REPORT

Natural Environment Level 1 and 2 Technical Report

Lafarge Navan Quarry Extension Lands Part of Lots 9 and 10, Concession 5, Geographic Township of Cumberland, City of Ottawa, Ontario

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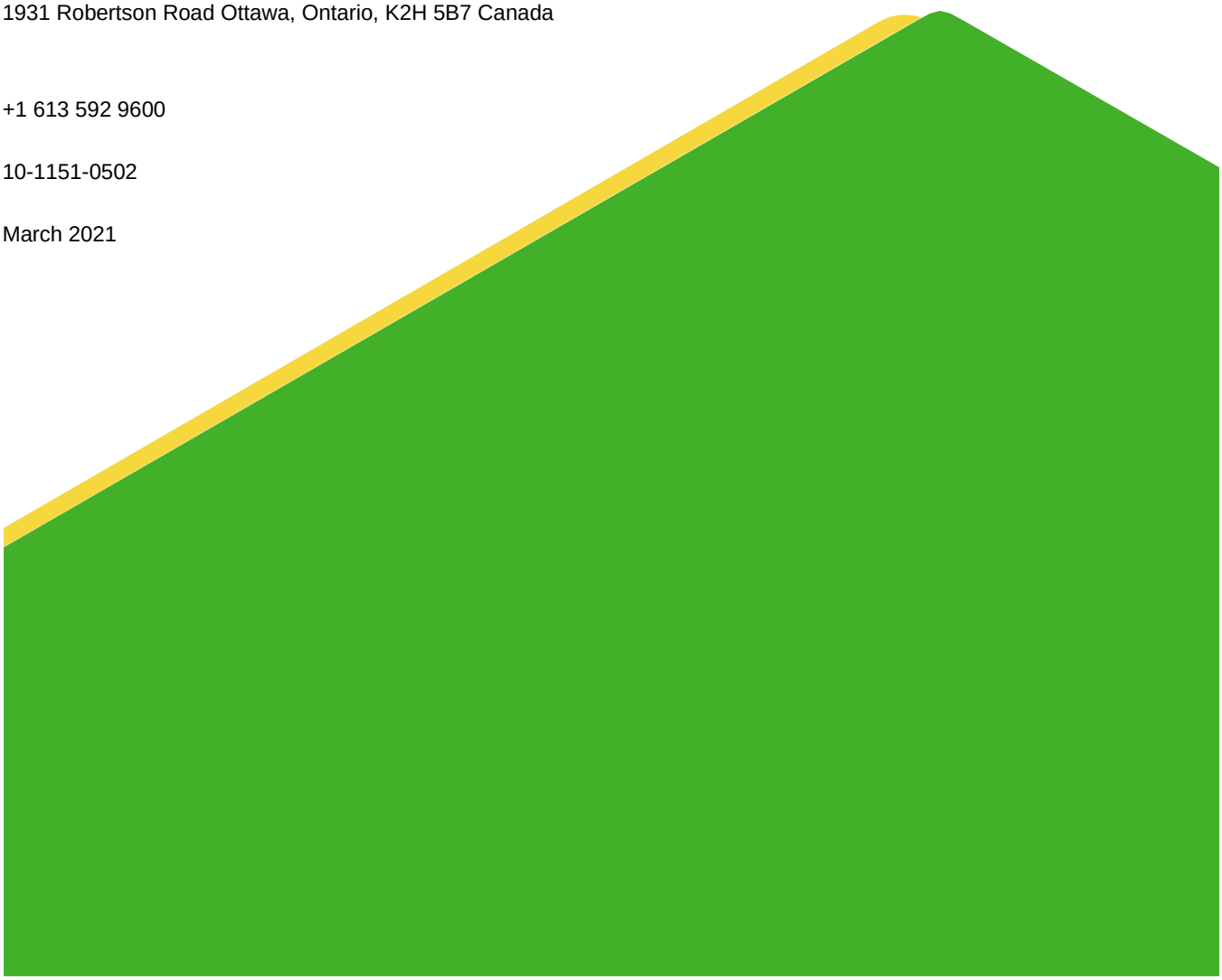

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1.0 INTRODUCTION

Golder Associates Ltd. (Golder) has been retained by Lafarge Canada Limited (Lafarge) to undertake natural environment studies to accompany the application for a Category 2 Class 'A' Quarry Below Water under the *Aggregate Resources Act* (ARA; Ontario 1990a) for the proposed extension to the Navan Quarry, located on Part Lots 9 and 10, Concession 5, Former Geographic Township of Cumberland, City of Ottawa, Ontario (the Site; Figure 1).

1.1 Purpose

This report specifically addresses the requirements of a Natural Environment Level 1 and Level 2 (NEL 1/2) study as described in Sections 2.2.3 and 2.2.4 of the Report Standards for Category 2 Application as presented in the Aggregate Resources of Ontario, Provincial Standards Version 1.0 [Ministry of Natural Resources and Forestry (MNRF) 1997a]. This NEL 1/2 assessment is also intended to satisfy the City of Ottawa (the City) Official Plan requirements for an Environmental Impact Statement (EIS; Ottawa 2015).

For the purpose of this report, the following definitions are used:

Site – The total land area that is proposed for licensing under the ARA [28.4 hectares (ha); Figure 1].

Extraction Limit – The total area within the Site proposed for extraction (21.1 ha; Figure 3). This area represents the area of the Site less setbacks described in Section 3.2.

Study Area – The Study Area for the NEL 1/2 assessment is defined in the Aggregate Resources of Ontario Provincial Standards, Sections 2.2.3 and 2.2.4 as the Site and surrounding 120 m. The Study Area has been expanded to include the expected 1 m incremental groundwater drawdown cone (Figure 1).

The purpose of this report is to assess potential environmental impacts of the proposed aggregate extraction on the Site and Study Area with respect to the following:

- The environmental features and functions;
- The influence of extraction on the surrounding natural environment; and,
- The rehabilitation potential of the Site after extraction.

1.2 Site Description

The Site is located north of the intersection of Colonial Road and Heuvelmans Road, abutting the existing Lafarge Navan Quarry to the west, in the City of Ottawa (Figure 1). Immediately east of the Site is the Dutrisac Municipal Drain. The Site consists of open agricultural fields, cultural meadow, mixed and deciduous forests. The Site is bounded by fields and woodlots to the north and east, and the southern property boundary is located approximately 150 metres north of Colonial Road. A scarp feature is located in the northern and eastern portion of the Site. The total relief associated with the scarp feature is greatest in the northern portion of the Site (approximately 20 metres of relief) and the slope of the scarp feature lessens adjacent to the southeastern portion Site (approximately 8 metres of relief).

1.2.1 Adjacent Land Use

Surrounding land uses off-Site in the Study Area include existing the licenced Lafarge aggregate extraction operations to the west (existing Navan Quarry), rural residential, a public works yard and a construction company to the west and south, and agricultural use and woodlots to the north and east.

2.0 ENVIRONMENTAL POLICY CONTEXT

The Site and Study Area is located in the City of Ottawa. Documents reviewed to gain an understanding of the natural heritage features and regulations that are relevant to the Site and Study Area consisted of the following:

- The ARA (Ontario 1990a) and the Provincial Standards of Ontario – Category 2 – Class 'A' Quarry Below Water (MNRF 1997a)
- The Provincial Policy Statement (PPS; MMAH 2020)
- The *Fisheries Act* (Canada 1985)
- The *Migratory Birds Convention Act* (Canada 1994)
- The *Species at Risk Act* (Canada 2002)
- The *Endangered Species Act* (Ontario 2007)
- City of Ottawa Official Plan (Ottawa 2003)
- South Nation Conservation (SNC) Reg. 170/06 Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses (Ontario 2006)

An overview of the above noted legislation and policy documents are discussed in Sections 2.1 to 2.7.

2.1 Aggregate Resources Act

Applicants are required under the ARA Provincial Standards to prepare a Level 1 Natural Environment Technical Report and, where significant natural environment features occur on, or in proximity (i.e., within 120 m) to the proposed operation, a Level 2 Natural Environment Technical Report is required. Significant natural heritage features are defined in the PPS (MMAH 2020) with guidance from supporting technical manuals prepared by the MNRF (MNRF 2000; MNFR 2010; MNRF 2015). A Level 2 Natural Environment Technical Report, identifying the particular features and functions of the designated natural environment feature(s), the nature of the potential negative impacts of the extractive operation, the proposed mitigation of those effects and the nature and magnitude of any residual effects is also required to satisfy the ARA Provincial Standards (MNRF 1997a). As well, the proposed rehabilitation of the extraction area, and any particular prescriptions for that rehabilitation, are identified and discussed in the Level 1 and, if necessary, the Level 2 Natural Environment Technical Reports. This report combines the requirements and results of both the NEL 1 and NEL 2 assessments.

2.2 Provincial Policy Statement

The Provincial Policy Statement (PPS; MMAH 2020) was issued under Section 3 of the *Planning Act* (Ontario 1990b).

The natural heritage policies of the PPS indicate that:

2.1.4 Development and site alteration shall not be permitted in:

a) Significant wetlands in Ecoregions 5E, 6E and 7E.

b) Significant coastal wetlands.

2.1.5 Unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions, development and site alteration shall not be permitted in:

a) Significant wetlands in the Canadian Shield north of Ecoregions 5E, 6E and 7E.

b) Significant woodlands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Mary's River).

c) Significant valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Mary's River).

d) Significant wildlife habitat.

e) Significant areas of natural and scientific interest.

f) Coastal wetlands in Ecoregions 5E, 6E and 7E that are not subject to policy 2.1.4(b).

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

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

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

2.1.9 Nothing in policy 2.1 is intended to limit the ability of agricultural uses to continue.

2.3 Fisheries Act

The purpose of the federal *Fisheries Act* (Canada 1985) is to maintain healthy, sustainable, and productive Canadian fisheries through the prevention of pollution and the protection of fish and their habitat. Under the *Fisheries Act* (Canada 1985), work in and near water must comply with the fish and fish habitat protection provisions of the *Fisheries Act* by incorporating measures to avoid (DFO 2019):

- causing the death of fish
- harmful alteration, disruption, or destruction (HADD) of fish habitat in your work, undertaking or activity

All projects where work is being proposed that cannot avoid impacts to fish or fish habitat require a Fisheries and Oceans Canada (DFO) project review (DFO 2019). DFO will review the project to identify potential risks of the project to the conservation and protection of fish and fish habitat. If potential impacts can be avoided, project approval is not required (DFO 2020a). However, if it is determined that the project will result in death of fish or HADD of fish habitat, an authorization is required under the *Fisheries Act*. Proponents of projects requiring a *Fisheries Act* authorization may be required to also submit a habitat offsetting plan, which provides details of how the death of fish and/or HADD of fish habitat will be offset, and outlines associated costs and monitoring commitments. Proponents also have a duty to notify DFO of any unforeseen activities during the project that cause harm to fish or fish habitat.

2.4 Migratory Birds Convention Act

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

2.5 Species at Risk

2.5.1 Species at Risk Act (SARA)

At a federal level, Species at Risk (SAR) designations for species occurring in Canada are initially determined by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). If approved by the federal Minister of the Environment and Climate Change, species are added to the federal List of Wildlife Species at Risk (Canada 2002). Species that are included on Schedule 1 as endangered or threatened are afforded protection of critical habitat on federal lands under the *Species at Risk Act* (SARA). On private or provincially-owned lands, only aquatic species listed as endangered, threatened or extirpated and listed migratory birds are protected under the SARA, unless ordered by the Governor in Council.

2.5.2 Endangered Species Act (ESA)

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

Subsection 9(1) of the ESA prohibits the killing, harming or harassing of species identified as 'endangered' or 'threatened' in the various schedules to the Act. Subsection 10(1)(a) of the ESA states that *"No person shall damage or destroy the habitat of a species that is listed on the Species at Risk in Ontario* (*SARO*) *list as an endangered or threatened species"*.

General habitat protection is provided, by the ESA, to all threatened and endangered species. Species-specific habitat protection is only afforded to those species for which a habitat regulation has been prepared and passed into law as a regulation of the ESA. The ESA has a permitting process to allow alterations to protected species or their habitats as well as a registration process for certain activities and species.

2.6 City of Ottawa

The Site is designated as Limestone Resource Area in the City of Ottawa Official Plan (OP; Ottawa 2003). The surrounding lands are designated Agricultural Resource Area. Schedule K of the OP identifies the Dutrisac Municipal Drain adjacent to the Site as Unstable Slope. The Site is zoned Mineral Extraction Hold (ME[1r]-h) in the Zoning By-law. The hold ('h') must be removed in order to allow establishment of a quarry on the Site. The hold removal application to the City requires submission of an application to the MNRF for a Licence under the ARA and City approval of an EIS. A Terms of Reference (ToR) for the EIS was prepared by Golder and submitted to the City of Ottawa for review and comment in September 2013. Comments on the ToR received from the City (email from S. Rehman dated January 14, 2014) were incorporated in the study plan and in this report, where applicable.

2.7 South Nation Conservation (SNC)

The Site and Study Area are located within the jurisdiction of the SNC, and portions of the Site along the Dutrisac Municipal Drain lie within the SNC regulated area.

3.0 DESCRIPTION OF PROPOSED PROJECT

3.1 Existing Navan Quarry

The existing Navan Quarry is owned and operated by Lafarge, and is located on Part of Lots 7, 8, 9 and 10, Concession 6 in the Geographic Township of Cumberland, City of Ottawa, Ontario. The quarry became

operational in the mid- to late-1970's, and the primary entrance/exit is off Rockdale Road. The Navan Quarry is bounded by Rockdale Road (and associated unopened road allowance) to the west, fields and woodlots to the north and the proposed Navan Quarry Extension to the east. The southern property boundary is located approximately 350 m north of Colonial Road. The Navan Quarry is made up of three ARA licences. The licenced area for the Navan Pit and Quarry (ARA licence number 4185) is approximately 176 hectares (ha), the licenced area for the Rathwell 1 property (ARA licence number 4144) is approximately 5.7 ha and the licenced area for the Rathwell 2 property (ARA licence number 10699) is approximately 34.5 ha. The combined licenced area for the three properties is referred to as the Navan Quarry or the existing Navan Quarry in this report.

The existing Navan Quarry is being extracted in two lifts. Based on the current ARA site plans, the final base elevation for the quarry portion of the Navan Pit and Quarry licence is 64 metres above sea level (m ASL) and the final base elevation for the pit portion of the Navan Pit and Quarry licence is 61 m ASL. The pit portion of the Navan Pit and Quarry licence (found on Part of Lot 8) is no longer active and is currently flooded. The final base elevations for the Rathwell 1 and Rathwell 2 licences are 64 m ASL and 72.5 m ASL, respectively.

Currently, the deepest area of extraction within the existing Navan Quarry is in the east/southeast portion where the current floor elevation is approximately 85 m ASL. Water taking, and water discharge associated with the dewatering of the existing Navan Quarry is authorized by Permit to Take Water (PTTW) number 6231-832RMG and Environmental Compliance Approval (ECA) Number 5440-7BYLAF. The sump for the existing Navan Quarry is located on the east side of the active extraction area.

3.2 Proposed Navan Quarry Extension

The licence area for the Site is approximately 28.4 ha and the proposed extraction area is approximately 21.1 ha. The proposed licence boundary and extraction boundary are shown on Figure 3.

The proposed quarry will be extracted in two lifts. The first lift will have a sloping floor remaining approximately three m above the Lindsay Formation-Verulam Formation contact. The second lift will extend 10 m below the base of the first lift. The elevation of the base of the quarry within Site will be highest at the northern end (approximately 95 m ASL) and will slope to an elevation of approximately 71.5 m ASL in the south/southwest extents of the extraction area.

The proposed extraction area on the Site will have a 15 m setback from the licenced boundary along the southern limit. Along the western boundary, the setback will be zero where there is a common limit of extraction with the existing Navan Quarry. The eastern and northern limit of the extraction boundary will maintain a 15 m setback from the top of the scarp feature along the eastern/northern boundary of the Site. When licenced, the Site will be accessed through the existing Navan Quarry.

4.0 METHODS

4.1 Background Review

The investigation of existing conditions on the Site and in the Study Area included a background information search and literature review to gather data about the local area and provide context for the evaluation of the natural features using the following resources:

- Online Make-A-Map Natural Heritage Explorer maintained by the MNRF (MNRF 2020a)
- Species at Risk Public Registry (ECCC 2020)
- Species at Risk in Ontario (SARO) List (MNRF 2020b)
- DFO Aquatic Species at Risk Maps (DFO 2020b)
- MNRF Land Information Ontario Aquatic Resources Area Layer (MNRF 2020c)
- Breeding Bird Atlas of Ontario (OBBA) (Cadman et al. 2007)
- Atlas of the Mammals of Ontario (Dobbyn 1994)
- Ontario Reptile and Amphibian Atlas (Ontario Nature 2020)
- Bat Conservation International (BCI) range maps (BCI 2020)
- Ontario Butterfly Atlas (Jones et al. 2020)
- eBird species maps (eBird 2020)
- City of Ottawa Official Plan (Ottawa 2003)
- Information contained in natural heritage related map layers from Land Information Ontario (LIO; MNRF 2020d) and the Ontario Land Cover Compilation (MNRF 2020e)
- Aerial imagery

To develop an understanding of the drainage patterns, ecological communities and potential natural heritage features that may be affected by the proposed aggregate extraction, MNRF LIO data were used to create base layer mapping for the Study Area. A geographic query of the MNRF Make-a-Map database was conducted to identify element occurrences of any natural heritage features, including wetlands, ANSI, rare vegetation communities and rare species [i.e., S1-S3 species in the Natural Heritage Information Centre (NHIC)], threatened or endangered species and other natural heritage features within 2 km of the Site. A formal information request was also submitted to the MNRF, with a response letter received in November 2018 (Appendix A).

4.2 SAR Screening

A SAR screening was completed for the Site and Study Area, focusing on species that are designated as threatened, endangered or special concern under the ESA, and species that are protected under Schedule 1 of the SARA. Species with ranges overlapping the Site or Study Area, or recent occurrence records in the vicinity, were screened by comparing their habitat requirements to habitat conditions on the Site and in the Study Area.

The potential for the species to occur was determined through a probability of occurrence. A ranking of low indicates no suitable habitat availability for that species on the Site or in the Study Area and no specimens identified. Moderate probability indicates more potential for the species to occur, as suitable habitat appeared to be present on the Site or in the Study Area, but no occurrence of the species has been recorded. Alternatively, a

moderate probability could indicate an observation of a species, but there is no suitable habitat on the Site or in the Study Area. High potential indicates a known species record on the Site or in the Study Area (including during field surveys or background data review) and good quality habitat is present.

Searches were conducted during field surveys for suitable habitats and signs of all SAR, and species-specific surveys were completed for SAR identified through the desktop screening. The screening was refined based on the results of the field surveys including habitat assessments and/or species-specific surveys. Any habitat identified during field surveys with potential to provide suitable habitat for SAR not already identified through the desktop screening was also assessed and documented.

4.3 Field Surveys

The habitats and communities on the Site were characterized through field surveys. The habitats in the Study Area were characterized through review of aerial imagery, and through visual assessment from accessible lands (e.g., roadside, edge of the Site). Some field surveys were completed in the Study Area where land access was granted (e.g., public roadside). The following sections outline the methods used for each of the field surveys. During all surveys, visual encounter surveys (VES) were conducted through area searches for wildlife, plants, and habitats. Searches were also conducted to document the presence or absence of suitable habitat, based on habitat preferences, for those species identified in the desktop SAR screening described above. The dates when all surveys were conducted are included in Table 1. Locations of all survey stations are shown on Figure 1.

Table 1: Summary of Field Surveys Conducted on the Site in 2012 through 2019

Year	Date	Type of Survey
2012	16 April	Anuran Point Count #1, Aquatic Habitat Assessment (adjacent)
	30 May	Anuran Point Count #2, Crepuscular/Nocturnal Bird Survey, Plant Community Assessment
	13 June	Breeding Bird Survey, VES
	4 July	Breeding Bird Survey, Plant Community Assessment, VES
2013	9 June	Breeding Bird Survey, VES
	5 July	Breeding Bird Survey, Plant Community Assessment, VES
2014	9 June	Bat Habitat Survey, Deploy bat acoustic detectors
	20 June	Retrieve bat acoustic detectors
2018	28 April	Anuran Point Count #1, VES
	29 May	Anuran Point Count # 2, Eastern Whip-poor-will #1
	4 June	Breeding Bird Survey, Plant Community Assessment, VES
	6 June	Eastern Whip-poor-will #2
	23 June	Eastern Whip-poor-will #3
	4 July	Breeding Bird Survey
	14 August	Plant Community Assessment, Butternut Health Assessment
2019	4 February	Winter Deeryard Survey
	6 March	Winter Deeryard Survey
	21 June	Deploy bat acoustic detectors, Bat Habitat Survey
	11 July	Retrieve bat acoustic detectors, Plant Community Assessment

4.4 Plant Community Assessment and Botanical Surveys

4.4.1 Ecological Land Classification

Ecological land classification (ELC) mapping and data on the Site were gathered in 2012, 2013, 2018 and 2019 according to standard protocols (Lee et al. 1998). ELC mapping of the Study Area was completed through interpretation of aerial imagery, and observations made from public access points (e.g., roadside) and from the edge of the Site.

4.4.2 Botanical Inventory

A botanical inventory was completed during 2012, 2013, and 2018 with a running list compiled of all plants encountered on the Site. An effort was made to search for SAR, provincially rare plants (ranked as S1 to S3 by NHIC), as well as food plants for any SAR insects. Additional information on plant species was also collected during all field surveys.

Efforts to locate butternut trees (*Juglans cinerea*) focused on areas where disturbance is contemplated, and within 50 m of those areas, where property access is available. Butternut health assessments (BHA) were undertaken butternut trees identified on the Site by qualified Butternut Health Assessors (i.e., certified by the MNRF). The assessments were performed according to standardized MNRF protocols (MNRF June 2013) and using the methods as outlined in Butternut Health Assessment Guidelines (MNRF December 2014) and Butternut Health Assessment in Ontario (FGCA August 2010), with all relevant information entered into the standard Butternut Data Collection Forms (1 and 2). The calculations and analysis were performed using the Butternut Retainable Tree Analysis electronic table, updated by the MNRF in 2013.

4.4.3 Wetlands

No wetlands were identified on the Site during surveys, so no wetland delineation was completed.

4.5 Wildlife and Wildlife Habitat Surveys

4.5.1 Herpetile Surveys

To document use of wetlands in the Study Area, if present, by breeding amphibians, two rounds of anuran point-counts were conducted (early and mid-season) in 2012 and 2018. Surveys followed standardized Marsh Monitoring Program (MMP) protocols (BSC 1995) and included evening call-count surveys, as well as VES, in areas where access was permitted. A third (late-season) survey was not completed as no wetlands were encountered in the Study Area or vicinity that held water long enough in the season to support late-calling species.

During all field surveys, VES for herpetiles on the Site were conducted following recommended MNRF protocols (MNRF 2013; McDiarmid 2012).

4.5.2 Breeding Bird Surveys

Diurnal breeding bird point counts were completed on the Site following standard protocols (Sauer et al. 2008; Cadman et al. 2007) in 2012, 2013 and 2018. Surveys were conducted at point-count stations distributed throughout all habitats on the Site (including potential SAR habitat) and were timed to encompass the period of maximum bird song (i.e., 30 minutes before dawn and 10:00 am). Given that the habitats at the Site did not change since those surveys were completed, no repeat of the breeding bird surveys were completed in 2019 or 2020. However, during all surveys that overlapped the breeding bird season (late May to early July), any birds heard or seen were noted.

During all field surveys, VES for bird species not well covered by point count surveys, such as raptors, were completed, and all bird observations were documented.

4.5.2.1 Eastern Whip-poor-will

Surveys for this species were conducted over three nights from late May to late June 2018, following MNRF protocols (MNRF 2014a). These surveys took place 30 minutes after sunset within 10 days on either side of the full moon, on relatively clear nights with little wind.

Surveys for crepuscular species [e.g., common nighthawk (*Chordeiles minor)* and short-eared owl (*Asio flammeus*)] were also conducted on the same days, but earlier in the evening (around dusk).

4.5.3 Mammal Surveys

4.5.3.1 Bat Surveys

Bat surveys were conducted on the Site between late May and early July 2014 and 2019. These surveys included a daytime habitat assessment (e.g., searching for suitable roosting habitat, such as trees with cavities, loose bark or clumps of dead leaves) and acoustic bat surveys.

Two acoustic bat detectors (Wildlife Acoustics) in 2014, and three detectors in 2019, were deployed on the Site (Figure 1). Each station was located to provide coverage and target areas where bats would most likely be roosting, commuting or feeding. The U1 microphones were programmed to record from 30 minutes before sunset to 30 minutes after sunrise, for a period of at least 10 days. Specially designed software was employed to attribute file names and scrub the data set of noise files. The high-grade noise scrubber setting was used. The data were analyzed and auto-classified using SonoBat. The Sonobat program is specifically intended for discrimination of bats to the species level wherever possible, and validation of the species-level classification was conducted by Golder's bat acoustic specialist. The results of the species classification were tallied on a per-night basis for each station for each species or species group. Once automated classification was complete, all high frequency files and a percentage of low frequency files were reviewed (QA/QC'd) by an experienced and qualified bat acoustic specialist using the SonoVet tool.

4.5.3.2 Winter Deeryard Surveys

Winter deeryard surveys were performed in two different locations when snow depths in open areas at the Site were 40 cm or greater, as agreed upon with MNRF (Pers.Comm. Dom Ferland, MNRF management biologist, 2017), and involved a biologist performing a wandering transect through treed areas of the Site. The surveys were timed to occur as soon as possible after a snowfall to allow for easy identification of tracks, and to quantify use by deer since the last snowfall. Any evidence of use by deer (e.g., tracks, trails, scat, bed or browse) was recorded, and an estimate of number of individuals was made, where possible.

4.5.4 Visual Encounter Surveys

General wildlife surveys included track and sign surveys, area searches, and incidental observations, concurrent with other field surveys. These surveys followed recommended protocols (MNRF 2013; McDiarmid 2012; Bookhout 1994). During these surveys, the full range of habitats across the Site and in accessible parts of the Study Area were searched, with special attention paid to edge habitats and other areas where mammals might be active. Areas of exposed substrate such as sand or mud were located and examined for any visible tracks. Any wildlife (including mammals, reptiles, amphibians, birds, butterflies, and dragonflies) seen and identified were recorded. When encountered, tracks and other signs (e.g., scats, hair, tree scrapes, etc.) were identified to species, if possible, and recorded.

4.5.5 Aquatic Habitat

Based on Golder's field surveys and through a review of published natural features mapping, no potential fish habitat was identified on the Site. The Dutrisac Municipal Drain, including two small unnamed tributaries of it, is located adjacent to the east side of the Site in the Study Area, and was visited and visually assessed in 2012. There is sufficient background information on the drain and the unnamed tributaries to confirm that they are fish habitat. As such, no aquatic surveys, including assessments for fish and fish habitat, were deemed necessary. One additional watercourse, the Frank McNeely Municipal Drain, is mapped in the far southwest portion of the Study Area. No background information is available for this feature, so this report has taken a conservative approach by assuming that it is fish habitat.

4.6 Analysis of Significance and Sensitivity and Impact Assessment

An assessment was conducted to determine the significance and sensitivity of natural features as well as significant species observed or determined to have the potential to exist on the Site or in the Study Area. The assessment was completed by comparing natural environment data collected through background material and the field surveys to published resources as described in Section 4.1, and through a detailed analysis using the methods and criteria outlined in the Natural Heritage Reference Manual (NHRM) (MNRF 2010), Significant Wildlife Habitat Technical Guide (SWHTG) (MNRF 2000) and the Significant Wildlife Habitat Ecoregion Criterion Schedules (SWHECS) (MNRF 2015).

An assessment was then conducted to determine whether the proposed extension would negatively impact surrounding significant natural features or SAR. Preventative, mitigative and remedial measures were considered in assessing the net effects of the proposed extension on the surrounding ecosystem.

5.0 EXISTING CONDITIONS

5.1 Ecosystem Setting and Regional Context

The Study Area is located in Ecoregion 6E (Lake Simcoe - Rideau), which covers approximately 6.4% of Ontario, extending from Lake Huron east to the Rideau River (Crins et al. 2009). Ecoregion 6E is dominated by the Great Lakes – St. Lawrence Forest Region, which is underlain primarily by dolomite and limestone bedrock, except along the Frontenac Arch between Algonquin Park and the Adirondack Mountains where granites and gneisses are mixed with limestones and sandstones (Crins et al. 2009). The majority of this ecoregion exists as cropland (44.4%) and pasture or abandoned fields (12.8%), while water covers 4% of the ecoregion (Crins et al. 2009).

The Study Area is located in the Ottawa Valley Clay Plains physiographic region of Ontario (Chapman and Putnam 1984). This region consists of a large clay plain interrupted by ridges of rock or sand. The sediments here consist of deep silty clays, underlain by limestone.

The Study Area lies within the South Nation River watershed. From headwaters north of Brockville, the South Nation River flows northeast for 175 km and drains into the Ottawa River near Plantagenet. The watershed is approximately 3,900 km^2. The Study Area lies within the Bearbrook Creek subwatershed. The Site is located in the Ottawa East Bearbrook planning area that has been identified by the City for the purposes of determining significance of woodlands. Forest cover in the Ottawa East Bearbrook planning area is 29.9%.

5.2 Geology and Hydrogeology

The majority of the Site and the quarry portion of the existing Navan Quarry are underlain at shallow depth by Paleozoic bedrock (Golder 2021). The upped bedrock unit beneath the existing Navan Quarry and the Site is mapped as the Lindsay Formation (Golder 2021). The Lindsay Formation is divided into an upper member and a lower member. The upper member is referred to as the Eastview Member. The lower member referred to as the Sherman Fall Member is described as having high resistance to erosion.

Extensive deposits of coarse and permeable overburden, capable of supplying sufficient quantities of groundwater for domestic/industrial use, are not prevalent to the east, south and west of the Site (Golder 2021). To the north of the Site, where there are deposits of sand and gravel at surface, and where the clay is underlain by coarse glacial till/sand and gravel material, some wells are completed in the overburden (Golder 2021). These wells obtain water from either the coarse-grained material overlying the bedrock (i.e., sand and gravel or coarse glacial till) or from the upper weathered portion of the bedrock (Golder 2021). In areas of thin/fine grained overburden (i.e., to the south and west of the Site) water was found at various depths within the underlying limestone formations (Golder 2021).

Golder (2021) identified the expected 1 m incremental groundwater drawdown zone in the deep aquifer shown on Figure 1. The same groundwater model was used to predict the expected 1 m groundwater table drawdown that may result from the proposed extension for use in this study (presented on Figure 1).

5.3 Surface Water Resources

There are no surface water features on the Site. Surface water features in the Study Area are limited to the Dutrisac Municipal Drain north and east of the Site, two small unnamed tributaries of the municipal drain to the northeast and east, and the Frank McNeely Municipal Drain in the southwest corner of the Study Area (Figure 1).

5.4 Aquatic Habitat and Fish

As there are no surface water features or wetlands on the Site, no fish habitat was identified. The Dutrisac Municipal Drain, located off-Site within the Study Area, is a Class C municipal drain and is considered low sensitivity warmwater fish habitat (MNRF 2018). Fish species collected in the municipal drain include: Blacknose Shiner (*Notropis heterolepis*), Brook Stickleback (*Culaea inconstans*), Brown Bullhead (*Ameiurus nebulosus*), Common Shiner (*Luxilus cornutus*), Creek Chub (*Semotilus atromaculatus*), Fallfish (*Semotilus corporalis*), Johnny Darter/Tesselated Darter (*Etheostoma nigrum / E. olmstedi*), and White Sucker (*Catostomus commersonii*) (MNRF 2018). The status of the two small tributaries of the drain as fish habitat are unknown, but given their direct connection to the municipal drain, they are assumed to be fish habitat. No information is available for the Frank McNeely Municipal Drain at the southern edge of the Study Area, so this report has taken a conservative approach by assuming that it is fish habitat.

5.5 Plant Communities

5.5.1 Ecological Land Classification

Overall, the Site consists of mixed and deciduous forest, a row crop agricultural field, and a small meadow/thicket complex. The Study Area includes the Site, plus additional forest, meadow, thicket, hedgerows, municipal drain, active aggregate extraction (existing Navan Quarry), agricultural fields, a municipal works yard, rural business and residential uses.

During the field surveys conducted on the Site, four upland plant communities were identified based on the ELC system (Lee et al. 1998), as well as one agricultural plant community (row crop). No provincially rare (S1-S3) plant communities were identified. The plant communities are described in Table 2 and shown on Figure 1.

Table 2: Upland Plant Communities on the Site

Plant Community	Description	SRANK[a]
TERRESTRIAL		
CUT1/CUM1 Mixed Thicket/ Mixed Meadow Complex	This community includes a small, dry, open area at the northern edge of the Site. It is an area of relatively shallow soil, where bedrock is exposed in some locations. There is a mix of meadow plants interspersed with shrubs and small trees. Dominant plants include a mix of primarily non-native grasses and forbs such as Timothy (*Phleum pretense*), orchard grass, wild carrot (*Daucus carota*), and ox-eye daisy (*Leucanthemum vulgare*), as well as shrubs and small trees such as common buckthorn (*Rhamnus cathartica*), and white elm (*Ulmus americana*).	N/A
FOD 5-5 Dry to Fresh Sugar Maple-Hickory Deciduous Forest Type	This community is a small patch of immature forest, within the larger FOM4 discussed below. The canopy is primarily closed and is dominated by sugar maple (*Acer saccharum*), with associates such as bitternut hickory (*Carya cordiformis*). The understory and ground cover is sparse with shrubs and forbs such as alternate-leaved dogwood (*Cornus alternifolia*), and Canada mayflower (*Maianthemum canadense*), as well as seedling trees. The soils are silty loam with rock and boulders, downed woody debris is occasional, and snags and cavity trees are rare.	N/A
FOD 7-2 Fresh to Moist Green Ash Deciduous Forest	This community is a band of immature forest, at the base of the slope at the eastern edge of the Site. The canopy is partially open and is dominated by green ash (*Fraxinus pennsylvanica*), with associates such as basswood (*Tilia americana*). The understory and ground cover are moderate with a shrubs and forbs such as common elderberry (*Sambucus canadensis*), and wood ferns (*Dryopteris* spp.); moss is also abundant in some areas. The soils are silty clay, downed woody debris is occasional, and snags and cavity trees are rare.	N/A
FOM4 Dry to Fresh White Cedar-Mixed Forest	This community is an immature forest that covers much of the Site. The canopy ranges from open to partially closed. Tree species dominance varies throughout, but common species include eastern white cedar (*Thuja occidentalis*), balsam fir (*Abies balsamea*), white ash (*Fraxinus americana*), and sugar maple. Although the forest is primarily immature, there is the occasional large mature white spruce (*Picea glauca*) in a few locations. The understory ranges from sparse to moderate, with shrubs and forbs such as round-leaved dogwood (*Cornus rugosa*), poison ivy (*Rhus radicans*), wild ginger (*Asarum canadense)*. Soils are silty loams, and rocky in some locations. Downed woody debris and snags are occasional, cavity trees are rare.	N/A
ANTHROPOGENIC		
AGRC-Row Crop	This community is a row crop field that has undergone crop rotation of corn and soya. In patches along the field edges, and scattered throughout are grasses and forbs typical of agricultural lands such as yellow foxtail (*Setaria pumila),* and annual bluegrass (*Poa annua*).	N/A

Notes: [a] SRANK is a provincial –level rank indicating the conservation status of a species or plant community and is assigned by the NHIC in Ontario (NHIC 2015). SRANKs are not legal designations but are used to prioritize protection efforts in the Province. SRANKs for plant communities in Ontario are defined in the Significant Wildlife Habitat Technical Guide (MNRF 2000). Ranks 1-3 are considered extremely rare to uncommon in Ontario; Ranks 4 and 5 are considered to be common and widespread. N/A indicates a community that has not been ranked.

5.5.2 Vascular Plants

A total of 128 vascular plant taxa were observed on the Site during the field surveys. For a list of plants identified within the Site refer to Appendix C. One butternut tree (endangered under the ESA) was observed on the Site, and seven were observed in the Study Area, immediately west of the Site (Figure 2). These trees are discussed further in Section 6.1. No other SAR, provincially rare, or regionally significant plant species were observed.

5.6 Wildlife

A list of all wildlife or wildlife signs encountered on the Site during field surveys is provided in Appendix D.

5.6.1 Herpetiles

A total of five herpetile species were observed in the Study Area. No breeding frog habitat was identified on the Site and no evidence of amphibian breeding in the Study Area was observed during targeted surveys. Observations of herpetiles on the Site were restricted to individuals. No SAR, provincially rare, or regionally significant herptile species were observed.

5.6.2 Birds

A total of 51 bird species were observed in the Study Area. This included a mix of edge, meadow and forest species such as song sparrow (*Melospiza melodia*) and red-eyed vireo (*Vireo olivaceus*). Three avian SAR were observed at the Site: wood thrush (*Hylocichla mustelina*), eastern wood pewee (*Contopus virens*) and barn swallow (*Hirundo rustica*). A single male wood thrush and a single male eastern wood pewee were observed on territory within the forest on the Site. A few individual barn swallows were observed feeding over the agricultural fields; however, there are no potential nesting habitats (i.e., structures) for this species on the Site. For more information on the avian SAR observed at the Site, refer to Section 6.1. No eastern whip-poor-will were observed during the targeted surveys for this species.

5.6.3 Mammals

A total of fourteen mammal species were observed on the Site including species that are common in the region such as white-tailed deer (*Odocoileus virginianus*) and eastern chipmunk (*Tamias striatus*). With the exception of little brown myotis (*Myotis lucifugus*) discussed below, no SAR or provincially rare mammals were identified in the Study Area.

5.6.3.1 Bats

In 2014, five species of bat were recorded at the three stations on the Site including big brown bat (*Eptesicus fuscus*), hoary bat (*Lasiurus cinereus*) and silver-haired bat (*Lasionycteris noctivagans*), followed by very few recordings of eastern red bat (*Lasiurus borealis*) and little brown myotis (*Myotis lucifugus*). Of the 6106 recorded calls at the three stations, there were twelve SAR calls recorded (all little brown myotis) and 117 high-frequency calls, which could represent a SAR bat (*Myotis* or *Perimyotis*) or an eastern red bat. These confirmed or potential SAR bat calls represent only 2% of the total recorded calls.

In 2019, species of bat recorded at the two stations on the Site included big brown bat, hoary and silver-haired bat. No confirmed SAR calls were recorded at the Site, and of the 241 recorded calls, only one high-frequency call was recorded, which could represent a SAR bat (*Myotis* or *Perimyotis*) or an eastern red bat (0.4% of total recorded calls).

Based on these results, there is no evidence from the 2014 or 2019 data that would indicate there is a SAR bat maternity roost on the Site.

5.6.3.2 Winter Deeryards

During winter deeryard surveys, very minimal use of the Site by deer was observed, and included a single track observed during the first survey, and no deer tracks during the second survey. No well-used trails, evidence of browsing, beds, scat or urine were observed. At the time of the surveys, snow depths in the open areas were measured at 40 – 70 cm, and snow within the treed areas was 20 – 45 cm. The tree cover within the forest is relatively open and does not appear to be ideal for winter deeryarding. The results of the winter deeryard surveys do not suggest that the Site is a winter deeryard.

5.6.4 Bumblebees, Dragonflies, and Butterflies

A total of 16 insect species were observed during the field surveys, including primarily common species such as black swallowtail (*Papilio polyxenes*) and white-faced meadowhawk (*Sympetrum obtrusum*). The majority of individuals observed were associated with the meadows and field edges, and no unusual concentrations were noted. No SAR, provincially rare, or regionally significant insect species were observed.

6.0 SIGNIFICANT NATURAL FEATURES AND IMPACT ASSESSMENT

This section assesses the significance of natural features and functions (as outlined in Section 2.0) observed on the Site or in the Study Area. The following sources were used during the assessment of features:

- Natural Heritage Reference Manual (NHRM; MNRF 2010)
- Significant Wildlife Habitat Technical Guide (SWHTG; MNRF 2000)
- Significant Wildlife Habitat Mitigation Support Tool (SWHMiST; MNRF 2014b)
- Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E (SWHECS; MNRF 2015)

6.1 Habitat of Endangered or Threatened Species

Based on the background review and field surveys, three threatened or endangered species and/or their defined habitat were observed on the Site and/or in the Study Area (Appendix B). This includes barn swallow, little brown myotis, and butternut.

Barn Swallow

Barn swallow is designated as threatened under the ESA. This species primarily nests on anthropogenic structures, such as buildings and bridges. This species was observed foraging over the Site during field surveys, however; no structures suitable for providing nesting habitat are present at the Site. Extraction of the Site will result in the loss of field habitat that may produce / attract forage insects for this species, however; the species can continue to fly and forage over the Site during extraction. The Study Area and surrounding landscape provides additional ample foraging habitat for this species. No permit under the ESA related to this species is required and no further analysis is warranted.

Little Brown Myotis

Little brown myotis is designated as endangered under the ESA. This species was recorded on the Site during acoustic surveys and has a high potential to be present in the Study Area. In natural habitats, little brown myotis shows preference for roosting in hollow trees and under peeling bark (ECCC 2015). This species uses caves or abandoned mines for hibernaculum, with high humidity and stable above freezing temperatures required (ECCC 2015).

During the acoustic surveys, this species was recorded at very low numbers in both 2014 and 2019 (only once in 2019), which indicates that there are no SAR bat maternity roosts on the Site. No potential hibernaculum is present on the Site or in the Study Area.

Based on this analysis, Golder's opinion is that no permit under the ESA is required for this species and no further analysis is warranted.

Butternut

Butternut is designated as endangered under the ESA. One butternut tree was observed on the Site , and seven were observed in the Study Area, immediately west of the Site (within 50 m of the Site) (Figure 2). Based on the BHA performed on the trees, 6 are considered Category 1 (non-retainable), including the tree on the Site, one is considered Category 2 (retainable) and one is Category 3 (archivable).

The BHA was submitted to the MNRF on February 20, 2019 and no audit was requested, therefore, harm to or clearing and removal of the Category 1 trees, including the tree on-Site, can take place at any time provided no intrusion into the area within 50 m of the Category 2 or Category 3 trees occurs as a result. According to O.Reg. 242/08, the trees on the existing Navan Quarry (off-Site in the Study Area) can be removed following registration of the activity with the MECP. Appropriate mitigation and monitoring for removal of those trees are listed under O.Reg. 242/08 and will be undertaken as part of the existing licence. Therefore, no registration or permitting under the ESA for this species will be required for the proposed extension and no further analysis is warranted.

Any habitat for endangered or threatened species that may be present off-Site but within the Study Area is unlikely to be affected by the proposed Navan Quarry extension, as no potential habitats for these species are within the the predicted 1 m water table drawdown area (Figure 2), so impacts to vegetation or natural habitats from a lowered water table are not expected.

6.2 Significant Wetlands

Significant wetlands are areas identified as provincially significant by the MNRF using evaluation procedures established by the province, as amended from time to time (MMAH 2020). Wetlands are assessed based on a range of criteria, including biology, hydrology, societal value and special features as identified in the Ontario Wetland Evaluation System (OWES; MNRF 2014c).

There are no wetlands on the Site and there are no mapped wetlands in the Study Area, and Golder did not observe any wetlands in the Study Area during surveys. No further analysis is warranted.

6.3 Fish Habitat

No fish habitat was identified on the Site. Immediately east of the Site, within the Study Area, the Dutrisac Municipal Drain is confirmed fish habitat. Two small unnamed tributaries of the drain to the northeast and east are likely fish habitat, due to their direct connection to the municipal drain. The Frank McNeely Municipal Drain in the southwest corner of the Study Area (Figure 1) may provide fish habitat, but its status as such has not been confirmed. For the purposes of this report, this feature has been assumed to be fish habitat.

Under existing conditions, the surface runoff from the Site flows in three directions (Golder 2021). A portion flows east, contributing to the Dutrisac Municipal Drain and a portion flows west into the existing Navan Quarry. Approximately one third flows south towards Colonial Road, where the drainage from the road ultimately contributes to the Frank McNeely Municipal Drain in the southwest corner of the Study Area.

No physical intrusion into any of the fish habitat in the Study Area will result from the proposed extension, and all watercourses are separated from the Site by over 100 m. During extraction and rehabilitation, both groundwater pumped from the excavation and surface water will be directed from the Site to the existing Navan Quarry, and discharged to the Dutrisac Municipal Drain via the existing outlet at the existing Navan Quarry. Overall, the average annual flow in the drain will only increase by approximately 20% during operational conditions and 11% during rehabilitated conditions as a result of the proposed extension (Golder 2021). No water quality changes in this drain are expected to result, since the water being discharged from the extension will have water quality treatment through settling of suspended solids (Golder 2021). As part of the settling process, the discharged water is expected to warm to a temperature similar to that in the Dutrisac Municipal Drain. Discharge from the extension lands will be subject to an amended Environmental Compliance Approval (ECA) for the existing Navan Quarry, and no new discharge outlet to the Dutrisac Municipal Drain will be constructed. As a result, no impacts to the fish habitat in the drain are anticipated.

The two small tributaries of the Dutrisac Municipal Drain do not rely on flows from the Site, they are not within the 1m water table drawdown zone, and therefore no impacts to those features are expected from the proposed extension. The portion of the Site that drains to the Frank McNeely Municipal Drain is minimal compared to the overall catchment area to that drain, therefore no quantifiable water quantity changes in this drain are anticipated to result from the proposed extension (Golder 2021). There will be no water quality impacts to Frank McNeely Municipal Drain as no water from the extracted area will be directed to it (Golder 2021).

According to Section 4.7.3 of the City of Ottawa official plan, developments located adjacent to surface water features are subject to setback requirements as laid out in the applicable watershed, subwatershed or environmental management plans. In the absence of such plans, minimum setbacks are prescribed in the official plan, which are the greater of:

- Development limits as established by the regulatory flood line
- Development limits as established by the geotechnical limit of the hazard lands
- 30 m from the normal high-water mark of rivers, lakes and streams, as determined in consultation with the conservation authority, or,
- 15 m from the existing top of bank, where there is a defined bank

The proposed extraction will respect a 115 to 180 m setback to the Dutrisac Municipal Drain, which exceed the City policy listed above. Setbacks to the other surface water features in the Study Area also exceed the distances in the City policy listed above.

Based on Golder (2021), no impacts to the fish habitat in the Study Area is anticipated, provided appropriate measures to protect water quality are implemented (refer to Section 7.2).

6.4 Significant Woodlands

Significant woodlands are to be defined and designated by the local planning authority (MNRF 2010). According to the PPS, significant woodlands are to be identified using criteria established by the MNRF in the NHRM for Policy 2.3 of the PPS (MNRF 2010).

The City of Ottawa official plan policies as they relate to determining woodland significance in the Rural Area are in conformity with the direction given in the PPS. The City criteria indicate that woodlands within the Rural Area are significant if they exhibit any one of the NHRM criteria and meet a minimum size threshold for each of those criteria (City of Ottawa, March 2019). The criteria and associated thresholds are provided in Table 3.

Table 3: City of Ottawa Significant Woodland Evaluation Criteria and Size Thresholds (Rural)

Woodland Cover in Planning Area (%):		5% or less	5%-15%	15%-30%	30%-60%	> 60%
Category	**Criteria**			**Minimum Size to be Considered for this Criteria**		
Size	Minimum Size	2 ha	4 ha	20 ha	50 ha	N/A
Ecological Functions	Woodland Interior	Any	Any	2 ha	8 ha	20 ha
	Proximity	0.8 ha	2 ha	5 ha	10 ha	20 ha
	Linkages	0.8 ha	2 ha	5 ha	10 ha	20 ha
	Water Protection	0.8 ha	2 ha	5 ha	10 ha	20 ha
	Woodland Diversity	0.8 ha	2 ha	5 ha	10 ha	20 ha
Uncommon Characteristics	Unique Species Composition	0.8 ha	0.8 ha	0.8 ha	0.8 ha	0.8 ha
	Provincially Significant Vegetation Community	0.8 ha	0.8 ha	0.8 ha	0.8 ha	0.8 ha
	Rare, Uncommon or Restricted Plant Species	0.8 ha	0.8 ha	0.8 ha	0.8 ha	0.8 ha
	Older Woodlands	0.8 ha	1 ha	2.5 ha	5 ha	10 ha
Economic and Social Values	Economic and Social Values	0.8 ha	2 ha	5 ha	10 ha	20 ha

For those criteria listed under Ecological Functions, the specified distance for Proximity and Water Protection is 30 m. For linkages, there are no minimum distances as any woodland meeting the minimum size threshold shall be considered significant if it falls within a core natural area or natural landscape linkage area shown in Appendix E of the guidelines (March 2019) or has been identified as a natural linkage in another Council-approved planning study.

Based on the definition of a break in canopy cover (i.e., 20 m per the NHRM), there are three distinct woodlands on the Site and in the Study Area (Woodlands 1, 2 and 3; Figure 2). Forest cover in the Ottawa East Bearbrook planning area is 29.9% (see green highlighted column in Table 4). As part of the approved licence and extraction plan of the existing Navan Quarry, all of the woodland along the north edge of the existing extraction footprint will be removed. As such, this woodland has not been considered in this report.

Woodland 1 is located on-Site and extends off-Site to the north and east along the Dutrisac Municipal Drain, and off-Site to the west where it runs along the south edge of the existing Navan Quarry. The size of this woodland is 32.2 ha, with 15.9 ha (49%) on the Site and the remainder (16.3 ha or 51%) off-Site. Table 5 compares the characteristics of Woodland 1 with the criterion for significance listed in Table 4.

Table 4: Comparison of Woodland 1 to Significance Criteria

Category	Criteria	Meets the Minimum Size for the Criterion?	Meets the Criterion?	Notes
Size	Minimum Size	Y	Y	32.2 ha
Ecological Function	Woodland Interior	Y	N	0.0 ha of woodland interior
	Proximity	Y	Y	Within 30 m of Woodland 2 and the Dutrisac Municipal Drain
	Linkages	Y	N	Woodland 1 is not located within a core natural area or natural landscape linkage area shown in Appendix E of the guidelines (March 2019) and has not been identified as a natural linkage in another Council-approved planning study.
	Water Protection	Y	Y	Within 30 m of the Dutrisac Municipal Drain
	Woodland Diversity	Y	N	-
Uncommon Characteristics	Unique Species Composition	Y	N	-
	Provincially Significant Vegetation Community	Y	N	-
	Rare, Uncommon or Restricted Plant Species	Y	N	-
	Older Woodlands	Y	N	-
Economic and Social Values	Economic and Social Values	Y	N	-

Based on this analysis, Woodland 1 meets the criteria for significance. The proposed extension will result in the removal of 9.7 ha of Woodland 1 (30%), with 6.2 ha remaining on-Site within the proposed setbacks (Figure 3). As a result of extraction, Woodland 1 will be split into two woodlands; one overlapping the Site and extending off-Site to the north and east, and the other overlapping the Site and extending off-Site to the west (Figure 3). The portion that extends to the north and east will continue to meet at least one of the criterion listed in Table 4, and will therefore continue to be significant. The portion that extends to the west will no longer meet any criterion for significance. Mitigation to address the impacts to Woodland 1 are discussed in Section 7.0.

Woodland 2 is approximately 19.1 ha in size, and is located to the northwest of the Site, separated from Woodland 1 by a gap of at least 20 m associated with the Dutrisac Municipal Drain. This gap area undergoes regular vegetation clearing along the banks of the drain as part of standard drain maintenance. According to the NHRM (MNRF 2010), woodlands are not considered contiguous if they are bisected by an opening of 20 m or more, measured between crown edges. Because the gap is generally wider than 20 m, for the purposes of this assessment, it is not considered contiguous with Woodland 1. This woodland meets the minimum size threshold for all the significance criteria listed in Table 4 (except the minimum size threshold for the Size criteria) and has features or functions that meet several of the criteria (e.g., proximity to watercourses, interior habitat). Therefore, it is considered significant.

Woodland 3 is 42.1 ha in size and is located in the southwest of the Study Area. This woodland meets all the minimum size thresholds listed in Table 4 and has features or functions that meet several of the criteria (e.g., proximity to watercourses, interior habitat). Therefore, it is considered significant.

Woodlands 2 and 3 are not expected to be impacted by noise, lighting or dust from the proposed extension because the woodlands are currently separated from the Site by existing disturbance (e.g., maintenance along Dutrisac Municipal Drain) and agriculture. Further, the existing Navan Quarry extraction operations already produce these types of disturbance. The additional disturbance related to the proposed extension is expected to be minimal. None of these woodlands lie within the predicted 1 m water table drawdown area (Figure 2), so impacts to vegetation from a lowered water table are not expected. Implementation of standard mitigation measures as outlined in Section 7.0 will further protect these woodlands.

Based on this analysis, all woodlands on the Site and in the Study Area are considered significant. The majority of the on-Site portions of Woodland 1 will be removed, resulting in the remaining portions of Woodland 1 being split into two woodlands; one on-Site and extending to the north and east will still be considered significant after extraction, and one on-Site and extending west will no longer meet the criteria for significance. Off-Site woodlands in the Study Area will not be impacted by the proposed extraction. Mitigation for the loss of a portion of Woodland 1 is discussed in Section 7.2.

6.5 Significant Valleylands

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

There are no significant valleylands on the Site or in the Study Area. Further analysis is not warranted.

6.6 Significant Areas of Natural or Scientific Interest (ANSIs)

Significant ANSIs are areas identified as provincially significant by the MNRF using evaluation procedures established by the Province, as amended from time to time. The Site is located approximately 1.8 km west of the Sarsfield – Bearbrook Esker provincially significant earth science ANSI, which is a highly permeable sand and gravel deposit running in a north-south orientation under the village of Sarsfield.

As this feature is outside the Study Area, further analysis is not warranted.

6.7 Significant Wildlife Habitat

Significant wildlife habitat (SWH) is one of the more complicated natural heritage features to identify and evaluate. The NHRM includes criteria and guidelines for designating SWH. There are two other documents, the Significant Wildlife Habitat Technical Guide (SWHTG) and the Significant Wildlife Habitat Mitigation Support Tool (SWHMiST) (MNR 2000 and MNRF 2014b), that can be used to help decide what areas and features should be considered significant wildlife habitat. These documents were used as reference material for this study.

There are four general types of significant wildlife habitat: seasonal concentration areas, rare vegetation communities or specialized habitats for wildlife, species of conservation concern, and animal movement corridors. The specific habitats considered in this report are evaluated based on the criteria outlined in the SWHECS for ecoregion 6E (MNRF 2015). All types of SWH are discussed below in relation to the Site and the Study Area.

6.7.1 Seasonal Concentration Areas

Seasonal concentration areas are those areas where large numbers of a species congregate at one particular time of the year. If a SAR, or if a large proportion of the population may be lost if significant portions of the habitat are altered, all examples of certain seasonal concentration areas may be designated.

The SWHTG for ecoregion 6E identifies the following types of seasonal concentrations of animals that may be considered significant wildlife habitat, and outlines means of identifying such habitat. They are:

- Waterfowl stopover and staging areas (aquatic and/or terrestrial)
- Shorebird migratory stopover areas
- Raptor wintering areas
- Bat hibernacula
- Bat maternity roost colonies
- Turtle wintering areas
- Snake hibernaculum
- Colonially nesting bird breeding habitat (bank and cliff)
- Colonially nesting bird breeding habitat (tree / shrub)
- Colonially nesting bird breeding habitat (ground)
- Migratory butterfly stopover areas
- Landbird migratory stopover areas
- Deer yarding and winter congregation areas

No areas suitable for supporting waterfowl during migration times (stopover and staging) were identified during field surveys. No terrestrial stopover or staging habitat was observed on the Site or in the Study Area.

Shorebird stopover sites are typically well-known and have a long history of use. There are no areas of suitable shorebird foraging habitat on the Site or in the Study Area. In addition, no concentrations of shorebirds or presence of the listed species was identified during the field surveys.

Ideal raptor wintering areas are generally located in mature mixed or coniferous woodlands that abut windswept fallow fields or pastures that do not get covered by deep snow, with a combined habitat size of >20 ha. There are no suitable habitats on the Site or in the Study Area for raptor winter feeding and roosting.

No suitable areas of bat hibernacula were observed on the Site, and the Site and Study Area are not mapped as confirmed or inferred karst topography (OMNDM 2016). Based on the field surveys, no portions of the Site provide the necessary number (>10/ha) of large (>25 cm DBH) wildlife trees to be considered significant maternity roost habitat; however, this habitat type may be present within the forests within the Study Area (off-Site). Potential impacts and mitigation of the proposed extension to potential off-Site bat maternity roost habitat are discussed under the blanket of Significant Woodlands (Sections 6.4 and 7.2).

No potential turtle over-wintering habitat was observed on the Site or in the Study Area, as no standing water of suitable depth was present.

Snake hibernacula and evidence of snake congregations were searched for during field surveys on the Site. No evidence of snake congregation were observed during field surveys. There are no structures on the Site deemed suitable for potential hibernacula. Suitable habitat of this type may be present in the Study Area, however; no impacts to these features, if present, are anticipated.

There are no banks or cliffs suitable for colonial bird nesting habitat on the Site or in the Study Area. Licenced quarries are not to be considered in determination of SWH of this type, and the scarp feature did not exhibit suitable cliff habitat or any evidence of colonial bird nesting.

Colonially nesting tree / shrub breeding habitats consist of heronries, while colonially nesting ground bird breeding habitat consist of rocky islands and peninsulas where species such as gulls and terns nest. No such habitats are present on the Site or in the Study Area, and no heronries were identified during the field surveys.

The Site and Study Area are not located within 5 km of Lake Ontario, and therefore do not meet the criteria for significant migratory butterfly stopover habitat.

The Site and Study Area are not located within 5 km of Lake Ontario, and therefore do not meet the criteria for significant migratory butterfly stopover habitat.

Deer management is an MNRF responsibility. The MNRF has indicated that deeryards are known in the local landscape that includes the Study Area (MNRF 2018). According to the MNRF (1997b), the key features of a deer wintering area are traditional use, cover and browse. Deer show affinity to the deer wintering areas within their ranges, and do not readily change their migration habits. The best winter cover for deer is provided by hemlock (*Tsuga canadensis*) and cedar (*Thuja occidentalis*), however; spruce (*Picea* spp.), pine (*Pinus* spp.) and balsam fir (*Abies balsamea*) also provide suitable cover. Areas with lower concentrations of conifers intermixed with browse species are used for feeding areas, while more dense areas of conifer are used for movement between feeding areas, sleeping, and protection during winter storms. Deer require diverse browse opportunities (generally three or more suitable species), including cedar, hemlock, viburnums, red maple (*Acer rubrum*), striped maple (*Acer pennsylvanicum*), mountain maple (*Acer spicatum*), red oak (*Quercus rubra*), sugar maple (Acer saccharinum), dogwood (*Cornus* spp.), beaked hazel (*Corylus cornuta*), yellow and white birch (*Betula* spp.), cherry (*Prunus* spp.), ground yew (*Taxus canadensis*), white pine (*Pinus strobus*), and arboreal lichens. To be accessible to deer, browse should be within 30 m of suitable cover in deeryards where snow depths exceed 50 cm, or as far as 100 m or more in southern deeryards with less snow or on south-facing slopes. (MNRF 1997b). No evidence of concentrated use by deer were observed on the Site during targeted surveys. It is Golder's opinion that this area does not provide over-wintering habitat for deer, and no further analysis is warranted.

Further analysis of seasonal concentration areas is not warranted.

6.7.2 Rare Vegetation Communities or Specialized Habitats for Wildlife

Rare Vegetation Communities

Rare vegetation communities are those that are considered rare in the province, such as sand barrens, alvars, savannah and tallgrass prairie. It is assumed that these habitats are at risk and that they are also likely to support additional wildlife species that are considered significant. Generally, communities assigned an SRANK of S1 to S3 (extremely rare to rare-uncommon) by the NHIC qualify as rare. None of the plant communities identified on the Site or in the Study Area are ranked S1 to S3 by the NHIC.

In addition to those communities considered rare by the NHIC, old-growth forests are considered rare. No old growth forests were identified on the Site or in the Study Area.

Further analysis of rare vegetation communities is not warranted.

Specialized Habitats for Wildlife

Specialized habitats for wildlife are microhabitats that provide a critical resource to some groups of wildlife. The SWHTG for ecoregion 6E defines specialized habitats that may be considered significant wildlife habitat, and outlines means of identifying such habitats. They are:

- Waterfowl nesting areas
- Bald eagle and osprey nesting, foraging and perching habitat
- Woodland raptor nesting habitat
- Turtle nesting areas
- Seeps and springs
- Amphibian breeding habitat (woodland)
- Amphibian breeding habitat (wetland)
- Woodland area sensitive bird breeding habitat

Waterfowl nesting areas consist of upland habitats extending 120 m from swamp and marsh habitats where waterfowl nesting is known to occur. To qualify as SWH, the wetlands must meet size criteria and contain certain numbers of listed species of waterfowl. No such habitats are present on the Site or in the Study Area.

Bald eagle and osprey nesting, foraging and perching habitat may be identified where an active nest is present, and includes the surrounding habitats. No active nests of either species were identified on the Site or in the Study Area.

Woodland raptor nesting habitat was not identified as no raptor nests were observed during field surveys. Further, to meet the SWHECS criteria for this habitat type, there must be > 10 ha of interior forest habitat (measured 200 m from any edge) present. This habitat is not present on the Site or in the Study Area.

The SWHECS indicates that exposed mineral soils in open sunny areas must be present to support turtle nesting. Although there are exposed soils on portions of the Site, these areas are separated from the Dutrisac Municipal Drain by steep slopes. No evidence of turtle nesting was observed during field surveys. Limited potential for turtle nesting may be present in the Study Area, but this habitat, if present, is not expected to be impacted by the proposed extraction.

No evidence of groundwater seepage or springs were observed on the Site. This habitat may be present in the Study Area; however, no impacts to this habitat are anticipated as part of the proposed extraction.

There are no wetlands on the Site, therefore no significant amphibian breeding habitat is present. There are no wetlands mapped in the Study Area, and the results of the targeted amphibian breeding surveys did not identify any significant breeding in the Study Area.

There are no forested areas on the Site that provide habitat for area-sensitive breeding birds (measured 200 m from the edge), and any removal of forested habitat on the Site will not affect the availability of interior forest habitat in the Study Area. This type of habitat is not present in the Study Area.

Further analysis of specialized habitats for wildlife is not warranted.

6.7.3 Habitat for Species of Conservation Concern

Habitat for species of conservation concern (SOCC) includes habitat for three groups of species:

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

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

Two SOCC were confirmed at the Site (Appendix B): eastern wood pewee and wood thrush. Both species were observed within the on-Site portions of Woodland 1. Removal of the on-Site portion of Woodland 1 will result in the loss of potential breeding habitat for 1 pair of each of these species, but suitable breeding habitat will remain in the off-Site portions of Woodland 1. Additional habitat for these species will remain in the Study Area. Mitigation for the loss of habitat on the Site for these species is discussed under the blanket of Significant Woodlands in Section 7.2.

In addition, there are four specific habitat types identified as potentially providing habitat for species of conservation concern:

- Marsh bird breeding habitat
- Open country bird breeding habitat
- Shrub/early successional bird breeding habitat
- Terrestrial crayfish

There is no marsh habitat suitable for marsh breeding birds on the Site or in the Study Area. No open country or shrub/early successional breeding bird habitat meeting the size criteria, or containing the required species as listed in the SWHECS are present on the Site. This habitat type may be present in the Study Area; however, no impacts to this habitat type, if present, are expected to result from the proposed extraction. No evidence of terrestrial crayfish was identified on the Site or in the Study Area during the field surveys.

Further analysis of habitat for species of conservation concern is not warranted.

6.7.1 Animal Movement Corridors

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

The SWHECS indicates that movement corridors are to be identified where certain types of SWH have been identified according to the SWHECS, including:

- Amphibian movement corridors: to be identified when significant amphibian breeding habitat (wetland) is present.
- Deer movement corridors: to be identified when deer wintering habitat is present.

Neither of these SWH were identified on the Site or in the Study Area, therefore, no animal movement corridors are identified.

The Study Area is not adjacent to a major watercourse or major landscape feature that would act as a natural corridor for wildlife. The Study Area is located in a local landscape characterized by a flat topography and a matrix of open and forested habitats, and so does not provide a linkage between different habitat types, or habitats providing different seasonal requirements for wildlife. For this reason, no animal movement corridors have been identified on the Site or in the Study Area.

Further analysis of animal movement corridors is not warranted.

7.0 REHABILITATION / MITIGATION / MONITORING

7.1 Rehabilitation Concept

Post-extraction, the Site will be filled with imported material to specified grade, with allowance for 5-10 m cliff face on the inside of the natural bedrock scarp feature. Once filled, the Site will be reforested.

7.2 Mitigation

The proposed extraction area on the Site will have a 15 m setback from the licenced boundary along the southern limit (Figure 3). Along the western boundary, the setback will be zero where there is a common extraction limit with the existing Navan Quarry. The eastern and northern limit of the extraction boundary maintain a 15 m setback from the top of the scarp feature found along the eastern/northern boundary of the Site (Figure 3). When licenced, the Site will be accessed through the existing Navan Quarry.

Water from the proposed extension will be treated for suspended solids and is expected to warm during the settling process to a temperature similar to the Dutrisac Municipal Drain prior to being discharged. This is expected to result in no negative impacts to the water quality in the Dutrisac Municipal Drain, or to the associated fish habitat. The setbacks from all watercourses in the Study Area are in accordance with City of Ottawa policies, and exceed 100 m. No additional mitigation measures related to fish habitat are recommended.

It is expected that, in the long term, the reforestation of the Site described in Section 7.1 will compensate for the temporary loss of woodlands on the Site and the habitats they provide, including breeding habitat for eastern wood-pewee and wood thrush. Once the reforested areas mature, no residual negative impacts relating to the loss of portions of Woodland 1 are expected. In the short term, habitats for these and other species that rely on forested areas are present elsewhere in the Study Area.

To avoid direct or indirect impacts to wildlife, no clearing of vegetation should take place within the core breeding bird season to avoid contravention of the MBCA (April 1 – August 15) unless a nesting survey has been completed by a qualified biologist within 24 hours of the clearing, and no active nests were observed. If an active nest is observed, the area must be buffered and vegetation clearing at that location postponed until the nest is no longer active.

An Awareness Package is to be prepared that lists the SAR that may be present on the Site or in the local landscape, and all staff should be made aware of the content through specific training. The package should include information on species identification, protection under relevant legislation, and what to do if SAR or other wildlife is encountered at the Site. Relevant species to include are: barn swallow; SAR bats, butternut, eastern wood-pewee and wood thrush.

Standard best management practices for noise and dust mitigation at quarry operations will be employed to reduce impacts on adjacent lands, and the habitats they provide.

7.3 Monitoring

Based on the finding of this Natural Environment Level 1 and 2 Technical Report, no monitoring is required or recommended.

A monitoring program of the proposed water discharge from the extension lands will be developed during the amendment process for the existing ECA for the existing Navan Quarry, and will include monitoring of water quality and temperature before it is discharged into Dutrisac Municipal Drain.

8.0 SUMMARY AND RECOMMENDATIONS

The proposed extension has been assessed for potential ecological impacts under the ARA Provincial Standards, the Provincial Policy Statement, policies of the City of Ottawa, as well as other relevant legislation, including the ESA.

Based on these analyses, it is expected that there will be no negative impacts to the significant natural features and functions in the Study Area. These conclusions are based on the following recommendations:

- Establish a minimum 15 m setback along the southern limit of the Site, and 15 m along the scarp that runs along the eastern and northern limits of the Site.
- No clearing of vegetation within the core breeding bird season (April 1 – August 15) unless a nesting survey has been completed by a qualified biologist within 24 hours of the clearing, and no active nests were observed.
- Conduct monitoring of water discharged to the Dutrisac Municipal Drain in accordance with an amended ECA for the existing Navan Quarry.
- Preparation of an Awareness Package highlighting SAR that may be present at or near the Site, including information on identification, legal protection, and encounter procedures to be followed in the event that a SAR or any wildlife is encountered. The Awareness Package is to be available at the Site, and all staff should be made aware of the content through specific training. The training and Awareness Package should focus on barn swallow, SAR bats, butternut, eastern wood-pewee and wood thrush.
- Standard best management practices to reduce dust and noise mitigation at the quarry, as are currently implemented at the existing Navan Quarry, will be continued during operation of the Navan Quarry Extension.
- Fill and reforest the Site at the end of extraction, in accordance with the rehabilitation plan.

8.1 Site Plan Notes

- No clearing of vegetation within the core breeding bird season (April 1 – August 15) unless a nesting survey has been completed by a qualified biologist prior to and within 24 hours of the clearing, with no active nests observed.
- Preparation of a Species at Risk (SAR) Awareness Package including information on identification, legal protection, and encounter procedures to be followed in the event a SAR is encountered. The Awareness Package is to be available at the Site or at the Navan Quarry site office, and all staff should be made aware of the content through specific training. The training and Awareness Package should focus on barn swallow, SAR bats, butternut, eastern wood-pewee and wood thrush.
- Conduct monitoring of water discharged to the Dutrisac Municipal Drain in accordance with an amended ECA for the existing Navan Quarry.

9.0 LIMITATIONS AND USE OF REPORT

This report was prepared for the exclusive use of Lafarge Canada Limited. The report, which specifically includes all tables, figures and appendices, is based on data and information collected by Golder Associates Ltd. and is based solely on the conditions of the properties at the time of the work, supplemented by historical information and data obtained by Golder Associates Ltd. as described in this report.

Golder Associates Ltd. has relied in good faith on all information provided and does not accept responsibility for any deficiency, misstatements, or inaccuracies contained in the report as a result of omissions, misinterpretation, or fraudulent acts of the persons contacted or errors or omissions in the reviewed documentation.

The services performed, as described in this report, were conducted in a manner consistent with that level of care and skill normally exercised by other members of the engineering and science professions currently practicing under similar conditions, subject to the time limits and financial and physical constraints applicable to the services.

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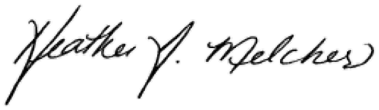
The findings and conclusions of this report are valid only as of the date of this report. If new information is discovered in future work, including excavations, borings, or other studies, Golder Associates Ltd. should be requested to re-evaluate the conclusions of this report, and to provide amendments as required.

10.0 CLOSURE

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

Golder Associates Ltd.

Gwendolyn Weeks, H.B.Sc.Env
Ecologist



Heather Melcher, M.Sc.
Associate, Senior Ecologist

GAW/KAM/sg/ca

https://golderassociates.sharepoint.com/sites/108530/project files/6 deliverables/reports/2021 nel/10-1151-0502_lafarge navan quarry nel1_2_final.docx

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KEY MAP

SCALE 1:100,000

LEGEND

- ANURAN POINT COUNT SURVEY STATION
- 2019 BAT DETECTOR
- 2014 BAT DETECTOR
- BREEDING BIRD SURVEY STATION
- EASTERN WHIP-POOR-WILL SURVEY STATION
- WATERCOURSE
- ROADWAY
- PREDICTED 1 m DEEP AQUIFER
- PREDICTED 1 m WATER TABLE
- SITE
- EXISTING LAFARGE NAVAN QUARRY
- STUDY
- ECOLOGICAL LAND CLASSIFICATION

AGRC: AGRICULTURAL
AGRC-R: AGRICULTURAL ROW CROP
CUT1/CUM1: MIXED THICKET/MIXED MEADOW COMPLEX
CUT/CUW: DECIDUOUS THICKET/OPEN WOODLAND
FOD5-5: DRY TO FRESH SUGAR MAPLE HICKORY DECIDUOUS FOREST
FOM: MIXED FOREST
FOM4: DRY-FRESH WHITE CEDAR MIXED FOREST
FOD7-2: FRESH- MOIST GREEN ASH LOWLAND DECIDUOUS FOREST
IND/RES: BUILT UP INDUSTRIAL/RESIDENTIAL

NOTE(S)
1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)
1. LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2014
2. PROJECTION: TRANSVERSE MERCATOR, DATUM: NAD 83, COORDINATE SYSTEM: UTM ZONE 18, VERTICAL DATUM: CGVD28

0 60 120 240
1:6,000 METRES

CLIENT
LAFARGE CANADA INC.

PROJECT
PROPOSED LAFARGE NAVAN QUARRY EXTENSION

TITLE
ECOLOGICAL LAND CLASSIFICATION AND SURVEY STATIONS

CONSULTANT
GOLDER

YYYY-MM-DD	2020-11-20
DESIGNED	----
PREPARED	JEM/BR
REVIEWED	GW
APPROVED	HM

PROJECT NO.	CONTROL	REV.	FIGURE
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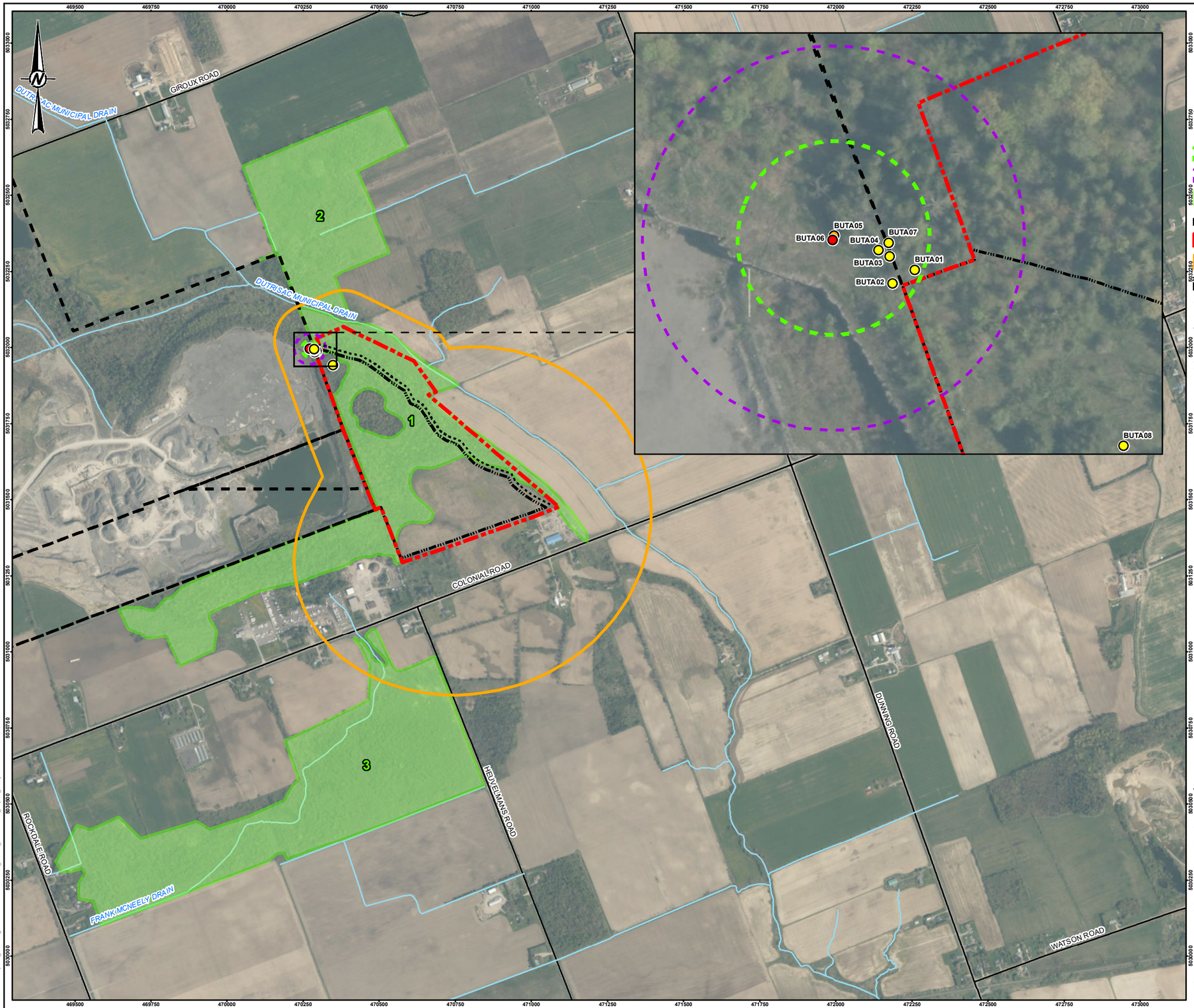


LEGEND

- CATEGORY 1 BUTTERNUT
- CATEGORY 2 BUTTERNUT
- CATEGORY 3 BUTTERNUT
- WATERCOURSE
- ROADWAY
- NATURAL SCARP
- BUTTERNUT REGULATED HABITAT (25 m)
- BUTTERNUT REGULATED HABITAT (50 m)
- SIGNIFICANT WOODLAND
- EXISTING LAFARGE NAVAN QUARRY
- SITE
- STUDY AREA
- PROPOSED NAVAN QUARRY EXTENSION LANDS LIMIT OF EXTRACTION

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2014
2. PROJECTION: TRANSVERSE MERCATOR, DATUM: NAD 83, COORDINATE SYSTEM: UTM ZONE 18, VERTICAL DATUM: CGVD28

0 125 250 500
1:1,000 METRES

CLIENT
LAFARGE CANADA INC.

PROJECT
PROPOSED LAFARGE NAVAN QUARRY EXTENSION

TITLE
SIGNIFICANT NATURAL FEATURES

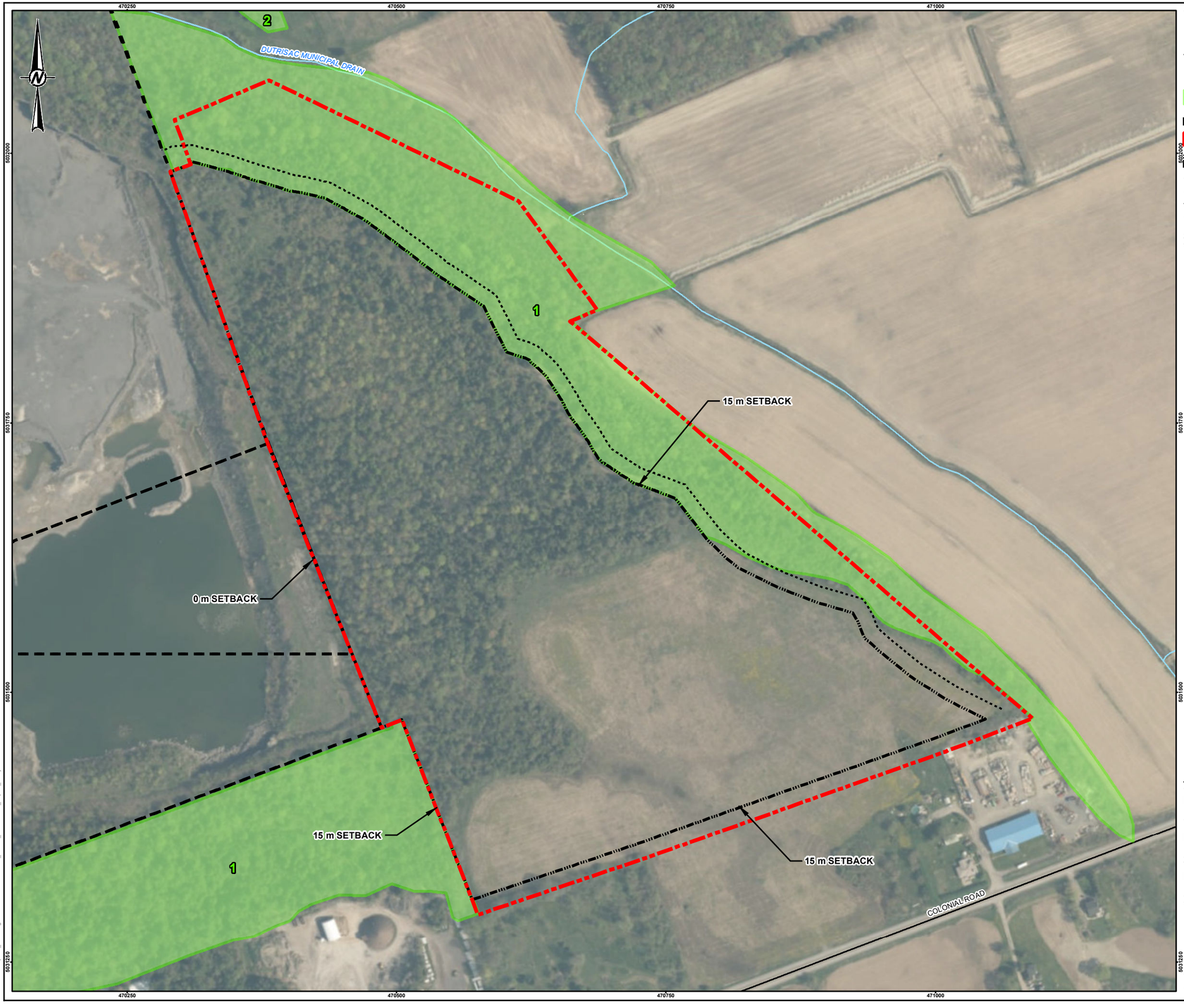
CONSULTANT
GOLDER

YYYY-MM-DD	2020-11-20
DESIGNED	----
PREPARED	JEM/BR
REVIEWED	GW
APPROVED	HM

PROJECT NO.	CONTROL	REV.	FIGURE
10-1151-0502	0002	0	**2**

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 0 25mm

Path: N:\Active\Spatial_IM\Lafarge\Navan\10115109200002_Natural_Environment_Impact_Study\10115109202-0002-HN-0002.mxd



LEGEND

- WATERCOURSE
- ROADWAY
- NATURAL SCARP
- SIGNIFICANT WOODLAND
- EXISTING LAFARGE NAVAN QUARRY
- SITE
- PROPOSED NAVAN QUARRY EXTENSION LANDS LIMIT OF EXTRACTION

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2014
2. PROJECTION: TRANSVERSE MERCATOR, DATUM: NAD 83, COORDINATE SYSTEM: UTM ZONE 18, VERTICAL DATUM: CGVD28

0 35 70 140

1:3,500 METRES

CLIENT
LAFARGE CANADA INC.

PROJECT
PROPOSED LAFARGE NAVAN QUARRY EXTENSION

TITLE
PROPOSED EXTRACTION AND SETBACKS

CONSULTANT
GOLDER

YYYY-MM-DD	2020-11-20
DESIGNED	----
PREPARED	JEM/BR
REVIEWED	GW
APPROVED	HM

PROJECT NO.	CONTROL	REV.	FIGURE
10-1151-0502	0002	0	3

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 25mm

Path: N:\Active\Spatial_IM\Lafarge\Navan\10-1151-0502\0002_Natural_Environment_Impact_Study\10-1151-0502-0002-HN-0003.mxd

APPENDIX A

Correspondence with the MNRF

Ministry of Natural Resources and Forestry

Kemptville District

10 Campus Drive
Postal Box 2002
Kemptville ON K0G 1J0
Tel.: 613 258-8204
Fax: 613 258-3920

Ministère des Richesses naturelles et des Forêts

District de Kemptville

10, promenade Campus
Case postale, 2002
Kemptville ON K0G 1J0
Tél.: 613 258-8204
Téléc.: 613 258-3920

Ontario

Fri. Nov 2, 2018

Gwendolyn Weeks
Golder Associates
1931 Robertson Rd
Ottawa, Ontario
K2H 5B7
(613) 592-9600
gweeks@golder.com

Attention: Gwendolyn Weeks

Subject: Information Request - Developments
Project Name: Navan Lands
Our File No. 2018_CUM-5049

Natural Heritage Values

The Ministry of Natural Resources and Forestry (MNRF) Kemptville District has carried out a preliminary review of the above mentioned area in order to identify any potential natural resource and natural heritage values.

The following Natural Heritage values were identified for the general subject area:

- ANSI, Earth Science, SARSFIELD - BEARBROOK ESKER (Provincial)
- Municipal Drain, Dutrisac Municipal Drain
- Wildlife Staging Area, Waterfowl Staging Area
- Wintering Area, Deer Wintering Area (Stratum 2)
- Wintering Area, Deer Yard (Stratum 1)

Municipal Official Plans contain information related to natural heritage features. Please see the local municipal Official Plan for more information, such as specific policies and direction pertaining to activities which may impact natural heritage features. For planning advice or Official Plan interpretation, please contact the local municipality. Many municipalities require environmental impact studies and other supporting studies be carried out as part of the development application process to allow the municipality to make planning decisions which are consistent with the Provincial Policy Statement (PPS, 2014).

The MNRF strongly encourages all proponents to contact partner agencies and appropriate municipalities early on in the planning process. This provides the proponent with early knowledge regarding agency requirements, authorizations and approval timelines; Ministry of the Environment and Climate Change (MOECC) and the local Conservation Authority may require approvals and permitting where natural values and natural hazards (e.g., floodplains) exist.

As per the Natural Heritage Reference Manual (NHRM, 2010) the MNRF strongly recommends that an ecological site assessment be carried out to determine the presence of natural heritage features and species at risk and their habitat on site. The MNRF can provide survey methodology for particular species at risk and their habitats.

The NHRM also recommends that cumulative effects of development projects on the integrity of natural heritage features and areas be given due consideration. This includes the evaluation of the past, present and possible future impacts of development in the surrounding area that may occur as a result of demand created by the presently proposed project.

Wildland Fire

MNRF woodland data shows that the site contains woodlands. The lands should be assessed for the risk of wildland fire as per PPS 2014, Section 3.1.8 "*Development shall generally be directed to areas outside of lands that are unsafe for development due to the presence of hazardous forest types for wildland fire. Development may however be permitted in lands with hazardous forest types for wildland fire where the risk is mitigated in accordance with wildland fire assessment and mitigation standards".* Further discussion with the local municipality should be carried out to address how the risks associated with wildland fire will be covered for such a development proposal. Please see the Wildland Fire Risk Assessment and Mitigation Guidebook (2016) for more information.

Significant Woodlands

Section 2.1.5 b) of the PPS states: *Development and site alteration shall not be permitted in significant woodlands unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions.* The 2014 PPS directs that significant woodlands must be identified following criteria established by the Ontario Ministry of Natural Resources and Forestry, i.e. the Natural Heritage Reference Manual (NHRM), 2010. Where the local or County Official Plan has not yet updated significant woodland mapping to reflect the 2014 PPS, all wooded areas should be reviewed on a site specific basis for significance. The MNRF Kemptville District modelled locations of significant woodlands in 2011 based on NHRM criteria. The presence of significant woodland on site or within 120 metres should trigger an assessment of the impacts to the feature and its function from the proposed development.

Significant Wildlife Habitat

Section 2.1.5 d) of the PPS states: *Development and site alteration shall not be permitted in significant wildlife habitat unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions.* It is the responsibility of the approval authority to identify significant wildlife habitat or require its identification. The MNRF has several guiding documents which may be useful in identification of significant wildlife habitat and characterization of impacts and mitigation options:

- Significant Wildlife Habitat Technical Guide, 2000
- The Natural Heritage Reference Manual, 2010
- Significant Wildlife Habitat Mitigation Support Tool, 2014
- Significant Wildlife Habitat Criteria Schedule for Ecoregion 5E and 6E, 2015

The habitat of special concern species (as identified by the Species at Risk in Ontario list) and Natural Heritage Information Centre tracked species with a conservation status rank of S1, S2 and S3 may be significant wildlife habitat and should be assessed accordingly.

Water

The Ministry of Natural Resources and Forestry (MNRF) has established timing window guidelines to restrict in-water work related to an activity during certain periods. These restricted periods are identified in order to protect fish from impacts of works or undertakings in and around water during spawning and other critical life stages. A suite of appropriate measures should be taken for projects involving in-water works to minimize and mitigate impacts to fish, water quality and fish habitat, and include:

- avoiding in-water works during the timing guidelines;
- installation of sediment/erosion control measures;
- avoiding the removal, alteration, or covering of substrates used for fish spawning, feeding, over-wintering or nursery areas; and
- debris control measures to manage falling debris (e.g. spalling).

Waterbody Name and location	Unnamed Drain (45.4389, -75.3721)
Watercourse classification (i.e. warmwater, coldwater)	Unknown, likely warm water
Habitat information/ locations (fish passage barriers, known spawning habitats etc.)	Unknown
Historical data on fish species present, including whether the subject waterbody is considered to support any vulnerable, threatened or endangered aquatic species	Blacknose Shiner, Brook Stickleback, Brown Bullhead, Common Shiner, Creek Chub, Fallfish, Johnny Darter/Tesselated Darter, White Sucker
MNRF fisheries management objectives, if applicable	Protect and maintain fishery
MNRF interpretation of fish and fish habitat sensitivity (scale of high, moderate, low or unknown as per DFO's Risk Management Framework)	Low sensitivity
In-water timing windows for construction	No in-water work can occur between March 15th and June 30th

Timing guidelines are based on species* presence and are therefore subject to change if new information becomes available. Timing guidelines in Kemptville District are:

Waterbody (and applicable geography or Fisheries Management Zone)	Timing Guidelines (no in-water works)
o St. Lawrence River (FMZ 20)	March 15 – July 15 (Spring spawning species)
o Ottawa River – Lac Des Chats (FMZ 12)	October 1 to July 15 (Spring and fall spawning species, including Lake Trout and Lake Whitefish)

○ Ottawa River – Lac Deschenes (FMZ 12)	October 15 to July 15 (Spring and fall spawning species, including Cisco)
○ Ottawa River – Lac Dollard des Ormeaux (FMZ 12)	January 1 to July 15 (Winter and spring spawning species, including Burbot)
○ Big Rideau Lake (South Burgess, North Burgess, Bastard and South Elmsley Twps) ○ Charleston Lake (Lansdowne and Escott Twps) ○ Crow Lake (South Crosby Twp)	October 1 to June 30 (Spring and fall spawning species, including Lake Trout)
○ Bass Lake (South Elmsley Twp) ○ Lower Rideau Lake (South Elmsley Twp) ○ Bob's Lake (South Sherbrooke Twp) ○ Christie Lake (South Sherbrooke Twp) ○ Dalhousie Lake (Dalhousie Twp) ○ Davern Lake (South Sherbrooke Twp) ○ Farren Lake (South Sherbrooke Twp) ○ Grippen Lake (Leeds Twp) ○ Indian Lake (South Crosby Twp) ○ Little Long Lake (Lansdowne Twp) ○ Millpond Lake (South Burgess) ○ Otter Lake (South Elmsley, South Burgess and Bastard Twps) ○ Otty Lake (North Burgess and North Elmsley Twps) ○ Pike Lake (North Burgess Twp) ○ Silver Lake (South Sherbrooke Twp) ○ Redhorse Lake (Lansdowne Twp) ○ Tay River (South Sherbrooke, Bathurst, Drummond and North Elmsley Twps) ○ Wolfe Lake (North Crosby Twp)	October 15 to June 30 (Spring and Fall spawning species, including Lake Whitefish and Cisco)
○ Bennett Lake (Bathurst Twp) ○ Crosby Lake (North Crosby Twp) ○ Gananoque River (Leeds Twp) ○ Lac Georges (Plantagenet and Alfred Twps) ○ Gillies Lake (Lanark Twp) ○ Little Crosby Lake (North Crosby Twp) ○ McLaren Lake (North Burgess Twp) ○ Mississippi Lake (Drummond, Beckwith and Ramsay Twps) ○ Mississippi River (Beckwith, Ramsay, Pakenham and Fitzroy Twps) ○ Raisin River below Martintown dam (Charlottenburgh Twp) ○ Rideau River (Wolford, Oxford, Montague, Marlborough, South Gower, North Gower, Osgood, Nepean and Gloucester Twps) ○ South Lake (Leeds Twp) ○ South Nation River below Plantagenet weir (Plantagenet Twp) ○ Upper Rideau Lake (North Crosby Twp) ○ Westport Sand Lake (North Crosby Twp)	January 1 – June 30 (Winter and spring spawning species, including Burbot)
○ Small rivers and streams (denoted on 1:50,000 National Topographic System maps as being one lined) ○ All other waterbodies in FMZ 18	March 15 to June 30 (Spring spawning species)

**Please note: Additional timing restrictions may apply as they relate to endangered and threatened species for works in both water and wetland areas. Timing restrictions are subject to change, depending on species found in a given waterbody.*

In addition to adhering to the above timing guidelines, a work permit from the MNRF may be required depending on the nature and scope of work. No encroachment on the bed or banks of a waterbody/watercourse (e.g. abutments, embankments, etc.) is permitted without MNRF approval. Additional information regarding work permits may be found online at https://www.ontario.ca/page/crown-land-work-permits#section-2.

The MNRF does not have any water quality or quantity data available. We recommend that the Ministry of the Environment and Climate Change be contacted for such data along with the local Conservation Authority. For further information regarding fish habitat and protocols, please refer to the following interagency, document, *Fish Habitat Referral Protocol for* Ontario at: http://www.web2.mnr.gov.on.ca/mnr/ebr/fish_hab_referral/protocol_en.pdf.

Additional approvals and permits may be required under the Fisheries Act and the Species at Risk Act; please contact Fisheries and Oceans Canada to determine requirements and next steps. There may also be approvals required by the local Conservation Authority or Transport Canada, and these agencies should be contacted directly to determine requirements. As the MNRF is responsible for the management of provincial fish populations, we request ongoing involvement in such discussions in order to ensure population conservation.

Species at Risk

A review of the Natural Heritage Information Centre (NHIC) and internal records indicate that there is a potential for the following threatened (THR) and/or endangered (END) species on the site or in proximity to it:

- American Eel (END)
- Butternut (END)
- Eastern Small-footed Myotis (END)
- Henslow's Sparrow (END)
- Little Brown Myotis (END)
- Northern Myotis (END)
- Spotted turtle (END)
- Tri-colored Bat (END)
- Bank Swallow (THR)
- Barn Swallow (THR)
- Blanding's Turtle (THR)
- Bobolink (THR)
- Channel Darter (THR)
- Chimney Swift (THR)
- Eastern Meadowlark (THR)
- Eastern Whip-poor-will (THR)
- Lake Sturgeon (THR)

All endangered and threatened species receive individual protection under section 9 of the ESA and receive general habitat protection under Section 10 of the ESA, 2007. Thus any potential works should consider disturbance to the individuals as well as their habitat (e.g. nesting sites). General habitat protection applies to all threatened and endangered species. Note some species in Kemptville District receive regulated habitat protection. The habitat of these listed species is

protected from damage and destruction and certain activities may require authorization(s) under the ESA. For more on how species at risk and their habitat is protected, please see: https://www.ontario.ca/page/how-species-risk-are-protected.

If the proposed activity is known to have an impact on any endangered or threatened species at risk (SAR), or their habitat, an authorization under the ESA may be required. It is recommended that MNRF Kemptville be contacted prior to any activities being carried out to discuss potential survey protocols to follow during the early planning stages of a project, as well as mitigation measures to avoid contravention of the ESA. Where there is potential for species at risk or their habitat on the property, an Information Gathering Form should be submitted to Kemptville MNRF at sar.kemptville@ontario.ca.

The Information Gathering Form may be found here:
http://www.forms.ssb.gov.on.ca/mbs/ssb/forms/ssbforms.nsf/FormDetail?OpenForm&ACT=RDR&TAB=PROFILE&ENV=WWE&NO=018-0180E

For more information on the ESA authorization process, please see:
https://www.ontario.ca/page/how-get-endangered-species-act-permit-or-authorization

One or more special concern species has been documented to occur either on the site or nearby. Species listed as special concern are not protected under the ESA, 2007. However, please note that some of these species may be protected under the Fish and Wildlife Conservation Act and/or Migratory Birds Convention Act. Again, the habitat of special concern species may be significant wildlife habitat and should be assessed accordingly. Species of special concern for consideration:

- Bald Eagle (SC)
- Black Tern (SC)
- Common Nighthawk (SC)
- Eastern Wood-pewee (SC)
- Horned Grebe (SC)
- Monarch (SC)
- Northern Brook Lamprey (SC)
- Northern Map Turtle (SC)
- Peregrine Falcon (SC)
- Short-eared Owl (SC)
- Silver Lamprey (SC)
- Snapping Turtle (SC)
- Wood Thrush (SC)
- Yellow-banded Bumble Bee (SC)

If any of these or any other species at risk are discovered throughout the course of the work, and/or should any species at risk or their habitat be potentially impacted by on site activities, MNRF should be contacted and operations be modified to avoid any negative impacts to species at risk or their habitat until further direction is provided by MNRF.

Please note that information regarding species at risk is based largely on documented occurrences and does not necessarily include an interpretation of potential habitat within or in proximity to the

site in question. Although this data represents the MNRF's best current available information, it is important to note that a lack of information for a site does not mean that additional features and values are not present. It is the responsibility of the proponent to ensure that species at risk are not killed, harmed, or harassed, and that their habitat is not damaged or destroyed through the activities carried out on the site.

The MNRF continues to strongly encourage ecological site assessments to determine the potential for SAR habitat and occurrences. When a SAR or potential habitat for a SAR does occur on a site, it is recommended that the proponent contact the MNRF for technical advice and to discuss what activities can occur without contravention of the Act. For specific questions regarding the Endangered Species Act (2007) or SAR, please contact MNRF Kemptville District at sar.kemptville@ontario.ca.

The approvals processes for a number of activities that have the potential to impact SAR or their habitat have recently changed. For information regarding regulatory exemptions and associated online registration of certain activities, please refer to the following website: https://www.ontario.ca/page/how-get-endangered-species-act-permit-or-authorization.

Please note: The advice in this letter may become invalid if:

- The Committee on the Status of Species at Risk in Ontario (COSSARO) re-assesses the status of the above-named species OR adds a species to the SARO List such that the section 9 and/or 10 protection provisions apply to those species; or
- Additional occurrences of species are discovered on or in proximity to the site.

This letter is valid until: Sat. Nov 2, 2019

The MNRF would like to request that we continue to be circulated on information with regards to this project. If you have any questions or require clarification please do not hesitate to contact me.

Sincerely,

Dom Ferland
Management Biologist
dominique.ferland@ontario.ca

Encl.\
-ESA Infosheet
-NHIC/LIO Infosheet

APPENDIX B

Species at Risk Screening

Taxon	Common Name	Scientific Name	Endangered Species Act[1]	Species at Risk Act (Sch 1)[2]	COSEWIC[3]	Provincial (SRank)[4]	Habitat Requirements[5]	Potential to Occur on Site	Potential to Occur in the Study Area
Amphibian	Western chorus frog - Great Lakes St. Lawrence / Canadian Shield population	*Pseudacris triseriata*	—	THR	THR	S3	In Ontario, habitat of this amphibian species typically consists of marshes or wooded wetlands, particularly those with dense shrub layers and grasses, as this species is a poor climber. They will breed in almost any fishless pond including roadside ditches, gravel pits and flooded swales in meadows. This species hibernates in terrestrial habitats under rocks, dead trees or leaves, in loose soil or in animal burrows. During hibernation, this species is tolerant of flooding (Environment Canada 2015).	Low - no wetland habitat occurs, and none were observed during surveys.	Moderate - wetlands may occur.
Arthropod	Monarch	*Danaus plexippus*	SC	SC	END	S2N, S4B	In Ontario, monarch is found throughout the northern and southern regions of the province. This butterfly is found wherever there are milkweed (Asclepias spp.) plants for its caterpillars and wildflowers that supply a nectar source for adults. It is often found on abandoned farmland, meadows, open wetlands, prairies and roadsides, but also in city gardens and parks. Important staging areas during migration occur along the north shores of the Great Lakes (COSEWIC 2010).	Low - available habitat is minimal, and none were observed during surveys.	Moderate - fields and habitat edges may provide suitable habitat.
Arthropod	Yellow-banded bumble bee	*Bombus terricola*	SC	SC	SC	S2	This species is a forage and habitat generalist. Mixed woodlands are commonly used for nesting and overwintering, but it also occupies various open habitats including native grasslands, farmlands and urban areas. It is an early emerging species, making it likely an important pollinator of early blooming wild flowering plants (e.g. wild blueberry) and agricultural crops (e.g., apple). Nest sites are mostly abandoned rodent burrows (COSEWIC 2015).	Low - this species is very rare, and none were observed during surveys or identified during desktop.	Low - this species is very rare, and none were identified during desktop.
Bird	Bank swallow	*Riparia riparia*	THR	THR	THR	S4B	In Ontario, bank swallow breeds in a variety of natural and anthropogenic habitats, including lake bluffs, stream and river banks, sand and gravel pits, and roadcuts. Nests are generally built in a vertical or near-vertical bank. Breeding sites are typically located near open foraging sites such as rivers, lakes, grasslands, agricultural fields, wetlands and riparian woods. Forested areas are generally avoided (Garrison 1999).	Low - no suitable bank or bluff habitat occurs, and none were observed during surveys.	Low - no suitable bank or bluff habitat occurs.
Bird	Barn swallow	*Hirundo rustica*	THR	THR	THR	S4B	In Ontario, barn swallow breeds in areas that contain a suitable nesting structure, open areas for foraging, and a body of water. This species nests in human made structures including barns, buildings, sheds, bridges, and culverts. Preferred foraging habitat includes grassy fields, pastures, agricultural cropland, lake and river shorelines, cleared right-of-ways, and wetlands (COSEWIC 2011). Mud nests are fastened to vertical walls or built on a ledge underneath an overhang. Suitable nests from previous years are reused (Brown and Brown 1999).	High - individuals were observed foraging over the Site, however no suitable nesting structures.	High - suitable structures occur, and individuals were observed during surveys.
Bird	Black tern	*Chlidonias niger*	SC	—	NAR	S3B	In Ontario, black tern breeds in freshwater marshlands where it forms small colonies. It prefers marshes or marsh complexes greater than 20 ha in area and which are not surrounded by wooded area. Black terns are sensitive to the presence of agricultural activities. The black tern nests in wetlands with an even combination of open water and emergent vegetation, and still waters of 0.5-1.2 m deep. Preferred nest sites have short dense vegetation or tall sparse vegetation often consisting of cattails, bulrushes and occasionally burreed or other marshland plants. Black terns also require posts or snags for perching (Weseloh 2007).	Low - no suitable wetland habitat occurs.	Low - no suitable wetland habitat occurs.
Bird	Bobolink	*Dolichonyx oryzivorus*	THR	THR	THR	S4B	In Ontario, bobolink breeds in grasslands or graminoid dominated hayfields with tall vegetation (Gabhauer 2007). Bobolink prefers grassland habitat with a forb component and a moderate litter layer. They have low tolerance for presence of woody vegetation and are sensitive to frequent mowing within the breeding season. They are most abundant in established, but regularly maintained, hayfields, but also breed in lightly grazed pastures, old or fallow fields, cultural meadows and newly planted hayfields. Their nest is woven from grasses and forbs. It is built on the ground, in dense vegetation, usually under the cover of one or more forbs (Renfrew et al. 2015).	Low - the meadow on Site is too small, and none were observed during surveys.	Moderate - fields in the Study Area may be suitable habitat.
Bird	Canada warbler	*Cardellina canadensis*	SC	THR	THR	S4B	In Ontario, breeding habitat for Canada warbler consists of moist mixed forests with a well-developed shrubby understory. This includes low-lying areas such as cedar and alder swamps, and riparian thickets (McLaren 2007). It is also found in densely vegetated regenerating forest openings. Suitable habitat often contains a developed moss layer and an uneven forest floor. Nests are well concealed on or near the ground in dense shrub or fern cover, often in stumps, fallen logs, overhanging stream banks or mossy hummocks (Reitsma et al. 2010).	Low- the forest on the Site is borderline habitat, but none were observed during surveys.	Moderate - forests in the Study Area may be suitable habitat.

Taxon	Common Name	Scientific Name	Endangered Species Act[1]	Species at Risk Act (Sch 1)[2]	COSEWIC[3]	Provincial (SRank)[4]	Habitat Requirements[5]	Potential to Occur on Site	Potential to Occur in the Study Area
Bird	Cerulean warbler	*Setophaga cerulea*	THR	END	END	S3B	In Ontario, breeding habitat of cerulean warbler consists of second-growth or mature deciduous forest with a tall canopy of uneven vertical structure and a sparse understory. This habitat occurs in both wet bottomland forests and upland areas, and often contains large hickory and oak trees. This species may be attracted to gaps or openings in the upper canopy. The cerulean warbler is associated with large forest tracks, but may occur in woodlots as small as 10 ha (COSEWIC 2010). Nests are usually built on a horizontal limb in the mid-story or canopy of a large deciduous tree (Buehler et al. 2013).	Low- the forest on the Site is borderline habitat, but none were observed during surveys.	Moderate - forests in the Study Area may be suitable habitat.
Bird	Chimney swift	*Chaetura pelagica*	THR	THR	THR	S4B, S4N	In Ontario, chimney swift breeding habitat is varied and includes urban, suburban, rural and wooded sites. They are most commonly associated with towns and cities with large concentrations of chimneys. Preferred nesting sites are dark, sheltered spots with a vertical surface to which the bird can grip. Unused chimneys are the primary nesting and roosting structure, but other anthropogenic structures and large diameter cavity trees are also used (COSEWIC 2007).	Low - there are no suitable nesting structures or large snags on the Site, and none were observed during surveys.	Moderate - suitable nesting structures may occur in buildings in the Study Area.
Bird	Common nighthawk	*Chordeiles minor*	SC	THR	SC	S4B	In Ontario, these aerial foragers require areas with large open habitat. This includes farmland, open woodlands, clearcuts, burns, rock outcrops, alvars, bogs, fens, prairies, gravel pits and gravel rooftops in cities (Sandilands 2007)	Low- the open areas on the Site are heavily vegetated and none were observed during surveys.	Moderate - the fields and open habitats in the Study Area may be suitable habitat.
Bird	Eastern meadowlark	*Sturnella magna*	THR	THR	THR	S4B	In Ontario, eastern meadowlark breeds in pastures, hayfields, meadows and old fields. Eastern meadowlark prefers moderately tall grasslands with abundant litter cover, high grass proportion, and a forb component (Hull 2003). They prefer well drained sites or slopes, and sites with different cover layers (Roseberry and Klimstra 1970)	Low - the meadow on Site is too small, and none were observed during surveys.	Moderate - fields in the Study Area may be suitable habitat.
Bird	Eastern whip-poor-will	*Antrostomus vociferus*	THR	THR	THR	S4B	In Ontario, whip-poor-will breeds in semi-open forests with little ground cover. Breeding habitat is dependent on forest structure rather than species composition, and is found on rock and sand barrens, open conifer plantations and post-disturbance regenerating forest. Territory size ranges from 3 to 11 ha (COSEWIC 2009). No nest is constructed and eggs are laid directly on the leaf litter (Mills 2007).	Low- the habitat on the Site is small for this species, and none were observed during surveys.	Moderate - forests in the Study Area may be suitable habitat.
Bird	Eastern wood-pewee	*Contopus virens*	SC	SC	SC	S4B	In Ontario, eastern wood-pewee inhabits a wide variety of wooded upland and lowland habitats, including deciduous, coniferous, or mixed forests. It occurs most frequently in forests with some degree of openness. Intermediate-aged forests with a relatively sparse midstory are preferred. In younger forests with a relatively dense midstory, it tends to inhabit the edges. Also occurs in anthropogenic habitats providing an open forested aspect such as parks and suburban neighborhoods. Nest is constructed atop a horizontal branch, 1-2 m above the ground, in a wide variety of deciduous and coniferous trees (COSEWIC 2012).	High - A single male on territory was identified during surveys.	Moderate - fields in the Study Area may be suitable habitat.
Bird	Least bittern	*Ixobrychus exilis*	THR	THR	THR	S4B	In Ontario, least bittern breeds in marshes, usually greater than 5 ha, with emergent vegetation, relatively stable water levels and areas of open water. Preferred habitat has water less than 1 m deep (usually 10 – 50 cm). Nests are built in tall stands of dense emergent or woody vegetation (Woodliffe 2007). Clarity of water is important as siltation, turbidity, or excessive eutrophication hinders foraging efficiency (COSEWIC 2009).	Low - no wetland habitat occurs.	Low - no suitable marsh habitat occurs.
Bird	Golden-winged warbler	*Vermivora chrysoptera*	SC	THR	THR	S4B	In Ontario, golden-winged warbler breeds in regenerating scrub habitat with dense ground cover and a patchwork of shrubs, usually surrounded by forest. Their preferred habitat is characteristic of a successional landscape associated with natural or anthropogenic disturbance such as rights-of-way, and field edges or openings resulting from logging or burning. The nest of the golden-winged warbler is built on the ground at the base of a shrub or leafy plant, often at the shaded edge of the forest or at the edge of a forest opening (Confer et al. 2011).	Low - none were observed during surveys.	Moderate - the thickets and open woodland may be suitable habitat.

Taxon	Common Name	Scientific Name	Endangered Species Act[1]	Species at Risk Act (Sch 1)[2]	COSEWIC[3]	Provincial (SRank)[4]	Habitat Requirements[5]	Potential to Occur on Site	Potential to Occur in the Study Area
Bird	Grasshopper sparrow *pratensis* subspecies	*Ammodramus savannarum* (pratensis subspecies)	SC	SC	SC	S4B	In Ontario, grasshopper sparrow is found in medium to large grasslands with low herbaceous cover and few shrubs. It also uses a wide variety of agricultural fields, including cereal crops and pastures. Close-grazed pastures and limestone plains (e.g. Carden and Napanee Plains) support highest density of this bird in the province (COSEWIC 2013).	Low - the meadow on Site is too small, and none were observed during surveys.	Moderate - fields in the Study Area may be suitable habitat.
Bird	Peregrine falcon (anatum/tundrius subspecies)	*Falco peregrinus anatum/tundrius*	SC	SC	Not at Risk	S3B	In Ontario, peregrine falcon breeds in areas containing suitable nesting locations and sufficient prey resources. Such habitat includes both natural locations containing cliff faces (heights of 50 - 200 m preferred) and also anthropogenic landscapes including urban centres containing tall buildings, open pit mines and quarries, and road cuts. Peregrine falcons nest on cliff ledges and crevices and building ledges. Nests consist of a simple scrape in the substrate (COSEWIC 2007).	Low - there are no suitable nesting structures or cliffs on the Site, and none were observed during surveys.	Low - there are no suitable nesting structures or cliffs in the Study area.
Bird	Red-headed woodpecker	*Melanerpes erythrocephalus*	SC	THR	END	S4B	In Ontario, red-headed woodpecker breeds in open, deciduous woodlands or woodland edges and are often found in parks, cemeteries, golf courses, orchards and savannahs (Woodliffe 2007). They may also breed in forest clearings or open agricultural areas provided that large trees are available for nesting. They prefer forests with little or no understory vegetation. They are often associated with beech or oak forests, beaver ponds and swamp forests where snags are numerous. Nests are excavated in the trunks of large dead trees (Smith et al. 2000).	Low - none were observed during surveys.	Moderate - forests in the Study Area may be suitable habitat.
Bird	Short-eared owl	*Asio flammeus*	SC	SC	SC	S2N,S4B	In Ontario, short-eared owl breeds in a variety of open habitats including grasslands, tundra, bogs, marshes, clearcuts, burns, pastures and occasionally agricultural fields. The primary factor in determining breeding habitat is proximity to small mammal prey resources (COSEWIC 2008). Nests are built on the ground at a dry site and usually adjacent to a clump of tall vegetation used for cover and concealment (Gahbauer 2007).	Low- the open areas on the Site are heavily vegetated and none were observed during surveys.	Moderate - the fields and open habitats in the Study Area may be suitable habitat.
Bird	Wood thrush	*Hylocichla mustelina*	SC	THR	THR	S4B	In Ontario, wood thrush breeds in moist, deciduous hardwood or mixed stands that are often previously disturbed, with a dense deciduous undergrowth and with tall trees for singing perches. This species selects nesting sites with the following characteristics: lower elevations with trees less than 16 m in height, a closed canopy cover (>70 %), a high variety of deciduous tree species, moderate subcanopy and shrub density, shade, fairly open forest floor, moist soil, and decaying leaf litter (COSEWIC 2012).	High - A single male on territory was identified during surveys.	Moderate - forests in the Study Area may be suitable habitat.
Fish	American eel	*Anguilla rostrata*	END	—	THR	S1?	In Ontario, American eel is native to the Lake Ontario, St. Lawrence River and Ottawa River watersheds. Their current distribution includes lakes Huron, Erie, and Superior and their tributaries. The Ottawa River population is considered extirpated. The preferred habitat of the American eel is cool water of lakes and streams with muddy or silty substrates in water temperatures between 16 and 19°C. The American eel is a catadromous fish that lives in fresh water until sexual maturity then migrates to the Sargasso Sea to spawn (Burridge et al. 2010; Eakins 2016).	Low - there is no aquatic habitat on the Site.	Low - there is no suitable aquatic habitat in the Study Area.
Fish	Channel darter - St. Lawrence populations	*Percina copelandi*	SC	SC	SC	S2	In Ontario, channel darter is found in the lower Great Lakes basin along the shores of Lake Erie, Detroit River, St. Clair River, Lake St. Clair, Ottawa River and some of its tributaries, and in drainages of the Bay of Quinte. Channel darter is a freshwater member of the perch family of fishes. Channel darter can be found in three general types of habitats, depending on which aquatic system they occupy: 1) in lakes, they are found in gravel and coarse sand beach areas; 2) in large river systems, they are typically found in gravel and cobble shoals and riffles; and, 3) in small- to medium-sized rivers, they are typically found in the riffles and pools. Communal spawning occurs in the spring and early summer in upstream areas with moderate to fast current and over fine gravel or small rocks (COSEWIC 2002).	Low - there is no aquatic habitat on the Site.	Low - there is no suitable aquatic habitat in the Study Area.
Fish	Lake sturgeon - Great Lakes / Upper St. Lawrence population	*Acipenser fulvescens*	END	—	THR	S2	In Ontario, lake sturgeon, a large prehistoric freshwater fish, is found in all the Great Lakes and in all drainages of the Great Lakes and of Hudson Bay. This species typically inhabits highly productive shoal areas of large lakes and rivers. They are bottom dwellers, and prefer depths between 5-10 m and mud or gravel substrates. Small sturgeons are often found on gravelly shoals near the mouths of rivers. They spawn in depths of 0.5 to 4.5 m in areas of swift water or rapids. Where suitable spawning rivers are not available, such as in the lower Great Lakes, they are known to spawn in wave action over rocky ledges or around rocky islands (Golder 2011).	Low - there is no aquatic habitat on the Site.	Low - there is no suitable aquatic habitat in the Study Area.

Taxon	Common Name	Scientific Name	Endangered Species Act[1]	Species at Risk Act (Sch 1)[2]	COSEWIC[3]	Provincial (SRank)[4]	Habitat Requirements[5]	Potential to Occur on Site	Potential to Occur in the Study Area
Fish	River redhorse	*Moxostoma carinatum*	SC	SC	SC	S2	In Ontario, river redhorse is known to occur in the Mississippi River, Ottawa River, Madawaska River, Grand River, Trent River, and Thames River systems. They inhabit moderate to large rivers. The majority of their time is spent in pool habitats with slow-moving water and abundant vegetation. Spawning occurs in areas of shallow, moderate to fast-flowing waters in riffle-run habitats with coarse substrates of gravel and cobble (DFO 2011).	Low - there is no aquatic habitat on the Site.	Low - there is no suitable aquatic habitat in the Study Area.
Mammal	Eastern small-footed myotis	*Myotis leibii*	END	—	—	S2S3	This species is not known to roost within trees, but there is very little known about its roosting habits. The species generally roosts on the ground under rocks, in rock crevices, talus slopes and rock piles. It occasionally inhabits buildings. Areas near the entrances of caves or abandoned mines may be used for hibernaculum, where the conditions are drafty with low humidity, and may be subfreezing (Humphrey 2017).	Low - there is no suitable roosting habitat on the Site, and none were identified during acoustic monitoring.	Moderate - suitable roosting habitat may occur .
Mammal	Little brown myotis	*Myotis lucifugus*	END	END	END	S4	In Ontario, this specie's range is extensive and covers much of the province. It will roost in both natural and man-made structures. Roosting colonies require a number of large dead trees, in specific stages of decay and that project above the canopy in relatively open areas. May form nursery colonies in the attics of buildings within 1 km of water. Caves or abandoned mines may be used as hibernacula, but high humidity and stable above freezing temperatures are required (ECCC 2018).	High - this species was identified during acoustic monitoring, although roosting habitat is limited.	Moderate - forests in the Study Area may be suitable habitat.
Mammal	Northern myotis	*Myotis septentrionalis*	END	END	END	S3	In Ontario, this species' range is extensive and covers much of the province. It will usually roost in hollows, crevices, and under loose bark of mature trees. Roosts may be established in the main trunk or a large branch of either living or dead trees. Caves or abandoned mines may be used as hibernacula, but high humidity and stable above freezing temperatures are required (ECCC 2018).	Low - none were identified during acoustic monitoring.	Moderate - forests in the Study Area may be suitable habitat.
Mammal	Tri-colored bat	*Perimyotis subflavus*	END	END	END	S3?	In Ontario, tri-colored bat may roost in foliage, in clumps of old leaves, hanging moss or squirrel nests. They are occasionally found in buildings although there are no records of this in Canada. They typically feed over aquatic areas with an affinity to large-bodied water and will likely roost in close proximity to these. Hibernation sites are found deep within caves or mines in areas of relatively warm temperatures. These bats have strong roost fidelity to their winter hibernation sites and may choose the exact same spot in a cave or mine from year to year (ECCC 2018).	Low - none were identified during acoustic monitoring.	Moderate - forests in the Study Area may be suitable habitat.
Reptile	Blanding's turtle - Great Lakes / St.Lawrence population	*Emydoidea blandingii*	THR	THR	END	S3	In Ontario, Blanding's turtle will use a range of aquatic habitats, but favor those with shallow, standing or slow-moving water, rich nutrient levels, organic substrates and abundant aquatic vegetation. They will use rivers, but prefer slow-moving currents and are likely only transients in this type of habitat. This species is known to travel great distances over land in the spring in order to reach nesting sites, which can include dry conifer or mixed forests, partially vegetated fields, and roadsides. Suitable nesting substrates include organic soils, sands, gravel and cobble. They hibernate underwater and infrequently under debris close to water bodies (COSEWIC 2016).	Low- there is no suitable wetland habitat and none were identified during surveys. Further no records were identified on adjacent lands.	Low- there is no suitable wetland habitat.. Further no records were identified .
Reptile	Midland painted turtle	*Chrysemys picta marginata*	—	—	SC	S4	In Ontario, painted turtles use waterbodies, such as ponds, marshes, lakes and slow-moving creeks, with a soft bottom and abundant basking sites and aquatic vegetation. This species hibernates on the bottom of waterbodies (Ontario Nature 2018).	Low - no wetland or aquatic habitat occurs.	Low - no suitable wetland or aquatic habitat occurs.
Reptile	Milksnake	*Lampropeltis triangulum*	NAR	SC	SC	S4	In Ontario, milksnake uses a wide range of habitats including prairies, pastures, hayfields, wetlands and various forest types, and is well-known in rural areas where it frequents older buildings. Proximity to water and cover enhances habitat suitability. Hibernation takes place in mammal burrows, hollow logs, gravel or soil banks, and old foundations (COSEWIC 2014).	Moderate - although none were observed during surveys, this species is cryptic and hard to observed, and suitable habitat does occur on the Site.	Moderate - although none were observed during surveys, this species is cryptic and hard to observed, and suitable habitat does occur in the Study Area.
Reptile	Northern map turtle	*Graptemys geographica*	SC	SC	SC	S3	In Ontario, the northern map turtle prefers large waterbodies with slow-moving currents, soft substrates, and abundant aquatic vegetation. Ideal stretches of shoreline contain suitable basking sites, such as rocks and logs. Along Lakes Erie and Ontario, this species occurs in marsh habitat and undeveloped shorelines. It is also found in small to large rivers with slow to moderate flow. Hibernation takes place in soft substrates under deep water (COSEWIC 2012).	Low - no wetland or aquatic habitat occurs.	Low - no suitable wetland or aquatic habitat occurs.

Taxon	Common Name	Scientific Name	Endangered Species Act[1]	Species at Risk Act (Sch 1)[2]	COSEWIC[3]	Provincial (SRank)[4]	Habitat Requirements[5]	Potential to Occur on Site	Potential to Occur in the Study Area
Reptile	Snapping turtle	*Chelydra serpentina*	SC	SC	SC	S3	In Ontario, snapping turtle uses a wide range of waterbodies, but shows preference for areas with shallow, slow-moving water, soft substrates and dense aquatic vegetation. Hibernation takes place in soft substrates under water. Nesting sites consist of sand or gravel banks along waterways or roadways (COSEWIC 2008).	Low - no wetland or aquatic habitat occurs.	Low - no suitable wetland or aquatic habitat occurs.
Reptile	Spotted turtle	*Clemmys guttata*	END	END	END	S2	In Ontario, spotted turtle habitat consists of shallow, slow-moving and unpolluted water such as ponds, bogs, marshes, ditches, vernal pools and sedge meadows. It is also occasionally found in woodland streams or sheltered shallow bays. These habitats are characterized by soft substrates and abundant aquatic vegetation. Females lay eggs in soil and leaf litter in wooded areas close to wetlands. Hibernation takes place in substrates under water, often under moss hummocks or muskrat dens (COSEWIC 2014).	Low - no wetland or aquatic habitat occurs.	Low - no suitable wetland or aquatic habitat occurs.
Reptile	Stinkpot or Eastern musk turtle	*Sternotherus odoratus*	SC	THR	SC	S3	In Ontario, eastern musk turtle is very rarely out of water and prefers permanent bodies of water that are shallow and clear, with little or no current and soft substrates with abundant organic materials. Abundant floating and submerged vegetation is preferred. Hibernation occurs in soft substrates under water. Eggs are sometimes laid on open ground, or in shallow nests in decaying vegetation, shallow gravel or rock crevices (COSEWIC 2012).	Low - no wetland or aquatic habitat occurs.	Low - no suitable wetland or aquatic habitat occurs.
Vascular Plant	American ginseng	*Panax quinquefolius*	END	END	END	S2	In Ontario, American ginseng is found in moist, undisturbed and relatively mature deciduous woods often dominated by sugar maple. It is commonly found on well-drained, south-facing slopes. American ginseng grows under closed canopies in well-drained soils of glaciary origin that have a neutral pH (ECCC 2018).	Low - this species was searched for and none were identified during surveys.	Moderate - forests in the Study Area may be suitable habitat.
Vascular Plant	Butternut	*Juglans cinerea*	END	END	END	S2?	In Ontario, butternut is found along stream banks, on wooded valley slopes, and in deciduous and mixed forests. It is commonly associated with beech, maple, oak and hickory (Voss and Reznicek 2012). Butternut prefers moist, fertile, well-drained soils, but can also be found in rocky limestone soils. This species is shade intolerant (Farrar 1995).	High - several individuals were identified on and immediately adjacent to the Site.	Moderate - forests, open woodlands, and hedgerows in the Study Area may be suitable habitat.
Lichen	Flooded jellyskin	*Leptogium rivulare*	—	THR	SC	S3	In Ontario, flooded jellyskin is found in the eastern region of the province. This lobed, leaf-like lichen grows on the lower trunks of trees in hardwood swamps where flooding occurs in the spring. The most common tree host is black ash, but it has also been recorded on silver maple, trembling aspen, bur oak and white cedar. Trees must be live to support the lichen. These seasonal pond habitats typically occur over top of calcareous bedrock, such as limestone. There is unlikely to be a minimum size requirement for the area of flooded forest habitat available to the lichen, as long as adequate flooding is present (Environment Canada 2013; COSEWIC 2004).	Low - no suitable wetland habitat occurs.	Low - no suitable wetland habitat occurs.

Notes:

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

[2] Species at Risk Act (SARA), 2002. Schedule 1 (Last amended 13 June 2018); Part 1 (Extirpated), Part 2 (Endangered), Part 3 (Threatened), Part 4 (Special Concern)

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

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

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

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

APPENDIX C

List of Vascular Plants

APPENDIX C
Plant Species List

Scientific Name	Common Name	Origin[a]	Global Rarity Status[b]	Ontario Rarity Status[b]	SARA[c]	ESA[d]	Regional Significance[e]
Abies balsamea	Balsam fir	N	G5	S5	–	–	No
Acer negundo	Manitoba maple	(N)	G5	S5	–	–	No
Acer saccharum	Sugar maple	N	G5	S5	–	–	No
Achillea millefolium	Common yarrow	I	G5T5?	SNA	–	–	No
Actaea pachypoda	Doll's-eyes	N	G5	S5	–	–	No
Actaea rubra	Red baneberry	N	G5	S5	–	–	No
Agrimonia gryposepala	Common agrimony	N	G5	S5	–	–	No
Amaranthus retroflexus	Redroot pigweed	I	GNR	SNA	–	–	No
Ambrosia artemisiifolia	Ragweed	N	G5	S5	–	–	No
Amphicarpaea bracteata	Hog peanut	N	G5	S5	–	–	No
Anemone acutiloba	Sharp-lobed hepatica	N	G5	S5	–	–	No
Anemone cylindrica	Thimbleweed	N	G5	S4	–	–	No
Apocynum androsaemifolium	Spreading dogbane	N	G5	S5	–	–	No
Aralia nudicaulis	Wild sarsaparilla	N	G5	S5	–	–	No
Arctium minus	Common burdock	I	GNR	SNA	–	–	No
Asarum canadense	Wild ginger	N	G5	S5	–	–	No
Asclepias syriaca	Common milkweed	N	G5	S5	–	–	No
Athyrium filix-femina	Lady fern	N	G5T5	S5	–	–	No
Barbarea vulgaris	Winter cress	I	GNR	SNA	–	–	No
Betula papyrifera	White birch	N	G5	S5	–	–	No
Bromus ciliatus	Fringed brome	N	G5	S5	–	–	No
Bromus inermis	Smooth brome	I	GNR	SNA	–	–	No
Carex communis	Common sedge	N	G5	S5	–	–	No
Carya cordiformis	Bitternut hickory	N	G5	S5	–	–	No
Celastrus scandens	Climbing bittersweet	N	G5	S5	–	–	No
Chenopodium album	Lamb's-quarters	I	G5T5	SNA	–	–	No
Circaea lutetiana	Enchanter's nightshade	N	G5	S5	–	–	No
Cirsium arvense	Canada thistle	I	GNR	SNA	–	–	No
Cirsium vulgare	Bull thistle	I	GNR	SNA	–	–	No
Clinopodium vulgare	Wild basil	N	G5	S5	–	–	No
Conyza canadensis	Horseweed	N	G5	S5	–	–	No
Cornus alternifolia	Alternate-leaved dogwood	N	G5	S5	–	–	No
Cornus rugosa	Round-leaved dogwood	N	G5	S5	–	–	No
Crataegus sp.	Hawthorn	N	?	?	–	–	No
Dactylis glomerata	Orchard grass	I	GNR	SNA	–	–	No
Danthonia spicata	Poverty oatgrass	NH	G5	S5	–	–	No
Daucus carota	Wild carrot	I	GNR	SNA	–	–	No
Desmodium canadense	Canada tick-trefoil	N	G5	S4	–	–	No
Dichanthelium macrocarpa	Small-fruited panic grass	N	G5	S4	–	–	No
Diervilla lonicera	Bush-honeysuckle	N	G5	S5	–	–	No
Dirca palustris	Leatherwood	N	G4	S4?	–	–	No
Dryopteris intermedia	Evergreen woodfern	N	G5	S5	–	–	No
Elymus repens	Quack grass	I	GNR	SNA	–	–	No
Erigeron philadelphicus	Philadelphia fleabane	N	G5	S5	–	–	No
Fragaria vesca	Woodland strawberry	N	G5	S5	–	–	No
Fragaria virginiana	Common strawberry	N	G5	S5	–	–	No
Fraxinus americana	White ash	N	G5	S5	–	–	No
Fraxinus pennsylvanica	Green ash	N	G5	S5	–	–	No
Galium aparine	Cleavers	N	G5	S5	–	–	No
Galium mollugo	White bedstraw	I	GNR	SNA	–	–	No
Gymnocarpium dryopteris	Oak fern	N	G5	S5	–	–	No
Hieracium piloselloides	King devil	I	GNR	SNA	–	–	No
Hypericum perforatum	Common St. John's-wort	I	GNR	SNA	–	–	No
Juglans cinerea	Butternut	N	G4	S3?	–	–	No
Lactuca canadensis	Canada lettuce	N	G5	S5	–	–	No
Lepidium densiflorum	Common pepper-grass	I	G5	SNA	–	–	No

Scientific Name	Common Name	Origin[a]	Global Rarity Status[b]	Ontario Rarity Status[b]	SARA[c]	ESA[d]	Regional Significance[e]
Leucanthemum vulgare	Ox-eye daisy	I	GNR	SNA	–	–	No
Linaria vulgaris	Butter-and-eggs	I	GNR	SNA	–	–	No
Lonicera tatarica	Tartarian honeysuckle	I	GNR	SNA	–	–	No
Lotus corniculatus	Bird's-foot trefoil	I	GNR	SNA	–	–	No
Maianthemum canadense	Canada mayflower	N	G5	S5	–	–	No
Maianthemum racemosum	False Solomon's-seal	N	G5	S5	–	–	No
Malus pumila	Apple	I	G5	SNA	–	–	No
Medicago lupulina	Black medick	I	GNR	S5	–	–	No
Medicago sativa	Alfalfa	I	GNR	S5	–	–	No
Melilotus alba	White sweet clover	I	G5	SNA	–	–	No
Mentha arvensis	Field mint	N	G5	S5	–	–	No
Nepeta cataria	Catnip	I	GNR	SNA	–	–	No
Oenothera biennis	Common evening-primrose	N	G5	S5	–	–	No
Osmunda cinnamomea	Cinnamon fern	N	G5	S5	–	–	No
Ostrya virginiana	Ironwood	N	G5	S5	–	–	No
Panicum capillare	Witch grass	N	G5	S5	–	–	No
Panicum sp.	Panic grass	N	?	?	–	–	No
Parthenocissus inserta	Virginia creeper	N	G5	S5	–	–	No
Pastinaca sativa	Parsnip	I	GNR	SNA	–	–	No
Phalaris arundinacea	Reed canary grass	N	G5	S5	–	–	No
Phleum pratense	Timothy	I	GNR	SNA	–	–	No
Picea glauca	White spruce	N	G5	S5	–	–	No
Pinus strobus	White pine	N	G5	S5	–	–	No
Plantago major	Common plantain	I	G5	SNA	–	–	No
Poa annua	Annual bluegrass	I	GNR	SNA	–	–	No
Poa compressa	Canada bluegrass	I	GNR	SNA	–	–	No
Poa pratensis	Kentucky bluegrass	I	G5T5?	SNA	–	–	No
Polygonatum pubescens	Hairy Solomon's seal	N	G5	S5	–	–	No
Populus grandidentata	Large-toothed aspen	N	G5	S5	–	–	No
Potentilla norvegica	Rough cinquefoil	I	G5	S5	–	–	No
Potentilla simplex	Old-field cinquefoil	N	G5	S5	–	–	No
Prenanthes alba	White lettuce	N	G5	S5	–	–	No
Prunella vulgaris	Heal-all	N	G5T5	S5	–	–	No
Pteridium aquilinum	Bracken	N	G5	S5	–	–	No
Quercus rubra	Red oak	N	G5	S5	–	–	No
Rhus radicans	Poison-ivy	N	G5T5	S5	–	–	No
Rhus typhina	Staghorn sumac	N	G5	S5	–	–	No
Ribes cynosbati	Prickly gooseberry	N	G5	S5	–	–	No
Ribes lacustre	Bristly black currant	N	G5	S5	–	–	No
Rubus allegheniensis	Mountain blackberry	N	G5	S5	–	–	No
Rubus idaeus	Red raspberry	N	G5T5	S5	–	–	No
Rubus occidentalis	Black raspberry	N	G5	S5	–	–	No
Rubus odoratus	Purple-flowering raspberry	N	G5	S5	–	–	No
Sambucus canadensis	Common elderberry	N	G5	S5	–	–	No
Sanicula marilandica	Black snakeroot	N	G5	S5	–	–	No
Setaria pumila	Yellow foxtail	I	GNR	SNA	–	–	No
Silene vulgaris	Bladder campion	I	GNR	SNA	–	–	No
Solidago canadensis	Canada goldenrod	N	G5T5	S5	–	–	No
Solidago nemoralis	Gray goldenrod	N	G5T5	S5	–	–	No
Solidago rugosa	Rough goldenrod	N	G5	S5	–	–	No
Sonchus arvensis	Common sow-thistle	I	GNR	SNA	–	–	No
Symphyotrichum ciliolatum	Blue aster	N	G5	S5	–	–	No
Symphyotrichum cordifolium	Heart-leaved aster	N	G5	S5	–	–	No
Symphyotrichum novae-angliae	New England aster	N	G5	S5	–	–	No
Taraxacum officinale	Common dandelion	I	G5	SNA	–	–	No
Thuja occidentalis	Eastern white cedar	N	G5	S5	–	–	No

APPENDIX C
Plant Species List

Scientific Name	Common Name	Origin[a]	Global Rarity Status[b]	Ontario Rarity Status[b]	SARA[c]	ESA[d]	Regional Significance[e]
Tilia americana	Basswood	N	G5	S5	–	–	No
Trifolium aureum	Yellow hop-clover	I	GNR	SNA	–	–	No
Trifolium hybridum	Alsike clover	I	GNR	SNA	–	–	No
Trifolium pratense	Red clover	I	GNR	SNA	–	–	No
Trifolium repens	White clover	I	GNR	SNA	–	–	No
Trillium grandiflorum	White trillium	N	G5	S5	–	–	No
Ulmus americana	White elm	N	G5?	S5	–	–	No
Urtica dioica	Stinging nettle	N	G5T?	S5	–	–	No
Verbascum thapsus	Common mullein	I	GNR	SNA	–	–	No
Veronica officinalis	Common speedwell	I	G5	SNA	–	–	No
Viburnum lentago	Nannyberry	N	G5	S5	–	–	No
Vicia cracca	Cow-vetch	I	GNR	SNA	–	–	No
Vincetoxicum sp.	Swallowwort	I	GNR	SNA	–	–	No
Viola sp.	Violet	N	?	?	–	–	No
Vitis riparia	Riverbank grape	N	G5	S5	–	–	No

Notes:

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

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

[c] Canada Species at Risk Act (Schedule 1)

[d] Ontario Endangered Species Act

[e] For City of Ottawa, as assessed by Brunton 2005

APPENDIX D

List of Wildlife

Wildlife Species List

Common Name	Scientific Name	Origin[a]	Global Rarity Status[b]	Ontario Rarity Status[b]	SARA[c]	ESA[d]
Mammals						
Big brown bat	Eptesicus fuscus	N	G5	S5	–	–
Coyote	*Canis latrans*	N	S5	G5	–	–
Eastern chipmunk	*Tamias striatus*	N	S5	G5	–	–
Gray squirrel	*Sciurus carolinensis*	N	S5	G5	–	–
Hoary bat	*Lasiurus cinereus*	N	G5	S4	–	–
Little brown myotis	***Myotis lucifugus***	**N**	**G5**	**S4**	**Endangered**	**Endangered**
Meadow vole	*Microtus pennsylvanicus*	N	S5	G5	–	–
Porcupine	*Erethizon dorsatum*	N	S5	G5	–	–
Raccoon	*Procyon lotor*	N	S5	G5	–	–
Red bat	*Lasiurus borealis*	N	S4	G3G4	–	–
Red squirrel	*Tamiasciurus hudsonicus*	N	S5	G5	–	–
Silver-haired bat	*Lasionycteris noctivagans*	N	G5	S4	–	–
White-tailed deer	*Odocoileus virginianus*	N	N	G5	–	–
Woodchuck	*Marmota monax*	N	S5	G5	–	–
Birds						
American crow	*Corvus brachyrhynchos*	N	G5	S5B	–	–
American goldfinch	*Carduelis tristis*	N	G5	S5B	–	–
American redstart	*Setophaga ruticilla*	N	G5	S5B	–	–
American robin	*Turdus migratorius*	N	G5	S5B	–	–
American woodcock	*Scolopax minor*	N	G5	S4B	–	–
Barn swallow	***Hirundo rustica***	**N**	**G5**	**S4B**	**Threatened**	**Threatened**
Black-and-white warbler	*Mniotilta varia*	N	G5	S5B	–	–
Black-billed cuckoo	*Coccyzus erythropthalmus*	N	G5	S5B	–	–
Black-capped chickadee	*Poecile atricapilla*	N	G5	S5	–	–
Black-throated green warbler	*Setophaga virens*	N	G5	S5B	–	–
Blue jay	*Cyanocitta cristata*	N	G5	S5	–	–
Chipping sparrow	*Spizella passerina*	N	G5	S5B	–	–
Common grackle	*Quiscalus quiscula*	N	G5	S5B	–	–
Downy woodpecker	*Picoides pubescens*	N	G5	S5	–	–
Eastern bluebird	*Sialia sialis*	N	G5	S5B	–	–
Eastern pheobe	*Sayornis phoebe*	N	G5	S5B	–	–
Eastern kingbird	*Tyrannus tyrannus*	N	G5	S4B	–	–
Eastern wood-pewee	***Contopus virens***	**N**	**G5**	**S4B**	**Special Concern**	**Special Concern**
European starling	*Sturnus vulgaris*	I	G5	SNA	–	–
Golden-crowned kinglet	*Regulus satrapa*	N	G5	S5B	–	–
Gray catbird	*Dumetella carolinensis*	N	G5	S4B	–	–
Great-crested flycatcher	*Myiarchus crinitus*	N	G5	S4B	–	–
Hairy woodpecker	*Picoides villosus*	N	G5	S5	–	–
Horned lark	*Eremophila alpestris*	N	G5	S5	–	–
House wren	*Troglodytes aedon*	N	G5	S5B	–	–
Indigo bunting	*Passerina cyanea*	N	G5	S4B	–	–
Mourning dove	*Zenaida macroura*	N	G5	S5	–	–
Mourning warbler	*Oporornis philadelphia*	N	G5	S4B	–	–
Nashville warbler	*Vermivora ruficapilla*	N	G5	S5B	–	–
Northern cardinal	*Cardinalis cardinalis*	N	G5	S5	–	–
Northern flicker	*Colaptes auratus*	N	G5	S4B	–	–
Ovenbird	*Seiurus aurocapilla*	N	G5	S4B	–	–
Pileated woodpecker	*Dryocopus pileatus*	N	G5	S5	–	–
Purple finch	*Haemorhous purpureus*	N	G5	S4B	–	–
Red-eyed vireo	*Vireo olivaceus*	N	G5	S5B	–	–
Red-winged blackbird	*Agelaius phoeniceus*	N	G5	S4	–	–
Ring-billed gull	*Larus delawarensis*	N	G5	S5B, S4N	–	–
Rock pigeon	*Columba livia*	I	G5	SNA	–	–
Rose-breasted grosbeak	*Pheucticus ludovicianus*	N	G5	S4B	–	–
Ruffed grouse	*Bonasa umbellus*	N	G5	S4	–	–
Savannah sparrow	*Passerculus sandwichensis*	N	G5	S4B	–	–
Sharp-shinned hawk	*Accipiter striatus*	N	G5	S5	–	–
Song sparrow	*Melospiza melodia*	N	G5	S5B	–	–
Tree swallow	*Tachycineta bicolor*	N	G5	S4B	–	–
Turkey vulture	*Cathartes aura*	N	G5	S5B	–	–
Veery	*Catharus fuscescens*	N	G5	S5B	–	–
Warbling vireo	*Vireo gilvus*	N	G5	5B	–	–
White-breasted nuthatch	*Sitta carolinensis*	N	G5	S5	–	–

Wildlife Species List

Common Name	Scientific Name	Origin[a]	Global Rarity Status[b]	Ontario Rarity Status[b]	SARA[c]	ESA[d]
White-throated sparrow	*Zonotrichia albicollis*	N	G5	S5B	–	–
Wild turkey	*Meleagris gallopavo*	N	G5	S5	–	–
Wood thrush	***Hylocichla mustelina***	**N**	**G5**	**S4B**	**Threatened**	**Special Concern**
Yellow warbler	*Setophaga petechia*	N	G5	S5B	–	–
Herpetiles						
American toad	*Bufo americanus*	N	S5	G5	–	–
Eastern garter snake	*Thamnophis sirtalis*	N	S5	G5T5	–	–
Eastern red-backed salamander	*Plethodon cinereus*	N	S5	G5	–	–
Northern leopard frog	*Rana pipiens*	N	S5	G5	–	–
Spring peeper	*Pseudacris crucifer*	N	S5	G5	–	–
Bumblebees, Butterflies, and Dragonflies						
American copper	*Lycaena phlaeas*	N	S5	G5	–	–
Black swallowtail	*Papilio polyxenes*	N	S5	G5	–	–
Cabbage white	*Pieris rapae*	I	SNA	G5	–	–
Clouded sulphur	*Colias philodice*	N	S5	G5	–	–
Common eastern bumblebee	*Bombus impatiens*	N	S4S5	G5	–	–
Common green darner	*Anax junius*	N	S5	G5	–	–
Darner species	*Aeshna* sp.	N	NA	NA	–	–
Eastern tailed blue	*Cupido comyntas*	N	S5	G5	–	–
European skipper	*Thymelicus lineola*	N	SNA	G5	–	–
Northern crescent	*Phyciodes cocyta*	N	S5	G5	–	–
Northern pearly eye	*Enodia anthedon*	N	S5	G4	–	–
Spreadwing damselfly	*Lestes* spp.	N	NA	NA	–	–
Summer azure	*Celastrina neglecta*	N	S5	G5	–	–
Tri-colored bumblebee	*Bombus ternarius*	N	S5	G5	–	–
Viceroy	*Limenitis archippus*	N	S5	G5	–	–
White-faced meadowhawk	*Sympetrum obtrusum*	N	S5	G5	–	–

Notes:

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

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

[c] Canada Species at Risk Act (Schedule))

[d] Ontario Endangered Species Act (O.Reg.230/08)

APPENDIX E

Curriculum Vitae

Education

H.B.Sc. (Env) Honours Environmental Science, University of Guelph, Guelph, ON, 2004

Certifications

MNRF Ecological Land Classification - Training Certificate, 2004

MNRF Ontario Wetland Evaluation System - Training Certificate, 2005

MNRF Butternut Health Assessor , 2011

Languages

English – Fluent

Golder Associates Ltd. – Ottawa

Terrestrial Ecologist

Gwendolyn has been providing ecological consulting services since 2004, with particular knowledge in the field of terrestrial ecology. Supported by her depth of experience, Gwendolyn thrives on anticipating and providing pro-active solutions for clients' needs as they navigate the natural environment approvals process. She is skilled at agency and community liaison, and prides herself on providing creative, efficient and positive outcomes for her clients.

Gwendolyn has authored numerous environmental impact statements, species at risk studies, natural heritage assessments, and due diligence reports for a variety of sectors, including residential development, recreational development, aggregates, energy projects (transmission lines, pipelines and renewable energy), as well as for municipalities, and federal and provincial agencies. She has also provided terrestrial ecology peer review services.

Gwendolyn's expertise is founded on years of direct in-field experience, where she gained extensive skills in identifying and understanding the ecology of Ontario's flora, fauna, and plant communities. Gwendolyn is certified in both the Ministry of Natural Resources and Forestry (MNRF) Ecological Land Classification (ELC) and Wetland Evaluation systems, as well as being an MNRF certified Butternut Health Assessor.

Employment History

Golder Associates Ltd. – Ottawa, ON

Ecologist and Project Manager (2011 to Present)

Gwendolyn is the senior ecologist located in the Ottawa office where she provides a range of terrestrial ecology services, including designing field programs and managing projects for numerous client sectors.

Stantec Consulting Ltd. – Guelph, ON

Ecologist and Project Manager (2004 to 2011)

Gwendolyn provided a range of terrestrial ecology services, including: designing and carrying out detailed field programs; natural features monitoring and species at risk surveys. Gwendolyn was also responsible for managing projects for a range of client sectors.

PROJECT EXPERIENCE – AGGREGATES

Arnott Pit
Ontario, Canada

Prepared a Natural Environment Level II report for Thomas Cavanagh Construction Ltd. according to the Aggregate Resources Act for an aggregate pit. Work included discussions with the MNRF, field studies, and authoring the final report. Integration of various studies by multiple disciplines to determine potential impacts of extraction and preparation of appropriate mitigation plans.

Rideau Road Quarry
Ottawa, ON, Canada

Prepared a Natural Environment Level II report for R.W.Tomlinson Ltd. according to the Aggregate Resources Act for a small limestone quarry expansion. Work included discussions with the MNRF, field studies, and authoring the final report. Integration of various studies by multiple disciplines to determine potential impacts of extraction and preparation of appropriate mitigation plans.

Canaan Quarry
Ontario, Canada

Prepared a Natural Environment Level I report for Cornwall Sand and Gravel according to the Aggregate Resources Act for a limestone quarry expansion. Work included a review of all published materials relating to the natural heritage features at the site, undertaking a scoped in-field review of the on-site features, and authoring the final report.

Karson Kennedy Pit
Ontario, Canada

Prepared a Natural Environment Level II report for Karson Aggregates according to the Aggregate Resources Act for a small sand pit project. Work included discussions with the MNRF, designing and undertaking the field studies, and authoring the final report. Integration of various studies by multiple disciplines to determine potential impacts of extraction and preparation of appropriate mitigation and rehabilitation plans. Worked with the Mississippi Valley Conservation Authority to develop an environmental monitoring program.

PROJECT EXPERIENCE – ECOLOGY PEER REVIEW SERVICES

City of Kingston
Kingston, Ontario, Canada

Retained by the City of Kingston to provide environmental peer review services. Reviewed an Environmental Impact Study (EIS) for the severance of a parcel of land from the Little Cataraqui Creek Conservation Area, and provided comments with respect to the adequacy of scope and appropriateness of conclusions made in the report.

County of Peterborough
Peterborough, Ontario, Canada

Retained in 2010 by the County of Peterborough to provide environmental peer review services. Reviewed Environmental Impact Studies (EIS) for residential and recreational developments within the County, and provided comments with respect to the adequacy of scope, and appropriateness of conclusions made in the reports.

County of Frontenac
Frontenac, Ontario, Canada

Retained in 2008/2009 by the County of Frontenac to provide environmental peer review services. Reviewed Environmental Impact Studies (EIS) for residential and recreational developments within the County, and provided comments with respect to the adequacy of scope, and appropriateness of conclusions made in the reports.

PROJECT EXPERIENCE – ECOLOGY

Former CFB Rockcliffe
Ottawa, Ontario, Canada

Golder provided multi-disciplinary support to the redevelopment of the former CFB Rockcliffe site to a multi-use urban development. In support of the application to the City of Ottawa by Canada Lands Company, the Natural Environment team prepared the environmental impact statement and the tree conservation report, based on the proposed development plan. The evaluation of natural heritage features for this project site included the integration of provincial and federal regulations and associated best practices for mitigation of potential impacts. Adjacent lands owned by the National Capital Commission were also reviewed as part of this project.

Capital Region Resource Recovery Centre
Ottawa, ON, Canada

Natural Environment lead for the Environmental Assessment of a new integrated waste management facility. Responsible for obtaining the required approvals from the South Nation Conservation Authority, Fisheries and Oceans Canada, and from the MNRF for species at risk (barn swallow).

Gatineau Park Trail Improvements
Chelsea, QC, Canada

Golder was retained by the National Capital Commission (NCC) to prepare an Ecological Characterization Report in support of proposed trail improvements at Trails 5, 27 and 29 within Gatineau Park (federal lands). Work included mapping of vegetation communities, a fish habitat assessment, and targeted searches for species at riskor their potential habitat along the trails.The final report outlined the existing natural environment and identified mitigation measures to be employed to protect those features from potential negative impacts.

Champlain Node Park Improvements
Ottawa, ON, Canada

Golder was retained by the National Capital Commission (NCC) to prepare an Ecological Characterization Report and Environmental Effects Evaluation (EEE) in support of proposed amenity improvements at the Champlain Node park along the Ottawa River (federal lands). Work included mapping of vegetation communities, a shoreline and fish habitat assessment, a detailed tree inventory and mapping of invasive species, a wetland assessment according to federal guidelines, and targeted botanical and wildlife surveys.The final report outlined the existing natural environment and identified mitigation measures to be employed to protect those features from potential negative impacts.

Kingston Third Crossing of the Cataraqui River
Kingston, ON, Canada

Golder was part of the team selected by the City of Kingston to assist in preparing the preliminary design for the third crossing bridge over the Cataraqui River. Golder biology worked with a multi-disciplinary team to identify potential natural environment constraints that helped to inform the proposed design. The key natural features in the Study Area included the Cataraqui River Marshes provincially significant wetland, fish habitat in the Cataraqui River, shoreline wetlands and woodlands, and potential habitat for species at risk. Golder biology provided input to the lighting design for the bridge structure that respected the sensitive nature of the area, and also provided input to the landscaping plan that incorporated micro-habitats and native species. The team worked closely with the City of Kingston and Parks Canada.

Claridge Greenbank Lands
Ottawa, ON, Canada

Golder was retained by Claridge Homes to prepare an Environmental Impact Study (EIS) and Tree Conservation report, including all necessary fieldwork, for this Site. Golder worked with the client and the City of Ottawa to address all natural environment issues at the Site, including the potential presence of Species at Risk bats and birds, as well as fish habitat in the Jock River.

Claridge Maplegrove Road
Ottawa, ON, Canada

Golder was retained by Claridge Homes to prepare an Environmental Impact Study (EIS) and Tree Conservation report, including all necessary fieldwork, for this Site. Golder worked with the client and the Ministry of Natural Resources and Forestry to provide solutions that met the clients needs as well as natural heritage policy requirements at the municipal and provincial levels. Species at Risk encountered at the Site included butternut, and the potential for Blanding's turtle which was addressed through the preparation of an Information Gathering Form.

Claridge Riverside South Lands
Ottawa, ON, Canada

Golder designed and undertook a comprehensive field program at the Site to characterize the natural features present. An Environmental Impact Statement (EIS) and Tree Conservation Report (TCR) in support of Claridge Homes' proposed residential development was then prepared which identified mitigation measures to limit potential impacts to the significant natural features identified. Those features included wetlands, headwater drainage features, woodlands, and Species at Risk including butternut.

Ottawa Police Services - South Campus
Ottawa, ON, Canada

Prepared an Environmental Impact Study (EIS) for the proposed South Campus institutional development project. Located adjacent to the Rideau River, the assessment included consideration of a number of Species at Risk, including Blanding's turtle, as well as fish habitat and surface water setbacks.

Greystone Village - Former Oblates Property
Ottawa, Ontario, Canada

Golder worked with the Regional Group on this exciting redevelopment of the historic Oblates property in Ottawa, along the Rideau River. The site was assessed for natural heritage values, and an Environmental Impact Study and Tree Conservation Report were prepared. Work included liason with the Rideau Conservation Authority and local community groups.

Species at Risk Studies - Various Projects
Various Location, Ontario, Canada

Gwendolyn has been involved in the design and undertaking of numerous studies for various Species At Risk in Ontario, and assessments of their habitats. Surveys followed accepted, standardized protocols and habitats were assessed against established criteria, where available. Species for which these types of studies have been undertaken include, but are not limited to: Fowler's Toad, Western Chorus Frog, Jefferson Salamander, Black Rat Snake, Eastern Hog-nosed Snake, Massassauga Rattlesnake, Short-eared Owl, Barn Swallow, Bobolink, Eastern Meadowlark, Peregrine Falcon, Least Bittern, West Virginia White, American Badger, Little Brown Bat and Northern Myotis, Eastern Foxsnake, Spiny Softshell, Blanding's Turtle, Butternut, American Hart's Tongue Fern, and American Ginseng, Gwendolyn has successfully navigated the over-all benefit permitting process under the Endangered Species Act for butternut and has performed work under the new O.Reg. 242/08 for American Ginseng. Gwendolyn's work with SAR has involved close liaison with the MNR, experts from academia, and involvement of public interest groups such as the Sierra Club of Canada and local Field Naturalist clubs.

O'Brien House Bat Maternity Colony Study Gatineau Park, QC, Canada	Golder was retained to assess the presence or absence of SAR bats using this historic building for maternity roosting. The study included daytime surveys to assess potential habitat and search for evidence of bats, while nighttime surveys focused on visually locating bats exiting the structure, according to standard protocols. Remote acoustic detection units were used to determine species present. Collaborated with the National Capital Commission (NCC), who is the landowner.
Connaught Range Turtle Nesting Study Ottawa, ON, Canada	Golder was retained by PWGSC to assess current SAR turtle nesting at the Connaught Range, and design a strategy to prevent future nesting, while at the same time offering alternate nesting habitat. Golder's plan was designed in consideration of rigorous shooting range requirements, while offering a safe nesting area for turtles away from the active range.
Environmental Management Plan for Urban Expansion Lands Areas 9a and 9b Ottawa, Ontario, Canada	Prepared an Environmental Management Plan (EMP) for two parcels of land, which included coordination and incorporation of materials from a number of external partners. The EMP provided a framework for future development of the area through a range of detailed studies, and included extensive consultation with City and Conservation Authority staff.
Brockville Employment Lands Brockville, Ontario, Canada	Designed a natural heritage study of a 130 acre property in the City of Brockville, with the intention of determining the potentially developable area in consideration of the natural environment features present at the Site, on behalf of the City of Brockville. Results were presented in a preliminary Environmental Impact Study for consideration as part of a Secondary Plan study for the Site.
Claridge Lands - 4789 Bank Street Ottawa, Ontario, Canada	Golder was retained by Claridge Homes to prepare an Environmental Impact Study (EIS) and Tree Conservation report, including all necessary fieldwork, for this Site. Golder worked with the client, City of Ottawa, South Nation Conservation and the Ministry of Natural Resources and Forestry to provide solutions that met the clients needs as well as natural heritage policy requirements at the municipal and provincial levels.
Remer Lands EIS and Environmental Management Plan Ottawa, Ontario, Canada	Golder provided natural heritage expertise in assisting the Regional Group to clear conditions for this draft-approved subdivision in Ottawa. This challenging project included a full inventory of the flora and fauna at the site in order to prepare an Environmental Management Plan, Environmental Impact Study and Tree Conservation Report for the site. Golder worked with the client, City of Ottawa, South Nation Conservation and the Ministry of Natural Resources and Forestry to navigate this challenging project and provide solutions that met the clients needs as well as natural heritage policy requirements at the municipal and provincial levels.
Dallan Lands - EIS Guelph, Ontario, Canada	Prepared an Environmental Impact Study for this proposed residential development. Multi-year field inventories related to flora and fauna were performed, including species at risk (Jefferson Salamander), and wetland boundaries were evaluated in co-operation with the Grand River Conservation Authority. Review of potential impacts was undertaken and presented in an Environmental Impact Statement. On-going consultation with public interest groups, University of Guelph experts, and City staff to develop a design plan in respect of complicated natural heritage features.

University of Waterloo Northwest Campus EIS
Waterloo, Ontario , Canada

Undertook a review and assessment of the natural heritage components associated with the subject lands, including floral, faunal and community investigations. The information gathered was used to create an updated Greenspace System on the subject lands and to propose trail linkages between the site and adjacent lands. Reviewed the draft plan of development in relation to the subject lands in order to identify potential environmental effects and recommend mitigation measures.

City of Hamilton Nature Counts Program
Ontario, Canada

Performed ELC within the City of Hamilton's boundary, from Ancaster to Puslinch. Designated Areas of Natural and Scientific Interest (ANSI) were inventoried for flora, fauna and disturbance level, and classified using ELC. Other tasks included air photo interpretation, field navigation and leadership.

TRAINING

Ontario Stream Assessment Protocol (OSAP) - Headwater Drainage Features
Ministry of Natural Resources and Forestry, 2017

Habitat Restoration Planning and Implementation
Northwest Environmental Training Centre, 2014

Wetland Creation Workshop
Toronto Zoo, 2010

MNRF Data Sensitivity Training
Ministry of Natural Resources and Forestry, 2014

St. John's Ambulance First Aid Training
2017

PROFESSIONAL AFFILIATIONS

Ontario Vernal Pool Association

Field Botanists of Ontario

Education

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

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

Certifications

PADI Master Scuba Diver Trainer,
2000

Small Craft Boat Operator, 2003

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

Canadian Red Cross First Aid and CPR,
2012

WHMIS Training,
1990, 2001, 2004, 2016

Languages

English – Fluent

Golder Associates Ltd. – Mississauga

Principal, Senior Ecologist

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

Employment History

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

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

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

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

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

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

PROJECT EXPERIENCE – CONSTRUCTION MATERIALS

Scotian Materials Limited
Halifax, Nova Scotia, Canada

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

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

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

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

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

Colacem Cement
L'Orignal, Ontario, Canada

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

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

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

CBM (a division of St. Marys Cement Inc. (Canada)), Lanci Pit Expansion Aberfoyle, Ontario, Canada	Project manager and natural environment technical advisor for an above water pit licence application under the ARA. Worked with the natural environment component lead to analyse, interpret and integrate terrestrial and aquatic data with hydrogeological and surface water components. Developed a rehabilitation plan, consulted with the Grand River Conservation Authority, the MNRF, the municipality, and participated in agency and public consultation. Coordinated and managed the activities of a multi-disciplinary team including hydrogeologists, surface water engineers, noise scientists, archaeologists, and an Indigenous Community engagement team. Managed and tracked overall project budget and schedule.
Cavanagh Construction Ltd., Henderson II Quarry Ottawa, Ontario, Canada	Natural environment component lead for a below water quarry licence application under the ARA. Coordinated aquatic and terrestrial field data collection and analysis, interpreted and integrated data with hydrogeological and surface water components and completed a comprehensive integrated impact assessment. Developed a rehabilitation plan, participated in agency and public consultation and developed an NEL 1/2 report and municipal EIS report. Led negotiations with the MNRF regarding SAR issues and developed compensation plans.
Tackaberry Sand and Gravel Ltd., Perth Quarry Perth, Ontario, Canada	Natural environment component lead for a below water quarry licence application under the ARA. Coordinated aquatic and terrestrial field data collection and analysis, interpreting and integrated data with hydrogeological and surface water components. Developed a rehabilitation plan, participated in agency and public consultation and developed an NEL 1/2 report and municipal EIS. Led negotiations with the MNRF regarding SAR issues and developed compensation plans for the removal of habitat. Worked with Rideau Valley Conservation Authority and Mississippi Valley Conservation Authority on headwater drainage feature assessment and mitigation plans.
Greenfield Aggregates Sherk Pit Waterloo, Ontario, Canada	Natural environment component lead for a below water pit licence application under the ARA. Analysed and integrated terrestrial and aquatic data with hydrogeological and surface water components, completed a comprehensive and integrated impact assessment. Developed a rehabilitation plan and an NEL 1/2 report and municipal EIS report. Participated in consultation with the Region and the Ecological and Environmental Advisory Committee (EEAC).
Lafarge Canada Inc., French Settlement Pit Ottawa, Ontario, Canada	Natural environment component lead for a below water pit licence application under the ARA. Coordinated aquatic and terrestrial field data collection and analysis. Interpreting and integrated data with hydrogeological and surface water components. Developed a progressive and final rehabilitation plan and an NEL 1/2 report and municipal EIS report. Consulted with regulatory agencies and participated in public consultation process.
Lafarge Canada Inc., Sunningdale Pit London, Ontario, Canada	Natural environment component lead for a below water pit licence application under the ARA. Coordinated aquatic and terrestrial field data collection and analysis. Interpreting and integrated data with hydrogeological and surface water components. Completed a comprehensive and integrated impact assessment. Developed a progressive and final rehabilitation plan and an NEL 1/2 report and EIS. Consulted with regulatory agencies and participated in public consultation process. Developed mitigation and habitat compensation plans under the ESA for barn swallow.

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

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

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

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

Floyd Preston Ltd.
Eastern Ontario, Canada

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

PROJECT EXPERIENCE – SPECIES AT RISK

EWL Management Ltd Madawaska Mine Decommissioning
Faraday, Ontario, Canada

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

TransCanada - Various Sites in Ontario
Ontario, Canada

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

Lafarge Canada Ltd.
Various Locations, Ontario, Canada

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

Leader Resources Services Ltd.
Various Locations, Ontario, Canada

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

Lafarge Canada Ltd.
Various Locations, Ontario, Canada

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

PROJECT EXPERIENCE – SERVICING/INFRASTRUCTURE

Peel Wastewater Treatment Plan
Region of Peel, Ontario, Canada

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

Niagara Falls Wastewater Servicing Strategy
Niagara Falls, Ontario, Canada

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

Clarksburg Master Servicing Plan
Clarksburg, Ontario, Canada

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

Cambridge Zone 3
Cambridge, Ontario, Canada

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

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

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

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

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

PROJECT EXPERIENCE – WASTE

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

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

Humberstone Landfill
Niagara, Ontario, Canada

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

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

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

PROJECT EXPERIENCE – MINING

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

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

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

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

PROJECT EXPERIENCE – OIL & GAS

Enbridge Bayview Avenue Pipeline Replacement
Ontario, Canada

Natural environment component lead for pipeline replacement project. Coordinated SAR screening, natural heritage feature mapping, site investigations, impact assessment, tree inventory, DFO self-assessment, consultation with MECP, registration of activities (NoA) under the Endangered Species Act and development of mitigation plan. Worked with team to obtain Toronto and Region Conservation Authority (TRCA) permits.

Enbridge Pipelines Inc. Line 9
Southern Ontario, Canada

Project manager for natural environment component of pipeline maintenance project in southern Ontario. Coordinated SAR screening and natural heritage feature mapping, site investigations, identification of permit requirements and constraint mapping in support of brushing and other maintenance activities.

TransCanada Bear Creek Rehabilitation Ontario, Canada	Natural environment component lead for Bear Creek rehabilitation following washout and exposure of the pipeline in the creek bed. Completed baseline existing conditions reporting including fish and fish habitat, SAR and riparian habitat to meet Conservation Authority, MNRF and DFO requirements. Worked with Golder's hydrology team to obtain Conservation Authority permits, develop a rehabilitation plan suitable for the existing conditions and fish community, and recommended appropriate mitigation during construction.
TransCanada Greater Golden Horseshoe Facilities Modifications Ontario, Canada	Natural environment component lead for an environmental and socio-economic assessment for modifications to a number of facilities under the National Energy Board (NEB). Responsibilities included designing the field program (vegetation, wetlands, wildlife, fish and fish habitat), analysing data, completing the baseline and effects assessment, liaising with agencies and permitting.
TransCanada Eastern Mainline Project Ontario, Canada	Vegetation and wetland component lead for an environmental and socio-economic assessment for a 392 km new construction pipeline in southern Ontario under the National Energy Board (NEB). Designed the field program, analysed data, completed the baseline and effects assessment and reporting. Consulted and negotiated with the MNRF, Environment and Climate Change Canada (ECCC) and local Conservation Authorities, prepared permit applications, and addressed Information Requests (IRs).
TransCanada Parkway West Connection Milton, Ontario, Canada	Natural environment component lead for an environmental and socio-economic assessment for a new pipeline connection under the NEB. Designed the field program (vegetation, wetlands, wildlife, fish and fish habitat), analysed data, completed the baseline and effects assessment, led consultation with agencies and obtained permits.
TransCanada Vaughan Mainline Extension Ontario, Canada	Senior technical reviewer and advisor for the vegetation, wetland and wildlife components for an environmental and socio-economic assessment for a new construction pipeline in southern Ontario under the NEB. Consulted with provincial and federal agencies, designed and coordinated baseline, construction and post-construction monitoring programs and developed environmental protection plans.
TransCanada Kings North Connection Ontario, Canada	Senior technical reviewer and advisor for the vegetation, wetland and wildlife components for an environmental and socio-economic assessment for a new construction pipeline in southern Ontario under the NEB. Consulted with provincial and federal agencies, designed compensation habitat for SAR, designed and coordinated baseline, construction and post-construction monitoring programs and developed environmental protection plans.
TransCanada LNG Facility Trois Rivieres, Quebec, Canada	Aquatic technical component lead. Designed and conducted inland fisheries field programs for a liquefied natural gas facility and associated distribution pipelines. The programs included aquatic habitat assessments of all watercourse pipeline crossings, and an assessment of habitat and water quality of inland lakes in the vicinity of the facility. Interpreted data and prepared technical reports.

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