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Environmental Impact Statement
Proposed Plan of Subdivision
Part of Lots 3 and 4, Concession 3
Township of Osgoode
City of Ottawa

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Submitted to:

9287043 Canada Corporation
1705 Old Prescott Road
Greely, Ontario
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Proposed Plan of Subdivision
Part of Lots 3 and 4, Concession 3
Township of Osgoode
City of Ottawa

July 20, 2021
Project: 100484.001 - V01

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1.0 INTRODUCTION

GEMTEC Consulting Engineers and Scientists Limited (GEMTEC) was retained by 9287043 Canada Corporation to carry out an Environmental Impact Statement (EIS) in support of the development of a subdivision, for the property located on Part of Lot 3 and Part of Lot 4, Concession 3, Osgoode Township, City of Ottawa (hereafter referred to as "the subject property"). The general location of the subject property is illustrated on Figure 1.

1.1 Purpose

The proponent is seeking to develop an approximately 35-hectare (ha) property into a 73-lot residential subdivision within the Village of Greely. Based on Section 4 of the City of Ottawa Official Plan (Ottawa, 2003), an EIS is required showing that the proposed plan of subdivision will not negatively impact any potential natural heritage features which may be present within the study area. The study area is defined as the property boundary and the adjacent lands encompassing an area of 120 m beyond the property boundary. The subject property and the extents of the study area are illustrated on Figure 2.

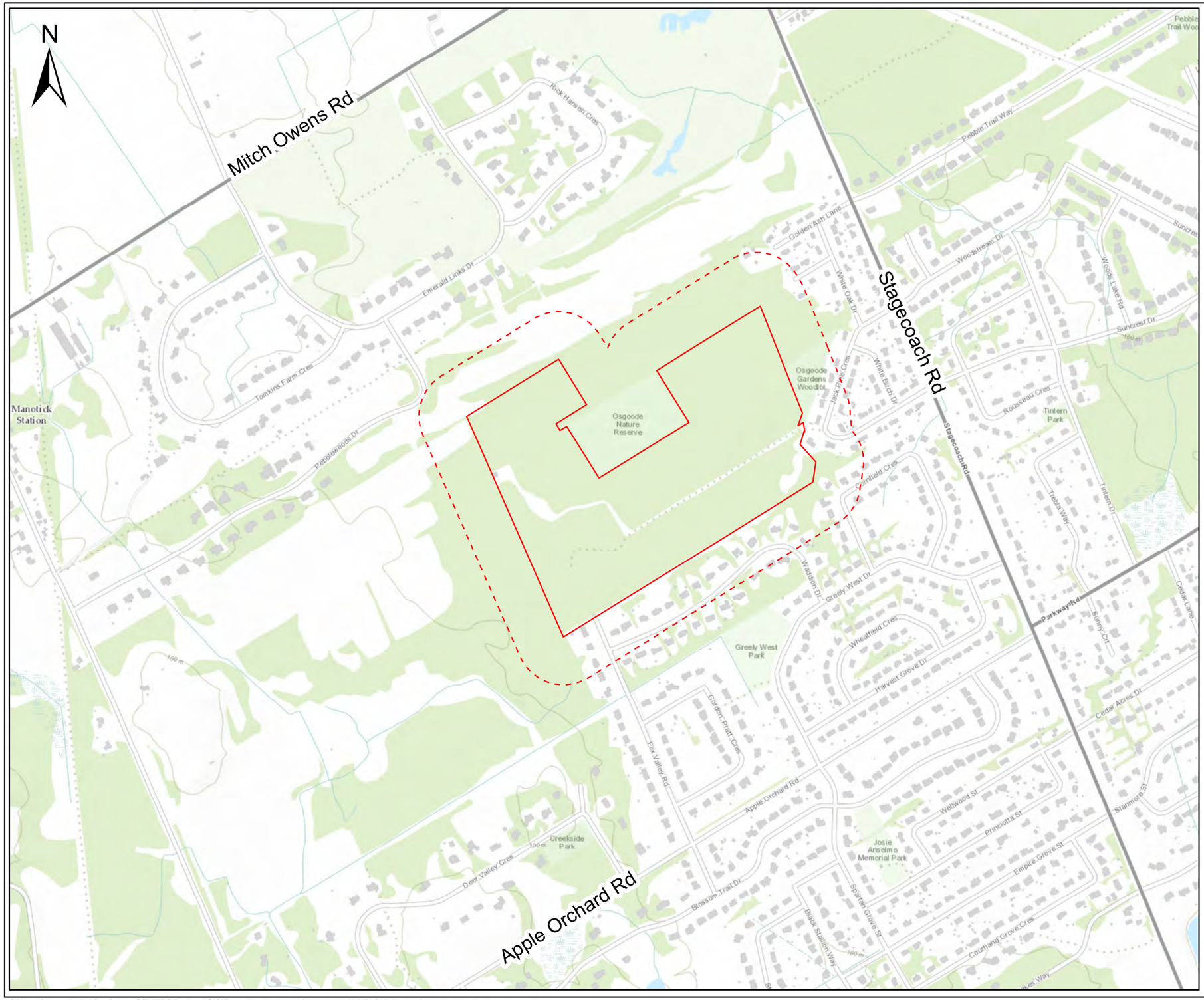
1.2 Objective

The 2020 Provincial Policy Statement (MMAH, 2020) issued under Section 3 of the Planning Act states that "development and site alteration shall not be permitted in: habitats of species at risk, significant wetlands, significant woodlands and significant wildlife habitat unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions." Similarly, the 2020 Provincial Policy Statement dictates that "development and site alteration shall not be permitted in fish habitat except in accordance with provincial and federal requirements."

The objective of the work presented herein is twofold; 1) to identify and evaluate the significance of any natural heritage features, as defined in the Provincial Policy Statement (MMAH, 2020), on the subject property and within the broader study area and; 2) to assess the potential impacts from the proposed development on any natural heritage features identified and to recommended appropriate and defensible mitigation measures to ensure the long-term protection of any natural heritage features identified.

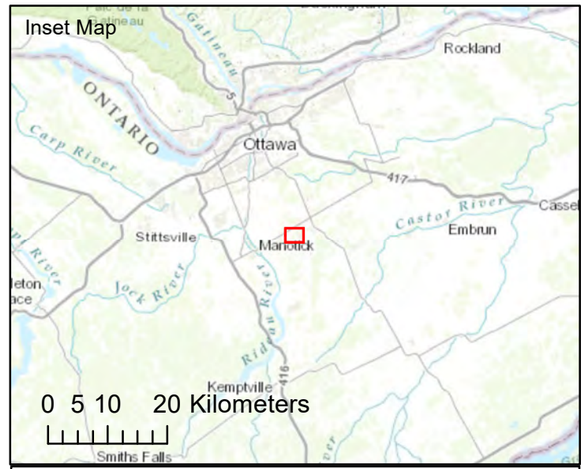
To meet these objectives, the EIS presented herein has been completed in accordance with the following federal, provincial and municipal policies and guidelines:

- Provincial Policy Statement (MMAH, 2020);
- Endangered Species Act (Ontario, 2007);
- Conservation Authorities Act (Ontario, 1990);
- Natural Heritage Reference Manual (OMNR, 2010);
- City of Ottawa Official Plan (Ottawa, 2003); and
- Environmental Impact Statement Guidelines (Ottawa, 2012).



Legend

- Property Boundary
- Study Area



Scale
1:10,000
0 70 140 280 420 560 Meters

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Client:	Project:
9287043 Canada Corporation	100484.001

Location
Part of Lots 3 & 4, Concession 3, Osgoode
Ottawa, Ontario

Drwn By:	Chkd By:	
JD	DP	Site Location

Date: July 2021	Rev.	
	0	Figure 1

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Coordinate System: NAD 1983 UTM Zone 18N
Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Legend

- Property Boundary
- Study Area
- Property Parcels
- Local Wetland

Scale
1:5,000

0 50 100 200 300 400 Meters

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Project: 100484.001

Location: Part of Lots 3 & 4, Concession 3, Osgoode
Ottawa, Ontario

Drwn By: JD | Chkd By: DP | Site Layout

Date: July 2021

Rev. 0

Figure 2

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Coordinate System: NAD 1983 UTM Zone 18N
Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

1.3 Physical Setting

The subject site is comprised of eight distinct land parcels including a shared right-of-way located on part of Lots 3 and 4, Concession 3, in the Geographic Township of Osgoode, City of Ottawa. The site and surrounding lands form a portion of the Greely West Natural Area and Shields Creek Sub-watershed Study that are mapped over the majority of the subject property and surrounding lands.

The subject site is bound to the north by a portion of the Emerald Links Golf Course, and three vacant land parcels of Lot 3, Concession 3 which are not owned by the proponent. One of the vacant land parcels to the north of the subject property is a 4 ha City owned block, municipally addressed as 5800 Silver Maple Lane that is zoned environmental protection (EP3). To the south, the subject site is bound by the rear and/or side yards of residences located on Fox Valley Road, Waddion Drive and Cornfield Crescent. To the east, the site is adjacent a city owned undeveloped parkland block, a vacant land parcels not owned by the proponent, and the rear yard of one residence located on Jack Pine Crescent. To the west, the site is bound by multiple undeveloped lots fronting to Green Links Way and Green Jacket Crescent, and the vacant lands of Lot 4, Concession 3, known locally as the 'UPI Lands'.

In the south-east corner of the site, the Greely Loop (pathway) transits the property from Jack Pine Crescent, 200 m west to connect with Waddion Drive.

1.4 Land Use Context

The subject site is situated within the larger residential development area, inside the Village of Greely boundaries.

The existing land use designation from the City of Ottawa OP is '*Village',* while the zoning by-law for the subject site is *development reserve* (DR1). The subject site is also identified on Schedule L2 of the City of Ottawa OP as captured within the City's *natural heritage system features overlay.* and portions are illustrated on the Schedule A of the Village of Greely Community Design Plan as *Ecological Function/Feature overlay*. The subject site is also within the boundaries of the Shields Creek Subwatershed Study.

2.0 METHODOLOGY

2.1 Desktop Review

A desktop information gathering exercise was completed to aid in the scoping of field investigations and to gather information relating to natural heritage features which may be present on the subject project or within 1 km of the subject property. An additional component of the desktop review was to assess the potential presence of SAR to occur on the subject property or within the study boundary based on a review of publicly accessible occurrence records, and review of SAR habitat requirements and range maps.

Information regarding the potential presence of natural heritage features and SAR within the vicinity of the site was obtained from the following sources:

- Make A Map: Natural Heritage Areas (OMNRF, 2014a);
- Land Information Ontario (OMNR, 2011b);
- City of Ottawa Official Plan (Ottawa, 2003);
- Region of Ottawa-Carleton's Natural Environment System Strategy (Brownell and Larson, 1997);
- Ontario Geological Survey (OGS, 2019);
- Breeding Bird Atlas of Ontario (Cadman et al., 2007)
- Atlas of Mammals of Ontario (Dobbyn, 1994);
- Ontario Herpetofaunal Atlas (Oldham and Weller, 2000);
- Ontario Reptile and Amphibian Atlas (Ontario Nature, 2020); and
- Species at Risk in Ottawa (Ottawa, 2021).

2.2 Field Investigations

Field investigations were undertaken to describe in general, the natural and physical setting of the subject property with a focus on natural heritage features and to identify any potential SAR or their habitat that may exist on-site.

Field investigations completed in support of this EIS are outlined in Table 2.1 below. Photographs of site features taken during field investigations are provided in Appendix A.

Table 2-1 Summary of Field Investigations

Date	Time	Surveyor	Weather	Purpose
April 8, 2021	09:00-13:30	DP/JD	19°C, ~20% cloud cover, Beaufort 1, no precipitation	Headwater Drainage Feature Assessment
April 12, 2021	20:30-22:15	DP	14°C, ~80% cloud cover, Beaufort 3, no precipitation	Amphibian Breeding Survey
April 21, 2021	08:00-14:00	TW	12°C, Beaufort 0, overcast, light snow	Snag Survey, Ecological Land Classification
May 13, 2021	09:30-13:00	TW/JD/DP	8°C, ~0% cloud cover, Beaufort 1, no precipitation	Headwater Drainage Feature Assessment, Ecological Land Classification
May 17, 2021	21:15-22:30	AA/JD	20°C, ~25% cloud cover, Beaufort 2, no precipitation	Amphibian Breeding Survey
May 31, 2021	07:30-08:15	AA	9°C, ~10% cloud cover, Beaufort 0, no precipitation	Breeding Bird Survey and Ecological Land Classification
May 31, 2021	16:30-18:30	DP	24°C, ~0% cloud cover, Beaufort 3, no precipitation	Headwater Drainage Feature Assessment
June 16, 2021	07:30-09:30	AA, EY	11°C, ~0% cloud cover, Beaufort 1, no precipitation	Breeding Bird Survey
June 25, 2021	07:30-09:00	EY	19°C, ~70% cloud cover, Beaufort 3, no precipitation	Breeding Bird Survey
June 28, 2021	06:15-07:30	JD	23°C, ~60% cloud cover, Beaufort 1, no precipitation	Breeding Bird Survey
July 6, 2021	21:15-22:15	JD/EY	27°C, ~10% cloud cover, Beaufort 1, no precipitation	Amphibian Breeding Survey

2.2.1 Ecological Land Classification

Vegetation communities on the subject property were delineated during the desktop review stage of this EIS using publicly available air photos, previous site specific investigations (Muncaster, 2011) and confirmed in the field on April 21, May 13 and May 31, 2020, following the Ecological Land Classification System for Southern Ontario (Lee et al., 2008). Vegetation communities were confirmed in the field by employing the random meander methodology while documenting dominant vegetation species within the various vegetation community forms.

2.2.2 Bat Maternity Roost Surveys

Potential bat maternity roosting sites were surveyed for in each forested ecosite on-site on April 21, 2021, following the protocol for identifying candidate maternity roosts outlined in the MNRF (2011a) Bats and Bat Habitats: Guidelines for Wind Power Projects.

2.2.3 Breeding Bird Surveys

Breeding bird surveys were conducted on three occasions at five point count locations; breeding bird survey locations are provided on Figure 3. Breeding bird surveys followed protocols from the Canadian Breeding Bird Surveys (Downes and Collins, 2003) and the Ontario Breeding Bird Atlas (Cadman et al., 2007). Surveys were conducted no earlier than 30 minutes before sunrise and were completed within 5 hours of sunrise, to encompass peak song bird activity. Breeding bird surveys consisted of 5 minutes of passive listening in which all birds heard or seen within the survey period were recorded, including species, sex and breeding behaviour, if possible. A list of all avian species identified on-site is provided in Appendix B.1.

2.2.4 Breeding Amphibian Surveys

Breeding amphibian surveys were conducted on three occasions at four point count locations; breeding amphibian survey locations are provided on Figure 3. Breeding amphibian surveys followed protocols from the Ontario Marsh Monitoring Protocol (Bird Studies Canada, 2008). Surveys began when evening air temperatures were above 10°C and were conducted no earlier than 30 minutes before sunset and were completed by midnight. Breeding amphibian surveys consisted of 3 minutes of passive listening in which all amphibians heard or seen within the survey period were recorded, including species, sex and breeding behaviour, if possible. A list of all amphibian species identified on-site is provided in Appendix B.1.

2.2.5 Head Water Drainage Feature Assessment

A headwater drainage feature assessment (HDFA) was conducted to aid in the assessment of potential impacts to downstream aquatic habitats. Field data collection of headwater drainage features on-site followed the protocol outlined in Section 4: Module 11, “Unconstrained Headwater Sampling” from the Ontario Stream Assessment Protocol (Stanfield, 2017). Evaluated Headwater Drainage Features (HDFs) are illustrated on Figure 3.

2.3 Data Analysis

An evaluation of the significance of natural heritage features, the sensitivity of identified flora and fauna and the potential impacts posed by the proposed development was undertaken through an analysis of desktop and field investigation data using the approaches and criteria outlined in the following documents:

- Natural Heritage Reference Manual (OMNR, 2010);
- Significant Wildlife Habitat Technical Guide (OMNR, 2000);
- Significant Wildlife Habitat Ecoregion Criterion Schedules (OMNRF, 2015);
- Significant Wildlife Habitat Mitigation Support Tool (OMNRF, 2014b); and
- Evaluation, Classification and Management of Headwater Drainage Features Guidelines (CVC/TRCA, 2014)

Legend

- Property Boundary
- Study Area
- Headwater Drainage Feature Assessment
- Local Wetland
- Amphibian Breeding Survey (100 m radius)
- Breeding Bird Survey (100 m radius)
- Bat Maternity Roosting Survey (12.6 m radius)

Scale
1:5,000

0 50 100 200 300 400 Meters

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Ottawa, Ontario

Drwn By:	Chkd By:	Survey Locations
JD	DP	

Date: July 2021	Rev.	Figure 3
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Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

3.0 EXISTING ENVIRONMENT

3.1 Study Area Land Use

Figure 4 below provides an illustration of the temporal changes in land use within the study area from 1976, 1999, 2008 and 2019 aerial imagery from GeoOttawa.

As visible in the 1976 air photo, the subject site is predominantly vegetated with the exception of the southern portion of the site where early road construction activities are visible. Other notable aspects include the undeveloped nature of the Greely community relative to the 1999 and later air photos, and the extents of the agricultural fields, which cover the entirety of properties located north and west of the site.

By 1999, the village of Greely had grown considerably, specifically the areas east and south of the study area. Land use to the north and west had also begun to shift from agricultural towards low density residential developments as well as the development of a golf course immediately north of the subject site.

By 2008, intensification of the surrounding area to the north, east and south of the subject property continued including further residential development within the Village of Greely and the expansion of the golf course immediately north of the subject site. Between 2008 and 2019, there were no notable changes in land use in the vicinity of the study area.

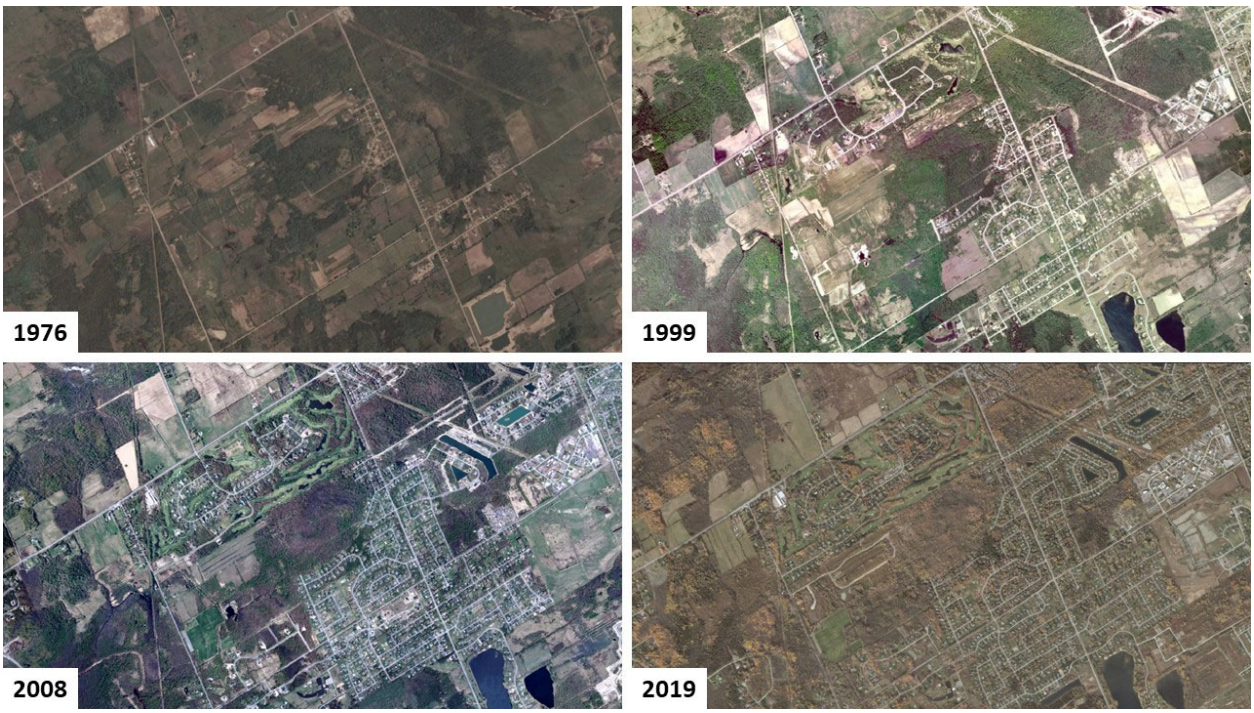

Figure 4 – Temporal Changes in Land Use within Study Area

It should be noted that since 2019, a new residential subdivision development has begun to the west of the subject site. Currently, with the exception of the approximately 200 m long property boundary shared between the subject site and the UPI Lands to the southwest, the entire subject site is surrounded by residential developments which comprise the Village of Greely.

3.1.1 Greely West Natural Area

As outlined in Section 1.3, the study area is located within the Greely West Natural Area polygon, identified as Area 17 in the Region of Ottawa-Carleton's Natural Environment System Strategy (Brownell and Larson, 1997).

The approximately 350 ha natural area was broadly designated to have a high overall significance in the evaluation summary performed as part of the Region of Ottawa-Carleton's Natural Environment System Strategy. The Greely West Natural Area is described by Brownell and Larson (1997) as primarily containing young to intermediate-aged poplar and white birch upland forests on acidic sand with approximately 23% (80 hectares) of thicket swamp and poplar swamp present. Site summary notes that the natural area has a low interior size relative to its total size due to its irregular shape.

The Natural Area scored high for the endangered, threatened and rare species, rare vegetation community/landform representation and species diversity criteria, and moderate for the hydrological features and landscape attributes criteria. No score was assigned to the seasonal wildlife concentrations criteria. Large scale movement corridor or linkages were not considered present. Species diversity was considered to have a high significance.

Note that in the 24-years since the Natural Environment System Strategy was undertaken, the lands containing the Greely West Natural Area have been re-designated *Village* under the City of Ottawa OP. The subject lands have been included in the settlement area for the village since the 1991. Further, the majority of the Natural Area between Old Prescott and Stagecoach Roads have been developed as Village residential, consistent with the temporal changes in land summarized in Section 3.1 above.

3.1.2 Shields Creek Sub-watershed Study

The Shields Creek Sub-watershed Study (Ottawa, 2004) was completed to provide, in part, to provide initial guidance on approaches required to protect and restore environmental values within the Shields Creek watershed. The Shields Creek watershed encompasses an area of approximately 6, 620 ha surrounding the Village of Greely.

The subject site is identified in the Shields Creek Sub-watershed Study as 'Greely West, area 17", and is identified within the study as a *highly significant natural area*. It should be noted that a significant portion of the Village of Greely located between Stagecoach Road east to Old Prescott Road north to Mitch Owens Road is also identified as a *highly significant natural area* and has

since been fully developed into residential subdivisions with a few remnant forest segments remaining.

Of particular relevance to this EIS are the sections of the Shields Creek Sub-watershed Study pertaining to impact analysis and management requirements for the Greely West area. The City of Ottawa parcel within the study area, including the adjacent periphery of lands owned by the applicant have been identified as *Level 2A* indicating *areas of significant ecological features and functions* while the remainder of the subject site has been identified as *Level 2B* indicating *areas of significant ecological functions.*

According to table 6.2.3 of the Shields Creek Sub-watershed Study, the rationale for protection *Level 2A* and *Level 2B* is the presence of rural natural features (i.e., significant woodlands), interior forest habitat, headwater region for Shields Creek and Mosquito Creek and partial corridor linkages between Shields Creek and Mosquito Creek. The key features and/or functions to be protected and/or enhanced, according to Table 6.2.3 include hydrogeological functions, canopy cover for watercourses, wildlife habitat including corridor linkages and interior forest habitat.

3.2 Ecoregion

The site is situated Ecoregion 6E-12 (Lake Simcoe-Rideau), which extends from Lake Huron in the west to the Ottawa River in the east. The climate of Ecoregion 6E is categorized as humid, high to moderate temperate ecoclimate with a mean annual temperature range between 4.9°C to 7.8°C and an annual precipitation ranging between 759 mm to 1,087 mm (Crins et al., 2009).

The eastern portion of the Ecoregion, which the subject property is located, is underlain by glaciomarine deposits as a result of the brief post-glacial incursion of salt water from the Champlain Sean along the St. Lawrence Valley. This Ecoregion falls with Rowe's (1972) Great Lakes-St. Lawrence Forest Region, including its Huron-Ontario and Upper St. Lawrence sections, and a small part of the Middle Ottawa Forest section (Crins et al., 2009).

3.3 Landforms, Soils and Bedrock Geology

The topography of the site relatively flat with the exception of a pronounced topographical high (~105 mASL) located in the eastern portion of the site. Topography at the site generally slopes from east to west, from the previously mentioned topographical high to a topographical low (~101 mASL) in the southwest corner of the site.

A single physiographical landform, as mapped by Chapman and Putnam (1984) is described on site; sand plains of the Russell and Prescott Sand Plains physiographic region.

Geological information obtained from the Ontario Geological Survey (OGS, 2019) during the desktop review identifies three surficial soil units on the subject property: till, organic deposits and coarse-textured glaciomarine deposits. Course-textured glaciomarine deposits consisting of sand, gravel, minor silt and clay originating from foreshore and basinal deposits, are found

throughout the majority of the site, primarily occurring in a band from the northeast to southwest of the property. Organic deposits consisting of peat, muck and marl are only found in along the northern edge of the property. Till, consisting of stone-poor, sandy silt to silty sand on Paleozoic terrain, occurs in small pockets along the east, south and west edges of the property. Bedrock at the site, as mapped by the Ontario Geological Survey (OGS, 2019), is comprised of the Beekmantown Group, consisting of dolostone and sandstone.

Site specific geological conditions, as presented in the geotechnical investigation undertaken in support of the project (GEMTEC, 2021c) indicates that the site is generally underlain by 0.005 to 0.015 m of topsoil which is in turn underlain by native deposits of silty sand to sand with some silt and trace gravel. Deposits of silty sand were further underlain by clayey silt ranging in thickness from 0.9 to 1.2 m which overlies glacial till. During advancement of hydrogeological test wells, bedrock was encountered between 5.3 and 8.8 mBGS.

3.4 Surface Water, Groundwater and Fish Habitat

No permanent surface water features were identified on-site during the desktop review or site investigations. Surface water features on-site consist of ephemeral HDFs and two local wetlands in the central and northeast portions of the subject property. No other surface water features were identified on-site during the desktop review or during any of the site investigations.

Through completion of the HDFA, ephemeral surface water features and associated wetlands were confirmed not to provide fish habitat as evidenced by the absence of fish during site investigations. It is assumed that the absence of fish habitat is primarily a result of shallow depths, short hydroperiod and lack of permanency and connectivity.

Groundwater investigations were completed in support of the plan of subdivision application and are detailed in the Hydrogeological Investigation & Terrain Analysis dated June 30, 2021 (GEMTEC, 2021b).

3.4.1 Headwater Drainage Feature Assessment

A headwater drainage feature assessment (GEMTEC, 2021a) was conducted for all identified ephemeral watercourses on-site. It should be noted that all seven HDFs identified on-site are of anthropogenic origins, having been excavated to facilitate seasonal drainage. The headwater drainage features are labelled as H1 through H7 and are illustrated on Figure 3.

The topographical depression of H1 originates within a Fresh-Moist Poplar Deciduous Forest (FOD8-1 on Figure 5) and grades downwards in a west direction for approximately 70 m where it confluences with H2.

The topographical depression of H2 originates at the confluence of H1 within the Fresh-Moist Poplar Deciduous Forest (FOD8-1) and grades downwards in a northern direction for approximately 250 m, where is confluences with both H3 and H4 before it discharges into H5.

H3 originates within the Dry-Fresh Sugar Maple Deciduous Forest (FOD5) and flows in a west direction for 48 m before it confluences with H2.

H4 originates within the Dry-Fresh Sugar Maple Deciduous (FOD5) and flows in a west direction for 183 m before it confluences with H2.

H5 originates out of the swamp communities (SWD3-1 and SWT12-13) in the northwest corner of the study area and flows in a west direction through the Dry-Fresh Sugar Maple Forest (FOD5) and cultural meadow (CUM) before exiting the site. Offsite, H5 connects to the roadside ditch drainage network of the approved subdivision located immediately adjacent to the western site boundary.

H6 is a multi-stemmed feature of anthropogenic origin, H6 originates within the Dry-Fresh Sugar Maple Deciduous Forest (FOD5) and the Maple Mineral Swamp (SWD3), the various stems of H6 have been separated through the use of consecutive alphabetic identifiers, and have been labelled H6A through H6D. Overall H6 flows for approximately 288 m in an overall north direction before it discharges into H5. H6A originates within the Maple Mineral Swamp (SWD3) and is the main feature of H6. H6B, H6C and H6D all originate within the Dry-Fresh Sugar Maple Deciduous Forest (FOD5), and confluence with the main channel of H6, which eventually drains into H5. It is clear that the multi-stemmed nature of H6 is the result of anthropogenic drainage efforts within this portion of the subject site, as evidenced by the excavation spoils adjacent to the feature(s).

H7 enters the subject property along the southeast property boundary, originating from the drainage network of Osgoode Garden subdivision to the east and flows for approximately 162 m before discharging into the Red Maple Deciduous Swamp (SWD3-1).

The evaluation, classification and management recommendations for each HDF, as derived from the Guidance Document (CVC/TRCA, 2014) are provided in the HDFA for the property in Appendix C.

3.5 Vegetation Communities

Vegetation communities on-site were confirmed by GEMTEC in 2021, following protocols utilized in the Southern Ontario Ecological Land Classification System (Lee et al., 2008). Vegetation at the site represents a mosaic of immature to semi-mature mixed hardwood forests, swamps and cultural meadows.

Table 3.1 below provides a summary of the various vegetation communities identified on-site while Figure 5 provides an illustration of the various vegetation communities.

Table 3-1 Vegetation Communities On-site

ELC Type	Description	Size (ha)
Dry-Fresh Oak-Maple-Hickory Deciduous Forest (FOD2)	This semi-mature vegetation community occurs atop the local topographical high in the central-east portion of the site. The dominant tree species present within this community is sugar maple. Lesser constituents included white pine, shagbark hickory, white ash and black cherry. The sparsely populated understory and herb layers were populated primarily by sugar maple saplings, sarsaparilla, bracken fern, common strawberry, Canada mayflower, starflower, false Solomon-seal, trout lily and white trillium.	1.6
Dry-Fresh Poplar Deciduous Forest (FOD3-1)	Occurring within the southeast portion of the site is a young poplar deciduous forest, primarily comprised of large-tooth aspen, trembling aspen and sugar maple. Less common constituents include red maple, black cherry, white birch, and green ash. The shrub and herb layers were predominately populated by saplings of the dominant tree species, sensitive fern, dwarf raspberry, Canada mayflower, Virginia creeper and goldenrods.	4.5
Dry-Fresh Sugar Maple Deciduous Forest (FOD5)	This community occurs over the majority of the subject site and is primarily comprised of sugar maple. Lesser constituents include red maple, green ash, large tooth aspen and black cherry. The shrub and herb layers were predominately populated by saplings of the dominant tree species, sensitive fern, dwarf raspberry, Canada mayflower, glossy buckthorn and beaked hazel.	13.4
Fresh-Moist Sugar Maple Deciduous Forest (FOD6)	Occurring along the south-central portion of the site, this sugar maple forest is similar to those above; however, the soil moisture regime trended towards a wetter site which is reflected in the herbaceous layer of the forest. The herb layer was comprised primarily of glossy buckthorn, sensitive fern, royal fern, dwarf raspberry, dogbane and enchanter's nightshade.	12.3
Fresh-Moist Poplar Deciduous Forest (FOD8-1)	Located within the southwest portion of the subject site is a large-tooth aspen dominated forest. Common less constituents included both red and sugar maple, green ash and black cherry. The shrub layer within this forest community was comprised of saplings of the dominate tree species as well as glossy buckthorn, Virginian creeper, dogbane and tartarin honeysuckle.	5.6
Fresh-Moist Oak-Maple Deciduous Forest (FOD9-2)	Surrounding a maple swamp, this moist red maple dominated forest comprises the majority of the centre of the subject site. The understory was comprised of glossy buckthorn, green alder, sensitive fern, royal fern and ostrich fern.	4.4
Cultural Meadow (CUM)	Two cultural meadows are present on the site; one in the northwest corner and one in the southeast corner. Both sites are representive	1.3

ELC Type	Description	Size (ha)
	of active human disturbance which have impacted upon the vegetation communities present. Mature tree species present are remnants of former tree cover and occur along the peripheries. The cultural meadow located in the northwest portion of the site is host to a large garden plot and recreational camp site.	
Maple Mineral Deciduous Swamp (SWD3)	This vegetation community is dominated by an almost equal mix of red maple and silver maple species and the occasional black ash. The herb layer was predominate absence due to prolonger inundation during and following the spring freshet. Species present include various hydrophilic sedges and forbs. Notable species included glossy buckthorn, narrow-leaved meadowsweet, jewelweed, royal fern, ostrich fern, sensitive fern amd water horehound.	0.7
Red Maple Mineral Deciduous Swamp (SWD3-1)	Similar to the vegetation community describe above, this vegetation community is dominated by red maple with green ash present but to a much lesser extent. The understory of this community is densely populated by green alder and to a lesser extent, glossy buckthorn.	5.8
Off-Site Vegetation Communities within Study Area		
Fresh-Moist White Cedar – Hardwood Mixed Forest (FOM7-2)	Occurring off-site, within the City of Ottawa parcel north of the subject site, is a mixed coniferous hardwood forest. Dominate tree species include eastern white cedar, red maple, sugar maple, silver maple and large-tooth aspen. The understory was predominately bare but included Canada mayflower, sensitive fern, royal fern and trout lily.	0.9
Non-native Mineral Deciduous Thicket Swamp (SWT-13)	Occurring along the western extents of the red maple swamp described above is a glossy buckthorn thicket swamp. This off-site vegetation community is comprised primarily by glossy buckthorn and to a lesser degree green alder and red maple saplings.	1.3

3.6 Wildlife

Wildlife observed on-site and within the study area during field investigations completed in 2021 are summarized in Table B.1 in Appendix B.

Legend

- Property Boundary
- Study Area
- Vegetation Community

FOD2 = Dry-Fresh Oak-Maple-Hickory Deciduous Forest
FOD3-1 = Dry-Fresh Poplar Deciduous Forest
FOD5 = Dry-Fresh Sugar Maple Deciduous Forest
FOD6 = Fresh-Moist Sugar Maple Deciduous Forest
FOM7-2 = Fresh-Moist White Cedar – Hardwood Mixed Forest
FOD8-1 = Fresh-Moist Poplar Deciduous Forest
FOD9-2 = Fresh-Moist Oak – Maple Deciduous Forest
CUM = Cultural Meadow
SWD3 = Maple Mineral Deciduous Swamp
SWD3-1 = Red Maple Mineral Deciduous Swamp
SWT2-13 = Non-native Mineral Deciduous Thicket Swamp

Scale
1:5,000
0 50 100 200 300 400 Meters

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Client: 9287043 Canada Corporation
Project: 100484.001

Location
Part of Lots 3 & 4, Concession 3, Osgoode
Ottawa, Ontario

Drwn By: JD
Chkd By: DP

Vegetation Communities

Date: July 2021

Rev. 0

Figure 5

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Coordinate System: NAD 1983 UTM Zone 18N
Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

4.0 NATURAL HERITAGE FEATURES

Natural heritage features are defined in the PPS 2020 as "features and areas, including *significant wetlands,… fish habitat, significant woodlands* and *significant valleylands…, habitat of endangered species and threatened species, significant wildlife habitat* and *significant areas of natural and scientific interest*, which are important for their environmental and social values as a legacy of the natural landscape of an area".

4.1 Significant Wetlands

As described in the Natural Heritage Reference Manual (OMNR, 2010), wetlands "mean lands that are seasonally or permanently covered by shallow water, as well as lands where the water table is close to or at the surface." In the PPS 2020, *significant* in regards to wetlands means "an area identified as provincially significant by the Ontario Ministry of Natural Resources and Forestry using evaluation procedures established by the Province, as amended from time to time."

No significant wetlands were identified on-site or within the study area during the desktop review or any of the site investigations. As no significant wetlands occur on-site or within the study area, significant wetlands are not evaluated or discussed further in this EIS.

Two local wetlands have been identified within the study area, a small 0.7 ha wetland in the central portion of the subject site and a larger 7 ha contiguous wetland in which a portion extends onto the northeast portion of the property from adjacent properties located to the north. Neither wetland has been evaluated under the provincial wetland evaluation system; however, based on professional experience and certification as an Ontario Wetland Evaluator, it is the EIS author's opinion that wetlands on-site would not provide unique features that would likely result in their designation as PSWs.

Impacts to local wetlands are discussed in Section 6 below.

4.2 Significant Woodlands

Significant woodlands are defined in the natural heritage reference manual (OMNR, 2010) as "an area which is ecologically important in terms of features such as species composition, age of trees and stand history; functionally important due to its contribution to the broader landscape because of its location, size or due to the amount of forest cover in the planning area; or economically important due to site quality, species composition, or past management history."

The subject site is located within the rural policy area of the City of Ottawa, as established in the City of Ottawa Significant Woodlands Guidelines (Ottawa, 2020b), rural policy area woodlands are to be assessed based on the criteria established in the Natural Heritage Reference Manual (NHRM). The subject site falls into the rural planning area of the Castor River Catchment, and as established in the City of Ottawa Significant Woodland Guidelines, the percent forest cover for this area is 27%. Therefore the minimum size criteria for significant woodlands in the Castor River

Catchment planning jurisdiction is 20 ha. Furthermore, the minimum size criteria for interior woodland habitat is 2 ha.

Vegetation communities within the subject site are consistent with regional forests descriptions provided in the Shields Creek Sub-watershed Study (Ottawa, 2004) in that forests are generally between 40 to 60 years in age and are represented by mixed forests of aspen, ash and maple, with occasional pockets of cedar dominated coniferous stands within larger deciduous or mixed forest stands. Similarly, as described in the Shields Creek Sub-watershed Study, upland climax forests are not present within the study area.

Table B.2 in Appendix B, presents the screening rationale for significant woodlands applied in this EIS. Based on the results of the significant woodland screening presented in Table B.2 significant woodlands are present on-site based on attributes including woodland size (91 ha), interior habitat (25 ha), proximity and linkages to other natural heritage features, and source water protection. Significant woodlands are illustrated on Figure 6 in relation to other site features. Impacts to significant woodlands from the proposed development are discussed in Section 6.

4.3 Significant Valleylands

Valleylands are defined in the natural heritage reference manual (OMNR, 2010) as 'a natural area that occurs in a valley or other landform depression that has water flowing through or standing for some period of time". The identification and evaluation of significant valleys lands in Ontario is based on the recommended criteria from the MNRF and is the responsibility of local planning authorities.

As discussed in Section 3.3, the subject site is relatively flat and no valleylands have been identified on-site, as such valleylands are not discussed or evaluated further in this EIS.

4.4 Significant Areas of Natural and Scientific Interest

The MNRF identifies two types of areas of natural and scientific interest (ANSI) in Ontario: life sciences ANSIs typically represent significant segments of Ontario's biodiversity and natural landscapes, while earth science ANSIs typically represent significant examples of bedrock, fossils or landforms in Ontario (OMNR, 2010).

No ANSI have been identified on-site or within the study area during the desktop review. Therefore, ANSI are not discussed or evaluated further in this EIS.

4.5 Significant Wildlife Habitat

The natural heritage reference manual (OMNR, 2010), in combination with the significant wildlife habitat technical guide (OMNR, 2000) and the significant wildlife habitat ecoregion criterion schedules (OMNRF, 2015) were used to identify and evaluated potential significant wildlife habitat on-site. Significant wildlife habitat is broadly categorized as habitats of seasonal concentration of

animals, rare vegetation communities, specialized habitats for wildlife, habitats of species of conservation concern and animal movement corridors. Table B.3, B.4, B.5 and B.6 in Appendix B, provide the screening rationale for each category of significant wildlife habitat, respectively.

4.5.1 Habitats of Seasonal Concentrations of Animals

Seasonal concentration areas are habitats where large numbers of species congregate at one particular time of the year. The significant wildlife habitat technical guides (OMNR, 2000) and significant wildlife habitat ecoregion criterion schedules (OMNRF, 2015) identify 11 types of seasonal concentration habitats that may be considered significant wildlife habitat. These 11 types of seasonal habitat are presented in Table B.3 in Appendix B, including a brief description of the rationale as to why or why they are not assessed further in this EIS.

Following review of Table B.3 in Appendix B, no *candidate* habitat of seasonal concentration of animals are present on-site, accordingly, habitats of seasonal concentrations of animals is not discussed further in this EIS.

4.5.2 Rare Vegetation Communities

Rare vegetation communities in the province are described generally as those with an S1 to S3 ranking by the NHIC, and typically include communities such as sand barrens, alvars, old growth forests, savannahs and tallgrass prairies.

The vegetation communities identified on-site and described in Section 3.5 of this report are not ranked by the NHIC as S1, S2 or S3 and are therefore not considered to be rare vegetation communities. Accordingly, rare vegetation communities are not discussed or evaluated further in this EIS.

4.5.3 Specialized Habitats for Wildlife

Specialized wildlife habitats are microhabitats that provide a critical resource to some groups of wildlife. The significant wildlife habitat technical guide (OMNR, 2000), defines eight specialized habitats that may constitute significant wildlife habitat, these eight types of specialized wild habitat are evaluated in Table B.4 in Appendix B.

Following review of Table B.4 in Appendix B, two *candidate* specialized habitats for wildlife are present on-site or within the broader study area and are discussed below in further detail: woodland amphibian breeding habitat and woodland area-sensitive bird breeding habitat.

4.5.3.1 Amphibian Breeding Habitat

Candidate woodland amphibian breeding habitat was identified on-site at two stations (Stations 1 and 3) observed to have large expanses of pooling water on-site. *Candidate* wetland amphibian breeding habitat was identified on-site within the maple deciduous swamp communities (ELC

codes SWD3 and SWD3-1). To evaluate the potential for the habitats on-site to provide amphibian breeding habitat, a series of amphibian breeding surveys were conducted.

To evaluate the potential for the habitats on-site to provide amphibian breeding habitat, a series of amphibian breeding surveys were conducted. Table 4.1 below summarizes the results of the amphibian breeding surveys described in Section 2.2.4 of this report. Figure 3 illustrates the survey locations.

Table 4-1 Summary of Amphibian Breeding Call Surveys

Survey Location	Breeding Habitat	Species/Highest Call Code/ Date	Confirmed SWH
1	Woodland	AMTO / 3-# / May 17, 2021 CHFR / 3-# /May 17, 2021 NLFR / 3-# / May 17, 2021 SPPE / 2-5 / May 17, 2021 GRTR / 1-2 / July 6, 2021	No
2	Wetland	WOFR / 1-3 / April 12, 2021 AMTO/ 2-6 / May 17, 2021 NLFR / 3-# / May 17, 2021 SPPE / 2-4 / May 17, 2021 GRTR / 1-1 / July 6, 2021	No
3	Woodland	SPPE / 3-# / April 12, 2021 AMTO / 3-# / May 17, 2021 NLFR / 3-# / May 17, 2021	No
4	Wetland	SPPE / 3-# / April 12, 2021 WOFR / 1-2 / April 12, 2021 NLFR / 1-2 / April 12, 2021 AMTO / 3-# / May 17, 2021 NLFR / 3-# / May 17, 2021	Yes

Notes: AMTO = American Toad, BULL = American Bullfrog, CHFR = Western Chorus Frog, GRFR = Green frog, GRTR = Gray Treefrog, NLFR = Northern Leopard Frog, SPPE = Spring Peeper, WOFO = Wood Frog. Call Codes: the first number indicates the call code where: (1) number of individuals can be accurately counted, (2) individuals can be readily estimated, (3) calls are continuous and overlapping such that estimates of individuals are not reliable. The second number identifies the number of individuals calling. Call codes of 3 do not have a second number, as individual estimates are not possible.

4.5.3.2 Woodland Amphibian Breeding Habitat

Candidate woodland amphibian breeding habitat was identified on-site at two stations (Stations 1 and 3) observed to have large expanses of pooling water on-site. Woodland amphibian breeding habitat provides critically important breeding habitat for the following wildlife species: eastern newt, blue-spotted salamander, spotted salamander, gray treefrog, spring peeper, western

chorus frog and wood frog. Woodland amphibian breeding habitat can be located in all ecosites associated with coniferous, mixed and deciduous forests or swamps. The defining criteria for confirmed woodland amphibian breeding SWH is the presence of breeding populations of one or more listed newt/salamander species, two or more of the listed frog/toad species with at least 20 individuals, or two or more of the listed frog/toad species with a call level code 3.

Based on review of Table 4.1 above, woodland habitat on-site does not meet the defining use criteria for *confirmed* woodland amphibian breeding SWH, for stations 1 and 3. As woodland amphibian breeding habitat is not present on-site it is not discussed or evaluated further in this EIS.

4.5.3.3 Wetland Amphibian Breeding SWH

Candidate wetland amphibian breeding habitat was identified on-site within the maple deciduous swamp communities (ELC codes SWD3 and SWD3-1). Wetland amphibian breeding habitat provides important breeding habitat for the following wildlife species: American toad, spotted salamander, four-toed salamander, blue-spotted salamander, gray treefrog, western chorus frog, northern leopard frog, pickerel frog, green frog, mink frog and bullfrog. Wetland amphibian breeding habitat occurs throughout swamps, marshes, fens, bogs, open aquatic and submerged aquatic habitats. The defining use criteria is the presence of breeding populations of one or more listed newt/salamander species, two or more of the listed frog/toad species with at least 20 individuals or two or more listed frog/toad species with a call level code of 3.

Based on review of Table 4.1 above, wetland habitat on-site does meet the defining use criteria for *confirmed* wetland amphibian breeding SWH, for station 4, which corresponds to the red maple deciduous swamp located in the northeast portion of the site (ELC code SWD3-1). Potential impacts to wetland amphibian breeding habitat are discussed in Section 6 below.

4.5.3.4 Woodland Area-Sensitive Bird Breeding Habitat

Candidate significant wildlife habitat for woodland area-sensitive breeding birds has been identified on-site and within the study area due to the large, approximately 8 ha, of interior forest habitat that is defined by a 200-m buffer from the forest edge, meeting the requirements of the Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E (OMNRF, 2015).

This category of significant wildlife habitat is difficult to confirm due to a lack of agreement within the scientific literature regarding the use of terms such as *forest interior* and *area-sensitive*, as few species appear to be true forest interior species (avoiding forest edges), distribution of territories for species that exhibit significant edge avoidance may not differ significant from that of randomly placed territories and the paucity of reproducible data demonstrating the presence of forest-interior species (OMNRF, 2014). Additionally, there are also differences of opinion between ornithologists as to which species are area-sensitive; some ornithologists define area-sensitive species as those that occur more frequently or increase in density as forest fragment size

increases while others have identified minimum thresholds for forest size required to support area-sensitive species (Freemark and Collins, 1992; and Robbins et al. 1998, in OMNRF, 2014). To further complicate the assessment of this significant wildlife habitat category, the sensitivity of an individual species to forest fragmentation varies geographically; results from one study area may not be directly transferable to another. Birds that are nesting in areas where forest cover is sparse tend to require larger forests than those of the same species that are nesting where forest cover is abundant. Similarly, rare species tend to only inhabit the best available habitat while common species may be more widespread, nesting in so-called marginal habitat (Riley and Mohr, 1994; and Berger, 1951 in OMNRF, 2014).

The MNRF have identified 13 area-sensitive species as indicator species of area-sensitive bird breeding habitat, these species are identified in Table 4.2 below. As per the Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E (OMNRF, 2015), for this type of *candidate* significant wildlife habitat to be *confirmed*, breeding bird surveys need to document the presence of breeding or probably breeding of three or more pairs of the indicator species.

Table 4-2 – Area Sensitive Breeding Bird Survey Results

Species	Survey 1 (May 31)	Survey 2 (June 16)	Survey 3 (June 25)	Survey 4 (June 28)	Probable Breeding
Yellow-bellied Sapsucker		✓	✓		Yes
Red-breasted Nuthatch			✓		
Veery	✓		✓		Yes
Blue-headed Vireo					
Northern Parula					
Black-throated Green Warbler					
Blackburnian Warbler					
Black-throated Blue Warbler					
Ovenbird	✓	✓	✓	✓	Yes
Scarlet Tanager					
Winter Wren			✓		
Cerulean Warbler					
Canada Warbler					

Following review of Table 4.2 above, three species (yellow-bellied sapsucker, veery and ovenbird) were determined to be probably breeding on-site and within the study area. However; based on the regional abundance of all three species and their apparent lack of local sensitivity to forest patch size (based on professional observations completed in the National Capital Region), it is the EIS authors opinion that significant wildlife habitat for area-sensitive breeding birds has not been confirmed to be present. Potential impacts to *candidate* area-sensitive breeding bird habitat is presented in Section 6.

4.5.4 Habitats of Species of Conservation Concern

Provincial rankings are used by the Natural Heritage Information Centre to set protection priorities for rare species, similar to those described in Section 4.5.2 above for vegetation communities. Provincial rankings (S-ranks), are not legal designations such as those used to define the various protection statuses of species at risk, they are only intended to consider factors within the political boundaries of Ontario that might influence a particular species abundance, distribution or population trend.

Based on the guidance provided in the Significant Wildlife Habitat Ecoregion Criterion Schedules (OMNRF, 2015), when a plant or animal element occurrence is recorded for any species with an S-rank of S1 (extremely rare), S2 (very rare), S3 (rare to uncommon) or SH (historically present), the corresponding vegetation ecosite is considered to provide *candidate* habitat for species of conservation concern and further consideration within the EIS is warranted.

The Significant Wildlife Habitat Ecoregion Criterion Schedules (OMNRF, 2015), provides five general habitat types known to support a wide range of species of conservation concern in Ontario. The five general habitat types for Ecoregion 6E-11 are provided in Table B.5 in Appendix B, including a brief rationale as to why they are or are not considered further in this EIS. Following review of Table B.5 in Appendix B, one habitat of species of conservation concern has been identified on-site, habitat for special concern and rare wildlife species due to the presence of wood thrush on-site.

4.5.4.1 Special Concern and Rare Wildlife Species

Based on observation data from the field investigations, two species of special concern have been identified on-site or within the broader study area, the eastern wood-pewee and wood thrush. No other species of special concern or rare wildlife species were identified on-site or within the broader study area.

The eastern wood-pewee is a small flycatcher bird with an S-rank of S4 (uncommon but not rare) and is listed as a species of special concern in Ontario. Eastern wood-pewee was identified on-site during the site investigations. The NHIC has not identified any historic observations for the subject property and surrounding study area; however, the species was observed calling from site

during the 2021 field investigations. Eastern wood-pewee is a woodland species that is often found near clearings and edges.

The wood thrush is a medium-sized songbird with an S-rank of S4 (uncommon but not rare) in Ontario; the most recent Ontario Breeding Bird Atlas indicated that the wood thrush populations in Ontario have shown a significant annual increase of 4.4% between the first and second atlas (Cadman et al., 2007). The NHIC has not identified any historic observations for the subject property and surrounding study area; however, the species was observed calling from site during the 2021 field investigations. Wood thrush is a woodland species often found in moist, deciduous hardwood or mixed forests stands, with dense deciduous undergrowth and tall trees.

Potential impacts to special concern and rare wildlife species (eastern wood-pewee and wood thrush) are presented in Section 6 below.

4.5.5 Animal Movement Corridors

Animal movement corridors are elongated areas used by wildlife to move from one habitat to another and allow for the seasonal migration of animals (OMNRF, 2015). The Significant Wildlife Habitat Ecoregion Criterion Schedules for Ecoregion 6E-11 (OMNRF, 2015), identifies two types of animal movement corridor: amphibian movement corridors and deer movement corridors. As per guidance presented in OMNRF, 2015, animal movement corridors should only be identified as significant wildlife habitat when a *confirmed or candidate* significant wildlife habitat has been identified by the MNRF district office or by the regional planning authority.

With respect to the later, the City of Ottawa through their Natural Landscape Linkage Analysis (Ottawa, *undated*) identifies natural linkage feature that qualify as part of the City's natural heritage system. These features are described as consisting of remnant woodlands or floodplains lying within existing or potential natural linkage areas. Review of Schedule L2 indicates that natural linkages, as defined by the City of Ottawa, are not present on-site or within the study area.

However, *confirmed* significant wildlife habitat for breeding wetland amphibians has been identified on-site. Accordingly, animal movement corridors need to be considered in evaluation of potential impacts. Accordingly, animal movement corridors are discussed in Section 6 and 7 below with respect to impacts to significant wildlife habitat for breeding wetland amphibians.

4.6 Fish Habitat

The protection of fish and fish habitat is a federal responsibility and is administered by the Department of Fisheries and Oceans Canada (DFO). Fish habitat as defined in the Fisheries Act (Canada, 1985) means, "spawning grounds and nursery, rearing food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes."

When development is unable to avoid or mitigate serious harm to fish from typical project impacts such as temperature change, sedimentation, infilling, reduction of nutrient and food supply, etc., an authorization under the Fisheries Act is required for the project to proceed.

A fisheries assessment was conducted as part of the HDFA (Appendix C). The results of the HDFA confirmed that no fish were observed in any of the ephemeral headwater features identified on-site. As such, fish habitat and impacts to fish habitat results for the proposed development are not discussed further in this EIS.

4.7 Headwater Drainage Features

As indicated above and in Section 2.2.5, a headwater drainage feature assessment was completed as part of this EIS. The HDFA is presented in full, in Appendix C; the results of the HDFA identified seven ephemeral headwater features on the subject site. Headwater drainage features are illustrated on Figure 3.

Assessment of the contribution of each headwater feature to downstream fish habitat was completed using the Evaluation, Classification and Management of Headwater Drainage Features Guideline (2014) jointly developed by Toronto Region Conservation Authority and Credit Valley Conservation Authority and endorsed regionally by Conservation Partners and the City of Ottawa.

Using the linking classification to management flow chart provided by the TRCA and CVC (2014), illustrated in Figure 5 below, the characteristics of the on-site headwater drainage features were used to determine management recommendations presented in Section 7.

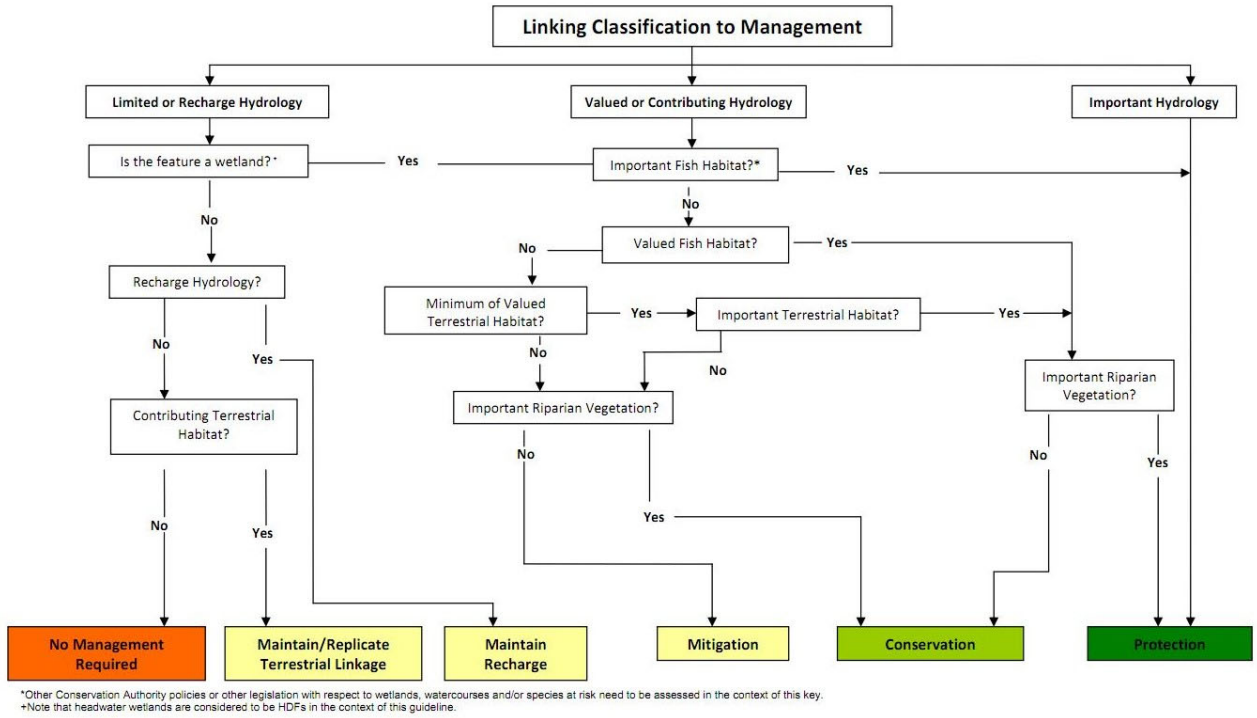
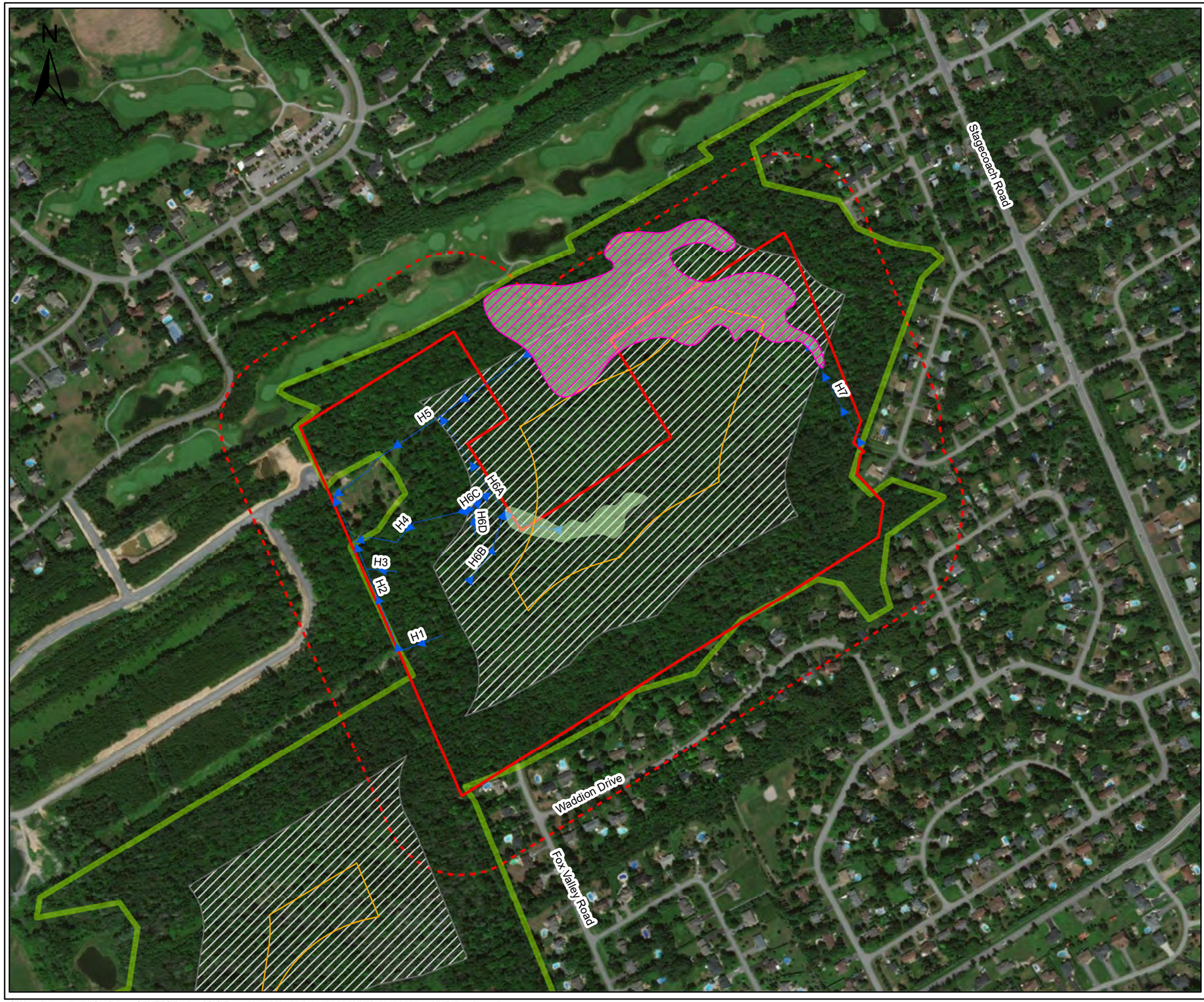


Figure 6 Flow Chart Providing Directions of Management Options (TRCA/CVC, 2014)

4.8 Species at Risk

The probability of occurrence for species at risk to occur on-site and within the broader study area was determined through the desktop review stage of this EIS, as described in Section 2.1 and through the site specific surveys conducted as part of this EIS, outlined in Section 2.2.

Table B.7 in Appendix B, provides a summary of all species at risk which were determined to have the potential to occur on-site or within the broader study area, their protection status under the provincial Endangered Species Act (Ontario, 2007), their probability of occurrence and a brief rationale of that probability. Impacts to endangered or threatened SAR determined to have a moderate or high potential to occur on-site or within the broader study area are discussed further in Section 6.



Legend

- Property Boundary
- Study Area
- Headwater Drainage Feature and Direction of Flow
- Local Wetland
- Significant Woodlands
- Interior Bird Habitat
- Interior Forest Habitat
- Significant Breeding Habitat for Wetland Amphibians

Scale
1:6,000

0 50 100 200 300 400 Meters

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Client: 9287043 Canada Corporation

Project: 100484.001

Location: Part of Lots 3 & 4, Concession 3, Osgoode
Ottawa, Ontario

Drwn By:	Chkd By:	
JD	DP	Natural Heritage Features

Date: July 2021

Rev. 0

Figure 7

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Coordinate System: NAD 1983 UTM Zone 18N
Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

5.0 PROPOSED PROJECT

The proposed project assessed for potential impacts on the natural heritage features determined to be present within the broader study area is a plan of subdivision application for Part of Lot 3 and 4, Concession 3, in the Geographic Township of Osgoode.

The proposed plan of subdivision includes the creation or extension of four residential roads providing access to 73, one-acre (0.4 ha) residential lots, three naturalized stormwater management ponds, creation of a wildlife travel corridor and extension of the existing Greely Loop (pathway). The proposed development will occupy the entire 35 ha subject site. All lots will be on private services. Access to the proposed subdivision will be from Fox Valley Road, Jack Pine Crescent and Green Links Way associated with the subdivision directly adjacent to the west which is currently under construction. The proposed plan of subdivision is provided on Figure 7.

Future components of the proposed project considered in the impact assessment presented in Section 6 include: tree clearing and vegetation grubbing, fill placement and elevation grading, laneway construction, excavation and pouring of foundations, construction of single family dwellings, all on private services, general landscaping activities and the creation of stormwater management ponds within the subdivision extents.

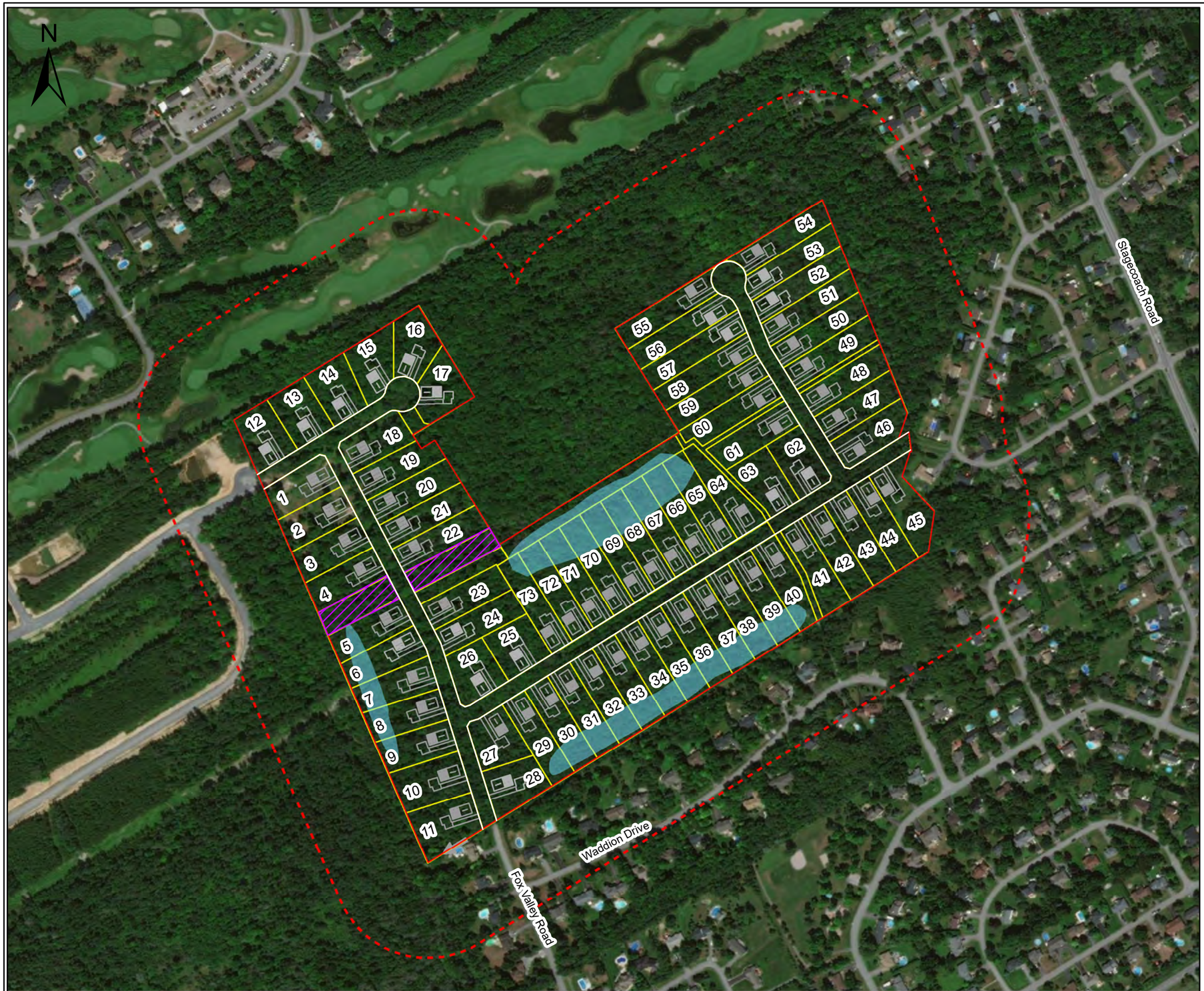
The existing surface water drainage network, which is comprised almost entirely of anthropogenic drainage features, will be altered to convey flows from rear-yards and roadside ditches to proposed storm water management ponds. Naturalized stormwater management ponds are anticipated to have a surface area of approximately 11,250 m^2, 12,000 m^2 and 6,000m^2, and will be designed to accommodate 50% of a two-year storm event.

Notwithstanding the above, the proponent will be retaining approximately 50% of the mature tree coverage on most of the of the 73 residential lots, wheras approximately 16 lots will retain 25% of the mature tree cover, forfeiting the other 25% to the development of the naturalized stormwater management ponds. The remaining 0.2 ha of every lot will, through replanting and landscaping activities, re-establish an additional 20% tree coverage. The location of the development envelope on each lot and the tree retention areas are designed to buffer and protect the adjacent natural areas and support wildlife habitat. The intent of the development is to provide a unique and modern perspective on living in a naturally wooded area in harmony with nature. To this end, the proponent intends to enforce tree retention targets through application of conservation /preservation instruments developed jointly by the City of Ottawa and proponent. At the time of home construction, all future lot owners will be required to submit and obtain a design review approval by the future *Owners Association*.

In addition to the above, the proposed development intends to integrate into the existing environment to the extent possible by providing linkages to public parkland and greenspace to the north and west of the proposed development. Located in a block, central to the subject site,

is a 4 ha parcel of woodland owned by the City of Ottawa that is zoned environmental protection. This parcel, which has been evaluated in this EIS as part of the study area encompassing 120 m around the subject site, is heavily treed and is proposed to include trail linkages between the developments to the east and west. Furthermore, the creation of a wildlife travel corridor located through the west portion of the development will provide for maintenance of wildlife movement between the City park, drainage corridor and UPI lands to the west of the proposed development and the City's 4 ha parcel in the centre. This wildlife corridor will be designed to provide protection for migratory wildlife, notably woodland amphibians.

The timeline for the proposed project, from lot creation to completion of residential construction is currently unknown. For the purpose of assessing impacts to natural heritage features, it is assumed in this EIS that the creation of individual residential lots will happen in the near-term and will not result in any physical alterations to the natural environment of the site and the broader study area. Future construction of single family residential homes on each of the subdivision lots is assumed to occur over a several year period and that the construction of any one residential home will be completed such that the duration of any potential impacts on the natural environment during construction will be approximately six months.



Legend

- Property Boundary
- Study Area
- Wildlife Travel Corridor
- Stormwater Management Pond

Proposed Development

- Lot Boundary
- House and Septic

Scale
1:5,000

0 50 100 200 300 400 Meters

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Client:	Project:
9287043 Canada Corporation	100484.001

Location
Part of Lots 3 & 4, Concession 3, Osgoode
Ottawa, Ontario

Drwn By:	Chkd By:	
JD	DP	Development Concept

Date: July 2021	Rev.	
	0	Figure 8

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Coordinate System: NAD 1983 UTM Zone 18N
Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

6.0 IMPACT ASSESSMENT

Potential impacts to natural heritage features on-site and within the broader study area are assessed for direct, indirect and cumulative effects based on the proposed project outlined in Section 5. Natural heritage features identified in Section 5 of this report as present or likely to be present are discussed in the subsections below.

Potential effects to the natural environment from the proposed development outlined in Section 5 include: loss of woodland wildlife habitat, loss of local wetland habitat, increased storm water generation, increased noise generation and increased human disturbance.

6.1 Local Wetlands

As outlined in Section 3.5 and Section 4.1, two local, unevaluated wetlands of approximately 7 ha and 0.7 ha, respectively, are present within the study area. No Provincially Significant Wetlands are present within the study area.

The proposed development, as illustrated on Figure 8, is anticipated to result in the loss of 1.61 ha of local wetland within the study area. The entirety of the small, 0.7 ha wetland in the south-central portion of the subject site is proposed to be replaced by a large, approximately 1.13 ha stormwater management pond. Approximately 0.91 ha of the local wetland located in the northeast portion of the site is proposed to be replaced with five residential development envelopes and a portion of a subdivision road.

Impacts to local wetlands will include the direct loss of wetland area and the cumulative loss of habitat complexity and structure, primarily for breeding interior avian and wetland amphibian species.

Impacts to the hydraulic regime and hydro-period of off-site watercourses which receive seasonal flows from local wetlands are not anticipated to be impacted by the development due to the net increase in stormwater storage provided by the three stormwater management ponds and the maintenance of connectivity to existing drainage networks off-site to the west.

Impacts relating to habitat loss can be partially offset through application of natural design principles to locations of the residential development envelopes and the design and construction of naturalized stormwater management ponds, including integration with the proposed wildlife travel corridor.

In accordance with the requirements of the Shields Creek Sub-watershed Study (Ottawa, 2004), it should be noted that as wetlands on-site are less than the threshold size of 2 ha, a demonstration of the hydrological, biological or social contributions of the wetlands to the greater watershed is not required. Furthermore, based on professional experience and certification as an

Ontario Wetland Evaluator, it is the EIS author's opinion that wetlands on-site would not provide unique features that would likely result in their designation as PSWs.

Mitigation measures intended to minimize impacts associated with loss of local wetland area are discussed in Section 7.

6.2 Significant Woodlands

As discussed in Section 4.2, woodlands on-site and within the study area, as illustrated on Figure 7, are considered significant due to their contiguous area (91 ha) relative to regional woodland coverage and their ecological functions for interior habitat (25 ha), proximity and linkages to other natural heritage features, and source water protection.

As the proposed development described in Section 5 above and illustrated on Figure 8 is intended to occur within the significant woodlands, direct impacts to woodland size and function are anticipated. Indirect impacts to the significant woodlands may include increased human disturbance, dumping of yard waste, increased noise and potential for encroachment.

Direct impacts resulting from subdivision development are the loss of approximately 11.6 ha of significant woodland and the loss of approximately 24 ha of interior forest habitat on-site. With respect to the contiguous woodlands within the study area, due to the connectivity of the on-site woodlands to off-site woodlands and the intention to maintain tree canopy cover, the total loss of on-site woodlands represents 12.7% of the contiguous significant woodland area and 75% of available interior habitat.

Despite the removal of 11.6 ha of significant woodlands, including interior forest habitat, from the site, the contiguous significant woodlands within the remnant portions of the site and the contiguous woodland coverage within the study area, identified significant woodlands will retain all defining elements for which their significance is based: contiguous woodland coverage greater than 27 ha; interior forest habitat greater than 2 ha, proximity and linkage to other natural features, and source water protection.

Mitigation measures intended to minimize impacts significant woodlands are discussed in Section 7.

6.3 Significant Wildlife Habitat

The potential presence of significant wildlife habitat on-site and within the study area was evaluated in Section 4.5, as a result of this assessment one type of significant wildlife habitat was determined to be present on-site or within the study area - habitats of special concern and rare wildlife species.

Potential impacts to significant wildlife habitats are discussed in greater detail in the following subsections, while mitigation measures indented to prevent such impacts are presented in Section 7.

6.3.1 Wetland Breeding Amphibian Habitat – Confirmed

Significant wildlife habitat for wetland breeding amphibian habitat was *confirmed* within the red maple deciduous swamp (ELC code SWD3-1) in the northeast portion of the site. As outlined in the sections above, approximately 0.91 ha of this wetland is proposed to be replaced with five residential development envelopes and a portion of a subdivision road. The proposed encroachment within the wetland will result in the loss of 0.91 ha of the approximately 7 ha of significant wildlife habitat for wetland amphibians.

Most amphibians require surface water to carryout their life histories. During spring many of these species concentrate in breeding ponds to mate and lay eggs. Amphibian species, namely frog and toad species, either live in the wetland or at its edge and disperse away from the breeding area once they emerge to live in terrestrial habitats some distance from the wetland, returning in the spring to breed or in autumn to hibernate (OMNRF, 2014).

According to the Significant Wildlife Habitat Mitigation Support Tool (OMNRF, 2014), development activities associated excavation and drainage have the potential to affect amphibian population dynamics in the vicinity of the development, primarily through alteration of wetland hydrologic regimes and loss of travel corridors. Other potential impacts resulting from residential subdivision development include the loss of woodland coverage and the corresponding loss of shelter and upland foraging habitat.

Direct impacts associated with wetland encroachment activities such as dredging, clearing and filling reducing the quality of wetland breeding sites. Impairment of breeding sites as a result of encroachment can result in increased predation and loss of habitat structure (OMNRF, 2014).

Cumulative impacts wetland breeding habitat include increased human disturbance (pet predation, frog catching, etc.), and increases in stormwater generation and concomitant sediment transport and nutrient loading to surface water, reducing water quality within wetlands.

Mitigation measures intended to minimize and offset impacts to *confirmed* significant wildlife habitat for breeding wetland amphibians are presented in Section 7.

6.3.2 Area-Sensitive Breeding Bird Habitat - Candidate

Candidate significant wildlife habitat for woodland area-sensitive breeding birds has been identified on-site and within the study area due to the large, approximately 8 ha, of interior forest habitat that is defined by a 200-m buffer from the forest edge, meeting the requirements of the Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E (OMNRF, 2015). However, only three of the 13 indicator species were assessed as ‘probable’ breeding within the on-site

woodlands. Furthermore, all three species detected (Yellow-bellied sapsucker, veery and ovenbird) are all common inhabitants of early successional woodlands within the National Capital Region, even within urban woodlands, and are not necessarily strong indicators of woodland use by area-sensitive breeding birds. Table 6.1 below has been adapted from Peck and James (1983, 1987 in OMNRF, 2014) and presents the general susceptibility of indicator species determined to be have a high potential to be utilizing interior forest habitat at the site.

Table 6.1 – Sensitivity of Area-Sensitive Breeding Birds

Species	Avian Predators	Mammalian Predators	Parasitism	Human Disturbance
Yellow-bellied Sapsucker	Very Low	None	None	Low
Veery	High	High	Moderate	Low
Overnbird	Low	High	Low	Low

Following a review of Table 6.1 above, potential impacts to *candidate* area-sensitive breeding bird habitat include loss of interior forest habitat through fragmentation, increased presence of subsidized predators and increased competition for nest sites and resources from bird species not affected by the presence of forest edges. However, impacts associated with increased human disturbance do not appear to negatively impact upon indicator species confirmed to be present and probably breeding within interior forest habitat on-site.

Mitigation measures intended to minimize impacts to *candidate* significant wildlife habitat for area-sensitive breeding bird habitat are presented in Section 7.

6.3.3 Habitats of Special Concern and Rare Wildlife Species

Eastern Wood-Pewee

Eastern wood-pewee (*Contupus virens*) is a small, avian insectivore that lives in a variety of deciduous, mixed, and to a lesser extent, coniferous woodland habitat (COSEWIC, 2012a). Adult eastern wood-pewee are grey-olive with pale wing-bars , the breast and sides are slightly darker green than the wings. It is best identified by its three-phrased song, often paraphrased as a whistled ‘pee-ah-wee’ (COSEWIC, 2012a). In Ontario, the eastern wood-pewee is listed as a species of special concern.

Threats to eastern wood-pewee are not well understood however, loss of suitable forest habitat does not appear to be a significant issue across their Canadian breeding range (COSEWIC, 2012a). Furthermore, research indicates that the species is not very sensitive to forest fragmentation effects or forest size (COSEWIC, 2012a). Eastern wood-pewee may be sensitive to human habitation, in Ontario they occur less frequently in woods with surrounding development than those without houses (COSEWIC, 2012a). Other threats to eastern wood-pewee may include

changes in the availability of aerial insects, mortality during migration and/or wintering, nest predation and habitat changes due to white-tailed deer browsing (COSEWIC, 2012a).

No eastern wood-pewee observations were provided by the NHIC for the subject property or broader study area. Eastern wood-pewee were however detected during breeding bird surveys on-site.

Impacts to eastern wood-pewee and their habitat on-site from the proposed subdivision are limited to the forest habitat on-site which may provide suitable nesting and foraging habitat. Impacts to eastern wood-pewee habitat may include the loss of forest habitat, increased fragmentation and increased human interaction. While the proposed development will result in the loss of a portion of suitable forest habitat on-site, suitable habitat is readily available within the broader study area. Impacts from increased human presence are anticipated to be negligible given the existing development surrounding the subject property, the existing and expected pathway incursions which are unrelated to this development proposal, and availability of suitable habitat within the greater study area.

Mitigation measures intended to prevent negative impacts to nesting and foraging eastern wood-pewee are presented in Section 7.

Wood Thrush

The wood thrush (*Hylocichla mustelina*) is a medium-sized songbird, similar in shape to an American robin, but slightly smaller. Generally wood thrush plumage is distinct from other thrush species, with rusty-brown upper parts, white underparts and large blackish spots on the breast and sides.

In Ontario, the wood thrush breeding range extends from southern Ontario north to northern Georgian Bay and eastern Lake Superior (COSEWIC, 2012b). While wood thrush populations have declined over most of its North American range, between 1981 and 2005, breeding bird data indicates populations in Ontario have increased by 4%, likely due to increases in woodland cover south of the Canadian Shield (Cadman et al., 2007). The probability of occurrence in Ontario however, has decreased by 15% between the first and second breeding bird atlas (Cadman et al., 2007). The wood thrush is listed as a species of special concern in Ontario.

During the breeding season, the wood thrush is found in moist, deciduous hardwood or mixed forest stands, often in previously disturbed sites with dense, deciduous undergrowth and tall trees that are used as singing perches (COSEWIC, 2012b). For wood thrush, habitat selection is based more on the structure of the forest, preferring sites with lower elevations, trees taller than 16 m, closed canopy (>70%), with a high variety of deciduous species, moist soil and decaying leaf litter (COSEWIC, 2012b).

No wood thrush observations were provided by the NHIC for the subject property or broader study area. Wood thrush were however detected during breeding bird surveys on-site.

Impacts to wood thrush and their habitat on-site from the proposed subdivision are limited to the forest habitat on-site which may provide suitable nesting and foraging habitat. Impacts to wood thrush habitat may include the loss of forest habitat, increased fragmentation and increased human interaction. While the proposed development will result in the loss of a portion of suitable forest habitat on-site suitable habitat is readily available within the broader study area. Impacts from increased human presence are anticipated to be negligible given the existing development surrounding the subject property, the existing and expected pathway incursions which are unrelated to this development proposal, and availability of suitable habitat within the greater study area.

Mitigation measures intended to prevent negative impacts to nesting and foraging wood thrush are presented in Section 7.

6.4 Species at Risk

As outlined in the Endangered Species Act (Ontario, 2007), only species listed as threatened or endangered and their general habitat receive automatic protection. When a species-specific recovery strategy is developed, a specific habitat regulation will be established, which eventually replaces the automatic habitat protection. Species of special concern and their habitat do not receive protection under the ESA.

Potential impacts associated with the proposed project to threatened or endangered species identified as having a moderate or high potential to occur on-site in Section 4.7, are discussed on a species-by-species basis in subsections below.

6.4.1 Eastern Small-footed Myotis

Eastern small-footed Myotis (*Myotis leibii*) is the smallest (typically 3-5 g), insectivorous bat found in Ontario. The fur of an eastern small-footed Myotis is golden-brown in colour, with a distinct black mask across the face. The eastern small-footed Myotis is very similar in appearance to the little brown Myotis, and is distinguishable by their small foot and keeled calcar (Fraser, MacKenzie & Davy, 2007).

The eastern small-footed Myotis is found throughout eastern North America. In Ontario the species has been observed in the areas sough of Lake Superior across to the Ontario-Quebec border (Humphrey, 2017).

Eastern small-footed Myotis overwinter primarily in caves and abandoned mines with low humidity and temperatures and stable microclimates (Humphrey, 2017). In comparison to other Ontario bat species, they are able to tolerate much colder temperatures, drier conditions and draftier locations for hibernating (Humphrey, 2017). During the spring and summer months, they utilize

a variety of habitats for roosting, including under rocks or rock outcrops, in buildings, under bridges, or in caves, mines or hollow trees (Ontario, 2019a).

Although the forest habitat on-site does not meet the requirements to support bat maternity colonies, given the availability of habitat and buildings on-site and within the study area, there is a potential for eastern small-footed Myotis to occur on the property, primarily for foraging or non-maternal roosting. Impacts to eastern small-footed Myotis are primarily associated with habitat loss, encroachment and increased wildlife-human interaction. Mitigation measures intended to protect eastern small-footed Myotis from impacts of the proposed development are discussed in Section 7.

6.4.2 Little Brown Myotis

Little brown Myotis (*Myotis lucifugus*) is a small (typically 4-11 g), insectivorous bat. The fur of a little brown Myotis is bi-coloured; fur is a glossy brown with a darker coloured base. The tragus of the Little Brown Myotis is long and thin, with a rounded tip (Fraser, MacKenzie & Davy, 2007).

In Canada, little brown Myotis' occur throughout all of the provinces and territories (except Nunavut), with its range extending south through the majority of the United States as well. In Ontario, the little brown Myotis is widespread in southern Ontario and has been found as far north as Moose Factory and Favourable Lake (Ontario, 2019b).

Little brown Myotis overwinter in caves and abandoned mines, they require highly humid conditions and temperatures that remain above the freezing mark (Ontario, 2019b). During the summer months, maternity colonies are often located in buildings or large-diameter trees. Little brown Myotis roost in trees and buildings. Foraging occurs over water and along waterways, forest edges and in gaps in the forest. Open fields and clearcuts are not typically utilized for foraging (COSEWIC, 2013).

Although the forest habitat on-site does not meet the requirements to support bat maternity colonies, given the availability of habitat and buildings on-site and within the study area, there is a potential for little brown Myotis to occur on the property, primarily for foraging or non-maternal roosting. Impacts to little brown Myotis are primarily associated with habitat loss, encroachment and increased wildlife-human interaction. Mitigation measures intended to protect little brown Myotis from impacts of the proposed development are discussed in Section 7.

6.4.3 Tri-Colored Bat

Tri-colored bat (*Perimyotis subflavos*) is a small (typically 5-7 g), insectivorous bat. The fur is uniformly coloured on the ventral and dorsal sides, however when parted fur shows three distinct colour bands. The base of the hair is blackish, with a blonde middle and brownish tip. The snout of the tri-coloured bat is also distinct, with swollen bulbous glands present (Fraser, MacKenzie & Davy, 2007).

In Canada, the tri-colored bat has only been recorded in southern parts of Nova Scotia, New Brunswick, Quebec and central Ontario. In Ontario it occurs primarily from the southern edge of Lake Superior across to the Ontario-Quebec border and south (COSEWIC, 2013).

Tri-colored bat overwinter in in caves or mines, and have very rigid habitat requirements; they typically roosting the deepest parts where temperatures are the least variable, and have the strongest correlation with humidity levels and warmer temperatures (COSEWIC, 2013). In the spring and summer, tri-colored bat utilize trees, rock crevices and buildings for maternity colonies. Foraging is mainly done over watercourses and streamside vegetation (COSEWIC, 2013).

Although the woodlands on-site do not meet minimum snag density requirements to support bat maternity colony habitat, given the availability of habitat on-site there is a potential for tri-colored bat to occur on the property, primarily for foraging or non-maternal roosting. Impacts to tri-colored bat are primarily associated with habitat loss, encroachment and increased wildlife-human interaction. Mitigation measures intended to protect tri-colored bat from impacts of the proposed development are discussed in Section 7.

6.4.4 Butternut

Butternut (*Juglans cinerea*) is a relatively short lived, medium-sized tree that can reach heights of up to 30 m. It is easily distinguished by its compound leaves, made up of 11 to 17 leaflets, arranged in a feather-like patter. Each leaflet is 9 to 15 centimetres in length. The bark is grey and smooth on young trees, becoming more ridged with age. Butternut is a member of the walnut family and produces edible nuts in the fall.

The Canadian range for Butternut extends through southern Ontario into southern Quebec, and New Brunswick (COSEWIC, 2003). Butternut is a shade intolerant tree that is commonly found in riparian habitats, and sites in a regenerative state. Butternut can also be found on rich, moist, well-drained gravels, favouring those of limestone origin. Common associates of Butternut trees include: basswood, black cherry, beech, black walnut, elm, hickory, oak, red maple, sugar maple, yellow poplar, white ash and yellow birch.

No butternut were observed on-site during the 2021 field investigations; however, habitat preferences of butternut are present within dry, upland sugar maple dominated forests and disturbed cultural sites. Furthermore, butternut are known to occur in within the region the subject site is located. Mitigation measures intended to protect butternut from impacts of the proposed development, should they be identified in the future, are presented in Section 7.

6.5 Cumulative Impacts

Potential cumulative impacts associated with the proposed project include an increase in storm water generation, loss of woodland habitat and local wetlands.

Cumulative impacts to the natural environment at the site due to increased human presence, increased wildlife and human interaction and increased noise, are expected to be negligible given the existing residential land use in the surrounding project area and the network of unofficial trails that bisect the subject site.

Cumulative impacts such as those listed above can be mitigated by implementing the proposed setbacks and recommended mitigation measures outlined in Section 7 below.

7.0 RECOMMENDED AVOIDANCE AND MITIGATION MEASURES

The following avoidance and mitigation measures have been recommended by GEMTEC in order to minimize or eliminate potential environmental impacts identified in Section 6. As such, recommended avoidance and mitigation measures should be enforced through a combination of subdivision registration clauses for development and individual lot level control.

7.1 Local Wetlands

As the proposed development is anticipated to result in the loss of approximately 1.61 ha of local wetlands, including approximately 0.91 ha of significant wildlife habitat for breeding wetland amphibians, the proposed naturalized stormwater management ponds should be designed and constructed following natural design principles.

Conventional stormwater management ponds provide stormwater attenuation and reduction of suspended solids, however they provide little to no ecological value. Conversely, naturalized stormwater ponds, with shallow slopes and increased capacity and depth, contain wetland characteristics such as native upland grasses and wet meadow vegetation along their peripheries and emergent wetland plants within the water column. These elements help to support the removal of stormwater pollutants, particularly excess nutrients, while also providing the necessary habitat structure and complexity to enable amphibian species to continue to carry out their life processes. A performance objective should be established with the aims to maintain and/or enhance breeding amphibian habitat relative to the amphibian community assemblage and relative abundance documented in Section 4.5.3 (specifically subsections 4.5.3.1, 4.5.3.2 and 4.5.3.3).

To meet this objective the following recommendations should be incorporated into future stormwater management pond design with input from the environmental consultant to provide specific recommendations to planting design:

- Native upland vegetation buffer strips should be established between the stormwater management ponds and the surrounding forested vegetation following construction. Upland vegetation buffers will aid in restoration of construction disturbances;
- The periphery of each stormwater management pond disturbed during construction should be re-vegetated and maintained to provide moist-meadow habitat consisting of native grasses and forb species, trees and shrubs;
- Stormwater management ponds should be designed and constructed to have relatively flat slopes of 7:1 and irregular shape shorelines and depths within the nearshore areas, while still maintaining a geometry required for hydraulic efficiency;
- Following final excavation and grading, the nearshore zone of each stormwater pond should be lined with an appropriate growing medium to allow for establishment of aquatic vegetation plantings;

- Maintain robust vegetation below the normal waterlevel with wet meadow and shallow marsh or deep emergent wetland plants;
- Aquatic plantings should include a mix of emergent aquatic vegetation and wet meadow species, including shrub species, to ensure colonization shorelines under various waterlevels and to provide sufficient cover to offer amphibians protection from predators;
- Woody bundles and basking logs should be incorporated into the design of the nearshore areas to increase habitat structure and complexity; and,
- Undertake annual vegetation and amphibian monitoring for a period of three years to document performance against existing breeding amphibian community assemblage and relative abundance.

7.2 Wildlife Travel Corridor

A secondary component to the loss of wetland function for woodland amphibians, coupled with loss of woodland coverage discussed below, is the need to preserve wildlife travel corridors between breeding sites and woodland sites during periods of congregation (spring) and dispersion (late summer). This requirement is also identified in the Shields Creek Sub-watershed Study for future developments within the Greely West natural area. To partially mitigate the loss of woodland coverage around existing local wetlands, development of a wildlife travel corridor is proposed as illustrated on Figure 9.

The wildlife travel corridor is proposed to be 28 metres in width and extend from the City of Ottawa owned land parcel in the centre of the subject site westward between proposed residential lots 22 and 23, and lots 4 and 5, to a City of Ottawa owned parcel directly to the west (1017 Green Jacket Crescent).

Through a combination of land ownership and landuse, specifically vacant woodlands, city owned parkland and stormwater easements, a nearly 1,000 m long vegetated corridor will be established. The 28 m wide corridor will extend from the undeveloped UPI woodlands west of the subject property (1295 Manotick Station Road) through the City owned corridor and parkland (1017 Green Jacket Crescent) connecting to the proposed wildlife travel corridor on-site, between residential Lots 4 and 5 and residential Lots 22 and 23. This proposed corridor maintains the connection to the City owned parcel (5800 Silver Maple Lane) in the centre of the proposed development, and ultimately to adjacent lands north, not owned by the proponent. This almost 1000 m long vegetated corridor will work to facilitate amphibian and wildlife movements within the study area.

The on-site portion of the wildlife travel corridor is proposed to be left in its existing, natural condition with no disturbance during construction. Maintenance of existing tree canopy coverage, including shrub layer and herbaceous ground cover will provide the necessary thermal regulation, protection from intense, full sun conditions, and protection from predators. The wildlife travel corridor will include a 500 mm corrugated steel pipe culvert suitable to allow the safe passage of amphibians beneath the traveled road surface.

7.3 Significant Woodlands

Despite the removal of 11.6 ha of significant woodlands from the site, the contiguous significant woodlands within portions of the site and the study area will retain the defining elements for which their significance is based: contiguous woodland coverage greater than 27 ha; interior forest habitat greater than 2 ha, proximity and linage to other natural features, and source water protection. The mitigation measures outlined in the paragraph below, in combination with those outlined in Section 7.1 above, will ensure that requirements outlined in the Shields Creek Sub-watershed Study (Ottawa, 2004) including the maintenance of interior forest habitat and buffering or natural features are adhered to.

To mitigate against further woodland cover loss, a plan to preserve trees is proposed. The tree preservation plan, as outlined on Figure 9 includes measures to ensure the preservation of approximately 50% tree canopy coverage in the back half of most of the of the 73 residential lots, although approximately one-third of lots will retain 25% of the mature tree cover, forfeiting the other 25% to the development of the naturalized stormwater management ponds. In addition, though post construction landscaping, a further 0.2 ha of every lot will, through replanting and landscaping activities, re-establish an 20% tree canopy coverage over the disturbed area of each lot. The location of the development envelope on each lot and the tree retention areas are designed to buffer and protect the adjacent natural areas and support wildlife habitat.

The proposed tree preservation plan, as illustrated on Figure 9 and detailed in Appendix D, will be enforced through legal instruments to be jointly developed by the City of Ottawa and the proponent which will govern the tree removals at the site.

7.4 Significant Wildlife Habitat

7.4.1 Wetland Amphibian Breeding Habitat

In accordance with the Significant Wildlife Habitat Mitigation Support Tool (OMNRF, 2014), for large areas of significant wildlife habitat, when complete avoidance is not possible, minimizing the amount of habitat affected may be a satisfactory mitigation measures (i.e., make the development footprint as small as possible, confine development along the edge of the habitat and ensure that is doesn't change wetland water quality or quantity). Furthermore, mitigating loss of forest cover to ensure it remains intact around the breeding wetland allows for maintenance of travel corridors into and out of breeding wetlands.

Mitigation measures presented in Section 7.1 are sufficient to mitigate and/or offset impacts to local wetlands and amphibian breeding habitat on-site. Furthermore, the wildlife travel corridor, presented in Section 7.2 above, to connect natural and open spaces on-site and off-site is sufficient to ensure that travel corridors are maintained, which is important for amphibians moving between habitats throughout the year.

In addition to the amphibian monitoring recommended in Section 7.1 above, to confirm the assumption that the loss of 0.91 ha of the approximately 7 ha of significant wildlife habitat for wetland amphibians does result in a negative impacts, breeding amphibian surveys should be undertaken for a period of three years to document no residual negative impacts to significant wildlife habitat for breeding wetland amphibians as a results of wetland encroachment.

7.4.2 Area-sensitive Breeding Bird Habitat

When considering mitigation of residential development impacts to area-sensitive breeding bird habitat, it is important to consider all species present in the existing woodland and how they may be affected by the proposed development. Emphasis should focus on species at risk, and those with the most demanding or limiting habitat requirements. This analysis should also take into account proposed management of the remnant woodlands when predicting which species will be affected (OMNRF, 2014).

Considering the regional abundance and commonality of the three area-sensitive breeding birds identified as probable breeding population within the study area (yellow-bellied sapsucker, veery and ovenbird) and the summarized guidance presented above from the Significant Wildlife Mitigation Support Tool (OMNRF, 2014), recommendations provided above relating to tree canopy preservation are likely to provide sufficient protection to avoid residual negative effects to identified indicator species.

7.4.3 Habitats of Special Concern – Eastern Wood-Pewee & Wood Thrush

To protect nesting and foraging eastern wood-pewee wood thrush on-site, vegetation removal should occur outside of April 1 to September 1 to avoid the key breeding bird period as identified by Environment Canada. If vegetation clearing activities must take place during the aforementioned timing window than a nest survey shall be conducted by a qualified professional.

7.5 Headwater Drainage Features

As detailed in Appendix C, the HDFA determined that the recommended management for the on-site ephemeral headwater drainage features is conservation. As outlined in the guidance document, protection management includes protecting or enhancing the existing feature and its functions. This includes riparian zone corridor, maintaining the hydroperiod, incorporation of shallow groundwater and base flow protection techniques and design and locate the stormwater management system to avoid impacts (i.e. sediment, temperature) to the feature. This has been accomplished through the design with nature approach to the subdivision layout, drainage pattern and stormwater management design which includes deep excavation to intercept groundwater, buried outlets and bottom draws with extensive tree canopy coverage to maintain cool water inputs.

Legend

- Property Boundary
- Study Area
- Local Wetland
- Stormwater Management Pond
- 20% Tree Canopy Planting Covenant
- 100% Tree Preservation
- 15 m Setback
- Limit of Disturbance
- Wildlife Travel Corridor

Proposed Development

- Lot Boundary
- House and Septic

Scale
1:5,000

0 50 100 200 300 400 Meters

GEMTEC
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ottawa@gemtec.ca

Client: 9287043 Canada Corporation

Project: 100484.001

Location: Part of Lots 3 & 4, Concession 3, Osgoode
Ottawa, Ontario

Drwn By:	Chkd By:	
JD	DP	Mitigation Measures

Date: July 2021

Rev. 0

Figure 9

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Coordinate System: NAD 1983 UTM Zone 18N
Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

7.6 Species at Risk

7.6.1 Eastern Small-footed Myotis, Little Brown Myotis, and Tri-Colored Bat

To protect roosting and foraging bats, tree removal where required should take place outside of April 1 to September 1) to avoid the spring and summer active season, when bats are more likely to be using forest habitat. If vegetation clearing must be conducted during the spring and summer timing window than a roost survey should be conducted be a qualified professional.

7.6.2 Butternut

As indicated in Section 6.4, no butternut trees were identified on-site. However, if butternuts are observed on site in the future, a Butternut Health Assessment shall be completed by a certified Butternut Health Assessor submitted to the Kemptville district MECP office prior to any site alterations within 50 metres of any individual butternut tree.

7.7 Wildlife

The following avoidance and mitigation measures are provided in effort to minimize impacts to on-site and off-site wildlife:

- To protect wildlife during construction, construction should be completed in accordance with the best practices outlined in Protocols for Wildlife Protection During Construction, from the City of Ottawa (Ottawa, 2015) and Bird-Safe Design Guidelines from the City of Ottawa (Ottawa, 2020).
- Vegetation removal should occur outside of April 1 to September 1 to avoid the key breeding bird period and bat summer active season. The timing windows provides protection of migratory birds, roosting bats and avoids contravention of the Migratory Bird Convention Act and Endangered Species Act. If vegetation clearing activities must take place during the aforementioned timing window than a nest and roost survey shall be conducted by a qualified professional.
- Installation of silt fence barriers around the entire construction envelope of each future residential dwelling to prohibit the emigration of wildlife into the construction area during lot-level construction.
- Perform daily pre-work sweeps of the each lot construction area to ensure no species at risk are present and to remove any wildlife from inside the construction area.
- Should any species at risk be discovered throughout the course of the proposed works, the species at risk biologist with the local MECP district should be contacted immediately and operations modified to avoid any negative impacts to species at risk or their habitat until further direction is provided by the MECP.

7.8 Best Practice Measures for Mitigation of Cumulative Impacts

The following best management practice measures are provided for the mitigation of cumulative impacts resulting from general construction and development activities;

- Stormwater generated from the proposed development is to be managed on-site such that dewatering discharge during construction and discharge to watercourse post-development, are both equal to pre-development discharge rates. Site stormwater management should also be treated to achieve a reduction of 80% TSS prior to discharge.
- To protect trees identified to be retained during construction, the Critical Root Zone (CRZ) should be identified and fenced. The CRZ is defined as 10 cm from the base of the tree for every centimetre in diameter of the tree trunk measured at breast height.
- Maintain as much permeable surface as possible in future development plans to minimize the generation of storm water runoff.
- Erosion and sediment control measures should be maintained until all disturbed ground has been permanently stabilized.
- In effort to offset the effect of vegetation clearing, consideration should be given to landscape planting with native tree species indicative of the Great Lakes – St. Lawrence Forest Region, such as white cedar, white spruce, red maple and red oak.

8.0 CONCLUSIONS

The proposed project supported by this EIS is a plan of subdivision application for Part of Lots 3 and 4, Concession 3, in the Geographic Township of Osgoode. The proposed plan of subdivision includes the creation or extension of four residential roads providing access to 73, one-acre (0.4 ha) residential lots, three naturalized stormwater management ponds, creation of a wildlife travel corridor and extension of the existing Greely Loop (pathway system). The proposed development will occupy the entire 35 ha subject site.

Based on the results of the impact analysis, impacts to the natural environment are anticipated however; within the local and regional context, impacts to the natural environment, primarily the loss of woodlands and local wetlands are anticipated to be minimal. Provided that mitigation measures recommended in Section 7 are implemented as proposed, no significant residual impacts are anticipated from the proposed development.

Following review of the information pertaining to the natural heritage features of the site, the following general conclusions are provided by GEMTEC in regards to the Environmental Impact Statement.

- No significant impacts to natural heritage features identified on-site, including significant woodlands, significant wildlife habitat or habitats of species at risk are anticipated as a result of future residential subdivision development.
- The proposed project complies with the natural heritage policies of the Provincial Policy Statement and meets the intent of the City of Ottawa Official Plan to support natural systems and encourage responsible development within designated settlement areas.

9.0 LIMITATION OF LIABILITY

This report and the work referred to within it have been undertaken by GEMTEC Consulting Engineers and Scientists Ltd (GEMTEC), and prepared for 9287043 Canada Corporation and is intended for the exclusive use of 9287043 Canada Corporation. This report may not be relied upon by any other person or entity without the express written consent of GEMTEC and 9287043 Canada Corporation. Nothing in this report is intended to provide a legal opinion.

The investigation undertaken by GEMTEC with respect to this report and any conclusions or recommendations made in this report reflect the best judgements of GEMTEC based on the site conditions observed during the investigations undertaken at the date(s) identified in the report and on the information available at the time the report was prepared.

This report has been prepared for the application noted and it is based, in part, on visual observations made at the site, all as described in the report. Unless otherwise stated, the findings contained in this report cannot be extrapolated or extended to previous or future site conditions, or portions of the site that were unavailable for direct investigation.

Should new information become available during future work, including excavations, borings or other studies, GEMTEC should be requested to review the information and, if necessary, re-assess the conclusions presented herein.

We trust this report provides sufficient information for your present purposes. If you have any questions concerning this report, please do not hesitate to contact our office.

Taylor Warrington, B.Sc.
Biologist

Drew Paulusse, B.Sc.
Senior Biologist

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APPENDIX A

Site Photographs

Site Photograph 1: Dry-Fresh Sugar Maple Forest (FOD5)

Site Photograph 2: Fresh-Moist Poplar Forest (FOD8-1)

Site Photograph 3: Maple Swamp (SWD3)

Site Photograph 4: Red Maple Swamp (SWD3-1)

GEMTEC Consulting Engineers and Scientists	Project Environmental Impact Statement, Part of Lots 3 & 4, Concession 3, Osgoode Ottawa, Ontario	**APPENDIX A** File No. 100484.001	**Site Photographs**

Site Photograph 5: Cultural Meadow (CUM)

Site Photograph 6: Cultural Meadow Looking North along HDF5

Site Photograph 7: FOD5 Showing Size Class and Understory

Site Photograph 8: FOD5 Showing Size Class and Understory

GEMTEC Consulting Engineers and Scientists	Project Environmental Impact Statement, Part of Lots 3 & 4, Concession 3, Osgoode Ottawa, Ontario	**APPENDIX A** File No. 100484.001	**Site Photographs**

Site Photograph 9: Dry-Fresh Poplar Forest (FOD3-1)

Site Photograph 10: Fresh-Moist Poplar Forest (FOD8-1)

Site Photograph 11: SWD3-1 Looking South to FOD2

Site Photograph 12: HDF #7 Looking North

GEMTEC Consulting Engineers and Scientists	Project: Environmental Impact Statement, Part of Lots 3 & 4, Concession 3, Osgoode Ottawa, Ontario	**APPENDIX A**	**Site Photographs**
		File No. 100484.001	

APPENDIX B

Report Summary Tables

TABLE B.1
SUMMARY OF WILDLIFE OBSERVED ON-SITE AND ADJACENT TO SITE

Common Name	Scientific Name	S-Rank	Evidence
Avian Species			
American crow	*Corvus brachyrhynchos*	S5B	Heard calling
American goldfinch	*Spinus tristis*	S5B	Heard calling
American redstart	*Setophaga ruticilla*	S5B	Heard calling
American robin	*Turdus migratorius*	S5B	Heard calling, observed foraging
Black-and-white warbler	*Mniotilta varia*	S5B	Heard calling
Black-capped chickadee	*Poecile atricapillus*	S5	Heard calling
Blue jay	*Cyanocitta cristata*	S5	Heard calling
Brown creeper	*Certhia americana*	S5B	Observed foraging
Chestnut-sided warbler	*Setophaga pensylvanica*	S5B	Heard calling
Common grackle	*Quiscalus quiscala*	S5B	Heard calling
Common yellowthroat	*Geothlypis trichas*	S5B	Heard calling
Downy woodpecker	*Picoides pubescens*	S5	Heard calling
Eastern phoebe	*Sayornis phoebe*	S5B	Heard calling
Eastern wood-pewee	*Contopus virens*	S4B	Heard calling
Great-crested flycatcher	*Myiarchus crinitus*	S4B	Heard calling
Hairy woodpecker	*Picoides villosus*	S5	Observed on-site
Mallard	*Anas platyrhnchos*	S5	Heard calling, observed swimming
Northern flicker	*Colaptes auratus*	S4B	Heard calling, observed foraging
Northern cardinal	*Cardinalis cardinalis*	S5	Heard calling
Northern waterthrush	*Parkesia noveboracensis*	S5B	Heard calling
Ovenbird	*Seiurus aurocapilla*	S4B	Heard calling
Red-breasted nuthatch	*Sitta canadensis*	S5	Heard calling
Red-eyed Vireo	*Vireo olivaceus*	S5B	Heard calling
Song sparrow	*Melospiza melodia*	S5B	Heard calling
Swamp sparrow	*Melospiza georgiana*	S5B	Heard calling
Veery	*Catharus fuscenscens*	S4B	Heard calling
White-breasted nuthatch	*Sitta carolinensis*	S5	Heard calling
White-throated sparrow	*Zonotrichia albicollis*	S5B	Heard calling
Wild Turkey	*Meleagris gallopavo*	S5	Observed on-site
Winter wren	*Troglodytes hiemalis*	S5B	Heard calling
Wood thrush	*Hylocichla mustelina*	S4B	Heard calling
Yellow warbler	*Setophaga petechia*	S5B	Heard calling
Yellow-bellied sapsucker	*Sphyrapicus varius*	S5B	Heard calling and drumming
Mammalian Species			
Coyote	*Canis latrans*	S5	Observed feces on site
Eastern cottontail	*Sylvilagus floridanus*	S5	Obsered on-site
Northern raccoon	*Procyon lotor*	S5	Observed on-site
Amphibian Species			
American Toad	*Anaxyrus americanus*	S5	Heard calling
Gray treefrog	*Hyla versicolor*	S5	Heard calling
Northern leopard frog	*Lithobates pipiens*	S5	Heard calling
Spring peeper	*Pseudacris crucifer*	S5	Heard calling
Western chorus frog	*Pseudacris triseriata*	S4	Heard calling

Notes:
* Denotes a threatened or endangered Species at Risk under the ESA
Subnational Conservation Status Ranks:
S1 – Critically Imperiled, at very high risk of extirpation, very few populations or occurrences or very steep population decline;
S2 – Imperiled, at high risk of extirpation, few populations or occurrences or steep population decline;
S3 – Vulnerable, at moderate risk of extirpation, relatively few populations or occurrences, recent and widespread population decline;
S4 – Apparently Secure, at a fairly low risk of extirpation, many populations or occurrences, some concern for local population decline;
S5 – Secure, at very low or no risk of extirpation, abundant populations or occurrences, little to no concern for population decline.
Qualifiers:
S#B – Conservation status refers to the breeding population of the species;
S#N – Conservation status refers to the non-breeding population of the species;
S#M – Migrant species, conservation status refers to the aggregating transient population of the species.

TABLE B.6
SCREENING RATIONALE FOR ANIMAL MOVEMENT CORRIDORS

General Habitats of Species of Conservation Concern	Further Considered in EIS	Rationale
Amphibian Movement Corridor	Yes	*Confirmed* wetland breeding is present within the Red Maple Deciduous Swamp to the North.
Deer Movement Corridor	No	No winter deer yards have been identified on-site by the OMNRF.

APPENDIX C

Headwater Drainage Feature Assessment
(GEMTEC, 2021)

GEMTEC Consulting Engineers and Scientists Limited
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July 14, 2021 File: 100484.001

9287043 Canada Corporation
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Greely, Ontario
K4P 1M8

Attention: Mr. Dan Anderson

Re: Headwater Drainage Feature Assessment
Proposed Plan of Subdivision, Par of Lots 3 and 4, Concession 3, Ottawa, Ontario

1.0 INTRODUCTION

GEMTEC Consulting Engineers and Scientists Limited (GEMTEC) was retained by 9287043 Canada Corporation to carry out a Headwater Drainage Feature Assessment (HDFA) for the proposed Plan of Subdivision located on Part of Lots 3 and 4, Concession 3, Osgoode Township, Ottawa, Ontario, hereafter referred to as the "subject property". This memo provides a summary of the HDFA results based on the completion of all three seasonal HDF site investigations and is intended to provide supplementary details to the Environmental Impact Statement for the proposed Plan of Subdivision.

1.1 Purpose

The proponent is seeking to develop an approximately 35 hectare (ha) property into a 73-lot residential subdivision within the Village of Greely. A portion of the proposed Plan of Subdivision includes the realignment and potential infilling of headwater features on-site. In order to assess the feasibility of realigning various headwater features a headwater drainage feature assessment (HDFA) is required to assess the surface water features on-site, herein referred to as headwater drainage features (HDF). The subject property and identified HDFs are illustrated on Figure A.1 in the Attachments.

This HDFA report is principally focused on identifying, evaluating and assessing impacts to headwater drainage features on the subject lands for the proposed Plan of Subdivision, specifically as it relates to stormwater management facilities, realignments and impact assessment to HDFs identified on-site.

1.2 Policy Context and Objective

Under Section 28 (1) of the Conservation Authorities Act, conservation authorities have the ability to define the definition of a watercourse, which is defined under Section 28 (5) of the Act as "*An identifiable depression in the ground in which a flow of water regularly or continuously occurs*". Headwater drainage features are defined as "*non-permanently flowing drainage features that may not have defined bed or banks; they are first-order and zero-order intermittent and ephemeral channels, swales and connected to headwater wetlands, but do not include rills or furrows*". According to conservation authorities in Ontario, headwater drainage features meet the definition of a watercourse.

The objective of the work presented herein is twofold; 1) to identify headwater drainage features on the subject property; and 2) to evaluate and classify identified headwater drainage features in accordance with *"Evaluation, Classification and Management of Headwater Drainage Features Guidelines*" developed by Toronto Region Conservation Authority and the Credit Valley Conservation (TRCA/CVC, 2014), including recommended mitigation and conservation measures.

In practice, the HDFA framework referenced above is typically applied to land development proposals occurring within an agricultural landscape to identify and evaluate the conservation value of natural or residual surface drainage features. In light of this, there is some uncertainty associated with application of the HDFA framework to the various dug drainage features (i.e., all HDFs identified herein). Specifically, as it relates to applying the HDFA framework to channelized, anthropogenic features within a forested landscape.

2.0 METHODOLOGY

2.1 Desktop Review

A desktop information gathering exercise was completed to aid in the scoping of field investigations and to gather background information relating to headwater drainage features (HDFs) on-site.

Information relating to the presence and assessment of headwater drainage features on-site was obtained from the following sources:

- Evaluation, Classification and Management of Headwater Drainage Features Guidelines (TRCA/CVC, 2014);
- Ontario Stream Assessment Protocol, Section 4, Module 11 (OSAP, 2017);
- Make a Map: Natural Heritage Areas (OMNRF, 2014); and
- Ontario Flow Assessment Tool (OMNRF, 2020).

2.2 Field Investigations

Field data collection for HDFs on-site followed the protocol outlined in Section 4: Module 11, "Unconstrained Headwater Sampling" from the Ontario Stream Assessment Protocol (Stanfield, 2017).

Field investigations completed in support of this report are summarized in Table 2.2 below, while site photographs taken during the field investigations are provided in Attachment B. Figure A.2 in the Attachments illustrates where site photographs were taken.

Table 2.2 Summary of Field Investigations

Date	Time	Weather	Purpose
April 9, 2021	09:00 – 13:30	19°C, Beaufort 1, no precipitation	Early Spring HDFA
May 13, 2021	09:20 – 14:00	8°C, Beaufort 1, no precipitation	Late Spring HDFA
May 31, 2021	16:30 – 18:30	24°C, Beaufort 3, no precipitation	Base Flow HDFA

Data collected during the site investigations included flow conditions, sediment transport, feature roughness, riparian and feature vegetation, as well as upstream and downstream site features. As outlined in the OSAP manual for assessing headwater drainage features, three site visits were completed.

Assessment and classification of the headwater drainage features on-site followed the protocols outlined in the Evaluation, Classification and Management of Headwater Drainage Features Guidelines manual (TRCA/CVC, 2014). Functions of the headwater drainage feature that were evaluated included hydrology, vegetation, fish and fish habitat, and terrestrial habitat. Mitigation and management recommendations provided for HDFs are based on the results of the classification.

3.0 HEADWATER DRAINAGE FEATURES ASSESSMENT

Site Characteristics

The 35 ha property is currently a mosaic of deciduous forests, deciduous swamps and cultural meadows. The site is located within the Castor River subwatershed, within the Lower Ottawa River watershed and is under the jurisdiction of the South Nation Conservation Authority (SNC). Through a review of LiDAR mapping data, all surface drainage from the subject site is towards Greys Creek, a tributary to the Castor River within the South Nation River watershed.

Based on the desktop review and site investigations completed, seven HDFs have been identified within the subject property. It should be noted that all HDFs identified herein are of anthropogenic origins. The seven HDFs are labelled consecutively H1 through H7 and are illustrated on Figure A.1.

The topographical depression of H1 originates within a Fresh-Moist Poplar Deciduous Forest and grades downwards in a west direction for approximately 70 m where it confluences with H2.

The topographical depression of H2 originates at the confluence of H1 within the Fresh-Moist Poplar Deciduous Forest and grades downwards in a northern direction for approximately 250 m, where is confluences with both H3 and H4 before it discharges into H5.

H3 originates within the Dry-Fresh Sugar Maple Deciduous Forest and flows in a west direction for 48 m before it confluences with H2.

H4 originates within the Dry-Fresh Sugar Maple Deciduous and flows in a west direction for 183 m before it confluences with H2.

H5 originates out of the wetlands (Red Maple Mineral deciduous swamp and Non-native Mineral Deciduous Thicket) in the northwest side of the study area and flows in a west direction through the Dry-Fresh Sugar Maple Forest and cultural meadow before exiting the site. Offsite, H5 connects to the drainage network of the approved subdivision located immediately adjacent to the site.

H6 is a multi-stemmed feature of anthropogenic origin, H6 originates within the Dry-Fresh Sugar Maple Deciduous Forest and the Maple Mineral Swamp, the various stems of H6 have been separated through the use of consecutive alphabetic identifiers, and have been labelled H6A through H6D. Overall H6 flows for approximately 288 m in an overall north direction before it discharges into H5. H6A originates within the Maple Mineral Swamp and is the main feature of H6. H6B, H6C and H6D all originate within the Dry-Fresh Sugar Maple Deciduous Forest, and confluence with the main channel of H6, which eventually drains into H5. It is clear that the multi-stemmed nature of H6 is the result of anthropogenic drainage efforts within this portion of the subject site, as evidenced by the excavation spoils adjacent to the feature(s).

H7 enters the subject property along the southeast property boundary, originating from the drainage network of Osgoode Gardens subdivision to the east and flows for approximately 162 m before discharging into the Red Maple Deciduous Swamp.

Each HDF identified is described in more detail, including summaries of collected field data, in the subsections below.

3.1.1 H1

H1 is a channelized surface water feature; during the first spring visit this feature was observed to be dry. Conditions within H1 were also dry during subsequent late spring and base flow visits. No vegetation was observed within H1 during any of the site visits, riparian vegetation is comprised of forest, specifically Fresh-Moist Poplar Deciduous Forest.

Table 3.1 below summarizes the existing conditions and characteristics of H1 observed during the site investigation. H1 was assessed as a single site with no site break triggers.

Table 3.1 Summary of Existing Conditions for H1

Site Visit	Hydrology			Vegetation Assessment		Channel Form			Sediment Transport		
	Flow Influence (FI)	Flow Condition (FC)	Feature Type (FT)	Feature	Riparian	Average Wetted Width (m)	Average Depth (*range*) (cm)	Average Bankfull Width (m)	Substrate	Sediment Transport	Sediment Dep.
1	Freshet (1)	Dry (1)	Channelized (2)	None (1)	Forest (7)	--	--	1.6	Sandy Silt	None	None
2	Baseflow (3)	Dry (1)	Channelized (2)	None (1)	Forest (7)	--	--	1.6	Sandy Silt	None	None
3	Baseflow (3)	Dry (1)	Channelized (2)	None (1)	Forest (7)	--	--	1.6	Sandy Silt	None	None

Notes:

-- = Not recorded/unable to record

Flow Influence = OSAP flow influence code: 1) spring freshet (immediately flowing freshet ~ late winter/early spring); 2) spate (~late April through mid-May); and, 3) baseflow (July through mid-September).

Flow Condition = OSAP flow condition codes: 1) no flow; 2) standing water; 3) interstitial flow; 4) surface flow minimal (<0.5 L/s); and, 5) surface flow substantial (>0.5 L/s).

Feature Type = OSAP feature type codes: 1) defined natural channel; 2) channelized; 3) multi-thread; 4) no defined feature; 5) tiled drainage; 6) wetland; 7) swale; 8) roadside ditch; and, 9) online pond outlet.

Vegetation Assessment = OSAP Vegetation Codes: 1) no vegetation; 2) lawn; 3) cropped land; 4) meadow; 5) scrubland; 6) wetland; and, 7) forest.

3.1.2 H2

H2 is a channelized surface water feature, vegetation within the feature was not present and riparian vegetation was dominated by forest, specifically Dry-Fresh Sugar Maple Deciduous Forest and Fresh-Moist Poplar Deciduous Forest. H2 is comprised of a single branch, with multiple confluences along its path. The presence of these confluences has lead to differences in flow observed throughout the different reaches of the channel. As such, H2 has been further divided into H2A and H2B, with H2A occurring from the downstream extent of H2 and continuing to the confluence with H4. And H2B occurring from the confluence of H2 with H4 and continuing until H4 discharges into H5. Due to the differences observed in flow between H2A and H2B, each segment is discussed as a separate feature, in the subsections below.

3.1.2.1 H2A

H2A was observed to be dry during all three site investigations. Table 3.2 below summarizes the existing conditions and characteristics of H2A observed during the site investigations. H2A was assessed as a single site with no site break triggers.

3.1.2.2 H2B

H2B was observed to have standing water during the first and second site visits and was observed to be dry during the third visit. Table 3.3 below summarizes the existing conditions and characteristics of H2B observed during the site investigations. H2B was assessed as a single site with no site break triggers.

Table 3.2 Summary of Existing Conditions for H2A

Site Visit	Hydrology			Vegetation Assessment		Channel Form			Sediment Transport		
	Flow Influence (FI)	Flow Condition (FC)	Feature Type (FT)	Feature	Riparian	Average Wetted Width (m)	Average Depth (*range*) (cm)	Average Bankfull Width (m)	Substrate	Sediment Transport	Sediment Dep.
1	Freshet (1)	Dry (1)	Channelized (2)	None (1)	Forest (7)	--	--	2	Silty sand	None	None
2	Baseflow (3)	Dry (1)	Channelized (2)	None (1)	Forest (7)	--	--	2	Silty Sand	None	None
3	Baseflow (3)	Dry (1)	Channelized (2)	None (1)	Forest (7)	--	--	2	Silty Sand	None	None

Notes:

-- = Not recorded/unable to record

Flow Influence = OSAP flow influence code: 1) spring freshet (immediately flowing freshet ~ late winter/early spring); 2) spate (~late April through mid-May); and, 3) baseflow (July through mid-September).

Flow Condition = OSAP flow condition codes: 1) no flow; 2) standing water; 3) interstitial flow; 4) surface flow minimal (<0.5 L/s); and, 5) surface flow substantial (>0.5 L/s).

Feature Type = OSAP feature type codes: 1) defined natural channel; 2) channelized; 3) multi-thread; 4) no defined feature; 5) tiled drainage; 6) wetland; 7) swale; 8) roadside ditch; and, 9) online pond outlet.

Vegetation Assessment = OSAP Vegetation Codes: 1) no vegetation; 2) lawn; 3) cropped land; 4) meadow; 5) scrubland; 6) wetland; and, 7) forest.

Table 3.3 Summary of Existing Conditions for H2B

Site Visit	Hydrology			Vegetation Assessment		Channel Form			Sediment Transport		
	Flow Influence (FI)	Flow Condition (FC)	Feature Type (FT)	Feature	Riparian	Average Wetted Width (m)	Average Depth (*range*) (cm)	Average Bankfull Width (m)	Substrate	Sediment Transport	Sediment Dep.
1	Freshet (1)	Standing Water (2)	Channelized (2)	None (1)	Forest (7)	--	--	1.7	Silty sand	None	None
2	Baseflow (3)	Standing Water (2)	Channelized (2)	None (1)	Forest (7)	0.7	13.67 (*5-25*)	1.7	Silty Sand	None	None
3	Baseflow (3)	Dry (1)	Channelized (2)	None (1)	Forest (7)	--	--	1.7	Silty Sand	None	None

Notes:

-- = Not recorded/unable to record

Flow Influence = OSAP flow influence code: 1) spring freshet (immediately flowing freshet ~ late winter/early spring); 2) spate (~late April through mid-May); and, 3) baseflow (July through mid-September).

Flow Condition = OSAP flow condition codes: 1) no flow; 2) standing water; 3) interstitial flow; 4) surface flow minimal (<0.5 L/s); and, 5) surface flow substantial (>0.5 L/s).

Feature Type = OSAP feature type codes: 1) defined natural channel; 2) channelized; 3) multi-thread; 4) no defined feature; 5) tiled drainage; 6) wetland; 7) swale; 8) roadside ditch; and, 9) online pond outlet.

Vegetation Assessment = OSAP Vegetation Codes: 1) no vegetation; 2) lawn; 3) cropped land; 4) meadow; 5) scrubland; 6) wetland; and, 7) forest.

3.1.3 H3

H3 is a channelized surface water feature; during the all three seasonal visits this feature was observed to be dry. No vegetation was observed within H3 during any of the site visits, riparian vegetation is comprised of forest, specifically Dry-Fresh Sugar Maple Deciduous Forest.

Table 3.4 below summarizes the existing conditions and characteristics of H3 observed during the site investigation. H3 was assessed as a single site with no site-break triggers.

Table 3.4 Summary of Existing Conditions for H3

Site Visit	Hydrology		Vegetation Assessment			Channel Form			Sediment Transport		
	Flow Influence (FI)	Flow Condition (FC)	Feature Type (FT)	Feature	Riparian	Average Wetted Width (m)	Average Depth (*range*) (cm)	Average Bankfull Width (m)	Substrate	Sediment Transport	Sediment Dep.
1	Freshet (1)	Dry (1)	Channelized (2)	None (1)	Forest (7)	--	--	1.5	Silty sand	None	None
2	Baseflow (3)	Dry (1)	Channelized (2)	None (1)	Forest (7)	--	--	1.5	Silty Sand	None	None
3	Baseflow (3)	Dry (1)	Channelized (2)	None (1)	--	--	--	1.5	Silty Sand	None	None

Notes:

-- = Not recorded/unable to record

Flow Influence = OSAP flow influence code: 1) spring freshet (immediately flowing freshet ~ late winter/early spring); 2) spate (~late April through mid-May); and, 3) baseflow (July through mid-September).

Flow Condition = OSAP flow condition codes: 1) no flow; 2) standing water; 3) interstitial flow; 4) surface flow minimal (<0.5 L/s); and, 5) surface flow substantial (>0.5 L/s).

Feature Type = OSAP feature type codes: 1) defined natural channel; 2) channelized; 3) multi-thread; 4) no defined feature; 5) tiled drainage; 6) wetland; 7) swale; 8) roadside ditch; and, 9) online pond outlet.

Vegetation Assessment = OSAP Vegetation Codes: 1) no vegetation; 2) lawn; 3) cropped land; 4) meadow; 5) scrubland; 6) wetland; and, 7) forest.

3.1.4 H4

H4 is a channelized surface water feature; during the early spring visit this feature was observed to have interstitial flow throughout the feature. By the second, late spring visit, this feature had interstitial flow in the downstream half of the feature and had dry/standing water in the upper reaches. At the time of the third site investigation, this feature was observed to by dry all the way through. No vegetation was observed within H4 during any of the site visits, riparian vegetation is comprised of forest, specifically Dry-Fresh Sugar Maple Deciduous Forest.

Table 3.5 below summarizes the existing conditions and characteristics of H4 observed during the site investigation. During the site investigations, the HDF was assessed in multiple sites based on site break triggers but the sites have been grouped for evaluation purposes.

Table 3.5 Summary of Existing Conditions for H4

Site Visit	Hydrology			Vegetation Assessment		Channel Form			Sediment Transport		
	Flow Influence (FI)	Flow Condition (FC)	Feature Type (FT)	Feature	Riparian	Average Wetted Width (m)	Average Depth (*range*) (cm)	Average Bankfull Width (m)	Substrate	Sediment Transport	Sediment Dep.
1	Freshet (1)	Interstitial (3)	Channelized (2)	None (1)	Forest (7)	--	--	2.5	Silty sand	None	None
2	Baseflow (3)	Interstitial (3)	Channelized (2)	None (1)	Forest (7)	1.9	10 (*7-13*)	2.5	Silty Sand	None	None
3	Baseflow (3)	Dry (1)	Channelized (2)	None (1)	Forest (7)	--	--	2.5	Silty Sand	None	None

Notes:

-- = Not recorded/unable to record

Flow Influence = OSAP flow influence code: 1) spring freshet (immediately flowing freshet ~ late winter/early spring); 2) spate (~late April through mid-May); and, 3) baseflow (July through mid-September).

Flow Condition = OSAP flow condition codes: 1) no flow; 2) standing water; 3) interstitial flow; 4) surface flow minimal (<0.5 L/s); and, 5) surface flow substantial (>0.5 L/s).

Feature Type = OSAP feature type codes: 1) defined natural channel; 2) channelized; 3) multi-thread; 4) no defined feature; 5) tiled drainage; 6) wetland; 7) swale; 8) roadside ditch; and, 9) online pond outlet.

Vegetation Assessment = OSAP Vegetation Codes: 1) no vegetation; 2) lawn; 3) cropped land; 4) meadow; 5) scrubland; 6) wetland; and, 7) forest.

3.1.5 H5

H5 is a channelized surface water feature; during the early spring visit this feature was observed to have minimal and interstitial flow throughout the feature. By the second, late spring visit, this feature had interstitial flow throughout the feature. At the time of the third site investigation, this feature was observed to by dry all the way through. Meadow vegetation was dominant throughout H5, riparian vegetation contained both scrubland and forest vegetation, but was more dominated by forest habitat, specifically Dry-Fresh Sugar Maple Deciduous Forest.

Table 3.6 below summarizes the existing conditions and characteristics of H5 observed during the site investigation. During the site investigations, the HDF was assessed in multiple sites based on site break triggers but the sites have been grouped for evaluation purposes.

Table 3.6 Summary of Existing Conditions for H5

Site Visit	Hydrology			Vegetation Assessment		Channel Form			Sediment Transport		
	Flow Influence (FI)	Flow Condition (FC)	Feature Type (FT)	Feature	Riparian	Average Wetted Width (m)	Average Depth (*range*) (cm)	Average Bankfull Width (m)	Substrate	Sediment Transport	Sediment Dep.
1	Freshet (1)	Minimal (4)	Channelized (2)	None (1)	Forest (7)	--	--	2.9	Silty sand	None	None
2	Baseflow (3)	Interstitial (3)	Channelized (2)	None (1)	Forest (7)	1.68	16 (*10-30*)	2.9	Silty Sand	None	None
3	Baseflow (3)	Dry (1)	Channelized (2)	None (1)	Forest (7)	--	--	2.9	Silty Sand	None	None

Notes:

-- = Not recorded/unable to record

Flow Influence = OSAP flow influence code: 1) spring freshet (immediately flowing freshet ~ late winter/early spring); 2) spate (~late April through mid-May); and, 3) baseflow (July through mid-September).

Flow Condition = OSAP flow condition codes: 1) no flow; 2) standing water; 3) interstitial flow; 4) surface flow minimal (<0.5 L/s); and, 5) surface flow substantial (>0.5 L/s).

Feature Type = OSAP feature type codes: 1) defined natural channel; 2) channelized; 3) multi-thread; 4) no defined feature; 5) tiled drainage; 6) wetland; 7) swale; 8) roadside ditch; and, 9) online pond outlet.

Vegetation Assessment = OSAP Vegetation Codes: 1) no vegetation; 2) lawn; 3) cropped land; 4) meadow; 5) scrubland; 6) wetland; and, 7) forest.

3.1.6 H6

H6 is a multi-stem, channelized surface water feature, vegetation within the feature was not present and riparian vegetation was dominated by forest, specifically Dry-Fresh Sugar Maple Deciduous Forest. H6 is compose of four branches that confluence together before discharging into H5 at a single locations. The branches of H6 have been further identified as H6A, H6B, H6C and H6D. Due to significant differences in flow observed throughout the investigations, each segment is discussed as a separate feature, in the subsections below.

3.1.6.1 H6A

H6A was observed to have minimal flows during the first spring visit, interstitial flow during the second spring visit and was dry during the third visit. Table 3.7 below summarizes the existing conditions and characteristics of H6A observed during the site investigations. During the site investigations, H6A was assessed in multiple sites based on site break triggers but the sites have been grouped for evaluation purposes.

3.1.6.2 H6B

H6B was observed to be dry during all three site investigations. Table 3.8 below summarizes the existing conditions and characteristics of H6B observed during the site investigations. H6B was assessed as a single site with no site break triggers.

3.1.6.3 H6C

H6C was observed to have standing water in the first and second site visits, and was dry during the third site investigation. Table 3.9 below summarizes the existing conditions and characteristics of H6C observed during the site investigations. H6C was assessed as a single site with no site break triggers.

3.1.6.4 H6D

H6D was observed to have standing water in the first and second site visits, and was dry during the third site investigation. Table 3.10 below summarizes the existing conditions and characteristics of H6D observed during the site investigations. H6D was assessed as a single site with no site break triggers.

Table 3.7 Summary of Existing Conditions for H6A

Site Visit	Hydrology			Vegetation Assessment		Channel Form			Sediment Transport		
	Flow Influence (FI)	Flow Condition (FC)	Feature Type (FT)	Feature	Riparian	Average Wetted Width (m)	Average Depth (*range*) (cm)	Average Bankfull Width (m)	Substrate	Sediment Transport	Sediment Dep.
1	Freshet (1)	Minimal (4)	Channelized (2)	None (1)	Forest (7)	--	--	3	Silty sand	None	None
2	Baseflow (3)	Interstitial (3)	Channelized (2)	None (1)	Forest (7)	1.35	5.83 (*2-15*)	3	Silty Sand	None	None
3	Baseflow (3)	Dry (1)	Channelized (2)	None (1)	Forest (7)	--	--	3	Silty Sand	None	None

Notes:

-- = Not recorded/unable to record

Flow Influence = OSAP flow influence code: 1) spring freshet (immediately flowing freshet ~ late winter/early spring); 2) spate (~late April through mid-May); and, 3) baseflow (July through mid-September).

Flow Condition = OSAP flow condition codes: 1) no flow; 2) standing water; 3) interstitial flow; 4) surface flow minimal (<0.5 L/s); and, 5) surface flow substantial (>0.5 L/s).

Feature Type = OSAP feature type codes: 1) defined natural channel; 2) channelized; 3) multi-thread; 4) no defined feature; 5) tiled drainage; 6) wetland; 7) swale; 8) roadside ditch; and, 9) online pond outlet.

Vegetation Assessment = OSAP Vegetation Codes: 1) no vegetation; 2) lawn; 3) cropped land; 4) meadow; 5) scrubland; 6) wetland; and, 7) forest.

Table 3.8 Summary of Existing Conditions for H6B

Site Visit	Hydrology			Vegetation Assessment		Channel Form			Sediment Transport		
	Flow Influence (FI)	Flow Condition (FC)	Feature Type (FT)	Feature	Riparian	Average Wetted Width (m)	Average Depth (*range*) (cm)	Average Bankfull Width (m)	Substrate	Sediment Transport	Sediment Dep.
1	Freshet (1)	Dry (1)	Channelized (2)	None (1)	Forest (7)	--	--	2.4	Silty sand	None	None
2	Baseflow (3)	Dry (1)	Channelized (2)	None (1)	Forest (7)	--	--	2.4	Silty Sand	None	None
3	Baseflow (3)	Dry (1)	Channelized (2)	None (1)	Forest (7)	--	--	2.4	Silty Sand	None	None

Notes:

-- = Not recorded/unable to record

Flow Influence = OSAP flow influence code: 1) spring freshet (immediately flowing freshet ~ late winter/early spring); 2) spate (~late April through mid-May); and, 3) baseflow (July through mid-September).

Flow Condition = OSAP flow condition codes: 1) no flow; 2) standing water; 3) interstitial flow; 4) surface flow minimal (<0.5 L/s); and, 5) surface flow substantial (>0.5 L/s).

Feature Type = OSAP feature type codes: 1) defined natural channel; 2) channelized; 3) multi-thread; 4) no defined feature; 5) tiled drainage; 6) wetland; 7) swale; 8) roadside ditch; and, 9) online pond outlet.

Vegetation Assessment = OSAP Vegetation Codes: 1) no vegetation; 2) lawn; 3) cropped land; 4) meadow; 5) scrubland; 6) wetland; and, 7) forest.

Table 3.9 Summary of Existing Conditions for H6C

Site Visit	Hydrology			Vegetation Assessment		Channel Form			Sediment Transport		
	Flow Influence (FI)	Flow Condition (FC)	Feature Type (FT)	Feature	Riparian	Average Wetted Width (m)	Average Depth (*range*) (cm)	Average Bankfull Width (m)	Substrate	Sediment Transport	Sediment Dep.
1	Freshet (1)	Standing Water (2)	Channelized (2)	None (1)	Forest (7)	--	--	2.3	Silty sand	None	None
2	Baseflow (3)	Standing Water (2)	Channelized (2)	None (1)	Forest (7)	1.6	5 (*2-9*)	2.4	Silty Sand	None	None
3	Baseflow (3)	Dry (1)	Channelized (2)	None (1)	Forest (7)	--	--	2.4	Silty Sand	None	None

Notes:

-- = Not recorded/unable to record

Flow Influence = OSAP flow influence code: 1) spring freshet (immediately flowing freshet ~ late winter/early spring); 2) spate (~late April through mid-May); and, 3) baseflow (July through mid-September).

Flow Condition = OSAP flow condition codes: 1) no flow; 2) standing water; 3) interstitial flow; 4) surface flow minimal (<0.5 L/s); and, 5) surface flow substantial (>0.5 L/s).

Feature Type = OSAP feature type codes: 1) defined natural channel; 2) channelized; 3) multi-thread; 4) no defined feature; 5) tiled drainage; 6) wetland; 7) swale; 8) roadside ditch; and, 9) online pond outlet.

Vegetation Assessment = OSAP Vegetation Codes: 1) no vegetation; 2) lawn; 3) cropped land; 4) meadow; 5) scrubland; 6) wetland; and, 7) forest.

Table 3.10 Summary of Existing Conditions for H6D

Site Visit	Hydrology			Vegetation Assessment		Channel Form			Sediment Transport		
	Flow Influence (FI)	Flow Condition (FC)	Feature Type (FT)	Feature	Riparian	Average Wetted Width (m)	Average Depth (*range*) (cm)	Average Bankfull Width (m)	Substrate	Sediment Transport	Sediment Dep.
1	Freshet (1)	Standing Water (2)	Channelized (2)	None (1)	Forest (7)	--	--	1.4	Silty sand	None	None
2	Baseflow (3)	Standing Water (2)	Channelized (2)	None (1)	Forest (7)	07	3.33 (*2-5*)	1.4	Silty Sand	None	None
3	Baseflow (3)	Dry (1)	Channelized (2)	None (1)	Forest (7)	--	--	3	Silty Sand	None	None

Notes:

-- = Not recorded/unable to record

Flow Influence = OSAP flow influence code: 1) spring freshet (immediately flowing freshet ~ late winter/early spring); 2) spate (~late April through mid-May); and, 3) baseflow (July through mid-September).

Flow Condition = OSAP flow condition codes: 1) no flow; 2) standing water; 3) interstitial flow; 4) surface flow minimal (<0.5 L/s); and, 5) surface flow substantial (>0.5 L/s).

Feature Type = OSAP feature type codes: 1) defined natural channel; 2) channelized; 3) multi-thread; 4) no defined feature; 5) tiled drainage; 6) wetland; 7) swale; 8) roadside ditch; and, 9) online pond outlet.

Vegetation Assessment = OSAP Vegetation Codes: 1) no vegetation; 2) lawn; 3) cropped land; 4) meadow; 5) scrubland; 6) wetland; and, 7) forest.

3.1.7 H7

H7 is a channelized surface water feature; during both the first and second spring visits, this feature was observed to have interstitial flow. During the third site visit, H7 was observed to be dry. No vegetation was observed within H7 during any of the site visits, riparian vegetation is comprised of forest, specifically Dry-Fresh Oak-Maple-Hickory Deciduous Forest, Dry-Fresh Poplar Deciduous Forest and Fresh-Moist Sugar Maple Deciduous Forest.

Table 3.11 below summarizes the existing conditions and characteristics of H7 observed during the site investigation. H7 was assessed as a single site with no site break triggers.

Table 3.11 Summary of Existing Conditions for H7

Site Visit	Hydrology			Vegetation Assessment		Channel Form			Sediment Transport		
	Flow Influence (FI)	Flow Condition (FC)	Feature Type (FT)	Feature	Riparian	Average Wetted Width (m)	Average Depth (*range*) (cm)	Average Bankfull Width (m)	Substrate	Sediment Transport	Sediment Dep.
1	Freshet (1)	Interstitial (3)	Channelized (2)	None (1)	Forest (7)	--	--	4.5	Silty sand	None	None
2	Baseflow (3)	Interstitial (3)	Channelized (2)	None (1)	Forest (7)	3.1	23.67 (*17-32*)	4.5	Silty Sand	None	None
3	Baseflow (3)	Dry (1)	Channelized (2)	None (1)	Forest (7)	--	--	4.5	Silty Sand	None	None

Notes:

Flow Influence = OSAP flow influence code: 1) spring freshet (immediately flowing freshet ~ late winter/early spring); 2) spate (~late April through mid-May); and, 3) baseflow (July through mid-September).

Flow Condition = OSAP flow condition codes: 1) no flow; 2) standing water; 3) interstitial flow; 4) surface flow minimal (<0.5 L/s); and, 5) surface flow substantial (>0.5 L/s).

Feature Type = OSAP feature type codes: 1) defined natural channel; 2) channelized; 3) multi-thread; 4) no defined feature; 5) tiled drainage; 6) wetland; 7) swale; 8) roadside ditch; and, 9) online pond outlet.

Vegetation Assessment = OSAP Vegetation Codes: 1) no vegetation; 2) lawn; 3) cropped land; 4) meadow; 5) scrubland; 6) wetland; and, 7) forest.

4.0 CLASSIFICATION

All HDFs on-site were classified following the narrative for each element of HDF evaluation (hydrology, riparian habitat, fish and fish habitat, and terrestrial habitat) as presented in Part 2 of the Evaluation, Classification and Management of HDFs guidance document (TRCA/CVC, 2014), the flow chart illustrated in Figure 1 below and the data collected during site investigations. The classification of each HDFs was used to determine management recommendations presented in Section 5 below.

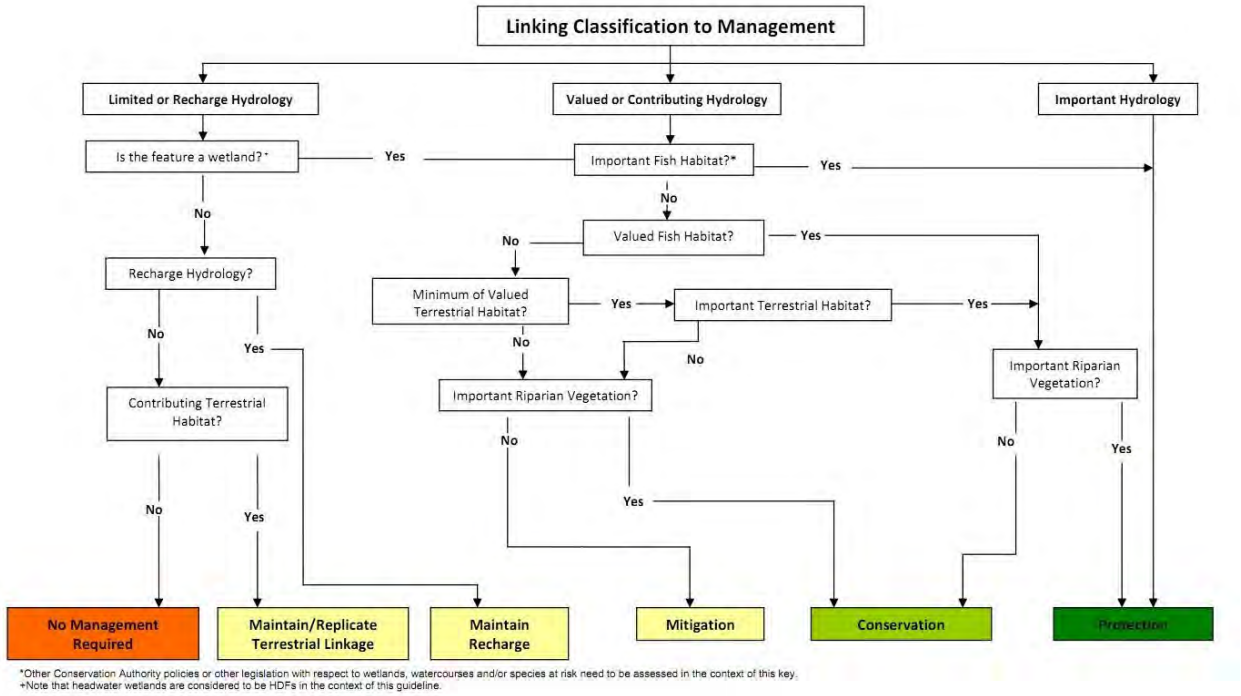

Figure 1 Flow Chart Providing Directions of Management Option's (TRCA/CVC, 2014)

H1, H2A, H2B, H3, H4, H6B, H6C, H6D and H7 had dry, standing water or interstitial flow during the first and second site investigations, and were all dry by the third investigation, indicating contributing – ephemeral hydrology. H1, H2A, H2B, H3, H4, H6B, H6C, H6D and H7 were all found to have contributing fish habitat, limited – channelized terrestrial habitat and important – forest riparian vegetation. Following review of Figure A.1, the presence of important riparian vegetation, due to adjacent forest cover drives this classification, as such conservation is required for H1 H2A, H2B, H3, H4, H6B, H6C, H6D and H7.

H5 was observed to have minimal flow in the first visit, interstitial in the second and was dry during the third visit, in combination with the wetland upstream of H5, this indicates valued – intermittent hydrology. H5 was found to have contributing fish habitat, limited – channelized terrestrial habitat and important – forest riparian vegetation. Following review of Figure A.1, the presence of

important riparian vegetation, due to adjacent forest cover drives this classification, as such conservation is required for H5.

H6A was observed to have interstitial flow in the first and second visit and was dry during the third visit, in combination with the wetland upstream of H6A, this indicates valued – intermittent hydrology. H6 was found to have contributing fish habitat, limited – channelized terrestrial habitat and important – forest riparian vegetation. Following review of Figure A.1, the presence of important riparian vegetation, due to adjacent forest cover drives this classification, as such conservation is required for H6.

Table 4.1 below provides a high-level summary for each element of HDF evaluation and the classification outcome of each HDF assessed. Management recommendations are provided in Section 5 below.

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Table 4.1 Summary of HDF Classification and Management Recommendations

HDF	Step 1		Step 2	Step 3	Step 4	Management Recommendation
	Hydrology	Modifiers	Fish Habitat	Terrestrial Habitat	Riparian Vegetation	
H1	Contributing – Ephemeral	None	Contributing	Limited – Channelized	Important – Forest	Conservation
H2A	Contributing – Ephemeral	None	Contributing	Limited – Channelized	Important – Forest	Conservation
H2B	Contributing – Ephemeral	None	Contributing	Limited – Channelized	Important – Forest	Conservation
H3	Contributing – Ephemeral	None	Contributing	Limited – Channelized	Important – Forest	Conservation
H4	Contributing – Ephemeral	None	Contributing	Limited – Channelized	Important – Forest	Conservation
H5	Valued – Intermittent	None	Contributing	Limited - Channelized	Important – Forest	Conservation
H6A	Valued – Intermittent	None	Contributing	Limited – Channelized	Important – Forest	Conservation
H6B	Contributing – Ephemeral	None	Contributing	Limited – Channelized	Important – Forest	Conservation
H6C	Contributing – Ephemeral	None	Contributing	Limited – Channelized	Important – Forest	Conservation
H6D	Contributing – Ephemeral	None	Contributing	Limited – Channelized	Important – Forest	Conservation
H7	Contributing – Ephemeral	None	Contributing	Limited Channelized	Important – forest	Conservation

5.0 MANAGEMENT RECOMMENDATIONS AND MITIGATION MEASURES

In accordance with the guidance document (TRCA/CVC, 2014), HDFs classified as valued functions require conservation; these are typically features characterized by valued or contributing hydrology contributing fish habitat and important riparian habitats, and may include seasonal fish habitat with woody riparian cover or general amphibian habitat with wood riparian cover. In this instance, the presence of woodland forest cover in the riparian area, is what drives the classification into valued functions and recommends conservation as a management strategy for all the HDFs identified on-site.

As outlined in the guidance document, conservation management includes: maintaining, relocating, and/or enhancing the existing feature and riparian zone corridor; restoring lost functions through enhanced lot level controls; maintaining or replacing on-site flows using mitigation measures; maintaining or replacing external flows; and feature must remain connected to downstream features.

In addition to the management recommendations for any alterations to the watercourse, the following mitigation measures are provided by GEMTEC in order to minimize or eliminate potential impacts to fish habitat.

- All future development and construction activities within the study area, including ditching, culvert installation, erosion and sediment control and storm water management should be completed in accordance with Ontario Provincial Standard Specification 182 and OPSS 805.
- No in-water work should occur between March 15 and June 30 of any year to protect potential downstream fish habitat beyond the development area.
- When native soil is exposed, sediment and erosion control work in the form of heavy-duty sediment fencing shall be positioned along the down gradient edge of any construction envelopes adjacent to waterbodies.
- The development plan should include lot-side swales and/or road side ditches designed to promote infiltration.
- In order to protect potential downstream fish habitat from contamination, it is recommended that all machinery be maintained in good working condition and that all machinery be fueled a minimum of 30 m from the high water mark.
- Any temporary storage of aggregate material shall be set back from the water's edge by no less than 40 m and be contained by heavy-duty silt fencing.
- Septic systems shall be installed no closer than 30 m from the high water mark of any surface water feature.

6.0 SUMMARY

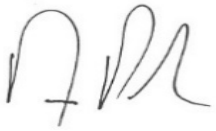
A headwater drainage feature assessment was completed and seven HDFs were identified on-site, identified as H1 through H7. Conservation is required for all HDFs on-site. Conservation management should include: maintaining, relocating and/or enhancing the existing features or riparian zone corridor; restoring lost functions through enhanced lot level controls; maintaining or replacing on-site flows through mitigation; maintaining or replacing external flows and maintaining connectivity with downstream features.

Additionally, through advanced stormwater management pond design which includes deep excavation to intercept groundwater, buried outlets and bottom draws with extensive tree canopy coverage to maintain cool water inputs, the thermal regime of the identified HDFs will be maintained, post development.

We trust this report provides sufficient information for your present purposes. If you have any questions concerning this report, please do not hesitate to contact the undersigned.

Sincerely,

Taylor Warrington, B. Sc.
Biologist



Drew Paulusse, B.Sc.
Senior Biologist

7.0 REFERENCES

Stanfield, L (Ed.). 2017. Ontario Stream Assessment Protocol. Version 10. Ontario, Canada.

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

ATTACHMENTS

A – Figure A.1: Site Layout
A – Figure A.2: Site Photographs
B – Site Photographs

Legend

- Property Boundary
- Study Area
- Local Wetland
- Headwater Drainage Feature and Direction of Flow

Scale
1:4,900

0 50 100 200 300 400 Meters

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Client: Sunset Lakes Developments

Project: 100484.001

Location: Part of Lots 3 & 4, Concession 3, Osgoode
Ottawa, Ontario

Drwn By:	Chkd By:	Site Layout
JD	DP	

Date: June 2021

Rev. 0

Figure A.1

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Coordinate System: NAD 1983 UTM Zone 18N
Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

N

Legend

- Property Boundary
- Study Area
- Local Wetland
- Headwater Drainage Feature and Direction of Flow
- Site Photograph

Scale
1:3,000

0 30 60 120 180 240 Meters

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Drwn By: JD | Chkd By: DP | Site Photographs

Date: June 2021

Rev. 0

Figure A.2

C:\Users\taylor.warrington\OneDrive - GEMTEC\Desktop\100484.001_June23\100484.001\MXD\100484.001_A2_HDF_photos.mxd
Coordinate System: NAD 1983 UTM Zone 18N
Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Site Photograph 1

Site Photograph 2

Site Photograph 3

Site Photograph 4

GEMTEC Consulting Engineers and Scientists	Project Headwater Drainage Feature Assessment Ottawa, Ontario	**APPENDIX B** File No. 100484.001	**Site Photographs**

Site Photograph 5

Site Photograph 6

Site Photograph 7

Site Photograph 8

GEMTEC Consulting Engineers and Scientists	Project Headwater Drainage Feature Assessment Ottawa, Ontario	**APPENDIX B** File No. 100484.001	**Site Photographs**

Site Photograph 9

Site Photograph 10

Site Photograph 11

Site Photograph 12

GEMTEC Consulting Engineers and Scientists	Project Headwater Drainage Feature Assessment Ottawa, Ontario	**APPENDIX B** File No. 100484.001	**Site Photographs**

Site Photograph 13

Site Photograph 14

Site Photograph 15

Site Photograph 16

GEMTEC Consulting Engineers and Scientists	Project Headwater Drainage Feature Assessment Ottawa, Ontario	**APPENDIX B** File No. 100484.001	**Site Photographs**

Site Photograph 17

Site Photograph 18

Site Photograph 19

Site Photograph 20

GEMTEC Consulting Engineers and Scientists	Project Headwater Drainage Feature Assessment Ottawa, Ontario	**APPENDIX B** File No. 100484.001	**Site Photographs**

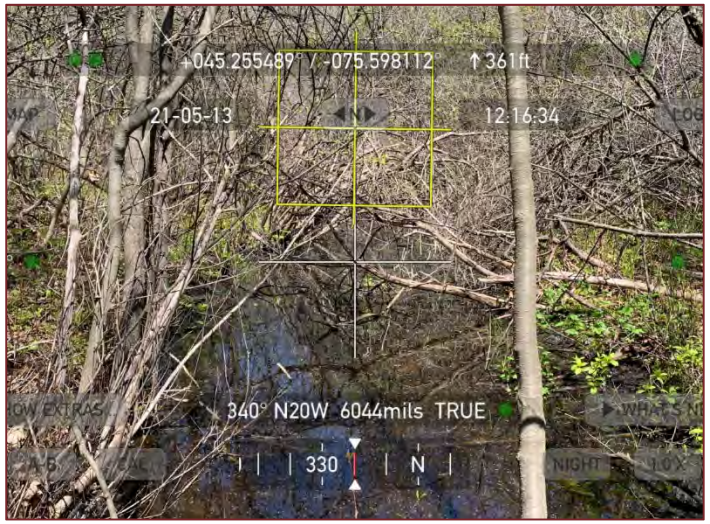
Site Photograph 21

Site Photograph 22

Site Photograph 23

Site Photograph 24

GEMTEC Consulting Engineers and Scientists	Project Headwater Drainage Feature Assessment Ottawa, Ontario	**APPENDIX B** File No. 100484.001	**Site Photographs**



Site Photograph 25

Site Photograph 26

Site Photograph 27

Site Photograph 28

GEMTEC Consulting Engineers and Scientists	Project Headwater Drainage Feature Assessment Ottawa, Ontario	**APPENDIX B**	**Site Photographs**
		File No. 100484.001	

Site Photograph 29

Site Photograph 30

Site Photograph 31

Site Photograph 32

GEMTEC Consulting Engineers and Scientists	Project Headwater Drainage Feature Assessment Ottawa, Ontario	**APPENDIX B** File No. 100484.001	**Site Photographs**

GEMTEC Consulting Engineers and Scientists	Project Headwater Drainage Feature Assessment Ottawa, Ontario	**APPENDIX B**	**Site Photographs**
		File No. 100484.001	

APPENDIX D

Tree Preservation Plan

EMERALD

Tree Preservation and Planting Program: Conservation Easement Agreement Information

Prepared by: Sunset Lakes Developments

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TREE PRESERVATION PLAN FOR EMERALD

Tree Preservation Plan for Emerald

1. The subdivision will be founded on the community concept of homes, trails and lifestyle within a forested area. This will be made known to perspective purchasers prior to purchasing through marketing, website, information brochures. The individual owner will have .2 ha of the .4 ha for the construction of a home, septic system, driveway, rear and front yards. This portion of the lot will also contain the requirement to plant or save 20% of the lot area in tree canopy cover at tree maturity. The rear of the lot will contain a unique feature. Both the homeowner and the community owners association will be stewards of the forest and the water features.

2. The specific legal requirements will form part of the Agreement of Purchase and Sale.

3. The covenants will be registered on title.

At the time of home construction all homes must submit and obtain a design review approval by the Owners Association. The application form posted on the website requires that information be provided including

- Copies of all elevations, floor plans, site plan, specifications and tree planting and conservation plan
- Prior to the release of the security deposit the owner/builder must submit a copy of the Certificate of Well Compliance, Well Record, Certificate of Completion, Occupancy Permit and Asbuilt drawing (confirming tree planting among other things).

A copy of the Design Review Application is attached.

(Sample Covenants below)
Purchasers are advised of the following.

(a) The owner must preserve and plant as required to maintain a minimum of 20% tree canopy coverage for the developable portion (front) of the lot. A list of suitable trees includes Red Oak, Bur Oak, American Basswood, Red Maple, Sugar Maple, White Cedar, Balsam Fir and Trembling Aspen. Replanting of Ash trees should be avoided due to potential future damage from the Emerald Ash Borer.

(b) The rear half of the lot is identified in the Conservation Easement Agreement and by registered survey. This portion of the lot is to remain fully tree covered, except where there is a water retention feature. The owner, his successors and assigns agrees not to remove any trees without the written consent of the owners association and to plant new replacement trees from the list in paragraph 3(a) above.

4) Prior to construction of a residence each homeowner will submit a design review application which will show the designated tree planting and saving areas.

5) Conservation Easement

(a) The rear portion of the lot dedicated for tree conservation and water retention as specified will also be identified by a separate survey part or block on a reference plan and a Conservation Easement Agreement will be conveyed to the

Emerald Owners Association. The “OA” will have the power to (1) enforce the covenants and (2) enforce the legal provisions of the easement and (3) to access the property for the purpose of planting or replanting where necessary.

Conservation Easement Agreement

All restrictions or prohibitions will be laid out in the registered Conservation Easement Agreement including

(i) Restricting the cutting down of trees. No logging or forestry activities. Dead or dangerous trees can be removed and replaced however no tree cutting can be done except with the written consent of the Owners Association.

(ii) Prohibiting any structures or land development,

(iii) Prohibiting any excavation or removal of resources like sand, rock, gravel and other aggregates from the land.

(c) The easement will also be combined with an easement over the stormwater management pond for maintenance and access to the pond by the owners association.

The owners association will be funded by annual dues payable to the owners association by each household similar to other currently operation O.A.’s throughout the Village of Greely.

TREE PLANTING AND CONSERVATION PLAN

Tree planting and conservation will be undertaken by a lot-by-lot basis using the following guidelines:

1. Typical Lot. Tree planting conservation plan on figure 1 attached showing the areas if a typical lot after allowing for house, yard, driveway, septic area and street.

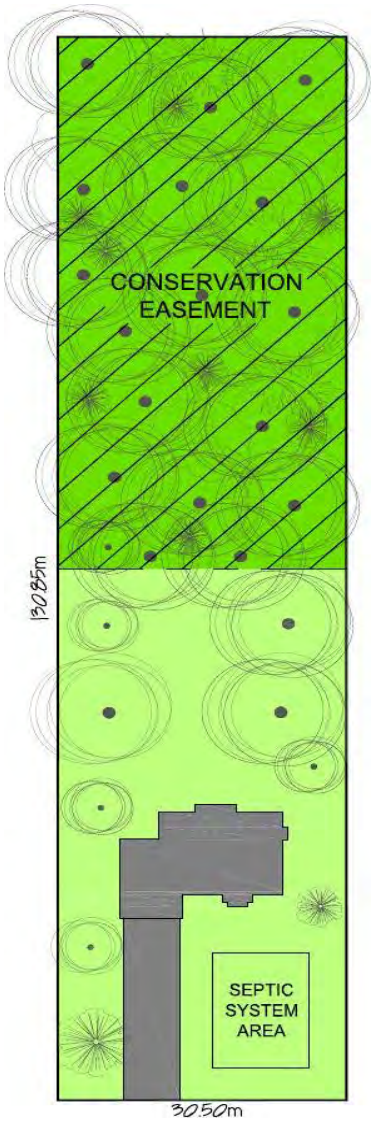


Figure 1

2. Restrictive Covenants registered on title to each lot require:
   a. The owner to submit for approval a detailed site plan with the application for design review approval. Tree conservation and planting will be addressed as part of the review No tree in excess of 100mm in diameter can be removed after construction of the home except for driveway, septic, and living area. No trees in the conservation easement area can be removed except with written consent of the Owners Association.

3. Tree conservation and planting guidelines:
   a. Maintaining existing trees:

   - Retain all existing trees whenever possible on the developable portion of the lot. Ensure that trees onsite are protected from grade change, equipment damage and root compaction during construction. If the trees have too much fill built up around them, they will not survive more than five years after construction. If equipment has been driving over the root system, then aeration of the soil to relieve compaction should be undertaken. If there has been damage to the tree trunk by equipment, the area should be cleaned, and torn bark removed.
   - Existing trees have successfully established their root systems in the soil on site whereas trees introduced to the site may have been grown in a different type of soil and will undergo planting shock and adjustment to the new soil conditions.

   b. Pruning, watering, staking and mulching:

- Pruning of trees should be kept to the minimum. Removing foliage will reduce photosynthesis and the production of food for the tree. The reasons for pruning are to improve structure by removing weak branches, removing dead or diseased branches and removing crossing or rubbing branches. Pruning to develop the structure of the tree should be done on the tree as soon as possible. Pruning a young tree for structure will help it develop better and faster and will create less damage by keeping the pruning cuts small.
- Water is critical for successful tree growth. There are correct and incorrect methods of watering. Frequent, shallow watering encourages surface roots and soil compaction, which

will make the tree more susceptible to drying out during periods of drought. The best method of watering is infrequent, deep soakings that will encourage deeper root growth, less compaction and healthier trees that can survive periods of drought. The best time to water is during the morning when evaporation is minimized. It is best to let the hose trickle water onto the root area for a longer period of time instead of using a sprinkler. Remember, you can over-water the tree or underwater the tree, but the result will be the same – loss of your tree. Good water management is critical to the success of your tree. Staking a tree is not always necessary. Staking a tree too tightly will cause more damage than not staking a tree at all. Trees that are not staked produce a better root system, a better trunk taper and a structurally stronger tree. If the tree cannot remain upright by itself, then staking will have to take place. When the tree is staked, it should have some movement in the wind and should not be tightened to the point of being rigid. Tree staking can be done with one, two or three stakes.

- Mulching the soil around the base of trees is beneficial. The mulch will reduce water evaporation from the soil, reduce soil erosion and improve soil aeration. The soil will remain cooler in the summer and protect the root system from summer heat. Mulch should be kept away from the tree trunk in order to prevent rot and fungus. The mulch layer should be 3 to 4 inches in depth and not any deeper. More mulch is not better and will cause problems with tree health and growth.

c. Managing Common Pests:
    - Pest infestations are common throughout all tree plantings. The best way to fight pest infestation is to keep your trees as healthy as possible. All healthy trees have a better chance to withstand levels of infestation without the need to treat with pesticides. If the infestation is heavy enough to defoliate the tree, then remedial action may be required. Deciduous trees can withstand defoliation and still survive, although in a weakened condition, but coniferous trees must not be defoliated. Defoliated conifers cannot survive and will not send out new needles. Conifers only produce leaves on the previous years' growth and if that is lost, the tree will die. Deciduous trees will refoliate after an attack, but the tree will be under stress.
    - A well-diversified planting with numerous different types of trees will help reduce the impact of serious insect infestation. Monoculture planting, the planting of only one type of tree, must be avoided. Most trees are subject to insect infestations, but some are more susceptible than others. Careful selection of species can reduce the impact of insect damage.
    - Caterpillars are the most common types of pests in trees. Forest tent caterpillars, Eastern tent caterpillars, Gypsy moth and Pine sawfly are all prevalent in this area. If the infestation threatens the tree, action should be taken. Tree collars are successful with many types of caterpillars. Removing the tent in the evening when the caterpillars are inside can control Eastern tent caterpillars in the spring. Remove the tent by hand and dispose of the caterpillars. Do not burn the tent while it is on the tree because this will damage the tree. The use of Bacillus, an organic/non-chemical spray, is very successful against all species of caterpillars.
    - Aphids are also a prevalent pest. This pest can be treated with applications of soapy water sprayed every ten days until the pest is not threatening the plant. The introduction of Lady Bugs will also reduce the aphid population. Lady Bugs are currently available at some Nurseries.

d. Indicators of stress and vigour of the vegetation:

- Trees always indicate when there are problems. Stress is the term used to describe the condition which causes the health of the tree to decline. Signs of stress might include reduced growth rate, abnormal foliage colour, vigorous suckering or leaf wilt or drop.
- The most common stress for trees is caused by a lack of watering during periods of drought. The leaves will wilt and begin to grow brown and crisp, indicating a need for water.
- Some trees will develop a yellowing of leaves with the veins remaining green. This description indicates the tree has an iron deficiency and requires an application of iron to correct the deficiency. This deficiency is also an indication of a tree planted in the wrong type of soil.
- If the tree shows a lack of vigour in its growth, the tree could be suffering from nutrient deficiency and may require a fertilization application. Trees do not require annual fertilization. Young trees should not be fertilized when they are first planted but may require an application of fertilizer a few years after planting. Fertilization should only be a response to stress and not a programmed activity.
- Decline in growth can also be an indication of soil compaction. This problem can occur as a result of heavy equipment around the root zone during house construction or continuous, shallow watering with sprinklers can cause it. Compaction must be corrected by aerating the root zone.

e. Root feeding:
    - Trees require certain nutrients in order to sustain a healthy growth rate. In most conditions the nutrients are available naturally in the soil. Fertilizing a tree should not be a regular activity but should be used as a correction if nutrient deficiency is a problem. Root feeding is done by drilling holes or using a root feeder on the end of a garden hose beyond the drip line (limit of branching) of the tree canopy. Do not fertilize during periods of drought or in the middle of summer. Fertilizer uptake is greatest during periods of active root growth, so applications are most effective during the spring and fall.

4. Tree Planting:
    a. Tree selection:
        - Selection of the right tree for your site condition is the most important decision to ensure success of tree planting. The tree must be matched to the site conditions. The soil conditions, size of property, reason for planting and available light are all considerations that must be made before selecting a tree to plant. A local Nursery will be able to assist in the selection of tree. Please consult preferred tree species listed for Emerald.
        - If a tree grows best in light, sandy soil then it should not be planted in heavy wet clay conditions.
        - If the lot size is small, then a large growing deciduous tree will not be a good selection. If there is a septic system on site then a small, shallow rooted tree will be required for the site instead of a large shade tree with an extensive root system that could invade the septic system.
        - Some trees must not be planted due to root system growth and soft, poorly structure branching. All varieties of Popular, Manitoba Maple, Silver Maple, and all varieties of Willow are not recommended to be planted. All of these trees can cause problems with extensive root growth, size of trunk and limb growth and poor structure.

- Planting for screening and privacy will require the planting of conifers. Cedars planted in hedging or in groupings, Pines or Spruces planted in groupings or in rows are recommended.
- Planting for shade will require a deciduous tree. The size of the tree will depend on the size of the lot. The type of shade, filtered or full, will also dictate the type of tree selected.

b. Planting:
   - Trees are available for purchase in three forms: bare root, balled and burlapped or containerized. All trees, no matter how they are purchased, should be planted in the hole to the level they were planted at in the nursery. Do not plant the tree deeper than it has been grown.
   - If a container-grown tree is purchased, check that the root system is not growing in circles before purchase. If roots are growing in circles, the plant will develop girding roots and will eventually die. Remove the container just before planting.
   - If a ball and burlap tree is purchased, place the tree in the planting hole and position it in the middle and straight. Place some soil in the hole to keep it straight, cut the ropes off and remove as much of the wire basket as possible. After the basked it removed, fold the burlap back from the top and sides of the tree. Do not leave the burlap on the top of the ball of the tree.
   - Plant the tree in the site soil that is dug out of the planting hole. Dig the hole wider than the root ball and only as deep as the root system requires. Once the tree is positioned at the correct depth and is straight, backfill the hole to the halfway point, compact the soil by walking around the root ball and then fill the hole with water. After the water has been absorbed, complete the backfilling and water again.
   - If the tree is not firmly positioned after planting, it may require staking. Place the stake outside of the ball, container or root mass on the side of the tree that receives the wind. Make sure that the tree is not staked too tightly, the trunk should move slightly with the wind.
   - Do not prune branches from the tree when it is planted. The only branches that should be removed are any that are broken.
   - Add a 4-inch layer of organic mulch to the base of the tree, but keep the mulch away from the trunk. The mulch will help reduce evaporation of moisture from the root zone.
   - Remove any wrapping that is on the trunk of the tree at planting time.
   - If the tree has been staked, remove the tie and stake after the first year of growth or when the tree is firmly rooted. Do not leave the tie in place longer than a year because it will start to impact the bark of the tree.

c. Maintenance:
   - The most important maintenance is to ensure that the tree receives regular amounts of water. If rainfall is not sufficient, the tree should be watered every five to seven days.
   - Remove any crossing branches that develop when they are small.
   - Do not fertilize the tree in the first year. The root system is limited at planting time and fertilization is not recommended. If the tree requires fertilizer after it is established, use a controlled release fertilizer in the spring or fall. The fertilizer should be applied only if it is required. There should not be a need to fertilize a tree every year.

"The arboricultural recommendations of this report, if followed, will ensure that the development takes place in an effective manner with an overall enhancement of the environment." - **WILLIAM STRUGNELL, Arborist**

BENEFITS OF TREE PLANTING

There are many benefits to tree planting and conservation in our community, both for the environment and for us as residents. From an environmental standpoint, trees improve groundwater quality, reduce flooding, prevent soil erosion, act as windbreakers, improve air quality, compensate potential grounds of global warming, and provide habitat, food and protection for local birds and wildlife. As residents, trees help protect well water quality, provide shade and privacy, improves the chances of observing wildlife, and adds real estate and aesthetic value to the property.

Air Quality

Urban forests provide benefit to the environment through air pollutant uptake and reductions in atmospheric carbon dioxide, otherwise known as the greenhouse effect. One fully-grown tree can produce enough oxygen for four people, and over a span of fifty years, a single tree can remove 60,000 pounds of air pollution. Trees remove air pollution by lowering air temperature through its respiration, and by containing the pollutants such as carbon monoxide, nitrogen dioxide, and sulphur dioxide. Street dust can be reduced by 25% with a single row of trees. Each healthy tree can decrease airborne dust particles by as much as 7,000 particles per litre of air. In this manner a tree acts as a purifier and air conditioner.

Water Quantity & Quality

Studies have demonstrated that urban forests help reduce the quantity of stormwater flows and improve the quality of stormwater runoff. Trees function as holding and confinement basins by catching rainfall and reducing run-off. Based on a 25mm rainfall, approximately 25% of the rain is intercepted and retained in the mulch layer. The actual runoff quantity benefits depend on the type of tree, the density of its canopy, the level of maintenance and the time of year. Water quality benefits by having pollutants eliminated by uptake and storage, the prevention of soil erosion, and reducing the overall quantity of stormwater runoff. Trees along waterways can eliminate over 75% of the nitrates in the ground water before the pollutants are able to reach the waterways.

Energy Savings

The east, west, and south walls of your home receive the most sun, therefore planting deciduous trees around the house will provide shade, and in turn reduce cooling bills in summer months. They can reduce up to 50% of the energy consumption of air conditioners. By planting a row of conifers on the north side, you will reduce heating bills by the windbreak provided by the trees. By slowing the strong winter winds, this windbreaker may help reduce heating costs by 20-40%. By acting as barriers to snow drifts, trees can lower winter plowing costs and reduce vehicular accidents in snow covered conditions.

Natural Habitat

Trees provide living space and a source of food for birds and other local wildlife.

Property Value

Trees create a pleasant and relaxing environment. Some related benefits include noise reduction and absorption. Strategically planted trees can muffle urban noise almost as effectively as stone walls. They provide beautiful colours to fall landscapes and provide excellent garden mulch. On average, trees increase property values up to 20%.

GUIDE TO TREE PLANTING

It is a good idea to begin by drawing a plan of your property with dimensions in order to determine the area available for planting. It is beneficial to plan in stages, beginning near the home and extending your gardens each year. Trees should not be planted where their branches will interfere with overhead wires, or overshadow or block windows. Trees should also not be planted where their roots will damage foundations, driveways, or sidewalks. Roots of willows and poplars spread to find water and are inclined to clog water and sewer pipes.

By using native species, you will increase the probability of success and decrease the amount of time and maintenance that your trees will require. Native species require less watering and can sustain periods of drought. They are also more prepared to combat pests, and therefore reduce the need for pesticide use.

The standard planting time is usually during the fall after the leaves have fallen or in early spring before the buds appear. This is a period of cool weather which allows the tree to situate their roots before the spring rains and summer heat activate new growth. Ash, birch, elm, poplar, and willow trees are better planted in the spring. Conifers can be planted early in the spring up until four weeks after the first bloom of deciduous trees. Alternatively, conifers can be planted in the fall, from the first week of August to the last week of October.

When handling seedlings, it is important not to allow the seedling to dry out and to transport them carefully, avoiding temperature extremes. Seedlings should be planted promptly and the roots should not be trimmed or pruned. The gel applied to the seedlings roots is there for its protection and to assist it in adapting to its new location. Seedlings should be planted deeply into the soil to give greater exposure and more water content. Seedlings which have been frozen in the pack should not be planted because the freezing has caused irreversible damage to the root system.

When planting your tree, you should dig a hole at least twice the size of the root ball of the tree, planted on existing soil level. If using a plastic pot, remove the container without disturbing the root system and fill the remainder of the hole with rich soil. If using a burlap or wire basket, place the ball at the bottom of the hole and fill with rich soil. Untie the burlap and spread it out without removing it. In the case of a wire basket, bend it away from the tree. When using a fibre pot, cut away the bottom of the pot and put the tree and remainder of the pot in the bottom of the hole. Slit the side of the pot from top to bottom and finish filling the hole. The remainder of the pot will rot away in time.

MAINTAINING YOUR TREES

To reduce the amount of time you spend on maintaining your trees, it is important to choose a species native to your area. Generally, conifers have an improved chance of survival and require less maintenance than deciduous trees. In the first few years after planting, seedlings need watering, weeding and rodent control, as well as staking. If mulch is developed under the tree, more rainfall will be kept.

If the soil is sandy and allows water to drain easily, you may need to soak the tree twice a week for the first three months and weekly thereafter for the first year. Peat moss and sandy soil mixtures at the time of planting would help in water retention. During the tree's second year, the tree should be watered twice monthly during spring and summer. If the soil contains clay, you may want to provide lighter watering to avoid flooding. For conifers, extra watering before winter will help protect the tree from drying.

Staking is suggested for trees that are taller than one meter, but only when the tree is unstable, to prevent it from being dislodged. It is important to ensure that the stake ties do not damage the bark and that the stakes are removed after two or three growing seasons.

Deciduous trees should be pruned in the late fall or early spring, for structure and the removal of dead or crossing branches, while they are dormant, with the exceptions of birch and maple, which require pruning when the leaves are full grown. Conifers are pruned to increase density and direct new growth. Spruce and firs must be pruned in late spring after the new growth has started.

TYPES OF TREES

To give you some ideas, a few types of trees and their descriptions are listed below:

Red Maple

The Red Maple is a deciduous tree, which means that it looses its leaves in the winter months, and blooms in mid-spring. It is recognized by its production of brilliant and impressive fall colours. The Red Maple can grow to a height of 18-19 metres with a spread of 12-13 metres.

It is a fast-growing, low maintenance species, favours sunlight but tolerates shade, and prefers soil that remains moist with pH levels below 7.

Red Oak

The Red Oak is also a deciduous tree, known for its strength and spectacular fall colours ranging from yellow-brown to russet-red and bright red and bears acorns. It grows to a height of 25-27 metres with a spread of 13-14 metres. The Red Oak prefers sunlight with moderate shade and well-drained soils.

Shagbark Hickory

The Shagbark Hickory is another deciduous tree which can be found in Southern Ontario, along the St. Lawrence River and into Quebec. It can grow to a height of 23 metres with a spread of 17 metres. The Shagbark Hickory's favourite soil is moist and rich and prefers to spend its time in the sun.

Honeylocust

Another deciduous tree is the Honeylocust. This tree is actually quite rare to be growing wild in Ontario, but is found in plenty of garden species. The Honeylocust has many recognizable features such as long, shard thorns and very unique seed pods. It should be planted in an area with full sun exposure.

American Beech

The American Beech is a deciduous tree with bluish grey bark that darkens with age and large oval leaves. The American Beech is a large tree and can grow up to 18 metres high and 15 metres wide. It requires moist, well drained and rich soil and should be planted in a shaded area.

Black Walnut

The Black Walnut is a deciduous tree that is usually recognized by its dark, thickly rigid bark and coarse branches. It can grow up to 20 metres tall and 16 metres wide. The Black Walnut prefers moist, well-drained rich soils and full sun exposure.

Little Leaf Linden

The Little Leaf Linden is another deciduous tree and grows at a medium rate – meaning its height increases 13-24" per year. It can grow to 13 metres high and 9 metres wide. It enjoys both full sun and partial shade, therefore should have four hours minimum of direct sunlight each day.

LIST OF NURSERIES AND TREE MOVERS

Greenlife Wholesale Nursery
1776 Manotick Station Road
Greely, Ontario
(613) 692-3047

Peter Knippel Inc. Garden Centre
4590 Bank Street
Ottawa, Ontario
(613) 822-2282

Richmond Nursery Inc.
5740 Old Richmond Road
Richmond, Ontario
(613) 838-2282

Integrated Forestree Services Inc.
6200 Old Richmond Road
Richmond, Ontario
(613) 838-5717

Green Thumb Garden Centre
17 Tristan Court
Nepean, Ontario
(613) 228-0224

Meadow Greens Nursery
4239 Gregoire Road
Russell, Ontario
(613) 445-3042

Trillium Tree Experts
247 Westbrook Road
Carp, Ontario
(613) 831- 4475

Greely Tree Services
5775 Bank Street
Greely, Ontario
(613) 574-0247

Hacket & Hill Tree Specialties
4709 Albion Road
Ottawa, Ontario
(613) 899-9292

Ashgrove Tree Service
1863 Salebarn Road
Greely, Ontario
(613) 821- 9292

Manotick Tree Movers Inc.
1966 Carsonby Road West
North Gower, Ontario
(613) 489-1116

A Paul's Seasonal Maintenance
5381 Downey Road
Gloucester, Ontario
(613) 224-6000

Algonquin Landscaping Ltd.
6078 Fourth Line Road
North Gower, Ontario
(613) 489- 2888

PREFERRED TREE COVERAGE LIST

1. Norway Maple

Maturity Height = 15m & Canopy Diameter = 12m
Canopy Area = 113m^2
Typical lot area = 2000m^2
30% x 2000 = 600m^2 / 113m^2 = 5.3 Norway Maple Trees per lot

2. Red Maple

Maturity Height = 15m & Canopy Diameter = 12m
Canopy Area = 113m^2
Typical lot area = 2000m^2
30% x 2000 = 600m^2 / 113m^2 = 5.3 Red Maple Trees per lot

3. Sugar Maple

Maturity Height = 21m & Canopy Diameter = 13m
Canopy Area = 133m^2
Typical lot area = 2000m^2
30% x 2000 = 600m^2 / 133m^2 = 4.5 Sugar Maple Trees per lot

4. Grey Birch

Maturity Height = 9m & Canopy Diameter = 4.5m
Canopy Area = 16m^2
Typical lot area = 2000m^2
30% x 2000 = 600m^2 / 16m^2 = 37.5 Grey Birch Trees per lot

5. Shagbark Hickory

Maturity Height = 21m & Canopy Diameter = 12m
Canopy Area = 113m^2
Typical lot area = 2000m^2
30% x 2000 = 600m^2 / 113m^2 = 5.3 Shagbark Hickory Trees per lot

6. American Beech

Maturity Height = 18m & Canopy Diameter = 12m
Canopy Area = 113m^2
Typical lot area = 2000m^2
30% x 2000 = 600m^2 / 133m^2 = 4.5 American Beech Trees per lot

7. American Mountain Ash

Maturity Height = 6m & Canopy Diameter = 4.5m
Canopy Area = 16m^2
Typical lot area = 2000m^2
30% x 2000 = 600m^2 / 16m^2 = 37.5 American Mountain Ash Trees per lot

8. Black Cherry

Maturity Height = 9m & Canopy Diameter = 9m
Canopy Area = 63.6m^2
Typical lot area = 2000m^2
30% x 2000 = 600m^2 / 63.6m^2 = 9.4 American Beech Trees per lot

9. White Oak

Maturity Height = 19m & Canopy Diameter = 19m
Canopy Area = 283m^2
Typical lot area = 2000m^2
30% x 2000 = 600m^2 / 283m^2 = 2.1 White Oak Trees per lot

10. Red Oak

Maturity Height = 19m & Canopy Diameter = 14m
Canopy Area = 154m^2
Typical lot area = 2000m^2
30% x 2000 = 600m^2 / 283m^2 = 3.89 Red Oak Trees per lot

11. Bur Oak

Maturity Height = 18m & Canopy Diameter = 24m
Canopy Area = 452m^2
Typical lot area = 2000m^2
30% x 2000 = 600m^2 / 452m^2 = 1.3 Bur Oak Trees per lot

12. American Basswood

Maturity Height = 20m & Canopy Diameter = 12m
Canopy Area = 113m^2
Typical lot area = 2000m^2
30% x 2000 = 600m^2 / 113m^2 = 5.3 American Basswood Trees per lot

13. White Cedar

Maturity Height = 10m & Canopy Diameter = 3.4m
Canopy Area = 9m^2
Typical lot area = 2000m^2
30% x 2000 = 9m^2 /

14. Balsam Fir

Maturity Height = 15m & Canopy Diameter = 6.7m
Canopy Area = 35m^2
Typical lot area = 2000m^2
30% x 2000 = 600m^2 /

600m^2 = 66.6 White Cedar Trees per lot

35m^2 = 54.5 Balsam Fir Trees per lot

15. Trembling Aspen

Maturity Height = 18m & Canopy Diameter = 24m
Canopy Area = 452m^2
Typical lot area = 2000m^2
30% x 2000 = 600m^2 / 452m^2 = 1.3
Trembling Aspen Trees per lot

EMERALD LAWN CARE AND WEED CONTROL

Weed Control Program

GOOD LAWN CARE PRACTICES:
One of the primary ways that a weed-free lawn can be maintained easily, cheaply and with a minimum of effort is through good lawn care practices which encourage the natural vigorous growth of turfgrass. Most weeds cannot compete with dense, healthy turf. The most important practices for weed control are detailed below.

MOWING:
Regular mowing induces the sod to become thick and dense. Grass should be cut at a height of 2.5″ to 3″; any shorter may cause an invasion of weeds. In addition many weeds cannot survive having their tops repeatedly cut off.

AERATING:
Aerating removes plugs of dirt from the lawn so that air, water and nutrients can reach the roots. Over time, soil can become hard and compacted; therefore, by aerating regularly (spring and fall) you will loosen up the soil and feed the roots. Aerators can be rented from a rental company or you can hire a landscape company to do this for you.

FERTILIZING:
According to the Ontario Ministry of the Environment, late summer or early fall is the best time to apply fertilizer. They can also be applied in the early spring.
In order to minimize any adverse affects on the lakes, use “organic” fertilizers (meaning most of the nitrogen is water insoluble).
The following brands of fertilizers may be used if necessary. Follow the manufacturer’s instructions with respect to quantities:

- CANAGRO VIGORO Natural Fertilizing 5-4-7
- NUTRITE Vitorganic 8-2-0
- CIL Mother Earth 100% organic Summer Lawn Food 8-2-0
- SO-GREEN Envirosoft 6-2-0
- MILGANIT Green & Fairway Fertilizer 6-2-0

Tip: Leave your lawn clippings on the lawn after you mow — they make an ideal (and free) fertilizer. As they break down they release nitrogen into the soil. Use compost or all-organic fertilizer in the fall to feed the roots of your lawn.

DETHATCHING:
Excessive thatch can lead to poor grass growth and weed encroachment. Dethatch in the spring.

WATERING:
During a period of drought, to prevent weeds from becoming established it is important to give one weekly soaking. Frequent light waterings encourage germination of shallow rooted weeds such as crab grass and creeping bent grass.

RESEEDING:
Reseed sparse areas before weeds become established.

PULLING BY HAND:
If there are only a few weeds, pulling them by hand or with hand tools may be preferable to other methods of weed control. This not only gets rid of the immediate problem but also prevents those plants from producing seeds resulting in more weeds later in the season or in the following years.

HERBICIDES:
On April 22, 2009, Ontario's ban on cosmetic pesticides came into effect. The use of pesticides to control pesky weeds and insects for purely cosmetic reasons is an unnecessary risk to our families and pets, especially when you can have a healthier lawn and garden without chemicals.
The Ontario government listened to medical experts – like the Canadian Cancer Society – who have made a convincing case for reducing our exposure to pesticides, particularly children who are generally more susceptible to the potential toxic effects of pesticides.
While it means that many herbicides, fungicides and insecticides can no longer be sold or used for cosmetic purposes on lawns and gardens, you can still have a beautiful lawn and garden using natural methods and greener alternatives. Gardeners can still purchase and use certain lower risk pesticides and biopesticides to manage weeds, insects and plant diseases. The biopesticides are those designated by Health Canada's Pest Management Regulatory Agency. Lower risk pesticides have characteristics such as low toxicity to humans, minimal impact to the environment, and act in a non-toxic way in controlling intended pests. You can view a list of these products in their entirety on the ministry's website at www.ontario.ca/pesticideban. To search for a specific product, use the new database on the ministry website: http://app.ene.gov.on.ca/pepsis.
Under provincial pesticide legislation, a pesticide must be registered under the Pest Control Products Act administered by Health Canada's Pest Management Regulatory Agency and classified for legal sale and use in Ontario. These pesticides must only be used according to label directions.
Tip: Corn Gluten Meal is also a great way to keep lawn weeds at bay. Available at most garden centres, it works to inhibit growth during seed germination. Apply in the early spring and wait at least 4 weeks before over-seeding.

GARDENS:
There are no herbicides available for weed control in established gardens and flower beds without the risk of damaging or killing desirable flowers and shrubs. Usually one must resort to pulling by hand, hoeing, competition and/or mulching.

HOEING:
A single hoeing will kill most annual weeds by cutting off all weeds to just below the ground surface. Perennial weeds are more persistent but repeated hoeing throughout one growing season will kill most and repeated hoeing into the second season will kill the rest.

COMPETITION:
Planting flowers and shrubs closer together than usually recommended may interfere with their shape and productivity, however, by shading the soil it can reduce the number of late germinating weeds.

MULCHING:
Mulch, particularly when used with landscape fabric, is effective in preventing weed growth. It also conserves moisture and moderates soil temperatures. Mulches can be organic (such as bark or wood chips) or inorganic (such as stones, pea gravel or brick rubble).

FERTILIZER FREE GARDENS
The following expands upon information previously distributed concerning "fertilizer free gardens" and provides an extended plant list.
On all lots, but particularly waterfront lots, it is encouraged that "fertilizer free gardens" be planted. Unlike lawns and most other garden plants, the plants listed below require little topsoil and no fertilizers to grow. Keep in mind that on waterfront lots, mature height of plants within 75 ft. of the water must be less than 3 ft.
Most of the following "fertilizer free" plants listed below are native plants and all are very hardy in the Ottawa area. They are commonly found in local nurseries:

TREES:

- White Spruce (Picea Glauca)
- Norway Spruce (Picea Albies)
- Austrian or Black Pine (Pinus Nigra)
- White Pine (Pinus Strobus)
- Canadian r Eastern Hemlock (Tsuga Canadensis)
- Eastern White Cedar (Thuja Occidentalis)

SMALL TREES/LARGE SHRUBS:

- Amur Maple (Acer Ginnala)
- Serviceberry or Shadblow (Amelanchier Canadensis)
- Red Osier Dogwood (Cornus Stolonifera)
- Russian Olive (Elaeagnus Angustifolia)
- Choke Cherry (Prunus Virginiana)
- Mountain Ash (Sorbus Americana)
- Common Lilac (Syringa Vulgaris)
- Nannyberry or Wayfaring Tree (Viburnum Lentago)
- High Bush – Cranberry (Viburnum Tribobum)

SMALL SHRUBS/PERENNIALS:

- Meadow Sweet (Filipendula)
- Potentilla or Cinquefoil (Potentilla Friuticosa)
- Rugosa Rose (Rose Rugosa)
- Raspberry (Rubus)
- Arctic Willow (Salix Purpurea Gracilis)
- Snowberry (Symphorecarpos Albus)

GROUNDCOVER:

The following plants are good for shady locations:

- Japanese Spurge (Pachysandra Terminalis)
- Periwinkle (Vinca Minor)

It is highly recommended that for waterfront lots, instead of a lawn, a “fertilizer free garden” of the following ground cover plants, which thrive in full sun, be grown within 20 ft. of the lake along at least 75% of the length of the shoreline. They will absorb nutrients before they enter the lake, thus minimizing aquatic plant and algae growth. In addition they will minimize soil erosion into the lake. They can also be used for other areas of your garden.

- Adjudge or Boggled (Adjudge Reptans)
- Bearberry (Arctostaphylos Uvaursi)
- Trumpet Vine (Campis Radicans)
- American Bittersweet (Celastrus Scandus)
- Virginia Creeper (Parthenocissus Quinquifolia)

Landscaping Companies that are 100% pesticide-free:

Disclaimer:

The City of Ottawa has striven for accuracy in these listings but recognizes that they may not be complete. To update the listings or to be added to either of the lists, please call 613-724-4227.

The material provided is for information only and should not be construed as professional advice. The listing or omission of companies does not constitute an endorsement or disapproval by the City of Ottawa.

- Appleseed Organic Lawn Care 613-224-7336
- Artistic Citywide Rototilling & Aeration 613-769-7079

- Avant Gardeners 613-839-0280
- B&C Landscaping 613-523-1952
- Forevergreen Canada Inc. 613-730-9595
- Hansen Lawn & Garden Ltd. 613-260-8175
- Natural Choice 1-866-GRUB-GUYS (613-823-9257)
- Nature's Way Design Company – Consultant Services 613-831-1852
- Precision Landscape Group Inc. 613-721-6337
- The Pond Clinic (Turf Grass Alternatives) 613-225-POND (613-225-7663)
- Turf's Up Landscaping & Property Maintenance Inc. 613-596-3127

Emerald Subdivision
Sunset Lakes Developments
Design Review Application

Please complete the Word version of this application and submit to Sunset Lakes Developments at sunsetlakes@rogers.com or print, complete and deliver (in person, by mail or fax) a hardcopy to Sunset Lakes Developments, 1705 Old Prescott Road, Greely, Ontario, K4P 1M8. Please allow up to 30 days for a response.

Please ensure that your submissions and supporting documents are on letter or legal size paper, to allow for more efficient communication via e-mail.

Lot: _____ Plan: 4M-_____ Civic Address: _____

Date Submitted by Owner: _____ Date Approved: _____

Name of Owner: _____

Address: _____

Email and/or Phone Number_____

I hereby apply for design review approval and attach herewith the following documents. I/we acknowledge that we cannot deviate from the design review approval without the written consent of Sunset Lakes Developments.

_____
Signature of Applicant

Enclosures:
□ elevations
□ floor plans
□ site plan
□ specifications
□ tree planting and conservation plan (Please provide a sketch indicating where on the lot trees will be cleared to make room for the home, well and septic system, as well as identify where trees will be planted after home construction is complete, indicating the type of species where possible)

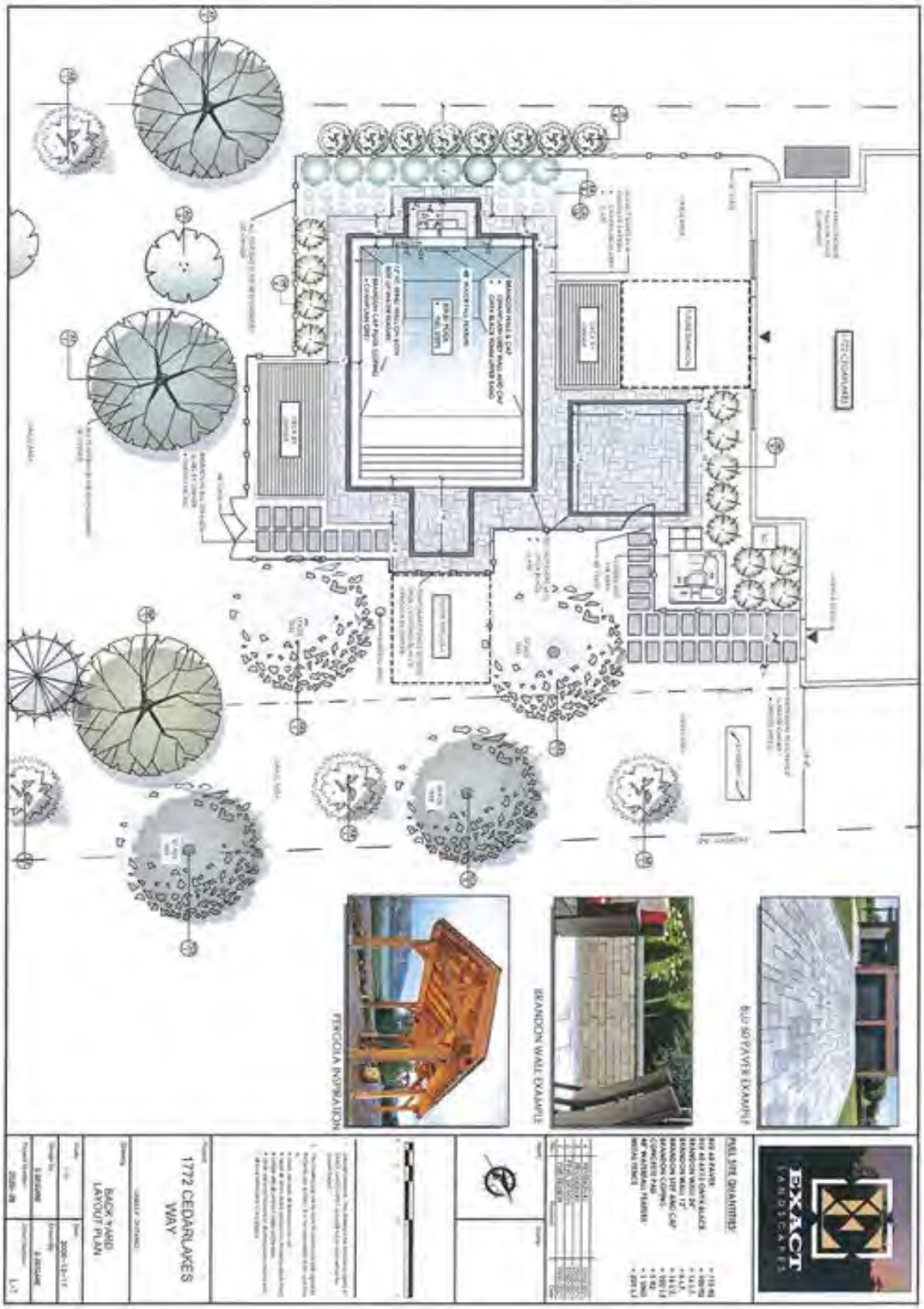
Post Development Site Visit with OA Representative (mandatory):
Date Scheduled: _____ Date Conducted: _____ By Whom: _____
□ Confirm Tree Planting & Conservation Compliance with Approved Sketch

To be filed by builder:
□ Certificate of Well Compliance
□ Well Record (provided by well driller)
□ Certificate of Completion (provided by Ottawa Septic System Office)
□ Occupancy Permit (provided by City Inspector, City of Ottawa)

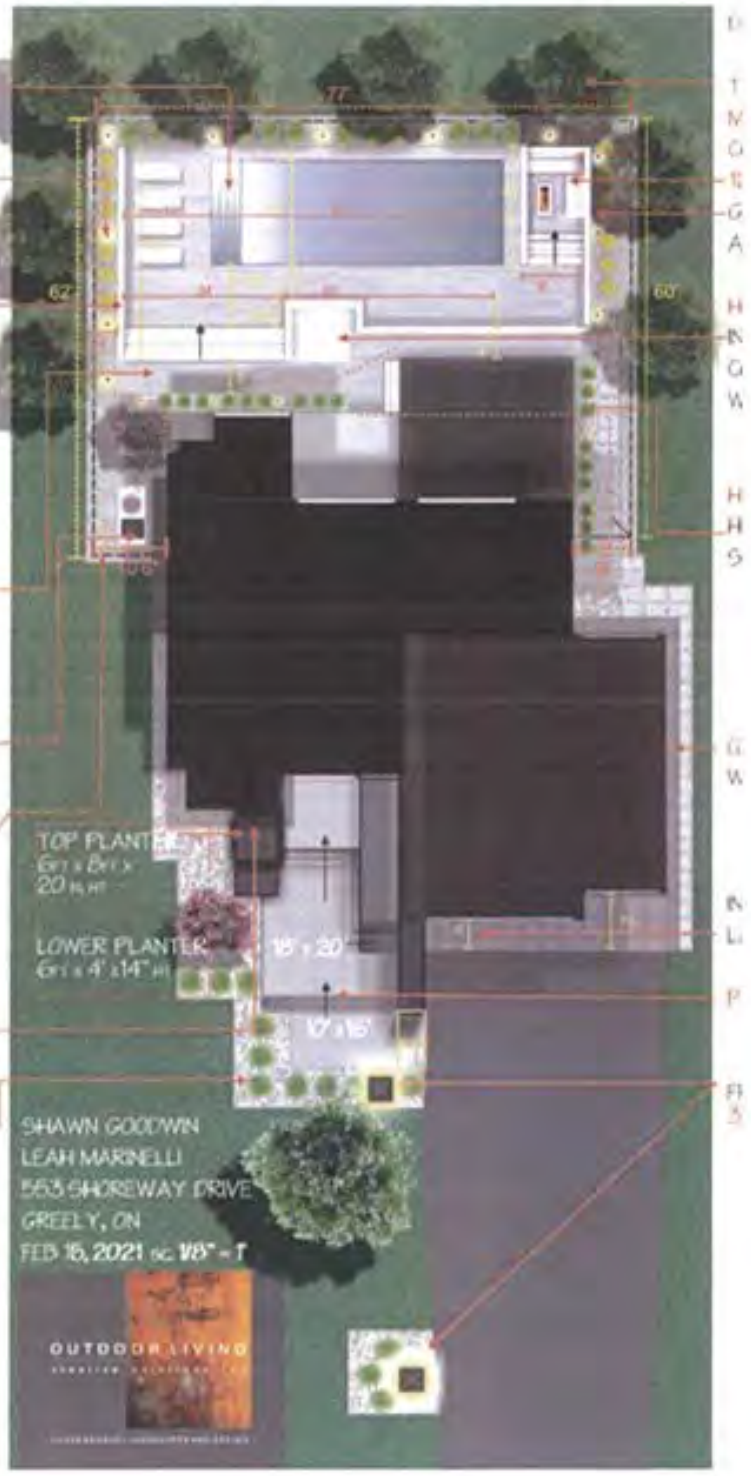
Please note that your culvert must be installed according to City specifications. The ditch must be left in its original state and no obstructions to the flow of drainage are permitted.

Reference material with regard to swimming pools, fences, sheds etc. is available on line at www.sunsetlakes.ca. (See Important Information – Design Review Information)
Review the Seven Deadly Sins of Home Design at www.sunsetlakes.ca (See Important Information – Design Review Information – Seven Deadly Sins of Home Design)

EXAMPLE OF TREE PLAN SUBMISSIONS #1



EXAMPLE OF TREE PLAN SUBMISSIONS #2

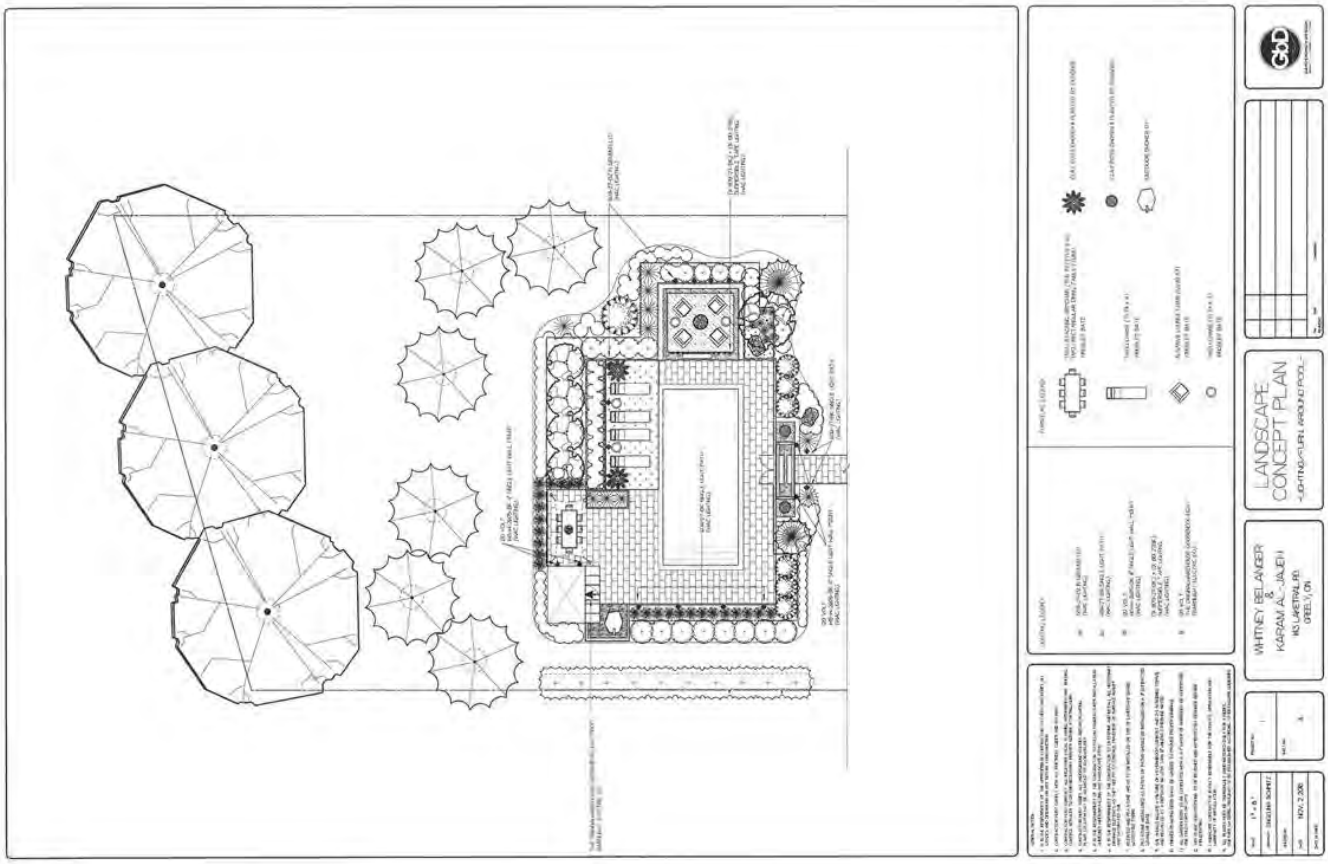


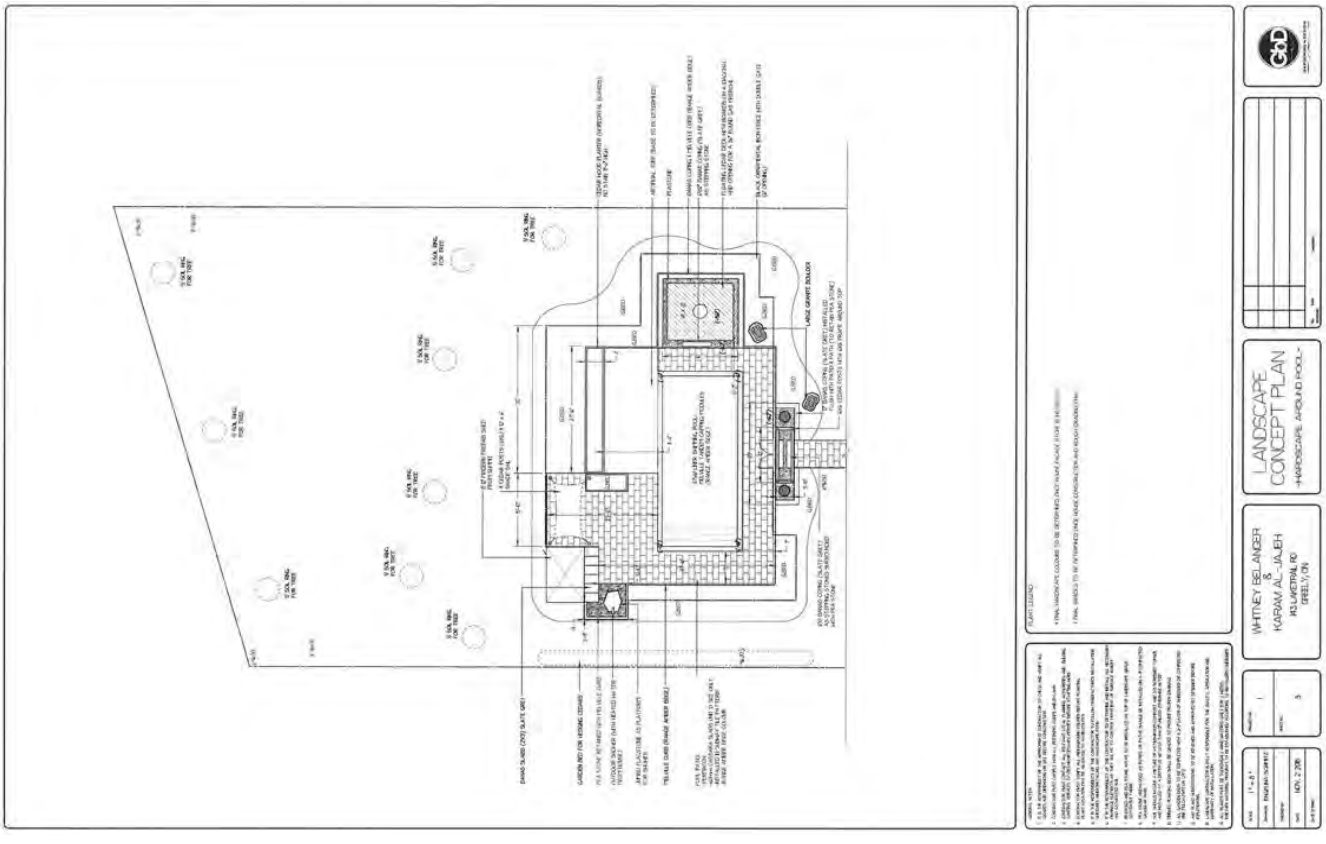
Engineered requirements for all work to be performed

The bearing medium evaluation consists of a silty sand. Excavation of all existing backfill is required as well as loose silty sand below the freshly backfilled areas so that all foundations for the swimming pool and stone walls can sit on high density 95% SPMDD This has to be executed according to the soil testing that was performed in June of 2020, by the Paterson Group Engineers. Sub grade materials will consist of OPSS B2 – ¾" Granular A crushed stone and compacted with high pressure diesel roller equipment.

6

EXAMPLE OF TREE PLAN SUBMISSIONS #3





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"Canada's National and Provincial Trees." Tree Planting Guide. http://www.treecanada.ca/publications/canadastrees.html (January 28, 2003).

"Facts and Guidelines on Planting Trees." Forestry. http://www.forestry.about.com/library/weekly/aa081097a.html (January 29, 2003).

"Green Side Up – A Guide to Tree Planting." Northern Forestry Centre. http://nofc.cfs.nrcan.gc.ca/publications/treecare/greenside_e.php.html (January 29, 2003).

"If You Own Land." Taking Action. http://www.creditvalleycons.com/takingaction/ownland.html (January 29, 2003). "Planting Instructions." Tree Planting Program. http://www.greenventure.on.ca.html (January 29, 2003).

"Ten Commandments for Seedling Survival." Forestry. http://www.forestry.about.com/library/weekly/aa121299.html (January 29, 2003).

"Tree Planting Tips – Caring for Your Trees." Tree Planting Tips.
http://ecokids.earthday.ca/pub/eco_info/topics/climate/tree_planting/caring_for_trees.cfm.html (January 29, 2003).

"Tree Trivia – Benefits of Urban Trees." Tree Planting Guide. http://www.treecanada.ca/publications/trivia.html (January 28, 2003).

"Tree Trivia – Why Plant Trees." Tree Planting Guide. http://www.treecanada.ca/publications/why.html (January 28, 2003).

"Tree Types & Descriptions." Tree Planting Program. http://www.greenventure.on.ca.html (January 29, 2003). "Types of Trees in Ontario." https://www.ontario.ca/ (March, April 2018).

APPENDIX E

CVs for Key Personnel

GEMTEC

Drew Paulusse, B.Sc.
Senior Biologist / Manager of Environmental Services

Mr. Paulusse has over 12 years of experience in the environmental consulting industry, providing private industry and municipal and federal government clients with cost effective solutions to manage environmental constraints associated with land development proposals and infrastructure projects. Mr. Paulusse's expertise, as it relates to land development proposals and infrastructure projects is field assessment and regulatory permitting associated with species at risk, fish habitat and wetlands.

Education

- B.Sc., Biology, Trent University, 2007
- Environmental Technician, Fleming College, 2004

Professional Experience

2018-date	**GEMTEC Consulting Engineers and Scientists Limited** *Manager of Environmental Services*	**Ottawa, Ontario**
2011-2018	**Geofirma Engineering Limited** *Senior Biologist*	**Ottawa, Ontario**
2007-2011	**INTERA Engineering Limited** *Biologist*	**Ottawa, Ontario**
2007	**Canadian Wildlife Service, Environment Canada** *Wetland Conservation Officer*	**Burlington, Ontario**
2005	**Centre for Inland Waters, Environment Canada** *Junior Marine Technologist*	**Burlington, Ontario**

Professional Affiliations and Technical Training

- Canadian Society of Environmental Biologists
- Ontario Association for Impact Assessment
- MTO/DFO/MNRF Protocol for Protecting Fish and Fish Habitat on Provincial Transportation Undertakings. Ministry of Transportation. 2018
- Ontario Wetland Evaluation System Certification Course. Ministry of Natural Resources and Forestry. 2017
- Headwater Drainage Feature Assessment Training Course. Rideau Valley Conservation Authority. 2017

- Ecological Land Classification System Certification Course. Ministry of Natural Resources and Forestry. 2015
- Ontario Benthic Biomonitoring Network Certification Course. Ministry of Environment, Conservation and Parks. 2011

Project Highlights

- ***DFO Self-Assessment and Preparation of Tender Special Provisions, Osceola Culvert Replacement, County of Renfrew, Ontario (2019):*** Project manager and technical lead responsible for the evaluation of the significance of fish habitat and species at risk, and completion of a DFO self-assessment. Work included aquatic habitat assessments, pathway of effects evaluation, culvert design recommendations and reporting.
- ***Biological Inventory, Ontario Power Generation Incorporated, Bath, Ontario (2018):*** Project manager and technical lead responsible for conducting a three-season inventory of avian and amphibian species at the Lennox Provincially Significant Wetland. Work included conducting presence and abundance surveys following the Canadian Wildlife Service marsh monitoring protocol and Bird Studies Canada breeding bird surveys, statistical analysis of species data trends and reporting.
- ***Wetland Management Plan, Ontario Power Generation Incorporated, Bath, Ontario (2018):*** Project manager and technical lead responsible for the development of an adaptive wetland management plan for the Lennox Provincially Significant Wetland. Work included a synthesis of historical data, statistical analysis of data trends, vegetation assessment, air photo interpretation, development of short-term and long-term management objectives and development of a standardized monitoring program.
- ***Environmental Compliance Monitoring, Petrie Island Causeway Rehabilitation Project, Ottawa, Ontario (2018):*** Project manager and technical lead responsible for monitoring constructor compliance with various Department of Fisheries and Oceans, Ministry of Natural Resources and Conservation Authority permit conditions during the Petrie Island Causeway Rehabilitation Project within the Ottawa River. Work included species at risk surveys, fish salvage, exclusion fence inspection, monitoring of sediment and erosion control measures, turbidity monitoring, regulatory agency consultation and weekly reporting.
- ***Wetland Delineation and Wetland Function Assessment, National Capital Commission, Ottawa, Ontario (2018):*** Project manager and technical lead responsible for the delineation of wetland pockets within the LeBreton Flats Redevelopment Area and the assessment of wetland function for the purpose of evaluating compensation requirements. Work was completed following both the federal and provincial wetland evaluation frameworks.

- ***Environmental Impact Statement, Code Drive Development, Smiths Falls, Ontario (2018):*** Project manager and technical lead responsible for the completion of an Environmental Impact Statement in support of a severance application for the creation of eight residential lots within a significant woodland and adjacent to a large local wetland. Work included targeted surveys for species at risk, breeding amphibians and marsh birds, impact assessment, development of lot-specific mitigation measures and agency consultations.
- ***Tree Conservation Report, Royal LePage Team Realty, Ottawa, Ontario (2018):*** Mr. Paulusse completed an inventory of all trees located on an urban commercial lot for the purpose of identify significant retainable trees and trees in conflict with the proposed site redevelopment. Work included, site inventory, tree removal permit preparation and reporting.
- ***Environmental Compliance Monitoring, Airport Parkway Culvert Rehabilitation Project, Ottawa, Ontario (2018):*** Project manager and technical lead responsible for monitoring constructor compliance with Ministry of Natural Resources and Conservation Authority permit conditions. Work included species at risk surveys, exclusion fence inspection, monitoring of sediment and erosion control measures and weekly reporting.
- ***Tier I and II Natural Environment Report, Crain's Construction, Ottawa, Ontario (2018):*** Project manager and technical lead responsible for completing an inventory of site flora and fauna, completion of species at risk surveys, regulatory agency consultation, impact assessment and reporting.
- ***Species at Risk Assessment, National Capital Commission, Gatineau, Quebec (2018):*** Project manager responsible for the completion of avian species at risk surveys to determine the presence or absence of chimney swift and barn swallows at a contaminated site. Work was undertaken to support an Ecological Risk Assessment.
- ***Fish Habitat Assessment, Various Culvert Replacements, Ottawa, Ontario (2018):*** Project manager and technical lead responsible for the evaluation of the significance of fish habitat at three culvert crossings in rural Ottawa. Work included aquatic habitat assessments, pathway of effects evaluation, culvert design recommendations and reporting.
- ***Environment Effects Evaluation Assessment, Britannia Wall Rehabilitation Project, Ottawa, Ontario (2018):*** Project manager and technical lead responsible for completing a comprehensive tree inventory, wetland boundary delineation, significant wildlife habitat assessment and evaluation of effects associated with the rehabilitation of the Britannia Wall, a 600-metre-long community flood protection structure.
- ***Environmental Compliance Monitoring, Petrie Island Beach Head Rehabilitation Project, Ottawa, Ontario (2018):*** Project manager and technical lead responsible for monitoring constructor compliance with various Department of Fisheries and Oceans, Ministry of Natural Resources and Conservation Authority permit conditions during the Petrie Island

Beach Head Rehabilitation Project within the Ottawa River. Work included species at risk surveys, exclusion fence inspection, monitoring of sediment and erosion control measures, and reporting.

- ***Provincially Significant Wetland Boundary Evaluation and Mitigation Plan, Town and County Chrysler, Smiths Falls, Ontario (2018):*** Project manager and technical lead responsible for revising the wetland boundary associated with a provincially significant wetland and development of a mitigation plan to enable the redevelopment of an adjacent commercial lot. Work included wetland vegetation delineation, regulatory technical document submissions, agency consultations, mitigation measure development and reporting.
- ***Environmental Impact Statement and Headwater Drainage Feature Assessment, Swank Construction Limited, Morrisburg, Ontario (2017-2018):*** Project manager and technical lead responsible for the completion of an Environmental Impact Statement with Headwater Drainage Feature Assessment for a 100-lot residential subdivision. Work included ecological land classification, breeding bird surveys, impact assessment and a three season assessment of hydrological conditions and their contributions to downstream fish habitat.
- ***Natural Heritage Inventory and Environmental Impact Assessment, Combermere Lodge Limited, Barry's Bay, Ontario (2017-2018):*** Project manager and technical lead responsible for the completion of a Natural Heritage Inventory and Environmental Impact Assessment completed in support of a 54-lot condominium development located in an environmentally sensitive area. Work included wetland boundary delineation, identification of significant wildlife habitat, application of the significant wildlife habitat mitigation support tool, completion of a two-year survey of site flora and fauna, impact assessment and town hall presentations.
- ***Lake Capacity Assessment, Combermere Lodge Limited, Barry's Bay, Ontario (2017-2018):*** Project manager and technical lead responsible for the predictive assessment of septic effluent impacts relating to the operation of a 54-lot condominium development on three adjacent waterbodies. Work included limnological investigations over two seasons, application of the provincial lakeshore capacity model, hydrogeological investigations, mass flux analysis, mitigation measure development and reporting.
- ***Detailed Quantitative Ecological Risk Assessment, National Capital Commission, Gatineau, Quebec (2016 to 2018):*** Project manager and technical lead for the completion of a Detailed Quantitative Ecological Risk Assessment completed for a former landfill property located adjacent to the Ottawa River. Work included aquatic habitat assessment, benthic community characterization, species at risk surveys, terrestrial wildlife surveys and analysis of site-specific aquatic toxicity data.
- ***Environmental Compliance Monitoring, Carp Snow Dump, Ottawa, Ontario (2017):*** Project manager and technical lead responsible for monitoring constructor compliance with a Ministry of Natural Resources overall benefit permit for blanding's turtle associated with the

construction of the Carp Snow Dump. Work included weekly exclusion fence inspection and weekly reporting to the contract administrator.

- ***Fish Habitat Assessment, Little Bark Bay Properties, Barry's Bay, Ontario (2017):*** Project manager and technical lead responsible for the identification and evaluation of significance of fish habitat within and adjacent to a proposed plan of subdivision. Work included aquatic habitat assessments, pathway of effects evaluation, application of the Department of Fisheries and Oceans self-assessment process and reporting.
- ***Species at Risk and Migratory Bird Screening Assessment, City of Ottawa, New Edinburg Park Redevelopment Project, Ottawa, Ontario (2017):*** Project manager and technical lead responsible for the completion of a species at risk and migratory bird screening assessment to assist in bid tender package preparation for the re-development of New Edinburg Park. Work included a general habitat assessment, a probability of occurrence assessment, follow-up pre-construction surveys and reporting.
- ***Fish Habitat Assessment, Highway 417 Culvert Replacement Project, Ottawa, Ontario (2017):*** Project manager and technical lead responsible for the evaluation of the significance of fish habitat at two culvert crossings Ottawa. Work included aquatic habitat assessments, pathway of effects evaluation, application of the Department of Fisheries and Oceans self-assessment process and reporting.
- ***Fish Habitat and Headwater Drainage Feature Assessment, Private Landowner, Ottawa, Ontario (2017):*** Project manager and technical lead responsible for the completion of a two-season hydrological assessment of on-site water courses and assessment of fish habitat. Work completed in support of a permit required to develop an unopened road allowance.
- ***Environmental Impact Statement and Wetland Boundary Assessment, Town and Country RV, Perth, Ontario (2016-2017):*** Project manager and technical lead responsible for delineation of a provincially significant wetland and impact assessment associated with the expansion of an existing commercial enterprise. Work included ecological land classification, identification of significant wildlife habitat, species at risk surveys, wetland vegetation assessment, impact assessment and development of site-specific mitigation measures.
- ***Environmental Impact Statement, Blueberry Creek Veterinary Clinic, Perth, Ontario (2016):*** Project manager and technical lead responsible for delineation of a provincially significant wetland and impact assessment associated with the development of a commercial lot. Work included ecological land classification, identification of significant wildlife habitat, species at risk surveys, wetland vegetation assessment, impact assessment and development of site-specific mitigation measures.

GEMTEC

Taylor Warrington, B.Sc.
Biologist

Ms. Warrington has 5 years of experience in the environmental consulting industry, providing private industry and municipal and federal government clients with cost effective solutions to manage environmental constraints associated with land development proposals and infrastructure projects.

Education

- B.Sc., Life Sciences, McMaster University, 2015
- Graduate Certificate, Ecosystem Restoration, Niagara College, 2016

Professional Experience

2020-date	**GEMTEC Consulting Engineers and Scientists Limited** *Biologist*	**Ottawa, Ontario**
2019-2020	**GEMTEC Consulting Engineers and Scientists Limited** *Junior Biologist*	**Ottawa, Ontario**
2017-2019	**Geofirma Engineering Limited** *Junior Biologist/Scientist*	**Ottawa, Ontario**
2016	**Dillon Consulting** *Junior Field Biologist*	**Little Current, Ontario**
2014	**McMaster University** *Laboratory-Research Assistant; URBAN Project Coordinator*	**Hamilton, Ontario**

Professional Affiliations and Technical Training

- Ottawa Conservation Partners Workshop: How to Prepare and Environmental Impact Statement. 2020.
- Class 2 Backpack Electrofishing Crew Leader Certification Course. June, 2019.
- Ontario Reptile and Amphibian Survey Course. Blazing Star Environmental, Natural Resource Solutions Inc., and Ontario Nature. 2018
- Ontario Benthic Biomonitoring Network Certification Course. Ministry of Environment, Conservation and Parks. 2016

Project Highlights

- ***Tier I and II Natural Environment Report, Crain's Construction, Lanark County, Ontario.*** Biologist responsible for completing on-going surveys in support of a proposed

quarry application. Surveys include winter mammal and ungulate use surveys, bat maternity roost surveys, ecological land classification, breeding bird surveys, turtle basking surveys, amphibian breeding surveys and targeted species at risk surveys for American ginseng and eastern whip-poor-will.

- ***Botanical Surveys, Ontario Power Generation Incorporated, Hydroelectric Generating Stations throughout Central and Eastern Ontario.*** Biologist responsible for completing on-going botanical surveys at 12 hydroelectric generating stations to update existing records. Botanical surveys will include a combination of field survey protocols including random meander, transects and quadrant sampling methods to identify vascular plant species present at each site.
- ***Foresters Falls Dam Removal, Renfrew County, Ontario.*** Biologist responsible for conducting a species at risk screening assessment to identify the presence of species at risk within the project area and evaluate the potential impacts on SAR and their habitat if the dam is removed. On-going surveys including targeted turtle basking surveys, and terrestrial wildlife and vegetation surveys.
- ***Environmental Impact Statement, Subdivision Development, Lanark County, Ontario.*** Biologist responsible for the completion of an Environmental Impact Statement for a proposed 25-lot subdivision application. Work included ecological land classification surveys, targeted surveys for species at risk, breeding amphibians and birds, basking turtle surveys, bat maternity roost surveys, headwater drainage feature assessment, butternut health assessment, impact assessment, development of lot-specific mitigation measures and agency consultation.
- ***Wetland Evaluation and Significant Wildlife Habitat Surveys, Ontario Power Generation Incorporated, Bath, Ontario (2019).*** Biologist responsible for conducting a wetland evaluation and significant wildlife habitat surveys at the Lennox Provincially Significant Wetland. Work included conducting turtle basking surveys, reptile hibernacula surveys, targeting species at risk surveys for Least Bittern and a wetland evaluation following the MNRF's Ontario Wetland Evaluation System.
- ***Environmental Impact Statement, Proposed Subdivision Development, Hawksbury, Ontario (2019).*** Biologist responsible for the completion of an Environmental Impact Statement in support of a proposed 272-lot subdivision application. Work included ecological land classification surveys, targeted surveys for breeding birds, bat maternity roost surveys, headwater drainage feature assessment, impact assessment and development of lot-specific mitigation measures.
- ***Surface Water Impact Assessment, Green Lake Development, Barry's Bay, Ontario (2019):*** Biologist responsible for the completion of a surface water impact assessment supporting two residential lot severances. Work included a review of existing data on Green

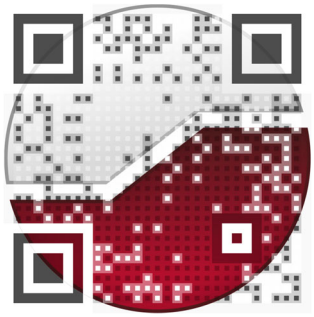
Lake, application of the provincial lakeshore capacity model, mitigation measure development and reporting.

- ***Biological Inventory, Ontario Power Generation Incorporated, Bath, Ontario (2018):*** Field Biologist responsible for conducting a three-season inventory of avian and amphibian species at the Lennox Provincially Significant Wetland. Work included conducting presence and abundance surveys following the Canadian Wildlife Service marsh monitoring protocol and Bird Studies Canada breeding bird surveys, statistical analysis of species data trends and reporting.
- ***Environmental Compliance Monitoring, Petrie Island Causeway Rehabilitation Project, Ottawa, Ontario (2018):*** Field biologist responsible for monitoring constructor compliance with various Department of Fisheries and Oceans, Ministry of Natural Resources and Conservation Authority permit conditions during the Petrie Island Causeway Rehabilitation Project within the Ottawa River. Work included species at risk surveys, fish salvage, exclusion fence inspection, monitoring of sediment and erosion control measures, turbidity monitoring, regulatory agency consultation and weekly reporting.
- ***Environmental Impact Statement, Code Drive Development, Smiths Falls, Ontario (2018):*** Field Biologist responsible for the completion of an Environmental Impact Statement in support of a severance application for the creation of eight residential lots within a significant woodland and adjacent to a large local wetland. Work included targeted surveys for species at risk, breeding amphibians and marsh birds, impact assessment, development of lot-specific mitigation measures and agency consultations.
- ***Tier I and II Natural Environment Report, Crain's Construction, Ottawa, Ontario (2018):*** Field biologist responsible for completing an inventory of site flora and fauna, completion of species at risk surveys, bat exit surveys, regulatory agency consultation, impact assessment and reporting.
- ***Species at Risk Assessment, National Capital Commission, Gatineau, Quebec (2018):*** Field biologist responsible for the completion of avian species at risk surveys to determine the presence or absence of chimney swift and barn swallows at a contaminated site. Work was undertaken to support an Ecological Risk Assessment.
- ***Environment Effects Evaluation Assessment, Britannia Wall Rehabilitation Project, Ottawa, Ontario (2018):*** Field Biologist responsible for completing a comprehensive tree inventory, wetland boundary delineation, significant wildlife habitat assessment and evaluation of effects associated with the rehabilitation of the Britannia Wall, a 600-metre-long community flood protection structure.
- ***Environmental Compliance Monitoring, Petrie Island Beach Head Rehabilitation Project, Ottawa, Ontario (2018):*** Field biologist responsible for monitoring constructor

compliance with various Department of Fisheries and Oceans, Ministry of Natural Resources and Conservation Authority permit conditions during the Petrie Island Beach Head Rehabilitation Project within the Ottawa River. Work included species at risk surveys, exclusion fence inspection, monitoring of sediment and erosion control measures, and reporting.

- ***Natural Heritage Inventory and Environmental Impact Assessment, Combermere Lodge Limited, Barry's Bay, Ontario (2017-2018):*** Field biologist responsible for the completion of a Natural Heritage Inventory and Environmental Impact Assessment completed in support of a 54-lot condominium development located in an environmentally sensitive area. Work included wetland boundary delineation, identification of significant wildlife habitat, application of the significant wildlife habitat mitigation support tool, completion of a two-year survey of site flora and fauna, and impact assessments.
- ***Species at Risk and Migratory Bird Screening Assessment, City of Ottawa, New Edinburg Park Redevelopment Project, Ottawa, Ontario (2017):*** Field biologist responsible for the completion of a species at risk and migratory bird screening assessment to assist in bid tender package preparation for the re-development of New Edinburg Park. Work included a general habitat assessment, a probability of occurrence assessment, follow-up pre-construction surveys and reporting.
- ***Post-Construction Windfarm Monitoring for Wildlife Impacts, Little Current, Ontario (2016):*** Field biologist responsible for the completion of post-construction monitoring of a windfarm for avian and mammalian fatalities. Work included fatality surveys, vegetation surveys, and wildlife scavenger surveys.
- ***Long-term Changes in Ecosystem Health, Frenchman's Bay, Pickering, Ontario (2015):*** Field biologist responsible for evaluating the long-term changes in ecosystem health of Frenchman's Bay. Work included: data review, analysis of data trends, watershed and land-use mapping, digitization of wetland vegetation cover and analysis of changes over time, reporting and symposium presentation.

experience • knowledge • integrity



civil	civil
geotechnical	géotechnique
environmental	environnementale
field services	surveillance de chantier
materials testing	service de laboratoire des matériaux

expérience • connaissance • intégrité