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REPORT ON

Environmental Impact Statement in Support of the Proposed Development of 3370 Greenbank Road, Ottawa, Ontario

Submitted to:

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Ottawa, Ontario
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Attention: Mr. Jim Burghout

REPORT



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Table of Contents

1.0 INTRODUCTION.....	1
1.1 Site Description	1
2.0 ENVIRONMENTAL POLICY CONTEXT	1
2.1 Provincial Policy Statement	2
2.2 City of Ottawa	2
2.3 Species at Risk.....	3
2.3.1 Species at Risk Act (SARA).....	3
2.3.2 Endangered Species Act (ESA).....	3
2.4 Fisheries Act.....	3
2.5 Migratory Birds Convention Act	3
2.6 Rideau Valley Conservation Authority	4
3.0 DESCRIPTION OF DEVELOPMENT PROPOSAL	4
4.0 METHODS	5
4.1 Background Review.....	5
4.2 SAR Screening	6
4.3 Site Investigations	6
4.3.1 Fish and Fish Habitat.....	7
4.4 Analysis of Significance and Sensitivity.....	7
5.0 SITE DESCRIPTION.....	7
5.1 Ecosystem Setting.....	7
5.2 Geology and Hydrogeology	7
5.3 Ecological Land Classification	8
5.3.1 Plant Communities.....	8
5.3.2 Vascular Plants.....	8
5.4 Wildlife.....	8
5.5 Fish and Fish Habitat.....	8
5.5.1 Jock River	8
5.5.2 Municipal Drains	9



ENVIRONMENTAL IMPACT STATEMENT

3370 GREENBANK ROAD

6.0 ASSESSMENT OF SIGNIFICANT NATURAL HERITAGE FEATURES.....	9
6.1 Habitat of Endangered or Threatened Species.....	9
6.2 Significant Wetlands and Coastal Wetlands	10
6.3 Fish Habitat	10
6.4 Significant Woodlands	12
6.5 Significant Valleylands.....	12
6.6 Significant Areas of Natural or Scientific Interest (ANSIs)	12
6.7 Significant Wildlife Habitat	12
6.7.1 Migration Corridors	12
6.7.2 Seasonal Concentration Areas	13
6.7.3 Rare or Specialized Habitats	15
6.7.4 Habitat for Species of Conservation Concern	16
7.0 POTENTIAL INDIRECT IMPACTS.....	17
7.1 Construction Impacts.....	17
7.2 Human Impacts	17
8.0 MITIGATION AND MONITORING.....	18
8.1 Significant Natural Features	18
8.2 Construction Best Management Practices.....	19
8.3 Light, Dust and Noise	19
8.4 Monitoring.....	19
9.0 CUMULATIVE EFFECTS	19
10.0 CONCLUSIONS AND RECOMMENDATIONS	20
10.1 Net Impacts	20
10.2 Policy Compliance	20
10.3 Recommendations.....	20
11.0 LIMITATIONS AND USE OF REPORT	21
12.0 CLOSURE	22
13.0 REFERENCES	23



TABLES

Table 1: Summary of Natural Environment Site Investigations in the Study Area6
Table 2: Plant Communities at the Site8

FIGURES

- Figure 1: Key Plan
- Figure 2: Ecological Land Classification and Significant Natural Features
- Figure 3: Proposed Development

APPENDICES

APPENDIX A

Species at Risk Screening

APPENDIX B

Wildlife Recorded from the Site

APPENDIX C

Vascular Plants Recorded from the Site

APPENDIX D

Tree Conservation Report (Golder, 2018)

APPENDIX E

Headwater Drainage Features Assessment (Bowfin and Muncaster, 2016)

APPENDIX F

Curriculum vitae



1.0 INTRODUCTION

Golder Associates Ltd. (Golder) was retained by Claridge Homes (South Nepean) Inc. (Claridge) to complete an Environmental Impact Statement (EIS) for the property at 3370 Greenbank Road, known as the Burnett Lands (the Site; Figure 1), adjacent to the Jock River in Ottawa, Ontario.

This report has been prepared in accordance with the EIS guidelines presented in the City of Ottawa Official Plan (OP) (Ottawa, 2015; 2013). Appendix D to this report is a Tree Conservation Report (TCR) (Golder, 2018) which has been prepared for the Site in accordance with the City's Tree Conservation Report Guidelines (Ottawa, 2014). Appendix E to this report is a Headwater Drainage Features Assessment prepared for the Site (Bowfin and Muncaster, 2016). Both of these reports should be read in conjunction with this report.

It should be noted that this report has been prepared in order to support Draft Plan of Subdivision approval. An update to this report, which incorporates additional studies as required, should be a condition of Final Approval. Additional details include gathering data on the presence / absence of Species at Risk (SAR) at the Site, and considering those results in light of the final design of the proposed development.

A Terms of Reference (ToR) for this study was sent to the City of Ottawa and Rideau Valley Conservation Authority (RVCA) for their review and comment. Their respective comments were addressed and or / included in this report, as appropriate.

1.1 Site Description

At the time of authoring this report, the Site consisted of 15.5 ha of active agricultural lands, including scattered trees. The Site is located immediately adjacent to the Jock River, and is traversed by smaller surface water features including the Burnett Municipal Drain and the Fraser Clark Municipal Drain, both flowing into the Jock River. Surrounding land uses consist of active agriculture and urban residential lands, including a school complex immediately to the east across Greenbank Road. There are also small areas of natural riparian habitat along the Jock River close to the Site.

2.0 ENVIRONMENTAL POLICY CONTEXT

The Site 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 included the following:

- Provincial Policy Statement (MMAH, 2014)
- City of Ottawa Official Plan (OP; Ottawa, 2013)
- *Endangered Species Act* (Ontario, 2007)
- *Species at Risk Act* (Canada, 2002)
- *Fisheries Act* (Canada, 1985)
- *Migratory Birds Convention Act* (Canada, 1994)
- Ontario Regulation 174/06 Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses (Ontario, 2006), administered by the RVCA

An overview of the above noted legislation and policy documents is discussed below.



2.1 Provincial Policy Statement

The Provincial Policy Statement (PPS) was issued under Section 3 of the *Planning Act* (MMAH, 2014).

The natural heritage policies of the PPS indicate that:

2.1.4 Development and site alteration shall not be permitted in:

- 3.0 Significant wetlands in Ecoregions 5E, 6E and 7E
- 4.0 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.

2.2 City of Ottawa

Proponents are required, under the City OP (Ottawa, 2013), to prepare an EIS following the City guidelines (Ottawa, 2015), which documents the occurrence of significant natural heritage features in, and adjacent to, the proposed development area. The policies in the OP address both natural features and natural functions.

The Site is designated as Mixed Use Centre with Town Centre Overlay and Major Open Space on Schedule B (Urban Policy Plan) of the City OP. The Site is designated as Mid Rise Residential and District Park on Schedule 1 (Land Use Plan, South Nepean Secondary Plan).



2.3 Species at Risk

2.3.1 Species at Risk Act (SARA)

At the federal level, species at risk 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, 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) (Canada, 2002). On private or provincially-owned lands, only aquatic species and migratory birds listed as endangered, threatened or extirpated are protected under SARA, unless ordered by the Governor in Council.

2.3.2 Endangered Species Act (ESA)

Species at risk 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 Natural Resources and Forestry, species are added to the provincial *Endangered Species Act* (ESA) that 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 provides general habitat protection to all species listed as threatened or endangered. 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. There are exemptions under the Act for the treatment of certain species and their habitats for some activities.

2.4 Fisheries Act

The purpose of the *Fisheries Act* (Canada, 1985) is to maintain healthy, sustainable and productive Canadian fisheries through the prevention of pollution, and the protection of fish and their habitat. Fisheries and Oceans Canada (DFO) has project screening, reporting and mitigation tools that make regulatory requirements clear and consistent.

Projects affecting waterbodies supporting Canada's commercial, recreational and Aboriginal (CRA) fisheries must comply with the provisions of the *Fisheries Act*. The proponent is responsible for determining if the project is likely to cause impacts to CRA fisheries and if these impacts can be avoided or mitigated, but a request for project review can also be submitted to DFO if the proponent is unsure, or the project or works do not easily fall into prescribed DFO categories. The proponent must gather information on the type and scale of impact on the fishery and determine if the impacts will result in serious harm to fish. Proponents have a duty to maintain records of self-assessments completed for projects they undertake, and need to provide this information to DFO upon request. Serious harm to fish is defined as the death of fish and/or any permanent alteration to, or destruction of, fish habitat. If it is determined that the impacts cannot be avoided or mitigated and will result in serious harm to fish, an application for authorization must be submitted to the DFO. Projects that have the potential to obstruct fish passage or affect flows needed by fish also require an authorization, even if these occur outside of CRA fishery areas.

2.5 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.



2.6 Rideau Valley Conservation Authority

The Rideau Valley Conservation Authority (RVCA) is the governing body that regulates flood potential and natural heritage features in the Rideau River watershed. Development within regulated areas is governed by Regulation 174/06 *Development, Interference with Wetlands and Alterations to Shorelines and Watercourses* (Ontario Legislative Assembly, 2006). Regulation 174/06 was derived under the authority of Ontario Regulation 97/04 and is specific to the RVCA.

Under Ontario Regulation 97/04 a regulation may:

- a) Restrict and regulate the use of water in or from rivers, streams, inland lakes, ponds, wetlands and natural or artificially constructed depressions in rivers or streams.
- b) Prohibit, regulate or require the permission of the authority to straighten, change, divert, or interfere in any way with the existing channel of a river, creek, stream or watercourse, or change or interfere in any way with a wetland.
- c) Prohibit, regulate or require the permission of the authority for development if, in the opinion of the authority, the control of flooding, erosion, dynamic beaches, or pollution, or the conservation of land may be affected by the development.

Development is not necessarily restricted within the RVCA regulated area; however, it designates an area that triggers the need for a permit and, in most cases, an accompanying EIS.

Development of portions of the Site, within RVCA regulated areas, will require a permit from the RVCA under the *Development, Interference with Wetlands and Alterations to Shorelines and Watercourses* regulation.

3.0 DESCRIPTION OF DEVELOPMENT PROPOSAL

The proposed development includes 667 residential units (247 townhomes and 420 apartment units). The townhomes will consist of two- to three-storey town houses with rear lane access. The apartment units will be divided between three buildings on two high-rise residential blocks, one of which will be designated as a seniors' residence. Official Plan amendments are required to permit the proposed High-Rise Residential Blocks and to make some other changes to the land use schedule, and other schedules to address the elimination and changes to the road fabric.

The proposed development also includes a setback area to the Jock River and Fraser Clark Municipal Drain, where no development will take place. This area will remain undeveloped until such time as the City of Ottawa begins development of this area as a park. The setbacks from surface water and watercourses are guided by policies in Section 4.7.3 of the City of Ottawa OP. The setback is generally governed by the greater of the constraints listed under Section 4.7.3 (Policy 2a), which in this case is the Floodplain Overlay in the current Zoning By-Law. Minor modifications have been proposed to the floodplain to implement the road configuration and lot fabric shown on the Land Use Schedule 1 in the South Nepean Town Centre Community Design Plan (CDP) (Ottawa, 2006a). As per Section 4.7.3 (Policy 14), a Cut and Fill application has been submitted to permit the minor floodplain boundary alternation within the Site. Land under the Floodplain Overlay will remain as park/open space and is to be acquired by the City at the time of Subdivision Registration. In addition, the proposed subdivision aligns with the Schedule B of the Official Plan and Schedule 1 of the South Nepean Secondary Plan, which identifies the floodplain area along Jock River as Major Open Space and District Park, respectively. A third surface water feature, the Burnett Municipal Drain, will be re-directed to the west, around the boundary of the Site, connecting with the existing outlet for the adjacent existing stormwater management pond (KB Pond), to ensure flows to the Jock River are maintained.



Storm servicing for the Site will be provided using a dual drainage system: Runoff from frequent events will be conveyed by storm sewers (minor system), while flows from large storm events which exceed the capacity of the minor system will be conveyed overland along defined overland flow routes (major system), as detailed in Novatech (2016a). Inlet control devices (ICDs) will be installed in all catchbasins to limit inflows to the minor system during large (>1:5 year) storm events. The Site will be graded to provide an engineered overland flow route (major system) for large, infrequent storms or in the event that the storm sewer system becomes obstructed. Flows will be directed to the Jock River at the low point in the system, after flowing through a Vortechs unit for water quality treatment. Stormwater flows will be directed to the Jock River via a stormwater outlet. Design of the outlet will be undertaken at the detailed design stage.

An Environmental Assessment for the realignment of Greenbank Road has been approved by the City (May 2006). The realigned Greenbank Road will bisect the Site. City OP Annex 1 states that the realigned Greenbank Road will be an arterial road, and requires 41.5 right-of-way (ROW). On the Draft Plan for the proposed development of 3370 Greenbank Road, the 41.5m ROW will be shown as a new public road to be dedicated at the time of registration. This area will remain undeveloped as part of this proposed development, until such time as the City of Ottawa begins work on the realignment project. The required realigned Greenbank Road ROW is more than the protected ROW indicated in the City OP. This additional land will be shown as blocks on the plan of subdivision to be acquired at the time of registration by the City.

4.0 METHODS

4.1 Background Review

Background data reviewed for this project included existing documents and a number of information sources. The review was also used to identify SAR that have been reported as occurring in the local landscape surrounding the Site, or have the potential to occur. Sources reviewed included:

- MNRF Natural Heritage Information Centre (NHIC) Biodiversity Explorer (MNRF, 2016a) for information on known occurrences of SAR and other significant natural features
- Rideau Valley Conservation Authority – Jock River Subwatershed Report (RVCA 2010)
- Atlas of Breeding Birds of Ontario (Cadman et al., 2007)
- Atlas of the Mammals of Ontario (Dobbyn, 1994)
- Ontario Reptile and Amphibian Atlas (Ontario Nature, 2015)
- Ontario Butterfly Atlas (Jones et al., 2015)
- Bat Conservation International (BCI) range maps (BCI, 2013)
- MNRF Land Information Ontario (LIO) mapping (LIO, 2014)
- City of Ottawa OP (Ottawa, 2013)
- Existing aerial photography

The MNRF and the RVCA were contacted by e-mail in order to obtain information on rare species, fish community data, and significant natural features on the Site in September 2016, respectively. Information provided by both agencies has been considered in this report.



4.2 SAR Screening

An assessment was conducted to determine which species listed under the SARA or ESA have the potential to be located in the study area. The potential for SAR to occur was assessed based on species range information, known records, review of the habitat observations made during the site investigations, historic land use practices, and the preferred habitat requirements of these species. Species with ranges overlapping the study area, or recent occurrence records in the vicinity, were screened by comparing their habitat requirements to habitat conditions in the study area.

The potential for the species to occur was determined through a probability of occurrence. A ranking of low indicates no suitable habitat availability for that species in the study area and no specimens identified. Moderate probability indicates more potential for the species to occur, as suitable habitat appeared to be present in the study area, but no occurrence of the species recorded. High potential indicates a known species record in the study area (including during site investigations or background data review) and good quality habitat is present. The rankings were based on observations made during the site investigations and background review.

4.3 Site Investigations

The following sections outline the methods used for each of the site investigations conducted in the study area. Surveys were limited to the Site, surrounding areas with public access, and areas visible from public areas such as roads. During all survey events, visual encounter surveys (VES) were conducted for any additional wildlife, plant, and habitat observations. 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.

Table 1: Summary of Natural Environment Site Investigations in the Study Area

Year	Date	Type of Survey
2016	March 17	VES, Botanical Survey (trees)
	September 9	Ecological Land Classification, Botanical Survey, VES

Ecological Land Classification and Habitat Assessment

Plant communities were first delineated at a desktop level using aerial imagery and existing reports, then further assessed in the field using the Ecological Land Classification (ELC) system for Southern Ontario (Lee *et al.*, 1998; Lee, 2008) (Figure 2). The survey was carried out by systematically traversing the study area, where access was available, for a thorough survey of species and plant communities. During all site investigations, information on plant community structure and composition was recorded in order to refine the plant community polygons. Based on the ELC polygons, potential habitats for SAR were searched for and suitability was assessed.

Botanical Surveys

Botanical surveys were completed concurrent with the ELC survey and included area searches in all accessible habitats in the study area, where access was available. A list of all plant taxa identified during the surveys was compiled. Plants that were obviously planted for landscape purposes were not included in this inventory. However, those landscape species or cultivars that appeared to be naturalized or escapees were included. The location of any SAR plants was recorded using a hand-held GPS unit.



Wildlife Visual Encounter Surveys

VES for all wildlife, including herpetiles, mammals, birds, butterflies and dragonflies, were conducted throughout the study area, where access was available. This included direct observations and a search for tracks and other signs (e.g., scat, tree scrapes, vocalizations, predated turtle nests etc.). In addition, attention was paid to searching for suitable wildlife habitat and micro-habitats (e.g., hollow trees, talus, vernal pools, etc.). Targeted surveys for wildlife were not conducted since surveys took place outside of the timing windows for most taxa. A list of all wildlife observations was compiled.

4.3.1 Fish and Fish Habitat

No aquatic field surveys were undertaken as the Jock River and Fraser Clark Municipal Drain have been highly studied in recent years. General observations on the shoreline and near-shore conditions were made during the site investigations. Detailed assessments of the Burnett Municipal Drain were undertaken by Bowfin and Muncaster (2016).

4.4 Analysis of Significance and Sensitivity

An assessment was conducted to determine the significance and sensitivity of designated features as well as significant species observed in the study area or determined to have potential to exist in the study area as inferred from the SAR screening. The assessment was completed by comparing natural environment data collected through background material and site investigations 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).

5.0 SITE DESCRIPTION

5.1 Ecosystem Setting

The Site lies within the Jock River subwatershed, which drains a total area of 555 km². The Barrhaven Catchment, located at the confluence of the Jock River with the Rideau River, has a drainage area of 31.6 km² and a total length of 58.5 km (RVCA, 2010).

5.2 Geology and Hydrogeology

The Site lies within the Ottawa Valley Clay Plains physiographic region (Chapman and Putnam, 1984), which is interrupted by ridges of rock or sand. The subsurface conditions on this Site generally consist of silty clay overlying glacial till at depths varying from about 3.1 metres on the north part of the Site and to more than 8.2 metres beneath the west part of the Site (Golder, 2016). The groundwater levels at the Site were measured at about 0.91 to 2.17 metres depth (Golder, 2016); however, there could be higher groundwater levels during wet periods of the year.



5.3 Ecological Land Classification

5.3.1 Plant Communities

Three plant communities were observed on the Site. These communities are shown on Figure 2 and summarized in Table 2.

Table 2: Plant Communities at the Site

Plant Community	Description
AGRC- Row Crop	These fields make up the majority of the Site, and were planted with corn in 2016. Within these fields are hedgerows and scattered trees with species such as white ash (<i>Fraxinus americana</i>) and white elm (<i>Ulmus americana</i>). Both of these species are generally in poor shape throughout the Site and appear to be impacted by disease and pests such as the emerald ash borer (<i>Agrilus planipennis</i>).
CUM1-1 Mixed Meadow	This is a disturbed meadow in the area of the abandoned farmyard. It is a mix of forbs and grasses such as Canada goldenrod (<i>Solidago canadensis</i>) and smooth brome (<i>Bromus inermis</i>). There are areas of landscaping debris and junk piles throughout, possibly a remnant of past land uses. There are scattered trees and shrubs, especially along the river where species such as bur oak (<i>Quercus macrocarpa</i>), and common buckthorn (<i>Rhamnus cathartica</i>) occur. Within the floodplain of the river is a mix of wetland water tolerant species such as green bulrush (<i>Scirpus atrovirens</i>), and nodding beggar-ticks (<i>Bidens cernua</i>).
RES Residential/Parkland	On the Site this includes the former location of a farm, and lawn areas. Much of this area is becoming naturalized and there are scattered trees and shrubs, especially along the river.

5.3.2 Vascular Plants

A total of 108 taxa of vascular plants was identified on the Site. For a list of plants observed refer to Appendix B. No SAR, provincially rare, or regionally significant species were observed.

5.4 Wildlife

For a list of wildlife observed during surveys refer to Appendix C. Wildlife observed included common species such as song sparrow (*Melospiza melodia*), and white-tailed deer (*Odocoileus virginianus*). No SAR, provincially rare, or regionally significant species were observed. Given that surveys were outside of the ideal period for most wildlife, the species list should not be considered complete, and does not necessarily represent the breeding wildlife community on the Site.

5.5 Fish and Fish Habitat

5.5.1 Jock River

The Jock River is a warmwater habitat that is known to support up to 40 species of fish. Common species include northern pike (*Esox lucius*), greater redhorse (*Moxostoma valenciennesi*), northern redbelly dace (*Phoxinus eos*), common shiner (*Luxilus cornutus*), fathead minnow (*Pimephales promelas*), brown bullhead (*Ameiurus nebulosus*), walleye (*Stizostedion vitreum vitreum*), and brook stickleback (*Culaea inconstans*). The fish community is primarily composed of warm and cool-water species, but cold-water species such as mottled sculpin (*Cottus bairdi*), pearl dace (*Margariscus margarita*) and spottail shiner (*Notropis hudsonius*) also occur (RVCA, 2010).



Over 80% of this catchment is characterized by runs and substrates of bedrock (25%), sand (14%), gravel (11%) and cobble (10%). Instream vegetation is low (<25%) throughout most of the catchment and primarily composed of submergent plants, narrow-leaved emergents, and algae (RVCA, 2010). Overall water quality in the catchment is assessed as fair. Approximately 60% of the catchment is characterized as natural with some significant human alteration (RVCA, 2010).

In the immediate area of the Site, the Jock River is characterized by areas of low flow that are heavily vegetated, areas of rapid flow, and a larger deep pool just downstream of the existing Greenbank Road bridge. All of these areas provided important habitat for various fish species (Niblett, 1995).

5.5.2 Municipal Drains

5.5.2.1 Fraser Clark Municipal Drain

This watercourse is a large drain that outlets into the Jock River adjacent to the Site. The morphology of the stream was described as flat, with substrates that are a mix of clay, silt and much (Ecoplans, 2006). In-stream cover included patches of vegetation such as grasses and other emergent plants, and water was described as visually turbid (Ecoplans, 2006).

Fish community surveys were conducted in 1992 and a total of eight (8) species were captured (Niblett, 1993). This includes banded killifish (*Fundulus diaphanus*), blacknose shiner (*Notropis heterolepis*), brook stickleback, creek chub (*Semotilus atromaculatus*), fathead minnow, pearl dace, pumpkinseed (*Lepomis gibbosus*), rock bass (*Ambloplites rupestris*), and white sucker (*Catostomus commersonii*). The mouth of this drain, where it meets the Jock River, has previously been identified as potential northern pike and muskellunge (*Esox masquinongy*) spawning area (Niblett, 1995).

5.5.2.2 Burnett Municipal Drain

It is not known whether the Burnett Municipal Drain supports a fish community or the quality of its habitat. Ecoplans (2006) describes it as an altered straightened agricultural drain but provides no additional information regarding fisheries potential. Bowfin and Muncaster (2016) undertook fish community sampling within the drain, with no catch resulting. The conclusion from that study was that this drain offers no direct fish habitat, but contributes to the fish habitat downstream in the Jock River. Upstream of the Site, a portion of the drain is piped under an existing driving rage for approximately 170 m.

6.0 ASSESSMENT OF SIGNIFICANT NATURAL HERITAGE FEATURES

6.1 Habitat of Endangered or Threatened Species

The following discussion of provincially endangered or threatened species is based on the SAR screening provided in Appendix A. Species with a low probability to occur in the Site are included in the screening, but are not discussed further in this report. Each of the species listed below has the potential to inhabit the Site, based on the desktop SAR screening and the results of the site investigations.

Barn Swallow

Barn swallow (*Hirundo rustica*) is designated as threatened under the ESA and SARA, and as such is provided species and habitat protection. This species primarily nests on anthropogenic structures, such as buildings and bridges. The Site does not contain buildings that may be suitable nesting habitat for this species, although individuals were seen foraging over the Jock River. As no suitable nesting habitat is present, no further study or assessment is warranted.



Small-footed Myotis, Little Brown Myotis and Northern Myotis

Small-footed myotis (*Myotis leibii*), little brown myotis (*Myotis lucifugus*) and northern myotis (*Myotis septentrionalis*) are designated as endangered under the ESA and SARA, and are therefore provided species and habitat protection. The Site contains large cavity trees that may provide suitable maternity roost habitat for these species (Figure 2), and the overall Site provides suitable foraging habitat. There are no potential hibernacula on the Site, as these species typically over-winter in caves or mines.

No site investigations were performed during the optimal timing windows for surveying for these species. Based on review of the proposed development plan, three potential bat habitat trees along the northern boundary of the Site and the single tree in Block 20 will need to be removed (Trees #14, #15, #23 and #33 as shown on Map 1 in Appendix D). Further study is required during the appropriate season (June / July 2018) to confirm the use of these trees by these bat species. If these species are confirmed using these trees as maternity roost habitat, appropriate mitigation measures and permitting of the activity under the ESA will be required.

The potential bat habitat trees within the open space areas along the Jock River and the future alignment of Greenbank Road will remain in place until the City of Ottawa develops those lands.

6.2 Significant Wetlands and Coastal Wetlands

Wetlands are evaluated by the MNRF according to evaluation procedures established by the province, specifically, the Ontario Wetland Evaluation System (MNRF, 2013c). Through this evaluation, wetlands are designated either provincially significant (PSW) or non-provincially significant (non-PSW). Coastal wetlands are located on the shores of the Great Lakes, or their connecting channels. No provincially significant wetlands or coastal wetlands are identified in the study area.

6.3 Fish Habitat

Projects affecting waterbodies supporting Canada's CRA fisheries must comply with the provisions of the *Fisheries Act*. To assess the implications of the *Fisheries Act*, fish habitat impacts are described in terms of direct, on-site habitat and indirect, off-site effects of the proposed project.

The Jock River and the Fraser Clark Municipal Drain are considered fish habitat. These features will not be directly impacted by the proposed development as setbacks are applied to them as part of the proposed development (Figure 3). The setback to the Jock River is between 34 m and 164 m wide, while the setback to the Fraser Clark Municipal Drain is 57 m wide. The setback area will be improved from its current condition as the area naturalizes as a result of no longer being under cultivation / lawn. These setbacks are sufficient to mitigate any direct harm to the fish habitats these surface water features provide from the proposed development. Any potential indirect impacts will be mitigated appropriately, as discussed in Section 9.

The Burnett Municipal Drain was assessed by Bowfin and Muncaster (2016) as part of a Headwater Drainage Features Assessment (HDFa), according to the Evaluation, Classification and Management of Headwater Drainage Features Guidelines (CVC/TRCA, 2014). Through that assessment, it was determined that this feature does not represent direct fish habitat, but it does contribute to the fish habitat present in the Jock River (contributing flows and materials). The proposed development will involve re-routing this feature around the proposed development, which will require a permit from the RVCA. According to the HDFa, the management recommendation for this feature was "Mitigation", which allows for replicating the existing function through use of bio-swales or vegetated swales, low-impact development strategies, or constructed wetlands. As the proposed development will not remove this feature, but rather simply re-route it, no mitigation measures are



proposed. Details with respect to the design of the re-routed channel will need to be negotiated with the RVCA, and will require a Development, Interference with Wetland and Alterations to Shorelines and Watercourses permit from the RVCA. A permit from the City's Municipal Drains Office will also be required.

Based on the proposed grade raises for this Site, which is anticipated to be in the order of about 1.7 metres above the existing ground surface, the foundations of the proposed residential dwellings are expected to be founded above the groundwater table. Therefore, limited groundwater inflow into the basement excavations would be expected. The excavations for the Site servicing will likely extend below the groundwater table. Higher groundwater inflows should be expected from the more permeable sandy layers within the glacial till, and passive dewatering may be required to prevent destabilization (i.e., disturbance) of the excavation base and side slopes. However, it is anticipated that the duration of pumping will be short, and all pumped water will be managed to remove suspended solids to acceptable levels prior to discharge to the existing storm sewer system. In view of the low hydraulic conductivity of the silty clay, and the distance of the work from the river bank (i.e., no development has been planned within the flood plain), impacts to the Jock River are not anticipated from the excavations and pumping.

Long-term groundwater level lowering at this Site could lead to overstressing of the silty clay and the settlement of overlying structures. Impervious dykes or cut-offs should be constructed at 100 m intervals in the service trenches to reduce groundwater lowering at the Site due to the "french drain" effect of the granular bedding and surround for the service pipes. It is important that these barriers extend from trench wall to trench wall and that they fully penetrate the granular materials to the trench bottom. The dykes should be at least 1.5 m wide and could be constructed using relatively dry (i.e., compactable) grey brown silty clay from the weathered zone.

Based on the above, and provided that recommendations for the impervious dykes or cut-offs are followed, no long-term impacts to groundwater levels, or water levels or water quality in the Jock River, are expected as result of the proposed development.

The proposed stormwater management system, as noted, will outlet to the Jock River at one location. The system has been designed to treat water entering the river using a Vortechs hydrodynamic separator unit at the outlet, which will ensure an enhanced level of water quality (80% TSS removal) entering the river. No quantity control is required since potential outflows from the Site are insignificant in comparison to the volume of flows in the river. Physical effects of discharging stormwater to the river, such as bank erosion or bed scour, must be mitigated, and will be considered during the detailed design stage. Depending upon final design, the construction of the outlet may be considered a permanent alteration of fish habitat under the *Fisheries Act*. As such, a Request for Review may need to be completed and submitted to DFO in order to determine if an Authorization under the *Fisheries Act* is required.

In addition to the Request for Review, the installation of the outlet will require a Development, Interference with Wetland and Alterations to Shorelines and Watercourses permit from the RVCA.



6.4 Significant Woodlands

Significant woodlands are to be defined and designated by the local planning authority (MNRF, 2010), which in this case is the City of Ottawa. According to the PPS, significant woodlands are to be identified using criteria established by the MNRF in the Natural Heritage Reference Manual (NHRM) for Policy 2.3 of the PPS (MNRF, 2010). The City has updated their OP policies as they relate to determining woodland significance in the Urban Area to be in conformity with the direction given in the PPS. The revised policies indicate that woodlands within the Urban Area are significant if:

- They are 0.8 ha in size or larger; and,
- They are 40 years of age or older at the time of evaluation.

The Site does not contain any woodlands (consists primarily of active agricultural lands). There are no significant woodlands on the Site.

6.5 Significant Valleylands

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. The City of Ottawa has identified unstable slopes at the Site (Schedule K), and Section 2.4.2 of the OP identifies significant valleylands as areas with slopes greater than 15% and a slope length of more than 50 m. The banks of the Jock River at this location are relatively flat and do not meet the criteria of significance as outlined in the City of Ottawa OP.

6.6 Significant Areas of Natural or Scientific Interest (ANSIs)

ANSIs are areas of land and water containing natural landscapes or features that have been identified as having life science or earth science values related to protection, scientific study or education. The MNRF is responsible for identifying ANSIs. No ANSI are identified in the study area.

6.7 Significant Wildlife Habitat

The Natural Heritage Reference Manual (MNRF, 2010) includes criteria and guidelines for designating significant wildlife habitat (SWH). There are two other documents, the SWHTG and the SWHECS, which provide specific values and criteria for identifying SWH and offer some general information and ideas regarding the consideration of thresholds for the definition of significance. The Significant Wildlife Habitat Mitigation Support Tool (SWHMiST; MNRF, 2014) is also used in conjunction with the SWHECS to determine appropriate mitigation for disturbance or removal of SWH.

There are four general types of significant wildlife habitat: migration corridors, seasonal concentration areas, rare or specialized habitats, and species of conservation concern. Each of these types of significant wildlife habitat is discussed below in relation to the study area.

6.7.1 Migration Corridors

The SWHTG defines animal movement corridors as elongated, naturally vegetated parts of the landscape used by animals to move from one habitat to another. 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 riparian areas of the Jock River may offer some linkage function for local movements of common species of wildlife, but given the urbanized nature of the surrounding landscape, Golder does not consider the riparian area at the Site significant in the planning area. No linkages are shown on the Site in the City of Ottawa Greenspace Masterplan (Ottawa, 2006b). No direct impacts to the riparian area will result from the proposed development, as the area will be protected within the riparian setback to the Jock River (34 m – 164 m wide). Any potential indirect impacts will be mitigated appropriately, as discussed in Section 9.

6.7.2 Seasonal Concentration Areas

Seasonal concentration areas are those areas where large numbers of a species congregate at one particular time of the year. Examples include deer yards, amphibian breeding habitat, bird nesting colonies, bat hibernacula, raptor roosts, and passerine migration concentrations. If a species is at risk, 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 identifies the following 14 types of seasonal concentrations of animals that may be considered significant wildlife habitat, and outlines means of identifying such habitat. They are:

- Winter deer yards
- Moose late winter habitat
- Colonial bird nesting sites
- Waterfowl stopover and staging areas (aquatic and/or terrestrial)
- Waterfowl nesting areas
- Shorebird migratory stopover areas
- Landbird migratory stopover areas
- Raptor winter feeding and roosting areas
- Wild turkey winter range
- Turkey vulture summer roosting areas
- Reptile hibernacula (and turtle wintering areas)
- Bat hibernacula
- Bullfrog concentration areas
- Migratory butterfly stopover areas

In addition to the above list, the SWHECS considers bat maternity colonies and bat migratory stopover areas as seasonal concentration areas for wildlife.

Deer and moose management is an MNRF responsibility, and deer winter congregations areas considered significant are mapped by the MNRF. There are neither deer yards nor moose late winter habitat identified in the study area.



There are no banks, cliffs, rocky islands or peninsulas suitable for colonial bird nesting habitat within the study area. Further, no heronries were identified during the site investigations.

No areas suitable for supporting waterfowl during migration times (stopover and staging) were identified during site investigations. No terrestrial stopover or staging habitat was observed in the study area, nor was any evidence of waterfowl nesting observed during the site investigations.

Shorebird stopover sites are typically well-known and have a long history of use. The study area does not have areas of suitable shorebird foraging habitat. In addition, no concentrations of shorebirds or presence of the listed species was identified through background review or during the site investigations.

The study area is not located in close enough proximity (i.e., within 5 km) to the Great Lakes to provide suitable landbird migratory stopover areas.

Ideal raptor winter roosting areas are generally located in mature mixed or coniferous woodlands that abut windswept fields that do not get covered by deep snow. There are no suitable areas in the study area for raptor winter feeding and roosting.

Suitable habitat for wild turkey includes a mix of forest and open land such as natural grassland or agriculture. For wintering, wild turkeys tend to prefer large dense coniferous forests adjacent to open land and close to both a food source and groundwater seeps. There is no suitable habitat for wild turkey in the study area.

No significant turkey vulture summer roosting habitat was observed on the Site.

Reptile hibernacula and active reptiles were searched for during site investigations in the study area. No evidence of reptile hibernacula was observed.

The Jock River is potential turtle over-wintering habitat, but will not be directly impacted by the proposed development, and will be buffered by a 34 m to 164 m wide setback from development. Any potential indirect impacts will be mitigated appropriately, as discussed in Section 9. Neither the Burnett nor the Fraser Clark Municipal drains appear to contain suitable habitat of this type.

There are no suitable areas of bat hibernacula in the study area, and no karst topography or features are known to occur at the Site or immediate vicinity (OMNDM, 2016). Based on site investigations, no portions of the Site provide the necessary number (>10/ha) of large (>25cm DBH) wildlife trees to be considered significant maternity roost habitat; however, some individual wildlife trees were identified scattered throughout Site (Figure 2). No bat migratory stopover areas are identified in this eco-region.

The Site may provide suitable large open water areas for bullfrog within the Jock River. This feature will not be directly impacted by the proposed development, and will be buffered by a 34 m to 164 m wide setback from development. Any potential indirect impacts will be mitigated appropriately, as discussed in Section 9.

The study area is not located within 5 km of Lake Ontario, and therefore does not meet the criteria for significant migratory butterfly stopover habitat.



6.7.3 Rare or Specialized Habitats

Rare Habitats

Rare habitats are those with plant communities that are considered rare in the province, such as sand barrens, alvars, old growth forests, 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 in the study area are ranked S1 to S3 by the NHIC.

Specialized Habitats

Specialized habitats are microhabitats that provide a critical resource to some groups of wildlife. The SWHTG defines 14 specialized habitats that may be considered significant wildlife habitat, and outlines means of identifying such habitats. They are:

- Habitat for area-sensitive species
- Forests providing a high diversity of habitats
- Old-growth or mature forest stands
- Foraging areas with abundant mast
- Amphibian woodland breeding ponds
- Turtle nesting habitat
- Specialized raptor nesting habitat
- Moose calving areas
- Moose aquatic feeding areas
- Mineral licks
- Mink, otter, marten, and fisher denning sites
- Highly diverse areas
- Cliffs
- Seeps and springs

In addition to the above list, the SWHECS considers waterfowl nesting habitat, bald eagle and osprey nesting, foraging and perching habitat, woodland raptor nesting habitat, and amphibian wetland (i.e., non-woodland) breeding habitat as specialized habitat for wildlife. Waterfowl nesting was discussed under Section 6.7.2 (Seasonal Concentration Areas).

There are no woodlands in the study area, therefore there is no suitable habitat for area-sensitive breeding birds.

There are no forests in the study area, therefore there are forests providing a high diversity of habitats, old-growth forests, or foraging areas with abundant mast.



The Site does not meet the criteria for significant amphibian breeding habitat (woodlands or wetlands). One American toad (*Anaxyrus americanus*) was heard calling in the Burnett Municipal Drain during amphibian call-count surveys at that feature (Bowfin and Muncaster, 2016), which does not meet the criteria for significance under the SWHECS. Amphibian breeding, if present adjacent to the Jock River or within the Fraser Clark Municipal Drain, will not be directly impacted by the proposed development, and will be buffered by a 34 m to 164 m wide setback from development. Any potential indirect impacts will be mitigated appropriately, as discussed in Section 9.

The SWHECS indicates that exposed mineral soils in open sunny areas must be present to support turtle nesting. The study area consists mainly of active agricultural lands, and so these areas would provide exposed soils during spring, prior to crops sprouting. The development will include a 34 m to 164 m wide setback from the Jock River, which will provide areas of potential turtle nesting habitat without the risk of damage to nests from agricultural practices. No impacts to this habitat type are expected to result from the proposed development.

Nesting habitat for raptors, as well as perching and foraging habitat for bald eagle and osprey, were not identified as no raptors or raptor nests were observed during site investigations. 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 is not present in the study area.

No moose calving or aquatic feeding areas, mineral licks, or mink, otter, marten or fisher denning sites were observed during site investigations in the study area.

Highly diverse areas are described in the SWHTG as areas with a high species or plant community diversity. The study is primarily active agriculture, and so does not meet this criteria.

There is no cliff / talus habitat on the Site, according to the criteria presented in the SWHECS.

No evidence of groundwater seepage or springs were observed on the Site.

6.7.4 Habitat for Species of Conservation Concern

Habitat for Species of Conservation Concern includes four types of species: those that are rare, those whose populations are significantly declining, those that have been identified as being at risk to certain common activities, and those with relatively large populations in Ontario compared to the rest of the world.

Rare species are considered at five levels: globally rare, nationally rare, provincially rare, regionally rare; and locally rare (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. Examples include species vulnerable to forest fragmentation and species such as woodland raptors that may be vulnerable to forest management or human disturbance. The final group of species of conservation concern includes species that have a high proportion of their global population in Ontario. Although they may be common in Ontario, they are found in low numbers in other jurisdictions.

Through the desktop SAR screening and site investigations (Appendix A), three species of conservation concern were identified as having potential to occur within the study area: monarch (*Danaus plexippus*); northern map turtle (*Graptemys geographica*) and snapping turtle (*Chelydra serpentina*). The Site provides suitable habitat for these species, primarily within the Jock River and associated riparian areas. As these habitats are being maintained and enhanced, no negative impacts to these species are expected to result from the proposed development.



The SWHECS also considers shrub/early successional breeding bird habitat, open country breeding bird habitat, marsh breeding bird habitat, and presence of terrestrial crayfish as habitat for species of conservation concern. Based on site investigations, the vegetation communities that represent shrub/early successional, open country or marsh breeding bird habitats are not present at the Site, or are not present in the required size. No evidence of terrestrial crayfish was observed during site investigations.

7.0 POTENTIAL INDIRECT IMPACTS

7.1 Construction Impacts

Impacts of the construction activities on the Site have the potential to negatively affect the natural features in the study area, including loss of overall biodiversity on the Site through removal of vegetation and wildlife habitat.

Activities related to Site preparation and development such as grading, filling, and presence of heavy machinery can cause soil erosion and compaction, while machinery can destroy over-hanging vegetation. Encroachment into the natural areas can also occur by machinery, foot traffic, and discarding or storage of construction materials outside the development envelope. The key measure employed as part of the proposed development to protect the significant natural features in the study area is the implementation of setbacks (34 m to 164 m wide setback from the Jock River). In addition, standard construction best management practices will be employed to mitigate potential damage to the adjacent natural features, as outlined in Section 10.2.

Generally, construction noise represents a short-term disturbance to wildlife using the adjacent natural areas. It is expected that with the completion of construction, wildlife will quickly return to their normal use patterns within the natural areas adjacent to the development. Temporary and short term loss of biodiversity at the Site due to construction (i.e., site clearing) will be mitigated through as the agricultural portions of the setback to the Jock River naturalizes over time as a result of no longer being under cultivation / lawn.

7.2 Human Impacts

Many of the chronic impacts that can occur in urban natural areas are not a result of degradation of the edge, but a dramatic increase in human use through the entire system. The residential development may result in a marginal increase in potential disturbance to the adjacent natural features through the following potential impacts:

- Light pollution
- Increased noise
- Introduction of exotic species
- Increased human influence (ad-hoc trails, dumping, edge encroachment)
- Mortality of wildlife from loose pets

Given the agricultural nature of the Site in its current condition, and the surrounding urban residential uses, many, if not all, of the above potential impacts are already present at the Site to some degree. The proposed setback from the Jock River may help to alleviate some of these issues if a formal trail with waste receptacles are contemplated in this area as part of the detailed design to be undertaken by the City. The proposed design plan also includes a roadway along the setback to the Jock River, rather than rear yards, which will further mitigate the potential for many of the above effects on the Jock River corridor (e.g., yard waste dumping).



The effects of increased lighting due to the development can be mitigated through the following measures:

- Direct glare should not be visible beyond the property boundaries that abut the Rideau River and can be avoided by installing low intensity and downward pointing lights.
- Outdoor lighting should be turned off when not in use, except where used for security and safety.
- Motion sensors should be considered for use on all safety and security lighting.

The key measure employed in the proposed development to mitigate for these potential effects is the implementation of setbacks from the significant natural features (Jock River and Fraser Clark Municipal Drain). Potential impacts to potential habitats for endangered and threatened species will need to be determined through further study. The development has been planned to leave large areas of natural vegetation intact and un-fragmented by concentrating development in the northern portion of the Site, and previously disturbed areas in the southern half (agricultural lands) will be allowed to naturalize. The potential human impacts described above are unlikely to have a measurable impact on adjacent natural features.

8.0 MITIGATION AND MONITORING

8.1 Significant Natural Features

The primary form of mitigation proposed as part of the design is avoidance of significant natural features to the extent possible, and implementing setbacks to those features. Significant natural features identified as present, or potentially present at the Site, include: fish habitat and potential for endangered species. Mitigation measures will be implemented during construction to minimize harm to fish and fish habitat in the Jock River and Fraser Clark Drain, including:

- **Contamination and Spill Management:** A response plan will be developed that will be implemented immediately in the event of a sediment release or spill of a deleterious substance and an emergency spill kit will be kept on-site.
- **Erosion and Sediment Control:** An erosion and sediment control plan will be developed to minimize the risk of sedimentation in surface water features.
- **Operation of Machinery:** Machinery will be operated on land outside of the proposed 30 m setback to surface water features. All refueling, washing, and servicing of machinery will be completed beyond 30 m of surface water features.

The only potential significant wildlife habitats on the Site that could be affected by the Project (based on the proposed design) are linkages, turtle nesting and habitat for species of conservation concern. Mitigation of impacts to these potential habitats is primarily achieved through the proposed setbacks to the Jock River and Fraser Clark Drain. Subsequent study is required to determine the presence or absence of SAR at the Site, namely SAR bats within the identified trees (Figure 2) that are proposed for removal. Should these species be confirmed at the Site, additional mitigation measures or permitting will need to be implemented, and should be detailed as part of an update or addendum to this EIS.



8.2 Construction Best Management Practices

Standard Best Management Practices to be followed during construction to mitigate damage to the adjacent natural features include the following:

- The development envelope be clearly demarcated and maintained.
- No removal of vegetation during the active season for breeding birds (April 15 – August 15), unless construction disturbance is preceded by a nesting survey conducted by a qualified biologist.
- Wildlife should be allowed the opportunity to leave the construction area safely by ensuring gaps in construction boundary fencing are maintained until vegetation clearing is complete.
- Implementation of standard best management practices, including sediment and erosion controls, spill prevention, etc., during the construction phase of the project.

8.3 Light, Dust and Noise

Potential human impacts to the adjacent natural features can be further mitigated through the following:

- Avoid direct glare beyond the property boundaries that abut natural features by installing low intensity and downward pointing lights.
- Turn off outdoor lighting when not in use, except where used for security and safety.
- Consider the use of motion sensors on all safety and security lighting.
- Implement standard best management practices to mitigate noise and dust on the Site during the construction phase of the project.

8.4 Monitoring

Monitoring programs are developed to assess the effectiveness of mitigation measures implemented at a project location. The key mitigation measure employed in this proposed development is avoidance of the adjacent significant natural features and their functions, therefore monitoring of the Site is not proposed.

Any monitoring requirements associated with the proposed realignment of the Burnett Municipal Drain, if any, will be determined at the permitting and approvals stage. Any monitoring requirements associated with the proposed stormwater management system will be determined as part of Ministry of Environment and Climate Change (MOECC) Environmental Compliance Approval (ECA).

9.0 CUMULATIVE EFFECTS

Cumulative effects assessment considers the potential for additive impacts to the local landscape due to existing and future development. The proposed development represents an intensification of use on an agricultural property, within an urbanizing context. Based on this, and the fact that there are no anticipated impacts to the natural environment, no cumulative effects have been identified.



10.0 CONCLUSIONS AND RECOMMENDATIONS

10.1 Net Impacts

The significant natural features and functions identified on-Site included potential habitat of endangered and threatened species, fish habitat (adjacent Jock River and Fraser Clark Drain), and potential significant wildlife habitat in the form of linkages, turtle nesting habitat, and suitable habitat for a number of species of conservation concern. Net impacts to each of these features are discussed below.

Suitable habitat for endangered and threatened species has been identified for SAR bats within individual cavity trees on-Site. Further study is required to determine presence or absence of these species on the Site, which should be undertaken as part of an update or addendum to this EIS. Should an endangered or threatened species be confirmed at the Site, the EIS should identify the appropriate next steps to be taken in the planning process, including or permitting under the ESA.

The water quantity and quality, as well as fish habitat in the Jock River, will not be negatively affected by the proposed development.

Potential significant wildlife habitats, including potential linkage functions along the Jock River, potential nesting habitat for turtles, and habitat for species of conservation concern, will be maintained within the proposed setback to the Jock River and Fraser Clark Drain.

The portions of the setback from the Jock River which are currently agricultural lands will eventually naturalize as a result of no longer being under cultivation / lawn, which will provide a net benefit to the riparian area of the river at this location.

10.2 Policy Compliance

Based on the information gathered and available at this time, it appears that the proposed development complies with the natural heritage policies of the PPS. In addition, at present, it appears that there will be no negative effects on the significant natural features associated with the Site, which satisfies the policies under Section 2.4.2 of the Official Plan. Further study as outlined in this report and summarized in Section 12.3 should be undertaken to confirm these conclusions.

The proposed development also respects the setback requirements for the Jock River and Fraser Clark Municipal Drain, as identified in the City's OP.

10.3 Recommendations

No negative impacts on the natural environment are expected to result from the proposed development. This conclusion is based on the following recommendations:

- Undertake additional field surveys to determine the presence or absence of endangered or threatened species on the Site (bat SAR). If present, the conclusions of this EIS would need to be confirmed or modified, and additional mitigation measures and/or permitting will be required.
- At the detailed design stage of the stormwater outlet, ensure all necessary permits and approvals are obtained.
- The development envelope shown in the design plan (Annis, O'Sullivan, Vollebakk Ltd., 2017) be maintained.



- The principles and general approach discussed in the Site Servicing and Stormwater Management Report for the Site (Novatech, 2016a) be adhered to.
- Impermeable dykes be installed in all service trenches to ensure no lowering of the local groundwater table.
- No removal of vegetation during the active season for breeding birds (April 15 – July 31).
- The contractor be made aware of, and follow the recommendations of the City of Ottawa Protocol for Wildlife Protection during Construction (Ottawa, 2015).
- All setbacks as shown on the design plan are established, protected and enhanced.
- Any and all monitoring requirements identified at later planning stages are adhered to.
- Best management practices, including sediment and erosion controls, spill prevention, etc., are implemented during the construction phase of the project.

It is suggested that this EIS be accepted as an assessment of the existing natural features at the Site, and a high-level assessment of the potential impacts associated with the proposed development on those features. In light of additional field surveys recommended in this report, an update to this EIS will be required. These updates should be prepared in order to confirm or modify the conclusions and recommendations of this report. This could be included as a condition of Draft Plan approval.

11.0 LIMITATIONS AND USE OF REPORT

This report was prepared for the Claridge Homes Inc. The report, which specifically includes all tables, figures and appendices, is based on data and information collected by Golder, and reflects the conditions within the study area at the time of the site investigations, supplemented by data obtained by Golder from external sources as described in this report. Golder has exercised reasonable skill, care and diligence to assess the external data acquired during the preparation of this assessment, but makes no guarantees or warranties as to the accuracy, currency or completeness of this information. This report is based upon and limited by circumstances and conditions acknowledged herein, and upon information available at the time of authoring.

Any use which a third party makes of this report, or any reliance on, or decisions to be made based on it, are the responsibilities of such third parties. Golder accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on this report.



12.0 CLOSURE

We trust this report meets your current requirements. Should you have any questions regarding this report, please contact the undersigned.

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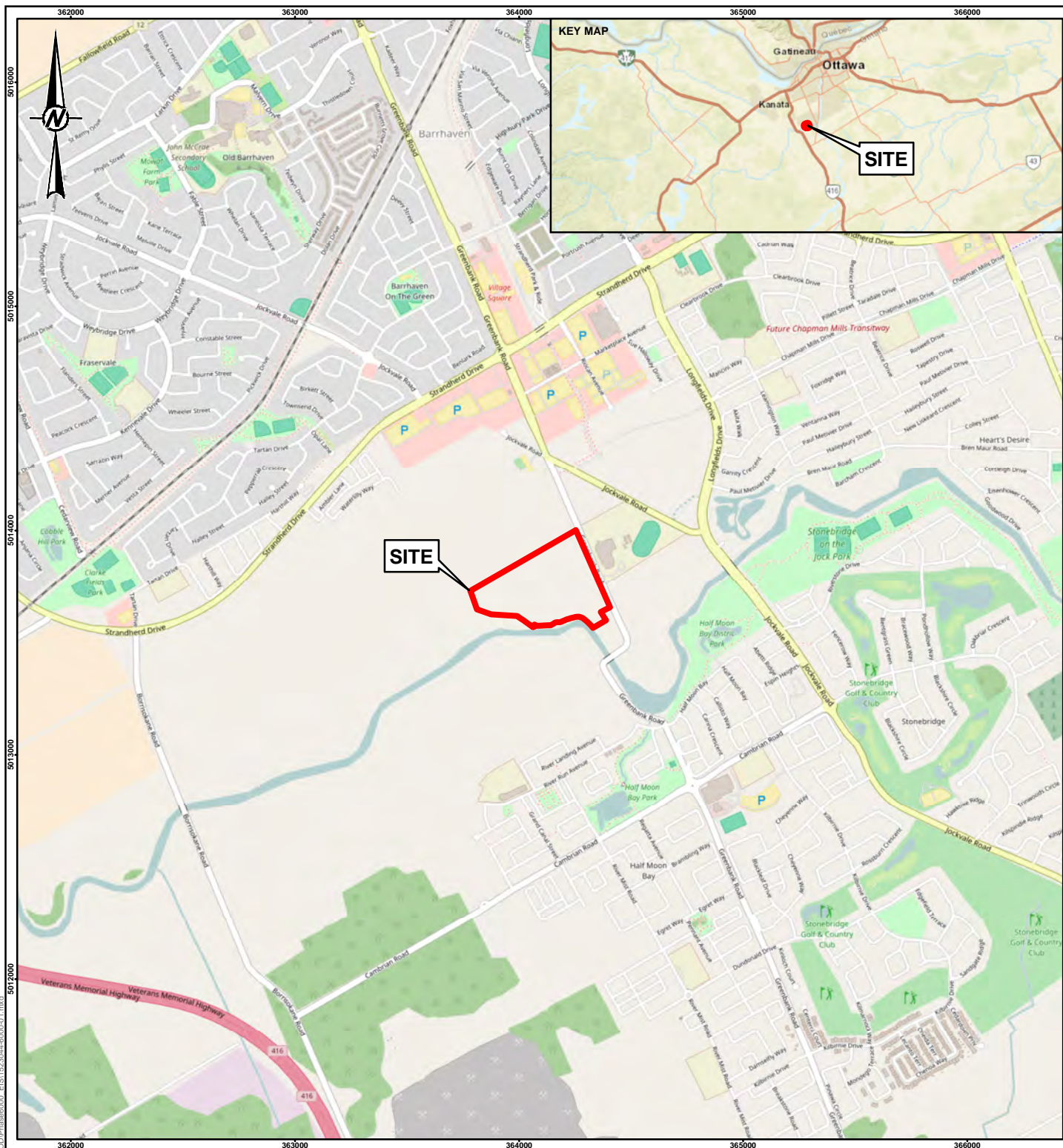
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CLIENT
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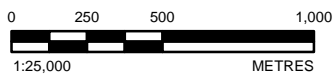
PROJECT
PRELIMINARY EIS IN SUPPORT OF PROPOSED DEVELOPMENT OF 3370 GREENBANK ROAD, OTTAWA, ON

TITLE
KEY PLAN

CONSULTANT	YYYY-MM-DD	2016-11-09
	DESIGNED	----
	PREPARED	BR/JEM
	REVIEWED	GW
	APPROVED	HM



PROJECT NO.	PHASE	REV.	FIGURE
1523044	6000	0	1



NOTE(S)
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 2. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83
 COORDINATE SYSTEM: MTM ZONE 9 VERTICAL DATUM: CGVD28

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



LEGEND

- POTENTIAL CAVITY TREE
- ROADWAY
- WATERCOURSE
- WATERBODY
- ▭ PROPERTY FABRIC
- ▭ THE SITE
- ▭ STUDY AREA
- ▭ ECOLOGICAL LAND CLASSIFICATION

AGRC: AGRICULTURAL ROW CROP
 AGRP: AGRICULTURAL PASTURE
 CUM1-1: MIXED MEADOW
 CUT/CUW: DECIDUOUS THICKET/OPEN WOODLAND
 DIST: DISTURBED AREA
 RES: RESIDENTIAL/PARKLAND
 FOD: DECIDUOUS FOREST



NOTE(S)
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CLIENT
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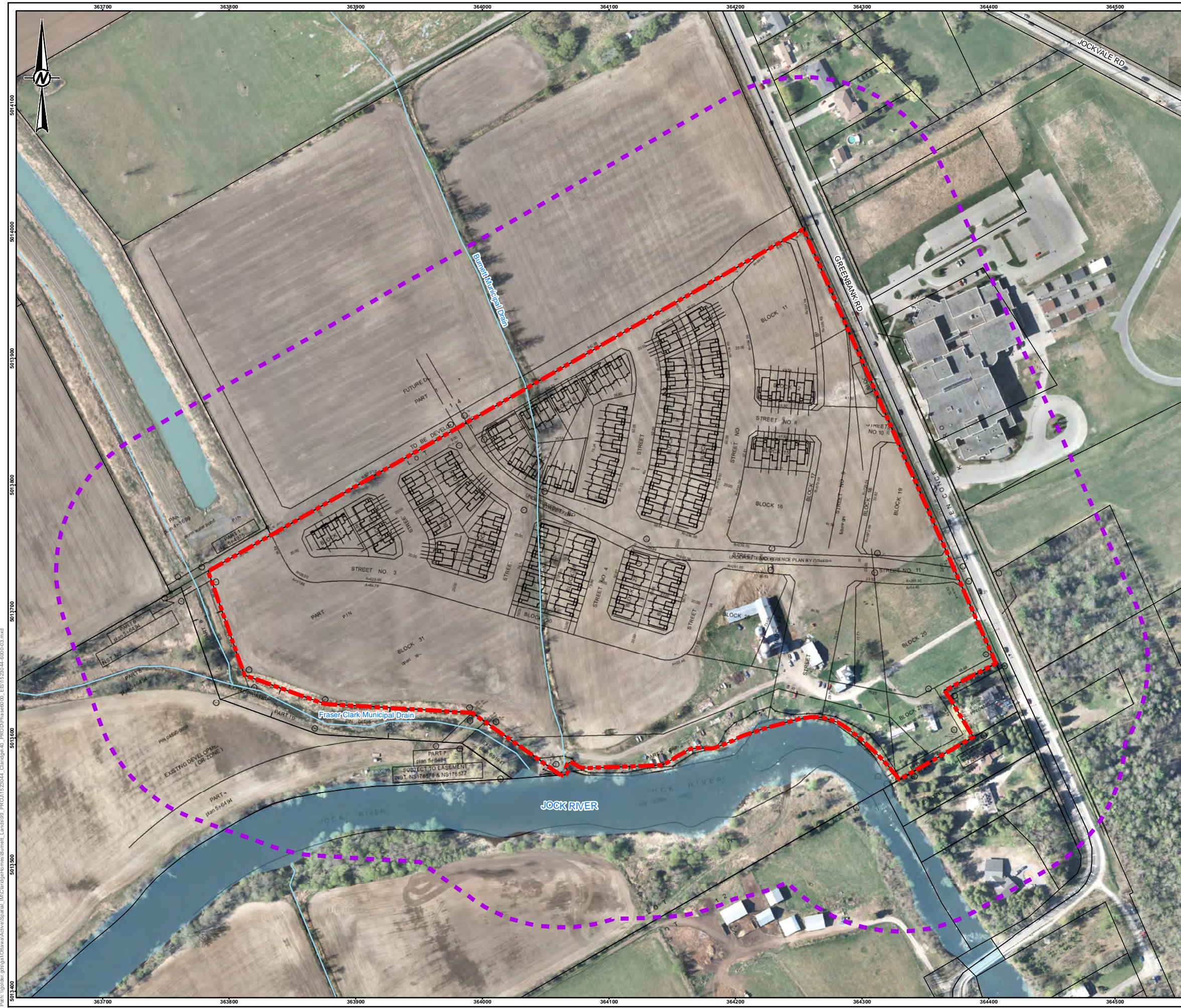
PROJECT
PRELIMINARY EIS IN SUPPORT OF PROPOSED DEVELOPMENT OF 3370 GREENBANK ROAD, OTTAWA, ON

TITLE
ECOLOGICAL LAND CLASSIFICATION AND SIGNIFICANT NATURAL FEATURES

CONSULTANT	YYYY-MM-DD	2016-11-09
DESIGNED	---	
PREPARED	JEM	
REVIEWED	GW	
APPROVED	HM	

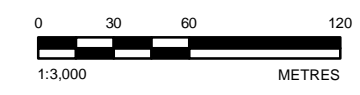
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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 26mm



LEGEND

- ROADWAY
- WATERCOURSE
- WATERBODY
- PROPERTY FABRIC
- THE SITE
- STUDY AREA



NOTE(S)
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 2. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83
 COORDINATE SYSTEM: MTM ZONE 9 VERTICAL DATUM: CGVD28

CLIENT
 CLARIDGE HOMES CORPORATION

PROJECT
 PRELIMINARY EIS IN SUPPORT OF PROPOSED DEVELOPMENT OF 3370 GREENBANK ROAD, OTTAWA, ON

TITLE
 PROPOSED DEVELOPMENT

CONSULTANT	DATE
DESIGNED	2018-01-18
PREPARED	JEM
REVIEWED	GW
APPROVED	HM

PROJECT NO. 1523044 PHASE 6000 REV. 1 MAP 3

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM 28mm



APPENDIX A

Species at Risk Screening

Taxon	Common Name	Scientific Name	Species at Risk Act, Schedule 1 List of Wildlife SAR Status ¹	Endangered Species Act, Reg. 230/08 SARO List Status ²	COSEWIC Status ³	Global Rarity Rank ⁴	Provincial Rarity Rank ⁵	Ontario Habitat Descriptions	Probability of Occurrence on Site
Amphibian	Western chorus frog - Great Lakes St. Lawrence/Canadian Shield Population	<i>Pseudacris triseriata</i>	THR	—	THR	G5TNR	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 - Suitable Habitat Not identified.
Arthropod	Monarch	<i>Danaus plexippus</i>	SC	SC	END	G5	S2N, S4B	In Ontario, monarch is found throughout the northern and southern regions of the province. This butterfly is found wherever there are milkweed (<i>Asclepius spp.</i>) 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).	Moderate - open habitats with host and nectar plants present.
Arthropod	Mottled duskywing	<i>Erynnis martialis</i>	—	END	END	G3	S2	In Ontario, the mottled duskywing is found in the same habitat as its food plant <i>Ceanothus spp.</i> : open or partially open, dry, sandy areas, or limestone alvars. These habitats are relatively uncommon and include dry open pine and pine oak woodland, other open dry woodlands, alvars, savannah and other dry open sandy habitats. Usually seen nectaring on wildflowers, or on wet sandy roads in the company of other duskywing species (Linton 2015).	Low - no food plants, sandy areas or alvars observed.
Bird	Bald eagle	<i>Haliaeetus leucocephalus</i>	—	SC	NAR	G5	S2N	In Ontario, bald eagle nests are typically found near the shorelines of lakes or large rivers, often on forested islands. The large, conspicuous nests are typically found in large super-canopy trees along water bodies (Buehler 2000).	Low - no nests observed and no super canopy trees observed.
Bird	Bank swallow	<i>Riparia riparia</i>	THR	THR	THR	G5	S4B	In Ontario, the 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 bluffs or notable vertical banks observed.
Bird	Barn swallow	<i>Hirundo rustica</i>	THR	THR	THR	G5	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).	Moderate - No structures present for nesting, however this species was observed foraging over the Jock River and could use the airspace over the Site for foraging.

Taxon	Common Name	Scientific Name	Species at Risk Act, Schedule 1 List of Wildlife SAR Status ¹	Endangered Species Act, Reg. 230/08 SARO List Status ²	COSEWIC Status ³	Global Rarity Rank ⁴	Provincial Rarity Rank ⁵	Ontario Habitat Descriptions	Probability of Occurrence on Site
Bird	Black tern	<i>Chlidonias niger</i>	—	SC	NAR	G4	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 large wetlands.
Bird	Bobolink	<i>Dolichonyx oryzivorus</i>	THR	THR	THR	G5	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 (Martin and Gavin 1995).	Low - open habitats are associated with intensive row-cropping.
Bird	Canada warbler	<i>Cardellina canadensis</i>	THR	SC	THR	G5	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 - no forests present.
Bird	Cerulean warbler	<i>Setophaga cerulea</i>	END	THR	END	G4	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 - no forests present on Site.

Taxon	Common Name	Scientific Name	Species at Risk Act, Schedule 1 List of Wildlife SAR Status ¹	Endangered Species Act, Reg. 230/08 SARO List Status ²	COSEWIC Status ³	Global Rarity Rank ⁴	Provincial Rarity Rank ⁵	Ontario Habitat Descriptions	Probability of Occurrence on Site
Bird	Chimney swift	<i>Chaetura pelagica</i>	THR	THR	THR	G5	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 - No structures present at the Site.
Bird	Common nighthawk	<i>Chordeiles minor</i>	THR	SC	THR	G5	S4B	These aerial foragers require areas with large open habitat. This includes farmland, open woodlands, clearcuts, burns, rock outcrops, alvars, bog ferns, prairies, gravel pits and gravel rooftops in cities (Sandilands 2007)	Low - open habitat consists of row crop (e.g. corn), which is not suitable nesting habitat for this species.
Bird	Eastern meadowlark	<i>Sturnella magna</i>	THR	THR	THR	G5	S4B	In Ontario, the 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 - open habitats are associated with intensive row-cropping.
Bird	Eastern wood-pewee	<i>Contopus virens</i>	SC	SC	SC	G5	S4B	In Ontario, the 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. Tends to inhabit edges of younger forests having a relatively dense midstory. 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.	Low - no forests present on Site.
Bird	Grasshopper sparrow <i>pratensis</i> subspecies	<i>Ammodramus savannarum (pratensis subspecies)</i>	SC	SC	SC	G5	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 - open habitats are small, or associated with intensive row-cropping.
Bird	Henslow's sparrow	<i>Ammodramus henslowii</i>	END	END	END	G4	SHB	In Ontario, Henslow's sparrow breeds in large grasslands with low disturbance, such as lightly grazed and ungrazed pastures, fallow hayfields, grassy swales in open farmland, and wet meadows. Preferred habitat contains tall, dense grass cover, typically over 30 cm high, with a high percentage of ground cover, and a thick mat of dead plant material. Henslow's sparrow generally avoids areas with emergent woody shrubs or trees, and fence lines. Areas of standing water or ephemerally wet patches appear to be important. This species breeds more frequently in patches of habitat greater than 30 ha and preferably greater than 100 ha (COSEWIC 2011).	Low - open habitats are small, or associated with intensive row-cropping.

Taxon	Common Name	Scientific Name	Species at Risk Act, Schedule 1 List of Wildlife SAR Status ¹	Endangered Species Act, Reg. 230/08 SARO List Status ²	COSEWIC Status ³	Global Rarity Rank ⁴	Provincial Rarity Rank ⁵	Ontario Habitat Descriptions	Probability of Occurrence on Site
Bird	Least bittern	<i>Ixobrychus exilis</i>	THR	THR	THR	G5	S4B	In Ontario, the 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 large wetlands present on Site.
Bird	Loggerhead shrike	<i>Lanius ludovicianus (migrans subsp)</i>	END	END	END	G4	S2B	In Ontario, the loggerhead shrike breeds in open country habitat characterized by short grasses with scattered shrubs or low trees. Unimproved pasture containing scattered hawthorns (<i>Crataegus</i> spp.) on shallow soils over limestone bedrock is the preferred habitat. Preferred nest sites include isolated hawthorns or red cedar. Males defend large territories of approximately 50 ha (Chabot 2007)	Low - open habitats are associated with intensive row-cropping.
Bird	Peregrine falcon (anatum subspecies)	<i>Falco peregrinus anatum</i>	SC	SC	SC	G4	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 - no cliff or skyscraper buildings present. s.
Bird	Short-eared owl	<i>Asio flammeus</i>	SC	SC	SC	G5	S2N,S4B	In Ontario, the 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 - open habitats are associated with intensive row-cropping.
Bird	Eastern whip-poor-will	<i>Antrostomus vociferus</i>	THR	THR	THR	G5	S4B	In Ontario, the 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 - no forests present on Site.
Bird	Wood thrush	<i>Hylocichla mustelina</i>	THR	SC	THR	G5	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).	Low - no forests or open woodlands are present on Site.

Taxon	Common Name	Scientific Name	Species at Risk Act, Schedule 1 List of Wildlife SAR Status ¹	Endangered Species Act, Reg. 230/08 SARO List Status ²	COSEWIC Status ³	Global Rarity Rank ⁴	Provincial Rarity Rank ⁵	Ontario Habitat Descriptions	Probability of Occurrence on Site
Fish	American eel	<i>Anguilla rostrata</i>	—	END	THR	G4	S1?	In Ontario, the 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 (Eakins 2012; Burrige et al. 2010).	Low - This species is not known to occur in the Jock River subwatershed.
Fish	Lake sturgeon – Great Lakes / upper St. Lawrence Population	<i>Acipenser fulvescens</i>	—	THR	THR	G3G4TNR	S2	In Ontario, the 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.	Low - This species is not known to occur in the Jock River subwatershed.
Lichen	Flooded jellyskin	<i>Leptogium rivulare</i>	THR	—	SC	G3G5	S1	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 swamps are present on Site.
Lichen	Pale-bellied frost lichen	<i>Physconia subpallida</i>	END	END	END	GNR	S1	In Ontario, pale-bellied frost lichen grows on trees in mature, deciduous forests with relatively open understory, but moderate to high canopy cover. Common host trees include ash, black walnut, hop-hornbeam, and elm, although in Ontario, it is most often found on hop-hornbeam. This lichen has also been found growing on fence rails and rocks (Lewis 2011).	Low - no forests present on Site.
Mammal	Eastern small-footed myotis	<i>Myotis leibii</i>	—	END	—	G3	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.	Low- No suitable roost habitat present.

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Mammal	Little brown myotis	<i>Myotis lucifugus</i>	END	END	END	G5	S4	In Ontario, this species range is extensive and covers much of the province. It will roost in both natural and man-made structures. They 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 for hibernaculum, but high humidity and stable above freezing temperatures are required.	Moderate - some potential habitat trees present.
Mammal	Tri-colored bat	<i>Perimyotis subflavus</i>	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.	Moderate - some potential habitat trees present.
Mammal	Northern myotis	<i>Myotis septentrionalis</i>	END	END	END	G4	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 for hibernaculum, but high humidity and stable above freezing temperatures are required.	Moderate - some potential habitat trees present.
Reptile	Blanding's turtle - Great Lakes/St. Lawrence population	<i>Emydoidea blandingii</i>	THR	THR	END	G4	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 2005).	Low The deep and fast flowing waters of the Jock River is unlikely to provide suitable habitat for this species.
Reptile	Eastern ribbonsnake - (Great Lakes population)	<i>Thamnophis sauritus</i>	SC	SC	SC	G5	S3	In Ontario, eastern ribbonsnake is semi-aquatic, and is rarely found far from shallow ponds, marshes, bogs, streams or swamps bordered by dense vegetation. They prefer sunny locations and bask in low shrub branches. Hibernation occurs in mammal burrows, rock fissures or even ant mounds (COSEWIC 2012).	Low - The deep and fast flowing waters of the Jock River is unlikely to provide suitable habitat for this species.
Reptile	Northern map turtle	<i>Graptemys geographica</i>	SC	SC	SC	G5	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).	Moderate - The Jock River may provide suitable habitat for this species

Taxon	Common Name	Scientific Name	Species at Risk Act, Schedule 1 List of Wildlife SAR Status ¹	Endangered Species Act, Reg. 230/08 SARO List Status ²	COSEWIC Status ³	Global Rarity Rank ⁴	Provincial Rarity Rank ⁵	Ontario Habitat Descriptions	Probability of Occurrence on Site
Reptile	Snapping turtle	<i>Chelydra serpentina</i>	SC	SC	SC	G5	S3	In Ontario, snapping turtle utilizes a wide range of waterbodies, but shows preference for areas with shallow, slow-moving water, soft substrates and dense aquatic vegetation. Hibernation takes place in soft substrates under water. Nesting sites consist of sand or gravel banks along waterways or roadways (COSEWIC 2008).	Moderate - The Jock River may provide suitable habitat for this species
Reptile	Spotted turtle	<i>Clemmys guttata</i>	END	END	END	G5	S3	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 suitable wetland habitats present.
Reptile	Stinkpot or Eastern musk turtle	<i>Sternotherus odoratus</i>	THR	SC	SC	G5	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 shallow, clear, permanent waterbodies with little or no current.
Vascular Plant	American ginseng	<i>Panax quinquefolius</i>	END	END	END	G3G4	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 neutral, loamy soils (COSEWIC 2000).	Low - no suitable forest habitats present. Not observed during site investigations.
Vascular Plant	Butternut	<i>Juglans cinerea</i>	END	END	END	G4	S3?	In Ontario, butternut is found along stream banks, on wooded valley slopes, and in deciduous and mixed forests. It is commonly associated with beech, maple, oak and hickory (Voss and Reznicek 2012). Butternut prefers moist, fertile, well-drained soils, but can also be found in rocky limestone soils. This species is shade intolerant (Farrar 1995).	Low - surveyed for and not observed on the Site.

Notes:

¹ *Species at Risk Act*, 2002. Schedule 1, END-Endangered, THR-Threatened, SC-Special Concern

² *Endangered Species Act* (2007) END-Endangered, THR-Threatened, SC-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 August 2011.



APPENDIX B

Wildlife Recorded from the Site

Scientific Name	Common Name	Origin ^a	Global Rarity Status ^b	Ontario Rarity Status ^b	SARA ^c	ESA ^d
<i>Acer negundo</i>	Manitoba maple	(N)	G5	S5	—	—
<i>Acer rubrum</i>	Red maple	N	G5	S5	—	—
<i>Acer saccharinum</i>	Silver maple	N	G5	S5	—	—
<i>Achillea millefolium</i>	Common yarrow	I	G5T5?	SNA	—	—
<i>Alliaria petiolata</i>	Garlic mustard	I	GNR	SNA	—	—
<i>Amaranthus retroflexus</i>	Redroot pigweed	I	GNR	SNA	—	—
<i>Ambrosia artemisiifolia</i>	Ragweed	N	G5	S5	—	—
<i>Arctium minus</i>	Common burdock	I	GNR	SNA	—	—
<i>Asclepias syriaca</i>	Common milkweed	N	G5	S5	—	—
<i>Berberis vulgaris</i>	Common barberry	I	GNR	SNA	—	—
<i>Bidens cernua</i>	Nodding beggar-ticks	N	G5	S5	—	—
<i>Brassica rapa</i>	Rape seed	I	GNR	SNA	—	—
<i>Bromus inermis</i>	Smooth brome	I	GNR	SNA	—	—
<i>Butomus umbellatus</i>	Flowering-rush	I	G5	SNA	—	—
<i>Chenopodium album</i>	Lamb's-quarters	I	G5T5	SNA	—	—
<i>Cichorium intybus</i>	Chicory	I	GNR	SNA	—	—
<i>Cinna latifolia</i>	Slender woodreed	N	G5	S5	—	—
<i>Cirsium arvense</i>	Canada thistle	I	GNR	SNA	—	—
<i>Cirsium vulgare</i>	Bull Thistle	I	GNR	SNA	—	—
<i>Clematis virginiana</i>	Virgin's-bower	N	G5	S5	—	—
<i>Conyza canadensis</i>	Horseweed	N	G5	S5	—	—
<i>Cornus stolonifera</i>	Red osier dogwood	N	G5	S5	—	—
<i>Crataegus</i> sp.	Hawthorn	N	?	?	—	—
<i>Dactylis glomerata</i>	Orchard grass	I	GNR	SNA	—	—
<i>Daucus carota</i>	Wild carrot	I	GNR	SNA	—	—
<i>Echinochloa crusgalli</i>	Barnyard grass	I	GNR	SNA	—	—
<i>Echinocystis lobata</i>	Wild cucumber	N	G5	S5	—	—
<i>Elodea canadensis</i>	Canada waterweed	N	G5	S5	—	—
<i>Elymus repens</i>	Quack grass	I	GNR	SNA	—	—
<i>Eragrostis pectinacea</i>	Love-grass	N	G5T5	S5	—	—
<i>Erigeron annuus</i>	Daisy fleabane	N	G5	S5	—	—
<i>Erigeron philadelphicus</i>	Philadelphia fleabane	N	G5	S5	—	—
<i>Festuca</i> sp.	Fescue	I	GNR	SNA	—	—
<i>Fragaria virginiana</i>	Common strawberry	N	G5	S5	—	—
<i>Fraxinus americana</i>	White ash	N	G5	S5	—	—
<i>Galium mollugo</i>	White bedstraw	I	GNR	SNA	—	—
<i>Hordeum jubatum</i>	Foxtail barley	I	G5T5	SNA	—	—
<i>Hydrocharis morsus-ranae</i>	Frogbit	I	GNR	SNA	—	—
<i>Impatiens capensis</i>	Spotted jewelweed	N	G5	S5	—	—
<i>Juniperus virginiana</i>	Eastern red cedar	N	G5	S5	—	—
<i>Larix laricina</i>	Tamarack	N	G5	S5	—	—
<i>Lemna minor</i>	Duckweed	N	G5	S5	—	—
<i>Leonurus cardiaca</i>	Common motherwort	I	GNR	SNA	—	—
<i>Leucanthemum vulgare</i>	Ox-eye daisy	I	GNR	SNA	—	—
<i>Lotus corniculatus</i>	Bird's-foot trefoil	I	GNR	SNA	—	—
<i>Malus pumila</i>	Apple	I	G5	SNA	—	—
<i>Malva neglecta</i>	Common mallow	I	GNR	SNA	—	—
<i>Matricaria discoidea</i>	Pineapple-weed	I	G5	SNA	—	—
<i>Medicago sativa</i>	Alfalfa	I	GNR	S5	—	—
<i>Mellilotus alba</i>	White sweet clover	I	G5	SNA	—	—
<i>Najas flexilis</i>	Slender naiad	N	G5	S5	—	—

Scientific Name	Common Name	Origin ^a	Global Rarity Status ^b	Ontario Rarity Status ^b	SARA ^c	ESA ^d
<i>Nymphaea odorata</i>	White water-lily	N	G5T5	S5?	—	—
<i>Oenothera biennis</i>	Common evening-primrose	N	G5	S5	—	—
<i>Oxalis stricta</i>	Common yellow wood-sorrel	N	G5	S5	—	—
<i>Panicum virgatum</i>	Switch grass	N	G5	S4	—	—
<i>Parthenocissus inserta</i>	Virginia creeper	N	G5	S5	—	—
<i>Pastinaca sativa</i>	Parsnip	I	GNR	SNA	—	—
<i>Persicaria sp.</i>	Lady's-thumb	I	?	SNA	—	—
<i>Phleum pratense</i>	Timothy	I	GNR	SNA	—	—
<i>Picea glauca</i>	White spruce	N	G5	S5	—	—
<i>Pinus strobus</i>	White pine	N	G5	S5	—	—
<i>Plantago lanceolata</i>	Narrow-leaved plantain	I	G5	SNA	—	—
<i>Plantago major</i>	Common plantain	I	G5	SNA	—	—
<i>Poa annua</i>	Annual bluegrass	I	GNR	SNA	—	—
<i>Poa pratensis</i>	Kentucky bluegrass	I	G5T5?	SNA	—	—
<i>Pontederia cordata</i>	Pickerelweed	N	G5	S5	—	—
<i>Portulaca oleracea</i>	Common purslane	I	GU	SNA	—	—
<i>Potamogeton spp.</i>	Pondweeds	N	?	?	—	—
<i>Potentilla recta</i>	Rough-fruited cinquefoil	I	GNR	SNA	—	—
<i>Prunus nigra</i>	Canada plum	N	G4G5	S4	—	—
<i>Prunus virginiana</i>	Choke cherry	N	G5	S5	—	—
<i>Quercus macrocarpa</i>	Bur oak	N	G5	S5	—	—
<i>Ranunculus acris</i>	Common buttercup	I	G5	SNA	—	—
<i>Rhamnus cathartica</i>	Common buckthorn	I	GNR	SNA	—	—
<i>Rhus radicans</i>	Poison-ivy	N	G5T5	S5	—	—
<i>Rhus typhina</i>	Staghorn sumac	N	G5	S5	—	—
<i>Rubus idaeus</i>	Red raspberry	N	G5T5	S5	—	—
<i>Rumex acetosella</i>	Sheep sorrel	I	GNR	SNA	—	—
<i>Rumex crispus</i>	Curled dock	I	GNR	SNA	—	—
<i>Salix discolor</i>	Pussy willow	N	G5	S5	—	—
<i>Salix sp.</i>	Willow	?	?	?	—	—
<i>Salix x fragilis</i>	Crack willow	I	GNR	SNA	—	—
<i>Scirpus atrovirens</i>	Green bulrush	N	G5	S5	—	—
<i>Setaria pumila</i>	Yellow foxtail	I	GNR	SNA	—	—
<i>Solanum dulcamara</i>	Climbing nightshade	I	GNR	SNA	—	—
<i>Solidago canadensis</i>	Canada goldenrod	N	G5T5	S5	—	—
<i>Solidago rugosa</i>	Rough goldenrod	N	G5	S5	—	—
<i>Sonchus asper</i>	Spiny sow-thistle	I	GNR	SNA	—	—
<i>Sparganium eurycarpum</i>	Giant burreed	N	G5	S5	—	—
<i>Symphyotrichum cordifolium</i>	Heart-leaved aster	N	G5	S5	—	—
<i>Symphyotrichum spp.</i>	Asters	N	G5	S5	—	—
<i>Syringa vulgaris</i>	Lilac	I	GNR	SNA	—	—
<i>Tanacetum vulgare</i>	Common tansy	I	GNR	SNA	—	—
<i>Taraxacum officinale</i>	Common dandelion	I	G5	SNA	—	—
<i>Thuja occidentalis</i>	Eastern white cedar	N	G5	S5	—	—
<i>Tilia americana</i>	Basswood	N	G5	S5	—	—
<i>Trifolium pratense</i>	Red clover	I	GNR	SNA	—	—
<i>Trifolium repens</i>	White clover	I	GNR	SNA	—	—
<i>Turritis glabra</i>	Tower mustard	N	G5	S5	—	—
<i>Tussilago farfara</i>	Colt's-foot	I	GNR	SNA	—	—
<i>Typha latifolia</i>	Common cattail	N	G5	S5	—	—
<i>Ulmus americana</i>	White elm	N	G5?	S5	—	—

Scientific Name	Common Name	Origin ^a	Global Rarity Status ^b	Ontario Rarity Status ^b	SARA ^c	ESA ^d
<i>Urtica dioica</i>	Stinging nettle	N	G5T?	S5	—	—
<i>Viburnum lentago</i>	Nannyberry	N	G5	S5	—	—
<i>Viburnum trilobum</i>	Highbush cranberry	N	G5T5	S5	—	—
<i>Vicia cracca</i>	Cow-vetch	I	GNR	SNA	—	—
<i>Vincetoxicum</i>	swallowwort species	I	GNR	SNA	—	—
<i>Vitis riparia</i>	Riverbank grape	N	G5	S5	—	—
<i>Xanthium spinosum</i>	Spiny cocklebur	I	GNR	SNA	—	—

^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); SNR = Provincial conservation status not yet assessed;

B = status applies to the breeding population of the species

^c Species at Risk Act (SARA), Schedule 1

^d Ontario *Endangered Species Act* (ESA)



APPENDIX C

Vascular Plants Recorded from the Site

Common Name	Scientific Name	Origin ^a	Global Rarity Status ^b	Ontario Rarity Status ^b	SARA ^c	ESA ^d
Mammals						
Beaver	<i>Castor canadensis</i>	N	G5	S5	—	—
Coyote	<i>Canis latrans</i>	N	G5	S5	—	—
Deer mouse	<i>Peromyscus</i> sp.	N	G5	S5	—	—
Eastern chipmunk	<i>Tamias striatus</i>	N	G5	S5	—	—
Eastern cottontail	<i>Sylvilagus floridanus</i>	N	G5	S5	—	—
Grey squirrel	<i>Sciurus carolinensis</i>	N	G5	S5	—	—
Raccoon	<i>Procyon lotor</i>	N	G5	S5	—	—
Red squirrel	<i>Tamiasciurus hudsonicus</i>	N	G5	S5	—	—
White-tailed deer	<i>Odocoileus virginianus</i>	N	G5	S5	—	—
Birds						
Eastern phoebe	<i>Sayornis phoebe</i>	N	G5	S5	—	—
American crow	<i>Corvus brachyrhynchos</i>	N	G5	S5B	—	—
American goldfinch	<i>Carduelis tristis</i>	N	G5	S5B	—	—
American robin	<i>Turdus migratorius</i>	N	G5	S5B	—	—
Belted kingfisher	<i>Ceryle alcyon</i>	N	G5	S4B	—	—
Black-capped chickadee	<i>Poecile atricapilla</i>	N	G5	S5	—	—
Blue jay	<i>Cyanocitta cristata</i>	N	G5	S5	—	—
Canada goose	<i>Branta canadensis</i>	N	G5	S5	—	—
Cedar waxwing	<i>Bombycilla cedrorum</i>	N	G5	S5B	—	—
Chipping sparrow	<i>Spizella passerina</i>	N	G5	S5B	—	—
Common grackle	<i>Quiscalus quiscula</i>	N	G5	S5B	—	—
Downy woodpecker	<i>Picoides pubescens</i>	N	G5	S5	—	—
European starling	<i>Sturnus vulgaris</i>	I	G5	SNA	—	—
Green heron	<i>Butorides virescens</i>	N	G5	S4B	—	—
House sparrow	<i>Passer domesticus</i>	I	G5	SNA	—	—
Killdeer	<i>Charadrius vociferus</i>	N	G5	S5B, S5N	—	—
Mallard	<i>Anas platyrhynchos</i>	N	G5	S5	—	—
Mourning dove	<i>Zenaida macroura</i>	N	G5	S5	—	—
Northern flicker	<i>Colaptes auratus</i>	N	G5	S5	—	—
Red-tailed hawk	<i>Buteo jamaicensis</i>	N	G5	S5	—	—
Rock pigeon	<i>Columba livia</i>	I	G5	SNA	—	—
Song sparrow	<i>Melospiza melodia</i>	N	G5	S5B	—	—
Spotted sandpiper	<i>Actitis macularia</i>	N	G5	S5	—	—
Wild turkey	<i>Meleagris gallopava</i>	N	G5	S5	—	—
Wood duck	<i>Aix sponsa</i>	N	G5	S5	—	—
Herpetiles						
American toad	<i>Bufo americanus</i>	N	S5	G5	—	—
Green frog	<i>Rana clamitans</i>	N	S5	G5	—	—
Northern leopard frog	<i>Rana pipiens</i>	N	S5	G5	—	—
Insects						
Cabbage white	<i>Pieris rapae</i>	I	G5	SNA	—	—
Clouded sulphur	<i>Colias philodice</i>	N	G5	S5	—	—
Common ringlet	<i>Coenonympha tullia</i>	N	S6	G6	—	—
Eastern comma	<i>Polygonia comma</i>	N	G5	S5	—	—
Lance-tipped darner	<i>Aeshna constricta</i>	N	S5	G5	—	—
Mourning cloak	<i>Nymphalis antiopa</i>	N	G5	S5	—	—
Northern crescent	<i>Phycoides pascoensis</i>	N	G5	S5	—	—
Yellow-legged Meadowhawk	<i>Sympetrum vicinum</i>	N	S5	G5	—	—

^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



APPENDIX D

Tree Conservation Report (Golder, 2018)



January 2018

REPORT ON

Tree Conservation Report in Support of Proposed Subdivision, 3370 Greenbank Road Burnett Lands, Ottawa, Ontario

Submitted to:

Claridge Homes (South Nepean) Inc.
2001-210 Gladstone Avenue
Ottawa, Ontario
K2P 0Y6

Attention: Mr. Jim Burghout

REPORT



Report Number: 1523044 / 4000

Distribution:

4 copies - Claridge Homes Inc.
1 e-copy - Claridge Homes Inc.
1 copy - Golder Associates Ltd.





Table of Contents

1.0 INTRODUCTION.....	1
2.0 QUALIFICATIONS.....	1
3.0 GENERAL SITE INFORMATION	1
4.0 PROPOSED WORKS AND SCHEDULE.....	1
5.0 EXISTING PLANT COMMUNITIES AND TREE COVER ON THE SITE.....	2
6.0 NATURAL ENVIRONMENT FEATURES ON-SITE.....	5
7.0 PROPOSED ALTERATIONS TO TREE COVER AND POTENTIAL TREE RETENTION	5
8.0 RECOMMENDATIONS AND MITIGATION MEASURES.....	6
9.0 CLOSURE	7
10.0 REFERENCES	8

TABLES

Table 1: Site Information	1
Table 2: Individual Trees Identified on the Site (Figure 1).....	2
Table 3: Tree Groupings Identified on the Site (Figure 1)	4
Table 4: Other Plant Taxa Observed on the Site.....	4

FIGURES

Figure 1: Existing Vegetation

Figure 2: Proposed Development and Conserved Vegetation



1.0 INTRODUCTION

Golder Associates Ltd. (Golder) was retained by Claridge Homes (South Nepean) Inc. (Claridge) to complete a Tree Conservation Report (TCR) for the property at 3370 Greenbank Road, known as the Burnett Lands (the Site; Figure 1), adjacent to the Jock River in Ottawa, Ontario. This TCR will accompany a subdivision approval submission to the City of Ottawa.

This TCR has been prepared in accordance with the City of Ottawa's TCR Guidelines (Ottawa, 2016).

2.0 QUALIFICATIONS

This report was prepared by Fergus Nicoll, Terrestrial and Wetland Specialist at Golder.

Fergus Nicoll specializes in ecology with an emphasis on wetland and terrestrial ecosystems. Fergus has over 17 years of technical experience, which includes working for private consulting industry, non-government organizations, as well as the provincial and federal government. Fergus has extensive experience in collecting botanical and forest inventory data and conducting ecological land classification (ELC) for research projects, long term post-construction monitoring, environmental impact assessments, environmental effects monitoring projects, CEAA screenings, and species at risk inventories. Being adept in plant identification, he has conducted numerous plant community, tree, wetland, and habitat surveys for various types of research and monitoring projects throughout his career. He has worked across Canada in various ecoregions. While working on plant studies, he has been responsible for study design, data management, and the presentation of results. He is also provincially certified in Ecological Land Classification for Ontario, Ontario Wetland Evaluation System, and Butternut Health Assessments, and has been involved in several related workshops.

3.0 GENERAL SITE INFORMATION

Table 1: Site Information

Municipal Address	3370 Greenbank Road, Ottawa, Ontario
Current Zoning	DR1 – Development Reserve Zone
Current Site Owner	Claridge Homes (South Nepean) Inc.
Address of Site Owner	Claridge Homes (South Nepean) Inc. 2001-210 Gladstone Avenue Ottawa, Ontario K2P 0Y6

4.0 PROPOSED WORKS AND SCHEDULE

The proposed project is a residential development on the Site which is approximately 15.5 ha in size (Figure 2). Construction is currently likely to occur in late summer 2017. There are no current applications at the time of the writing of this report.



5.0 EXISTING PLANT COMMUNITIES AND TREE COVER ON THE SITE

The Site is dominated by row crop agricultural fields, with small clumps and hedgerows of trees and shrubs, narrow meadow communities along field edges, and riparian zones. Trees and shrubs in these areas include a variety of species such as Manitoba maple (*Acer negundo*), white ash (*Fraxinus americana*), and common buckthorn (*Rhamnus cathartica*). Riparian and aquatic vegetation communities occur along and within the Jock River and the Fraser Clark Municipal Drain. A summary of the trees and other plants identified on the Site is included in Tables 2, 3, and 4.

Table 2: Individual Trees Identified on the Site (Figure 1)

Tree #	Species	Diameter at breast height (dbh; cm)	Condition	Notes
1	Manitoba maple (<i>Acer negundo</i>)	15,23,26	Good	Three-stemmed, gnarly.
2	Manitoba maple	21,28	Fair	Two-stemmed. Healthy crown, but damage and decay at base of stem.
3	White elm (<i>Ulmus americana</i>)	52	Good	Full crown, no visual sign of disease.
4	Bur oak (<i>Quercus macrocarpa</i>)	57	Good	Some wires and nails embedded but scarred over. Overhangs Jock River.
5	Silver maple (<i>Acer saccharinum</i>)	39,44	Good	Two-stemmed. Healthy crown, within the river high water zone, base submerged during survey.
6	Silver maple	32	Good	Healthy crown, within the river high water zone, base submerged during survey.
7	Bur oak	34	Good	Almost full crown with occasional broken branch. On edge of Jock River.
8	Bur oak	58	Good	Almost full crown with occasional broken branch. Moderately sized, high quality shade tree. On edge of Jock River.
9	Manitoba maple	36	Good	No visible dieback.
10	White elm	21,33,41	Poor	Three-stemmed. ~ 10% visibly dead crown, some bark peeling on stem. Many small exit wholes of elm bark beetles. No visible cavities.
11	White elm	34	Very Poor	~ 80% visibly dead, most bark peeling away. No visible cavities.
12	White ash	100	Fair to Good	Large mature tree, a few dead branches but otherwise little visible dieback. No cavities, except one large hole at base of tree. Used by raccoons etc.
13	White ash	48,52	Poor	Two stemmed. Many borer exit holes in bark. At least 10% dieback starting in crown. Bark peeling all over stem.



**TREE CONSERVATION REPORT 3370 GREENBANK ROAD
BURNETT LANDS, OTTAWA ONTARIO**

Tree #	Species	Diameter at breast height (dbh; cm)	Condition	Notes
14	White ash	44	Fair to Good	Some dieback in crown visible, otherwise healthy tree. No sign of borer exit holes.
15	Bur Oak	121	Good	Very large healthy tree. Very small patch of bark damage at base of stem, otherwise in excellent shape.
16	White elm	11	Good	Healthy sapling.
17	Eastern white cedar (<i>Thuja occidentalis</i>)	44	Good	Overhanging the river.
18	White elm	48	Good	No visible sign of disease or insect pests. Overhanging the river.
19	Bur oak	46	Good	Overhanging the river.
20	Crack willow	20 to 53	Fair to Good	Large gnarly multi-stemmed tree, overhanging river. Some stems are almost horizontal. Occasional dead branch.
21	Apple (<i>Malus</i> sp.)	18	Good	Possibly ornamental, could not tell in leaf-off condition.
22	White elm	27	Good	No visible sign of disease or insect pests.
23	White elm	8, 10, 13	Good	Three-stemmed sapling. Some human damage in past (cutting) healed.
24	Bur oak	72.5	Fair	At least partially in City right-of-way. Some dieback in crown, a lot of damage at base (human caused?).
25	White ash	94.5	Good	At least partially in City right-of-way. A few dead branches otherwise no visible signs of disease or insect pests.
26	White ash	72	Good	No visible signs of disease or insect pests.
27	Bur oak	53	Good	No visible signs of disease or insect pests.
28	Manitoba maple	40, 48, 52	Fair	Three-stemmed tree. Overall healthy with some dieback and large cavities. Suitable wildlife cavities.
29	Red cedar (<i>Juniperus virginiana</i>)	18	Good	Appears to be overgrown ornamental, possibly a cultivar.



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BURNETT LANDS, OTTAWA ONTARIO**

Table 3: Tree Groupings Identified on the Site (Figure 1)

Tree Grouping #	Stand Description*	Average range of dbh (cm)	Notes
1	Manitoba maple (<i>Acer negundo</i>) 100%	4 to 24	Small patch of saplings. Also many suckers not measured (less than 2cm dbh). Flooded during survey.
2	Manitoba maple 45% Basswood (<i>Tilia americana</i>) 34% White ash (<i>Fraxinus Americana</i>) 7% Bur oak (<i>Quercus macrocarpa</i>) 7% Silver maple (<i>Acer saccharinum</i>) 7%	8 to 40 6 to 27 37 28 21	Small stand of trees adjacent to pond at outflow of Fraser Clark Municipal Drain. Also many seedlings and shrubs such as common buckthorn (<i>Rhamnus cathartica</i>), not measured. One dead white elm (<i>Ulmus americana</i>). Overall trees are in fair to good condition, with some minor dieback occurring. No notable cavities or visible signs of pest or disease observed.
3	Mix of many stems of red maple (<i>Acer rubrum</i>), white pine (<i>Pinus strobus</i>), tamarack (<i>Larix laricina</i>), white elm, Highbush cranberry (<i>Viburnum trilobum</i>).	2 to 15	Planted naturalization area, primarily off-site. Trees and shrubs in good condition, with at least one older Manitoba maple in poor condition, also mix of grasses and forbs.
4	Mix of many small stems of white elm, hawthorn (<i>Craetagus</i> sp.), common buckthorn, willows (<i>Salix</i> spp.), chokecherry (<i>Prunus virginiana</i>).	<1 to 8	Sparse deciduous thicket hedgerow, although shrubs are dense in some locations. Dominated by shrubs and small trees. Overall in good condition.
5	Mix of many small stems of hawthorn, common buckthorn, nannyberry (<i>Viburnum lentago</i>), Canada plum (<i>Prunus nigra</i>), red raspberry (<i>Rubus idaeus</i>), and Manitoba maple.	<1 to 9	Dense deciduous thicket hedgerow. Dominated by shrubs and small trees, overall in good condition, with occasional dead or dying elm.
6	White elm 60% Manitoba maple 40%	2 to 35 <1 to 40	Clump of many stems at river edge. Most stems are saplings and suckers. Overall healthy, although some dieback in white elms. Also includes dense vines such a riverbank grape (<i>Vitis riparia</i>).
7	Eastern white cedar 100%	25 to 55	Small stand of eastern white cedar (15 Stems), overall trees in good condition, with occasional bark damage (e.g. woodpecker damage).
8	White spruce (<i>Picea glauca</i>) 45% White elm 30% Eastern white cedar 5% Basswood 5% White ash 5% Manitoba maple 10%	12 to 65 20 to 35 24 15 13 <1 to 12	Small patch of trees including many suckers of Manitoba maple. Overall trees are healthy, with some dieback amongst the elms.
9	Manitoba maple 100%	<1 to 11	Dense thicket of saplings and seedlings/suckers. All in good condition.

Note: *Dominant species and percent absolute cover, only trees and tree-sized shrubs are included.

Table 4: Other Plant Taxa Observed on the Site



Common Name	Scientific Name.
Asters	<i>Symphyotrichum</i> spp.
Bluegrass	<i>Poa</i> sp.
Goldenrod	<i>Solidago</i> sp.
Orchard grass	<i>Dactylis glomerata</i>
Thistle	<i>Cirsium</i> sp.
Wild cucumber	<i>Echinocystis lobata</i>
Parsnip	<i>Pastinaca sativa</i>
Common evening primrose	<i>Oenothera biennis</i>
Burdock	<i>Arctium</i> sp.
Clovers	<i>Trifolium</i> spp.
Barberry	<i>Berberis</i> sp.
Common lilac	<i>Syringa vulgaris</i>
Common dandelion	<i>Taraxacum officinale</i>
Virginia creeper	<i>Parthenocissus inserta</i>
Wild carrot	<i>Daucus carota</i>
Cattail	<i>Typha</i> sp.
Red osier dogwood	<i>Cornus stolonifera</i>
Poison-ivy	<i>Rhus radicans</i>
Staghorn sumac	<i>Rhus typhina</i>
Fescue	<i>Festuca</i> sp.
Timothy	<i>Phleum pratense</i>

Note: surveys were outside of the growing season so a full plant inventory was not possible.

6.0 NATURAL ENVIRONMENT FEATURES ON-SITE

For an assessment of natural environment features on the Site, refer to the Environmental Impact Statement (EIS) for this Site.

7.0 PROPOSED ALTERATIONS TO TREE COVER AND POTENTIAL TREE RETENTION

The trees and shrubs on the Site are limited to a few small patches and individuals growing along hedgerows, the riparian zone of the Jock River and the Fraser Clark Municipal Drain, and scattered locations throughout the Site (Figure 1). There is a mix of trees in good, fair, and poor condition (Tables 2, and 3). Several trees such as many of the eastern white cedars (*Thuja occidentalis*) and bur oaks (*Quercus macrocarpa*) are in good condition. Most of the Manitoba maples on the Site are in good condition but generally weedy in form. Many of the white elms (*Ulmus americana*), and to a lesser degree white ash (*Fraxinus americana*), are showing signs of disease, insect damage, and in some cases, severe dieback and loss of vigor.



Generally, the lands within Blocks 31 and 21 will remain undeveloped, pending the City of Ottawa's future development plans for these areas (Map 2). There will be some works within Block 31 and Block 21 (i.e. cut/fill and storm outlet) related to this development. The future alignment of Greenbank Road will remain undeveloped until the City begins construction on that project (Map 2). The three potential bat habitat trees along the northern boundary of the Site and the single tree in Block 20 will need to be removed as part of this development (Trees #14, #15, #23 and #33; Map 1).

Additional trees will be planted as part of the landscape plan, which will increase the overall number and quality of trees in the local landscape. The landscape plan, which is currently not finalized, will include specific tree species, number of trees, and locations within the development. Some general recommendations are provided in Section 8.0.

8.0 RECOMMENDATIONS AND MITIGATION MEASURES

- If not already completed, the Site, including trees should be assessed for potential presence of SAR and SAR habitat. Approvals for any alteration of SAR habitat should be sought in consultation with the City of Ottawa and the Ministry of Natural Resources and Forestry (MNRF).
- In order to protect birds that are protected under the *Migratory Birds Convention Act* (MBCA), no removal of vegetation during the active season for breeding birds (April 15th – August 15th), without input from a qualified biologist (i.e., nesting surveys). Note that even with input of a qualified biologist, scheduled clearing during the active season may lead to construction delays.
- The priority for tree retention should focus on those trees along the Jock River, and within the floodplain as many of the best specimens are located in this area. There is also potential SAR bat habitat in this area and development is restricted, based on the current subdivision plan.
- Planting trees along streets, and additional plantings within park areas where feasible, will help to off-set the minimal tree loss associated with the proposed development. This will be included in the landscape plan.
- Wherever tree planting is to take place on the Site, first consideration should be given to the native species that occur in the local landscape, such as: Sugar maple (*Acer Saccharum*), hackberry (*Celtis occidentalis*), red oak (*Quercus rubra*), and eastern white cedar (*Thuja occidentalis*). Cultivars of native species designed for urban conditions can be used as deemed suitable. Alien non-invasive species and cultivars should only be used where it's not reasonable to use native species or native cultivars. Alien invasive species such as Norway maple (*Acer platanoides*) should not be used in any circumstance.
- For the trees that will be retained during development, the following measures, as recommended by the City of Ottawa, should be employed to ensure the protection and survival of trees to be retained:
 - a) If trees occur close to construction areas, erect a fence at the critical root zone (CRZ) of trees to be retained.
 - b) Do not place any material or equipment within the CRZ of the trees.
 - c) Do not attach any signs, notices or posters to the trees.
 - d) Do not raise or lower the existing grade within the CRZ without approval.
 - e) Tunnel or bore when digging within the CRZ of the trees.
 - f) Do not damage the root system, trunk or branches of the trees.
 - g) Ensure that exhaust fumes from all equipment are not directed towards any trees canopy.



9.0 CLOSURE

We trust that the information presented in this report meets your requirements. Should you have any questions or concerns, please do not hesitate to contact the undersigned.

GOLDER ASSOCIATES LTD.

Fergus Nicoll Dip.T.
Terrestrial and Wetlands Technical Specialist

Heather Melcher, M.Sc.
Associate / Senior Ecologist

FN/HM/sg

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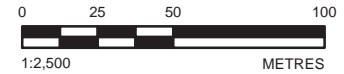


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- LEGEND**
- INDIVIDUAL TREE
 - ROADWAY
 - WATERCOURSE
 - WATERBODY
 - ▭ PROPERTY FABRIC
 - ▭ STUDY AREA
 - ▭ TREE GROUPING



NOTE(S)
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 2. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83
 COORDINATE SYSTEM: MTM ZONE 9 VERTICAL DATUM: CGVD28

CLIENT
 CLARIDGE HOMES CORPORATION

PROJECT
 TREE CONSERVATION REPORT - 3370 GREENBANK ROAD,
 BURNETT LANDS, OTTAWA, ONTARIO

TITLE
 EXISTING VEGETATION

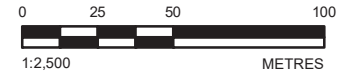
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	REVIEWED FIN
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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 26mm



- LEGEND**
- INDIVIDUAL TREE
 - ROADWAY
 - WATERCOURSE
 - WATERBODY
 - ▭ PROPERTY FABRIC
 - ▭ STUDY AREA
 - ▭ TREE GROUPING



NOTE(S)
 1. THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO. 1523044-4000.

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CLIENT
 CLARIDGE HOMES CORPORATION

PROJECT
 TREE CONSERVATION REPORT - 3370 GREENBANK ROAD,
 BURNETT LANDS, OTTAWA, ONTARIO

TITLE
 PROPOSED DEVELOPMENT AND CONSERVED VEGETATION

CONSULTANT	YYYY-MM-DD	2018-01-18
DESIGNED	---	
PREPARED	JEM	
REVIEWED	FIN	
APPROVED	HM	



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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM 28mm



APPENDIX E

Headwater Drainage Features Assessment (Bowfin and Muncaster, 2016)

Greenbank (Burnett Municipal Drain)

Headwaters Report

Prepared for:

Claridge Homes (South Nepean) LP

Prepared by:

Bowfin Environmental Consulting
and
Muncaster Environmental Planning Inc.

March 2016

Table of Contents

1.0	INTRODUCTION.....	4
2.0	METHODOLOGY.....	6
2.1	Review of Background Information.....	6
2.2	Habitat Description.....	6
2.3	Fish Community Sampling.....	6
2.4	Headwater Drainage Features.....	6
2.5	Amphibian Surveys.....	6
3.0	RESULTS.....	8
3.1	Review of Background Information.....	8
3.2	Site Investigations.....	8
3.2.1	Summary of Visits and Sampling Site Locations.....	8
3.2.2	Habitat and Fish Community Descriptions.....	9
4.0	Headwater Drainage Features Assessment.....	21
4.1	Classification.....	21
4.1.1	Step 1: Hydrology Classification.....	21
4.1.2	Step 2: Riparian Classification.....	23
4.1.3	Step 3: Fish and Fish Habitat Classification.....	23
4.1.4	Step 4: Terrestrial Habitat Classification.....	24
4.2	Part 3 – Management Recommendations.....	25
	Appendix A.....	27
Figures		
Figure 1	Location of Study Area.....	5
Figure 2	Location of Headwater Features and Stations.....	10

Tables

Table 1	Summary of the Marsh Monitoring Criteria	7
Table 2	Summary of Dates, Times of Site Investigations	8
Table 3	Features and sampling parameters from Burnett Municipal Drain and its tributaries (Figure 2).....	11
Table 4	Summary of Fish Community Sampling.....	14
Table 5	Hydrology classification features using data from OSAP S4.M10.....	22
Table 6	Summary of Rainfall for the 7 Days Preceding the Field Surveys	22
Table 7	Riparian Classification	23
Table 8	Fish and Fish Habitat Classification.....	24
Table 9	Terrestrial Habitat Classification	24
Table 10	Evaluation, Classification and Management Summary and Study Conclusion	25

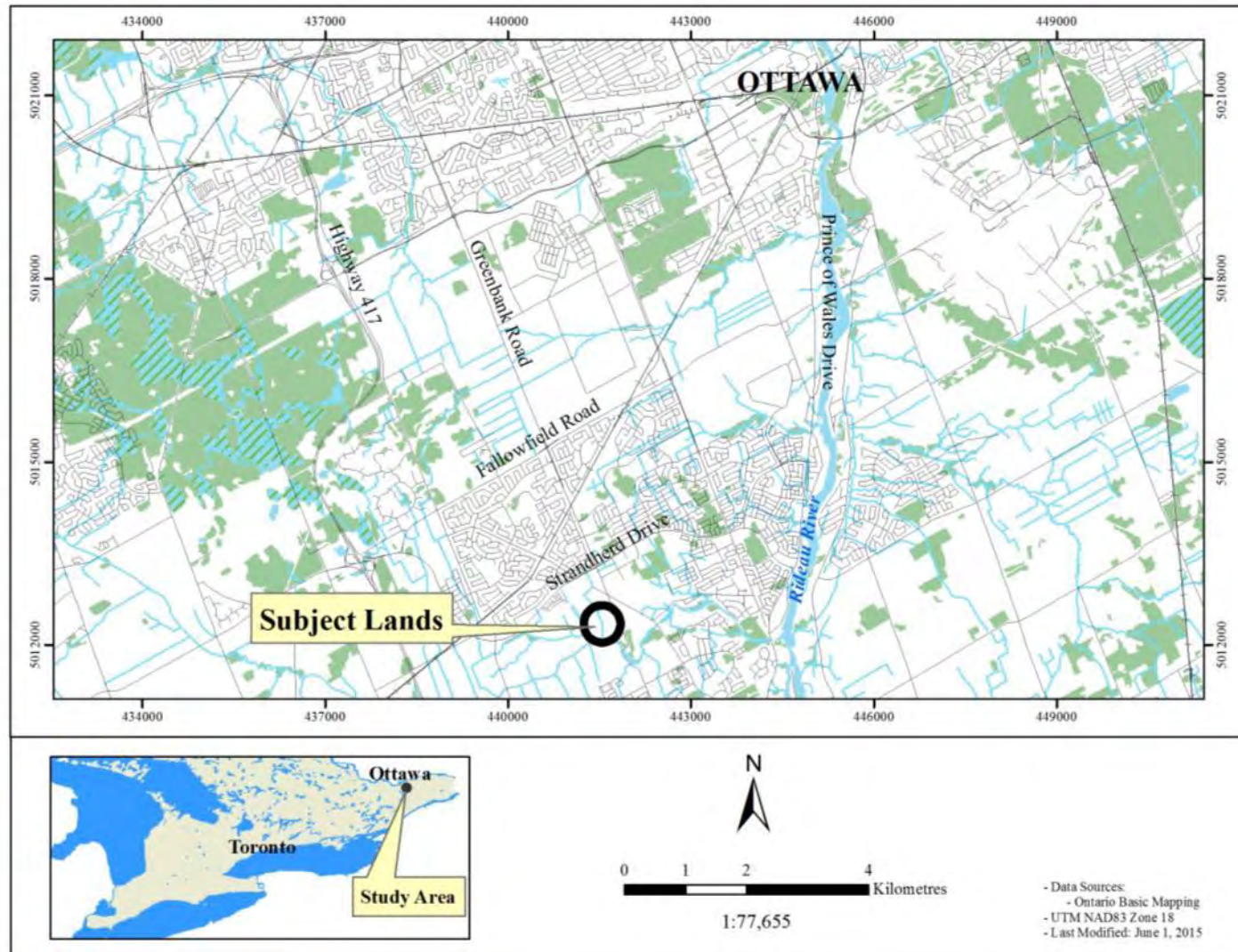
Photographs

Photo 1	Looking upstream at downstream end of the piped section of the Burnett Municipal Drain (May 21, 2015)	12
Photo 2	Looking from the upstream end of the culvert to downstream end at the connection to Jock River (May 1, 2015).....	13
Photo 3	Station 1 looking upstream from the downstream end (May 1, 2015).....	14
Photo 4	Station 1 looking upstream from the downstream end (July 27, 2015)	15
Photo 5	Tributary 1 (Station 5) looking upstream from the downstream end (May 1, 2015)	16
Photo 6	Station 2 looking upstream from the downstream end (May 21, 2015).....	16
Photo 7	Station 2 looking upstream from the downstream end (July 27, 2015)	17
Photo 8	Tributary 3 (Station 6) looking upstream from the downstream end (May 1, 2015)	18
Photo 9	Station 3 looking upstream from the downstream end (July 27, 2015)	18
Photo 10	Tributary 3 (Station 4) looking upstream from the downstream end (May 1, 2015)	19
Photo 11	Station 4 looking downstream from the upstream end (July 27, 2015)	20

1.0 INTRODUCTION

Muncaster Environmental Planning has been retained by Claridge Homes (South Nepean) LP to complete an assessment of the fish habitat in the Burnett Municipal Drain. The study area is to the west of Greenbank Road, north of the Jock River corridor and is within Lot 13 and 14, Concession 3, Geographic Township of Nepean, City of Ottawa. This report, completed by Bowfin Environmental Consulting, provides a summary of the fisheries habitat and communities findings along with an evaluation of the headwaters as per the *Evaluation, Classification and Management of Headwater Drainage Features Guidelines* created by Credit Valley Conservation and Toronto Region Conservation (approved July 2013, finalized January 2014).

Figure 1 Location of Study Area



2.0 METHODOLOGY

2.1 Review of Background Information

The review of background information was conducted in order to augment the data collected during the site visit. Background information regarding fish species was obtained by reviewing Distribution of Fish Species at Risk maps published by the Conservation Authorities, a search of the Natural Heritage Information Centre (NHIC) databases, and a search of the Land Information Ontario databases and other consulting reports, when available.

2.2 Habitat Description

The fish habitat features within the study area was described based on the MTO *Environmental Guide for Fish and Fish Habitat October 2006* and the *Ontario Stream Assessment Protocol*. Information on the channel morphology was collected (channel width, wetted width, bankfull and wetted depths, cover type and abundance, and substrate type). The location of specific features mentioned in the text is shown on Figure 2.

2.3 Fish Community Sampling

Fish community sampling was performed to document the use. The community was sampled utilizing backpack electrofishing.

2.4 Headwater Drainage Features

The headwater drainage features within the study area were assessed based on the *Evaluation, Classification and Management of Headwater Drainage Features* (here after referred to as the Guidelines) (prepared by Credit Valley Conservation Authority and Toronto and Region Conservation, approved July 2013, finalized January 2014). The Guidelines are divided into three parts. Part 1 is the Evaluation and discusses various suggested study designs/methods. Part 2 determines the appropriate Classification following the outcome of Part 1. Finally, Part 3 outlines the Management Recommendations.

Incidental observations of wildlife/plant species using the features were noted (Appendix A).

2.5 Amphibian Surveys

The *Environment Canada Marsh Monitoring Program* (MMP) guide was followed as described below:

- Three surveys were completed during the spring and early summer.

Table 1 Summary of the Marsh Monitoring Criteria

Survey Number	MMP Estimated Survey Period	MMP Temperature Criteria (°C)	Survey Date	Minimum Temperature (°C)
1	April 15-30 th	>5	April 28	5.8
2	May 15-30 th	>10	May 25	14.8
3	June 15-30 th	>17	June 22	14.5

- Observations began 30 minutes after sunset and end before midnight;
- Each station was surveyed for 3 minutes during which time the species and the calling code were recorded for each of the following distances: 0-50m, 50-100m, and >100m. The calling codes were recorded as one of:
 - Code 1: Calls not simultaneous, number of individuals could be accurately counted
 - Code 2: Some calls simultaneous, number of individuals could be reliably estimated
 - Code 3: Full chorus, calls continuous and overlapping, number of individuals could not be reliably estimated
- Surveys were only conducted if the wind strength was Code 0, 1, 2 or 3 on the Beaufort Wind Scale.
- If multiple Amphibian survey stations are necessary they would be separated by at least 500 m.

In addition to the point counts a walk around the areas surrounding the features was completed to confirm presence/absence within the subject lands.

3.0 RESULTS

3.1 Review of Background Information

The NHIC databases, Land Information Ontario, OMNRF, and RVCA indicate that there were no fish species at risk within a 10 km radius of the study area.

3.2 Site Investigations

3.2.1 Summary of Visits and Sampling Site Locations

Seven visits were completed between April 28th, 2015 and July 27th, 2015. Environmental conditions for each visit are described in Table 2 below.

The aquatic habitats were described primarily on May 1st, May 21st, June 2nd, and July 27th, 2015. Additional notes were collected on the habitats during other visits and were included where applicable. The fish community was sampled using backpack electrofishing. Sampling took place on the May 1st, 2015 visit, no additional sampling was conducted during the summer as the sites contained insufficient water. The electrofishing settings utilized were 65 volts and 1.9 amps. Figure 2 provides the locations of the sampling stations and features described below.

Table 2 Summary of Dates, Times of Site Investigations

Date	Time (h)	Staff	Staff Hours	Air Temperature (Min-Max) °C	Weather	Purpose
April 28, 2015	2115-2130	M. Lavictoire	0.5	16.0 (4.4-20.6)	2% cloud cover, no wind	- Amphibian Monitoring
May 1, 2015	1215-1330	M. Lavictoire C. Fontaine	2.5	17.0 (8.0-21.5)	25% cloud cover, light air	- Fish Community Sampling -Headwater Assessment
May 21, 2015	1245-1400	S. St. Pierre C. Fontaine	2.5	20.0 (6.2-20.6)	10-20% cloud cover, gentle breeze changing to 30% cloud cover, gentle breeze	- Headwater Assessment
May 25, 2015	2345-2400		0.5	16.0 (14.2-18.9)	10% cloud cover, no wind	- Amphibian Monitoring

Date	Time (h)	Staff	Staff Hours	Air Temperature (Min-Max) °C	Weather	Purpose
June 2, 2015	1315-1400	S. St. Pierre	0.75	17.0 (5.8-16.5)	100% cloud over, light air changing to 100% cloud cover, light breeze	- Headwater Assessment
June 22, 2015	2315-2345	S. St. Pierre C. Fontaine	1	22.0 (15.4-27.8)	Overcast, light air	- Amphibian Monitoring
July 27, 2015	1100-1200	S. St. Pierre	1	27.0-29.0 (18.3-31.8)	Clear skies, light air changing to 10% cloud cover, light breeze	- Headwater Assessment

M. Lavictoire – Michelle (Nunas) Lavictoire – M.Sc. Natural Resources
 S. St. Pierre – Shaun St. Pierre – B. Sc. Biology and Fisheries and Wildlife Technologist
 C. Fontaine - Cody Fontaine - Fisheries and Wildlife Technologist

*Min-Max Temp Taken From: Environment Canada. National Climate Data and Information Archive. Ottawa International Airport. Available <http://climate.weatheroffice.gc.ca/> [July 31, 2015]

3.2.2 Habitat and Fish Community Descriptions

There were four watercourses within the subject lands: The Burnett Municipal Drain and three tributaries to the Burnett Municipal Drain. One station was established on each watercourse (stations 1-4).

Tables 3 provide a summary of the water temperatures and other parameters collected at the stations during 2015. The water temperatures varied between 15.0-19.9° C, with air temperatures varying between 17.0-20.0° C. Note that snow pack of winter 2014-2015 melted prior to ice off resulting in low peak flows in 2015. This was followed by a period of low precipitation and cooler than normal temperatures until approximately the last week of April when the air temperatures were above seasonal. Temperatures returned to near average by May 13th, 2015.

Figure 2 Location of Headwater Features and Stations



Table 3 Features and sampling parameters from Burnett Municipal Drain and its tributaries (Figure 2)

Station No.	Date	Time (h)	Air Temp (°C)	Water Temp (°C)	pH	TDS (ppm)	Conductivity (µ)	Ave. Depth (cm)	Ave. Wetted Width (m)	Ave. Channel Width (m)
<i>Burnett Municipal Drain</i>										
1	May 1, 2015	1220	17.0	19.9	N/A	704	1387	5.0	1.3	2.1
	May 21, 2015	1300	20.0	19.7	8.68	703	1412	2.0	0.3	
	June 2, 2015	1326	17.0	15.0	8.55	1041	1326	5.0	0.7	
	July 27, 2015						DRY			
<i>Tributary 1</i>										
2	May 1, 2015									1.1
	May 21, 2015						DRY			
	June 2, 2015									
	July 27, 2015									
<i>Tributary 2</i>										
3	May 1, 2015									2.5
	May 21, 2015						DRY			
	June 2, 2015									
	July 27, 2015									
<i>Tributary 3</i>										
4	May 1, 2015									1.6
	May 21, 2015						DRY			
	June 2, 2015									
	July 27, 2015									

Burnett Municipal Drain

The Burnett Municipal Drain is a tributary to the Jock River and travels through the centre of study area. This drain flowed north to south and its total length (inside and outside of the study area) was estimated at 1.3 km. At a distance of approximately 550 m upstream of the confluence with the Jock River the drain is piped under a driving range for a distance of approximately 170 m (Photo 1). The channel was confined with a straight pattern. There is a potential for fish to access the site during the spring under high flows but based on the observations made during spring 2015 the duration of the connection would be short lived. The culvert was old and flow was travelling through holes in the culvert and under it during the May 1st visit (Photo 2). By the May 21st, 2015 visit the upstream portion of the channel, beginning immediately upstream of the station, was dry (Figure 2). The whole of the drain was dry come summer.



Photo 1 Looking upstream at downstream end of the piped section of the Burnett Municipal Drain (May 21, 2015)



Photo 2 Looking from the upstream end of the culvert to downstream end at the connection to Jock River (May 1, 2015)

Station 1

Station 1 was located approximately 74 m upstream of the confluence with the Jock River and was 55 m in length. The average channel and wetted widths were 2.1 m and 0.3 m respectively. The average bankfull depth was approximately 16 cm. The average water depth on May 21st was 2 cm (range 1-5 cm). The site was dry by July 27th, 2015 (Table 4). The habitat type consisted of glide morphological units. The substrate consisted of fines. The in-water cover consisted of overhanging vegetation. The canopy cover was poor. There were no signs of erosion throughout the station.

The top of the banks were fully vegetated with herbaceous vegetation and the occasional woody species. The most common species were: reed canary grass, spotted jewel-weed, Virginia creeper, hawthorn species, wild red raspberry, tartarian honeysuckle, American elm and green ash

During the May 1st, 2015 site visit the station was shocked for 255 seconds over an area of approximately 72 m². The average wetted width and water depth present during the spring sampling were 1.3 m and 5 cm (range 3-12 cm), respectively. No fish were captured.

The site was not sampled during the summer visit due to lack of water.

Table 4 Summary of Fish Community Sampling

Date	Wetted Width (m)	Average Depth (range) (cm)	Effort	Results (species, numbers and fork lengths)
May 1, 2015	1.3	5 (3-12)	4 s/m ²	no fish caught or observed
May 21, 2015	0.3	2 (1-5)	n/a	No fish observed
June 2, 2015	0.7	5 (4-9)	n/a	No fish observed
July 27, 2015	DRY			



Photo 3 Station 1 looking upstream from the downstream end (May 1, 2015)



Photo 4 Station 1 looking upstream from the downstream end (July 27, 2015)

Tributary 1 off of Burnett Municipal Drain

Station 2 was located within a tributary on the east bank of the Burnett Municipal Drain. This tributary flowed east to west, was located 500 m upstream of the confluence with the Jock River, and was approximately 260 m in length.

Station 2

Station 2 was located approximately 30 m upstream of the confluence with Burnett Municipal Drain and was 50 m in length. The station was dry. The average channel width and average bank height were 1.1 m and 18 cm. The substrate consisted of fines. Cover consisted of aquatic vegetation, (reed canary grass). There was no canopy cover present. The station had no signs of erosion.

The top of the banks were fully vegetated with herbaceous vegetation and the occasional woody species. The most common species were: reed canary grass, spotted jewel-weed, Virginia creeper, hawthorn species, wild red raspberry, tartarian honeysuckle, American elm, and green ash.

No sampling was conducted at this station due to lack of water and dense vegetation.



Photo 5 Tributary 1 (Station 5) looking upstream from the downstream end (May 1, 2015)



Photo 6 Station 2 looking upstream from the downstream end (May 21, 2015)



Photo 7 Station 2 looking upstream from the downstream end (July 27, 2015)

Tributary 2 off of the Burnett Municipal Drain

Station 3 was located within a tributary on the east bank of the Burnett Municipal Drain. This tributary flowed east to west, was located 560 m upstream of the confluence with the Jock River, and was approximately 110 m in length.

Station 3

Station 3 was located approximately 20 m upstream of the confluence with Burnett Municipal Drain and was 52 m in length. This site was dry. The average channel width and bank height were 2.5 m and 24 cm respectively. The substrate consisted of fines. Cover consisted of aquatic vegetation (narrow-leaved cattail). There was no canopy cover. No signs of erosion were noted.

The top of the banks were completely vegetated with herbaceous vegetation. The most common species were: reed canary grass and smooth bedstraw.

No sampling was conducted at this station due to lack of water and dense vegetation.



Photo 8 Tributary 3 (Station 6) looking upstream from the downstream end (May 1, 2015)



Photo 9 Station 3 looking upstream from the downstream end (July 27, 2015)

Tributary 3 off of the Burnett Municipal Drain

Station 4 was located within a tributary on the west bank of the Burnett Municipal Drain. This tributary flowed west to east, was located 560 m upstream of the confluence with the Jock River, and was approximately 160 m in length.

Station 4

Station 4 was located approximately 10 m upstream of the confluence with Burnett Municipal Drain and was 95 m in length. The station was completely dry during all visits. The average channel width and bank height were 1.6 m and 24 cm respectively. The substrate consisted of fines. Cover consisted of aquatic vegetation (reed canary grass). The canopy cover was poor. There were no signs of erosion throughout the station.

The top of the banks were fully vegetated with herbaceous vegetation and the occasional woody species. The most common species were: reed canary grass, common dandelion, pussy willow, Manitoba maple and crack willow.

No sampling was conducted at this station due to lack of water and dense vegetation.



Photo 10 Tributary 3 (Station 4) looking upstream from the downstream end (May 1, 2015)



Photo 11 Station 4 looking downstream from the upstream end (July 27, 2015)

4.0 Headwater Drainage Features Assessment

4.1 Classification

This classification follows the four step process of the Headwater Guidelines using the information collected from the portion of the tributaries in the subject lands. The four steps are: hydrology classification, riparian classification, fish and fish habitat classification and terrestrial classification.

4.1.1 Step 1: Hydrology Classification

In step 1 the flow is classified based on the amount recorded during the three visits. These are summarized in Table 5 (as per OSAP S4.M10).

Note that there is no appropriate feature type code for these systems with the exception of the municipal drain. All of the tributaries are constructed water courses and not ‘natural headwater features’. A review of the geoOttawa mapping indicates that all were present since before 1976 and that the fields on both sides of the drain and its tributaries were cropped since prior to 1976.

All of these watercourses could meet one of three possible codes for the Feature Type:

- (2) Channelized
 - This code requires there to have been a natural channel that shows signs of channelization. This applies to the Burnett Municipal Drain.
- (7) Swale
 - This definition fits the best for the three unnamed tributaries to the municipal drain with the exception of the ill-defined banks. Since it had been dug down the banks are well defined. However the description of a system that carries water flow during rainstorms or snowmelt matches. The three unnamed tributaries were all dry throughout the spring and summer. Note that these systems only would carry water during snow melt (no flowing water during rainstorms – June 2, 2015 visit was completed after a rain event).
- (8) Roadside Ditch
 - This definition fits with the constructed nature of the features however there is no roadway.

Based on Table 4 in the guidelines the drain would be considered Values Function as in water was present in the spring until June-July (had a substantial surface flow) and this drain was channelized.

The tributaries would be considered Limited as in Late April-May and after a rainfall event they had no surface (dry) and consisted of a swale.

The soil map for the area indicates that North Gower and Carp soils which are described as being imperfect to very poorly drained. These types of soils prevent the area from matching the Recharge Function description of the guidelines.

Table 5 Hydrology classification features using data from OSAP S4.M10.

Tributary ID	Definitions of Flow Influence	Flow Conditions	Types of Headwater Drainage Features	Hydrology Classification
Burnett Municipal Drain	Spring Freshet or rainfall events	3.4l/s (5)*	Channelized	Valued Functions
	Late April-May	(5)*		
	July-August	N/A (dry)		
Tributary 1	Spring Freshet or rainfall events	N/A (dry)		
	Late April-May			
	July-August			
Tributary 2	Spring Freshet or rainfall events	N/A (dry)	Constructed agricultural drain (Swale)	Limited
	Late April-May			
	July-August			
Tributary 3	Spring Freshet or rainfall events	N/A (dry)		
	Late April-May			
	July-August			

*(5) – surface flow substantial (>0.5l/s)

The amount of rainfall recorded in the seven days preceding each station visit is summarized in Table 6 to provide context to the water depths in Table 3.

Table 6 Summary of Rainfall for the 7 Days Preceding the Field Surveys

Dates	Total Rainfall (mm)
April 23, 2015 to April 30, 2015	0.0
May 13, 2015 to May 20, 2015	2.2
May 26, 2015 to June 1, 2015	20.4
July 19, 2015 to July 26, 2015	6.8

Total Rainfall taken from: Environment Canada. 2015. National Climate Data and Information Archive – Ottawa INTL. On-line (<http://climate.weatheroffice.gc.ca>) accessed February 10, 2015.

4.1.2 Step 2: Riparian Classification

Terrestrial and wetland habitats adjacent to HDF can provide important functions and attributes for the HDF. As such, the surrounding habitat is also included in the evaluation criteria. This habitat was assessed based on OSAP S4.M10. When the value of the land type differs from one bank to the other, the highest functioning habitat is used.

Based on this criterion Burnett Municipal Drain and Tributary 1 are listed as limited function due to cropped land while tributaries 2, and 3 are listed as limited to contributing function due to the cropped land and manicured lawn (riparian vegetation codes 3 and 2, respectively) (Table 7).

Table 7 Riparian Classification

Tributary	Riparian Classification	Comments
Burnett Municipal Drain	Limited Functions	Within the subject land the drain flows within very small windrow and cropped land. The dominate being cropped land.
Tributary 1		Within the subject land the tributary flows within cropped land.
Tributary 2 Tributary 3	Limited to Contributing Functions	Within the subject land the south bank of these tributaries flows within cropped lands, while the north bank consists of a manicured grass (driving range).

4.1.3 Step 3: Fish and Fish Habitat Classification

These watercourses did not provide any direct fish habitat. They were sampled during the May 1st, 2015 visit. Note that additional sampling during April 2012, upstream of the site as part of another project on the Burnett Municipal Drain, also found no fish (Bowfin 2012). No fish were captured or observed within these reaches and the lack of flow (even during periods of significant rainfall) limits the potential of the reaches to even contribute to fish habitat. There was potential for fish access to the Burnett Municipal Drain however the poor condition of the culvert at its mouth resulted in the low flows travelling through the holes under the culvert. Later on in the season the water level in the Jock River is lower than the mouth of the drain resulting in a gradient barrier. At best, the Burnett Municipal Drain is considered to be contributing and the three tributaries have no fish value (no flow during any visit).

Table 8 Fish and Fish Habitat Classification

Tributary	Fish and Fish Habitat Classification	Comments
Burnett Municipal Drain	Contributing	Contributing fish habitat: Transport of allochthonous materials (detritus, insects, etc.) to downstream fish-bearing reaches provides sources of food.
Tributary 1	No value – dry throughout spring and summer	
Tributary 2		
Tributary 3		

4.1.4 Step 4: Terrestrial Habitat Classification

Step 4 of the guidelines classifies the value of the HWF as it relates primarily to amphibian breeding habitat and its ability to provide movement corridors. It is assessed through the use of both the OSAP S4.M10 and Marsh Monitoring Protocol. The feature must meet both of these protocols for each class. Only those features with both wetland habitat (Feature Type Code 6 - wetland) and amphibians calling can be deemed Important.

The Burnett Municipal Drain contained little water throughout the survey period and was dry by the second half of July. The drain is not connected with any wetland features and the lands upstream are entirely developed. Only a single American toad was heard calling and only during the one visit.

Table 9 Terrestrial Habitat Classification

Tributary	Terrestrial Habitat Classification	Comments
Burnett Municipal Drain	Limited Functions	- One American Toads was heard calling on May 25, 2015. - OSAP Riparian Condition = 3 - OSAP Feature Type = 2
Tributary 1		- OSAP Riparian Condition = 3 - OSAP Feature Type = 7
Tributary 2		- OSAP Riparian Condition = 2 and 3
Tributary 3		- OSAP Feature Type = 7

4.2 Part 3 – Management Recommendations

The management recommendations are grouped into six categories: protection, conservation, mitigation, maintain recharge, maintain/ replicate terrestrial linkage, and no management required. Utilising the guideline and the data collected at each tributary the management recommendations for the Burnett Municipal Drain would be mitigation and its tributaries would be no management required (Table 10)

Table 10 Evaluation, Classification and Management Summary and Study Conclusion

Drainage Feature Segment	Hydrology Classification	Riparian Classification	Fish and Fish Habitat Classification	Terrestrial Habitat Classification	Guideline's Management
Burnett Municipal Drain	Valued Functions		Contributing		Mitigation
Tributary 1		Limited Functions			
Tributary 2	Limited Functions		None	Limited Functions	No Management Required
Tributary 3		Limited to Contributing Functions			

REFERENCES

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Evaluation, Classification and Management of Headwater Drainage Features Guideline. Toronto and Region Conservation Authority and Credit Valley Conservation, TRCA Approval July 2013 (Finalized January 2014).

Marsh Monitoring Program Participant's Handbook Surveying Amphibians. 2008 Edition. 20 pages. Published by Bird Studies Canada in cooperation with Environment Canada and the U.S. Environmental Protection Agency. February 2008.

Mississippi Valley Conservation Authority (MVCA). (2013). Distribution of Fish Species at Risk. Department of Fisheries and Oceans.

MTO (2006). *Environmental Guide for Fish and Fish Habitat*. Ministry of Transportation Ontario.

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Appendix A

Incidental Observations

Common Name	Scientific Name	SRank	Provincial Status (SARO)	Federal Status (SARA)	Coefficient of Conservatism
AMPHIBIANS					
American Toad	<i>Bufo americanus</i>	S5			
Green Frog	<i>Rana clamitans</i>	S5			
BIRDS					
Canada Goose	<i>Branta canadensis</i>	S5			
Killdeer	<i>Charadrius vociferus</i>	S5B, S5N			
PLANTS					
Manitoba Maple	<i>Acer negundo</i>	S5			0
Common Dandelion	<i>Taraxacum officinale</i>	SNA			
Spotted Jewelweed	<i>Impatiens capensis</i>	S5			4
Tartarian Honeysuckle	<i>Lonicera tatarica</i>	SNA			
Green Ash	<i>Fraxinus pennsylvanica</i>	S4?			3
Hawthorn sp.	<i>Crataegus sp.</i>				
Wild Red Raspberry	<i>Rubus idaeus ssp. strigosus</i>	S5			0
Smooth Bedstraw	<i>Galium mollugo</i>	SNA			
Pussy Willow	<i>Salix discolor</i>	S5			3
Crack Willow	<i>Salix fragilis</i>	SNA			
American Elm	<i>Ulmus americana</i>	S5			3
Virginia Creeper	<i>Parthenocissus inserta</i>	S5			3
Reed Canary Grass	<i>Phalaris arundinacea</i>	S5			0

Status Updated February 12, 2016

SRANK DEFINITIONS

S4 Apparently Secure, Uncommon but not rare; some cause for long-term concern due to declines or other factors.

S5 Secure, Common, widespread, and abundant in the nation or state/province.

SNA Not Applicable, A conservation status rank is not applicable because the species is not a suitable target for conservation activities.

S#S# Range Rank, A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species or community. Ranges cannot skip more than one rank (e.g., SU is used rather than S1S4).

? Inexact Numeric Rank—Denotes inexact numeric rank

S#B Breeding

S#N Non-Breeding

Coefficient of conservatism ranking criteria

- 0 Obligate to ruderal areas.
- 1 Occurs more frequently in ruderal areas than natural areas.
- 2 Facultative to ruderal and natural areas.
- 3 Occurs less frequent in ruderal areas than natural areas.
- 4 Occurs much more frequently in natural areas than ruderal areas.
- 5 Obligate to natural areas (quality of area is low).
- 6 Weak affinity to high-quality natural areas.
- 7 Moderate affinity to high-quality natural areas.
- 8 High affinity to high-quality natural areas.
- 9 Very high affinity to high-quality natural areas.
- 10 Obligate to high-quality natural areas.



APPENDIX F

Curriculum vitae



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

PADI Medic First Aid (CPR, First Aid, Automatic Emergency Defibrillator) Instructor, 2003, 2009

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

Canadian Red Cross First Aid and CPR, 2012

WHMIS Training, 1990, 2001, 2004

Languages

English – Fluent

Golder Associates Ltd. – Mississauga

Associate, Senior Ecologist

Heather Melcher, is an Associate, Senior Ecologist and Project Manager with Golder Associates. Heather has over 11 years of experience working in a number of sectors including power, aggregates, mining and land development. Her experience lies in designing, managing and carrying out field programs for natural environment components of projects of various size and complexity, analysing and interpreting data, integrating natural environment data with surface water and hydrogeological data in the development of technical impact assessment reports and developing rehabilitation plans. Heather also has extensive experience in managing multi-disciplinary Environmental Assessments, and has worked as a project manager and ecologist within provincial, federal and international frameworks, as well as with other environmental and land use policies. Heather is experienced in dealing with Species at Risk (SAR) issues and works with municipal, provincial and federal legislation, negotiating with regulatory agencies and developing compensation plans.

Employment History

Golder Associates Ltd. – Mississauga, Ontario

Senior Ecologist/Project Manager/GTA Bioscience Group Leader (2004 to Present)

Responsibilities include project management and preparation of environmental assessment reports, screening reports, and natural environment reports for private and public sectors, including land development, aggregate, and power. Development, implementation and coordination of terrestrial and aquatic field programs, coordination and management of activities and budgets of multi-disciplinary teams, and client and agency liaison. Management of the Bioscience GTA group, marketing and new client initiatives.

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.

Southeast Environmental Association – Montague, Prince Edward Island

Bacterial Water Quality Project Coordinator (2000 to 2002)

Responsible for collection of freshwater samples and laboratory analysis of faecal coliform bacteria to determine the effects of livestock farming runoff on the shellfish industry. Liaised with landowners and the agricultural engineer to establish effective remediation efforts, and developed education initiatives involving the general public, farmers and shell fishers. Reported to a multi-stakeholder board.



PROJECT EXPERIENCE – AGGREGATES

Lafarge Canada Ltd.
Various Locations,
Ontario, Canada

Project Manager and Natural Environment Component Lead for a number of ongoing license applications for proposed new and expanded aggregate extraction operations (pits and quarries) in Ontario under the Aggregate Resources Act (ARA). Responsibilities include coordinating aquatic and terrestrial field data collection and analysis, coordinating and interpreting and integrating with hydrogeological and surface water data, as well as producing Level I & II Natural Environment Technical reports and developing rehabilitation plans. Project responsibilities also included negotiating with municipalities and agencies on SAR issues, submitting ESA permit applications and developing compensation plans; attending open houses and public forums, responding to public and agency comments following submission. Project manager roles and responsibilities include coordinating and managing the activities of a multi-disciplinary team including hydrogeologists, surface water engineers, and noise, air quality and blasting specialists.

**Cavanagh
Construction Ltd.**
Ottawa, Ontario, Canada

Natural Environment Component Lead for a below water Quarry license application under the ARA. Responsibilities included coordinating aquatic and terrestrial field data collection and analysis, interpreting data and integrating with hydrogeological and surface water data, working with the planner in developing a rehabilitation plan, attending agency and public meetings as well producing a Level II Natural Environment Technical report and Environmental Impact Statement report for the municipality. Responsible for negotiations with the MNR regarding SAR issues and developing compensation plans.

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

Natural Environment Component Lead for a below water Quarry license application under the ARA. Responsibilities included coordinating aquatic and terrestrial field data collection and analysis, interpreting data and integrating with hydrogeological and surface water data, working with the planner in developing a rehabilitation plan, attending agency and public meetings as well producing a Level II Natural Environment Technical report and Environmental Impact Statement report for the municipality. Responsible for negotiations with the MNR regarding SAR issues and developing compensation plans.

**Greenfield Aggregates
Sherk Pit**
Waterloo, Ontario,
Canada

Natural Environment Component Lead for the below water Sherk Pit license application under the ARA. Responsibilities included terrestrial and aquatic data analysis, interpretation and integration with hydrogeological and surface water data, working with the planner to develop a rehabilitation plan as well as producing a Level I & II Natural Environment Technical report and an Environmental Impact Statement for the municipality. Responsibilities also included responding to public and agency comments following submission.



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

Natural Environment Component Lead for the French Settlement Pit below water license application under the ARA. Responsibilities included coordinating aquatic and terrestrial field data collection and analysis, interpreting and integrating with hydrogeological and surface water data, working with the planner to develop a progressive and final rehabilitation plan (natural conditions) as well as producing a Level I & II Natural Environment Technical report and an Environmental Impact Statement for the municipality. Consulted with regulatory agencies, and attended public open houses.

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

Natural Environment Component Lead for the Sunningdale Pit below water license application under the ARA. Responsibilities included coordinating aquatic and terrestrial field data collection and analysis, interpreting and integrating with hydrogeological and surface water data, working with the planner to develop a progressive and final rehabilitation plan (natural conditions) as well as producing a Level I & II Natural Environment Technical report and an Environmental Impact Statement for the municipality. Consulted with regulatory agencies, and attended public open houses. Developed mitigation and habitat compensation plans under the Ontario Endangered Species Act for barn swallow.

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

Project Manager and Natural Environment Component Lead for the Limebeer Pit below water license application under the ARA. Responsibilities included coordinating aquatic and terrestrial field data collection and analysis, interpreting and integrating with hydrogeological and surface water data, working with the planner to develop a progressive and final rehabilitation plan (natural conditions) as well as producing a Level I & II Natural Environment Technical report and an Environmental Impact Statement for the municipality. Consulted with regulatory agencies, and attended public open houses. Project manager roles and responsibilities included coordinating and managing the activities and budgets of a multi-disciplinary team including hydrogeologists, surface water engineers, and noise, and air quality specialists.

**Lafarge Canada Inc.,
Oster Pit**
Creemore, Ontario,
Canada

Project Manager and Natural Environment Component Lead for the Oster Pit above water license application under the ARA. Responsibilities included coordinating aquatic and terrestrial field data collection and analysis, interpreting and integrating with hydrogeological and surface water data, working with the planner and the agricultural subconsultant to develop a progressive and final rehabilitation plan (agricultural conditions) as well as producing a Level I & II Natural Environment Technical report and an Environmental Impact Statement for the municipality. Project manager roles and responsibilities included coordinating and managing the activities and budgets of a multi-disciplinary team including hydrogeologists, surface water engineers, and noise and air quality specialists.



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

Natural Environment Component Lead for the McGill Pit below water license application under the ARA. Responsibilities included coordinating aquatic and terrestrial field data collection and analysis, interpreting data and integrating with hydrogeological and surface water data, working with the planner in developing progressive and final rehabilitation plans, attending agency and public meetings as well producing a Level II Natural Environment Technical report and Environmental Impact Statement report for the municipality. Responsible for negotiations with the MNR regarding Species at Risk issues and developing mitigation and habitat compensation plans for butternut.

Floyd Preston Ltd.
Eastern Ontario, Canada

Natural Environment Component Lead for a proposed new quarry license application in eastern Ontario. Liaised with client, coordinated field data collection, mentored intermediate staff in data analysis and interpretation and preparing a Level I Natural Environment Technical Report under the Aggregate Resources Act (ARA), and reviewed reporting.

Amherst Quarries Inc.
Windsor, Ontario,
Canada

Aquatic Ecology Component Lead for a proposed quarry expansion license application in southern Ontario. Coordinated and/or conducted field data collection, interpreted and analysed data, and provided the aquatic environment and other background data components for the Level I/II Natural Environment Technical Report under the ARA.

PROJECT EXPERIENCE – SPECIES AT RISK

**TransCanada - Various
Sites in Ontario**
Ontario, Canada

Natural environment component lead for Species at Risk (SAR) monitoring at a number of sites across Ontario. Provided SAR advice and liaised with Ontario Ministry of Natural Resources (MNR) to develop construction monitoring protocols for SAR and migratory birds.

Lafarge Canada Ltd.
Various Locations,
Ontario, Canada

Natural environment component lead for a number of SAR surveys at aggregate sites across Ontario in support of Endangered Species Act (ESA) exemption agreements. Species surveys included Blanding's turtle, loggerhead shrike, least bittern and gray ratsnake. Developed survey protocols with a number of MNR district offices, directed surveys and produced reports for submission.

**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 MNR to develop protocols and coordinate field surveys. Worked on ESA permitting applications and compensation plans.

Lafarge Canada Ltd.
Various Locations,
Ontario, Canada

Project Manager and Natural Environment Component Lead for a number of license applications for proposed new and expanded aggregate extraction operations (pits and quarries) in Ontario under the Aggregate Resources Act (ARA). Responsibilities included working with the Ontario Endangered Species Act (ESA), developing survey protocols, negotiating with the MNR, completing Information Gathering Forms (IGF), submitting permit applications and developing compensation plans.



PROJECT EXPERIENCE – WASTE MANAGEMENT

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

Natural Environment Component Lead for a provincial Environmental Assessment for a resource recovery centre on a 175 hectare site), including a landfill, contaminated soil management and recycling components. Responsibilities included designing the field program (terrestrial and aquatic), analyzing data, integrating the ecological data with other discipline data, completing the effects assessment, consulting with regulatory agencies, and participating in the public consultation process.

PROJECT EXPERIENCE – POWER SECTOR

**Trillium Power Wind
Corporation**
Lake Ontario, Ontario,
Canada

Project Manager for an offshore wind power project in Lake Ontario under O. Reg. 359/09 Renewable Energy Approvals (REA). Responsibilities included coordinating and managing a multi-disciplinary team including noise specialists, biologists, archaeologists, public consultation specialists, aboriginal engagement specialists, visual impact assessment specialists and geophysicists. Liaised with client and agencies, attended regulatory agency meetings and participated in public open houses. Reporting satisfied both provincial and federal (CEAA) requirements.

**Leader Resources
Services Corporation**
Various Locations,
Ontario, Canada

Project Manager for a number of ongoing wind farm projects under O. Reg. 359/09 Renewable Energy Approvals (REA). Responsibilities include coordinating and managing a multi-disciplinary team including noise specialists, natural heritage specialists, archaeologists, cultural heritage specialists, public consultation specialists and aboriginal engagement specialists. Liaising with client and agencies, attended regulatory agency meetings and participated in public open houses.

**Mann
Engineering/EffiSolar**
Various Locations,
Ontario, Canada

Natural Heritage Project Manager for four 10 MW ground-mounted PV solar farms in southeastern Ontario under O. Reg. 359/09 Renewable Energy Approvals (REA). Coordinated field programs, and carried out data analysis and report production. Liaised with client and agencies.

SkyPower Corp.
Various Locations,
Ontario, Canada

Project Manager for eight wind power park projects in Renfrew County, Prince Edward County and Parry Island, Ontario. Coordinated field programs and managed a multi-disciplinary team including hydrogeologists, biologists, surface water engineers, noise and air quality experts, socio-economic and public consultation coordinators, liaised with client and agencies, organized public open houses including assisting with preparation of panels, analysed data, and compiled results into an Environmental Screening Report/Environmental Impact Statement for submission to regulatory agencies.



Algonquin Power
Amherst Island, Ontario,
Canada

Project Manager and field coordinator for one wind power project in Prince Edward County. Coordinated field programs and multi-disciplinary team including hydrogeologists, biologists, surface water engineers, noise and air quality experts, socio-economic and public consultation coordinators, liaised with client and agencies, analysed data, and compiled results into documents to be submitted to regulatory agencies in support of the RES III RFP under the Ontario Power Authority Standing Offer Program.

SkyPower Corp.
Various Locations,
Ontario, Canada

Project Manager for several solar power projects across Ontario, including Napanee and Norfolk. Coordinated or conducted field programs and data collection, coordinated and managed the activities of a multi-disciplinary team. Completed reports addressing the Ministry of the Environment Screening Criteria for Energy Projects to be submitted to regulatory agencies.

OptiSolar Inc.
Various Locations,
Ontario, Canada

Project Manager for several solar power projects across Ontario, including Sarnia, Tilbury and Petrolia. Coordinated or conducted field programs and data collection, coordinated and managed the activities of a multi-disciplinary team including noise, archaeology, surface water, traffic and natural environment assessments. Completed reports to be submitted to regulatory agencies in support of planning/zoning applications.

Port Granby Long-Term Waste Management Facility
Port Granby, Ontario,
Canada

Coordinated aquatic field technicians and participated in the collection and analysis of fish samples in support of the human health assessment component of the project. Worked with a team of biologists in the interpretation of data and reporting.

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

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

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

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

TransCanada LNG Facility
Trois Rivieres, Quebec,
Canada

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.



PROJECT EXPERIENCE – PIPELINE

**TransCanada Eastern
Mainline Project**
Ontario, Canada

Vegetation and wetland component lead for an environmental and socio-economic assessment for a 392 km pipeline in southern Ontario under the National Energy Board (NEB). Responsibilities included designing the field program, analysing data, completing the baseline and effects assessment.

**TransCanada Parkway
West**
Milton, Ontario, Canada

Natural environment component lead for an environmental and socio-economic assessment for a new pipeline connection 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.

PROJECT EXPERIENCE – MINING

EnCana Dyno
Bancroft, Ontario,
Canada

Natural environment component lead for an environmental and health risk assessment of a decommissioned uranium mine. Worked with a multi-disciplinary team including surface water engineers, geotechnical engineers, risk specialists. Designed and coordinated bioscience field technicians to carry out the natural environment workplan. Tasks in the aquatic workplan included fish habitat assessment, and collection of benthic, fish, sediment and aquatic plant samples in affected and reference lakes and watercourses. As part of the terrestrial workplan, collection of plant 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.

EnCana Coldstream
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, risk specialists. Designed and coordinated bioscience field technicians to carry out the natural environment work plan. Tasks in the aquatic work plan included fish habitat assessment, and collection of benthic, fish, sediment and aquatic plant samples in affected and reference lakes and watercourses. As part of the terrestrial work plan, collection of plant 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 – FISHERIES ENVIRONMENTAL ASSESSMENTS

Bruce Power Ltd
Kincardine, Ontario,
Canada

Lead biologist for a Lake-wide whitefish distribution study. Tagged and collected meristic data on all whitefish captured using trap nets. Completed weekly summary reports in addition to a final fish effort report including recommendations.



**Bruce Power Ltd.,
Ontario Power
Generation**
Kincardine, Ontario,
Canada

Completed terrestrial and aquatic environment post-restart follow-up monitoring reports, including entrainment, impingement, fish habitat use, fishing pressure, bass spawning habitat, waterfowl surveys, roadkill surveys, and deer mortality surveys.

PROJECT EXPERIENCE – LAND DEVELOPMENT ENVIRONMENTAL ASSESSMENTS

Biglieri Group
Ontario, Canada

Project Manager for a residential subdivision development application in southern Ontario. Responsibilities included coordinating and managing a multi-disciplinary team including surface water engineers and biologists. Tasks included designing and coordinating the terrestrial and aquatic field program, and completing an environmental impact study report. Liaised with client and agencies.

Brookfield Homes
Brantford, Ontario,
Canada

Project Manager for a residential subdivision development application in southern Ontario. Responsibilities included coordinating and managing a multi-disciplinary team including hydrogeologists, surface water engineers and geomorphologists. Tasks included designing and coordinating the terrestrial and aquatic field program, and completing a constraints analysis report and map, and environmental impact study report. Liaised with client and agencies, and attended regulatory agency meetings and participated in negotiations.

**Maldives Fishery
Infrastructure -
Feasibility Study**
Maldives, Asia

Responsibilities included writing a preliminary environmental screening assessment of eight proposed fishery infrastructure projects, including aquaculture, upgrading existing processing plants and marinas in the Maldives and completing a feasibility study of these projects. Tasks included completing a desktop background assessment of the natural environment, collecting in-situ water quality data, mapping marine fish habitat, corals and terrestrial habitats. In addition, collection of socio-economic data - both desktop and personal interviews was included in the study. Compilation and analysis of the data was completed, and recommendations and mitigation measures were provided in the report. Follow-up included designing the environmental impact assessment required for the chosen project.

**Oak Hills Golf Course -
Permit to Take Water**
Stirling, Ontario, Canada

Project Manager for a golf course Permit to Take Water (PTTW) renewal application. Designed aquatic and hydrology field program and carried out fish habitat assessments. Analysed data and determined aquatic habitat critical low flows. Compiled supporting documentation for the permit application and prepared a client report including recommendations for continued monitoring.



PROJECT EXPERIENCE – AQUATIC ECOSYSTEM ASSESSMENTS

SYSCO Road Access
Sydney, Nova Scotia,
Canada

Responsibilities included acting as the Natural Environment Component Lead for a new road access through a forested/wetland area. Designed and coordinated a field program, and lead a crew in the completion of terrestrial and aquatic environment assessments. Compiled and analysed data, wrote a report, and completed the application process for all required provincial and federal permits.

**Nova Atlantic
Aluminum Ltd.
Aluminum Smelter and
Power Plant**
Halifax, Nova Scotia,
Canada

Completed an assessment of all marine and freshwater ecosystems within the impact zone of the proposed development, including habitat inventory and impacts to both near shore and offshore fisheries.

**Charlottetown
International Airport
Master Plan**
Charlottetown, Prince
Edward Island, Canada

Responsibilities included acting as the Natural Environment Component Lead for the environmental and land use components for the airport master plan. Designed, coordinated and conducted field program, including terrestrial and aquatic, and wrote the report which included mitigation measures and recommendations.

PROJECT EXPERIENCE – CEAA SCREENING

**Trillium Power Wind
Corporation**
Lake Ontario, Ontario,
Canada

Project Manager for an offshore wind power project in Lake Ontario under O. Reg. 359/09 Renewable Energy Approvals (REA). Responsibilities included coordinating and managing a multi-disciplinary team including noise specialists, biologists, archaeologists, public consultation specialists, aboriginal engagement specialists, visual impact assessment specialists and geophysicists. Liaised with client and agencies, attended regulatory agency meetings and participated in public open houses. Reporting satisfied both provincial and federal (CEAA) requirements.

SkyPower Corp.
Various Locations,
Ontario, Canada

Project Manager for several wind power park projects across Ontario, including Renfrew County, Prince Edward County, and Parry Island. Coordinated field programs, analysed data, and compiled results into an Environmental Screening Report/Environmental Impact Statement for submission to regulatory agencies.

**Inverness Phase I and
II Assessment**
Inverness, Nova Scotia,
Canada

Compiled background information, conducted an assessment of fish habitat in the marine and freshwater environments, and an assessment of water quality. Completed the data management and reporting phases of the reports and assisted with the development of the CEAA screening report.



TRAINING

Microsoft Project Level 1 Training

2008

Royal Ontario Museum (ROM) Fish ID Workshop

2005

Introduction and Intermediate MapInfo Professional Training

2000

PROFESSIONAL AFFILIATIONS

Professional Association of Diving Instructors (PADI)

Member, Ontario Stone Sand and Gravel Association (OSSGA)

PUBLICATIONS

Conference Proceedings

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

Other

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



Education

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

Certifications

*Ecological Land
Classification - Training
Certificate,
2004*

*Ontario Wetland Evaluation
System - Training
Certificate,
2005*

*Ontario Ministry of Natural
Resources Butternut Health
Assessor ,
2011*

*Canadian Environmental
Assessment Act Orientation
- Training Certificate,
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. Gwendolyn is certified in both the Ontario Ministry of Natural Resources Ecological Land Classification (ELC) and Wetland Evaluation systems, as well as being an OMNR certified Butternut Health Assessor.

Gwendolyn has strong field skills in plant and wildlife identification, terrestrial monitoring, applying ELC and wetland evaluation principles, and she possesses a strong understanding of planning regulations and policies in a natural heritage context. She is experienced in a broad range of environmental services, including terrestrial monitoring and assessment, wildlife inventory, floral inventory, habitat assessment, agency liaison and client relations.

Gwendolyn has authored numerous environmental impact statements, environmental assessments, natural heritage reviews, environmental constraints analyses, and letters of compliance for a variety of sectors, including residential developments, recreational developments, aggregates and energy projects (including renewable energy). She has also provided terrestrial ecology expertise on a wide range of projects, including work for government agencies and peer review services.

Employment History

Stantec Consulting Ltd. – Guelph, ON

Ecologist and Project Manager (2004 to 2011)

Provided a range of terrestrial ecology services, including managing projects and natural heritage components of Environmental Assessments for numerous sectors, including land development, transportation, renewable energy and aggregate industries, as well as government agencies.

Hamilton Region Conservation Authority – Hamilton, ON

Ecological Land Classification Technician (2004 to 2004)

Conservation Halton – Milton, ON

Student Ecologist (2003 to 2003)



PROJECT EXPERIENCE – ENERGY

Hydro One - Bruce to Milton Transmission Reinforcement Project
Ontario, Canada

This project required a complete Environmental Assessment (EA) for the proposed installation of a new 180 km long double-circuit 500kV transmission line from the Bruce Power Complex to Hydro One’s existing Milton Switching Station. Gwendolyn assisted in the preparation of the Natural Heritage component of the EA through planning and execution of various ecology field surveys, and through liaison with First Nations stakeholders. Work included Ecological Land Classification, wetland boundary delineation according to OWES, wildlife and plant inventory, and identification of significant wildlife habitat or habitat for species at risk within the proposed corridor and adjacent lands. Provided input as to suitable mitigation for sensitive environmental features along the proposed route.

TransCanada - Eastern Mainline Project
Ontario, Canada

TransCanada Pipelines Limited proposes to construct and operate new natural gas pipeline facilities along its existing Canadian Mainline between Markham, Ontario and the community of Iroquois, Ontario. The preliminary scope of the Project includes up to approximately 370 km of pipeline and related components, including valve sites and new and modified compression facilities at existing compressor stations along the proposed route. Work included designing and undertaking portions of the environmental field program, as well as contributing to reporting for the Environmental Assessment (EA) pursuant to the requirements of the National Energy Board Act and CEAA 2012.

PROJECT EXPERIENCE – AGGREGATES

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.

PROJECT EXPERIENCE – ECOLOGY PEER REVIEW SERVICES

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

**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.

**McMachen Pit - SAR
Works**

Rideau Lakes, Ontario,
Canada

Designed and undertook a baseline study and transplantation plan for a sensitive plant Species at Risk on the client's proposed aggregate pit expansion lands in accordance with O.Reg. 242/08 under the Endangered Species Act. This project will involve annual follow-up monitoring of the transplanted individuals to assess their health and continued vigour. This project requires a detailed understanding of plant physiology and ecology, as well as a firm grasp of provincial legislation and regulations associated with Species at Risk.

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.

**Richmond Hill
Subdivisions -
Monitoring**

Richmond Hill, Ontario,
Canada

Collected data and samples for an on-going monitoring program. Tasks included undertaking annual vegetation monitoring using a standardized methodology, analyzing collected data and comparing it with previous years results to identify changes.



**Activa Waterloo West
Side Lands -
Monitoring**
Waterloo, Ontario,
Canada

Pre-construction monitoring on the subject lands was initiated in 1999 and continued during pre-construction years, with the intention of providing baseline environmental information prior to area grading and construction. This program addressed the City of Waterloo's development monitoring requirements, implemented for Laurel Creek and other watercourses within the City. The scope of work for the terrestrial monitoring included photographic and descriptive inventories of 22 stations on the subject lands. Terrestrial monitoring was conducted once per year with results analyzed, catalogued and compared with previous observations where applicable.

**Simpson Lands EIS
and Terrestrial
Monitoring**
Waterloo, Ontario,
Canada

Designed an on-going terrestrial monitoring program for the subject lands based on City of Waterloo and GRCA guidelines. Monitoring of vegetation communities, changes in species compositions, and disturbance levels was undertaken, interpreted, and reported. Requirements for the EIS field program were designed and discussed with relevant agencies. An EIS was prepared that considered the proposed plan of development, the potential environmental impacts related to the plan, and discussed mitigation measures for each potential impact.

**Buffalo Springs EIS
Update and
Homeowners' Manual**
Oro-Medonte, Ontario,
Canada

Prepared an EIS as well as an Environmental Stewardship Guide for new homeowners, which aimed to acquaint residents with their natural surroundings and educate them as to how to protect those areas through their daily actions. Liaised with the Ministry of Natural Resources and local Conservation Authority throughout this project. Conducted surveys using standardized methodology for Butternut.

**Gordon Creek
Developments - EIS**
Guelph, Ontario, Canada

Designed a fieldwork program in order to assess natural heritage features within the study area, and presented the Terms of Reference for the study to the City of Guelph Environmental Advisory Committee. Provided input to the project design based on findings of the field program, and authored an Environmental Impact Statement for the proposed development. The site contained a number of significant features, including Provincially Significant Wetland and wildlife corridors. Liaised with the City of Guelph and the Conservation Authority.

**Clerview
Environmental
Constraints Analysis
and EIS**
Guelph, Ontario, Canada

Performed a preliminary environmental constraints analysis for the subject lands, using published resources and an initial field investigation to identify constraints to development. Wetland boundaries on site were delineated according the methodology outlined in the Ontario Wetland Evaluation System. Information was presented to the client in report format. The constraints analysis was used in the production of the draft plan of subdivision, for which an EIS was prepared. The field program and report format for the EIS was presented to and negotiated with the Guelph Environmental Advisory Committee (EAC). A full three-season field program was undertaken, and findings were reported in the EIS. The draft plan was reviewed to identify potential environmental impacts to the adjacent natural areas, and mitigation measures were recommended. The final EIS will be presented to the Guelph EAC.



**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.

**Activa Branchton -
Dundas Lands EIS**
Cambridge, Ontario ,
Canada

Compiled three seasons worth of field data, including information on flora and fauna. Reviewed field data in conjunction with the preliminary design plan in order to recommend changes to elements of the plan to reflect consideration for the surrounding natural environment. Identified potential environmental effects related to the final design plan and recommended mitigation measures in the final Environmental Impact Statement.

**Victoria South Golf
Course Environmental
Constraints Analysis
and EIS**
Guelph, Ontario, Canada

Completed a natural heritage review of the subject lands, and inventoried the site using Ecological Land Classification, as well as collecting data on flora and fauna. Completed an Environmental Constraints Analysis to present the findings of both the review and field inventories for consideration during preliminary site design for a recreational golf facility. Upon receipt of the preliminary design plan, a Terms of Reference was prepared and submitted to the City of Guelph Environmental Advisory Committee outlining the proposed approach for a complete Environmental Assessment for the proposed development. Review of potential impacts was undertaken and presented in an Environmental Impact Statement.

**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.

PROJECT EXPERIENCE – RENEWABLE ENERGY

**Clarington Wind Power
Project**
Clarington, Ontario,
Canada

Retained by Leader Resources Services Corp. to complete various studies in support of the REA application for an onshore Class 4 wind turbine generating project. These included a Natural Heritage Assessment, a Water Body Assessment, Endangered Species Act Permit Applications, Environmental Effects Monitoring Plan and a Noise Study Report. Golder successfully completed a thorough records review as well as field investigations. Wildlife and wildlife habitat investigations focused on bat maternity roosting habitat, grassland bird habitat, landbird migratory stopover areas, marsh bird breeding habitat, amphibian breeding habitat and snake hibernacula. Use of the property by avian wildlife was assessed over several years during various seasons including breeding and migration. Species at risk (SAR) habitat was identified and focused field surveys were completed as required. Completion of the Natural Heritage Assessment was approved by the MNR.



**Lindsay-Ops Landfill
Site Renewable Energy
Generation Facility**
Kawartha Lakes,
Ontario, Canada

Retained by the City of Kawartha Lakes to conduct the site investigation component of a Natural Heritage Assessment (NHA) as per section 26 of Ontario Regulation (O. Reg.) 359/09 for a proposed biogas facility at the Lindsay-Ops Landfill site, City of Kawartha Lakes, Ontario. A Site Investigation Report was prepared based on these investigations, followed by an Evaluation of Significance (EOS) and Environmental Impact Statement (EIS) report as per sections 27 and 38 (2) of O. Reg. 359/09.

**South Branch Wind
Farm**
South Dundas, Ontario,
Canada

Environmental compliance monitoring during construction of this wind project for EDP Renewables - North America. Undertook a review of all environmental approvals and permits associated with the Project and prepared a comprehensive Compliance Manual based on the review. Golder also reviewed construction plans and procedures prepared by the Contractor for the Project in order to assess their compliance with agency guidelines and their related Acts, Codes and Regulations. Golder conducted monthly construction monitoring events to monitor compliance. Following the completion of Project construction, and all associated monitoring events, Golder will be preparing a Compliance Assessment Summary Report.

**Melancthon II - Natural
Heritage Component**
Shelburne, Ontario,
Canada

Completed a review of the natural heritage features within the study area for the Melancthon II Wind Project for Canadian Hydro Developers Inc. Work included contact and discussion with various agencies to obtain information on significant natural features. Also, field reconnaissance was undertaken within the study area to apply Ecological Land Classification for Southern Ontario. Prepared a Technical Appendix on the Natural Heritage features of the study area, to support the Environmental Screening Report for this project. This project was undertaken prior to implementation of the REA process.

**Kingsbridge II - Natural
Heritage Component**
Goderich, Ontario,
Canada

Undertook a review of natural heritage features within the study area for the Kingsbridge II Wind Project near Goderich, Ontario. Various agencies were contacted to obtain information on significant natural features within the study area. This information, along with data collected in the field, was presented in a Technical Appendix that formed part of the larger Environmental Screening Report for this project. This project was undertaken prior to implementation of the REA process.

**Multiple Renewable
Energy Projects**
Multiple Location,
Ontario, Canada

Assisted in design and implementation of field programs and subsequent reporting in support of REA applications for a number of wind farms in Ontario, including: Wolfe Island Wind Project (Wolfe Island, ON); Port Alma Wind Farm (Port Alma, ON); Grand Renewable Energy Park (Haldimand County, ON); St. Columban Wind Farm (Huron County, ON); Summerhaven Wind Energy Centre (Haldimand County, ON); Suncor Energy Adelaide Wind Power Project (Middlesex County, ON); and Armow Wind Project (Bruce County, ON). Many of these projects included surveys for species at risk utilizing standardized protocols.



PROJECT EXPERIENCE – TRANSPORTATION

**Highway 11/17 Route
Planning - MTO**
Kakabeka Falls, Ontario,
Canada

Route Planning Study for the future four-laning of Highway 11/17 between Kakabeka Falls and Shabaqua Corners. The purpose of the study was to review and evaluate various route alternatives for a new four-lane divided Highway 11/17. At completion of the study, a preferred route will be selected and designated. Terrestrial investigations characterized vegetation communities in the vicinity of each bridge according to Ecological Land Classification (ELC) for southern Ontario, and the Forest Ecosystems of Central Ontario. Observations of ecological linkages, wildlife and wildlife habitats were also made. Sensitive vegetation communities within a provincial park were reviewed. Fieldwork and reporting were undertaken according to MTO regulations and guidelines.

**Highway 11 Access
Review - MTO**
Muskoka, Ontario,
Canada

Planning, preliminary design and environmental assessment study to upgrade Highway 11 to a fully controlled access freeway, from Muskoka Road 117 to north of Alpine Ranch Road, in the Town of Bracebridge and the District Municipality of Muskoka. The study included identifying a plan to eliminate all at grade intersections and entrances and providing access to the highway at interchange locations only. Terrestrial investigations characterized vegetation communities in the vicinity of each bridge according to Ecological Land Classification (ELC) for southern Ontario, and the Forest Ecosystems of Central Ontario. Observations of ecological linkages, wildlife and wildlife habitats were also made. Fieldwork and reporting were undertaken according to MTO regulations and guidelines.

**Highway 69 Site
Selection of Highway
Maintenance Patrol
Yards – MTO**
Parry Sound to Sudbury,
Ontario, Canada

This study was undertaken in order to assess a number of alternative locations for patrol yards within the study area, and to identify preferred alternatives at three locations. Performed Ecological Land Classification within each identified patrol yard alternative. Identification of flora and fauna, and habitat descriptions. The study area contained significant features including Provincially Significant Wetlands and required surveys and habitat assessments for Massasauga Rattlesnake, which was present in the study areas. Fieldwork and reporting conducted in accordance with MTO regulations and guidelines. Concurrent with the submission of the Fisheries and Aquatic Ecosystems Report, a Terrestrial Ecosystems Report was submitted to characterize existing conditions, and to address predicted impacts and required mitigation to on-site vegetation communities, terrestrial wildlife and their habitats, and adjacent ecological linkages.



Highway 11 at the South Entrance of Powassan – MTO
Powassan, Ontario, Canada

This study was carried out to update a Preliminary Design Report that recommended interchange locations for this stretch of Highway 11. Performed Ecological Land Classification along the study corridor. Identification of flora and fauna, and habitat description. The study area contained significant features, a variety of habitats, and cultural communities. Fieldwork and reporting conducted in accordance with MTO regulations and guidelines. Concurrent with the submission of the Fisheries and Aquatic Ecosystems Report, a Terrestrial Ecosystems Report was submitted to characterize existing conditions, and to address predicted impacts and required mitigation to on-site vegetation communities, terrestrial wildlife and their habitats, and adjacent ecological linkages.

Veuve River Bridge and Amable du Fond River Bridges in Sudbury and North Bay - MTO
Multiple Sites, Ontario, Canada

This study was carried out as part of the preliminary design for improvements to these two bridges located on Highways 535 and 630, respectively. Terrestrial investigations characterized vegetation communities in the vicinity of each bridge according to Ecological Land Classification (ELC) for southern Ontario, and the Forest Ecosystems of Central Ontario. Observations of ecological linkages, wildlife and wildlife habitats were also made. Fieldwork and reporting were undertaken according to MTO regulations and guidelines. Concurrent with the submission of the Fisheries and Aquatic Ecosystems Report, a Terrestrial Ecosystems Report was submitted to characterize existing conditions, and to address predicted impacts and required mitigation to on-site vegetation communities, terrestrial wildlife and their habitats, and adjacent ecological linkages. Fieldwork and reporting were undertaken according to MTO regulations and guidelines.

Highway 6 (Hanlon Expressway) Improvements from South of Maltby Road to the Speed River – MTO
Sudbury, Ontario, Canada

The purpose of this study was to identify the location and configuration for new interchanges to provide access to the Hanlon Expressway. Performed Ecological Land Classification along the study corridor. Identification of flora and fauna, and habitat description. The study area contained a wide range of upland forest habitats, wetlands and cultural communities. Fieldwork and reporting conducted in accordance with MTO regulations and guidelines. Concurrent with the submission of the Fisheries and Aquatic Ecosystems Report, a Terrestrial Ecosystems Report was submitted to characterize existing conditions, and to address predicted impacts and required mitigation to on-site vegetation communities, terrestrial wildlife and their habitats, and adjacent ecological linkages.



**Highway 17 at the West
Junction of Municipal
Road 55 - MTO**
Sudbury, Ontario,
Canada

The purpose of this study was to identify the location and configuration for a new interchange to provide access to the west junction of Sudbury Municipal Road 55 from Highway 17. This work also included the planning for the future four-lane alignment of Highway 17, and the preliminary design of an interim two-lane Highway 17. Performed Ecological Land Classification along the study corridor. Identification of flora and fauna, and habitat description. The study area contained a wide range of upland forest habitats, wetlands, an agricultural reserve, and cultural communities. Fieldwork and reporting conducted in accordance with MTO regulations and guidelines. Concurrent with the submission of the Fisheries and Aquatic Ecosystems Report, a Terrestrial Ecosystems Report was submitted to characterize existing conditions, and to address predicted impacts and required mitigation to on-site vegetation communities, terrestrial wildlife and their habitats, and adjacent ecological linkages.

**Highway 17 Southwest
By-Pass - MTO**
Sudbury, Ontario,
Canada

The purpose of this study was to identify a four-lane highway plan for this section of Highway 17, through the Sudbury area, with access restricted to interchange locations only. Performed Ecological Land Classification along the study corridor. Identification of flora and fauna, and habitat description. The study area contained a variety of upland and wetland habitats, including Areas of Natural and Scientific Interest. Fieldwork and reporting conducted in accordance with MTO regulations and guidelines. Concurrent with the submission of the Fisheries and Aquatic Ecosystems Report, a Terrestrial Ecosystems Report was submitted to characterize existing conditions, and to address predicted impacts and required mitigation to on-site vegetation communities, terrestrial wildlife and their habitats, and adjacent ecological linkages.

**Future Highway 11/17 –
MTO**
North Bay, Ontario,
Canada

This study was carried out to update previous studies that have been undertaken since the early 1960s to investigate ways to increase safety and efficiency on Highway 11/17 through the North Bay area. Performed Ecological Land Classification along the study corridor. Identification of flora and fauna, and habitat description. The study area contained significant features including Provincially Significant Wetlands, a variety of upland habitats, and cultural communities. Fieldwork and reporting conducted in accordance with MTO regulations and guidelines. Concurrent with the submission of the Fisheries and Aquatic Ecosystems Report, a Terrestrial Ecosystems Report was submitted to characterize existing conditions, and to address predicted impacts and required mitigation to on-site vegetation communities, terrestrial wildlife and their habitats, and adjacent ecological linkages.



**Highway 23 Widening -
MTO**
Palmerston to Harriston,
Ontario, Canada

The purpose of this project was to identify any improvements necessary to ensure that Highway 23, between Palmerston and the West limits of Harriston, met expected operational needs and standards. Performed Ecological Land Classification along the study corridor, identification of flora and fauna, and habitat description. The study area consisted mainly of agricultural land with remnant upland deciduous forest. Fieldwork and reporting conducted in accordance with MTO regulations and guidelines. Concurrent with the submission of the Fisheries and Aquatic Ecosystems Report, a Terrestrial Ecosystems Report was submitted to characterize existing conditions, and to address predicted impacts and required mitigation to on-site vegetation communities, terrestrial wildlife and their habitats, and adjacent ecological linkages.

**Highway 26 Widening -
MTO**
Thornbury to Meaford,
Ontario, Canada

Retained by the Ministry to assess possible design alternatives and develop the preliminary design for recommended improvements to Highway 26 in the study area. The project included the review and assessment of pavement condition, drainage, intersections, entrances, illumination, and highway alignment. Performed Ecological Land Classification along the study corridor. Identification of flora and fauna, and habitat description. The study area contained Areas of Natural and Scientific Interest, prominent valleys, cliff features, and high quality fruit-crop lands. Fieldwork and reporting conducted in accordance with MTO regulations and guidelines. Concurrent with the submission of the Fisheries and Aquatic Ecosystems Report, a Terrestrial Ecosystems Report was submitted to characterize existing conditions, and to address predicted impacts and required mitigation to on-site vegetation communities, terrestrial wildlife and their habitats, and adjacent ecological linkages.

**Aquatic and Terrestrial
Biology Retainer
Services - MTO**
Southern Ontario,
Canada

Provided terrestrial biology support for Natural Sciences work associated with ten proposed culvert repair projects, located throughout the Southwestern Region. The purpose of the assignment was to document the existing aquatic ecological features and to provide an assessment of migratory bird use in the vicinity of each culvert. Agency and field data were then considered in terms of the proposed culvert repairs, and recommendations for appropriate environmental protection measures were provided.

TRAINING

Wetland Creation Workshop

Toronto Zoo, 2010

MNRF Data Sensitivity Training

Ministry of Natural Resources and Forestry, 2014

Habitat Restoration Planning and Implementation

Northwest Environmental Training Centre, 2014

St. John's Ambulance First Aid Training

2013



PROFESSIONAL AFFILIATIONS

- Ottawa Field Naturalists
- Ontario Vernal Pool Association
- Field Botanists of Ontario

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