September 2017

REPORT ON

Preliminary Environmental Impact Statement in Support of the Proposed Development of Riverside South Lands East of 805-809 River Road, Ottawa, Ontario

Submitted to:
Claridge Homes Inc.
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Ottawa, Ontario
K2P 0Y6

Attention: Mr. Jim Burghout

REPORT

Report Number: 1658448

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Golder Associates

Table of Contents

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

Golder Associates Ltd. (Golder) was retained by Claridge Homes Inc. (Claridge) to complete a preliminary Environmental Impact Statement (EIS) for the lands between River and Spratt Roads, Part Lots 23 & 24, Broken Front Concession, Township of Gloucester, City of Ottawa, Ontario (the Site; Figure 1). This report has considered, wherever possible, the lands within 120 m of the Site (study area). The Site is located within the Riverside South neighbourhood.

This report has been prepared in accordance with the EIS guidelines presented in the City of Ottawa Official Plan (OP) (Ottawa, 2015a; 2013), based on information gathered to date. It should be noted that this report has been prepared in order to support Draft Plan approval only, and that the report should be updated to include additional details as discussed throughout this report. Appendix E to this report is a Tree Conservation Report (TCR) which has been prepared for the Site in accordance with the City's Tree Conservation Report Guidelines (Ottawa, 2016).

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

The Site consists of approximately 39 ha of active agricultural lands, hedgerows, fallow areas and some structures associated with a snow ploughing operation and shop. The Site is bounded by River Road on the west, Spratt Road on the east, and undeveloped former and active agricultural lands to the north and south (both in the process of obtaining development approvals).

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, 2015a), 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 General Urban Area on Schedule B (Urban Policy Plan) of the City OP. The Site also lies within the area considered part of Sector 2 in the Riverside South Community Design Plan (CDP) (Ottawa, June 2016). The CDP identifies urban development as the intended land use for the entire Site.

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, or unless the project is federally funded or federally governed.

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.

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).

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 primarily residential development of varying densities (detached, semi-detached and townhomes) totalling approximately 647 units. In addition, there is one park block and one school block included in the plan, along with a road network and site servicing. The proposed plan is shown on Figure 4.

The ultimate storm runoff outlet from the property is Pond 5 which is presently under design and will be constructed west of River Road. Stormwater from the Site will be directed via a trunk storm sewer to Pond 5; as recommended by the Riverside South Community Infrastructure Servicing Study Update (Stantec, 2017). During frequent storms the effective runoff collected by catchment areas is directly released via catch basin inlets into the network of storm sewers. During less frequent storms, the balance of the flow is accommodated by a system of rear yard swales and street segments.

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 study area surrounding the Site, or have the potential to occur. Sources reviewed included:

- MNRF Natural Heritage Information Centre (NHIC) Biodiversity Explorer (MNRF, 2016) for information on known occurrences of SAR and other significant natural features
- Characterization of Ottawa's Watersheds (Ottawa, 2011)
- Lower Rideau River Subwatershed Report (RVCA, 2012)
- 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, 2016)
- Ontario Butterfly Atlas (Jones et al., 2015)
- Bat Conservation International (BCI) range maps (BCI, 2013)
- eBird (Audubon and Cornell, 2017)
- MNRF Land Information Ontario (LIO) mapping (LIO, 2016)

- City of Ottawa OP (Ottawa, 2013)
- Riverside South Community Design Plan (Ottawa, June 2016)
- Existing aerial photography

The MNRF, City of Ottawa 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. Information provided by these 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 considered natural feature observations (i.e. habitat) made during the site investigations and background information obtained through the desktop 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, and surrounding areas with public access, and areas visible from public areas such as roads. During all survey events, visual encounter surveys (VES) were conducted and any additional wildlife, plant, and habitat observations were recorded. 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	November 17	Site Reconnaissance; HDF Reconnaissance; VES
2017	April 5	HDF Assessment 1; VES
	April 19	Amphibian Call-Count Survey; VES
	May 16	HDF Assessment 2; Bat Habitat Assessment; VES
	June 7	Amphibian Call-Count Survey; Eastern Whip-poor-will Survey; VES
	June 12	ELC and Vegetation; Breeding Bird Survey; VES
	June 23-July 4	Bat Acoustic Surveys
	July 4	Breeding Bird Survey; VES
	July 27	HDF Assessment 3; ELC and Vegetation; Butternut Health Assessment; 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). The surveys were 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 ELC surveys and included area searches in all accessible habitats in the study area. A list of all plant taxa identified during the surveys was compiled. Plants that were obviously planted for landscape purposes on residential and commercial properties were not included in this inventory. However, those landscape species or cultivars that appeared to be naturalized or escapees were included.

Efforts to locate butternut trees (*Juglans cinerea*) were concentrated in areas where development is contemplated, and within 50 m of those areas. Butternut health assessments (BHA) were undertaken on all butternut trees identified on the Site by qualified Butternut Health Assessors (i.e., certified by the MNRF). Searches for trees were conducted during all site investigations, and marked when found using a hand-held GPS unit. The assessments were performed according to standardized MNRF protocols (MNRF, June 2013) and using the methods as outlined in Butternut Health Assessment Guidelines (MNRF, May 2011) and Butternut Health Assessment in Ontario (FGCA, August 2010; MNRF, 2013a), with all relevant information entered into the standard Butternut Data Collection Forms (1 and 2). The calculations and analysis were performed using the Butternut Retainable Tree Analysis electronic table, updated by the MNRF in 2013.

Breeding Bird Surveys

Breeding bird point count surveys were conducted at eight stations for songbirds and other diurnal birds (Figure 2). Surveys followed protocols adapted from Atlas of the Breeding Birds of Ontario (Cadman *et al.,* 2007). Point count stations were established within the study area, on accessible lands, at least 250 m apart. Surveys were conducted in the period between 30 minutes before sunrise and 10:00 am to encompass the period of maximum bird song.

All birds seen or heard were noted and observations were made regarding sex, age, breeding evidence, and notable behaviour, when possible. Additional observations of birds in the study area were made during all other survey events.

A specific survey for eastern whip-poor-will was undertaken at the Site at two stations, according to standard protocols (MNRF, December 2014) to determine appropriate station locations and correct timing of the survey.

Herpetile Surveys

Amphibians

Two anuran call-count surveys were conducted during spring and utilized a point count methodology (Bird Studies Canada, 2003). Three stations were distributed across the Site, based on the locations of potential breeding habitat, and following spacing requirements in the methodology (Figure 2). Surveys were conducted between 30 minutes after sunset and midnight. At each station, a three minute survey was completed and amphibian species were identified by vocalization. The search area was generally identified by a 100 m radius semi-circle around the listening station. Amphibians heard beyond the 100 m survey plot were also noted along with any other wildlife encountered during the survey.

In addition, searches were made for potential woodland breeding pools for salamanders, and visual encounter surveys for amphibians were conducted during all site investigations following recommended protocols (MNRF, 2013b; McDiarmid, 2012).

Reptiles

VES for reptiles were conducted in all suitable habitats (e.g., under and within logs and other types of cover objects, edges of wetlands, open pools of water, etc.) following recommended protocols (MNRF, 2013b; McDiarmid, 2012).

Mammals

Mammal surveys included track and sign surveys, as well as VES during all other site investigations, and generally followed recommended protocols (Bookhout, 1994). Habitats within the Site were searched, with special attention paid to edge habitats and other areas where mammals might be most active. Areas of exposed substrate such as sand or mud were located and examined for any visible tracks. Any mammals seen and identified were noted. When encountered, tracks and other signs (e.g., tracks, scat, tree scrapes, etc.) were identified to species, if possible, and noted.

Bats

Daytime bat habitat surveys included a survey of each plant community to identify cavity trees with potential to support bat maternity roosts. Areas with higher concentrations of cavity trees were targeted for acoustic surveys. In addition to habitat, areas of high foraging potential (such as wetlands) were also assessed using acoustic surveys.

Stationary acoustic surveys were performed to confirm the presence of any SAR bats, based on draft protocols prepared by the MNRF (undated). Frequent nightly passage by SAR bats would suggest that they are roosting within close proximity to the acoustic station. Bats will travel several kilometres in a night from their roost locations to feeding locations where they spend much of their time. Therefore, incidental recording of species does not necessarily indicate the presence of a maternity roost within the study area.

Two full-spectrum bat detectors (Wildlife Acoustics SM3BAT+®) were deployed across the Site (Figure 2). The detectors recorded bat activity for a total of 11 nights each (June 23 – July 4, 2017) during the maternity roosting season. Each station was located to provide coverage of the Site and target areas where bats would most likely be roosting, commuting or feeding. The U1 microphones were left open with no horn or windscreen for maximum recording capability. They were controlled to record from 30 minutes before sunset to 30 minutes after sunrise. The detectors were triggered by ultrasound (which may or may not be a bat). Once triggered, they recorded a file between 5 and 15 seconds in duration and then started a new recording (if ultrasound persisted) or slept until they were next triggered.

This preliminary report was prepared to meet Claridge's submission schedule, and so at the time of authoring this report, the gathered data has not yet been analyzed. The data will be filtered through Kaleidoscope software (Wildlife Acoustics) for signals between 15 and 120 kHz and then processed in Sonobat ® and BatData (developed by Golder). The Sonobat program is specifically intended for discrimination of bats to the species level wherever possible, and validation of the species-level classification will be conducted by Golder's bat acoustic specialist. The results of the species classification will be tallied on a per-night basis for each station for each species or species group. Once automated classification is complete, a subset of the files (approximately 10%) will be reviewed (QA/QC'd) by an experienced and qualified bat acoustic specialist. This QA/QC will focus on files for which a species-level classification was made by Sonobat with particular attention to any files that could be a SAR.

Wildlife Visual Encounter Surveys

VES for all wildlife, including butterflies and dragonflies, were conducted throughout the study area, where access was available. This included a search for tracks and other signs (e.g. scat, tree scrapes, 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.). A list of all wildlife observations was compiled.

Aquatic Habitat and Fish

Golder completed field investigations at the Site to confirm the flow and connection of the surface water features on the Site and to complete a Headwater Drainage Features (HDF) assessment. This assessment evaluates and classifies each feature following the Evaluation, Classification, and Management of Headwater Drainage Features Guidelines (the Guidelines) developed by the Toronto and Region Conservation Authority and Credit Valley Conservation (TRCA and CVC, 2014). The assessment is based on data collected in the on-Site surface water features according to Ontario Stream Assessment Protocol (OSAP) Section 4 Module 11 – Unconstrained Headwater Sampling (Gorenc and Stanfield, March 2017). Scoping for this assessment was confirmed through consultation with the RVCA (call to J. Lamoureux, November 21, 2016), which included identification of a single fish community sampling location based on the highest on-Site potential to support fish (Figure 2).

Information gathered included basic measurements (wetted width and depth; feature width; bankfull depth; flow rates; etc.) as well as information on substrates, sediment deposition, barriers to fish movement, riparian conditions, etc. Fish community sampling was performed in one feature using a Smith-Root LR24 backpack electrofisher.

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 study area is within the Upper St. Lawrence sub-region of the Great Lake-St. Lawrence Forest Region. Trees characteristic of this sub-region include sugar maple, beech, red maple, yellow birch, basswood, white ash, largetooth aspen, and red and bur oak. Coniferous species include eastern hemlock, eastern white pine, white spruce and balsam fir (Rowe, 1977).

The Site is located in the Lower Rideau River Subwatershed, and the Hogs Back Catchment Area (RVCA, 2012). This catchment drains an area of 38 km^2 and is highly developed through residential and agricultural uses. Forest cover in this catchment is 13%. There are several small, intermittent surface water features present on the Site, draining west towards the Rideau River.

5.2 Geology and Hydrogeology

The Site lies within the Clay Plains section of the Ottawa Valley Clay Plains physiographic region (Chapman and Putnam, 1984), which is typically interrupted by ridges of rock or sand. The Site is generally flat with the exception of a small rise (drumlin) in the middle of the Site. In general, the subsurface conditions across the Site consist of surficial layers of topsoil, fill, and silty sand (Golder, 2017). The surficial soils across the majority of the Site are underlain by a deposit of weathered silty clay, clayey silt, and silty sand, which is underlain by unweathered silty clay and/or glacial till. Shallow bedrock (i.e. at a depth of about 3 metres depth) was encountered at the east end of the Site, adjacent to Spratt Road. Groundwater under the Site was measured at between 0.3 m and 2.5 m below ground surface. Higher groundwater levels are expected during wet periods of the year, such as spring.

5.3 Ecological Land Classification

5.3.1 Plant Communities

Eight plant communities were observed on the Site, including one anthropogenic polygon. These communities are shown on Figure 3 and summarized in Table 2.

Table 2: Plant Communities at the Site

Plant Community	Description
CUM1-1a Mixed Meadow	This community may have been row crop or hayfields in the past, and was present on the eastern and western sides of the Site. The majority of these fields had been temporarily plowed for archeological surveys in 2016. The plant community was a mix of forbs and grasses such as Timothy (*Phleum pratense*) and Canada goldenrod (*Solidago canadensis*). Portions of these fields were low-lying and had pockets of moisture tolerant vegetation such as purple loosestrife (*Lythrum salicaria*) and rushes (*Juncus* spp.).
CUM1-1b Forb Meadow	This community was a recently fallow row crop field. No row crops were planted in 2017, and the field has been colonized primarily by early successional forbs such as common ragweed (*Ambrosia artemisiifolia*) and red clover (*Trifolium pratense*).
CUW1 White Elm-Ash Open Woodland	This was a transitional area between the MAM and the FOD4 in the middle of the Site. It was a mix of treed areas and open meadow/thicket along the edge of a slope. Dominant trees included white elm (*Ulmus americana*) and green ash. Understory and ground cover included a variety of species such as smooth brome (*Bromus inermis*), Canada goldenrod (*Solidago canadensis*), and red raspberry (*Rubus idaeus*). Downed woody debris and standing snags were rare.
FOD4- Dry to Fresh Ash – White Elm Deciduous Forest	This small woodlot was located in the middle of the Site, primarily on a small hill. It was similar in species composition to the CUW1, but with a higher percentage of tree cover. Snags and downed woody debris were rare, with the exception of several small diameter dead white elm. There were occasional coniferous tree such as Scots pine (*Pinus sylvestris*) in scattered locations.
SWD4 Poplar – Willow Deciduous Mineral Swamp	This was a small woodlot in the eastern portion of the Site. It appeared to be a mix of upland and wetland areas, although it was dominated by wetland. Trees species included trembling aspen (*Populus tremuloides*), small-tree sized willows (*Salix* spp.), and European white birch (*Betula pendula*). Spring flooding was observed throughout and the soil was saturated for most of the year. Snags and downed woody debris were rare to occasional.

Plant Community	Description
MAM Meadow Marsh	This was a small portion of an overgrown field, near the middle of the Site. It was characterized by a graminoid wetland, with only a few scattered pools of standing water, but soil was saturated throughout. Plants observed included grasses and forbs such as reed canary grass (*Phalaris arundinacea*), and cattail (*Typha latifolia*). Scattered trees and shrubs such as pussy willow (*Salix discolor*), and green ash (*Fraxinus pennsylvanica*) occurred throughout.
DH Deciduous Hedgerow	This community included several hedgerows at field edges throughout the Site. Tree species dominance varied, but abundant species included green ash, basswood (*Tilia americana*), and European white birch. Interspersed amongst the trees were areas of thicket and meadow species such as common buckthorn (*Rhamnus cathartica*), and grasses.
DIST Disturbed – Shop and Storage Area	This was an area being used as a workshop, storage area and related activities. There were small buildings, parking areas, as well as stored materials and junk piles. There were patches of typical "waste area" plants such as charlock (*Sinapsis arvensis*), and parsnip (*Pastinaca sativa*) throughout.

5.3.2 Vascular Plants

At the time of authoring this report, a total of 66 taxa of vascular plants was identified on the Site (to be updated following compilation of late-season data). For a list of plants observed refer to Appendix B. No SAR, provincially rare, or regionally significant species were observed with the exception of a single butternut (*Juglans cinerea*) (Figure 3). Butternut is designated as endangered under the ESA and the SARA and is discussed further in Section 6.1.

5.4 Wildlife

Forty-three (43) bird species, four herpetiles, eleven mammal species, and thirteen insect species were observed on the Site during the surveys. 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*). Full chorus of spring peeper (*Pseudacris crucifer*) were heard adjacent to the Site during spring surveys, but only a few individuals were on the Site itself. This is likely due to the limited open water breeding habitat on the Site. No SAR, provincially rare, or regionally significant species were observed with the exception of barn swallow (*Hirundo rustica*) were observed on the Site. At least 2 pairs of barn swallows were observed in and around the shop area at the western edge of the Site, and foraging over the fallow fields. Two active nests with young were observed in buildings in this area (Figure 3) in existing buildings associated with the shop area. Although the contents of the nest could not been seen, adults were seen carrying food to both nests in early July 2017. Signs of historic nests were seen in several other locations. For further discussion on barn swallow refer to Section 6.1.

At the time of authoring this report, the bat acoustic monitoring data has not been analyzed. An update to this report will be required to present the results of the analysis.

5.5 Surface Water Features

Five (5) water features occurring within the site were identified by Golder (HDF1 through HDF5) (Figure 2). These features are generally linear drainage ditches, intermittent, and flow westward towards the Rideau River.

HDF1 was located along the southern boundary of the Site, just off-Site, running east-west. It was dominated by dense herbaceous vegetation within the feature, with active agriculture on either side. Portions of the feature were associated with a sparse deciduous hedgerow (on-Site) of ash, elm and Manitoba maple trees.

HDF2 (a and b) was located in the western portion of the Site, running primarily east-west then turning north-south. It was dominated by dense herbaceous vegetation within the feature, with active agriculture and the snow plough operation at the upstream end, and active agriculture and meadow at the downstream end. The feature flowed through several CSP culverts on-Site, and one concrete culvert at the boundary of the Site and the property to the north.

HDF3 (a and b) was located in the western portion of the Site, running east-west. The feature fed into HDF2 at the northern Site boundary. It was dominated by dense herbaceous vegetation and deciduous tree cover within and directly adjacent to portions of the feature, and primarily active agriculture on either side.

HDF4 was located in the western portion of the Site, running north-south. The feature fed into HDF3. The feature was a very small, shallow swale dominated by dense herbaceous vegetation within the feature, and active agriculture on either side.

HDF5 was located at the eastern portion of the Site, running north-south. The feature was a small, shallow swale dominated by dense herbaceous vegetation, with meadow and thicket present on either side. The feature originated off-site to the south, traversed the Site, and exited to lands to the north.

5.6 Fish and Fish Habitat

Based on information previously gathered by Minnow Environmental Inc. for the Riverside South CDP (Pers. comm. J. Lamoreaux, RVCA, 2016) the Site is not considered to contain fish habitat. Golder did not collect any fish from the Site as part of our targeted fish community survey. The previous findings of Minnow Environmental are confirmed by the results of Golder's fish community survey.

6.0 ASSESSMENT OF SIGNIFICANT NATURAL HERITAGE FEATURES

The following is a discussion of the significant natural features in, or likely to be in, the study area based on the review of background materials and results of the site investigations undertaken for this study. Also, included in this section is an **assessment of the potential direct impacts** of the project on the significant natural heritage features in the study area.

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 moderate or high 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 contains abandoned buildings that were confirmed during the site investigation to provide nesting habitat for this species (Figure 3). The project calls for the removal of structures supporting nesting of this species, and therefore the activity must conform to the rules in regulation under the ESA, including creation of replacement habitat, monitoring and record-keeping.

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 buildings and large dead and dying trees that may provide suitable maternity roost habitat for these species, and the overall Site provides suitable foraging habitat. There are no potential hibernacula on the Site, in the form of either natural or anthropogenic structures, as these species typically over-winter in caves or mines.

At the time of authoring this report, the bat acoustic monitoring data has not been analyzed. An update to this report will be required to present the results of the analysis.

Butternut

Butternut is designated as endangered under the ESA and SARA, and are therefore provided species and habitat protection. A single butternut tree was confirmed at the Site (Figure 3). Based on the BHA performed on the tree, it is classified as Category 2 – Retainable. According to the rules in the regulation under the ESA, a person may remove up to 10 Category 2 trees, provided the activity is registered using the Notice of Butternut Impact form on the MNRF on-line registry and the required mitigation (compensation) measures are undertaken. This includes submission of the BHA to the MNRF. The project calls for the removal of this tree, and therefore the activity must conform to the rules in regulation. No clearing can take place until after the 30-day review period of the BHA is complete and the MNRF has not requested an audit.

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 Surface Water Features

A Headwater Drainage Features Assessment was undertaken for each of the HDFs identified at the Site, according to the Guidelines. Using the information collected during the field investigations, the following four characteristics of the drainage features were classified according to the Guidelines:

- Hydrology
- Riparian conditions
- Fish and fish habitat
- Terrestrial habitat

The results of the classifications for each feature are presented in Appendix D. Figure 2 of the Guidelines provides a flow-chart that allows the assessor to input the various classifications determined for each of the four characteristics for each feature, and arrive at a management recommendation for that feature. Based on the flow-chart, the management recommendations for each of the HDFs is presented in Table 3 below.

Table 3: HDF Management Recommendations

Headwater Feature	Management Recommendation
HDF1	Protection
HDF2-a	Mitigation
HDF2-b	Mitigation
HDF3-a	Protection
HDF3-b	Protection
HDF4	Mitigation
HDF5	Protection

According to the Guidelines, a management recommendation of Protection entails keeping the feature intact on the landscape, and ensuring impacts from site development, including stormwater management, do not affect the feature. Re-alignment is not generally permitted. A management recommendation of Mitigation entails replicating or enhancing the function of the feature through lot level conveyance measures, such as vegetated swales and/or Low Impact Development (LID) stormwater management options.

As noted, urban development is the land use identified for the Site and adjacent lands in the CDP, with no areas of natural environment preservation noted. The proposed development calls for the removal of all HDF's identified at the Site, which will require a *Development, Interference with Wetland and Alterations to Shorelines and Watercourses* permit from the RVCA. HDF1 was identified through the assessment as requiring protection. This feature is located just off-Site to the south and will not be affected by the proposed development. HDF3a, HDF3b and HDF5 were also identified for protection through the assessment, but each of these features drains wet areas off-Site to the south, which will be removed as part of the adjacent developments. Once the lands to the south are developed as per the CDP, these features will no longer convey water and therefore their protection is unnecessary. The function that each of these features performs, in terms of conveyance of surface water, will be replicated through the proposed stormwater management plan.

6.4 Fish Habitat

Based on consultation with the RVCA and Golder's assessment, none of the surface water features at the Site represent fish habitat, therefore no impacts to fish and fish and fish habitat will occur. No further consideration is required for the proposed development and no consultation with the DFO is required as part of project planning.

6.5 Significant Woodlands

Significant woodlands are to be defined and designated by the local planning authority (MNRF, 2010). General guidelines for determining the significance of woodlands is provided in Section 2.4.2 of the City of Ottawa OP, which state that significant woodlands within the urban area are typically identified in the OP as Urban Natural Features (UNF), or as identified through existing planning or environmental studies. There are no UNFs currently mapped at the Site (Schedule B of the City OP). 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 is currently in the process of updating their woodlands policies to be in-line with this direction, and as part of that process are drafting new criteria for determining significance within the urban area.

According to the NHRM, woodlands separated by distances of 20 m or more are to be considered individual woodlands. Based on this, Golder has identified two woodland areas on the Site (ELC Codes FOD4 and SWD4; Figure 3). The two woodlands are connected to more extensive forested lands to the north of the Site. The lands to the north are in the process of obtaining development approvals, and no forest retention is planned as part of that development, nor is any retention on or off-Site recommended as part of the Riverside South CDP. Once the lands to the north are developed, the forested portions of the Site will be isolated, and represent only 1.8 ha (west area) and 1.8 ha (east area) of forest. RVCA (2012) notes that forest cover in the catchment area is 13%.

Based on the size criteria in the NHRM, for significance, the following size thresholds must be met:

- Where forest cover is between 5 and 15%, woodlands 4 ha in size or larger should be considered significant.
- Where forest cover is between 15 and 30% of the land cover, woodlands 20 ha in size or larger should be considered significant.
- Where forest cover is between 30 and 60%, woodlands 50 ha in size or larger should be considered significant.

Based on the above criteria, the on-site portions of woodland are not significant in the planning area, when considered in isolation of the lands to the north. In addition, the on-Site forested areas were immature to semi-mature, and did not include any interior forest habitat (measured 100m from the edge). They are not in proximity to other woodlands or surface water features, they do not represent any linkage function, they were not diverse in terms of species or terrain, nor did they present any uncommon characteristics. For these reasons, they are not considered significant for the purposes of this report and no further discussion is warranted.

6.6 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 not identified any 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. There are no significant valleylands present at the Site.

6.7 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.

6.8 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.

6.8.1 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.

No linkages are shown on the Site in the City of Ottawa Greenspace Masterplan (Ottawa, 2006). No migration corridors were identified during the site investigation.

6.8.2 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. No further consideration is required.

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 further consideration is required.

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. No further consideration is required.

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 during the site investigations. No further consideration is required.

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. No further consideration is required.

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. No further consideration is required.

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. No further consideration is required.

Reptile hibernacula were searched for during site investigations in the study area. The existing snow plough operation buildings are modern and did not appear to have foundations that could support snakes during hibernation, and are unlikely to meet the criteria for SWH as outlined in the SWHECS. No other potential hibernacula were observed on the Site. No further consideration is required.

No potential turtle over-wintering habitat was observed at the Site, as no standing water of suitable depth was present. No further consideration is required.

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 the 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 potential wildlife trees were identified scattered throughout Site. No bat migratory stopover areas are identified in this eco-region.

The Site does not provide suitable large open water areas for bullfrog. No further consideration is required.

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. No further consideration is required.

6.8.3 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, nor were any old growth forests identified.

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 large woodlands in the study area, therefore there is no suitable habitat for area-sensitive breeding birds. No further consideration is required.

There forested portions of the Site do not provide a high diversity of habitats, old-growth forests, or foraging areas with abundant mast. No further consideration is required.

Based on the surveys performed by Golder, the Site does not meet the criteria for significant amphibian breeding habitat (woodland or wetland). No further consideration is required.

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. However, given the lack of adjacent aquatic habitats suitable for supporting turtles, no habitat of this type is identified at the Site. No further consideration is required.

Nesting habitat for raptors, as well as perching and foraging habitat for bald eagle and osprey, were not identified as no 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 at the Site. No further consideration is required.

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

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. No further consideration is required.

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

No evidence of groundwater seepage or springs were observed on the Site. No further consideration is required.

6.8.4 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), one species of conservation concern was identified as having potential to occur within the study area: monarch (*Danaus plexippus*). The Site may provide suitable habitat for this species, primarily in the eastern portions and along the hedgerows. As habitats for this species are widespread in the planning area, the Site has not been considered significant wildlife habitat for this species for the purposes of this report, and no further consideration is required.

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 the results of the breeding bird surveys, the Site does not meet the criteria for shrub/early successional or open country breeding bird habitat. No marsh breeding bird habitats are present at the Site. No evidence of terrestrial crayfish was observed during site investigations. No further consideration is required.

7.0 POTENTIAL INDIRECT IMPACTS AND MITIGATION

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. Standard construction best management practices will be employed to mitigate potential damage to the adjacent natural features, as outlined in Section 7.3.

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.

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. Once the development is established, a different assemblage of wildlife species will utilize the area, and any effect to wildlife on surrounding lands from the development are expected to be short-term.

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 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 potential human impacts described above are unlikely to have a measurable impact on adjacent natural features.

7.3 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 1 – 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.

7.4 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.

7.5 Monitoring

Monitoring programs are developed to assess the effectiveness of mitigation measures implemented at a project location. For this project, the key monitoring to be undertaken will be associated with the removal of habitat for endangered and threatened species per the rules in regulation under the ESA for barn swallow and butternut. The monitoring for activities that affect these species is highly prescribed, and will be undertaken accordingly.

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).

8.0 CUMULATIVE EFFECTS

Cumulative effects assessment considers the potential for additive impacts to the local landscape due to existing and future development. The Riverside South CDP has identified this area, and lands surrounding it, for intensive urban development. The CDP and supporting studies have determined that this was an appropriate land-use for the area. The proposed development represents an intensification of use on an agricultural property, within an urbanizing context.

9.0 CONCLUSIONS AND RECOMMENDATIONS

9.1 Net Impacts

The significant natural features and functions identified on-Site included habitat of endangered and threatened species (barn swallow, butternut and potentially bats), and the presence of headwater drainage features. Removal of habitat for barn swallow and the single butternut can be undertaken provided the rules in regulation under the ESA are adhered to. Once the bat acoustic data is analyzed, and the findings must be incorporated into an update or addendum to this preliminary EIS and the implications, if any, described.

The HDFs on-Site are proposed for removal, however their function will be maintained through implementation of the proposed stormwater management design.

Based on these findings, there will be no net impacts to significant natural features or their functions at the Site or in the study area as a result of the proposed development.

9.2 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. Analysis of the bat acoustic data is required to confirm these conclusions.

9.3 Recommendations

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

- No removal of vegetation during the active season for breeding birds (April 1 – August 15).
- No demolition of existing structures at the Site until the rules in regulation under the ESA for barn swallow have been adhered to.
- No removal of the single butternut tree at the Site until the rules in regulation under the ESA for butternut have been adhered to.
- No removal of or alteration to the HDF's at the Site until a permit has been obtained from the RVCA.
- The City of Ottawa Protocol for Wildlife Protection during Construction (Ottawa, 2015b) must be reviewed by the contractor and 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 a preliminary 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 the outstanding field data analysis noted in this report (bats; vascular plants), 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.

10.0 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.

11.0 CLOSURE

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

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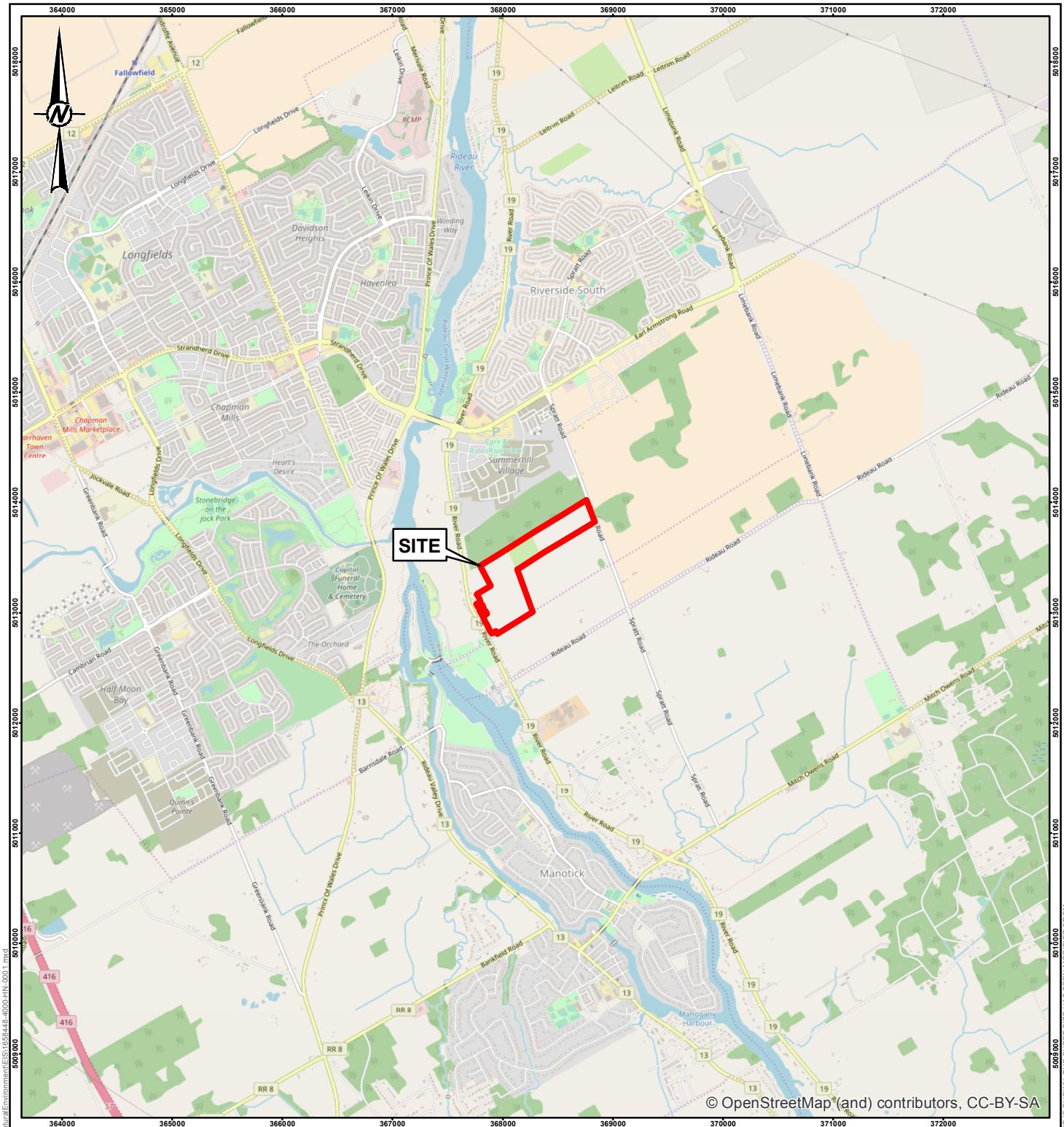

LEGEND

SITE

0 500 1,000 2,000

1:50,000 METRES

NOTE(S)

1. THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO. 1658448-4000.

REFERENCE(S)

1. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83
COORDINATE SYSTEM: MTM ZONE 9 VERTICAL DATUM: CGVD28

CLIENT

CLARIDGE HOMES CORPORATION

PROJECT

PRELIMINARY ENVIRONMENTAL IMPACT STATEMENT IN SUPPORT OF THE PROPOSED DEVELOPMENT OF RIVERSIDE SOUTH LANDS EAST OF 805-809 RIVER ROAD, OTTAWA, ONTARIO

TITLE

KEY PLAN

CONSULTANT

Golder Associates

YYYY-MM-DD	2017-08-08
DESIGNED	----
PREPARED	JEM
REVIEWED	GW
APPROVED	RB

PROJECT NO.	PHASE	REV.	FIGURE
1658448	4000	0	1

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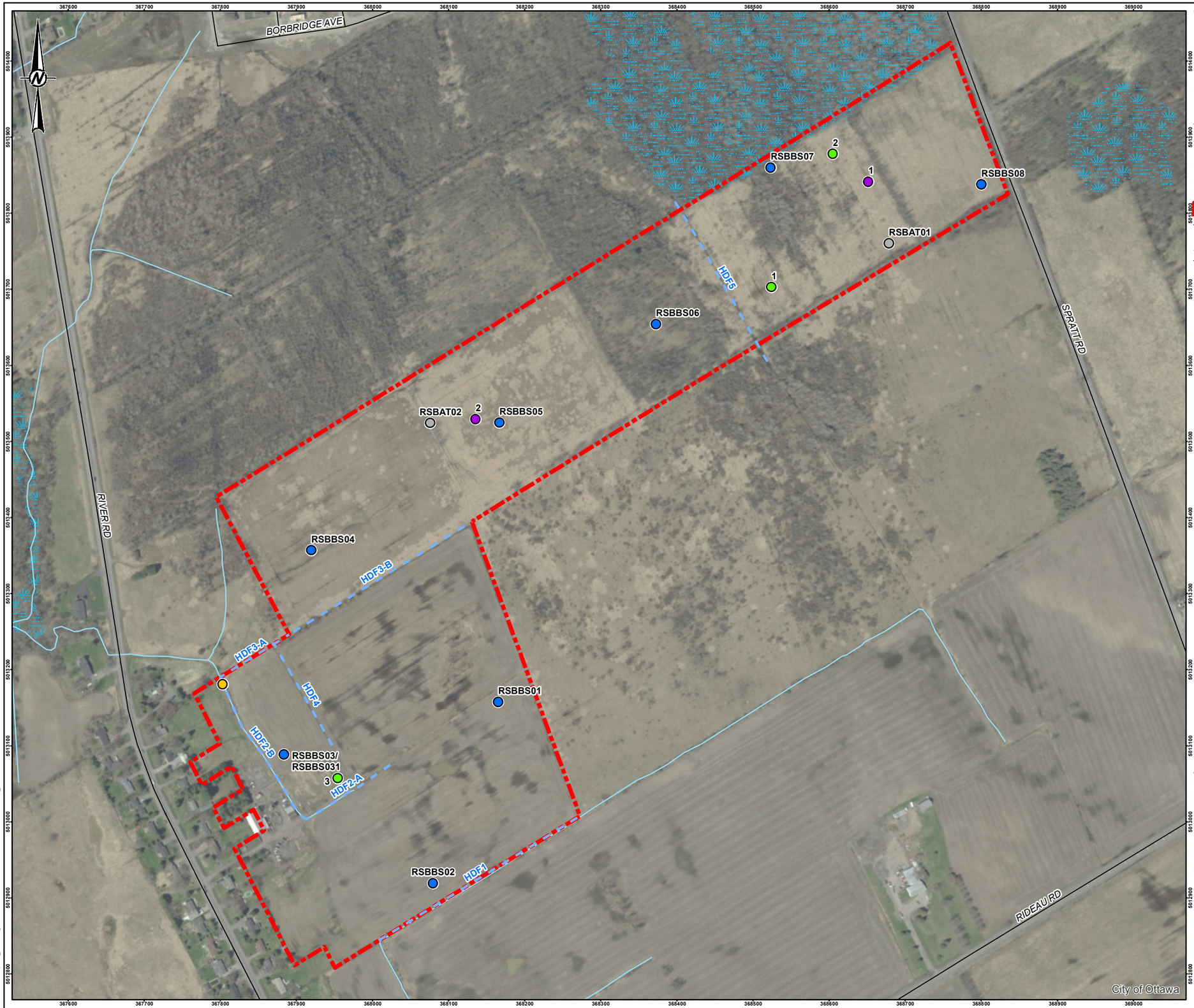

LEGEND

- AMPHIBIAN CALL-COUNT SURVEY STATION
- BAT ACOUSTIC MONITORING STATION
- BREEDING BIRD SURVEY STATION
- EASTERN WHIP-POOR-WILL SURVEY STATION
- FISH COMMUNITY SAMPLING LOCATION
- ROADWAY
- WATERCOURSE
- HEADWATER DRAINAGE FEATURE (HDF)
- WETLAND
- SITE

NOTE(S)

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REFERENCE(S)

1. LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2014
2. PROJECTION: TRANSVERSE MERCATOR, DATUM: NAD 83, COORDINATE SYSTEM: MTM ZONE 9, VERTICAL DATUM: CGVD28

0 50 100 200
1:5,000 METRES

CLIENT
CLARIDGE HOMES CORPORATION

PROJECT
PRELIMINARY ENVIRONMENTAL IMPACT STATEMENT IN SUPPORT OF THE PROPOSED DEVELOPMENT OF RIVERSIDE SOUTH LANDS EAST OF 805-809 RIVER ROAD, OTTAWA, ONTARIO

TITLE
SURVEY STATION LOCATIONS

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-08-08
DESIGNED	----
PREPARED	JEM
REVIEWED	GW
APPROVED	RB

PROJECT NO.	PHASE	REV.	FIGURE
1658448	4000	0	3

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

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BORBRIDGE AVE

RIVER RD

SPRATT RD

RIDEAU RD

City of Ottawa

SWD

FOD

DH

CUM1-1a

CUM1-1

SWD4

FOD4

CUW1

MAM

HDF5

CUM1-1/CUT/CUW

CUM1-1b

HDF3-B

HDF3-A

HDF4

HDF2-B

HDF2-A

HDF1

DIST

RES

367600 367700 367800 367900 368000 368100 368200 368300 368400 368500 368600 368700 368800 368900 369000

5014000 5013900 5013800 5013700 5013600 5013500 5013400 5013300 5013200 5013100 5013000 5012900 5012800

LEGEND

- BUTTERNUT
- BARN SWALLOW NEST
- ROADWAY
- WATERCOURSE
- HEADWATER DRAINAGE FEATURE (HDF)
- WETLAND
- SITE
- ECOLOGICAL LAND CLASSIFICATION

CUM1-1: MIXED MEADOW
CUM1-1/CUT/CUW: MEADOW/THICKET/OPEN WOODLAND COMPLEX
MAM: MIXED MEADOW/MEADOW MARSH
CUW1: WHITE ELM- ASH OPEN WOODLAND
DH: DECIDUOUS HEDGEROW
DIST: DISTURBED SHOP AND STORAGE AREA
FOD: DECIDUOUS FOREST
FOD4: DRY TO FRESH ASH – WHITE ELM DECIDUOUS FOREST
RES: RESIDENTIAL
SWD: DECIDUOUS SWAMP
SWD4: POPLAR – WILLOW- BIRCH MINERAL SWAMP

NOTE(S)

1. THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO. 1658448-4000.

REFERENCE(S)

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2. PROJECTION: TRANSVERSE MERCATOR, DATUM: NAD 83, COORDINATE SYSTEM: MTM ZONE 9, VERTICAL DATUM: CGVD28

0 50 100 200
1:5,000 METRES

CLIENT
CLARIDGE HOMES CORPORATION

PROJECT
PRELIMINARY ENVIRONMENTAL IMPACT STATEMENT IN SUPPORT OF THE PROPOSED DEVELOPMENT OF RIVERSIDE SOUTH LANDS EAST OF 805-809 RIVER ROAD, OTTAWA, ONTARIO

TITLE
ECOLOGICAL LAND CLASSIFICATION AND SIGNIFICANT NATURAL FEATURES

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-08-08
DESIGNED	----
PREPARED	JEM
REVIEWED	GW
APPROVED	RB

PROJECT NO.	PHASE	REV.	FIGURE
1658448	4000	0	3

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

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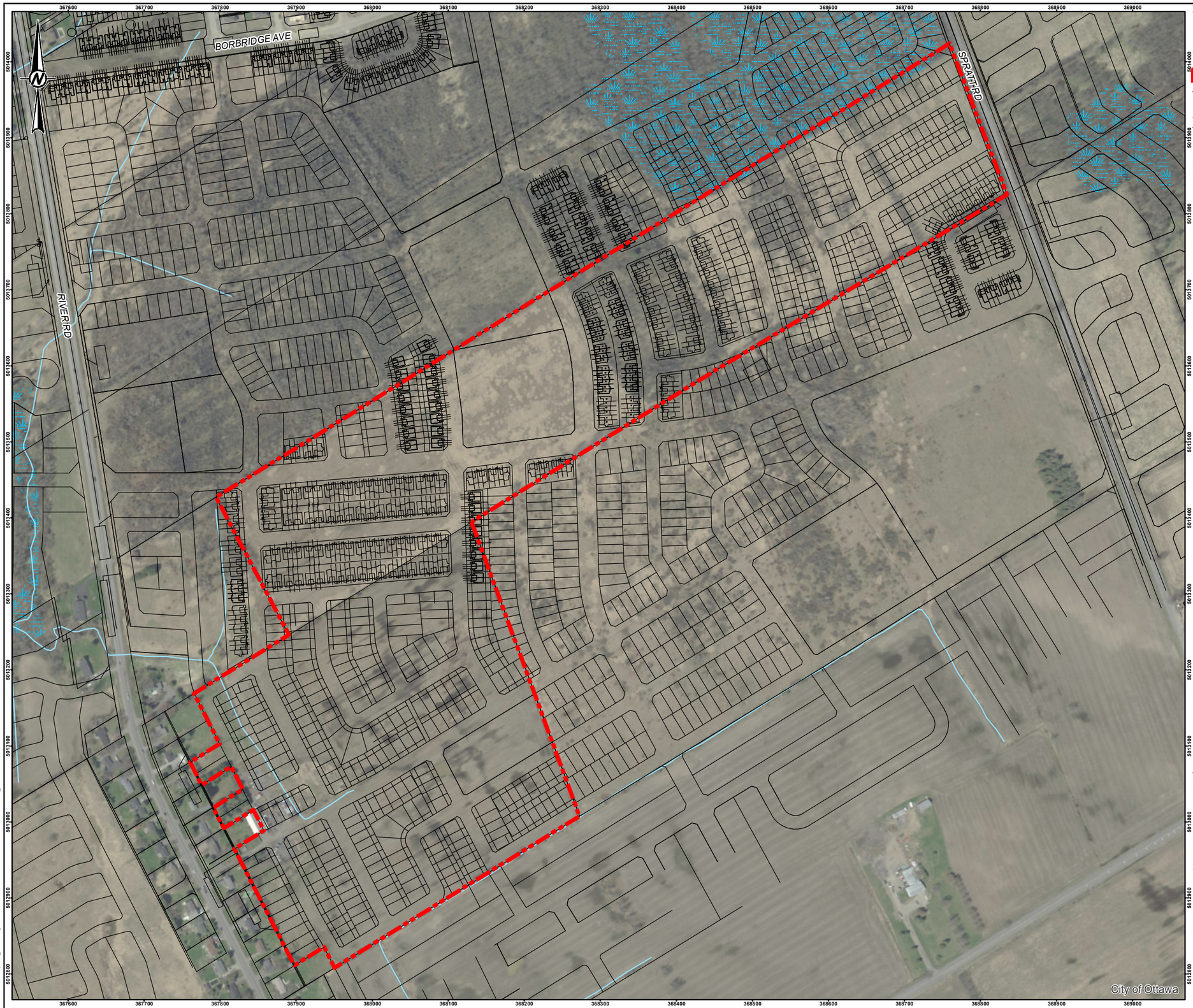

LEGEND

- WATERCOURSE
- WETLAND
- SITE

NOTE(S)

1. THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO. 1658448-4000.

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2. PROJECTION: TRANSVERSE MERCATOR, DATUM: NAD 83, COORDINATE SYSTEM: MTM ZONE 9, VERTICAL DATUM: CGVD28

0 50 100 200

1:5,000 METRES

CLIENT

CLARIDGE HOMES CORPORATION

PROJECT

PRELIMINARY ENVIRONMENTAL IMPACT STATEMENT IN SUPPORT OF THE PROPOSED DEVELOPMENT OF RIVERSIDE SOUTH LANDS EAST OF 805-809 RIVER ROAD, OTTAWA, ONTARIO

TITLE

DESIGN PLAN

CONSULTANT

Golder Associates

YYYY-MM-DD	2017-08-08
DESIGNED	----
PREPARED	JEM
REVIEWED	GW
APPROVED	RB

PROJECT NO.	PHASE	REV.	FIGURE
1658448	4000	0	**4**

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

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APPENDIX A

Species at Risk Screening

September 2017
Report No. 1658448

Appendix A
Species at Risk Screening

Taxon	Common Name	Scientific Name	Species At Risk Act (Sch 1)[1]	Endangered Species Act[2]	COSEWIC[3]	Provincial (SRank)[4]	Source	Habitat Requirements[5]	Potential to Occur on Site	Rationale for Potential to Occur on Site
Amphibian	Western chorus frog - Great Lakes St. Lawrence/Canadian Shield Population	*Pseudacris triseriata*	THR	—	THR	S3	ORAA	In Ontario, this amphibian species habitat 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.	Low	This species was not recorded on-Site during targeted surveys.
Arthropod	Monarch	*Danaus plexippus*	SC	SC	SC	S2N, S4B	MNRF	In Ontario, monarch is found throughout the northern and southern regions. This butterfly is found wherever there are milkweed (*Asclepius spp.*) plants for its caterpillars and wildflowers that supply a nectar source for adults; 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.	Moderate	The Site is dominated by agriculture, but some habitat for this species may be present in the fallow areas and along the hedgerows.
Arthropod	West Virginia white	*Pieris virginiensis*	—	SC	—	S3	Odonate Atlas	In Ontario, West Virginia white is found primarily in the southern region of the province. This butterfly lives in moist, mature, deciduous woodlands, and the caterpillars feed only on the leaves of toothwort (*Cardamine* spp), which are small, spring-blooming plants of the forest floor. These woodland habitats are typically maple-beech-birch dominated.	Low	No suitable forested habitat is present at the Site.
Bird	Bank swallow	*Riparia riparia*	—	THR	THR	S4B	MNRF, OBBA	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 aovided.	Low	No suitable banks are present. Species may forage over the Site.
Bird	Barn swallow	*Hirundo rustica*	—	THR	THR	S4B	MNRF, OBBA	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 rights-of-way, and wetlands. Mud nests are fastened to vertical walls or built on a ledge underneath an overhang. Suitable nests from previous years are reused.	High	Nesting confirmed at the Site associated with buildings on the western edge of the Site.
Bird	Bobolink	*Dolichonyx oryzivorus*	—	THR	THR	S4B	MNRF, OBBA	In Ontario, the bobolink breeds in grasslands or graminoid dominated hayfields with tall vegetation. Bobolinks prefer grassland habitat with a broad-leaf component and a substantial litter layer. They have low tolerance for presence of woody vegetation and are sensitive to extensive mowing. They are found in greater numbers in old fields where mowing and re-sowing are infrequent. 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 broad-leaved forbs.	Low	This species was not recorded on-Site during targeted surveys.

Appendix A
Species at Risk Screening

Taxon	Common Name	Scientific Name	Species At Risk Act (Sch 1)[1]	Endangered Species Act[2]	COSEWIC[3]	Provincial (SRank)[4]	Source	Habitat Requirements[5]	Potential to Occur on Site	Rationale for Potential to Occur on Site
Bird	Canada warbler	*Cardellina canadensis*	THR	SC	THR	S4B	MNRF	In Ontario, breeding habitat for the 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. 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.	Low	Suitable moist forest with well-developed understory is not present at the Site.
Bird	Chimney swift	*Chaetura pelagica*	THR	THR	THR	S4B, S4N	MNRF, OBBA	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.	Low	No suitable structures present at the Site.
Bird	Common nighthawk	*Chordeiles minor*	THR	SC	THR	S4B	MNRF	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.	Low	This species was not recorded on-Site during targeted surveys.
Bird	Eastern meadowlark	*Sturnella magna*	—	THR	THR	S4B	MNRF, OBBA	In Ontario, the eastern meadowlark breeds in pastures, hayfields, meadows and old fields. Eastern meadowlarks prefer moderately tall grasslands with abundant litter cover, high grass proportion, and a forb component. They prefer well drained sites or slopes, and sites with different cover layers.	Low	This species was not recorded on-Site during targeted surveys.
Bird	Eastern wood-pewee	*Contopus virens*	—	SC	SC	S4B	OBBA	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, one to two meters above the ground, in a wide variety of deciduous and coniferous trees.	Low	This species was not recorded on-Site during targeted surveys.
Bird	Golden-winged warbler	*Vermivora chrysoptera*	THR	SC	THR	S4B	BNA Online	In Ontario, golden-winged warbler breeds in regenerating scrub habitat with dense ground cover and a patchwork of shrubs, usually surrounded by forest. Their preferred habitat is characteristic of a successional landscape associated with natural or anthropogenic disturbance such as right-of-ways, and field edges or openings resulting from logging or burning. The nest of the golden-winged warbler is built on the ground at the base of a shrub or leafy plant, often at the shaded edge of the forest or at the edge of a forest opening (Confer et al. 2011).	Low	This species was not recorded on-Site during targeted surveys.

Appendix A
Species at Risk Screening

Taxon	Common Name	Scientific Name	Species At Risk Act (Sch 1)[1]	Endangered Species Act[2]	COSEWIC[3]	Provincial (SRank)[4]	Source	Habitat Requirements[5]	Potential to Occur on Site	Rationale for Potential to Occur on Site
Bird	Grasshopper sparrow *pratensis* subspecies	*Ammodramus savannarum* (*pratensis* subspecies)	—	SC	SC	S4B	OBBA	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	This species was not recorded on-Site during targeted surveys.
Bird	Peregrine falcon (anatum subspecies)	*Falco peregrinus anatum*	SC	SC	SC	S3B	BNA Online	In Ontario, the 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.	Low	No suitable cliff faces present.
Bird	Red-headed woodpecker	*Melanerpes erythrocephalus*	THR	SC	THR	S4B	BNA Online	In Ontario, the red-headed woodpecker breeds in open, deciduous woodlands or woodland edges and are often found in parks, cemeteries, golf courses, orchards and savannahs. They may also breed in forest clearings or open agricultural areas provided that large trees are available for nesting. They prefer forests with little or no understory vegetation. They are often associated with beech or oak forests, beaver ponds and swamp forests where snags are numerous. Nests are excavated in the trunks of large dead trees.	Low	This species was not recorded on-Site during targeted surveys.
Bird	Short-eared owl	*Asio flammeus*	SC	SC	SC	S2N,S4B	MNRF, OBBA	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. Nests are built on the ground at a dry site and usually adjacent to a clump of tall vegetation used for cover and concealment.	Low	This species was not recorded on-Site during targeted surveys.
Bird	Eastern whip-poor-will	*Antrostomus vociferus*	THR	THR	THR	S4B	BNA Online	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. No nest is constructed and eggs are laid directly on the leaf litter.	Low	This species was not recorded on-Site during targeted surveys.
Bird	Wood thrush	*Hylocichla mustelina*	—	SC	THR	S4B	BNA Online	During the breeding season, the wood thrush is found in moist, deciduous hardwood or mixed stands, often previously disturbed, with a dense deciduous undergrowth and with tall trees for singing perches. Wood thrushe chooses habitats based on the structure of the forest. Specifically, this species selects nesting sites with the following characteristics: lower elevations with trees >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.	Low	This species was not recorded on-Site during targeted surveys.
Fish	American eel	*Anguilla rostrata*	—	END	THR	S1?	ROM	In Ontario, the American eel is native to 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.	Low	No suitable surface water features at the Site.

Appendix A
Species at Risk Screening

Taxon	Common Name	Scientific Name	Species At Risk Act (Sch 1)[1]	Endangered Species Act[2]	COSEWIC[3]	Provincial (SRank)[4]	Source	Habitat Requirements[5]	Potential to Occur on Site	Rationale for Potential to Occur on Site
Fish	Lake sturgeon - Great Lakes / upper St.Lawrence Population	*Acipenser fulvescens*	—	THR	THR	S2	ROM	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 metres 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	No suitable surface water features at the Site.
Mammal	Eastern small-footed myotis	*Myotis leibii*	—	END	—	S2S3	MNRF	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 roosting habitat for this species are present at the Site.
Mammal	Little brown myotis	*Myotis lucifugus*	END	END	END	S4	MNRF	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	Presence of dead and dying trees at the Site may offer suitable habitat for this species.
Mammal	Tri-colored bat	*Perimyotis subflavus*	END	—	END	S3?	MNRF	The appearance of this species at tree-top levels indicate that they may roost in foliage or in high tree cavities and crevices. They are not often found in buildings or in deep woods, seeming to prefer edge habitats near areas of mixed agricultural use. 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	Presence of dead and dying trees, and trees in general, at the Site may offer suitable habitat for this species.
Mammal	Northern myotis	*Myotis septentrionalis*	END	END	END	S3	MNRF	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	Presence of dead and dying trees at the Site may offer suitable habitat for this species.
Reptile	Blanding's turtle - Great Lakes/St.Lawrence population	*Emydoidea blandingii*	THR	THR	THR	S3	MNRF	Blanding's turtle will utilize 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 to order 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.	Low	No suitable habitat for this species is present at the Site.

Appendix A
Species at Risk Screening

Taxon	Common Name	Scientific Name	Species At Risk Act (Sch 1)[1]	Endangered Species Act[2]	COSEWIC[3]	Provincial (SRank)[4]	Source	Habitat Requirements[5]	Potential to Occur on Site	Rationale for Potential to Occur on Site
Reptile	Eastern ribbonsnake - (Great Lakes population)	*Thamnophis sauritius*	SC	SC	SC	S3	MNRF	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.	Low	Given that the surface water features at the Site are primarily ephermeral and dry for much of the year, habitat is not likely present.
Reptile	Northern map turtle	*Graptemys geographica*	SC	SC	SC	S3	ORAA	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. Hibernation takes place in soft substrates under deep water.	Low	No suitable open water habitats on or adjacent to the Site.
Reptile	Snapping turtle	*Chelydra serpentina*	SC	SC	SC	S3	NHIC, MNRF	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.	Low	Given that the surface water features at the Site are primarily ephermeral and dry for much of the year, habitat is not likely present.
Reptile	Stinkpot or Eastern musk turtle	*Sternotherus odoratus*	THR	SC	SC	S3	ORAA	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. 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.	Low	Given that the surface water features at the Site are primarily ephermeral and dry for much of the year, habitat is not likely present.
Vascular Plant	American ginseng	*Panax quinquefolius*	END	END	END	S2	ROM	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.	Low	No suitable mature forest habitats present at the Site.
Vascular Plant	Butternut	*Juglans cinerea*	END	END	END	S3?	MNRF	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. Butternut prefers moist, fertile, well-drained soils, but can also be found in rocky limestone soils. This species is shade intolerant.	High	A single butternut was observed on the Site.
Vascular Plant	Eastern prairie fringed-orchid	*Platanthera leucophaea*	END	END	END	S2	ROM	Eastern prairie fringed-orchid grows in wet prairies, fens, bogs, wet meadows, and wet successional fields. It grows in full sun in neutral to mildly calcareous substrates , and occassionaly grows along roadsides or lake margins.This species is found only in southern Ontario, and only two locations are currently known on sand spits along the shore of Lake Erie.	Low	This species is only known in two locations in Ontario, along the shores of Lake Erie.

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APPENDIX B

Vascular Plants Recorded from the Site

September 2017
Report No. 1658448

Scientific Name	Common Name	Origin[a]	Global Rarity Status[b]	Ontario Rarity Status[b]	SARA[c]	ESA[d]
Abutilon theophrasti	Velvet-leaf	I	GNR	SNA	–	–
Ambrosia artemisiifolia	Ragweed	I	GNR	SNA		
Acer rubrum	Red maple	N	G5		–	–
Acer saccharum	Sugar maple	N	G5		–	–
Arctium minus	Common burdock	I	GNR	SNA	–	–
Asclepias syriaca	Common milkweed	N	G5		–	–
Athyrium filix-femina	Lady fern	N	G5T5		–	–
Betula pendula	European white birch	I	GNR	SNA	–	–
Bromus inermis	Smooth brome	I	GNR	SNA	–	–
Carex spp.	Sedges	N	?	?	–	–
Cirsium arvense	Canada thistle	I	GNR	SNA	–	–
Fragaria virginiana	Common strawberry	N	G4		–	–
Cornus stolonifera	Red osier dogwood	N	G5		–	–
Crataegus sp.	Hawthorn species	N	?	?	–	–
Daucus carota	Wild carrot	I	GNR	SNA	–	–
Dryopteris sp.	Wood fern	N	?	?	–	–
Equisetum arvense	Field horsetail	N	G5		–	–
Equisetum variegatum	Variegated scouring-rush	N	G5		–	–
Fraxinus americana	White ash	N	G5		–	–
Fraxinus pennsylvanica	Green ash	N	G5		–	–
Galium mollugo	White bedstraw	I	GNR	SNA	–	–
Geum sp.	Avens species	N	?	?	–	–
Juglans cinerea	Butternut				**END**	**END**
Juglans nigra	Black walnut	(N)	G5			
Juncus spp.	Rushes	N	?	?		
Juniperus communis	Common juniper	N	G5		–	–
Lonicera tatarica	Tartarian honeysuckle	I	GNR	SNA	–	–
Lythrum salicaria	Purple loosestrife	I	G5	SNA	–	–
Malus pumila	Apple	I	G5	SNA	–	–
Onoclea sensibilis	Sensitive fern	N	G5		–	–
Osmunda regalis	Royal fern	N	G5		–	–
Parthenocissus inserta	Virginia creeper	N	G5		–	–
Pastinaca sativa	Parsnip	I	GNR	SNA	–	–
Phalaris arundinacea	Reed canary grass	N	G5		–	–
Phleum pratense	Timothy	I	GNR	SNA	–	–
Pinus resinosa	Red pine	N	G5		–	–
Pinus strobus	White pine	N	G5		–	–
Pinus sylvestris	Scots pine	I	GNR	SNA	–	–
Poa sp.	Bluegrass	?	?	?	–	–
Populus deltoides	Eastern cottonwood	N	G5T5		–	–
Populus tremuloides	Trembling aspen	N	G5		–	–
Potentilla sp.	Cinquefoil species	?	?	?	–	–
Prunus serotina	Black cherry	N	G5		–	–
Prunus virginiana	Choke cherry	N	G5		–	–
Quercus macrocarpa	Bur oak	N	G5		–	–
Rhamnus cathartica	Common buckthorn	I	GNR	SNA	–	–
Rhamnus frangula	Glossy buckthorn	I	GNR	SNA	–	–
Rubus idaeus	Red raspberry	N	G5T5		–	–
Rumex crispus	Curled dock	I	GNR	SNA	–	–
Salix discolor	Pussy willow	N	G5	S5		
Salix spp.	Willows	N	?		–	–
Sinapis arvensis	Charlock	I	GNR	SNA	–	–
Solanum dulcamara	Climbing nightshade	I	GNR	SNA	–	–
Solidago canadensis	Canada goldenrod	N	G5T5		–	–
Solidago rugosa	Rough goldenrod	N	G5		–	–
Sonchus asper	Spiny sow-thistle	I	GNR	SNA	–	–
Symphyotrichum spp.	Asters	N	?	?	–	–
Thuja occidentalis	Eastern white cedar	N	G5		–	–
Tilia americana	Basswood	N	G5		–	–
Trifolium pratense	Red clover	I	GNR	SNA	–	–
Trifolium repens	White clover	I	GNR	SNA	–	–

Scientific Name	Common Name	Origin[a]	Global Rarity Status[b]	Ontario Rarity Status[b]	SARA[c]	ESA[d]
Typha sp.	Cattail	N	?	?	–	–
Ulmus americana	White elm	N	G5?		–	–
Viburnum trilobum	Highbush cranberry	N	G5T5		–	–
Vicia cracca	Cow-vetch	I	GNR	SNA	–	–
Vitis riparia	Riverbank grape	N	G5		–	–

Notes:

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

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

Wildlife Recorded from the Site

September 2017
Report No. 1658448

Golder Associates

Appendix C
Wildlife Species Observed in the Study Area

Common Name	Scientific Name	Origin[a]	Global Rarity Status[b]	Ontario Rarity Status[b]	SARA[c]	ESA[d]
Mammals						
Coyote	*Canis latrans*	N	G5	S5	—	—
Deer mouse	*Peromyscus* sp.	N	G5	S5	—	—
Eastern chipmunk	*Tamias striatus*	N	G5	S5	—	—
Eastern cottontail	*Sylvilagus floridanus*	N	G5	S5	—	—
Grey squirrel	*Sciurus carolinensis*	N	G5	S5	—	—
Meadow vole	*Microtus pennsylvanicus*	N	G5	S5	—	—
Norway rat	*Rattus norvegicus*	N	G5	S5	—	—
Raccoon	*Procyon lotor*	N	G5	S5	—	—
Striped skunk	*Mephitis mephitis*	N	G5	S5	—	—
White-tailed deer	*Odocoileus virginianus*	N	G5	S5	—	—
Woodchuck	*Marmota monax*	N	G5	S5	—	—
Birds						
Alder flycatcher	*Empidonax alnorum*	N	G5	S5B	—	—
American crow	*Corvus brachyrhynchos*	N	G5	S5B	—	—
American goldfinch	*Carduelis tristis*	N	G5	S5B	—	—
American robin	*Turdus migratorius*	N	G5	S5B	—	—
American woodcock	*Scolopax minor*	N	G5	S4B	—	—
Baltimore oriole	*Icterus galbula*	N	G5	S4B	—	—
Barn swallow	*Hirundo rustica*	N	G5	S4B	—	—
Black-capped chickadee	*Poecile atricapilla*	N	G5	S5	—	—
Blue jay	*Cyanocitta cristata*	N	G5	S5	—	—
Brown-headed cowbird	*Molothrus ater*	N	G5	S4B	—	—
Canada goose	*Branta canadensis*	N	G5	S5	—	—
Cedar waxwing	*Bombycilla cedrorum*	N	G5	S5B	—	—
Clay-colored sparrow	*Spizella pallida*	N	G5	S4B	—	—
Common grackle	*Quiscalus quiscula*	N	G5	S5B	—	—
Common yellowthroat	*Geothlypis trichas*	N	G5	S5B	—	—
Chestnut-sided warbler	*Setophaga pensylvanica*	N	G5	S5B	—	—
Downy woodpecker	*Picoides pubescens*	N	G5	S5	—	—
Eastern pheobe	*Sayornis phoebe*	N	G5	S5B	—	—
European starling	*Sturnus vulgaris*	I	G5	SNA	—	—
Great-crested flycatcher	*Myiarchus crinitus*	N	G5	S4B	—	—
Golden-crowned kinglet	*Regulus satrapa*	N	G5	S5B	—	—
Hairy woodpecker	*Picoides villosus*	N	G5	S5	—	—
House finch	*Carpodacus mexicanus*	I	G5	SNA	—	—
House sparrow	*Passer domesticus*	I	G5	SNA	—	—
House wren	*Troglodytes aedon*	N	G5	S5B	—	—
Killdeer	*Charadrius vociferus*	N	G5	S5B	—	—
Mourning dove	*Zenaida macroura*	N	G5	S5	—	—
Rose-breasted grosbeak	*Pheucticus ludovicianus*	N	G5	S4B	—	—
Red-tailed hawk	*Buteo jamaicensis*	N	G5	S5	—	—
Red-winged blackbird	*Agelaius phoeniceus*	N	G5	S4	—	—
Rock pigeon	*Columba livia*	I	G5	SNA	—	—
Ruby-throated hummingbird	*Archilochus colubris*	N	G5	S5B	—	—
Ruffed grouse	*Bonasa umbellus*	N	G5	S4	—	—
Savannah sparrow	*Passerculus sandwichensis*	N	G5	S4B	—	—
Song sparrow	*Melospiza melodia*	N	G5	S5B	—	—
Swamp sparrow	*Melospiza georgiana*	N	G5	S5B	—	—
Turkey vulture	*Cathartes aura*	N	G5	S5B	—	—
Veery	*Catharus fuscescens*	N	G5	S4B	—	—
Warbling vireo	*Vireo gilvus*	N	G5	S5B	—	—
White-breasted nuthatch	*Sitta carolinensis*	N	G5	S5	—	—
Wilson's snipe	*Gallinago delicata*	N	G5	S5B	—	—
Wild turkey	*Meleagris gallopava*	N	G5	S5	—	—
Yellow warbler	*Setophaga petechia*	N	G5	S5	—	—
Herpetiles						
American toad	*Anaxyrus americanus*	N	G5	S5	–	–
Eastern gartersnake	*Thamnophis sirtalis sirtalis*	N	G5TG	S5	–	–
Gray tree frog	*Hyla versicolor*	N	G5	S5	–	–
Spring peeper	*Pseudacris crucifer*	N	G5	S5	–	–
Insects						
Black swallowtail	*Papilio polyxenes*	N	G5	S5	–	–
Cabbage white	*Pieris rapae*	I	G5	SNA	–	–
Canada tiger swallow tail	*Papilio canadensis*	N	G5	S5	–	–
Common eastern bumblebee	*Bombus impatiens*	N	G5	S5	–	–
Clouded sulphur	*Colias philodice*	N	G5	S5	–	–
Common ringlet	*Coenonympha tullia*	N	G5	S5	–	–
Dun skipper	*Euphyes vestris*	N	G5	S5	–	–
Eastern-tailed blue	*Everes comyntas*	N	G5	S5	–	–

Appendix C
Wildlife Species Observed in the Study Area

Common Name	Scientific Name	Origin[a]	Global Rarity Status[b]	Ontario Rarity Status[b]	SARA[c]	ESA[d]
European skipper	*Thymelicus lineola*	I	G5	SNA	–	–
Northern crescent	*Phycoides pascoensis*	N	G5	S5	–	–
Meadow frittillary	*Boloria bellona*	N	G5	S5	–	–
Twelve-spotted skimmer	*Libellula pulchella*	N	G5	S5	–	–
White-faced meadowhawk	*Sympetrum obtrusum*	N	G5	S5	–	–

[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

Headwater Drainage Features Assessment

September 2017
Report No. 1658448

Golder Associates

Appendix D
Headwater Drainage Features Assessment

Classification: Drainage Feature Segment	Step 1			Step 2		Step 3		Step 4		Management Recommendation
	Field Data	Hydrology	Modifiers	Field Data	Riparian	Field Data	Fish and Fish Habitat	Field Data	Terrestrial Habitat	
RS-HDF-1	April: FC = 5 / FT = 2 May: FC = 4 / FT = 2 July: FC = 4 / FT = 2 November (2016): FC = 1 / FT = 2	A - Important Functions	One culvert	FT = 2 Highest Functioning Riparian Veg Type = 5	A - Important Functions	Fish Collection Date: N/A Results: N/A	C - Contributing Functions	FT = 2 MMP Call Code = 0	D - Limited Functions	Protection
RS-HDF-2A	April: FC = 5 / FT = 2 May: FC = 1 / FT = 2 July: FC = 2 / FT = 2 November (2016): FC = 1 / FT = 2	C - Contributing Functions*	One culvert; trash barriers; dredging	FT = 2 Highest Functioning Riparian Veg Type = 4	B - Valued Functions	Fish Collection Date: N/A Results: N/A	C - Contributing Functions	FT = 2 MMP Call Code = 0	D - Limited Functions	Mitigation
RS-HDF-2B	April: FC = 5 / FT = 2 May: FC = 2 / FT = 2 July: FC = 1 / FT = 2 November (2016): FC = 2 / FT = 2	C - Contributing Functions	Four culverts; dredging	FT = 2 Highest Functioning Riparian Veg Type = 4	B - Valued Functions	Fish Collection Date: May 16, 2017 Results: No catch	C - Contributing Functions	FT = 2 MMP Call Code = 0	D - Limited Functions	Mitigation
RS-HDF-3A	April: FC = 5 / FT = 2 May: FC = 5 / FT = 2 July: FC = 5 / FT = 2 November (2016): FC = 1 / FT = 2	A - Important Functions	Dredging	FT = 2 Highest Functioning Riparian Veg Type = 5	A - Important Functions	Fish Collection Date: N/A Results: N/A	C - Contributing Functions	FT = 2 MMP Call Code = 0	D - Limited Functions	Protection
RS-HDF-3B	April: FC = 5 / FT = 2 May: FC = 5 / FT = 2 July: FC = 5 / FT = 2 November (2016): FC = 1 / FT = 2	A - Important Functions	One clogged culvert; choked by debris	FT = 2 Highest Functioning Riparian Veg Type = 4	B - Valued Functions	Fish Collection Date: N/A Results: N/A	C - Contributing Functions	FT = 2 MMP Call Code = 0	D - Limited Functions	Protection
RS-HDF-4	April: FC = 5 / FT = 2 May: FC = 1 / FT = 2 July: FC = 2 / FT = 2 November (2016): FC = 1 / FT = 2	C - Contributing Functions*	Dredging	FT = 2 Highest Functioning Riparian Veg Type = 3	D - Limited Functions	Fish Collection Date: N/A Results: N/A	C - Contributing Functions	FT = 2 MMP Call Code = 0	D - Limited Functions	Mitigation
RS-HDF-5	April: FC = 5 / FT = 2 May: FC = 5 / FT = 2 July: FC = 2 / FT = 2 November (2016): FC = 1 / FT = 2	A - Important Functions	None	FT = 2 Highest Functioning Riparian Veg Type = 6	A - Important Functions	Fish Collection Date: N/A Results: N/A	C - Contributing Functions	FT = 2 MMP Call Code = 0	C - Contributing Functions	Protection

Note: * While a FC of 2 in July would result in an A - Important classification, these features were dry during the May surveys and the July flow condition is inferred to be the result of the unusually high rainfall in June 2016.

Legend:
FC = Flow Condition
FT = Feature Type

APPENDIX E

Tree Conservation Report (Golder, 2017)

September 2017
Report No. 1658448

September 2017

REPORT ON

Tree Conservation Report in Support of the Proposed Development of Riverside South Lands East of 805-809 River Road, Ottawa, Ontario

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

Attention: Mr. Jim Burghout

Report Number: 1658448

Distribution:

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

REPORT

Golder Associates

Table of Contents

1.0 INTRODUCTION

Golder Associates Ltd. (Golder) was retained by Claridge Homes Inc. (Claridge) to complete a Tree Conservation Report (TCR) for the lands between River and Spratt Roads, Part Lots 23 & 24, Broken Front Concession, Township of Gloucester, City of Ottawa, Ontario (the Site; Figure 1). This TCR will accompany an Environmental Impact Statement (EIS), as part of 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 18 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	None
Legal Description	Part of Lots 23 and 24, Broken Front Concession (Rideau Front), Geographic Township of Gloucester, City of Ottawa
Current Zoning	DR – Development Reserve
Current Site Owner	Claridge Homes Inc.
Address of Site Owner	Claridge Homes Inc. 2001-210 Gladstone Avenue Ottawa, Ontario K2P 0Y6

4.0 PROPOSED WORKS AND SCHEDULE

The Site consists of approximately 39 ha of active agricultural lands, hedgerows, fallow areas and some structures associated with a snow ploughing operation and shop. The Site is bounded by River Road on the west, Spratt Road on the east, and undeveloped former and active agricultural lands to the north and south (both in the process of obtaining development approvals). The proposed development includes primarily residential development of varying densities (detached, semi-detached and townhomes) totalling approximately 647 units. In addition, there is one park block and one school block included in the plan, along with a road network and site servicing.

5.0 EXISTING PLANT COMMUNITIES AND TREE COVER ON THE SITE

The Site includes a mix of meadow (historically agriculture), active row crops, two small woodlots with upland and swamp forest, meadow marsh, and a shop and storage yard area, with several small buildings, which was actively in use during the field data collection. Trees and shrubs in these areas include a variety of species such white elm (*Ulmus americana*), green ash (*Fraxinus americana*), and common buckthorn (*Rhamnus cathartica*). A summary of the trees identified on the Site is included in Tables 2 and 3. This report focuses on trees and other woody vegetation. For more details on plant and wildlife communities at the Site, refer to the EIS.

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

Tree #	Species	Diameter at breast height (dbh; cm)	Condition	Notes
1	White elm (*Ulmus americana*)	48	Good	Large healthy tree, showing no dieback or signs of disease visible.
2	White pine (Pinus strobus)	53	Good	Large, super-canopy tree, taller and older than rest of forest stand. Self-pruning slowly occurring, no dieback or signs of disease visible.
3	White ash (*Fraxinus americana*)	73	Fair to Good	Some limb die back healed, and healed wounds.
4	Bur oak (*Quercus macrocarpa*)	91	Good	Large healthy tree in hedgerow.
5	Butternut (*Juglans cinerea*)	18	Fair	Category 2 according to BHA; showing signs of butternut canker disease.

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

Tree Grouping #	Stand Description*	Average range of dbh (cm)	Notes
1	Green ash (*Fraxinus pennsylvanica*) 90% Common buckthorn (*Rhamnus cathartica*) 10%	7 to15 5 to 8	Narrow band of immature trees along roadside ditch on moist soils. Tops have been trimmed off, more than once, for utility line maintenance. Otherwise in good condition, but with a bushy form due to trimming. No signs of emerald ash borer (EAB) seen.
2	Basswood (*Tilia americana*) 60% White ash *(Fraxinus Americana)* 20% White elm (*Ulmus americana*) 10% Bur oak (*Quercus macrocarpa*) 10%	15 to 30 20 to 40 5 to 15 15 to 20	Wide hedgerow of immature and semi-mature along property fence on rocky soils. Larger trees present on adjacent property. Occasional potential cavity tree present. Overall trees are in good condition, with the exception of the white ash, most of which are showing signs of EAB and branch dieback. Understory of shrubs such as common buckthorn and red raspberry (*Rubus idaeus).*
3	Green ash 70% White elm 10% Red maple (*Acer rubrum*) 10% Basswood 10% Trembling aspen 10%	10 to 30 5 to 10 20 to 34 20 5 to 8	Two perpendicular hedgerows of immature trees, on fresh to moist soils. Many ashes showing signs of EAB and dieback, and occasional elm dead or dying, and showing signs of insect damage. Remainder of trees in good condition. Understory of shrubs such as willows (*Salix* spp) dense in some areas.
4	Trembling aspen 100%	8 to 14	Two small stands of relatively even aged immature aspen. Trees in good condition.
5	Trembling aspen 40% Willows 40% European white birch (*Betula pendula*) 20%	10 to 15 4 to 8 5 to 12	Open woodland of mature willow shrubs in small tree form, and immature aspen and birch on moist soils. Trees interspersed with meadow and marsh vegetation. Signs of spring flooding apparent in some areas. Trees are in good condition, considering the species. European white birch is an introduced species and is potentially invasive.

Tree Grouping #	Stand Description*	Average range of dbh (cm)	Notes
6	Trembling aspen 100%	15 to 30	Pure stand of immature to semi-mature aspen surrounded by open woodland. Signs of spring flooding apparent. Some top breakage and trees fallen over, and some woodpecker damage and nest cavities, but most trees are in fair to good condition.
7	Green ash 60% White elm 20% Trembling aspen 10% Scots pine (*Pinus sylvestris*) 5% European white birch and willows 5%	7 to 20 7 to 17 3 to 12 5 to 15 3 to 10	Open deciduous woodland, with immature trees interspersed with shrubs and meadow plants. Most ash are showing signs of dieback and emerald ash borer. Some elms are dying or dead, with signs of disease and insect damage such as exist holes and peeling bark.
8	Green and white ash 50% White elm 30% Bur oak 10% White pine (*Pinus strobus*) 5% Trembling aspen, Scots pine, hawthorn (*Crataegus* sp,), black cherry (*Prunus serotina*), and apple (*Malus pumila*) 5%	10 to 20 6 to 15 8 to 10 6 to 18 5 to 14	Semi-open woodland of primarily deciduous trees, and tall shrubs. Most ash are showing signs of dieback and emerald ash borer. Many elms are dying or dead with signs of disease and insect damage. Larger Scots pines are gnarly and twisted. The remainder of trees are immature but primarily in good condition. Some open patches of meadow throughout.
9	White ash 30% White elm 30% Black cherry 15% Sugar maple 10% Trembling aspen 10% Red maple 5 %	12 to 25 5 to 13 8 to 12 10 to 20 4 to 16 8 to 20	Small patch of immature deciduous forest with different dominant species than tree grouping 8. Contiguous with forest adjacent to the Site. Overall trees are in good condition, with occasional woodpecker damage and cavities present.
10	Red maple 95% Green ash 5%	18 to 35 17 to 32	Open hedgerow/clump of semi-mature maple with the odd ash. Overall trees are in fair to good condition, but some maples are multi-stemmed with branch dieback and cavities present. Ash are showing dieback and signs of EAB.
11	Bur oak 74% Green ash 25% Red maple 1%	17 to 30 20 to 35 16 to 30	Small band of semi-mature trees in moist hedgerow. All ash are showing some dieback and signs of EAB. Oaks and maples are fair to good conditions, with minimal trunk decay on some individuals. Trees crowded overall.

Tree Grouping #	Stand Description*	Average range of dbh (cm)	Notes
12	European white birch 55% Willows 40% Eastern cottonwood (*Populus deltoides*) 5%	5 to 20 15 to 30 15 to 30	Small narrow patch of immature trees and tree-sized shrubs. Overall trees are in good condition. European white birch is an introduced species and is potentially invasive.
13	Green ash 100%	35 to 70	Small hedgerow of semi-mature to mature ash. All trees in fair to poor condition, showing signs of dieback and EAB.
14	Green ash 80% Sugar maple (*Acer saccharum*) 15% Manitoba maple 5%	15 to 35 4 to 15 12 to 15	Small hedgerow of immature trees, with occasional larger ash. Overall trees are in fair to good condition, but ash is showing some bark damage and dieback, and signs of EAB. Dead standing elms are present.
15	Red pine (*Pinus resinosa*) 85% Sugar maple 10% Norway spruce (*Picea abies*) 4% Black walnut (*Juglans nigra*) 1%	30 to 35 5 to 15 20 32	Small patch of primarily semi-mature trees, associated with residential property. Most trees are from planted origin. All trees in fair to good condition, black walnut showing some damage and wounds from pruning.
16	White elm 100%	15 to 29	Small patch of immature and semi-mature trees. All in fair to good condition.
17	Red pine 79% Scots pine 21%	25 to 40 15 to 20	Small conifer plantation. Trees in good condition but crowded.
18	Red pine 55% White pine 45%	25 to 35 40 to 48	Small conifer plantation. Trees in good condition but crowded.

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

6.0 NATURAL ENVIRONMENT FEATURES ON-SITE

For details on natural heritage features, potential impacts, and recommended mitigation, refer to the EIS.

7.0 PROPOSED ALTERATIONS TO TREE COVER AND POTENTIAL TREE RETENTION

The Site has limited tree cover, and the proposed design plan (Figure 2) considered there will be no tree retention associated with Site development. A landscape plan will be prepared for Site that addresses restoration requirements and 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

- For detailed recommendations and mitigation measures, related to natural heritage features on the Site, refer to the EIS.
- 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 1–August 15), 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.
- 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. Replacement planting species and densities will be addressed through a site specific landscape plan that takes into consideration and prioritizes the planting of native trees.
- Wherever tree planting is to take place on the Site, first consideration should be given to the use of native species that occur in the local landscape, such as: Sugar maple (*Acer Saccharum*), red maple (*Acer rubrum*), white pine (*Pinus strobus*) and bur oak (*Quercus macrocarpa*). Cultivars of native species designed for urban conditions can be used as deemed suitable by the City. Alien non-invasive species and cultivars should only be used where it is 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 any 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.

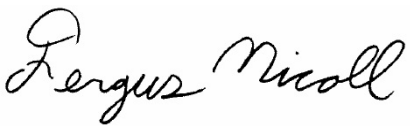
  f) Do not damage the root system, trunk or branches of the trees.

  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

Richard Booth, Ph.D.
Senior Ecologist / Associate

FN/RB/sg
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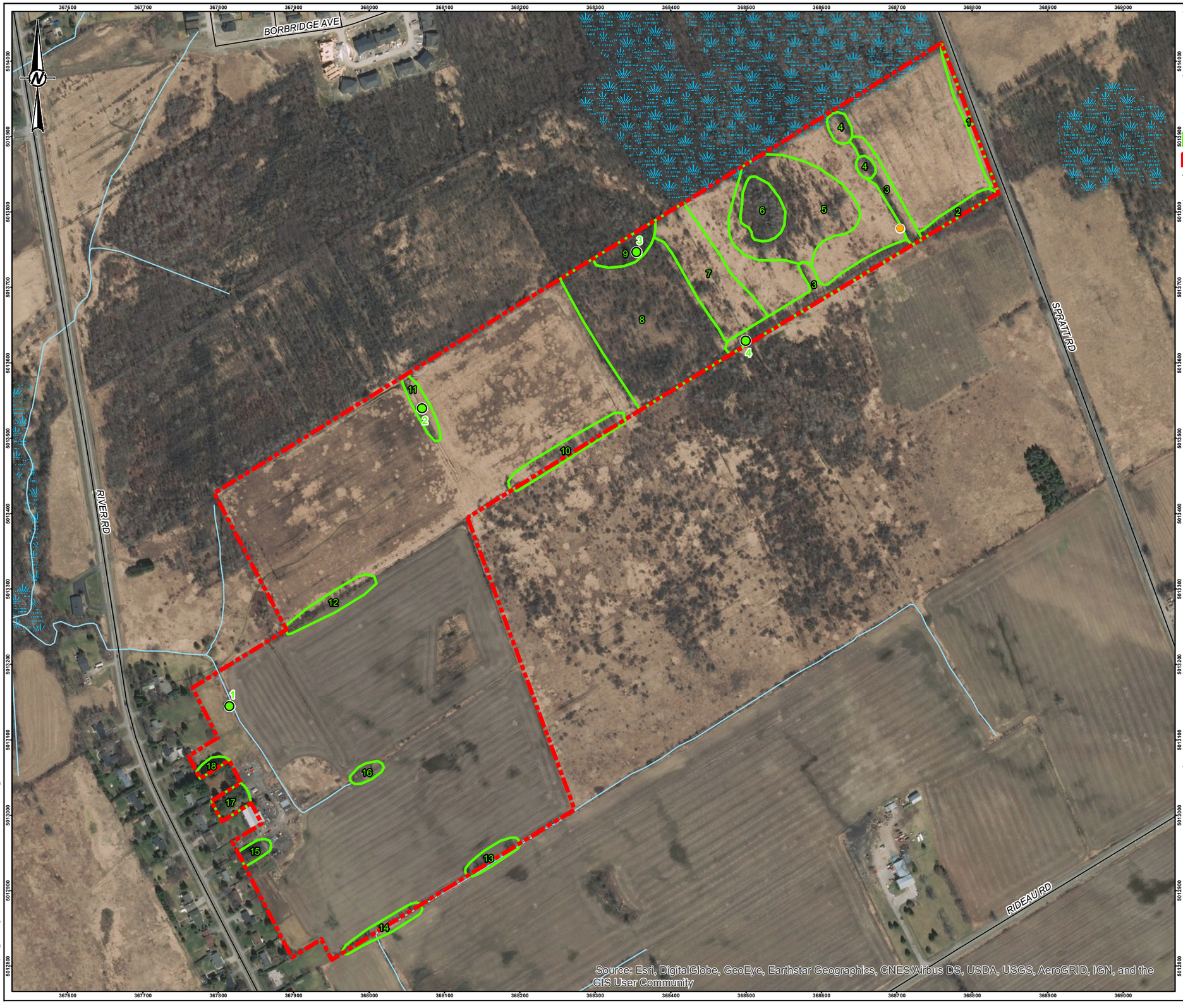
10.0 REFERENCES

Ottawa, City of. 2013. Annotated Version of the OP Showing Proposed Changes as per Amendment No. 150. Available: http://documents.ottawa.ca/en/node/5720.

Ottawa, City of. 2015. Tree Conservation Report Guidelines (Online). Available: http://ottawa.ca/en/residents/water-and-environment/trees-and-community-forests/tree-conservation-report-guidelines. Accessed: 2014.



LEGEND

- TREE
- BUTTERNUT
- ROADWAY
- WATERCOURSE
- WETLAND
- TREE GROUPING
- SITE

NOTE(S)

1. THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO. 1658448-4000.

REFERENCE(S)

1. LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2014
2. PROJECTION: TRANSVERSE MERCATOR, DATUM: NAD 83, COORDINATE SYSTEM: MTM ZONE 9, VERTICAL DATUM: CGVD28

0 50 100 200
1:5,000 METRES

CLIENT
CLARIDGE HOMES CORPORATION

PROJECT
PRELIMINARY ENVIRONMENTAL IMPACT STATEMENT IN SUPPORT OF THE PROPOSED DEVELOPMENT OF RIVERSIDE SOUTH LANDS EAST OF 805-809 RIVER ROAD, OTTAWA, ONTARIO

TITLE
CURRENT VEGETATION

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-08-09
DESIGNED	----
PREPARED	JEM
REVIEWED	GW
APPROVED	RB

PROJECT NO.	PHASE	REV.	MAP
1658448	4000	0	1

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

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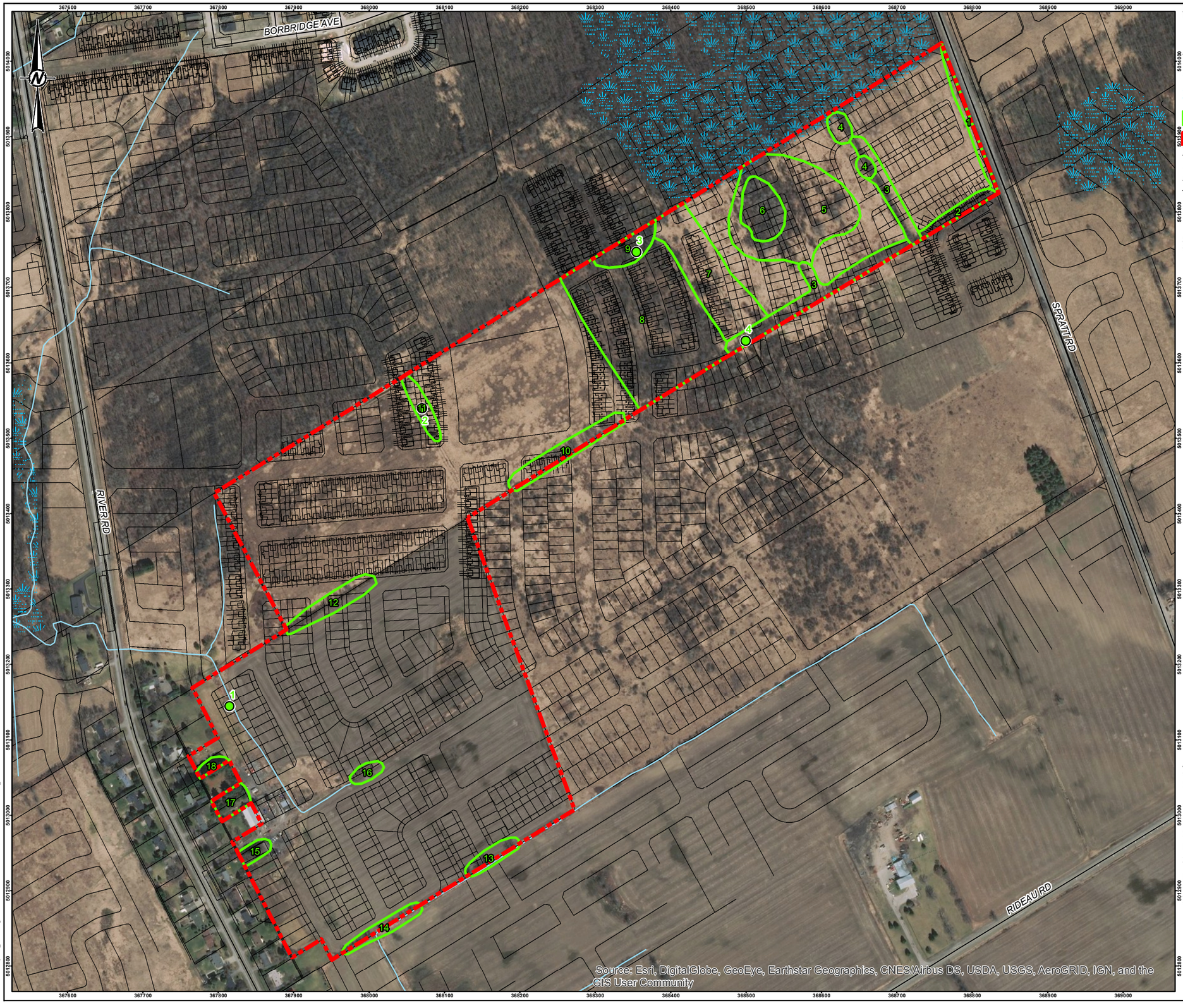

LEGEND

- TREE
- ROADWAY
- WATERCOURSE
- WETLAND
- TREE GROUPING
- SITE

NOTE(S)

1. THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO. 1658448-4000.

REFERENCE(S)

1. BASE PLAN SUPPLIED BY ANNIS O'SULLIVAN VOLLEBEKK LTD., RECEIVED NOV. 1, 2016, FILE NO. CLIENT 15739-15 CLARIDGE PT LTS 23 24 BF RF GL SK S D5.DWG
1. LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2014
2. PROJECTION: TRANSVERSE MERCATOR, DATUM: NAD 83, COORDINATE SYSTEM: MTM ZONE 9, VERTICAL DATUM: CGVD28

0 50 100 200
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CLIENT
CLARIDGE HOMES CORPORATION

PROJECT
PRELIMINARY ENVIRONMENTAL IMPACT STATEMENT IN SUPPORT OF THE PROPOSED DEVELOPMENT OF RIVERSIDE SOUTH LANDS EAST OF 805-809 RIVER ROAD, OTTAWA, ONTARIO

TITLE
PROPOSED DEVELOPMENT AND CONSERVED VEGETATION

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-08-09
DESIGNED	----
PREPARED	JEM
REVIEWED	GW
APPROVED	RB

PROJECT NO.	PHASE	REV.	MAP
1658448	4000	0	**2**

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

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APPENDIX F

Curriculum Vitae

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 Massassauga 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

Education

Post-Doctoral Fellowship (Industrial) Fisheries Biology, Memorial University St. John's. NF, 1999

Ph.D. Fisheries Biology, University of Waterloo, Waterloo, ON, 1998

M.Sc. Fisheries Biology, Queen's University, Kingston, ON, 1994

B.Sc. (Honours) Biology, Trent University, Peterborough, ON, 1991

Certifications

Ministry of Natural Resources Class 2 Electrofishing Certification, September 2010

Ministry of Transportation Fisheries Assessment Specialist RAQS Qualified, January 2009

Languages

English – Fluent

Golder Associates Ltd. – Mississauga

Senior Ecologist, Associate

Dr. Richard Booth is an Associate and Senior Ecologist in Golder's Mississauga, Ontario Office. Richard has a doctorate degree in fisheries ecology and has more than 20 years of ecological consulting experience, with a focus on applied fisheries and aquatic ecology. Richard is the recipient of Fisheries and Oceans Canada's National Prix d'Excellence recognizing his contribution to Canada's inland fisheries through his research on hydropower effects to fisheries. Richard is also the recipient of a Fisheries and Oceans Canada Regional Distinction award for his research into Atlantic salmon conservation in eastern Canada. Dr. Booth has been called as an expert witness and subject matter expert on fisheries ecology and hydroelectric power related effects on aquatic systems.

Richard's current clients include Ministry of Transportation, TransCanada Pipelines, Enbridge, and CN Rail. He is currently supporting planning and assessment, design and build projects in oil and natural gas pipelines, renewable energy, water wastewater systems, highway transportation, and light and heavy rail projects in Ontario. Within these projects, his areas of focus are environmental assessment, impact assessment, regulatory compliance and permitting and environmental monitoring.

Dr. Booth supports professional affiliations with government and academic agencies, and currently guest lectures for the University of Toronto and Seneca College on a range of fisheries and environmental topics. Richard is a past President of the Southern Ontario Chapter of the American Fisheries Society.

Employment History

Golder Associates – Mississauga, ON
Senior Ecologist

Associate, Senior Ecologist. Responsibilities include project management and technical delivery, staff mentoring, delivery of financial targets, business development and marketing, client engagement and management, and day to day representation of the Company in the public domain

AECOM – Markham, ON
GTA Ecology Group Team Leader, Senior Ecologist (2008 to 2011)

Senior Ecologist and Manager of the Greater Toronto Area Ecology Team. Responsibilities included delivery of financial targets, tracking group utility, project QA/QC, business development and marketing, client management, staff mentoring and day to day representation of the Company.

Lotek Wireless – Newmarket, ON
Manger of Consulting Services, Senior Fisheries Scientist (2002 to 2008)

EarthTech – Markham, ON
Senior Fisheries Biologist (2000 to 2002)

Lotek Wireless – Newmarket, ON
Senior Fisheries Biologist (1999 to 2000)

Ontario Ministry of Natural Resources – Dorset, ON
Forest Ecologist (1991 to 1992)

PROJECT EXPERIENCE – POWER AND HYDROPOWER (SELECTIVE)

Miller Hydro Group/ Topsham Hydro Partners Maine, United States	Provided expert witness support as a subject matter expert on the effects of hydropower projects on migratory Atlantic salmon and aquatic ecosystems. Provided sworn testimony under State (Maine) law as a representative of the defence.
Nalcor Energy Fish Protection Assessment Grand Falls-Windsor, Newfoundland, Canada	Project manager and lead aquatic scientist for a two year study of juvenile salmonid entrainment and passage through a 90 mW generating facility located in Grand Falls-Windsor, Newfoundland. The project goal was to evaluation the effectiveness of the fish protection systems for downstream juvenile bypass, turbine entrainment and mortality, upstream adult passage through a fish ladder and post-spawning (kelt) survival within the system.
Exploits River Atlantic salmon Out-migration Assessment Grand Falls-Windsor, Newfoundland, Canada	Project manager and lead aquatic scientist for a 12 year study of juvenile and adult salmonid forebay entrainment, turbine entrainment and post passage survival of Atlantic salmon through a 90 mW generating facility located in Grand Falls-Windsor, Newfoundland. The project goal was to understand fish entrainment behaviours and optimize the fish diversion and protection system to improve project level fish survival.
Grand Falls Generating Facility Tailrace Entrainment Study Grand Falls-Windsor, Newfoundland, Canada	Project manager and lead aquatic scientist for the assessment of tailrace attraction among adult migratory Atlantic salmon at the Grand Falls Generating Facility. The project was undertaken to address Fisheries and Oceans concerns regarding the impacts associated with the installation and operation of a 20 mW turbine generating unit. The project goal was to address concerns related to forebay entrainment, delayed migration and tailrace attraction and residency (i.e., migratory delay) among adult migratory Atlantic salmon.
Grand Falls Generating Facility Fish Behavioural Assessment Study Grand Falls-Windsor, Newfoundland, Canada	Project manager and lead aquatic scientist for a four year study of juvenile and adult salmonid behaviour in relation to flows and hydraulic characteristics in the forebay and power canal of a hydroelectric generating facility. Key objectives of this project were establishing effectiveness criteria for behavioural mitigation and documentation of diversion and survival.
Lower Churchill River Development Environmental Assessment Goose Bay, Newfoundland and Labrador, Canada	Senior fisheries biologist responsible for implementing a large-scale fisheries program to assess the home ranges and migration areas for 5 species of sport fish within the Lower Churchill River between Churchill Falls and Goosebay, Labrador. Data was used to document the existing condition of fisheries resources within the targeted project footprint and to develop a statement of potential impacts based on the background data.
Moses-Saunders Dam and Generating Station on the St. Lawrence River Massena, New York, United States	Senior fisheries scientist within a multi-disciplinary team studying the fish passage behaviour of American eel within the forebay of the Moses-Saunders hydroelectric facility and post passage survival. Project objectives were to develop technological approaches to study eel migration, entrainment and passage at the Moses Saunders Generating Facility.

Tobique River Generating Facility Atlantic salmon Passage and Entrainment Study
Plaster Rock, New Brunswick, Canada

Senior consulting biologist Fisheries and Oceans Canada for the development of a fisheries telemetry program to monitor the approach, passage route and survival of Atlantic salmon migrating past the Tobique River generating Station.

Clackamas River Fisheries Assessment and Data Analysis Program
Oregon City, Oregon

Senior consulting biologist to Portland General Electric for the development of a fisheries telemetry program to monitor salmonid activity within the Clackamas River.

Bonneville Dam Salmonid Energetics Study
Portland, Oregon, United States

Senior Canadian fisheries biologist for a collaborative fisheries program with the United States Geological Survey to assess swimming performance among migratory Sockeye and Chinook salmon in relation to fish ladder design at Bonneville Dam.

The Dalles Dam Juvenile Salmonid Predation Assessment Study
Dalles, Oregon, United States

Consulting scientist to the University of Washington for a project assessing the impacts of northern pike minnow on juvenile salmonid after turbine and spillway passage. Key responsibilities included development of advanced radio telemetry program to monitor fish movements in a hostile environment, surgical training to key project field staff, senior review and consultation, peer review.

PROJECT EXPERIENCE – PIPELINES (SELECTIVE)

Trans Canada Pipelines – Kings North Crossing Project
Vaughan, Ontario, Canada

Senior ecological (aquatics) lead for design build of an 11km new gas pipeline Key responsibilities focussed on project environmental assessment and supporting provincial and federal environmental permit applications and negotiations. Project was successfully permitted and is currently under construction.

Trans Canada Pipelines Eastern Mainline Project
Various locations, Ontario, Canada

Senior Ecologist responsible for field plan development, field surveys, impact assessment reporting, permitting and client consultation for the 270 km Eastern Mainline Project spanning central and eastern Ontario. Project is ongoing.

Trans Canada Pipelines Vaughan Mainline Extension
Vaughan, Ontario, Canada

Senior Ecologist providing senior review and supporting field plan development, field surveys, impact assessment reporting, and permitting and agency consultation for the Vaughan Mainline Extension new gas pipeline in the City of Vaughan. Project is scheduled for construction starting in 2016.

PROJECT EXPERIENCE – TRANSPORTATION AND RAIL (SELECTIVE)

Ministry of Transportation - Highway 401 Widening
Cobourg, Ontario, Canada

Lead Ecologist and Fisheries Assessment Specialist responsible for ensuring project compliance with the Ministry's approved Environmental Assessment, completion of aquatic and terrestrial background studies in accordance with MTO guidelines, agency consultation and project permitting under the Canadian Fisheries Act (MTO-DFO Protocol), and Ontario Endangered Species Act (American eel).

Ministry of Transportation - Highway 26 New Bridge at the Crowe River
Bancroft, Ontario, Canada

Senior Ecologist responsible for the development of a fisheries compensation and restoration plan, agency consultation and negotiation and overall project permitting under the Canadian Fisheries Act.

Bloomington Road Widening Environmental Assessment, York Region
Aurora, Ontario, Canada

Senior, lead ecologist for the permitting and approvals for the realignment and widening of Bloomington Side road between Yonge Street and Highway 404, in the Town of Aurora. This project involved working sensitive Provincially Significant Wetland areas, endangered species and aquatic ecology enhancement.

Toronto York Spadina Subway Extension Construction/Tunnelling Environmental Management Plan
Toronto, Ontario, Canada

Senior Ecologist and lead Aquatic Specialist responsible for assessment of impacts associated with subway tunnelling, dewatering and discharge, development of offsetting mitigation and preparation of relevant components of the system wide Environmental Management Plan (EMP). Duties included agency consultation, negotiation and approval of project mitigation and the development of communication protocols for emergency environmental response.

PROJECT EXPERIENCE – WATER AND WASTEWATER SERVICING (SELECTIVE)

Region of Peel – East West Trunk Sewer Class EA (2014 ongoing)
Mississauga, Ontario, Canada

Environmental lead for a large scale municipal Class EA for the new construction of an 11 km east-west 1500 mm diameter trunk sewer, north of Highway 401, City of Mississauga. The project has many ecological challenges associated with protection of natural environmental features along Levi Creek, Credit River and involves coordination of environmental requirements of both the Toronto and Region and Credit Valley Conservation Authorities.

Region of Peel – South-West Mississauga Water/Wastewater Upgrades Class EA
Mississauga, Ontario, Canada

Environmental lead for a large scale municipal Class EA for the new construction of a1500 mm diameter trunk sewer crossing of the Credit River and various improvements and upgrades to existing water and wastewater infrastructure in the City of Mississauga. The project has many ecological challenges associated with protection of natural environmental features along the Credit River and the conservation of urban treescapes along established road right of ways, parklands and natural areas. The project involves liaison with the Credit Valley Conservation Authorities.

Halton Region Water and Wastewater Master Plan
Halton Region, Ontario, Canada

Senior Ecologist responsible for the completion of natural sciences studies in support of a Master Plan for future water servicing and sewage recovery within Halton Region. Key responsibilities included synthesis of existing data, environmental management objectives and policies regarding environmental requirements relevant to the project and providing this information in the form of a baseline conditions report and preliminary impact assessment. Other responsibilities included coordination with hydrogeology disciplines regarding water taking impacts, QA/QC, client management and budget performance monitoring.

Niagara Region Water and Wastewater Master Plan
Niagara Region, Ontario, Canada

Senior Ecologist responsible for the completion of natural sciences studies in support of a Master Plan for future water servicing and sewage recovery within Niagara Region. Key responsibilities included synthesis of existing data, management objectives and policies regarding environmental requirements relevant to the project and providing this information in the form of a baseline conditions report and preliminary impact assessment.

Bolton Elevated Tank and Feedermain
Bolton, Ontario, Canada

Senior Ecologist responsible for natural sciences studies in support of the completion of a Class Environmental Assessment for the construction of a new water delivery and sewer recovery system in the north Bolton area.
Key responsibilities included development of field methodologies for collecting relevant aquatic and terrestrial information, synthesis of field data into a baseline conditions report and preliminary impact assessment, consultation with agencies with respect to impacts and mitigation and the preparation of relevant inputs to the overall project Environmental Study Report. Other responsibilities included QA/QC, client management and budget performance monitoring.

PROJECT EXPERIENCE – ENVIRONMENTAL EFFECTS MONITORING (SELECTIVE)

Placer Dome Campbell Mine Walleye Environmental Effects Monitoring
Ontario, Canada

Senior fisheries biologist and project manager responsible for the assessment of the effects of mine effluent discharge on Walleye populations within Red Lake. Core responsibilities included the development and agency approval of a detailed fisheries study to document migratory patterns, spawning locations and activities and overall population health for Red Lake. A specific focus of this study was the characterization of the effluent discharge plume and impacts on noted biological indicators.

Voisey Bay Developments Fisheries Impact and Migration Study
Nain, Newfoundland and Labrador, Canada

Senior fisheries biologist involved in the assessment of mining operations, including exploration, processing and shipping on resident and migratory Arctic charr populations within Voisey's Bay and along coastal inlets. Key responsibilities included the collection of migratory, residency and morphological data from sampled fish at identified locations and as assessment of possible impacts to these populations based on current mining practices and operations.

International Paper Mill Environmental Effects Monitoring
Thunder Bay, Ontario, Canada

Lead fisheries scientist and project manager for the assessment of thermal discharge effects on northern pike populations within thermal effluent discharge plume. Key responsibilities included the development of methodologies to identify where thermal effects are occurring, including migratory patterns, plume residency and long term survival following prolonged exposure of northern pike to heated discharge water.

PROJECT EXPERIENCE – FIRST NATIONS CONSULTATION AND MENTORING (SELECTIVE)

Conne River Salmon Migration Study Neah Bay, Washington, United States	Senior consulting biologist to Mi'kwaq First Nation for the development of a fisheries telemetry program to monitor Atlantic salmon migration patterns within Conne River and traditional native lands. Key responsibilities included First Nations Consultation, scientific study development and support as well as fisheries and telemetry training and mentoring.
Lake Ozette Salmonid Habitat Study Neah Bay, Washington, United States	Senior consulting biologist to Makah First Nation for the development of a fisheries telemetry program to monitor salmonid activity within Lake Ozette and the Waatch River. Key responsibilities included First Nations Consultation, scientific study development and support as well as fisheries and telemetry training and mentoring.
Wenatchee River Salmonid Migration Monitoring Program Leavenworth, Washington, United States	Senior consulting biologist to Yakima First Nation for the development of a fisheries telemetry program to monitor salmonid activity within the Wenatchee River. Key responsibilities included First Nations Consultation, scientific study development and support as well as fisheries and telemetry training and mentoring.
Port of Seattle Fisheries Assessment Puyallup, Washington, Canada	Senior consulting biologist to Puyallup First Nation for the development of a fisheries telemetry program to monitor salmonid activity within Puyallup Nation Territory and broader study area within the port. Key responsibilities included First Nations Consultation, scientific study development and support as well as fisheries and telemetry training and mentoring.

TRAINING

Golder Health and Safety Modules

Workplace Hazardous Information System (WHMIS)
Golder, July 2011

SUPPLEMENTAL SKILLS

Radio and Acoustic Wildlife Telemetry
Extensive experience in the monitoring of fish and wildlife using a variety of telemetry techniques; including study design and statistics, equipment specification, surgical and non-surgical transmitter attachment methods, remote data-logging and ground and airborne manual tracking.

PROFESSIONAL AFFILIATIONS

Atlantic Salmon Federation

American Fisheries Society

PUBLICATIONS

Refereed Journal Articles

Booth, R.K., J.D. Kieffer, K. Davidson, A. Biella and B.L. Tufts. Effects of late season catch and release angling on anaerobic metabolism, acid-base status, survival and gamete viability in wild Atlantic salmon. *Canadian Journal of Fisheries and Aquatic Sciences*, 52 (1995), 283-290.

Booth, R.K. and C.J. Bridger. Monitoring fish behaviour with a remote, combined acoustic and radio telemetry system. *Journal of Applied Ichthyology*, 17 (2001), 126-129.

Booth, R.K., E.B. Bombardier, R.S. McKinley, D.A. Scruton and R.F. Gooney. Swimming performance of post spawning adult (kilt) and juvenile (smelt) Atlantic salmon. *Canadian Manuscript Report of Fisheries and Aquatic Sciences*, 2406 (1997), 1-22.

Booth, R.K., R.S. McKinley and J. Galantine. Plasma non-esterified fatty acid profiles in Atlantic salmon during their freshwater migration and spawning. *Journal of Fish Biology*, 55 (1999), 260-273.

Scruton, D. A., R.K. Booth, C. J. Pennell, F. Cubitt, R. S. McKinley and K. D. Clarke. Conventional and EMG telemetry studies of upstream migration and tailrace attraction of adult Atlantic salmon at a hydroelectric installation on the Exploits River, Newfoundland, Canada. Hydrobiologia., 582 (2007), 67-99.

Scruton, D. A., C. J. Pennell, C. E. Bourgeois, R. F. Goosney, L. King, R. K. Booth, W. Eddy, T. R. Porter, L. M. Ollerhead and K. D. Clarke. Hydroelectricity and fish: a synopsis of comprehensive studies of upstream and downstream passage of anadromous wild Atlantic salmon, Salmo salar, on the Exploits River, Canada Hydrobiologia., 609, (1) (2008), 225-239.

Scruton, D.A., R. S. Mckinley, N. Kouwen, W Eddy and R.K. Booth. Improvement and optimization of fish guidance efficiency (FGE) at a behavioural fish protection system for downstream migrating Atlantic salmon (Salmo salar) smolts. River res. Applic., 19 (2003), 605–617.

Scruton, D. A., C. J. Pennell, C. E. Bourgeois, R. F. Goosney and R.K. Booth. Assessment of a retrofitted downstream fish bypass system for wild Atlantic salmon (Salmo salar) smolts and kelts at a hydroelectric facility on the Exploits River, Newfoundland, Canada. Hydrobiologia, 582 (2007), 155-169.

Scruton, D.A., R. S. Mckinley, N. Kouwen, W. Eddy and R. K. Booth. Use of telemetry and hydraulic modelling to evaluate and improve fish guidance efficiency (FGE) at a louver and bypass system for downstream migrating Atlantic salmon (Salmo salar) smolts and kelts. In Proceedings of the Fourth Conference on Fish Telemetry in Europe, Thorstad E, Fleming IA, Naesje T (eds). Hydrobiologia., 483 (2002), 83–94.

Enders, E.C., C. J. Pennell, R.K. Booth and D.A. Scruton. Energetics Related to Upstream Migration of Atlantic Salmon in Vertical Slot Fishways. Canadian Technical Report of Fisheries and Aquatic Sciences No. 2800 (2008)

Doucette, R.R., R.K. Booth and G. Power. Effects of spawning migration on the nutritional status of anadromous Atlantic salmon: insights from stable isotope analysis. *Canadian Journal of Fisheries and Aquatic Sciences*, 56 (1999), 2171 2180.

Bridger, C.J and R.K. Booth. The effects of Biotelemetry transmitter presence and attachment procedures on fish physiology and behaviour. *Reviews in Fisheries Science*, 11(1) (2001), 13-34.

Bridger, C.J. and R.K. Booth. Site fidelity and dispersal patterns of domestic triploid steelhead trout released to the wild. *ICES Journal of Marine Science*, 58 (2001), 510-516.

McKinley, R.S., D.A. Scruton and R.K. Booth. Use of Radio Telemetry for Assessing the migratory patterns of downstream migrating Atlantic salmon smolts. *Hydro Review* (August 2002), 13-34.

Booth, Richard. Measurement of red muscle activity and oxygen consumption in wild Atlantic salmon using radio transmitted EMG signals. Biotelemetry XIII, 07. Williamsburg, VA, United States. (1996)

Muscle physiology of Atlantic salmon determined by electromyogram radio telemetry. 1997. Norwegian Institute for Nature Research Project Report. No. 002.

Evaluation of swimming capability and potential velocity barrier problems for fish Part A: Swimming performance of selected warm and cold water fish species relative to fishway design and passage. *Canadian Electricity Association Technical Publication Series No.9236* (1998), 62pp.

Evaluation of swimming capability and potential velocity barrier problems for fish Part B: New telemetric approaches to the assessment of fish swimming performance. *Canadian Electricity Association Technical Publication Series No.9237* (1998), 48pp.

Refereed Conference Proceedings

Booth, Richard. 1996. *Measurement of red muscle activity and oxygen consumption in wild Atlantic salmon using radio transmitted EMG signals*. Biotelemetry XIII, 07. Williamsburg, VA, United States.

Other

Muscle physiology of Atlantic salmon determined by electromyogram radio telemetry. 1997. Norwegian Institute for Nature Research Project Report. No. 002.

Evaluation of swimming capability and potential velocity barrier problems for fish Part A: Swimming performance of selected warm and cold water fish species relative to fishway design and passage. 1998. Canadian Electricity Association Technical Publication Series No.9236, 62pp.

Evaluation of swimming capability and potential velocity barrier problems for fish Part B: New telemetric approaches to the assessment of fish swimming performance. 1998. Canadian Electricity Association Technical Publication Series No.9237, 48pp.

As a global, employee-owned organisation with over 50 years of experience, Golder Associates is driven by our purpose to engineer earth's development while preserving earth's integrity. We deliver solutions that help our clients achieve their sustainable development goals by providing a wide range of independent consulting, design and construction services in our specialist areas of earth, environment and energy.

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