arctic Skipper	S5				R	X	
Epargyreus clarus	Silver-spotted Skipper	S4				UC	X	
Erynnis baptisiae	Wild Indigo Duskywing	S4				UK	X	
Erynnis icelus	Dreamy Duskywing	S5				R	X	
Erynnis juvenalis	Juvenal's Duskywing	S5				R	X	
Erynnis lucilius	Columbine Duskywing	S4				R	X	
Erynnis martialis	Mottled Duskywing	S2	END	E			X	
Euphyes bimacula	Two-spotted Skipper	S4				R	X	
Euphyes conspicua	Black Dash	S3				UC	X	
Euphyes dion	Dion Skipper	S4				R	X	
Euphyes vestris	Dun Skipper	S5				VC	X	
Pholisora catullus	Common Sootywing	S4				R	X	
Poanes hobomok	Hobomok Skipper	S5				C	X	
Poanes viator	Broad-winged Skipper	S4				C	X	
Polites mystic	Long Dash Skipper	S5				UC	X	
Polites origenes	Crossline Skipper	S4				R	X	
Polites peckius	Peck's Skipper	S5				VC	X	
Polites themistocles	Tawny-edged Skipper	S5				C	X	
Pompeius verna	Little Glassywing	S4				UC	X	
Thymelicus lineola	European Skipper	SNA				VC	X	
Wallengrenia egeremet	Northern Broken Dash	S5				C	X	
Papilionidae	**Swallowtails**							
Papilio cresphontes	Giant Swallowtail	S4				UC	X	
Papilio glaucus	Eastern Tiger Swallowtail	S5				VC	X	
Papilio polyxenes	Black Swallowtail	S5				VC	X	
Papilio troilus	Spicebush Swallowtail	S4					X	
Pieridae	**Whites and Sulphurs**							
Colias eurytheme	Orange Sulphur	S5				VC	X	
Colias philodice	Clouded Sulphur	S5					X	
Pieris oleracea	Mustard White	S4				PE	X	
Pieris rapae	Cabbage White	SNA				VC	X	
Pontia protodice	Checkered White	SNA				R	X	
Pyrisitia lisa	Little Yellow	SNA				R	X	
Lycaenidae	**Harvesters, Coppers, Hairstreaks, Blues**							
Callophrys niphon	Eastern Pine Elfin	S5				R	X	
Celastrina lucia	Northern Spring Azure	S5					X	
Celastrina neglecta	Summer Azure	S5				VC	X	
Cupido comyntas	Eastern Tailed Blue	S5				UC	X	
Feniseca tarquinius	Harvester	S4				R	X	
Glaucopsyche lygdamus	Silvery Blue	S5					X	
Lycaena hyllus	Bronze Copper	S5				VC	X	
Satyrium acadica	Acadian Hairstreak	S4				UC	X	
Satyrium calanus	Banded Hairstreak	S4				UC	X	
Satyrium caryaevorus	Hickory Hairstreak	S4				R	X	
Satyrium liparops	Striped Hairstreak	S5				UC	X	
Satyrium titus	Coral Hairstreak	S5				UC	X	

Nymphalidae	**Brush-footed Butterflies**							
Aglais milberti	Milbert's Tortoiseshell	S5				UC	X	
Asterocampa clyton	Tawny Emperor	S2S3				UC	X	
Boloria bellona	Meadow Fritillary	S5				VC	X	
Boloria selene	Silver-bordered Fritillary	S5				R	X	
Cercyonis pegala	Common Wood-Nymph	S5				VC	X	
Chlosyne nycteis	Silvery Checkerspot	S5				R	X	
Coenonympha tullia	Common Ringlet	S5				C	X	
Danaus plexippus	Monarch	S2N, S4B	SC	E	Schedule 1	VC	X	X
Euphydryas phaeton	Baltimore Checkerspot	S4				R	X	
Junonia coenia	Common Buckeye	SNA				UC	X	
Lethe anthedon	Northern Pearly-Eye	S5				C	X	
Lethe appalachia	Appalachian Brown	S4				UC	X	
Lethe eurydice	Eyed Brown / Northern Eyed Brown	S5				VC	X	X
Libytheana carinenta	American Snout	SNA				R	X	
Limenitis archippus	Viceroy	S5				VC	X	
Limenitis arthemis arthemis	White Admiral/Banded Purple	S5				C	X	
Limenitis arthemis astyanax	Red-spotted Purple	S5				C	X	
Megisto cymela	Little Wood-Satyr	S5				VC	X	
Nymphalis antiopa	Mourning Cloak	S5				VC	X	
Nymphalis l-album	Compton Tortoiseshell	S5				UC	X	
Phyciodes cocyta	Northern Crescent	S5				UC	X	
Phyciodes tharos	Pearl Crescent	S4				C	X	
Polygonia comma	Eastern Comma	S5				VC	X	
Polygonia comma	Eastern Comma/Hop Merchant	S5					X	
Polygonia interrogationis	Question Mark	S5				VC	X	
Polygonia progne	Grey Comma	S5				UC	X	
Speyeria atlantis	Atlantis Fritillary	S5				R	X	
Speyeria cybele	Great Spangled Fritillary	S5				VC	X	
Vanessa atalanta	Red Admiral	S5				VC	X	X
Vanessa cardui	Painted Lady	S5				C	X	
Vanessa virginiensis	American Lady	S5				C	X	
						Total	76	3

[1]MNRF 2019a; [2]MECP 2019 ; [3]Government of Canada 2019; [4]Regional Municipality of Waterloo 1985; [5]Macnaughton et al 2019

LEGEND
SRANK
S2 Imperiled
S3 Vulnerable
S4 Apparently Secure
S5 Secure
SNA Unranked
COSSARO
SC Special Concern
END Endangered
COSEWIC
E Endangered
SARA Schedule
Schedule 1 Officially Protected under SARA
Region of Waterloo Status
VC Very Common
C Common
UC Uncommon
R Rare
UK Unknown
PE Possibly Extirpated

APPENDIX VII

Odonates Reported from the Study Area

Appendix VII
#2259A Whistle Bare Pit Expansion EIS
Dragonfly and Damselfly Species Reported From the Study Area

Scientific Name	Common Name	SRANK[1]	SARO[2]	COSEWIC[3]	SARA Schedule[3]	Odonate Atlas (17NJ40)[4]	NRSI Observed
Coenagrionidae	**Narrow-winged Damselflies**						
Amphiagrion saucium	Eastern Red Damsel	S4				X	
Argia apicalis	Blue-fronted Dancer	S4				X	
Enallagma civile	Familiar Bluet	S5				X	
Enallagma exsulans	Stream Bluet	S5				X	
Ischnura verticalis	Eastern Forktail	S5				X	
Corduliidae	**Emeralds**						
Epitheca cynosura	Common Baskettail	S5				X	
Libellulidae	**Skimmers**						
Libellula luctuosa	Widow Skimmer	S5					X
Plathemis lydia	Common Whitetail	S5				X	
Sympetrum vicinum	Yellow-legged (Banded) Meadowhawk	S5					X
					Total	**7**	**2**

[1]MNRF 2019a; [2]MECP 2019; [3]Government of Canada 2019; [4]Ontario Odonate Atlas database 2019

LEGEND
SRANK
S4 Apparently Secure
S5 Secure

APPENDIX VIII

Significant Wildlife Habitat Assessment Tables

Significant Wildlife Habitat Assessment Tables

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Bat Maternity Colonies					

Rationale:
Known locations of forested bat maternity colonies is extremely rare in all Ontario landscapes.
	Big Brown Bat
	Silver-haired Bat
		Maternity colonies considered SWH are found in forested Ecosites.
		
		All ELC Ecosites in ELC Community Series:
		FOD
		FOM
		SWD
		SWM
			Maternity colonies can be found in tree cavities, vegetation and often in buildings[xxii, xxv, xxvi, xxvii, xxxi] (buildings are not considered to be SWH).
			• Maternity roosts are not found in caves and mines in Ontario[xxii]
			• Maternity colonies located in Mature deciduous or mixed forest stands[ccix, ccx] with >10/ha large diameter (>25cm dbh) wildlife trees[ccvii]
			• Female Bats prefer wildlife tree (snags) in early stages of decay, class 1-3[ccxiv] or class 1 or 2[ccxii]
			• Silver-haired Bats prefer older mixed or deciduous forest and form maternity colonies in tree cavities and small hollows. Older forest areas with at least 21 snags/ha are preferred[ccx]
			
			Information Sources
			• OMNRF for possible locations and contact for local experts
			• University Biology Departments with bat experts.
				• Maternity Colonies with confirmed use by:
				  • >10 Big Brown Bats
				  • >5 Adult Female Silver-haired Bats
				• The area of the habitat includes the entire woodland or a forest stand ELC Ecosite or an Ecoelement containing the maternity colonies.
				• Evaluation methods for maternity colonies should be conducted following methods outlined in the "Bats and Bat Habitats: Guidelines for wind Power Projects[ccv]
				• SWHMiS T[cxlix] Index #12 provides development effects and mitigation measures.
					Big Brown Bat has been documented in the vicintiy of the study area. Woodland communities present within the study area are limited to hedgerows and small areas of trees. Suitable diameter trees on-site were assessed for their potential to host bat maternity colonies. A number of trees on-site were found to have suitable cavities for roosting bats.
					
					Candidate SWH.

Significant Wildlife Habitat Assessment Tables

Table 4. Characteristics of Habitat for Species of Conservation Concern for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Marsh Bird Breeding Habitat					
Rationale: Wetlands for these bird species are typically productive and fairly rare in Southern Ontario landscapes.	American Bittern Virginia Rail Sora Common Gallinule American Coot Pied-billed Grebe Marsh Wren Sedge Wren Common Loon Sandhill Crane Green Heron Trumpeter Swan Special Concern: Black Tern Yellow Rail	MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 SAS1 SAM1 SAF1 FEO1 BOO1 For Green Heron: All SW, MA and CUM1 sites.	• Nesting occurs in wetlands • All wetland habitat is to be considered as long as there is shallow water with emergent aquatic vegetation present[cxxiv]. • For Green Heron, habitat is at the edge of water such as sluggish streams, ponds and marshes sheltered by shrubs and trees. Less frequently, it may be found in upland shrubs or forest a considerable distance from water. Information Sources • Contact OMNRF, wetland evaluations are a good source of information. • Field naturalist clubs • Natural Heritage Information Center (NHIC) Records • Reports and other information available from CAs. • Ontario Breeding Bird Atlas[ccv]	Studies confirm: • Presence of 5 or more nesting pairs of Sedge Wren or Marsh Wren or 1 pair of Sandhill Cranes; or breeding by any combination of 5 or more of the listed species[l]. • Note: any wetland with breeding of 1 or more Black Terns, Trumpeter Swan, Green Heron or Yellow Rail is SWH[l]. • Area of the ELC ecosite is the SWH • Breeding surveys should be done in May/June when these species are actively nesting in wetland habitats. • Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects”[ccxi]. • SWHMiST[cxlix] Index #35 provides development effects and mitigation measures	Suitable wetland habitat is present to the south of the subject property. Green Heron was documented to be 'Possibly' breeding within the MAM2 communities. **SWH present**