Environmental Impact Study for the Proposed Development of the Western Annex Lands (141 Peter Street) in Perth, Ontario

February 23, 2023

Version 3

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Version History

Version	Date	Description of Revisions
1	April 1, 2022	Original draft of preliminary report
2	April 12, 2022	Revised draft of preliminary report based on comments from Caivan Communities
3	February 23, 2023	Completed report with 2023 studies

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List of Acronyms and Abbreviations

cm – centimetre
DBH – diameter at breast height
DFO – Department of Fisheries and Oceans (Fisheries and Oceans Canada)
ECCC – Environment and Climate Change Canada
e.g. – *exempli gratia*
EIS – Environmental Impact Study
ELC – Ecological Land Classification
ESC – erosion and sediment control
ESA – *Endangered Species Act*
FWCA – *Fish and Wildlife Conservation Act*
ha – hectare
HDFA – Headwater Drainage Features Assessment
i.e. – *id est*
KAL – Kilgour & Associates Ltd.
km – kilometre
m – metre
MBCA – *Migratory Birds Convention Act*
MECP – Ministry of Environment, Conservation, and Parks
MNRF – Ministry of Natural Resources and Forestry
NHIC – Natural Heritage Information Centre
PPS – Provincial Policy Statement
RVCA – Rideau Valley Conservation Authority
SAR – species at risk
SARA – *Species at Risk Act*

1.0 INTRODUCTION

This Environmental Impact Study (EIS) was prepared by Kilgour & Associates Ltd. (KAL; Appendix A) on behalf of Caivan (Perth GC) Ltd. in support of their proposed development of the Western Annex Lands (141 Peter Street) in Perth, Lanark County, Ontario ("the Site"; Figure 1). The Site is approximately 147 hectares (ha) in size and the legal description is part of Lots 1, 25, 26, and 27, Concessions 1 and 2. Land cover on the Site is dominated by open greens and fairways associated with the existing Perth Golf Course, deciduous swamp of Grants Creek Provincially Significant Wetland, deciduous forest, and cultural meadow. The Site is bounded by the Tay River to the north and east, and Grants Creek and Grants Creek Provincially Significant Wetland to the south. West of the Site includes forested and agricultural land. The western portion of the Site proposed for development is owned by Caivan (Perth GC) Ltd., while the eastern half associated with the front nine golf course holes is owned by the Perth Golf Course. The proposed project involves developing the western portion of the golf course (i.e., the existing back nine golf course holes) and adjacent lands south of the Tay River into a residential subdivision consisting of approximately 900 to 1000 units.

In 2009, the Town of Perth annexed two parcels along the western limits, known locally as the Perth Golf Course and the Tayview property, formerly in Tay Valley Township. Concurrently, the Town had appealed the Lanark County Sustainable Communities Official Plan, which had projected slow growth rates for Perth and had not included the annexed lands on the County's Schedule A: Land Use Designations as Settlement Area. The Town was concerned that the population projections could affect the anticipated development of the annexed lands. Following negotiations between the Town of Perth and Lanark County through the Ontario Municipal Board, a portion of the Western Annex Lands was designated for future residential development to accommodate the Town's population allocation of 8085 people by 2038. An Infrastructure Master Plan for the Western Annex Lands was created in 2019 to develop a framework for transportation, water supply, and sanitary sewer and stormwater servicing for the area and to provide the Town with an understanding of constraints and opportunities associated with developing the area. The preparation of the Infrastructure Master Plan involved public and agency consultations, including with Rideau Valley Conservation Authority (RVCA) to address constraints associated with floodplain and wetlands.

The EIS addresses the draft plan for residential development proposed on the Site. This EIS broadly assesses potential impacts of the proposed development on natural heritage features on and adjacent to the Site, including habitat for species at risk (SAR), Grants Creek Provincially Significant Wetland, watercourses and fish habitat areas, and areas meeting the definitions of Significant Wildlife Habitat and Significant Woodland. This EIS identifies mitigation measures to minimize or eliminate potential impacts to these natural heritage features.

KAL was retained by Caivan (Perth GC) Ltd. to produce the EIS for the proposed development in mid-May of 2021, approximately halfway through the standard timing window in which ecological field surveys to document existing conditions are conducted. This timing window initiates in the early spring and coincides with the time of year during which wildlife species are most active and most easily detected (i.e., breeding season). As such, KAL was limited to a truncated field season in 2021. Subsequently, additional field studies took place in the spring and summer of 2022 to complete documentation of natural environment features that were not completed in the 2021 field season due to appropriate survey windows. This report has been updated to document existing ecological conditions based on all surveys completed in 2021 and 2022,

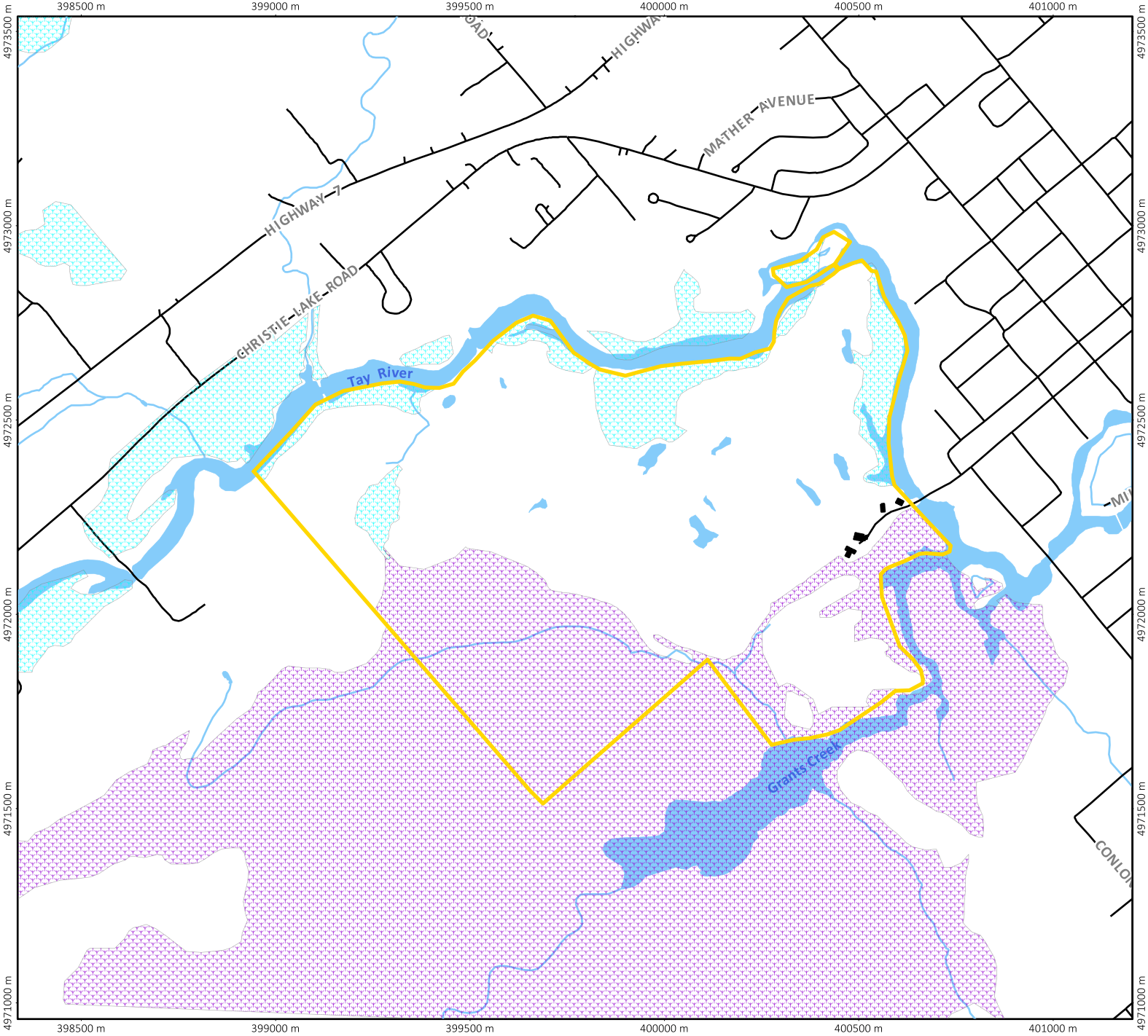


Figure 1 Map showing the location of the Site

Legend

- Site
- PWS (Existing boundary)
- Unevaluated Wetland
- Water

N

0 400 m

Project: CAIV1193 - 2203b
Universal Transverse Mercator - Zone 18 (N)

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supplemented by existing information from online databases and previous reports.

2.0 SITE DESCRIPTION

The Site encompasses the Western Annex Lands and is approximately 147 ha in size. The area comprises the Perth Golf Course and adjacent undeveloped lands, characterized predominantly by terrestrial forested areas and thickets and treed swamps (Figure 1). The Western Annex Lands are bordered to the north and east by the Tay River. The study area for this EIS also encompasses parcels of land outside the Western Annex Lands, which are proposed locations for utility and infrastructure connections between the proposed new residential community and the Town of Perth. These Peripheral Areas include 1) a parcel surrounding the Lanark County Administration Building along the north side of the Tay River; 2) lands on the east side of the Tay River at the Peter Street Bridge approaching the Perth Golf Course; and 3) lands on the north and south side of the Rogers Road Bridge, southeast of the Perth Golf Course.

The Site is bordered by:

- The Tay River, forested lands, agricultural lands, and Christie Lake Road to the north;
- The Tay River and residential neighbourhoods in the Town of Perth to the east;
- Forested lands, Grants Creek Provincially Significant Wetland, and Grants Creek to the south; and
- Forested lands and agricultural lands to the west.

3.0 ENVIRONMENTAL POLICY CONTEXT

Natural heritage policies and legislation relevant to this EIS are outlined below.

3.1 The Provincial Policy Statement, 2020

The Provincial Policy Statement (PPS) was issued under Section 3 of the *Planning Act* (Government of Ontario, 1990a). The current PPS came into effect on May 1, 2020 (Government of Ontario, 2020). Natural features are afforded protections under Section 2.1 of the PPS, via the official plans and environmental policies of the municipal jurisdictions in which development is proposed. Protections may include maintenance, restoration, and improved function of diversity, connectivity, ecological function, and biodiversity of natural heritage systems. These protections restrict development and site alteration in significant natural areas (e.g., significant habitat of endangered and threatened species, significant wetlands, significant coastal wetlands, significant woodlands, significant valleylands, Significant Wildlife Habitat, Areas of Natural and Scientific Interest (ANSI), and fish habitat) unless it can be demonstrated that there will be no negative effects on the features and ecological functions of those natural areas. Technical guidance for implementing the natural heritage policies of the PPS is found within the second edition of the *Natural Heritage Reference Manual for Natural Heritage Policies of the Provincial Policy Statement, 2005* (NHRM: Ministry of Natural Resources (MNR), 2010). This manual recommends the approach and technical criteria for protecting natural heritage features and areas in Ontario. This manual further addresses the width of adjacent lands to be considered when evaluating potential negative impacts, such as areas within 120 metres (m) of protected natural heritage features.

3.2 Lanark County Sustainable Communities Official Plan, 2012

The Lanark County Sustainable Communities Official Plan (McIntosh Perry, 2012b) is intended to provide a land-use framework for the next 20 years. It is intended to facilitate the integration of land use planning policies with sustainable action plans to facilitate the implementation of planning goals and objectives.

3.3 Town of Perth Official Plan

The Town of Perth Official Plan (2019) serves as the Official Plan used in the town of Perth. This Official Plan provides direction for future growth and is a policy framework to guide physical development.

3.4 *Species at Risk Act*, 2002

The federal *Species at Risk Act* (SARA; Government of Canada, 2002) is administered by Environment and Climate Change Canada (ECCC) and provides direction to protect and ensure the survival of wildlife species in Canada. The purpose of the SARA is to prevent populations of wildlife from becoming Extirpated, Endangered, or Threatened, provide recovery Endangered or Threatened species, and to manage other species to prevent them from becoming Endangered or Threatened.

All species listed on Schedule 1 of SARA are afforded protection on federal lands. Aquatic species and species of migratory birds protected by the *Migratory Birds Convention Act* (MBCA; 1994) and listed as Endangered, Threatened, or Extirpated under Schedule 1 of SARA are protected wherever they occur in Canada, regardless of land ownership.

3.5 *Endangered Species Act*, 2007

The provincial *Endangered Species Act* (ESA; Government of Ontario, 2007) is administered by the Ministry of Environment, Conservation, and Parks (MECP) and provides protection for species at risk (SAR) and their habitat. The ESA states that it is illegal to harm the habitat of species listed as Extirpated, Endangered, and Threatened. It is also illegal to kill, harm, harass, possess, transport, buy, or sell Extirpated, Endangered, and Threatened species, whether it is living or dead. Species listed as Endangered, Threatened, or Extirpated and their habitats (e.g., areas essential for breeding, rearing, foraging, hibernation, and migration) are automatically afforded legal protection under the ESA.

3.6 *Fisheries Act*, 1985

The federal *Fisheries Act* (Government of Canada, 1985) is administered by Fisheries and Oceans Canada (DFO) and provides protections to fish, fish habitat, and fisheries. Specifically, the *Fisheries Act* in its current version provides: 1) protection for all fish and fish habitat; 2) prohibition against the "harmful alteration, disruption or destruction of fish habitat"; and 3) prohibition against causing "the death of fish by means other than fishing".

Projects with a scope that does not fall within DFO’s defined standards and codes of practice require submission of a request for review to DFO.

3.7 *Migratory Birds Convention Act*, 1994

Nesting migratory birds are protected under the MBCA (Government of Canada, 1994). No work is permitted that would result in the destruction of active nests or the wounding or killing of bird species protected under the MBCA and/or associated regulations (e.g., SARA). The "incidental take" of migratory birds and the disturbance, destruction, or taking of the nest of a migratory bird is prohibited. "Incidental take" is the killing or harming of migratory birds due to actions that are not primarily focused on taking migratory birds (e.g., economic development) and no permits exist for the incidental take of migratory birds or their nest/eggs as a result of activities that are not focused on taking migratory birds. These prohibitions apply throughout the year. The Government of Canada has compiled nesting calendars that apply across Canada that can be used to greatly reduce the risk of harming/destroying active nests by ensuring works that may impact nests are performing outside of the nesting period.

3.8 *Fish and Wildlife Conservation Act,* 1997

The provincial *Fish and Wildlife Conservation Act* (FWCA; Government of Ontario, 1997) governs the hunting and trapping of a variety of wildlife including mammals, birds, reptiles, amphibians, and fish in Ontario, thereby facilitating the protection of wildlife and their habitat. The FWCA outlines the prohibition of hunting or trapping specially protected species and the requirement for provincially issued licenses for the hunting or trapping of "furbearing" or "game" animals. Examples of specifically protected animals include, for example, Southern Flying Squirrel (*Glaucomys volans*), Northern Harrier (*Circus cyaneus*), American Kestrel (*Falco sparverius*), Blue Jay (*Cyanocitta cristata*), Midland Painted Turtle (*Chrysemus picta marginata*), Northern Watersnake (*Nerodia sipedon*), and Gray Treefrog (*Hyla versicolor*). In particular, raptors that are not protected under the MBCA (including Peregrine Falcon) are protected under the FWCA.

3.9 *Conservation Authorities Act*, 1990

Conservation Authorities were created to address erosion, flooding, and drought concerns regionally by managing at the watershed level. Conservation Authorities were given the ability to regulate under Section 28 of the *Conservation Authorities Act* (Government of Ontario, 1990b). The Act provides mechanisms to regulate works and site alterations that have potential to affect erosion, flooding, land conservation, and alterations to waterbodies within their jurisdiction. It is the obligation of all Conservation Authorities to implement Ontario Regulations 42/06 and 146/06 to 182/06 *Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses* under Section 28 of the *Conservation Authorities Act* for relevant works.

4.0 MATERIALS AND METHODS

4.1 Desktop and Background Data Review

4.1.1 Agency Consultation

The Site is located within the jurisdictions of the Town of Perth, Lanark County, Rideau Valley Conservation Authority (RVCA), and the Kemptville District of the Ministry of Environment, Conservation and Parks (MECP). It also contains fish habitat regulated by Fisheries and Oceans Canada (generally still referred to as "DFO").

4.1.1.1 Municipal Agency Consultation

KAL, on behalf of and along with Caivan (Perth GC) Ltd., attended virtual pre-consultation meetings with the Town of Perth and Lanark County on November 25, 2021, and January 14, 2022, respectively, regarding the proposed development. Representatives of RVCA were present for both meetings. Requirements of the EIS were identified by the three agencies during these meetings and include (Appendix B; Appendix C):

- A map identifying ecological constraints on the Site.
- Identification and characterization of SAR and their habitat and natural heritage features and systems including wetlands, significant woodlands, significant valleylands, Significant Wildlife Habitat, fish habitat, and Areas of Natural and Scientific Interest.
- Recommendations which uphold and build upon original commitments made by the Town of Perth in the Infrastructure Master Plan (Jp2g Consultants Inc., 2019) that relate to environmental protection.
- A Headwater Drainage Features Assessment (HDFA) prepared in accordance with accepted methods, including:
    - *Evaluation, Classification, and Management of Headwater Drainage Features Guidelines* (Credit Valley Conservation Authority and Toronto Region Conservation Authority, 2014)
    - Ontario Stream Assessment Protocol (OSAP) S4.M11 (Unconstrained Headwater Sampling; Stanfield, 2017)

RVCA also indicated a requirement for an Integrated Hydrological Impact Assessment (herein the "IHIA" to ensure the continued form and function of Grants Creek Provincially Significant Wetland. The IHIA was completed in February 2023 (JFSA, 2023). The IHIA integrates data and analysis collected on the groundwater and surface water to establish the existing conditions contributing to the wetland hydrological function. The findings of the hydro-technical components of this work indicate that the contributions to the hydrological regime of the wetland from this site are predominantly from surface water. Groundwater plays a very minor role due to the near-to-surface bedrock conditions and limited movement of groundwater through it. Conversely, within the catchment area of the wetland on this site, surface water runs overland or just below the ground surface, but above the bedrock interface towards the wetland (interflow).

4.1.1.2 Provincial Consultation

A letter request for confirmation of SAR potential related to the Site was submitted to MECP on May 18, 2021. This EIS addresses the list of potential SAR confirmed by MECP on July 22, 2021 (Appendix D), including considering potential impacts to SAR and associated mitigation measures.

4.1.1.3 Federal Consultation

The construction of stormwater outlets into fish habitat, and/or the removal of surface water features from the Site (if they constitute fish habitat) would require DFO consultation. DFO consultation would involve submission of a Request for Review of proposed fish habitat alterations to determine if the alterations would

require an authorization under the *Fisheries Act*. Alterations to watercourses would also require formal permission from RVCA.

4.1.2 Records Review

Colour digital aerial photographs from Google Earth Pro and RVCA's public and consultant geoportals (RVCA 2022a, b) were used to initially identify natural environment features in the area through a desktop review. Additional background information in this report was obtained from a combination of studies and reports performed within the general area of the Site to review relevant information and to guide field studies. The review of existing information also included a desktop assessment of species listed under the ESA and SARA having some potential to occur in the broader area. Existing information was obtained from online sources, which include but are not limited to:

- *Environmental Impact Statement Perth Golf Course Community Concept* (McIntosh Perry, 2012a)
- Lanark County Sustainable Communities Official Plan (McIntosh Perry, 2012b)
- *Infrastructure Master Plan Western Annex in the Town of Perth* (Jp2g Consultants Inc., 2019)
- RVCA:
    - *Tay River Subwatershed Report: Grants Creek Catchment* (2017a)
    - *Tay River Subwatershed Report: Glen Tay Catchment* (2017b)
    - *Tay River Subwatershed Report: Perth Catchment* (2017c)
- Town of Perth Official Plan (Town of Perth, 2019)
- Aquatic Species at Risk Map (DFO, 2022)
- Ontario Ministry of Natural Resources and Forestry (MNRF)
    - Natural Heritage Information Centre (2023a)
    - Land Information Ontario Provincially Tracked Species Grid Detail (2023b)
    - Fish ON-Line (2023c)
    - Source Protection Information Atlas (2023d)
    - Fish Habitat of the Tay River Watershed: Existing Conditions and Opportunities for Enhancement (Esseltine, 2021)
    - Recovery Strategy for the Eastern Small-footed Myotis (*Myotis leibii*) in Ontario (Humphrey, 2017)

  - Recovery Strategy for the Little Brown Myotis (*Myotis lucifugus*), Northern Myotis (*Myotis septentrionalis*) and Tri-colored Bat (*Perimyotis subflavus*) in Ontario (Humphrey & Fotherby, 2019)

- Species at Risk in Ontario List (MECP, 2023)
- Species at Risk Public Registry (Government of Canada, 2023)
- Ontario Breeding Birds Atlas (Birds Canada et al., 2009)
- Ontario Reptile and Amphibian Atlas (Ontario Nature, 2019)
- iNaturalist (California Academy of Sciences and National Geographic Society, 2023)
- eBird (Cornell Lab of Ornithology, 2023a)
- Bumble Bee Watch (Wildlife Preservation Canada et al., 2023)

4.2 Field Studies

4.2.1 Surface Water and Fish Habitat

A Headwater Drainage Feature Assessment (HDFA; Appendix H) was conducted for the Site in 2021 and 2022. The HDFA describes surface water features on and directly adjacent to the Site following the methods identified within *Evaluation, Classification and Management of Headwater Drainage Features Guidelines* (Credit Valley Conservation Authority and Toronto Region Conservation Authority, 2014).

Headwater drainage features are typically non-permanently flowing drainage features that are important for maintaining healthy watersheds. Headwater drainage features may not have defined beds or banks and can include first-order and zero-order intermittent and ephemeral channels, swales, and connected headwater wetlands. Conservation Authorities are concerned with land development activities that can alter and/or eliminate headwater drainage features. Such activities could have broad implications for water quality and quantity, recharge/infiltration, and the overall health of the local headwater drainage feature and downstream aquatic habitats.

The HDFA identifies and describes 20 headwater features on Site within the project area (Tributary A, and Tributaries C through U; Appendix H; Figure 2), and three outside of the project area and off-site (Grants Creek, the Tay River, and Tributary B; Appendix H; Figure 2). Surveys of the surface water features addressed in the HDFA were conducted during late May through early July of 2021, and from May 10 to June 03, 2022, to coarsely assess water levels to determine which features may permanently contain water and therefore provide perennial fish habitat. These assessments also included coarse characterizations of channel morphology and potential sediment transport and storage capacity of these features, along with their riparian and in-stream vegetation.

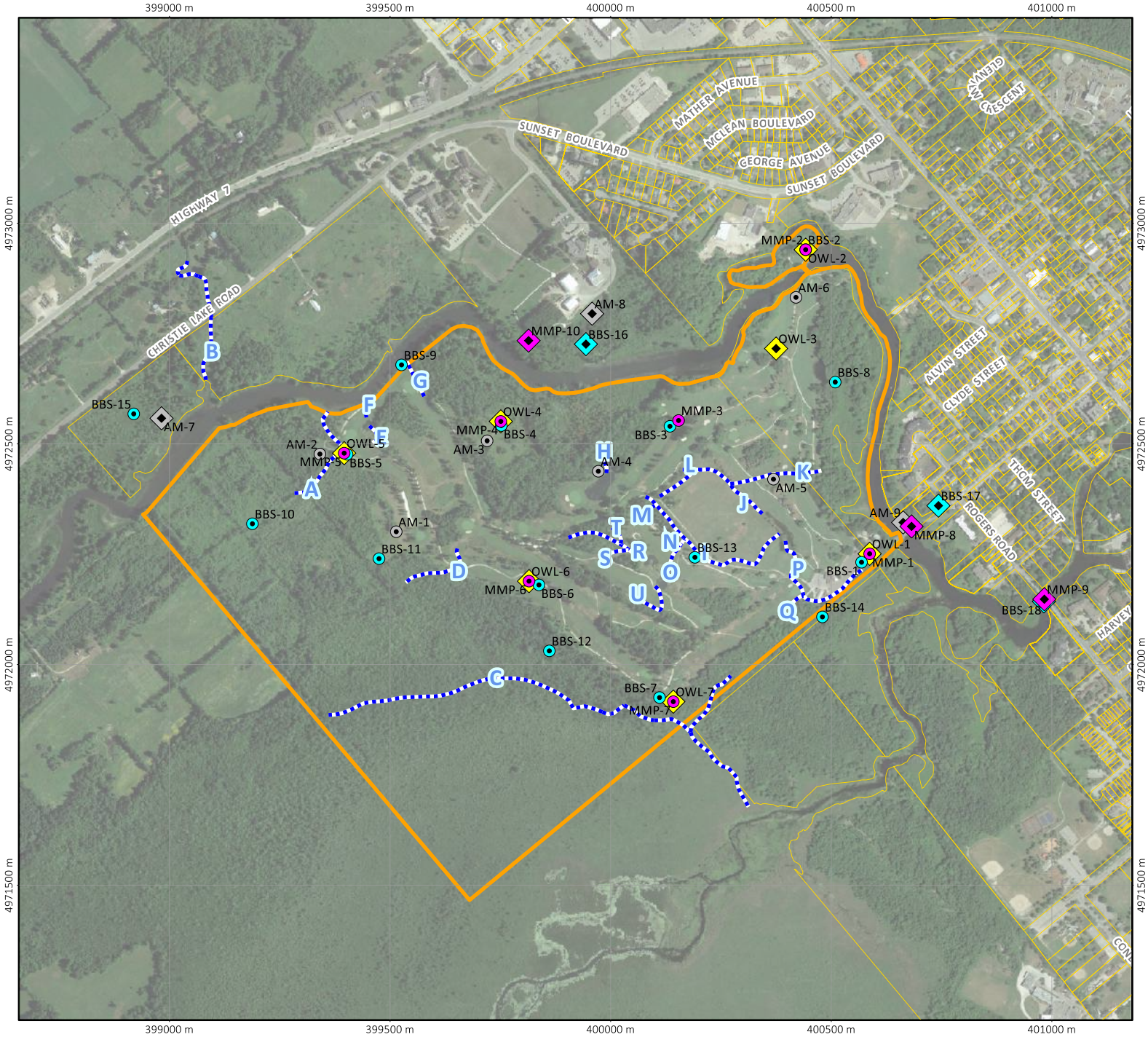


Figure 2 Map showing surface water features and survey stations

Legend

- Site
- Perth Parcels
- Headwater Drainage Feature

Survey Stations

- Anurans (2021 and 2022) - and EWPW (2021)
- Anurans (2022)
- Breeding Birds (2021)
- Breeding Birds (2022)
- Owls (2022)
- Bats (2021)
- Bats (2022)

N

0 400 m

Project: CAIV1193
Map File: CAIV1193 - 2302b
Universal Transverse Mercator - Zone 18 (N)
Printed on: 2023-02-22

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4.2.2 Electrofishing

Summer fish community sampling was completed as part of the broader HDFA process (Appendix H) via non-lethal backpack electrofishing on July 20, 2021. Based on observed water levels throughout the spring and summer of 2021, one headwater drainage feature, Tributary B, was sampled to document fish communities because it still contained sufficient water (>0.1 m depth) for electrofishing. Tributaries A, C, and D did not contain sufficient water for electrofishing. Electrofishing sampling was not employed for Grants Creek and the Tay River as these are well-documented permanent waterbodies; fish community information for these waterbodies is based on publicly available data collected by RVCA and others.

One ~50 m reach within Tributary B was electrofished (Appendix H;

) Captured fish were enumerated and identified to species before being returned to the water. Effort was recorded at each reach as electrofishing seconds and used to estimate catch per unit effort. Supporting information collected during the fish surveys included *in situ* water chemistry (temperature, dissolved oxygen, pH, and specific conductance) and channel morphology information such as mean wetted depth, mean wetted width, mean bankfull width, and mean bankfull depth, along with a general description of substrate, channel anatomy, bank stability, vegetation cover, migratory obstructions, and surrounding land use.

4.2.3 Vegetation

A desktop review of available aerial imagery and preliminary field visits informed how the Site may be divided into vegetation communities based on variation in land cover, topography, and vegetation structure. Vegetation communities on the Site were identified and delineated in the field during multi-season field surveys conducted using standard Ecological Land Classification (ELC) methods for Ontario (Lee et al., 1998). This method provides a consistent approach to identifying, describing, naming, and mapping vegetation communities or physiographic features on the landscape-based dominant plant species and soil composition. It results in a standardized description of each vegetation community to capture the natural diversity and variability of communities within a site and to provide insight into available habitats and the type of species that may be present. More specifically, the classifications from ELC provide a basis for determining whether potential habitat for a given SAR or other ecological value may be present.

During surveys, the dominant plant species were recorded within each proposed ecosite in the field to further divide ecosites into vegetation types (the finest resolution in ELC), where possible. Soil samples were taken using a 120 centimetre (cm) long soil auger to characterize community substrates. Representative photos of each ELC unit on the Site were taken and are included with the community descriptions in this report.

While wetland ecosites were defined across the Site based on ELC, the presence of 50% wetland plant coverage was used, per the OWES protocol (MNRF, 2014) in the confirmation/delineation of wetland boundaries associated with the Grant's Creek PSW Complex adjacent to the south side of the Site.

Detailed surveys of individual trees will not be completed until Site phasing is confirmed. A general assessment of proposed tree removals based on the ELC-level site review, however, was completed through a Tree Conservation Plan (TCP; Appendix I).

4.2.4 Breeding Birds

Morning breeding bird surveys were performed via point count surveys following the *Ontario Breeding Bird Atlas Guide for Participants* (Birds Canada et al., 2001; Birds Canada et al., 2021). Breeding bird surveys are to be completed from survey stations (Figure 2) that, combined, provide suitable viewing of all habitats on a site on calm weather days with light wind (≤3 on the Beaufort scale[1]) and no precipitation.

Per Birds Canada et al. (2001, 2021), two rounds of surveys must take place between sunrise and five hours after sunrise between May 24 and July 10, with a minimum of 15 days between survey dates. Since several at-risk bird species were assessed as having a moderate to high potential of occurring on the Site (details in Section 4.10), an extra (third) survey round was conducted to increase detectability of these species. The addition of the third survey is also consistent with monitoring requirements for some listed grassland bird species under Ontario Regulation 242/08, which details standard practices for activities under the ESA. All incidental observations were recorded while moving between survey points as well as during other field visits. Birds were identified by vocalization and/or direct visual observation.

The presence of regionally rare bird species was based on an analysis of data from the Atlas of Breeding Birds of Ontario (Cadman et al., 1987) based on Hill's Site Regions, now Ecoregions. The *Ontario Wetland Evaluation System: Southern Manual* (MNRF, 2014a) also assisted with classifying regionally significant breeding birds in the area (Region 6). The presence of provincially and federally significant species was based on species listed under the ESA and SARA, respectively, and any other non-SAR species that are tracked by the Natural Heritage Information Centre (these species are considered provincially significant; MNRF, 2023a).

4.2.5 Nightjars

Night-time bird surveys to confirm the presence/absence of at-risk nightjars (Eastern Whip-poor-will (*Antrostomus vociferus*) and Common Nighthawk (*Chordeiles minor*)) and their potential breeding territories were conducted following the *Draft Survey Protocol for Eastern Whip-poor-will in Ontario* (MNRF, 2014b). This protocol calls for a minimum of three separate night-time surveys between May 18 and June 30 (breeding season), with two occurring in late May or the first week of June during a week preceding or just after a full moon, and a third survey in the next full moon period (middle/end of June).

Eastern Whip-poor-will usually forage in the semi-darkness of early morning and dusk, but on nights when the moon is more than half full, they are likely to forage all night under the brighter conditions. Their broods are timed such that the young hatch approximately 10 days before the full moon when the parents have more time (and moonlight) to catch food for them (Cornell Lab of Ornithology, 2019; Kaufman, 2019). As such, this species is more detectable during a full moon period.

Common Nighthawk are most often observed at dusk and dawn when flying high over forests or feeding on flying insects over water. Common Nighthawk are also identifiable by their distinctive call and "loud booming", noise produced by the rushing of air through the birds' primary feathers as they dive (Cornell Lab

[1]The Beaufort Wind Force Scale is an empirical measure that relates wind speed to observed conditions at sea or land. The scale is as follows: **0**: calm, smoke rises vertically, wind speed <1 km/hr; **1**: light air, smoke drift indicates wind direction, leaves and wind vanes are stationary, wind speed = 1.1 – 5.5 km/hr; **2**: light breeze, wind felt on exposed skin, leaves rustle, wind vanes begin to move, wind speed = 5.6-11 km/hr; **3**: gentle breeze, leaves and small twigs constantly moving, light flags extended, wind speed – 12-19 km/hr.

of Ornithology, 2023b). Nesting habitat and survey timing is similar for Common Nighthawk and Eastern Whip-poor-will and as such, these species are surveyed for in the same locations and at the same time.

Following the protocol, surveys were completed within a week of the full moon while the moon was visible above the horizon (>50% illuminated). Surveys started at least 30 minutes after sunset and ended while the moon was still visible. Surveys were conducted under field conditions with no precipitation, little or no wind, clear skies, temperature of 10°C or above, and good visibility (low cloud cover). The timing of Eastern Whip-poor-will surveys is also optimal for detecting Common Nighthawk, as that species is generally best heard calling in the late evening.

Survey points (Figure 2) were established at 500 m intervals along the survey route; the aim is to have one survey point for every 30 ha of typical habitat. As per MNRF (2014a), each point count station had a fixed radius of 300 m so that the absolute numbers of birds could be counted within a reasonable hearing range (note that calling Eastern Whip-poor-will can be heard up to 1 km away under ideal conditions). Surveyors were careful not to walk directly through suitable nightjar habitat in between survey stations to avoid stepping on any potential Eastern Whip-poor-will eggs, which are cryptically coloured and laid on the forest floor. Surveys were undertaken by two surveyors to triangulate the location of a calling individual.

4.2.6 Owls

Nocturnal owl surveys were performed following the *Citizen Scientist's Guide for Conducting Owl Surveys in Central Ontario* (Birds Canada, undated). Owl surveys are to be conducted in April, preferably during the first two weeks of the month. They are to begin one half hour after sunset and end before midnight on evenings with little wind (≤3 on the Beaufort Scale[1]), no precipitation, and warmer than -15°C in areas with minimal background noise. If possible, survey stations should be spaced 2 km apart. At each station (Figure 2) a broadcast file is played consisting of a standardized two-minute silent listening period, followed by prerecorded calls of two owl species alternating with silent listening periods. The 12-minute-long broadcast consists of five prerecorded 20-second-long owl calling periods between each listening period. The first set is Boreal Owl calls, while the following four sets are Barred Owl calls. In addition to documenting all owl species detected, Ruffed Grouse, Wilson's Snipe, and American Woodcock heard or seen during each listening period are recorded. Additional observations of owls were made throughout the spring and summer during other field visits.

4.2.7 Bats and Other Mammals

Bat monitoring was completed following acoustic surveys under MNRF's *Survey Protocol for Species at Risk Bats within Treed Habitats* (2017; Figure 2). This is currently the recommended protocol for confirming the presence/absence of Little Brown Myotis, Northern Myotis, and Tri-colored Bat, where it is determined that potentially suitable habitat for the establishment of maternity roosts is present.

All species of bats that may occur on and adjacent to the Site are detectable following MNRF (2017) protocols if ultrasonic acoustic monitors are used and the signal-to-noise ratio can be analyzed from oscillogram displays to identify bat calls to species level. Under this protocol, acoustic monitors are to be installed for a minimum of 10 nights between June 1 and June 30, with recordings commencing after dusk and continuing for five hours.

Kaleidoscope Pro analysis software was used to automatically detect and identify bat calls from acoustic data. This software typically has an identification accuracy rate of ~70-80%; approximately 10% of the acoustic data were manually verified.

4.2.8 Turtles

Visual encounter surveys were completed following MNRF's *Survey Protocol for Blanding's Turtle in Ontario* (MNRF, 2015a), with a particular focus on golf course ponds and the Tay River. During turtle surveys, surveyors stopped and scanned areas of interest with binoculars from a distance of approximately 50 m to prevent any turtles from being startled before being observed. Areas of potential overwintering and nesting were also investigated to assess suitability. The protocol calls for five rounds of visual encounter surveys starting immediately after ice-off (approximately mid-April) until June 15, with surveys spanning a minimum of three weeks. Although this protocol is intended primarily for Blanding's Turtle (*Emydoidea blandingii*), most turtle species generally occurring in the area would be detectable under this protocol.

This protocol requires that potential habitat for turtles be visited under the following conditions:

- After ice off, and no later than June 15;
- If air temperature is between 5 and 15˚C, surveys are to take place during sunny periods, between 10:00am and 5:00pm, when basking sites are receiving full sunlight;
- If air temperature is between 15 and 25˚C, surveys are to take place during sunny periods between 8:00am and 12:00pm, when basking sites are receiving full sunlight or during overcast periods from 9:00am until 4:00pm if air temperature is higher than water temperature; and
- Five surveys must be spread over a period of at least three weeks, at sites with no previous documentation of the species.

Targeted Eastern Musk Turtles were conducted in the Tay River. Unlike other turtle species which can be surveyed for using the survey protocol described above, the highly aquatic Eastern Musk Turtle requires a more targeted active survey method to maximize the probability of detection. While most freshwater turtles bask out of the water and are therefore detectable during land-based visual surveys, the Eastern Musk Turtle usually basks by floating at or just below the surface among or under floating aquatic vegetation (ECCC, 2022). The standard active search survey method for Eastern Musk Turtle is to wade through shallow aquatic habitat and actively search for them basking under floating vegetation by flipping lily pads and moving floating vegetation. This survey is to be completed between 11 am and 5 pm when the surface layer of the water is warmed from the sun (Blazing Star Environmental et al., 2019).

In addition to formal surveys, all incidental turtle observations were documented throughout the field season.

4.2.9 Snakes

Snake surveys followed visual encounter survey techniques outlined in *Survey Protocol for Ontario Species at Risk Snakes* (MNRF, 2016). These surveys involve slowly walking through suitable habitat while looking for

basking and foraging snakes, searching under cover objects (e.g., logs, rocks, artificial cover), and listening for the sound of snakes moving through vegetation.

Preliminary desktop reviews of the Site indicated potential presence of Gray Ratsnake (*Pantherophis spiloides*; Frontenac Axis population listed as Threatened under the ESA and SARA) based on occurrence records and habitat suitability (Section 4.1.2 and Appendix G). Snake surveys were therefore tailored to the habitat preferences of this species. Since this species is regularly found in trees, surveys included regularly scanning the subcanopy (i.e., approximately 1 to 4 m in height) of forested habitats.

The protocol requires that suitable habitat areas be surveyed under the following conditions:

- On sunny days when air temperature is between 10 and 25°C, or under overcast conditions when air temperature is between 15 and 30°C.
- In the spring, surveys can be carried out between 9am and 5pm. However, in July and August when daytime temperatures are typically above 25°C, surveys should be carried out between 8am and 12pm, or 5pm and 8pm.
- Surveys for basking snakes should not be carried out on days with wind speeds >24 km/hr.
- A total of 10 surveys are required and should be spread over the active season, with at least five surveys occurring prior to July 1. The recommended search effort is approximately 1-2 hours per hectare of suitable habitat. Note that one survey is the amount of effort required to thoroughly search all suitable habitat. For large sites, several visits may be required to adequately cover the entire area and complete one survey.

Note that all incidental snake observations were documented throughout the field season.

4.2.10 Anurans

Anuran (frog and toad) surveys were performed following the Marsh Monitoring Program (Birds Canada et al., 2008). This protocol calls for multiple survey stations across a site to capture spatial and habitat variability. The Marsh Monitoring Program advises that each station (Figure 2) be visited a minimum of three times at night, no less than 15 days apart, during the spring and early summer. Following this protocol, the timing of the three anuran surveys is based on nighttime air temperature:

- Early breeders (Wood Frog, Western Chorus Frog, Spring Peeper): above 5°C;
- Mid-season breeders (Mink Frog, American Toad, Gray Treefrog): above 10°C; and
- Late breeders (Green Frog, Bullfrog): above 17°C.

Anuran surveys are to begin one half hour after sunset and end before midnight on evenings with appropriate temperatures and light winds (≤3 on the Beaufort Scale[1]). Additional observations of amphibians were made throughout the spring and summer during other field visits.

5.0 RESULTS

5.1 Surface Water and Fish Habitat

Results of field and desktop reviews of the Tay River, Grants Creek, and unnamed associated tributaries on and adjacent to the Site are described below and in greater detail throughout the HDFA in Appendix H. At the time of summer fish habitat surveys, Tributaries A and C through U did not have sufficient water depths to support electrofishing or fish habitat (<0.1m) and were not hydrologically connected to the Tay River or Grants Creek. As a result, Tributary B was the only tributary that was electrofished and considered to provide potential fish habitat. The Tay River and Grants Creek are well-documented watercourses, and as such, fish community information was extracted from previous studies conducted by others.

5.1.1 Periphery Reaches

5.1.1.1 Tributary A

Tributary A is located near the northwestern corner of the golf course (Figure 2; Appendix H). This tributary originates in a thicket swamp, flows through lowland deciduous forest (Figure 3), then a short distance through the golf course via two culverts under cart paths (Figure 4), and into the Tay River via a wooded area. The upstream portion of Tributary A mostly lacks in-stream vegetation. The reach along the golf course was mowed close to the banks, with in-stream vegetation dominated by cattails (*Typha* sp.), Reed-canary Grass (*Phalaris arundinacea*), Common Duckweed (*Lemna minor*), and bur-reed (*Sparganium* sp.). Tributary A has a well-defined channel with a mean bankfull width of approximately 4.5 m over mucky, organic substrate. This tributary appears to be a constructed feature as it is relatively linear, particularly along the upstream reach, where it ends at an old farm fence before transitioning into regenerating thicket swamp. This channel was potentially excavated to support previous agricultural uses on lands west of the upstream extent.

Water was present throughout Tributary A in the spring likely due to seasonally extended contributions from the upstream thicket swamp. Mean wetted width and depth in late May were approximately 2.5 m and 0.3 m, respectively (Figure 3). Tributary A is intermittent; in July, the feature was surface-damp with a wetted width of approximately 1.5 m and scattered remnant puddles less than 0.1 m deep (Figure 5). Average water temperature within remnant puddles was 19.7°C, pH was 7.4, dissolved oxygen was 3.0 mg/L, and specific conductance was 327.8 µS/cm.



Figure 3 Photo showing Tributary A through lowland deciduous forest (note abundant tadpoles), taken on May 27, 2021

Tributary A was not electrofished in 2021 due to low water levels. However, McIntosh Perry (2012a) electrofished Tributary A in late June of 2010, capturing two fish species: Brook Stickleback and Central Mudminnow. Tributary A therefore likely provides intermittent habitat for fish, including for feeding, cover, refuge, and migration, and contributes to downstream habitat in the Tay River through the transport of allochthonous materials. In addition to providing seasonal fish habitat, an abundance of frogs was repeatedly observed within and adjacent to Tributary A in 2021. Numerous tadpoles were observed within the tributary in late May 2021 (Figure 3), suggesting that it provides breeding and egg-laying habitat for amphibians.



Figure 4 Photo showing Tributary A where it crosses the golf course, taken on May 27, 2021



Figure 5 Photo showing Tributary A through lowland deciduous forest, taken on July 20, 2021

5.1.1.2 Tributary B

Tributary B is located north of the Tay River near the northwestern portion of the Site (Figure 2; Figure 6). It appears to receive flows from Blueberry Marsh Provincially Significant Wetland north of the Site. Tributary B crosses the Site under the Christie Lake Road bridge and flows through meadow surrounded by Silver Maple (*Acer saccharinum*) swamp followed by meadow marsh before reaching the Tay River (Figure 2; Figure 6). In-stream vegetation consists of a mix of narrow- and broad-leaved emergent plants, robust emergent plants, floating plants, and submerged plants. Tributary B is a permanent watercourse with a clearly defined bed and banks and evidence of sorted substrate. The substrate consisted of clay, sand, cobble, and gravel. Only July 20, 2021, Tributary B had a 5.7 m wide channel with a water depth of 0.3 m. At that time, water temperature was 25.1°C, pH was 7.6, dissolved oxygen was 5.0 mg/L, and specific conductance was 231.5 µS/cm.



Figure 6 Photo showing Tributary B south of the Christie Lake bridge, taken on July 20, 2021

An ~50 m long run sequence within the channel of Tributary B was electrofished on July 20, 2021, resulting in the capture of 114 fish belonging to 12 different species (Table 1; Appendix H) making it the only area of fish habitat other than the Tay River or Grants Creek in vicinity of the Site. No other fish habit occurs directly within the Site. Of the species captured, this included six species of minnows (Cyprinidae), two sunfish species (Centrachidae), one species of catfish (Ictaluriae), one species of darter (Percidae), one species of sucker (Catostomidae), and one species of mudminnow (Umbridae). Average catch per unit of effort was 8.8 fish/minute. Catch rates of minnow species were highest, consisting of ~59% of the total catch. Five fish species previously undocumented in Tributary B were observed: Hornyhead Chub, Golden Shiner, Blackchin Shiner, Bluntnose Minnow, and Creek Chub (Table 1; Appendix H).

Table 1 Fish species captured in Tributary B on July 20, 2021

MNRF Code	Common Name	Scientific Name	Number
141	Central Mudminnow	*Umbra limi*	15
163	White Sucker	*Catostomus commersoni*	18
192	Hornyhead Chub	*Nocomis biguttatus*	11
194	Golden Shiner	*Notemigonus crysoleucas*	4
198	Common Shiner	*Luxilus cornutus*	30
199	Blackchin Shiner	*Notropis heterodon*	2
208	Bluntnose Minnow	*Pimephales notatus*	16
212	Creek Chub	*Semotilus atromaculatus*	4
233	Brown Bullhead	*Ameiurus nebulosus*	1
311	Rock Bass	*Ambloplites rupestris*	8
313	Pumpkinseed	*Lepomis gibbosus*	4
341	Johnny Darter	*Etheostoma nigrum*	1
Total Number of Species			12
Total Fish Catch			114
Total Effort (seconds)			377.9
Total Effort (minutes)			12.9
Catch per unit effort (fish caught/mins)			8.8

Fish communities in Tributary B were previously documented by McIntosh Perry (2012a) in late April and June of 2010. A total of 12 species were caught during this study including Johnny Darter, Brown Bullhead, Yellow Bullhead, Pumpkinseed, Blacknose Shiner, Common Shiner, Emerald Shiner, Shorthead Redhorse, White Sucker, Rock Bass, Bluegill, and Central Mudminnow (Table 2**Error! Reference source not found.**). The average depth of Tributary B was approximately 0.3 m, and the average width of the channel was approximately 2 m at the time of this fish sampling (McIntosh Perry, 2012a). Tributary B contained floating and emergent vegetation over gravel, pebbles, and sand, and was assessed as providing suitable fish habitat for spawning, nursery, rearing, foraging, and migration for common baitfish and sportfish species (McIntosh Perry, 2012a); these habitat assessments align with observations made in 2021.

Table 2 Fish species captured in Tributary B in previous study compared to 2021 study

MNRF Code	Common Name	Scientific Name	McIntosh Perry	KAL
			April and June, 2012	July, 2021
141	Central Mudminnow	*Umbra limi*	X	X
163	White Sucker	*Catostomus commersoni*	X	X
171	Shorthead Redhorse	*Moxostoma macrolepidotum*	X	
192	Hornyhead Chub	*Nocomis biguttatus*		X

MNRF Code	Common Name	Scientific Name	McIntosh Perry	KAL
			April and June, 2012	July, 2021
194	Golden Shiner	*Notemigonus crysoleucas*		X
196	Emerald Shiner	*Notropis atherinoides*	X	
198	Common Shiner	*Luxilus cornutus*	X	X
199	Blackchin Shiner	*Notropis heterodon*		X
200	Blacknose Shiner	*Notropis heterolepis*	X	
208	Bluntnose Minnow	*Pimephales notatus*		X
212	Creek Chub	*Semotilus atromaculatus*		X
232	Yellow Bullhead	*Ameiurus natalis*	X	
233	Brown Bullhead	*Ameiurus nebulosus*	X	X
311	Rock Bass	*Ambloplites rupestris*	X	X
314	Bluegill	*Lepomis macrochirus*	X	
313	Pumpkinseed	*Lepomis gibbosus*	X	X
341	Johnny Darter	*Etheostoma nigrum*	X	X
		Total Species Captured	12	12

In addition to providing perennial fish habitat, one frog species, American Bullfrog (*Lithobates catesbeianus*), was observed within Tributary B during the 2021 electrofishing survey. Year-round fish presence may prevent abundant amphibian presence. The tributary is more likely to provide feeding, hydration, and migration habitat for amphibians rather than breeding and egg-laying habitat.

5.1.1.3 Tributary C

Tributary C is mapped by the Province and RVCA as a watercourse that flows through Grants Creek Provincially Significant Wetland from the west and then southeast into Grants Creek (Figure 2). However, Tributary C mostly does not have a channel form, nor does it directly follow this mapped flow path. A defined channel form is more prevalent towards the downstream end near Grants Creek, but the upstream portion consists of complex microtopography of numerous small depressions and "fingers" within the wetland where water pools and eventually drains towards Grants Creek (i.e., no evidence of organized surface flow). These depressions and fingers may be relics of past flows or may represent wildlife corridors. In the spring, these upstream areas contained patches of shallow standing water interspersed by raised hummocks (Figure 7). Standing water was most evident along a divide within the wetland between treed swamp and thicket swamp, which mostly aligns with the mapping of this tributary. Figure 15 in Section 4.2.3 shows the divide between these vegetation communities). In July, the substrate surface of the wetland was mostly dry or surface-damp with some remnant puddles less than 0.1 m in depth (Figure 8). Vegetation throughout this portion of Grants Creek Provincially Significant Wetland is dominated by Speckled Alder (*Alnus incana*).



Figure 7 Photo showing a patch of standing water associated with Tributary C on May 28, 2021



Figure 8 Photo showing hummocks and dry conditions associated with Tributary C on July 20, 2021

Upstream portions of Tributary C are unlikely to provide direct fish habitat due to low water levels, which probably cause isolated areas of pooled water that are not connected to downstream features via surface flow. However, this feature form would likely provide ideal breeding and egg-laying habitat for amphibians. The downstream end of Tributary C near the confluence with Grants Creek likely provides direct and permanent fish habitat given the hydrological connection to the creek.

Tributary C was not mapped or described in the reviewed studies previously conducted by others (e.g., McIntosh Perry, 2012a).

5.1.1.4 Tributary D

Tributary D is located on the western edge of the golf course and is affiliated with a golf course pond (Figure 2; Appendix H). The upstream portion of this tributary is a well-defined channel located within a forested area (Figure 9) southwest of the associated pond. Tributary D appears to be a constructed feature because the upstream extent is linear and ends abruptly at an area of non-excavated land (Figure 10). It is likely that this feature was created to convey water from the forest to the pond. Downstream of the forest, Tributary D transitions into a grassy swale that connects to the pond via a culvert under a cart path (Figure 11). Tributary D was dry throughout the late spring and summer of 2021. However, the presence of wetland obligate species in the transitional area between forest and swale, such as Fowl Mannagrass (*Glyceria striata*), Spikerush (*Eleocharis palustris*), Water-plantain (*Alisma* sp.), Marsh Speedwell (*Veronica scutellata*), and Purple Loosestrife (*Lythrum salicaria*; Figure 12), suggests that it may be ephemeral. Tributary D therefore potentially provides flow or water storage functions for a short time during and after the spring freshet and

potentially following large rain events. Tributary D also likely contributes allochthonous material to fish and amphibian habitat within the pond.



Figure 9 Photo showing the downstream reach of Tributary D, taken on June 10, 2021



Figure 10 Photo showing the abrupt downstream extent of Tributary D, taken on June 10, 2021



Figure 11 Photo showing Tributary D downstream of the cart path, taken on June 10, 2021



Figure 12 Photo showing Tributary D at the transition between forest and swale, taken on June 10, 2021

5.1.2 Golf Course Reaches

5.1.2.1 Tributary E through U

Tributaries E through U are located on the golf course and can generally be described as grassed swales conveying overflow surface water from golf course ponds off Site during the spring freshet. As such, they can generally be characterized as ephemeral but may contribute sources of food, sediment, water, nutrients, and/ or organic matter to downstream habitats.

5.1.3 Adjacent Watercourses

5.1.3.1 Grants Creek

Grants Creek is classified as a warm water system (RVCA, 2017a). Twenty-eight species of fish are known to occur in Grants Creek, including Brown Bullhead, Largemouth Bass, Smallmouth Bass, Northern Pike, Pumpkinseed, and White Sucker (RVCA, 2017a; MNRF, 2023c). In 2016, Grants Creek was assessed as having low to moderate levels of instream wood structure in the form of branches and trees (RVCA, 2017a). The instream and riparian habitat complexity of Grants Creek is considered low within Grants Creek Provincially Significant Wetland (RVCA, 2017a). However, the wetland habitat provides the critical benefits of flood storage, water quality treatment, increased biodiversity, and important aquatic and terrestrial habitat (RVCA, 2017a). Substrates in Grants Creek near the Site are dominated by cobble, sand, and silt. Instream morphology here consists of runs and pools dominated by submerged plants.

Water quality in Grants Creek at the Glen Tay Road crossing (i.e., RVCA's closest monitoring station to the Site) was assessed as "Fair" for 2015-2017, indicating that water quality is usually protected but is occasionally threatened or impaired (RVCA, 2017a). From 2006 to 2017, average concentrations of total phosphorous, Kjeldhal nitrogen, and aluminum at this location exceeded guidelines while average *Escherichia coli* concentrations fell below guidelines (RVCA, 2017a). Grants Creek was assessed as having more than a 30 m buffer along 94% of its banks, with buffer areas dominated by natural wetland and forest conditions, resulting in a near absence of signs of erosion (RVCA, 2017a).



Figure 13 Photo showing Grants Creek looking upstream from the southeastern edge of the Site, taken on June 3, 2022

5.1.3.2 Tay River

The Tay River is classified as warm water system (RVCA, 2017b). The following 14 fish species were observed in the Tay River near the Site by McIntosh Perry (2012a) in May and August of 2010: Central Mudminnow (*Umbra limi*), Brook Stickleback (*Culaea inconstans*), Rock Bass (*Ambloplites rupestris*), Pumpkinseed (*Lepomis gibbosus*), Bluegill (*Lepomis macrochirus*), Golden Shiner (*Notemigonus crysoleucas*), Banded Killifish (*Fundulus diaphanus*), Blacknose Shiner (*Notropis heterolepis*), Brown Bullhead (*Ameiurus nebulosus*), White Sucker (*Catostomus commersonii*), Common Shiner (*Luxilus cornutus*), Smallmouth Bass (*Micropterus dolomieu*), Northern Pike (*Esox lucius*), Shorthead Redhorse (*Moxostoma macrolepidotum*), Hornyhead Chub (*Nocomis biguttatus*), Logperch (*Percina caprodes*), Creek Chub (*Semotilus atromaculatus*), and Johnny Darter (*Etheostoma nigrum*). The substrate of areas within the Tay River sampled by McIntosh Perry (2012a) consisted of muck and detritus. Average water depth was approximately 2.5 m and the channel width was approximately 20 m during these fish community surveys (McIntosh Perry, 2012a). Fish habitat structures noted within the Tay River at that time included submergent and emergent vegetation and organic debris. Observed fish habitat within the Tay River was assessed as suitable for spawning, nursery, rearing, foraging,

and as migration areas for baitfish and sportfish species. A weir associated with a bridge over the Tay River at the golf course may hinder fish migration, increase upstream sediment deposition, and reduce sediment transport downstream.

Surface water chemistry of the Tay River at Rogers Road was assessed by RVCA as "Good" over 2015 to 2017, indicating only a minor degree of threat or impairment with conditions rarely departing from natural or desirable levels (RVCA, 2017c). Average concentrations of total phosphorous, Kjeldhal nitrogen, and *E. coli* at this location during 2006 to 2017 fell below water quality guidelines (RVCA, 2017b). Most of the shoreline along the length of the Tay River has a natural buffer greater than 30 m, consisting mostly of forest, scrubland, wetland, and meadows (RVCA, 2017b). The Site encompasses two catchments of the Tay River; natural buffers are more prevalent in the Glen Tay catchment of the Tay River compared to the Town of Perth catchment where it is more urbanized (RVCA, 2017b, c). Riparian vegetation communities on Site along the Tay River are dominated by woody species (trees and/or shrubs; Figure 14). The shoreline of the Tay River is mowed to the banks along the northeastern and northwestern edges of the golf course (i.e., highly altered). Reaches of the Tay River close to the Site that were surveyed by RVCA had no signs of erosion (RVCA, 2017b, c).



Figure 14 Photo showing the Tay River looking upstream from the northeastern tip of the golf course, taken on May 27, 2021

5.2 Vegetation

During surveys on May 28, June 4, June 10, June 15, and July 14, 2021 and May 25, 2022, nineteen distinct ELC units (ecosites and vegetation types) were delineated for the Site (Figure 15). Ten of these ELC units are

terrestrial classifications and nine are wetland (swamp and marsh) classifications. The golf course constitutes approximately 26% of the Site, while the remaining 74% is mainly natural or naturalizing habitat. Of this natural habitat approximately 40% is wetland, 23% is forested (non-wetland), 8% is cultural thicket, and 3% is cultural meadow. The Peripheral Areas, situated on lands adjacent to the Site, constitute swamp and marsh wetlands, deciduous forest, cultural thicket, coniferous plantation, and cultural meadows, as well as small areas of constructed green lands and residential properties (lawns).

Each ELC unit and the dominant vegetation therein is described in detail below, with the descriptions split up by terrestrial and wetland vegetation communities. The ELC designations below were used in subsequent analyses to identify potential habitat that may be used by species of interest (i.e., SAR) occurring or potentially occurring on the Site.



Figure 15 Map showing Ecological Land Classifcation units for the Site

Legend

Site

Ecological Land Classification

- Cultural Meadow
- Cultural Thicket
- Forest
- Golf Course
- Wetland

PSW

N

0 400 m

Project: CAIV1193
Map File: CAIV1193 - 2302b
Universal Transverse Mercator - Zone 18 (N)
Printed on: 2023-02-22

KILGOUR & Associates

5.2.1 Terrestrial Communities

Golf Course (CGL_1)

This ELC unit is associated with the existing constructed 18-hole golf course and is dominated by manicured grass (Figure 16). Associated infrastructure includes a clubhouse, maintenance and storage buildings, other accessory buildings, and a parking lot. The golf course has several constructed ponds, the largest of which has a surface area of approximately 0.3 ha and an estimated depth of 9 to 12 m (KAL (K. Black) personal communication with Perth Golf Course (C. Drummond)). The golf course also has numerous hedgerows and scattered standalone mature trees, with species such as Green Ash (*Fraxinus pennsylvanica*), White Pine (*Pinus strobus*), apple (*Malus* sp.), White Oak (*Quercus alba*), Sugar Maple (*Acer saccharum*), Silver Maple, Jack Pine (*Pinus banksiana*), and Eastern Cottonwood (*Populus deltoides*). Many of the trees in and adjacent to the golf course showed signs of defoliation by Spongy Moth (*Lymantria dispar dispar*) during the 2021 field season. Larger patches of forest within and along the periphery of the golf course are treated as separate forest units and are described further below.



Figure 16 Photo showing the golf course, taken on May 28, 2021

Constructed Green Land (CGL)

An area of Constructed Green Land is situated southeast of the Peter Street Bridge within the Peripheral Areas adjacent to the Site. It was characterized as a manicured lawn with scattered trees, covering a small area bounded by Peter Street, the Tay River, and residential properties (Figure 17).



Figure 17 Photo showing manicured space south of Peter Street adjacent to the Site, taken May 25, 2022

Fresh-Moist Ash Lowland Deciduous Forest Type (FOD7-2)

This vegetation type exists within a forested area in the central portion of the golf course, along the western edge of the golf course, and within and along the northwestern portion of the golf course. It also characterized the riverbank areas along the Tay River at the Rogers Road Bridge (i.e., the southernmost Peripheral Area adjacent to the Site). These areas are lowland forests dominated by Green Ash (Figure 18). The canopy also includes scattered cover of White Willow (*Salix alba*), Black Poplar (*Populus nigra*), White Oak, and Bur Oak (*Quercus macrocarpa*). The subcanopy is dominated by European Buckthorn (*Rhamnus cathartica*) and Common Prickly-ash (*Zanthoxylum americanum*) and includes Bebb's Willow (*Salix bebbiana*). Ground cover consists mostly of European Buckthorn saplings and a mixture of herbaceous species common to wet sites and upland sites, including Marsh Bedstraw (*Galium* palustre), Sweet-scented Bedstraw (*Galium triflorum*), Woodland Strawberry (*Fragaria virginiana*), Calico Aster (*Symphyotrichum lateriflorum*), Shinleaf (*Pyrola elliptica*), Foxglove Beardtongue (*Penstemon digitalis*), Black Bulrush (*Scirpus atrovirens*), Hops Sedge (*Carex lupulina*), Bog Hemp (*Boehmeria* sp.), Fowl Bluegrass (*Poa palustris*), Purple Loosestrife (*Lythrum salicaria*), Crested Sedge (*Carex cristatella*), Flat-topped White Aster (*Doellingeria umbellata*), Wood Horsetail (*Equisetum sylvaticum*), Graceful Sedge (*Carex gracillima*), Tall Agrimony (*Agrimonia gryposepala*), Common Yarrow (*Achillea millefolium*), Canada Anemone (*Anemone canadensis*), Common Blue Violet (*Viola sororia*), and Spinulose Wood Fern (*Dryopteris carthusiana*). Soils consist of loams underlain by stiff clay. This

vegetation type is typically associated with moist to fresh moisture regimes and is characterized by well-drained to poorly-drained soils.



Figure 18 Photo showing Fresh-Moist Ash Lowland Deciduous Forest, taken on May 28, 2021

Fresh-Moist Sugar Maple – Lowland Ash Deciduous Forest Type (FOD6-1)

Lowland forest patches co-dominated by Sugar Maple and Green Ash with Eastern White Cedar (*Thuja occidentalis*) exist adjacent to wetland areas near the southern and eastern edges of the golf course Figure 19). These forested areas have evidence of disturbance (e.g., trash), likely due to proximity to the golf course, and represent the transition between adjacent wetland (swamp) and upland areas. The subcanopy in these locations primarily consists of Common Prickly-ash, followed by Green Ash saplings and European Buckthorn. Ground cover here represents a mixture of terrestrial and wetland species, including Ostrich Fern (*Matteuccia struthiopteris*), Crested Sedge, and Graceful Sedge. Soils consist of a thin (20 cm) organic layer over loams and clay. This vegetation type is associated with complex microtopography and imperfect to poor soil drainage.



Figure 19 Photo showing Fresh-Moist Sugar Maple – Lowland Ash Deciduous Forest, taken on June 14, 2022

Dry-Fresh Sugar Maple Deciduous Forest Type (FOD5-1)

This Sugar Maple-dominated forest is located in the southeastern portion of the Site and includes Basswood (*Tilia americana*), Bitternut Hickory (*Carya cordiformis*), and Black Cherry (*Prunus serotina*; Figure 20). It is situated on variable topography with shallow soils (loams) over bedrock (Figure 21) and is expected to have moderately dry to fresh moisture regimes (rapid to well drained). The understory is open, with ground cover dominated by litter, Green Ash saplings, Virginia Creeper (*Parthenocissus quinquefolia*), Sweet-scented Bedstraw (*Galium triflorum*), and upland sedges such as Bladder Sedge (*Carex intumescens*) and Graceful Sedge. Remnant signs of spring ephemeral vegetation, such as Blue Cohosh (*Caulophyllum thalictroides*), White Trillium (*Trillium grandiflorum*), and False Solomon's-seal (*Maianthemum racemosum*), were also observed. Wild garlic (*Allium canadense*), a protected species in Quebec due to destructive harvesting practices, was widespread in this area. Note that there are currently no protections in place for Wild Garlic in Ontario.



Figure 20 Photo showing Fresh-Moist Sugar Maple – Lowland Ash Deciduous Forest, taken on June 4, 2021



Figure 21 Variable topography and exposed rock within the FOD5-1 community, taken May 12, 2022

Dry-Fresh Sugar Maple – White Ash Deciduous Forest Type (FOD5-8)

The central portion of the golf course contains a remnant and irregularly shaped forest patch dominated by Sugar Maple, White Ash (*Fraxinus americana*), and White Oak (Figure 22). The canopy here also includes Basswood, American Elm (*Ulmus americana*), and Black Cherry. This degraded forest area relatively lacks shrub cover and understory vegetation and includes exposed rock over variable topography. Fringes of this forest area are dominated by European Buckthorn, Tartarian Honeysuckle (*Lonicera tatarica*), White Ash saplings, and Common Prickly-ash. Interior areas with shallow soils are dominated by graminoids such as Sprengel's Sedge (*Carex sprengelli*), Kentucky Bluegrass (*Poa pratensis*), and Graceful Sedge, along with Ostrich Fern, Virginia Creeper, asters, Herb Robert (*Geranium robertianum*), Wild Blue Phlox (*Phlox divaricata*), Woodland Strawberry, False Solomon's-seal, Black Raspberry (*Rubus occidentalis*), Broad-leaved Helleborine (*Epipactis helleborine*), Tall Agrimony, Rosy Sedge (*Carex rosea*), and Wild Basil (*Clinopodium vulgare*).



Figure 22 Photo showing Dry-Fresh Sugar Maple – White Ash Deciduous Forest, taken on June 4, 2021

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

Forested areas to the north and south of the Peter Street Bridge, comprising a portion of the Peripheral Area at that location, are characterized as a moist poplar-dominated forest. The canopy is characterized by Trembling Aspen, with American Elm, Green Ash and Manitoba Maple (Figure 23). The subcanopy is dominated by dense Common Buckthorn, with Bur Oak saplings, Staghorn Sumac, and Tatarian Honeysuckle.

Groundcover comprises widespread Common Horsetail, Common Mullein, Wild Parsnip, Virginia Creeper, species of grasses, and horticultural varieties of daylily.



Figure 23 Fresh – Moist Poplar Deciduous Forest Type (FOD8-1), taken on May 5, 2022

Mixed Forest Ecosite (FOM)

This degraded ecosite is associated with the eastern portion of the FOD5-8 forest patch described above and a small forest patch in the western portion of the golf course. These forest patches include a relatively unique mix of canopy species, likely due to management, that do not correlate with a more detailed ecosite or vegetation type per ELC. They contain a combination of more than 25% coniferous tree species cover and more than 25% deciduous tree species cover, making these units mixed forests. The canopy in these areas is co-dominated by Trembling Aspen (*Populus tremuloides*), White Ash, White Birch (*Betula papyrifera*), Scots Pine (*Pinus sylvestris*), and White Pine (Figure 24). The subcanopy is dense with European Buckthorn and White Ash saplings. Ground cover is similarly dominated by White Ash saplings, along with Canada Goldenrod (*Solidago canadensis*), Kentucky Bluegrass, Creeping Jenny (*Lysimachia nummularia*; a garden escapee), Virginia Creeper, False Solomon's-seal, Canada Mayflower (*Maianthemum canadense*), Common Lady-fern (*Athyrium filix-femina*), Woodland Strawberry, Wild Red Raspberry (*Rubus idaeus*), and abundant leaf litter. Two drainage ditches are associated with the small patch of mixed forest towards the centre of the golf course: one along the eastern edge dominated by cattails (*Typha*) and willow (*Salix*) shrubs, and one that bisects this forest patch.

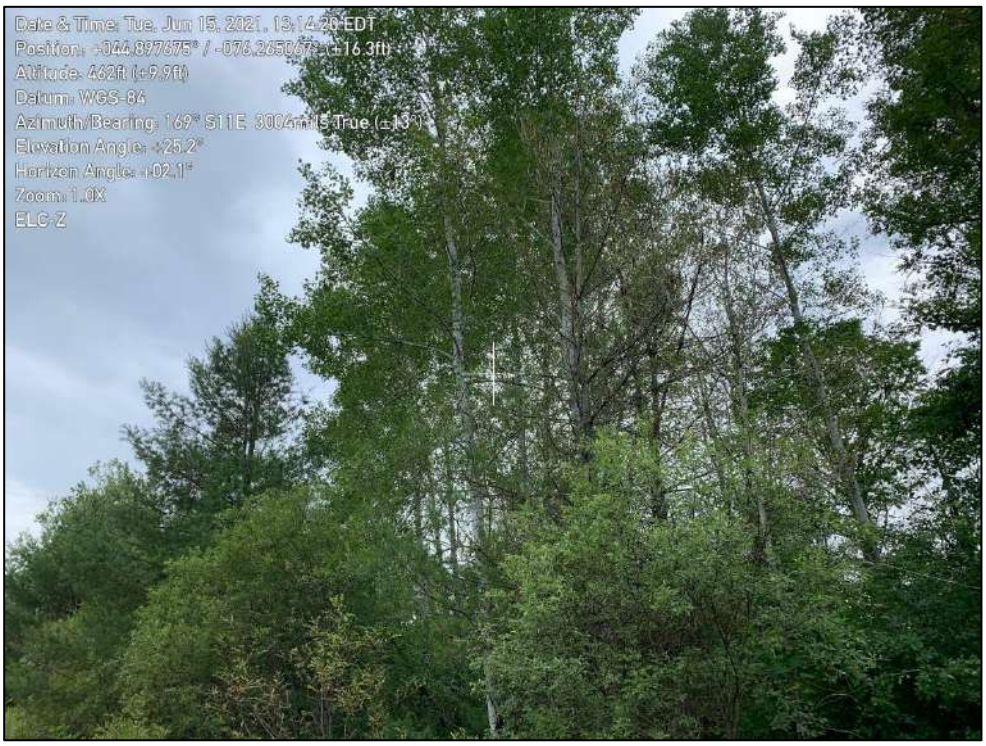


Figure 24 Photo showing Mixed Forest, taken on June 15, 2021

Dry – Fresh White Pine Naturalized Coniferous Plantation Type (FOCM6-1)

A relatively small forested community situated south of the Lanark County Administration Building is characterized as naturalized White Pine plantation. The canopy was dominated exclusively by Eastern White Pine (Figure 25). The subcanopy was open, with Common Buckthorn, Green Ash and occasional Red Spruce observed around the stand margin. The plantation was situated on lands that were gently sloping down from the Administration Building toward the Silver Maple swamp along the Tay River.



Figure 25 Photo showing Dry – Fresh White Pine Naturalized Coniferous Plantation, taken May 22, 2022

Mineral Cultural Thicket Ecosite (CUT1)

The northwestern portion of the Site is comprised of a cultural thicket dominated by dense shrub cover including Common Prickly-ash, European Buckthorn, and a species of hawthorn (*Crataegus* sp.; Figure 26). Cultural Thickets are also documented on the Peripheral Lands north of the Tay River, south of the Lanark County Administration Building. This vegetation community represents regeneration post-anthropogenic disturbance (i.e., agriculture). It includes remnant hedgerows dominated by Green Ash and Black Cherry, with Green Ash saplings present throughout thicket areas. Ground cover is minimal given the dense shrub cover, but patches of open areas include upland sedges, grasses (mainly *Bromus* sp.), and Canada Goldenrod. Soils are variable but appear to consist mostly of sandy loams over shallow bedrock.



Figure 26 Photo showing Mineral Cultural Thicket, taken on May 28, 2021

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

The western portion of the golf course contains three patches of cultural meadow that are in a stage of regeneration (Figure 27). Cultural Meadow areas are also documented on the Peripheral Lands north of the Tay River, south of the Lanark County Administration Building. A small cultural meadow patch also occurred in the Peripheral Area at the Peter Street Bridge, situated at the northwest corner of Peter Street and North Street. On-site, these areas appear to be periodically mowed and consist of a mix of upland forbs, graminoids, and weeds, including Canada Goldenrod, Kentucky Bluegrass, vetches (*Vicia* spp.), Oxeye Daisy (*Leucanthemum vulgare*), Prairie Fleabane (*Erigeron strigosus*), Wormseed Mustard (*Erysimum cheiranthoides*), Curly Dock (*Rumex crispus*), Black-eyed Susan (*Rudbeckia hirta*), Pale Smartweed (*Persicaria lapathifolia*), Creeping Thistle (*Cirsium arvense*), Bentgrass (*Agrostis* sp.), Rough Cinquefoil (*Potentilla norvegica),* Common Toadflax (*Linaria vulgaris*), Yellow Foxtail (*Setaria pumila*), Black Medic (*Medicago lupulina*), Shepherd's Purse (*Capsella bursa-pastoris*), Common Yarrow, Green Bulrush (*Scirpus atrovirens*), Perennial Ryegrass (*Lolium perenne*), Self-heal (*Prunella vulgaris*), Strawberry Blite (*Blitum capitatum*), Common Hemp-nettle (*Galeopsis tetrahit*), Common Nettle (*Urtica dioica*), Hop Trefoil (*Trifolium campestre*), Red Clover (*Trifolium pratense*) White Sweet-clover (*Melilotus albus*), Bird's-foot Trefoil (*Lotus corniculatus*), and Common St. John's-wort (*Hypericum perforatum*). These meadow areas also contain scattered willow and Speckled Alder shrubs and some standalone or clustered trees including White Pine and Tamarack (*Larix laricina*). The easternmost cultural meadow area contains a large brush and debris pile (Figure 28). The cultural meadow on the north Peripheral Land parcel also included scattered planted saplings and young trees, including young Eastern White Pine. The cultural meadow at the Peter Street Peripheral Land parcel appears disturbed and supports garden escapees, such as daylilies.



Figure 27 Photo showing cultural meadow, taken on June 4, 2021



Figure 28 Photo showing a brush pile, taken on May 27, 2021

Low-Density Residential (CVR_1)

A small area of Low-Density Residential (CVR_1) is situated on the south bank of the Tay River at the Rogers Road bridge. Permission to access this area had not been granted at the time of survey; however, coarse observations indicate that the area was characterized as a large, manicured lawn adjacent to a single-family residence.

5.2.2 Wetland Communities

Silver Maple Mineral Deciduous Swamp Type (SWD3-2)

Wetland areas adjacent to the Tay River on-Site mostly consist of Silver Maple swamps; similarly, areas along the Tay River within the Peripheral Areas north of the Tay River (i.e., near the Lanark County Administration Building) and at the Rogers Road Bridge also support Silver Maple swamps. In addition to Silver Maple, the canopy of these swamps contains Black Ash (*Fraxinus nigra*) and American Elm (Figure 29). The subcanopy is relatively open in most areas, with fringes and lower-lying areas sometimes dominated by Speckled Alder, Silver Maple and Black Ash saplings, and Red-osier Dogwood (*Cornus sericea*). Ground cover is fern- and sedge-rich and dominated by Sensitive Fern (*Onoclea sensibilis*) and Reed Canary Grass. Ground cover also includes Eastern Marsh Fern (*Thelypteris palustris*), Fringed Sedge (*Carex crinita*), Royal Fern (*Osmunda regalis*), Tufted Loosestrife (*Lysimachia thyrsiflora*), Purple Loosestrife, Bittersweet Nightshade (*Solanum dulcamara*), Woolgrass (*Scirpus cyperinus*), Creeping Jenny, Gray's Sedge (*Carex greyi*), Hops Sedge, Tuckerman's Sedge (*Carex tuckermani*), Crested Sedge, Bog Hemp, Calico Aster, Northern Blue-flag (*Iris versicolor*), and Swamp Candles (*Lysimachia terrestris*). Some of these swamps contain shallow standing water late into the spring and early summer (Figure 29). Soils consist of a shallow (<20 cm) organic layer underlain by stiff clay with shallow signs of mottles (a reflection of an alteration between water saturation and drying) followed by gley (a reflection of more permanently saturated and reduced conditions).



Figure 29 Photo showing Silver Maple Mineral Deciduous Swamp on June 4, 2021

Silver Maple Organic Deciduous Swamp Type (SWD6-2)

The south edge of the golf course is comprised of Silver Maple swamp that is very similar to that described above, except in this area the substrates consist of a deeper organic soil layer (>40 cm).

Black Ash Mineral Deciduous Swamp Type (SWD2-1)

A portion of Grants Creek Provincially Significant Wetland west of the golf course is comprised of Black Ash swamp (Figure 30). Other canopy species here include Silver Maple, American Elm, and Eastern White Cedar. The understory is sparse in most areas and consists of scattered cover of Black Ash saplings, Speckled Alder, Nannyberry (*Viburnum lentago*), White Meadowsweet (*Spiraea alba*), Common Prickly-ash, Dwarf Raspberry (*Rubus pubescens*), and Wild Black Currant (*Ribes americanum*). Ground cover is dominated by a mixture of ferns, including Sensitive Fern, Ostrich Fern, and Royal Fern. Additional groundcover included a mixture of forbs and graminoid species, including Tufted Loosestrife, Reed Canary Grass, Northern Blue-flag, Riverbank Grape (*Vitis riparia*), Wood Horsetail, Woodland Strawberry, Common Dandelion (*Taraxacum officinale*), Broadleaf Cattail (*Typha latifolia*), asters (*Symphyotrichum* spp.), and sedges (*Carex* spp.) Areas of standing shallow water were present in late spring through early summer. Soils consist of a shallow organic layer (<10cm) followed by thick clay with mottles and gley.



Figure 30 Photo showing Black Ash Mineral Deciduous Swamp, taken on June 3, 2022

Alder Mineral Thicket Swamp Type (SWT2-1)

The majority of Grants Creek Provincially Significant Wetland associated with the Site is dominated by Alder Mineral Thicket Swamp (Figure 31). This vegetation community also occurs along the margins of the Tay River near the eastern and northwestern boundaries of the Site (Figure 15). The dominant species here is Speckled Alder, which forms a continuous dense thicket. Within Grants Creek Provincially Significant Wetland, this vegetation community has complex microtopography comprised of raised hummocks, with interhummock areas consisting of shallow vernal pools mostly lacking in vegetation. Hummocks are dominated by Sensitive Fern, Wild Sarsaparilla (*Aralia nudicaulis*), Bog Bean (*Menyanthes trifoliata*), a variety of sedges, and mosses. Woody debris was present throughout this thicket swamp.

Thicket swamp along the Tay River mostly occurs over a thin layer of organic substrate over water (i.e., floating mat) underlain by clay. In addition to Speckled Alder, these areas include shrubs such as Sweet Gale (*Myrica gale*), Red-osier Dogwood, Nannyberry, and Silky Dogwood (*Cornus amomum*). Forbs include Sensitive Fern, Purple Loosestrife, Marsh Cinquefoil (*Comarum palustre*), Nodding Sedge (*Carex gynandra*), Curly Dock, and Labrador Bedstraw (*Galium labradoricum*).



Figure 31 Photo showing Alder Mineral Thicket Swamp near the eastern edge of the Site, taken on May 28, 2021

Forb Mineral Shallow Marsh Type (MAS2-9)

A forb-dominated marsh exists along the margin of the Tay River near the eastern boundary of the Site, in between treed and thicket swamps (Figure 32). This marsh is associated with an open water channel that receives flows from a golf course pond and then flows into the Tay River. This marsh is affiliated with a floating organic mat and is dominated by Bitter Dock (*Rumex obtusifolius*), Swamp Loosestrife, Giant Bur-reed (*Sparganium eurycarpum*), and Couch Grass (*Elymus repens*), and includes Purple Loosestrife, Curly Dock, Nodding Sedge, Marsh Cinquefoil, Spotted Touch-me-not (*Impatiens capensis*), Hardstem Bulrush (*Schoenoplectus acutus*), Common Spike-rush, Spotted Joe-pye Weed (*Eutrochium maculatum*), and False Nettle (*Boehmeria cylindrica*). The margins of the channel are dominated by Pickerelweed (*Pontederia cordata*) and Water Arum (*Calla palustris*) and include European Frog-bit (*Hydrocharis morsus-ranae*). The surface of the channel was dense with Common Duckweed in the summer (Figure 32).



Figure 32 Photo showing Forb Mineral Marsh, taken on July 14, 2021

Sweet Gale Organic Thicket Swamp Type (SWT3-6)

There are three pockets of thicket swamp dominated by Sweet Gale along the Tay River in the northern portion of the Site. These patches have very similar species compositions to the alder-dominated thicket swamps along the Tay River, but instead are dominated by Sweet Gale (Figure 33).



Figure 33 Photo showing Sweet Gale Organic Thicket Swamp, taken on June 4, 2021

Willow Mineral Thicket Swamp Type (SWT2-2)

A willow-dominated thicket swamp exists in the western portion of the Site and is contiguous with Black Ash swamp of Grants Creek Provincially Significant Wetland. In addition to willow shrubs, this thicket swamp contains dense cover of Speckled Alder and European Buckthorn (Figure 34). The interior of this wetland contained patches of shallow standing water up until early summer. As previously described, this thicket swamp contributes flows to Tributary A. The fringes of this thicket swamp represent transitional vegetation communities between wetland and the surrounding upland cultural thicket described above.



Figure 34 Photo showing Willow Mineral Thicket Swamp Type, photo taken June 3, 2022

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

A Reed Canary Grass Mineral Meadow Marsh Type (MAM2-2) is located southeast of the Lanark County Administration Building at the northern Peripheral Land parcel. It is characterized by Reed Canary Grass, Common Cattail, Purple Loosestrife, Common Horsetail, Marsh Bedstraw and species of sedges (Figure 35). This wetland is situated adjacent to Silver Maple swamp community along the Tay River.



Figure 35 Reed-canary Grass Mineral Meadow Marsh Type adjacent to the Lanark County Administration Building's maintenance area, taken May 25, 2022

Cattail Mineral Shallow Marsh Type (MAS2-1)

Cattail Mineral Shallow Marshes (MAS2-1) are situated along the east bank of the Tay River at the Peter Street Bridge and along the south bank of the Tay River at the Rogers Road Bride (i.e., within the Peripheral Areas adjacent to the Site). The shoreline and bank were dominated by Common Cattail, Pickerelweed, and White Pond Lily closest to the Tay River, with Sensitive Fern and Water Smartweed farther up the bank (Figure 36). The banks are also characterized by Red-osier Dogwood, Spotted Alder, Glossy Buckthorn and species of willow.



Figure 36 Cattail Mineral Shallow Marsh adjacent to the Tay River at the Peter Street Bridge, taken May 25, 2022

5.3 Breeding Birds

A total of 18 breeding bird survey stations were established in representative habitats on-site and in the Peripheral Areas and are labelled with the pre-fix "BBS" (Figure 2). Three rounds of breeding bird surveys were conducted at 15 stations throughout the Site in 2021. In 2022, breeding bird surveys were only conducted at three new stations. These three new stations were introduced to account for the Peripheral Areas including (1) north of the Tay River south of the Lanark Country Administrative Building, (2) along Peter Street east of the Tay River, and (3) around the Rogers Road crossing over the Tay River. A summary of the weather conditions during the breeding bird surveys conducted in 2021 and 2022 are provided in Table 3. In total, including birds detected incidentally, 89 bird species were detected, through vocalization and/or direction visual observation, on or adjacent to the Site (Appendix E).

Table 3 Dates and weather conditions of breeding bird surveys in 2021 and 2022

Date	Wind (Beaufort Scale)1	Air Temperature (°C)	Cloud Cover (%)	Precipitation
2021-05-28	2 to 3	6 to 15	80 to 100	None
2021-06-15	2 to 5[1]	18 to 20	100	None
2021-06-29	0 to 1	19 to 28	0 to 100	None
2022-05-25	0 to 2	22 to 24	0	None
2022-06-10	1 to 2	12 to 14	20 to 75	None
2022-06-24	0 to 1	20 to 22	0	None

Table Notes: [1]Wind speeds exceeded the recommended limit during a portion of the survey conducted on June 15, 2021. However, the following survey on June 29, 2021, was conducted under ideal conditions and therefore surveys effectively captured the latter portion of the breeding season.

5.3.1 2021 Bird Overview

In 2021, a total of 72 bird species were detected (through breeding birds surveys and incidentally) on or adjacent to the Site. During 2021 breeding bird surveys, 64 bird species were detected. Of these, 19 species were not detected in 2022. The following bird species were detected at 70% or more of the 15 breeding bird survey stations: American Crow (*Corvus brachyrhynchos*), American Robin (*Turdus migratorius*), Baltimore Oriole (*Icterus galbula*), Black-capped Chickadee (*Poecile atricapillus*), Common Grackle (*Quiscalus quiscula*), Common Yellowthroat (*Geothlypis trichas*), Gray Catbird (*Dumetella carolinensis*), Red-winged Blackbird (*Agelaius phoeniceus*), Song Sparrow (*Melospiza melodia*), and Yellow Warbler (*Setophaga petechia*). One regionally significant bird species (Cadman et al., 1987; MNRF, 2014a), Tennessee Warbler (*Leiothlypis peregrina*), was observed from the edge of forest and wetland habitat on May 28, 2021, from station BBS-7.

Three at-risk bird species were observed during the 2021 breeding bird surveys: Barn Swallow (*Hirundo rustica*), Eastern Wood-Pewee (*Contopus virens*), and Wood Thrush (*Hylocichla mustelina*). They are all listed as Special Concern under the ESA. Barn Swallow was observed foraging over the Tay River near the northwestern tip of the golf course on May 28, 2021. No Barn Swallow nests were observed on Site. The foraging flight path appeared to trace back to an area north of the Tay River, potentially to agricultural buildings located south of Christie Lake Road or the Christie Lake Road bridge, which would provide suitable nesting habitat. McIntosh Perry (2012a) similarly observed Barn Swallow foraging over the Tay River adjacent to the Site but did not locate nests. Eastern Wood-Pewee and Wood Thrush were repeatedly observed throughout forested and treed swamp habitats on Site, outside of the golf course. Additional information on these SAR and their potential to interact with the proposed development are provided in Section 5.10 below.

5.3.2 2022 Bird Overview

In 2022, a total of 69 bird species were detected (through breeding birds surveys and incidentally) on or adjacent to the Site. During 2022 breeding bird surveys, 47 bird species were detected. Of these, 17 species were not detected in 2021. The following species were detected at all three survey stations during breeding bird surveys: American Robin (*Turdus migratorius*), Blue Jay (*Cyanocitta cristata*), Cedar Waxwing (*Bombycilla cedrorum*), Common Grackle (*Quiscalus quiscula*), European Starling (*Sturnus vulgaris*), Mourning Dove (*Zenaida macroura*), Red-eyed Vireo (*Vireo olivaceus*), Red-winged Blackbird (*Agelaius phoeniceus*), Song Sparrow (*Melospiza melodia*), Warbling Vireo (*Vireo gilvus*), and Yellow Warbler (*Setophaga petechia*).

Two regionally significant bird species (Cadman et al., 1987; MNRF, 2014a) were detected in 2022. Philadelphia Vireo (*Vireo philadelphicus*) was detected on May 25, 2022, at station BBS-16; and Rusty Blackbird (*Euphagus carolinus*) was detected incidentally on May 5, 2022, singing in a swamp (SWD3-2) south of the Tay River.

Six at-risk bird species were observed during breeding bird surveys and/or incidentally in 2022: Barn Swallow, Chimney Swift (*Chaetura pelagica*), Eastern Meadowlark (*Sturnella magna*), Eastern Wood-Pewee, Rusty Blackbird, and Wood Thrush. Barn Swallow were observed foraging over Tributary B near the bridge on May 12, 2022; no nests were identified on the bridge. They are likely nesting on a building off-site. An Eastern

Meadowlark was heard singing on May 12, 2022, north of Christie Lake Road (off-site) likely in a grassland. Chimney Swift was observed at BBS-17 on May 25, 2022, flying high in the sky over the Tay River, they are likely associated with chimneys in town as they were detected regularly when driving through town. As mentioned, a Rusty Blackbird was incidentally detected on May 5, 2022, singing south of the Tay River in a swamp on-site. Finally, Eastern Wood-Pewee and Wood Thrush were detected across the Site throughout the spring and summer. They were detected in the same area(s) a week or more apart which suggests that both species are probably breeding on-site.

5.3.3 Barn Swallow

When the second version of this EIS was submitted on April 12, 2022, Barn Swallow was listed as Threatened under the ESA. On January 25, 2023, however, Barn Swallow was down-listed to Special Concern under Ontario Regulation 230/08.

Barn Swallow was observed foraging over the Tay River near the northwestern tip of the golf course on May 28, 2021, and foraging over Tributary B near the bridge on May 12, 2022. Buildings associated with the golf course in the southeastern portion of the Site may provide suitable nesting habitat, along with the Peter Street bridge directly east of the Site. However, no Barn Swallow nests were observed on the Site in 2021 or 2022. In 2021, the foraging flight path of the observed Barn Swallow appeared to trace back to an area north of the Tay River, potentially to agricultural buildings located south of Christie Lake Road or the Christie Lake Road bridge, both of which would provide suitable nesting habitat. In 2022, the Barn Swallow foraging over Tributary B near the Christie Lake Road bridge appeared to be flying north of the Site. The bridge was checked for nests, but none were observed. Agricultural properties in the area contain houses and outbuildings that could support Barn Swallow nests. McIntosh Perry (2012a) similarly observed Barn Swallow foraging over the Tay River adjacent to the Site but did not locate nests.

5.3.4 Chimney Swift

Chimney Swifts are typically found in urban areas where there is a high concentration of traditional-style, uncapped chimneys. They primarily nest and roost in chimneys that have an opening > 28.5 cm in diameter, a rough interior surface, and are not capped or screened (COSEWIC, 2018a). Chimney Swift was observed at BBS-17 on May 25, 2022, flying over the Tay River. While Chimney Swifts can nest and roost in hollow trees and tree cavities (COSEWIC, 2018a), traditional-style chimneys on old buildings in the Town of Perth likely provide suitable nesting and/or roosting habitat as they were regularly detected in town.

5.4 Nightjars

Nightjar surveys were conducted at seven survey stations (Figure 2). The stations covered habitats that were considered the most likely to support nightjars (i.e., they were close to edge habitats along wooded areas that would provide feeding opportunity near potential nesting areas). Nightjar survey stations were the same as the 2021 anuran survey stations and are labelled with the pre-fix “MMP” (Figure 2). A summary of conditions during nightjar surveys conducted on May 19, May 25, and June 24, 2021, is provided in Table 4. Neither Eastern Whip-poor-will nor Common Nighthawk were detected at any of the seven survey stations.

Table 4 Dates and weather conditions of nightjar surveys in 2021

Date	Wind (Beaufort Scale)	Air Temperature (°C)	Cloud Cover (%)	Precipitation	Moon Visible? (Y/N)
2021-05-19	0	22	0 to 10	None	Y
2021-05-25	1 to 3	21	40 to 60	None	Y
2021-06-24	3	21	80	None	Y

5.5 Owls

Owl surveys were conducted at seven survey stations and are labelled with the pre-fix "OWL" (Figure 2). A summary of conditions during owl surveys conducted on April 4 and April 26, 2022, is provided in Table 5.

Table 5 Dates and weather conditions of owl surveys in 2022

Date	Wind (Beaufort Scale)	Air Temperature (°C)	Cloud Cover (%)	Precipitation
2022-04-04	1 to 2	7 to 5	50	None
2022-04-26	2 to 1	12 to 8	100	None to Light rain

One species of owl, Great Horned Owl (*Bubo virginianus*), was recorded during the owl surveys. No owls were detected on April 4, but three Great Horned Owl individuals were detected calling on April 26. They were heard calling from four (OWL-3, OWL-4, OWL-5, OWL-6) of the seven survey stations. The calls were likely males defending territory or contact calls between mates. An iNaturalist observation provides further evidence that Great Horned Owls nest in the area. An active Great Horned Owl nest (two owlets in nest) was observed approximately 750 m east of the Site on May 10, 2021 (submitted to iNaturalist on March 14, 2022; California Academy of Sciences and National Geographic Society, 2023). Further, Barred Owl (*Strix varia*) was detected (calling and observed roosting) on-site during the day several times throughout the 2022 field season.

5.6 Bats and Other Mammals

Acoustic bat monitors were installed at a total of nine different locations for a minimum of 10 nights each. The survey stations are labelled with the pre-fix "AM" (Figure 2). Six acoustic bat monitoring stations were established throughout the Site in 2021. In 2022, acoustic bat monitoring occurred at three new stations in the Peripheral Areas.

In 2021, acoustic monitoring was conducted over 38 nights via six survey stations (Table 6). Light rain occurred for short periods during six of the survey evenings: June 5, June 14, June 18, June 25-26, and July 8. Conditions were otherwise ideal with warm temperatures (≥15 °C) and low winds.

In 2022, acoustic monitoring was conducted over 19 nights via three survey stations. There was light rain for part of the evening on May 27, June 2-3, and June 6. The temperature dropped below 10 °C on May 29, June 4-6, and June 11. Conditions were otherwise ideal with warm temperatures and low winds.

Table 6 Number of bat recordings from acoustic monitoring in 2021 and 2022

Survey Station	Survey Dates	Habitat Description	Big Brown Bat	Eastern Red Bat	Hoary Bat	Silver-haired Bat	Little Brown Myotis	Tri-colored Bat	Mean Number of Calls per Night per Station
AM-1	2021-06-04 to 2021-06-14	Cultural meadow surrounded by ash forest and thicket; adjacent to golf course	803	21	743	446	3	2	183
AM-2	2021-06-05 to 2021-06-14	Interface of ash forest and golf course	455	10	280	239	10	1	100
AM-3	2021-06-15 to 2021-06-23	Open meadow surrounded by forest	340	5	115	134	1	1	66
AM-4	2021-06-15 to 2021-06-23	Interface of ash forest and golf course pond	372	124	250	147	14	1	101
AM-5	2021-06-24 to 2021-07-13	Open golf greens	476	20	1917	444	16	4	151
AM-6	2021-06-24 to 2021-07-13	Open golf greens adjacent to Tay River	1906	364	2894	1173	103	22	340
AM-7	2022-05-26 to 2022-06-14	Northwest side of Tay River in small, shallow marshy bay on the edge of a Silver Maple swamp	362	8	591	1704	8	-	181.2
AM-8	2022-05-26 to 2022-06-14	Inside tree line/deciduous thicket south of the Lanark Country Administrative Building	394	3	1358	361	2	-	143.5
AM-9	2022-05-26 to 2022-06-14	East side of the Tay River, north of the Peter Street Bridge among alders and buckthorn	1041	120	866	4123	106	120	200.9

5.6.1 2021 Bat Overview

In 2021, monitoring began on June 4 and ended on July 13. Due to limitations associated with acoustic monitor availability (i.e., number of units) and the size of the Site, monitoring continued beyond June 30 for two of the monitoring stations (AM-5 and AM-6) to ensure spatial and habitat variability was captured. These stations still covered seven nights of data collection in June, and other guidance documents indicate that acoustic monitoring can be done up until the end of July (MNRF, 2014c). As such, additional bat acoustic monitoring was not warranted.

Six species of bats were recorded (Table 6). The number of recordings obtained is not directly equivalent to the number of bats present in an area. A single bat may pass the monitor many times during an evening, triggering multiple recordings, while other bats foraging just beyond the monitor range may never trigger recordings. However, in general, the number of recordings per species can be indicative of relative abundances. Most recorded bat echolocations were by Hoary Bat (*Lasiurus cinereus*), followed by Big Brown

Bat (*Eptesicus fuscus*) and Silver-Haired Bat (*Lasionycteris noctivagans*), suggesting that these three bat species are the most abundant on the Site.

Two at-risk bat species, Little Brown Myotis (*Myotis lucifugus*) and Tri-colored Bat (*Perimyotis subflavus*), were detected at all six survey stations but were consistently associated with relatively low numbers of recordings at all but one of the stations. The recordings imply that bats do occur within the broader vicinity of the areas where acoustic monitors were installed. The very low numbers of recordings from stations AM1-5, however, suggest the at-risk species only occur transiently over most of the Site. Acoustic monitor survey station AM-6 recorded more than double to over five times the number of recordings from the other acoustic monitoring stations. This implies that better bat habitat is affiliated with AM-6, which was located in the northeast corner of the Site adjacent to the Tay River. Rivers and other riparian areas provide important foraging habitat for insectivorous bats due to high insect availability (e.g., Hagen and Sabo, 2011). The Tay River likely provides important food sources for bats and is probably the most ideal foraging habitat for bats that occur on and adjacent to the Site.

5.6.2 2022 Bat Overview

In 2022, monitoring for bats focused on Peripheral Areas. Monitoring began on May 26 and ended on June 14. Consistent with the protocol (MNRF, 2017), this monitoring period encompassed the required 10 nights of surveying in June. Monitors were installed earlier than required under the protocol while the project team was on-site for other tasks; thus, the automatic monitors began collecting data earlier than the protocol suggests. The data collected during May are included in the results reported below.

Monitoring at Stations AM-7 and AM-8 addressed Peripheral Areas across the Tay River from the Site. As these areas are no longer included as part of the development application, they will not be reviewed in detail. Monitoring Station AM-9 focused on areas adjacent to the Peter Street Bridge. Six species of bats were recorded at that site (Table 6). Most recorded bat echolocations from here were of Silver-Haired Bat. Hoary and Big Brown Bats, as with other sites, were also common here, suggesting that these three bat species are common to this area. Recordings of Little Brown Myotis and Tri-colored Bat (endangered bat species), while less frequent than other species, were at higher levels than anywhere else on-site (Table 6). This implies that the habitat surrounding the Peter Street Bridge, including the Tay River, likely provides habitat for both species.

5.7 Turtles

In 2021, formal turtle surveys following the standard industry protocol (MNRF, 2015a) were not completed due to the late start of the field campaign. Instead, incidental observations of turtles made throughout field studies in 2021 were recorded. Turtles were incidentally encountered nearly every visit to the Site throughout the 2021 field season. Midland Painted Turtles (*Chrysemys picta marginata*) were repeatedly observed in golf course ponds and along the Tay River. The greatest abundance of Midland Painted Turtles was associated with a fallen tree over the Tay River near the northeastern portion of the golf course, with up to 27 individuals were observed basking here at a time.

Two turtle species listed under the ESA were incidentally observed and documented on multiple occasions in 2021: Snapping Turtle and Eastern Musk Turtle (Table 7).

Table 7 Summary of incidental observations of turtles listed under the ESA in 2021

Date Observed	Common Name	Scientific Name	Location Observed (UTM)	Time Observed	Description
2021-05-27	Snapping Turtle	*Chelydra serpentina*	18T 400281 4972710	11:40	Adult submerged in Tay River near northeastern tip of golf course.
2021-05-27	Snapping Turtle	*Chelydra serpentina*	18T 399532 4972680	--	Juvenile basking on shore of Tay River near northwestern tip of golf course.
2021-06-04	Snapping Turtle	*Chelydra serpentina*	18T 399734 4972323	12:23	Adult walking along drainage swale in western portion of golf course.
2021-06-04	Eastern Musk Turtle	*Sternotherus odoratus*	18T 400506 4972343	15:51	Adult walking along cart path from Tay River towards golf course pond.
2021-06-15	Snapping Turtle	*Chelydra serpentina*	18T 400448 4972176	11:06	Adult nesting in grass near drainage swale near golf cart parking area (southeastern corner of golf course).
2021-06-15	Snapping Turtle	*Chelydra serpentina*	18T 400440 4972886	13:34	Adult swimming in Tay River near bridge at northeastern tip of golf course.
2021-06-24	Eastern Musk Turtle	*Sternotherus odoratus*	18T 400493 4972350	--	Adult submerged in golf course pond near southeastern corner of the golf course.

In 2022, targeted turtle surveys were conducted across the Site on six days between April 29 and June 3, 2022, with a total of 52.8 hours of search effort. Surveys focused on the golf course ponds and the Tay River. Weather conditions and search effort during the turtle surveys are provided in Table 8.

Table 8 Dates, weather conditions, and search effort of turtle surveys in 2022

Date	Wind (Beaufort Scale)	Air Temperature (°C)	Basking Temperature (°C)	Water Temperature (°C)	Cloud Cover (%)	Precipitation	Number of Observers	Search Effort Hours	Total Search Effort Hours
2022-04-29	4	13 to 12	17 to 12	10 to 15	0	None	3	4.75	14.3
2022-05-05	2	10 to 15	10 to 15	11	0 to 25	None	2	5	10
2022-05-09	3 to 4	16 to 21	16 to 24	19.5 to 19	0	None	2	4.25	8.5
2022-05-12	2	23.5 to 22	27 to 23	14.5 to 19.5	0	None	2	1.25	2.5
2022-05-26	6 to 5	20 to 23	20 to 23	21	100 to 75	None	2	1	2
2022-06-03	1 to 2	18.5 to 22	18.5 to 23	18.5 to 22	75 to 0	None	2	6.25	12.5
	2 to 4	22 to 21	23 to 21	18	25 to 75		1	3	3

A detailed summary of turtle observations from 2022 surveys and incidental observations can be found in Appendix F; Table 9 provides a condensed summary of the data collected. In total, 148 turtles were observed on or adjacent to the Site. Most turtles, particularly Midland Pointed Turtle, were found in or on the edge of golf course ponds. Four turtle species were found in the Tay River and the marshy bays along the Tay River.

Although Grants Creek was not heavily surveyed turtles were also observed. Further, turtles were observed in Tributary A and C.

In 2022 three turtle species listed as Special Concern under the ESA were observed on or adjacent to the Site: Snapping Turtle, Eastern Musk Turtle, and Northern Map Turtle. Snapping Turtle was encountered regularly across the Site while Eastern Musk Turtle was encountered in the Tay River (aside from a shell that was found in a Silver Maple swamp along edge of Tay River). Northern Map Turtle was only encountered once in the Tay River (Figure 37). Further, one turtle species, Midland Painted Turtle, listed as Special Concern under SARA (but not the ESA) was regularly encountered across the Site in golf course ponds, the Tay River, and Grants Creek.



Figure 37 Northern Map Turtle basking on a rock in the Tay River

Table 9 Summary of turtle observations in 2022

Common Name	Scientific Name	Number of Turtles Observed				
		Golf Course Ponds	Tay River	Grants Creek	Other	Total
Midland Painted Turtle	Chrysemys picta marginata	95[1]	16	6	1[2]	118
Snapping Turtle	*Chelydra serpentina*	4	13	-	1[3]	18
Eastern Musk Turtle	*Sternotherus odoratus*	-	11	-	-	11
Northern Map Turtle	*Graptemys geographica*	-	1	-	-	1
Total		99	41	6	2	148

Table Notes: [1]One individual was not in/adjacent to a golf course pond, it was 120 m northeast of pond # basking in a small flooded area; [2] Tributary A; [3] Tributary C

The Site provides a variety of habitats that would support a range of turtle life processes, including foraging, mating, overwintering, thermoregulation, movement, staging, protection from predators, and nesting. The Tay River and ponds on the golf course with depths greater than approximately 0.5 min the autumn are anticipated to provide overwintering habitat. Shallower surface water features are expected to freeze to depth, rendering them unsuitable for overwintering. The gravel banks associated with the Peter Street crossing over the Tay River appeared to provide important turtle nesting habitat, with approximately 10-15 depredated nests observed here on June 15, 2021 (Figure 38). Most of the remaining eggs were desiccated and/or too fragmented to identify the species, though some of the eggs were clearly those of Snapping Turtle. A depredated Snapping Turtle egg was found in the same location on May 26, 2022. A Snapping Turtle was observed nesting directly on the golf course (Table 9; Figure 39), and anecdotal evidence from staff and golfers suggests that this species frequently nests on the golf course. A depredated turtle nest and turtle tracks were also observed in a patch of sand within cultural meadow near acoustic monitor station AM-3.



Figure 38 Photo showing depredated turtle nests and eggs on the bank of the Peter Street bridge, taken on June 15, 2021



Figure 39 Photo showing a Snapping Turtle nesting on the golf course, taken on June 15, 2021

5.8 Snakes

Snake surveys were conducted on eleven days in May and June of 2021 and 2022, with a total of 71.75 hours of search effort. Weather conditions and search effort during the snake surveys are provided in Table 10.

Although the MNRF's survey protocol requires a total of 10 surveys with a recommended search effort of approximately 1-2 hours per hectare of suitable habitat, MECP biologists have acknowledged that with large and/or complex study sites it may not be possible to complete the recommended amount of surveys effort. While acknowledging that maximizing survey effort to the extent possible is preferable, another approach is to utilize a habitat sub-sampling approach, preferentially selecting and surveying in the highest quality habitat (MECP (B. Norman) personal communication with KAL, February 2023). That approach was taken for this project.

Table 10 Dates, weather conditions, and search effort of snake surveys in 2021 and 2022

Date	Wind (Beaufort Scale)	Air Temperature (°C)	Basking Temperature (°C)	Cloud Cover (%)	Precipitation	Number of Observers	Search Effort Hours	Total Search Effort Hours
2021								
2021-05-27	3	15 to 18	17 to 20	0 to 25	None	1	8	8
2021-06-04	0 to 2	16 to 32	22 to 30	75 to 100	None	2	7	14
2021-06-10	1	21 to 25	22 to 27	25 to 50	None	1	3.5	3.5
2021-06-15	2 to 3	19 to 23	19 to 22	25 to 100	None	2	6.5	13

Date	Wind (Beaufort Scale)	Air Temperature (°C)	Basking Temperature (°C)	Cloud Cover (%)	Precipitation	Number of Observers	Search Effort Hours	Total Search Effort Hours
2021-06-24	2 to 4	22 to 26	22 to 26	0	None	2	4.5	9
2021-06-29	0 to 1	24 to 28	24 to 28	0 to 100	None	1	4.75	4.75
								52.25
2022								
2022-05-05	2	10 to 15	10 to 15	0 to 25	None	2	1.25	2.5
2022-05-12	1 to 2	25.5 to 24.5	27 to 26	0 to 75	None	2	2.5	5
2022-06-03	1	19 to 22	20 to 23	0 to 25	None	2	1	2
2022-06-14	2 to 3	24 to 27	25 to 28	50 to 0	None	2	3	6
2022-06-17	5	21 to 23	22.5 to 24	0 to 75	None	2	2	4
								19.5

Three species of snakes were observed during targeted snake surveys and incidentally: Northern Watersnake, Eastern Gartersnake, and Gray Ratsnake (Table 11); the latter species is listed as Endangered under the ESA.

Table 11 Summary of snake observations in 2021 and 2022

Date Observed	Common Name	Scientific Name	Location Observed (UTM)	Time	Description	Incidental (Y/N)
2021						
2021-05-10	Northern Watersnake	*Nerodia sipedon sipedon*	18T 400142 4971916	20:25	Dead juvenile on cart path near southern tip of golf course.	Y
2021-05-28	Eastern Gartersnake	*Thamnophis sirtalis sirtalis*	18T 399234 4972353	11:50	Adult moving through grass in cultural thicket west of golf course.	Y
2021-06-15	Eastern Gartersnake	*Thamnophis sirtalis sirtalis*	18T 399127 4972499	12:04	Healthy adult in open patch of grass south of the Tay River and west of the golf course.	N
2021-06-15	Northern Watersnake	*Nerodia sipedon sipedon*	18T 400450 4972889	13:31	Adult basking on rocks along Tay River near northeastern tip of golf course.	N
2021-06-15	Northern Watersnake	*Nerodia sipedon sipedon*	18T 400661 4972295	14:24	Adult basking on grassy shoulder of Peter Street bridge.	N
2021-06-15	Northern Watersnake	*Nerodia sipedon sipedon*	18T 400671 4972306	14:26	Adult basking on rocks along Tay River next to Peter Street bridge.	N
2021-06-15	Northern Watersnake	*Nerodia sipedon sipedon*	18T 400450 4972889	14:56	Adult basking on rock along Tay River near northeastern tip of golf course.	N
2021-06-24	Northern Watersnake	*Nerodia sipedon sipedon*	18T 400651 4972297	8:31	Adult basking on grassy shoulder of Peter Street bridge.	N
2021-06-24	Northern Watersnake	*Nerodia sipedon sipedon*	18T 400661 4972294	8:34	Adult basking on rocks along Tay River next to Peter Street bridge.	N
2021-06-24	Northern Watersnake	*Nerodia sipedon sipedon*	18T 400661 4972294	8:34	Juvenile basking on rocks along Tay River next to Peter Street bridge.	N
2021-06-24	Eastern Gartersnake	*Thamnophis sirtalis sirtalis*	18T 399745 4972507	10:16	Juvenile moving through meadow habitat north of golf course.	N
2021-06-24	Gray Ratsnake (Frontenac Axis population)	*Pantherophis spiloides*	18T 399510 4972697	10:51	Adult basking on rock pile in Tay River near northwestern tip of golf course.	N
2021-06-29	Eastern Gartersnake	*Thamnophis sirtalis sirtalis*	18T 399756 4972549	7:42	Adult moving through meadow habitat north of golf course.	N
2021-06-29	Eastern Gartersnake	*Thamnophis sirtalis sirtalis*	18T 399488 4972259	8:08	Adult moving through meadow habitat adjacent to golf course.	N

Date Observed	Common Name	Scientific Name	Location Observed (UTM)	Time	Description	Incidental (Y/N)
2021-06-29	Northern Watersnake	*Nerodia sipedon sipedon*	18T 399531 4972697	10:19	Adult basking on rock pile in Tay River near northwestern tip of golf course.	N
2022						
2022-04-06	Eastern Gartersnake	*Thamnophis sirtalis sirtalis*	~ 18T 399401 4972497	-	Near Tributary A, in grassy area at the edge of the golf course	Y
2022-04-29	Eastern Gartersnake	*Thamnophis sirtalis sirtalis*	18T 400617 4972867	12:33	Adult snake, basking on the east side of Tay River.	Y
2022-04-29	Eastern Gartersnake	*Thamnophis sirtalis sirtalis*	18T 399379 4972564	15:40	Adult snake, travelling along the south edge of Tay River.	Y
2022-05-05	Northern Watersnake	*Nerodia sipedon sipedon*	18T 400656 4972298	10:10	Adult basking on a rock pile on the northwestern side of the bridge on Peter Street.	N
2022-05-05	Northern Watersnake	*Nerodia sipedon sipedon*	18T 400689 4972294	10:28	Adult basking near the southeastern side of the bridge on Peter Street.	N
2022-05-05	Northern Watersnake	*Nerodia sipedon sipedon*	18T 400683 4972281	10:28	Adult swimming from west to east side in Tay River.	N
2022-05-05	Northern Watersnake	*Nerodia sipedon sipedon*	18T 400465 4972714	11:30	Adult basking on the edge of a golf course pond.	N
2022-05-05	Northern Watersnake	*Nerodia sipedon sipedon*	18T 400553 4972887	12:08	Adult swimming in Tay River along the west edge.	N
2022-05-05	Eastern Gartersnake	*Thamnophis sirtalis sirtalis*	18T 400544 4972881	12:08	Adult basking on the west side of Tay River.	N
2022-05-05	Northern Watersnake	*Nerodia sipedon sipedon*	18T 400486 4972901	12:18	Juvenile dead, floating near the south shore of Tay River.	N
2022-05-05	Northern Watersnake	*Nerodia sipedon sipedon*	18T 400460 4972991	12:45	Adult basking on the south edge of Tay River.	N
2022-05-05	Northern Watersnake	*Nerodia sipedon sipedon*	18T 400249 4972656	13:11	Adult aquatic basking on the south side of Tay River.	N
2022-05-09	Northern Watersnake	*Nerodia sipedon sipedon*	18T 400493 4972898	12:40	Juvenile dead, floating near the south shore of Tay River. (Presumed to be the same snake as on 2022-05-05).	Y
2022-05-09	Northern Watersnake	*Nerodia sipedon sipedon*	18T 400443 4972905	13:15	Larger adult basking near northern bridge on Tay River. Later saw mating.	Y
2022-05-09	Northern Watersnake	*Nerodia sipedon sipedon*	18T 400443 4972905	13:15	Smaller adult basking near northern bridge on Tay River. Later saw mating.	Y
2022-05-09	Northern Watersnake	*Nerodia sipedon sipedon*	18T 400467 4972986	13:49	Adult basking near the southwestern side of the Tay River.	Y
2022-05-09	Northern Watersnake	*Nerodia sipedon sipedon*	18T 400535 4972356	13:31	Adult basking in southeastern swamp thicket near shore, marsh off Tay River.	Y
2022-05-09	Northern Watersnake	*Nerodia sipedon sipedon*	18T 399150 4972551	17:33	Adult swimming in northwestern area of bay under aquatic vegetation along Tay River.	Y
2022-05-12	Northern Watersnake	*Nerodia sipedon sipedon*	18T 400656 4972299	12:15	Adult basking on rock pile along Tay River near bridge on Peter Street.	Y
2022-05-12	Northern Watersnake	*Nerodia sipedon sipedon*	18T 400656 4972299	12:15	Adult basking on rock pile along Tay River near bridge on Peter Street.	Y
2022-05-12	Northern Watersnake	*Nerodia sipedon sipedon*	18T 400656 4972299	12:15	Adult swimming in Tay River near the bridge on Peter Street.	Y
2022-06-03	Northern Watersnake	*Nerodia sipedon sipedon*	18T 400687 4971842	10:04	Juvenile travelling in marshy shore along west side of Grants Creek.	Y
2022-06-03	Unknown	N/A	18T 400650 4971799	10:14	Adult travelling through marshy bay along north side of Grants Creek. (Likely an Eastern Gartersnake, but could have been an Eastern Ribbonsnake).	N

Date Observed	Common Name	Scientific Name	Location Observed (UTM)	Time	Description	Incidental (Y/N)
2022-06-03	Northern Watersnake	*Nerodia sipedon sipedon*	18T 399327 4972579	12:51	Adult (likely gravid female) basking on south side of Tay River in marshy shoreline.	N
2022-06-03	Northern Watersnake	*Nerodia sipedon sipedon*	18T 399327 4972579	13:37	Juvenile (in shed) basking on south side of Tay River in marshy shoreline.	N
2022-06-03	Northern Watersnake	*Nerodia sipedon sipedon*	18T 399102 4972533	13:54	Adult swimming in Tay River in aquatic vegetation along the south shore.	N
2022-06-17	Unknown	N/A	18T 400484 4971913	9:20	Travelling over a small log in southern Sugar Maple forest. (Likely an Eastern Gartersnake, but could have been an Eastern Ribbonsnake).	N

Observations of snakes were mainly associated with areas outside of the golf course, including along the Tay River (Figure 40), the banks of the Peter Street bridge (Figure 41), meadow areas (Figure 42), and along Grants Creek. These areas, along with forest and wetland edges and clearings on the Site, provide semi-open microhabitats used by snakes to thermoregulate with adequate cover to retreat from predators and other threats. Natural and artificial cover objects for thermoregulation and refuge were abundant throughout clearings and treed habitats on the Site, including logs, rocks, old tires, scrap piles, and a large brush pile (Figure 28). Areas potentially suitable as hibernacula were also observed, including animal burrows, hollow trees in treed swamps, rock piles/outcrops in clearings, and south-facing rocky slopes with fissures within the Sugar Maple forest. The openness of most of the golf course combined with frequent human disturbance (e.g., mowing, presence of golfers, etc.) would likely deter snakes from conducting most life processes here.



Figure 40 Photo showing two Northern Watersnakes basking along the Tay River, taken on June 24, 2021



Figure 41 Photo showing a Northern Watersnake basking along the bank of the Peter Street bridge, taken on June 24, 2021



Figure 42 Photo showing an Eastern Gartersnake basking in meadow habitat, taken on June 24, 2021



Figure 43 Rocky outcrop within the FOD5-1 community, taken May 5, 2022

5.9 Anurans

Anuran surveys were performed at seven stations distributed across the Site to capture spatial and habitat variability (Figure 2); anuran survey stations are labelled with the pre-fix "MMP". As the early breeding window was missed in 2021 due to the delayed start of the field program, this timing was captured in the spring of 2022. In 2021 surveys were conducted at seven stations, while in 2022 surveys were conducted at ten stations. An additional three surveys were added in 2022 to account for the Peripheral Areas. A summary of the weather conditions during anuran surveys 2021 and 2022 is provided in Table 12.

Table 12 Dates and weather conditions of anuran surveys in 2021 and 2022

Date	Wind (Beaufort Scale)	Air Temperature (°C)	Cloud Cover (%)	Precipitation
2021-05-19	0	22	0 to 10	None
2021-06-24[1]	3	21	80	None
2022-04-12	1	14 to 12	0	None

Date	Wind (Beaufort Scale)	Air Temperature (°C)	Cloud Cover (%)	Precipitation
2022-05-17	1 to 3	10 to 9	0 to 10	None
2022-06-29	0 to 2	15 to 14	50 to 100	Fog, Drizzle

Table Notes: [1]Due to timing constraints and limitations of the appropriate survey window, the survey on June 24, 2021, ended at 12:45am instead of before midnight, and the survey on June 29, 2022 took place at temperatures slightly below optimal. However, in combination, these surveys effectively captured the latter portion of the breeding season.

Seven species of anurans were detected, including six species of frogs and one toad species (Table 13). Calling codes (i.e., abundances) were highest for Gray Treefrog, Spring Peeper, and Wood Frog. Most anuran observations were associated with golf course ponds, the Tay River, Grants Creek, wetlands, and Tributary A. Tadpoles (i.e., anuran breeding confirmation) were observed in Tributary A, within golf course ponds, and along the Tay River. American Bullfrog (both adults and tadpoles), Green Frog, and Northern Leopard Frog were repeatedly incidentally observed in golf course ponds. Note that although Northern Leopard Frog was not detected during surveys in 2022 (Table 13), they were detected incidentally.

Table 13 Summary of anuran surveys in 2021 and 2022

Common Name	Scientific Name	Station(s) Observed	Survey Date(s) Observed	Highest Calling Code[1]
American Bullfrog	*Lithobates catesbeianus*	MMP-1, MMP-2, MMP-3, MMP-4, MMP-5, MMP-6, MMP-7, MMP-8, MMP-9	2021-05-19, 2021-06-24, 2022-06-29	2
American Toad	*Anaxyrus americanus*	MMP-1, MMP-2, MMP-3, MMP-4, MMP-5, MMP-6, MMP-7	2021-05-19, 2022-05-17	2
Gray Treefrog	*Dryophytes versicolor*	MMP-1, MMP-3, MMP-4, MMP-5, MMP-6, MMP-7	2021-05-19, 2021-06-24, 2022-05-17	3
Green Frog	*Rana clamitans*	MMP-1, MMP-2, MMP-3, MMP-4, MMP-5, MMP-7, MMP-8, MMP-9, MMP-10	2021-05-19, 2021-06-24, 2022-05-17, 2022-06-29	2
Northern Leopard Frog	*Lithobates pipiens*	MMP-4	2021-05-19	1
Spring Peeper	*Pseudacris crucifer*	MMP-1, MMP-3, MMP-4, MMP-5, MMP-6, MMP-7, MMP-8, MMP-9, MMP-10	2021-05-19, 2022-04-12, 2022-05-17	3
Wood Frog	*Lithobates sylvaticus*	MMP-3, MMP-4, MMP-5, MMP-7, MMP-9	2022-04-12, 2022-05-17, 2022-06-29	3

Table Notes: [1]Calling codes are defined as follows (Birds Canada et al., 2008): **1** – Calls not simultaneous, individuals can be accurately counted; **2** – Some calling simultaneous, individuals reliably estimated; **3** – Full chorus, continuous and overlapping, individuals not reliably estimated.

5.10 Species at Risk

An assessment of species listed under SARA and/or ESA was completed to identify species having some potential to be negatively impacted by the proposed development. The potential for SAR to occur on the Site

and interact with the proposed development was assessed based on our review of existing information (SAR habitat requirements and occurrence records), ELC communities (habitat availability), and field studies (Appendix G). Species listed as Extirpated, Endangered, and Threatened are afforded species and habitat protection under the ESA. Federal protections under SARA are always in force for listed species of fish and migratory birds. For species of other groups, SARA normally only applies on federal lands or on projects having some level of participation with or oversight by the federal government. However, SARA-based protections can be imposed on private projects by ministerial order on a case-by-case basis in situations where provincial-level protections are deemed inadequate to otherwise protect a species or within habitat areas for the species that are regionally highly significant.

Nine species for which individuals and/or their habits may be directly subject to protections under SAR legislation were assessed as having a moderate to high potential to occur on the Site and/or to interact with the proposed development (Table 14). All other SAR with potential to occur in the Perth area based on their documented ranges (Appendix G) were assessed either as having a low, negligible, or no potential to interact with the proposed development due to lack of occurrence records and/or suitable habitat, or are not subject directly to protections under SAR legislation. Species that are listed as Special Concern under the ESA (e.g., Eastern Musk Turtle, Snapping Turtle, Monarch, etc.) are not afforded individual or habitat protection under the Act. However, individuals of these species are varyingly protected under other regulations addressing wildlife conservation generally, such as the FWCA, MBCA, and the PPS. Further, these species and their habitats may be protected by the municipality if habitat areas meet the criteria for Significant Wildlife Habitat for Special Concern species (MNRF, 2015b). As such, discussion regarding species listed as Special Concern under the ESA is from a perspective of Significant Wildlife Habitat throughout the remainder of this EIS (see Section 5.12.3). Migratory bird species that are listed as Special Concern under the ESA, remain included in this section as they are subject to SARA. Fish species would be similarly included here, but no SAR fish were identified as likely to occur in the area.

Table 14 Species at risk with a moderate to high potential to interact with the proposed development

Species Name (*Taxonomic Name*)	Status under the *Endangered Species Act*	Status under Schedule 1 of the *Species at Risk Act*	Potential to Interact with the Proposed Development
Birds			
Eastern Wood-Pewee (*Contopus virens*)	Special Concern	Special Concern	High
Rusty Blackbird (*Euphagus carolinus*)	Special Concern	Special Concern	High
Wood Thrush (*Hylocichla mustelina*)	Special Concern	Threatened	High
Reptiles			
Blanding's Turtle (*Emydoidea blandingii*)	Threatened	Endangered	High
Gray Ratsnake *(Pantherophis spiloides)*	Frontenac Axis population: Threatened	Frontenac Axis population: Threatened	High
Mammals			
Little Brown Myotis (*Myotis lucifugus*)	Endangered	Endangered	High
Tri-colored Bat (*Perimyotis subflavus*)	Endangered	Endangered	High
Vascular Plants			
Black Ash (*Fraxinus nigra*)	Endangered	No Status	High
Butternut (*Juglans cinerea*)	Endangered	Endangered	High

Table Notes: [1]Rows highlighted in yellow indicate species ranked as Threatened or Endangered under the ESA that have a moderate to high likelihood of occurring on the Site.

Eight of the nine SAR in Table 14 were directly observed on the Site in 2021 and/or 2022. Blanding's Turtle was not directly observed. However, this species is known to occur in the Tay River and Grants Creek and

may occasionally access the Site. The Provincial guidance document (MECP, 2021c) requires the identification of habitat for the species on the Site habitat assessments for these eight SAR are presented below.

5.10.1 Eastern Wood-Pewee, Rusty Blackbird, and Wood Thrush

Eastern Wood-Pewee, Rusty Blackbird and Wood Thrush occur in wooded areas throughout the Site (but with Rusty Black Bird generally limited to swamps). Small, wooded areas directly on the golf course are considered to provide only low quality habitat as compared to more extensive such areas in the broader vicinity. As species of Special Concern (provincially), the three birds are not directly protected under the ESA and so no specific permitting process would be required through the MECP to alter their habitat. These forested areas, however, have the potential to be deemed Significant Wildlife Habitat (as discussed in Section 5.12.3). A permit would be required from ECCC, however, to alter habitat as these species are protected under the SARA.

5.10.2 Blanding's Turtle

Blanding's Turtle is known to occur in the Tay River and Grants Creek (RVCA, 2017a, b; MECP (B. Norman) personal communication with KAL, February 2023) and therefore may utilize suitable habitat areas on the Site. Blanding's Turtle prefers shallow lakes, ponds, and wetlands with abundant emergent vegetation, clean water, and organic substrates. This species overwinters in the soft bottoms of bogs, fens, marshes, ponds, and channels with a minimum of 7 cm of free (unfrozen) water (Edge et al., 2009).

The Site contains suitable habitat to support all life stages (e.g., mating, foraging, nesting, overwintering). Blanding's Turtle may use wetland and forest habitats on the Site as migration corridors, and vernal pools and swamps as staging areas. They may overwinter in ponds on the golf course given sufficient water depth that is unlikely to freeze to bottom. However, there is uncertainty regarding whether the substrate of these ponds is appropriate for overwintering for Blanding's Turtle (i.e., they may or may not be mucky).

Nests and overwintering sites for Blanding's Turtle and the surrounding 30 m would be protected as Category 1 habitat under the ESA. Spring turtle surveys, however, found no evidence of overwintering within golf course ponds or other aquatic features directly associate with the Site. Under the General Habitat Description for the species (MECP, 2021c), suitable waterbodies and wetlands within 2 km of an occurrence, and the area within 30 m of these wetlands are considered Category 2 habitat. The Tay River, Grants Creek Wetland, and a all areas within 30 m of these features thus constitute Category 2 habitat. Category 2 habitat is important habitat for a range of life processes including foraging, mating, thermoregulation, movement, and refuge.

The areas between 30 and 250 m around Category 2 habitats are protected as Category 3 habitat, which represents movement corridors (MECP, 2021c). The area between the Tay River and the PSW is less than 500 m wide for most of the Site. Portions most of the remainder of the Site not defined as Category 2 habitat thus constitutes Category 3 habitat.

5.10.3 Gray Ratsnake

iNaturalist displays multiple recent (2019-2022) records of Gray Ratsnake in the area (California Academy of Sciences and National Geographic Society, 2023). The average home range size of a Gray Ratsnake is 18.5 ha (COSEWIC, 2007). Gray Ratsnakes require a mosaic of forest and open habitat and prefer deciduous forests

and edge habitat. Suitable habitat exists, therefore, both on and off-Site in the form of forests and wooded areas, tree-lined watercourses, open areas, and barns and sheds. Nearly any habitat with abundant small mammal and bird prey with vertical escape (climbing) opportunities is suitable for Gray Ratsnake during its active season (COSEWIC, 2007). The most suitable Gray Ratsnake habitat on-site is the mature Sugar Maple forest (FOD5-1) containing rocky outcrops located in the southeastern portion of the Site. Females tend to lay eggs in decaying organic matter inside standing snags, stumps, logs, and compost piles where conditions are warm and humid (COSEWIC, 2007). Gray Ratsnake overwinter underground in communal hibernacula. Adult Gray Ratsnakes exhibit strong fidelity to nesting and hibernation sites, and sometimes egg-laying sites (COSEWIC, 2007).

Anecdotal evidence from staff and golfers suggests that this species has been relatively frequently observed on the golf course. However, such anecdotal evidence is considered non-confirmed because it can be difficult to distinguish Gray Ratsnakes from darkly coloured Northern Watersnakes, with the latter two species also observed on the Site. The presence of Gray Ratsnake at the Site, however, was confirmed by KAL with the observation of an individual observed basking on a rock pile in the Tay River near the northwestern tip of the golf course on June 24, 2021.

The habitat regulation for Gray Ratsnake under the ESA protects sites used for nesting, hibernation, and communal shedding and basking, as well as areas within 1 km of a Gray Ratsnake occurrence that are suitable for carrying out its life processes (MECP, 2021d). The 1 km radius from the observed Gray Ratsnake would encompass nearly all the Site and would be considered as protected habitat under the ESA. However, lakes, rivers, and agricultural fields are excluded in the habitat description. Although the openness of most of the golf course, combined with frequent human disturbance (e.g., mowing, presence of golfers, etc.), may deter Gray Ratsnake from conducting major life processes there, consultation with MECP indicated that golf courses falling within general habitat areas are subject to the habitat regulation for Gray Ratsnake. This is because they can still provide habitat functions and may play a role in maintaining quality and function of Category 1 habitat (MECP (B. Norman) personal communication with KAL, February 2023).

5.10.4 Little Brown Myotis and Tri-colored Bat

Roosting habitat for Little Brown Myotis includes buildings, rock crevices, exfoliating tree bark, within foliage, and cavities and crevices in trees (Humphrey and Fotherby, 2019). Tri-colored Bat prefers to roost in dead or live leaf clusters in trees, arboreal lichens, and within buildings (Humphrey and Fotherby, 2019). Both species prefer to forage over clearings adjacent to forests.

Little Brown Myotis and Tri-colored Bat were detected at all six acoustic monitoring stations and therefore likely forage and/or roost in proximity to the Site. The numbers of detections over most survey stations, however, were very low, suggesting only a limited transient presence over most of the Site. The most frequent occurrence of the two species is associated with the easternmost edge of the Site directly along the Tay River, especially near the Peter St. Bridge. This area is thus considered to provide habitat for the two species.

Hibernacula for Little Brown Myotis and Tri-colored Bat are generally subterranean openings, including caves, abandoned mines, wells, and tunnels (Environment Canada, 2015). Potential underground structures for bat hibernation were not observed on the Site.

As Endangered species, Little Brown Myotis and Tri-colored Bat receive “general habitat protection” under the ESA. Generally, trees and buildings that at-risk bats use for roosting cannot be significantly altered during the roosting season (April 1 to September 30 inclusive; MNRF, 2015c). Potential impacts to at-risk bats directly would be mitigated by clearing trees outside of the roosting season. Following this tree-clearing window would also avoid potential interactions with birds and bird nests protected under the MBCA.

5.10.5 Black Ash

Numerous Black Ash individuals were observed in the SWD3-2 and SWD2-1 ELC units on the Site and Peripheral Lands. It was particularly widespread within the SWD2-1 ELC unit, where it formed the dominant canopy species. Black Ash was listed as Endangered under the ESA on January 26, 2022; subsequently, however, the Minister of MECP ordered Ontario Regulation 23/22 that ESA protections for Black Ash be temporarily suspended for a two-year period (i.e., until January 26, 2024) following its listing (Government of Ontario, 2022a) to allow for the development of a recovery strategy and associated policy will be developed during this time by the province.

5.10.6 Butternut

Five Butternut trees were observed near the Site entrance near the Peter St. Bridge (Figure 44). Butternut prefers moist, well-drained soils and is often found in sunny openings near forest edges and along watercourses (MECP, 2021e). The habitat regulation for Butternut under the ESA reflects a “root harm prevention zone” based on the tree’s diameter at breast height (DBH) measured in metres from the stem, with the maximum zone being 25 m (Government of Ontario, 2021; Table 15).

Table 15 Root harm prevention zones for Butternut

Tree Stem Diameter	Root Harm Prevention Zone
< 3 cm	6 m
> 3 cm < 15 cm	9 m
> 15 cm < 30 cm	12 m
> 30 cm < 50 cm	18 m
> 50 cm	25 m

Butternut 1 was just over 15 cm DBH, while Butternuts 3, 4 and 5 were between 30 and 50 cm DBH. All four trees were generally in poor condition, though a formal Butternut Health Assessment (BHA) has not been completed. These four trees are sufficiently close to Peter Street (i.e. <12 m from the road edge) that any future proposed road works would need to e preceded by a BHA. The BHA would need to be completed between late May and late August, but should only be completed in the season immediately prior to their proposed removal. If a BHA determines the trees to be in good general health, a subsequent application to the MEPC for a permit to impact the trees would be required.

Butternut 2 (~35 cm DBH) would need to be similarly addressed but, as ~90% of its canopy appeared to be dead, it is most likely that a BHA would determine that tree to be non-retainable, which would preclude protections under the ESA.

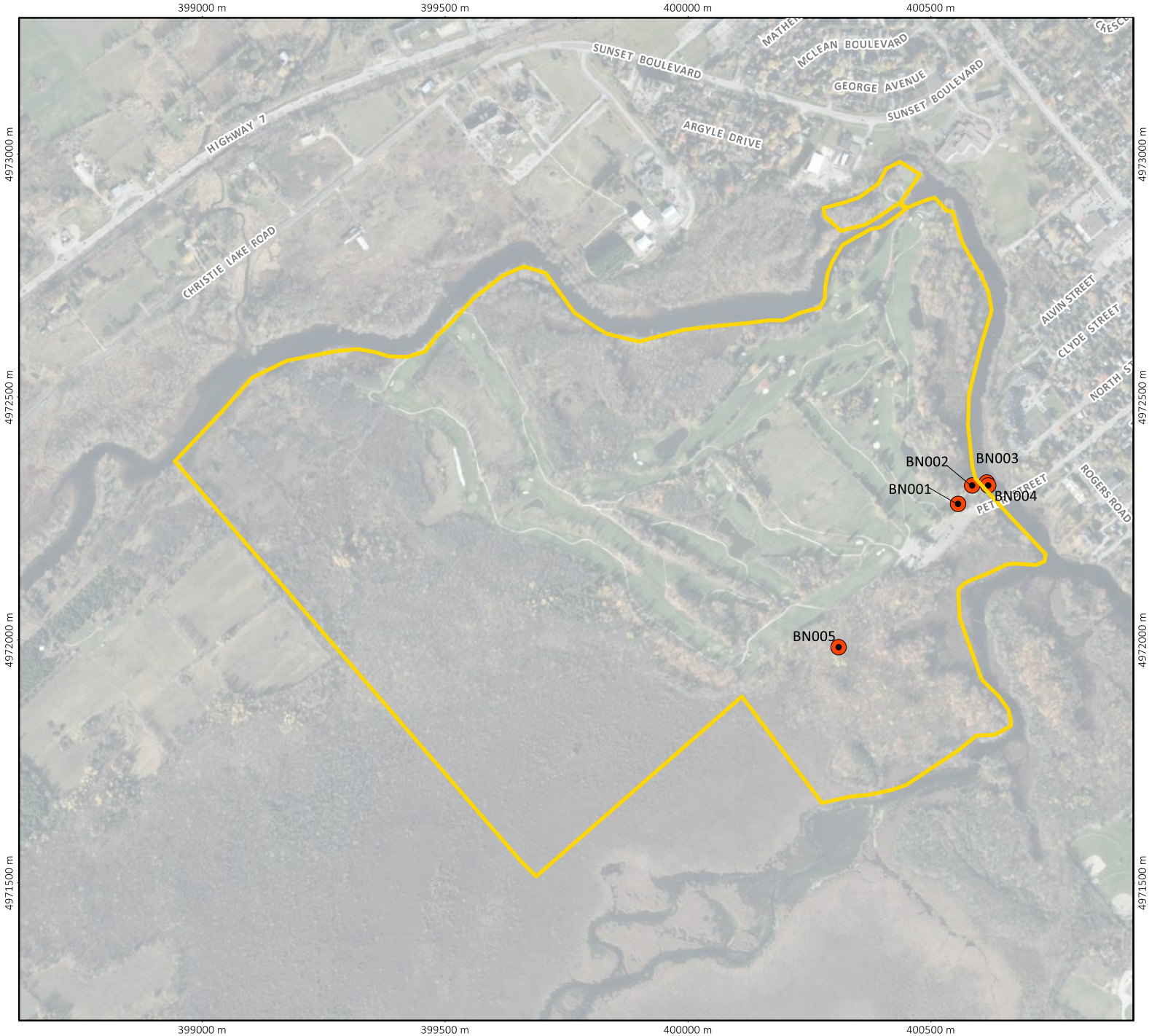


Figure 44 Map showing the location of Butternut trees

Legend

Butternut

Site

N

0 400 m

Project: CAIV1193 - 2203b
Universal Transverse Mercator - Zone 18 (N)

KILGOUR & Associates

5.11 Incidental Wildlife Observations

Incidental mammal observations made during site visits included American Beaver (*Castor canadensis*), American Red Squirrel (*Tamiasciurus hudsonicus*), Eastern Chipmunk (*Tamias striatus*), Eastern Gray Squirrel (*Sciurus carolinensis*), Groundhog (*Marmota monax*), Muskrat (*Ondatra zibethicus*), Porcupine (*Erethizon dorsatum*), and White-tailed Deer (*Odocoileus virginianus*).

5.12 Other Significant Natural Heritage Features

In addition to the natural heritage features previously described, the Site contains Provincially Significant Wetland, and habitats that meet the definitions of Significant Woodland, and Significant Wildlife Habitat. The Site does not contain nor is within 120 m of Significant Valleylands or Areas of Natural and Scientific Interest.

5.12.1 Grants Creek Provincially Significant Wetland

This wetland was formally evaluated and designated as provincially significant in 1984 due to the combination of its biological, social, and hydrological functions and special features. Portions of Grants Creek Provincially Significant Wetland associated with the Site are described in detail throughout this report, including vegetation communities and fish habitat.

Following the OWES protocol (MNRF 2021), an extension of wetland contiguous with Grants Creek Provincially Significant Wetland was identified in the western portion of the Site (SWT2-2 in Figure 15). As this feature represents a contiguous wetland area, it is considered part of Grants Creek Provincially Significant Wetland. Based on historical imagery, the SWT2-2 wetland was likely not present during the evaluation of Grants Creek Provincially Significant Wetland in the 1980s, as land cover here was dominated by agricultural uses at that time. The SWT2-2 wetland represents natural regeneration by hydrophilic vegetation, as the land has been left fallow in recent years. The updated PWS boundary reflects this extended area (herein the “PSW Extension”), as well as several minor adjustments along the south edge of the Site based on ELC and OWES-type assessments of plant cover (Figure 45).

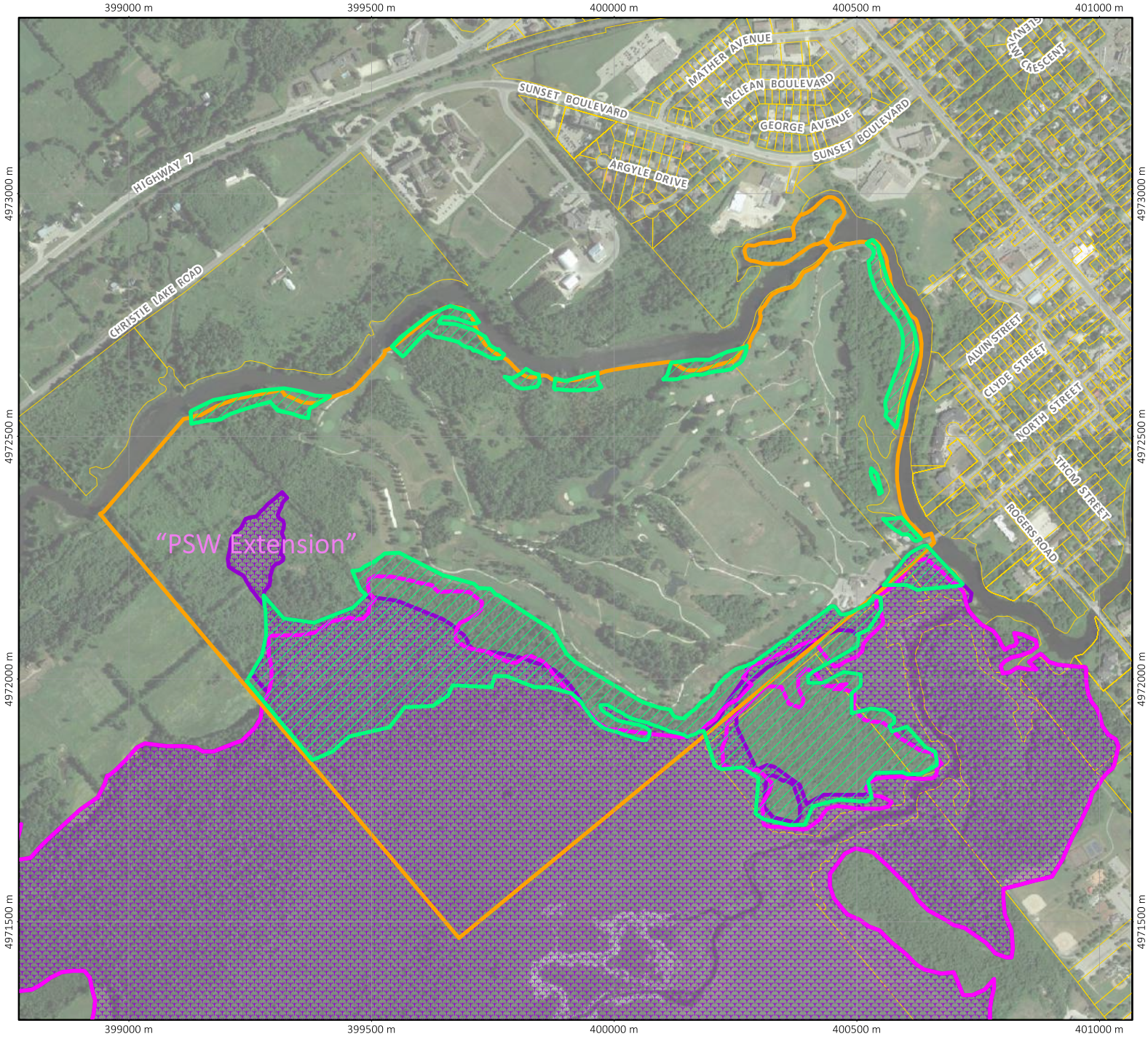


Figure 45 Map summarizing revised PSW boundary and Significant Woodland areas

Legend

- Site
- Perth Parcels

PSW

- Original Boundary
- Current (Revised)

- Significant Woodland

N

0 400 m

Project: CAIV1193
Map File: CAIV1193 - 2302b
Universal Transverse Mercator - Zone 18 (N)
Printed on: 2023-02-22

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5.12.2 Significant Woodlands

Appendix 11 of the Town of Perth Official Plan identifies Potentially Significant Woodlands associated with the Site. The large (28.3 ha), contiguously forested area associated with Grants Creek Provincially Significant Wetland and Grants Creek (comprising both upland and wetland [swamp] areas of tree cover) will provide protection to the ecological and hydrological functions of these significant natural features and act as natural corridors and linkages between them (Figure 45). As such, this feature aligns with criteria for significance per the Natural Heritage Reference Manual (MNR, 2010). Wooded areas located directly along the Tay River, however, are smaller (<10 ha) and include no interior forest space. The Town of Perth Official Plan does not establish specific size guidelines for the review of "Ecological Functions Criteria" under the Natural Heritage Reference Manual standards for Significant Woodlands (i.e. other than the default size guidelines). As such these wooded patches, and other patches associated with the interior of the golf course, are too small to qualify as Significant Woodlands per the Natural Heritage Reference Manual. Under the PSS, municipalities may apply alternative criteria for determining the significance of woodlands that achieve or exceed the approach recommended by the Province. Wooded areas located within 30 m of the Tay River can be expected to protect ecological and hydrological functions of the River generally. Accordingly, wooded features along the Tay River were identified within Appendix 11 of the Town of Perth Official Plan as potentially significant within 30 m of the river. As such, they should also be considered as Significant Woodlands (Figure 45).

5.12.3 Significant Wildlife Habitat

Guidelines and criteria for the identification of Significant Wildlife Habitat (SWH) in ecoregion 6E (in which the Site resides) are provided by MNRF (2015a). Under the *Significant Wildlife Habitat Criteria Schedules* (MNRF, 2015a), potential SWHs are identified based on the presence both of certain habitat types (generally based on the presence of specific ELC ecosite) and of the presence of certain numbers and/or groupings of species. Areas including the appropriate habitat (i.e., supporting ecosite or land cover element/feature above a defined size threshold) and with defining species occurring in the broader vicinity can be considered as "candidate" (e.g., a pond >500 m^2 may be deemed a candidate Amphibian Breeding Wetlands Habitat if anurans have potential access to it during the breeding season). Such areas that have been directly observed as supporting the relevant species can be defined as "confirmed" (e.g., if the pond in the previous example were found to support large numbers of two more breeding anuran species). Note, however, that even though a feature or area may be deemed "confirmed" as SWH per the *Significant Wildlife Habitat Criteria Schedules*, the designation (and subsequent protection) of the wildlife habitat as "significant" is a municipal matter. As such, the Town of Perth is ultimately responsible for designating an area as SWH and determining the appropriate protections and/or mitigation measures. Smaller or degraded areas potentially qualifying as "confirmed" SWHs under the provincial guidelines may be consider as not-significant, for example, where more expansive or higher quality such features exist nearby.

Initial reviews of ecosites present on the Site suggested fourteen candidate SWH types (Table 16). Following wildlife surveys and more detailed ELC reviews through 2021 and 2022, six of the SWH types were confirmed as meeting the MNRF's criteria for confirmed SWH. Table 16 describes the SWH types considered for the Site and reviews their "significance" in the context of the broader vicinity of the Site.

Table 16 Summary of the types of Significant Wildlife Habitat associated with the Site

Type of Significant Wildlife Habitat (Candidate/Confirmed[1])	Rationale
Raptor Wintering Area (Not supported)	The habitat on and adjacent to the Site meets the criteria for SWH. The area contains a combination of fields and woodlands that may provide roosting, foraging, and resting habitats for wintering raptors. The Site contains >20 ha of forest while adjacent lands, north and west of the Site, provide >15 ha of field habitat. Confirmation of this type of SWH requires studies confirming the use of this habitat by at least one Short-eared Owl or Bald Eagle, or at least 10 individuals of two hawk/owl species (MNRF, 2015b). Insufficient numbers and species of birds were observed on the Site, however, to support a SWH designation.
Woodland Raptor Nesting Habitat (Not supported)	The Site contains forested ecosites that likely provide nesting habitat for Barred Owl and Great Horned Owl. Barred Owl was observed several times on-site in 2021 and 2022. Note that targeted owl surveys were conducted in 2022 and detected Great Horned Owls on the west side of the Site in forested habitats (deciduous forest and deciduous swamp). No raptor nests were observed to support a SWH designation.
Bald Eagle and Osprey Nesting, Foraging, and Perching Habitat (Not supported)	The Site contains deciduous forest and treed swamp ecosites adjacent to the Tay River and Grants Creek that may qualify as SWH. Osprey was observed on the Site (McIntosh Perry, 2012a; KAL, 2022). Breeding bird surveys in 2021 did not detect Osprey, however, Osprey was incidentally detected on May 12, 2022. Additional studies would be required to determine where the Osprey is nesting, but nests were not apparent during Site work.
Deer Winter Congregation Areas (Not supported)	The Site contains deciduous forest and treed swamp ecosites and White-tailed Deer was observed numerous times in 2021 and 2022. SWH status, however, requires designation by MNRF.
Turtle Wintering Areas (Not supported directly on the Site)	Several turtle species were observed on and adjacent to the Site in 2021 and 2022. The Site contains and is adjacent to permanent water bodies (Tributary B, Tay River, and Grants Creek) that were not created by anthropogenic means and likely provide suitable wintering habitat for turtles. Musk Turtle, Snapping Turtle, and Midland Painted Turtle were found in the Tay River early in the season (April 29, 2022) suggesting that turtles likely overwinter in river. Ponds on the golf course that are deeper than ~0.8 m in the autumn could provide overwintering habitat. However, these ponds are not considered Significant Wildlife Habitat because they are human-made and are likely highly impacted by the golf course (e.g., fertilizer inputs).
Colonially – Nesting Bird Breeding Habitat (Not supported directly on the Site)	MNRF (2022a) indicates a Colonial Waterbird Nesting Area within the Natural Heritage Information Centre 1 km grids that contain the Site. Colonially-nesting birds were not observed during breeding bird surveys. However, breeding bird survey stations targeted on-Site areas and not off-Site areas affiliated with the Tay River and/or Grants Creek where there may be higher potential for colonial waterbird nesting.
Reptile Hibernaculum (Candidate – but likely limited)	Several animal burrows, rock piles, fissures in south-facing rocky slopes, and underground spaces associated with large tree roots were observed across the Site, as were multiple species of snakes. Confirmation of this type of Significant Wildlife Habitat requires studies confirming the presence of five or more individuals or individuals of two or more snake species near potential hibernacula during the pre-overwintering and spring emergence periods (MNRF, 2015a). Based on the observed conditions, snakes could potentially overwinter over much of the Site, though no single feature suggested concentrated abundance. Mitigation measures should focus on limiting harm to snakes generally rather than a designation of SWH broadly.
Waterfowl Nesting Area (Candidate – but likely limited)	The Site contains and is adjacent to a Provincially Significant Wetland and contains treed deciduous swamp and thicket swamp ecosites. American Black Duck (observed in 2021) and Mallard (observed in 2021 and 2022) were observed on the Site. Waterfowl nesting in Grants Creek Provincially Significant Wetland and along the Tay River and/or Grants Creek is considered likely, but nest surveys in these areas would be required to confirm. A single nest of an American Black Duck meets the definition of SWH. Mitigation measures should focus on limiting harm to individuals and nests generally rather than a designation of SWH broadly.
Bat Maternity Colonies (Confirmed)	The Site contains deciduous forest and treed swamp ecosites and several species of bats were detected via acoustic monitoring in 2021 and 2022. Maternity colonies may occur in tree cavities in these ecosites as there are >10 large diameter (>25 cm DBH) wildlife trees per ha. This type of SWH is confirmed through the presence of more than 10 Big Brown Bats and five adult female Silver-Haired Bats. The number and sex of the bats cannot be discerned from the acoustic monitoring data, but both bat species were detected in sufficient frequency that all wooded areas on the Site can serve as SWH for bat maternity colonies. However, wooded areas

Type of Significant Wildlife Habitat (Candidate/Confirmed[1])	Rationale
	associated with the periphery of the golf course (i.e. directly along the Tay River or within the Grants Creek PSW appear to be the most used by bats. Mitigation measures should focus on timing windows to prevent impacts to bats. Site development should ensure the retention roosting habitat in proximity to feeding areas.
Turtle Nesting Areas (Confirmed)	Exposed mineral soil (sand or gravel) within 100 m of marsh habitat with five or more nesting Midland Painted Turtles or one or more nesting Snapping Turtles or Northern Map Turtles confirms this type of Significant Wildlife Habitat. Marsh habitat was identified on the eastern edge of the Site (MAS2-9 in Figure 14). No evidence of turtle nesting was observed within 100 m of this habitat. Turtle nesting was observed elsewhere on the Site; the gravel banks associated with the Peter Street bridge appeared to provide important nesting habitat with approximately 10-15 depredated nests observed here. However, nesting areas on the sides of road embankments and shoulders are not considered Significant Wildlife Habitat. Site development should ensure the protection and preservation of nesting areas associated with the Peter Street Bridge.
Woodland Amphibian Breeding Habitat (Confirmed)	Spring Peeper, Gray Treefrog, and Wood Frog were observed at call level code 3 in deciduous forest and treed swamp ecosites across the Site, confirming that these ecosites can qualify as significant amphibian breeding habitat. However, wooded areas associated with the periphery of the golf course (i.e. directly along the Tay River and within the Grants Creek PSW appear to be the most important areas. Mitigation measures should focus on timing windows to prevent direct impacts to frogs. Site development should ensure the retention of broad areas suitable for frog breeding generally.
Wetland Amphibian Breeding Habitat (Confirmed)	Breeding evidence of American Bullfrog via calling adults and tadpoles in swamp and marsh habitats along the Tay River confirms this type of Significant Wildlife Habitat. Such breeding evidence was also observed for ponds on the golf course, but these anthropogenic features are not typically considered Significant Wildlife Habitat. Mitigation measures should focus on timing windows to prevent direct impacts to frogs. Site development should ensure the protection of the riparian fringe along the Tay River.
Woodland Area-sensitive Bird Breeding Habitat (Confirmed)	The Site contains deciduous forest and treed swamp ecosites and several area-sensitive breeding birds were observed in these habitats in 2021 and/or 2022 with possible to confirmed breeding evidence: Red-breasted Nuthatch, Veery, Ovenbird, Scarlet Tanager, Yellow-bellied Sapsucker, and Winter Wren. Areas of sufficient size to qualify as SWH, however, are limited to the contiguously wooded portion of Grants Creek PSW. Mitigation measures should focus on timing windows to prevent direct impacts to birds. Site development should limit incursions into the edge of the wooded the Grants Creek PSW and to ensure the retention of the extended wooded area.
Special Concern and Rare Wildlife Species (Confirmed)	The following Special Concern species were observed on the Site in 2021 and/or 2022 and confirm this type of Significant Wildlife Habitat: Barn Swallow, Eastern Wood-Pewee, Rusty Blackbird, Wood Thrush, Eastern Musk Turtle, Snapping Turtle, and Northern Map Turtle. Eastern Ribbonsnake was also observed on the Site (McIntosh Perry, 2012a). Areas (potentially) supporting these species cover the entire Site. However, Tay River directly, its riparian edge, and the Grants Creek PSW appear collectively to be the most important areas for these species. Mitigation measures should focus on limiting harm to individuals. rather than a designation of SWH broadly. Site development should ensure the retention and/or improvements of extensive areas of suitable habitat areas.

Table Notes: [1]MNRF identifies candidate Significant Wildlife Habitat based on ELC ecosite codes and habitat criteria (MNRF, 2015b). Confirmed Significant Wildlife Habitat is identified by MNRF as meeting defining criteria (e.g., obtained through specific studies). Note that protection of either candidate or confirmed Significant Wildlife Habitat is the decision of the municipality.

6.0 DESCRIPTION OF THE PROPOSED PROJECT

The proposed Caivan (Perth GC) Ltd. redevelopment of the Western Annex Lands will be a residential community consisting of a mix of 939 dwelling units (with 299 townhomes and 640 singles), three community parks, three stormwater management (SWM) ponds and an integrated trail (Figure 46). Detailed design, including specific landscape designs and planting plans, are anticipated to be completed by early summer 2023 with initial servicing works to begin one year later. Home construction is planned to begin in the spring of 2026 with the first homes completed by the fall of that year.

The entry into the community will be via the Peter Street Bridge. This narrow structure will widened to accommodate the increased traffic. Adding a collector road here to service the residential community would invoke some additional disturbance but would mostly not require the removal of natural vegetation. However, the south side of the ROW for the road infringes into the Provincially Significant Wetland by ~9 m, where some removal of natural vegetation would be required. The current alignment of the Peter Street bridge constrains the location of the proposed new road to this location, and therefore alternative designs are not feasible. Since this portion of the Grants Creek PSW currently abuts the parking lot (i.e., is already degraded), removing vegetation here is not expected to significantly alter the wetland if vegetation removal and disturbance are minimized.

The entrance roadway will follow near the south edge of the site. The setback to the adjacent natural areas is as wide as 30 m but drops down to 9 m at one point. The area abutting the south edge of the road, especially within ROW but into the setback, is recommended to be raised to form a wide, gently sloping berm to direct any meltwater winter plowing windrows towards the stormwater collection system of the roadway, and not towards the wetland. The top and backside of the berm are to be fully revegetated with dense trees of similar species to those of the adjacent band of forest.

Along the southwestern edge, the new community will, at three locations, edge into adjacent areas of Significant Woodland that extend beyond the boundary of the PSW. This will remove a 2.61 ha line of forest (maximum width 90 m) but will retain 30 m of that forested edge within the setback to the PSW (except at the narrow point indicated above). At the western end of the Site, however, the community wraps around the PSW Extension. While this green area includes a small (0.50 ha) corner of the existing FOD7 forest, which will be retained, most space consists of regenerating the thicket/thicket swamp (2.14 ha and 1.48 ha respectively) that is rife with invasive buckthorn. The thicket areas will be subject to program for the removal of Buckthorn (and other invasives), and an intensive replanting program to meet renaturalize/enhance the area as a maple forest/swamp. The final landscape design is expected to use Silver Maple as the dominant tree species in the central swamp area associated with the PSW itself, and Red Maple as the dominant species in the moist forest of the surrounding buffer. These replanted areas collectively provide greater areas of forest/swamp cover than those removed from the Significant Woodland and PSW.

The proposed road crossing at the base of the PSW Extension will be designed to minimize its footprint directly within the wetland area itself and to maximize wildlife passage potential beneath. It will be designed with wildlife fencing and vertical elements to prevent local reptile populations from accessing the road surface.

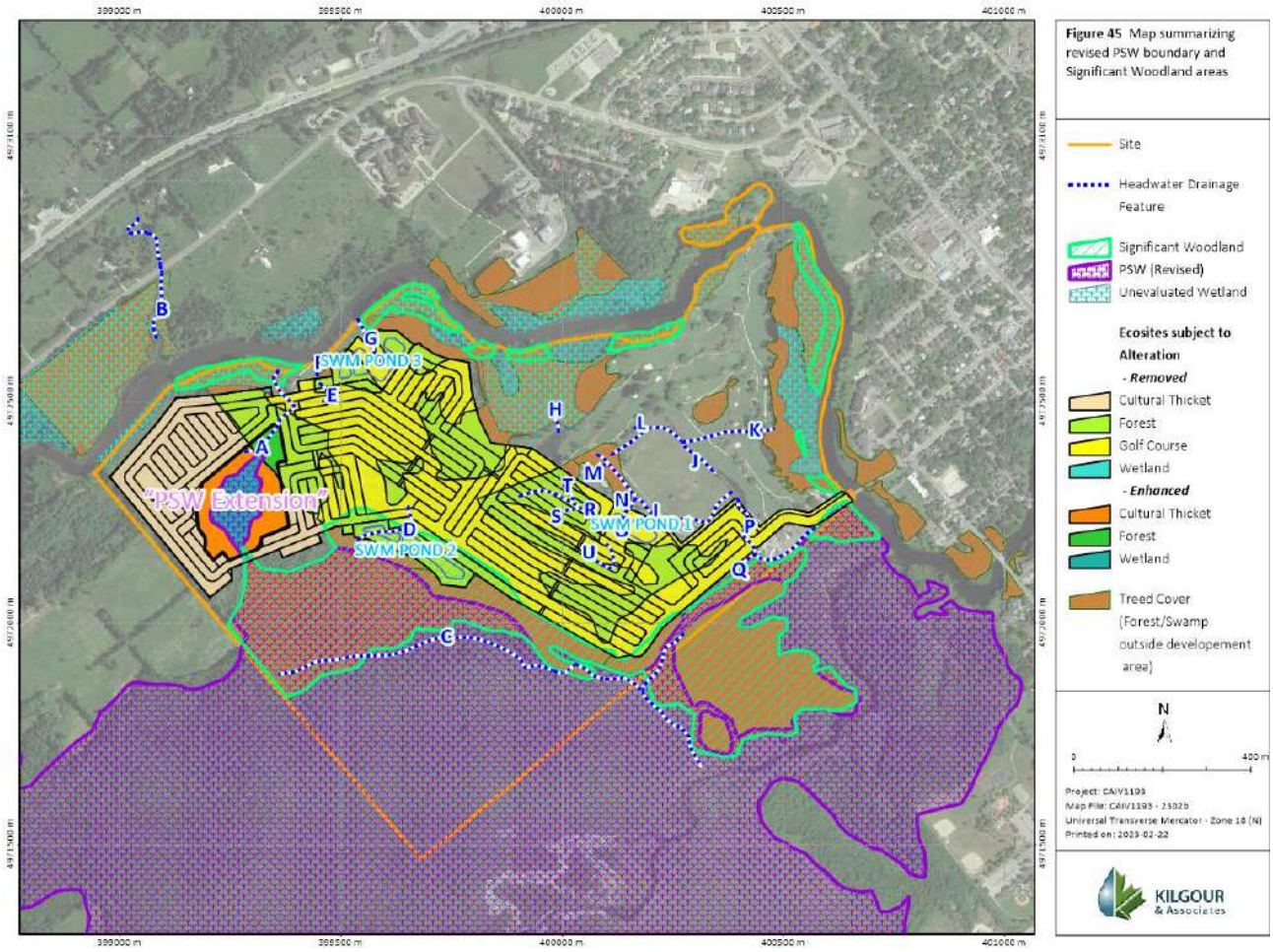


Figure 46 Map showing the proposed development of the Site

Along its north side, the community will be setback 30 m from the Tay River. This will maintain wooded areas (forest and swamp) there constituting Significant Woodland (per the Official Plan), and all but 233 m^2 of the 12.65 ha (i.e. 99.82%) of riparian wetland space along the river's edge within the Site.

Headwater features occurring within the development area will be fully removed/realigned. None of these features provide fish habitat. Per the HDFA (Appendix H) all but one of these features (Tributary A) have minimal management recommendations limited to the maintenance of the hydrological functioning of the area (i.e. with no requirement to maintain the specific features per se). Tributary A, located along the northwest side of the site, warranted a management recommendation of Conservation (Appendix H). This recommendation allows for the alteration/realignment of the tributary but necessitates the new feature be designed following the principles of natural channel design. The future outlet channel for SWM Pond 1 in the northwest corner be designed accordingly to offset the loss of Tributary A.

Tributaries B and C are outside of the development area and will not be touched. Tributary D will be replaced by SWM Pond 2. Outflow from this pond should be directed back towards the adjacent wetland to maintain hydrology per the IHIA, but this should be done with a level spreader to avoid concentrated (erosive) flows and to replicate groundwater infiltration (i.e. subsurface flows).

Other all other headwater features on the Site (i.e. Tributaries E to U) will be altered as required. These features all currently drain (eventually) to the Tay River. Their hydrological contributions will be rerouted to the Tay River via either SWM Pond 3 (as noted above) or towards the Peter Street Bridge from the outlet channel of SWM Pond 1.

As part of the overall management of SAR occurring in the vicinity of the site, the rear-facing yards around the perimeter of the new community will likely require fencing designed to steer turtles and snakes around, as opposed to through, the area. Specific details of the fencing will be developed in consultation with MECP as part of the SAR permit application process.

7.0 IMPACT ASSESSMENT AND MITIGATION

7.1 Surface Water and Fish Habitat

Within the Site itself, fish habitat is limited to the Tay River and to Grants Creek. The Infrastructure Master Plan for the Western Annex Lands recommended the establishment and/or retention of a minimum 30 m natural buffer from the high-water mark of watercourses to protect fish habitat and water quality (Jp2g Consultants Inc., 2019). The new community will retain a 30 m setback from the standard shoreline elevation of the Tay River. This setback will include, and thus preserve both the significant woodland areas located along the riparian edge of the river along the community's north side and the shoreline wetland. The block grid will see the removal of only 235 m^2 of SWD3-2 swamp in the corner of a single row of lots, which will be offset by tree planting along the remainder of the buffer there as discussed below in Section 7.4.2.

At its closest point south of the Peter Street Bridge, Grants Creek is separated from the development by >120 m of the PSW, and no SWM drainage features will lead directly to it. As such, no impacts are anticipated to the fish community within the creek. Setbacks and other considerations related to the Grants Creek PSW are discussed in Section 7.4.1.

Tributaries B and C are not anticipated to be impacted as they will be outside of the proposed development area on Site. As such, they will not be discussed further here.

Tributary A, located along the northwest side of the site, conveys surface drainage from that area of the Site to the Tay River, though its hydrological capacity is limited by the presence of two small culvert crossings associated with existing golf cart paths. Under the proposed site plan, this feature will be fully removed. Per the HDFA (Appendix H), the feature has been given a management recommendation of Conservation. This recommendation allows for the alteration/realignment of the tributary but necessitates the new feature be designed following principles of natural channel design to provide a similar or better aquatic habitat, and to ultimately convey water to the same receiver (i.e. provide comparable hydrological functionality with the context of the broader catchment). SWM Pond 1 in the northwest corner of the proposed development will be required to outlet directly to the Tay River. Permits for the design and construction of the outlet channel for this pond are expected to require a natural channel design, with a naturalized, (re)forested corridor at least 65 m in width (i.e. equivalent to a 5 m wide channel with 30 m setbacks) to offset the loss of Tributary A.

Other all other headwater features on the Site (i.e. Tributaries D to U), have management recommendations under the HDFA of "Maintain Recharge". These features may be altered as required by the development but the overall hydrology of the area must be maintained (i.e. no significant change to the hydration of the Tay or Grants Creek PSW. Tributaries E through U all currently drain (eventually) to the Tay River. Their hydrological contributions will be rerouted to the Tay River via either SWM Pond 3 (as noted above) or towards the Peter Street Bridge from the outlet channel of SWM Pond 1.

Tributary D will be replaced by, SWM Pond 2. Outflow from this pond should be directed back towards the adjacent wetland to maintain hydrology per the IHIA, but this should be done with a level spreader to avoid concentrated (erosive) flows and to replicate groundwater infiltration (i.e. subsurface flows).

Stormwater from SWM Ponds would be managed and treated under permissions from MECP (as well as RVCA), and as such can be anticipated to have no net deleterious effect on water quality or fish habitat. Stormwater must discharge areas must incorporate means for energy dissipation such as a riprap followed by a vegetated channel to prevent erosion. All outlet channels/systems must be supported by permits from the RVCA, which will confirm the final design as providing a comparable or improved aquatic habitat. None of the features potentially impacted constitute fish habitat. As such, no requirement for a Fisheries Act Authorization from DFO is anticipated. With all proposed channel realignments built according to their respective permits, no impacts to aquatic habitat or fish communities would be anticipated.

During construction, the potential for sediment to be released into surface water features during site preparation and construction would be mitigated using standard erosion and sediment control measures. An erosion and sediment control (ESC) plan should be developed to the satisfaction of regulating agencies and is anticipated to include:

- A multi-faceted approach to provide ESC.
- Silt fence paired with sturdy construction fence along the project perimeter. This fencing can also act as a wildlife exclusion measure for smaller and less mobile animals that may occupy or traverse through the forests and wetlands, such as amphibians, turtles, and snakes (with the exception of Gray Ratsnake).
- Regularly inspecting and maintaining the ESC measures during all phases of the project.
- Regularly inspecting the Site for signs of sedimentation during all phases of work and taking corrective action if required.
- Retention of existing vegetation and stabilization of exposed soils with native vegetation where possible.
- Keeping the ESC measures in place until all disturbed ground has been permanently stabilized.
- Using biodegradable ESC materials where possible and removing all exposed non-biodegradable ESC materials once the Site is stabilized.
- Limiting the duration of soil exposure and phasing project works.
- Limiting the size of disturbed areas by minimizing nonessential clearing and grading.
- Minimizing the total slope length and the gradient of disturbed areas.
- Refueling of machinery should occur >30 m from surface water features and all machinery will remain on the project-side of silt and construction fence.
- Maintaining overland sheet flow and avoiding concentrated flows.
- Storing/stockpiling materials >30 m away from surface water features.

- Fencing or tarping stockpiled material (<150 millimetre gravel) during the turtle nesting period (late May to early July) (MNRF, 2015a).

- Developing a response plan to be implemented immediately in the event of a spill of a deleterious substance.

- Keeping an emergency spill kit on the Site.

- Stopping work and containing deleterious substances to prevent dispersal.

- Reporting any spills of sewage, oil, fuel, or other deleterious material whether near or directly into a surface water feature.

7.2 Vegetation

Relative to other naturally vegetated areas of the Site, converting the western portion of the golf course (22.08 ha) into a residential subdivision minimizes vegetation removal. Areas of deciduous woodland (13.21 ha) on the golf course would be removed. To the west of the golf course, the proposed development would remove 7.76 ha of a cultural thicket, consistent with the Infrastructure Master Plan for the Western Annex Lands. All existing trees and other vegetation within these areas proposed for community development would be removed to accommodate site development as detailed in the Tree Preservation Plan (Appendix I).

To offset vegetation loss, native tree and shrub species must be planted. Plantings may occur at ground level, on top of structures, in adjacent rights-of-way, in parks, or any other existing or future public space. Landscaping plans must be prepared to the satisfaction of the Town of Perth. To promote canopy coverage throughout the new community, trees should be planted at an equivalent of 1.5 trees per lot with a minimum of one tree per on each house lot and the remainder to be planted in public areas as required such as parks or school yards.

The following tree and shrub species are recommended for planting and should be used to direct the development of the landscape plan for the Site. The following species are appropriate given site conditions and are native and non-invasive: Alternate-leaf Dogwood (*Cornus alternifolia*), Basswood (*Tilia americana*), Bitternut Hickory, Black Cherry (*Prunus serotina*), Black Walnut (*Juglans nigra*), Bur Oak (*Quercus macrocarpa*), Chokecherry (*Prunus virginiana*), Eastern White Cedar, Hawthorns (*Crataegus* spp.), Ironwood (*Ostrya virginiana*), Largetooth Aspen (*Populus grandidentata*), Maple-leaf Viburnum (*Viburnum acerifolium*), Nannyberry (*Viburnum lentago*), Northern Bush-honeysuckle (*Diervilla lonicera*), Peachleaf Willow (*Salix amygdaloides*), Pin Cherry (*Prunus pensylvanica*), Red Maple (*Acer rubrum*), Red Oak, Serviceberries (*Amelanchier* spp.), Sugar Maple, Silver Maple, Trembling Aspen, White Birch (*Betula papyrifera*), Yellow Birch (*Betula alleghaniensis*), White Oak (*Quercus alba*), and White Pine (*Pinus strobus*).

The Significant Wetland and Woodland (which includes areas along within the Tay River setback) are discussed in Sections 7.4.1 and 7.4.2 below.

It is recommended to incorporate native plants into Site landscaping to the extent possible for the benefit of local wildlife and pollinators (e.g., milkweed for Monarch). Further, it is recommended that plantings encompass a variety of native flowering species with different blooming periods to provide varied food

sources for native pollinators. Further, the use of herbicides should be limited within and surrounding the planted habitat.

To prevent the spread of invasive species, it is recommended to ensure equipment is clean prior arriving on site for vegetation removal to avoid introducing invasive species (e.g., Common Reed) to the Site and to clean equipment prior to leaving the Site to avoid spreading invasives elsewhere.

7.3 Species at Risk

7.3.1 SAR Birds

Eastern Wood-Pewee and Wood Thrush were both observed on multiple occasions and from multiple locations within the extended forested area associated with the Grants Creek PSW. The proposed development will include incursions into the edge of this feature totaling 2.6 ha but would see 3.6 ha of low-quality thicket replanted as deciduous forest within the PSW Extension. Other limited observations of these species were associated with treed areas in the Tay River riparian edge (mostly along the eastern end of the Site, which will be retained. With the implementation of standard timing windows and mitigation measures per Section 7.5., no negative impacts would be anticipated to individual birds. Development of the Site will require the negotiation of a SAR permit, however, with the ECCC. For these two species, the permit is anticipated only to confirm the specific mitigation measures to be employed with no additional measures beyond those in Section 7.5 expected. Compliance with the stipulations of that permit will ensure no negative impacts to these species or their habitats.

The occurrence of Rusty Blackbird on the Site is limited to a single incidental observation from the eastern end of the golf course beyond the proposed development. As such no negative impacts are anticipated to this species. ECCC will be consulted on the possible need for permit regardless.

7.3.2 SAR Reptiles

7.3.2.1 Blanding's Turtle

Blanding's Turtle is known to occur in the Tay River and Grants Creek (RVCA, 2017a, b; MECP (B. Norman) personal communication with KAL, February 2023); however, the species was not detected during the 2021 and 2022 turtle surveys. Surveys targeted wetlands on the Site, golf course ponds, the Tay River, Grants Creek, and potential nesting sites. Given the nature of the golf course ponds as typical golf course features (i.e. heavily managed), and the lack of observations of Blanding's Turtles there, the ponds are not considered suitable habitat.

The NHIC system, however, includes an element occurrence record of the Blanding's Turtle centred on the eastern edge of the golf course. As this record is within 2 km of the Site, the Tay River and natural wetland areas on the Site plus the 30 m around them must be considered as Category 2 habitat. Category 2 areas are to be managed/protected to allow general life processes for the species including feeding, basking and mating. Development activities that do not interfere with this habitat functionality are generally permissible.

The proposed development will retain a 30 m naturalized buffer along its entire length adjacent to the Tay River. It will also leave a 30 m buffer along much of its length adjacent to the Grants Creek PSW, though the setback briefly reduces to ~3m along the central portion. The reductions or alterations to Category 2,

however, must be supported by a Net Benefit Permit from the MECP, which the proponent will have to negotiate before proceeding with development. Under the permit, the proponent will be required to include design elements in the community plan, and mitigation measures within the construction approach to prevent harm to turtles and to ensure no net loss of habitat functionality. Measures to prevent harm to individuals will likely correspond with general wildlife management approaches provided in Section 7.3.2.3. For habitat, the current scrubby thicket coverage within the PWS Extension is considered to be of limited suitability. Renaturalization of the 3.6 ha of this feature could provide a net increase in Category 2 area. Such works are recommended for inclusion in a compensation plan to be negotiated with MECP as part of the application for a Net Benefit Permit. That compensation plan would also likely require the implementation of a long-term monitoring plan of the local Blanding's Turtle population.

The area 220 m beyond the edge of Category 2 habitat (i.e. up to 250 m from the edge of a suitable aquatic habitat) would be considered Category 3 habitat. Category 3 habitat is to be managed/protected to allow safe turtle movements between wetland areas. The proposed development will be situated directly between the Tay River and the Grants Creek PSW, thus fully eliminating the potential functionality of the Category 3 habitat at that location. The Grants Creek PSW, however, would still fully connect to the Tay River to the east and west of the new development ensuring continued accessibility between the two areas. The mitigation plan for the Net Benefit Permit for Blanding's Turtles will most likely require the inclusion of wildlife fencing along all outward-facing rear yards of the new community to direct turtles around the development and prevent turtles from accessing/crossing local roadways (see Appendix J for standard fencing guidelines). Accordingly, the road crossing at the base of the PSW Extension will need to be designed as a wide-span structure with a natural bottom to encourage turtle passage beneath, with vertical elements at the base and appropriate fencing to prevent turtles from accessing the road top.

The final details of the mitigation plan must be negotiated with the MECP as part of the application process for a Net Benefit Permit for Blanding's Turtles. The implementation of that plan, however, will ensure no negative impacts of the development on the species.

7.3.2.2 Gray Ratsnake

Field surveys for Gray Ratsnake in 2021 and 2022 resulted in the detection of one Gray Ratsnake individual, basking on a rock pile in the Tay River, near the northwestern tip of the golf course. Both anecdotal evidence and records on iNaturalist also indicate occurrences both on the golf course and adjacent lands. Consequently, habitat areas on the Site that are suitable for this species to carry out its life processes are protected under the ESA. The General Habitat Description omits lakes, rivers, and agricultural fields from habitat designation (MECP, 2021d); however, recent consultation with MECP indicated that golf courses falling within general habitat areas are subject to the habitat regulation for Gray Ratsnake, as they can still provide habitat functions and may play a role in maintaining quality and function of Category 1 habitat (MECP (B. Norman) personal communication with KAL, February 2023).

Development of the new community must be preceded by successful negotiation with MECP for a Net Benefit for the species. The application for this permit must include the development of a mitigation plan that would offset habitat alteration and prevent harm to individual snakes. Habitat alteration would likely involve the creation of suitable habitat for Gray Ratsnake. Renaturalization of the PSW Extension from thicket swamp to treed deciduous swamp would likely be one element of offsetting. As a second element, a successful habitat compensation project for Gray Ratsnake was recently performed in Leeds and Grenville through the creation of thermoregulation and egg-laying sites, with evidence of use by Gray Ratsnake (EcoTec, 2022). Such

structures could be located on the west end of the golf course island in the northeast corner of the site. Best management practices and guidelines for creating habitat for Gray Ratsnake and other at-risk snake species are provided by MNRF (2018).

To prevent harm to individual snakes, the community will also likely require permanent wildlife fencing around the perimeter. Such fencing was already specified for Blanding's Turtles, but the fencing will need to be taller than a typical turtle-specific structure (see Appendix J for standard fencing guidelines). The final details of the mitigation plan must be negotiated with the MECP as part of the application process for a Net Benefit Permit for Gray Ratsnake. The implementation of that plan, however, will ensure no negative impacts of the development on the species.

7.3.2.3 General SAR Reptile Mitigations

In addition to complying with any other specific obligations imposed by MECP as may be required, the following mitigation measures are to be implemented to prevent impacts to Gray Ratsnake, Blanding's Turtle, and other reptiles:

- As both the golf course and adjacent forested areas on-site are considered "suitable" and subject to the habitat regulation for Blanding's Turtle and Gray Ratsnake, the proponent will likely be required to complete an Information Gathering Form to inform MECP's determination of 1) the presence of SAR or their habitats; 2) the potential effects of the proposed development on these species and habitats; and 3) whether the proposed development will contravene the ESA. It is likely that an Authorization under the ESA will be required to alter this habitat, which would obligate the proponent to obtain and fulfill an Overall Benefit permit.

- All on-site workers are to receive environmental compliance and SAR identification and awareness training for at-risk reptiles delivered by a qualified biologist prior to working on-site.

- Prior to vegetation clearing, sweeps of areas to be cleared are to be conducted by a qualified biologist to ensure the absence of at-risk reptiles and associated sensitive habitat areas (e.g., hibernacula).

- Install temporary exclusion fence prior to the reptile active season (April through October; MNRF, 2015a; 2016), and should follow recommendations in *Reptile and Amphibian Exclusion Fencing: Best Practices* (MNR, 2013) and *Best Management Practices for Mitigating the Effects of Roads on Amphibian and Reptile Species at Risk in Ontario* (OMNRF, 2016). Temporary exclusion fence may be paired with ESC measures and should be installed along the perimeter of the project area but outside of wetlands and setbacks. Temporary exclusion measures should be inspected weekly by a qualified biologist during the reptile active season.

    - Permanent snake fencing is to be installed along the mature Sugar Maple forest (FOD5-1) to keep Gray Ratsnakes off of the Site both during and after construction. As Gray Ratsnakes are excellent climbers the exclusion fencing must be a minimum of 2 m tall and have a smooth surface (e.g., concrete, aluminum, vinyl). Fencing must be designed following the above protocols (MNR, 2013; OMNRF, 2016).

  - The residential community should incorporate permanent turtle fence either along wetland and watercourse setbacks or yard fences. Once these permanent fences are installed, temporary exclusion measures may be removed.

- Fence or tarp all stockpiled material prior to the turtle nesting period (late May) to prevent turtles from nesting in stockpiles (MNRF, 2015a).

- Culverts and other watercourse/wetland crossings are to consider design features that allow for safe wildlife passage, including reptiles following *Best Management Practices for Mitigating the Effects of Roads on Amphibian and Reptile Species at Risk in Ontario* (OMNRF, 2016).

- If an at-risk reptile is encountered during project works, nearby works should cease immediately. If the SAR is in immediate harm's way, it should be safely and humanely moved into nearby suitable habitat following *Ontario Species at Risk Handling Manual: For Endangered Species Act Authorization Holders* (MNR, undated). If the SAR is not in immediate harm's way, the project Biologist should be contacted for direction. Photographs and notes (species, health, sex, behaviour, location) should be taken for all encounters.

  - The proponent should obtain a Wildlife Scientific Collector's Authorization from the MNRF to handle at-risk reptiles.

  - All encounters with Threatened and Endangered species should be reported to the MECP within 24 hours of an encounter.

7.3.3 Little Brown Myotis and Tri-colored Bat

Tree removal in the development area would result in a loss of roosting habitat for these two bat species, along with candidate Significant Wildlife Habitat for Bat Maternity Colonies. However, suitable roosting habitat exists elsewhere on Site where trees will be retained. Foraging habitat on the Site and over the Tay River would be retained. As Endangered species, Little Brown Myotis and Tri-coloured Bat receive "general habitat protection" under the ESA; no defined protection currently exists for these species. Generally, trees that these at-risk bats use for roosting cannot be significantly altered during the roosting season (April through September inclusive; MNRF, 2015c). While the need for a Net Benefit Permit from the MECP is not considered likely to be required for SAR bats, the advice above must be confirmed with MEPC, which would likely result in a letter of advice from the ministry. Adherence to any such advice will ensure no negative impacts to bat species. Regardless of whether specifically required by MECP for the consideration of SAR bats, the installation of bat roosting boxes around the perimeter of the community and the remaining golf course is strongly recommended.

7.3.4 Black Ash

Black Ash is a predominantly wetland species that occurs in swamps, floodplains, fens (COSEWIC, 2018b). Numerous Black Ash individuals were observed in the SWD3-2 and SWD2-1 communities on the Site and Peripheral Lands. Black Ash was listed as Endangered under the ESA on January 26, 2022; subsequently, however, the Minister of MECP ordered by Ontario Regulation 23/22 that ESA protections for Black Ash be temporarily suspended for a two-year period following its listing (Government of Ontario, 2022a). The

regulation allows activities that impact Black Ash and its habitat to proceed without the requirement for an ESA authorization or exemption during the two-year period (until January 26, 2024). A recovery strategy and associated policy will be developed during this time by the province. Much of the SWD3-2 and SWD2-1 ELC units correspond to setbacks along the Tay River and unevaluated wetland areas, thereby minimizing potential impacts to Black Ash; however, anticipated vegetation clearing and development within these ELC units has potential to impact Black Ash individuals.

The required mitigation compensation efforts (if any) will not be known until MECP provides further guidance closer to January 26, 2024.

7.3.5 Butternut

The root harm prevention zone (i.e., protected habitat area) of Butternuts near the Peter Street bridge may interact with the construction of a road in this area. Measurements of trunk diameter are required to determine the root harm prevention zones of these trees and whether they would interact with construction. Per O. Reg. 829/21, what can be done to a Butternut and its associated root harm prevention zone depends on the health of the tree, which is determined through a formal Butternut health assessment. The health of Butternuts that have protected root zones that overlap with the project footprint must be assessed by a Butternut health expert to determine their health status and associated follow-up actions in the season prior to planned works in their vicinity. Impacts to such small numbers of Butternuts (i.e. five or fewer depending on the BHA findings) can ultimately be offset through the standardized mechanisms associated with the Ontario Conservation Fund. With the appropriate application of this process, no net negative impacts are anticipated to the species.

Additional Butternut surveys are recommended for areas in which development has not commenced prior to May 2024. These surveys should be conducted during the leaf-on season and as close in time to tree-clearing activities in this location as feasible.

7.4 Other Significant Natural Heritage Features

The Provincial Policy Statement identifies significant natural features including Significant Woodlands, Wildlife Habitats, and Wetlands, and provides direction as to how those features should be protected and/or managed. Development affecting Significant Woodlands and Significant Wildlife Habitats can be permitted where it can be demonstrated that there will be no negative impacts on the natural features or their ecological functions. Where alterations of a feature's area/boundary under a proposed project are small - and are offset by comparable (or better) additions or improvements within other portions of the feature - or where such alterations will not reduce general ecological function in a broader context, the project may be considered as not having a negative impact.

Within Significant Wetlands, however, the PPS directs for no development or site alteration within the feature. Small incursions into Significant Wetlands to support broader infrastructure requirements (e.g. bridges and roadways), however, can be supported by the Province.

7.4.1 Grants Creek Provincially Significant Wetland and Unevaluated Wetlands

The Infrastructure Master Plan for the Western Annex Lands recommended the establishment and/or retention of a minimum 30 m of natural vegetated cover adjacent to Grants Creek Provincially Significant Wetland (Jp2g Consultants Inc., 2019). The proposed development mostly incorporates a 30 m setback from this wetland, except for in three locations: 1) immediately west of the Peter Street Bridge, 2) along the southern limit of the development area ~400 m from the Peter Street Bridge, and 3) at the location of a proposed road crossing at the bottom of the PSW Extension.

At the Peter Street Bridge, the surrounding area is associated with existing disturbed conditions of the golf course, including manicured lawn, cart paths, and a parking lot. Adding a collector road here to service the residential community would invoke some additional disturbance but would mostly not require the removal of natural vegetation. However, the south side of the ROW for the road infringes into the Provincially Significant Wetland by ~9 m, where some removal of natural vegetation would be required. The current alignment of the Peter Street bridge constrains the location of the proposed new road to this location, and therefore alternative designs are not feasible. Since this portion of the Provincially Significant Wetland currently abuts parking lot (i.e., is already degraded), removing vegetation here is not expected to significantly alter the wetland if vegetation removal and disturbance are minimized (e.g., using swamp mats).

Further (~400 m) down the ROW, the proposed roadway remains generally straight as it follows the Site topography and existing golf edge. The PSW boundary, beyond the band of existing forest on the south side of road is less straight and is situated at one point with ~9 m of the edge of the ROW. The intervening area, especially within ROW abutting the road, is recommended to be raised to form a wide, gently sloping berm of sufficient width and gradient, and constructed of sufficiently impervious fill, such that melt water from salt laden snow accumulations (windrows) from winter plowing drain fully towards the stormwater collection system of the roadway, and not towards the wetland. The top and backside of the berm are to be fully revegetated with dense trees of similar species to those of the adjacent band of forest including Sugar Maple, Basswood, Bitternut Hickory, and Black Cherry.

The proposed road crossing at the base of the PSW Extension, must be designed to limit supporting fill within the wetland area itself (e.g. no round pipe culverts) following the general recommendations provided in Section 7.3.2.1 associated with Blanding's Turtles.

Invasive Reed-canary Grass and European Buckthorn were observed throughout this PSW Extension (as well more broadly along parts of the riparian edge of the Tay River in the northwest corner of the site). A renaturalization/enhancement program, including invasive species removal and extensive plantings of native deciduous wetland trees (e.g. Silver and Red Maple; Appendix I) within this area, is anticipated to provide a net benefit to the wetland feature and to offset small incursions associated with development at Peter Street.

Alterations within 120 m of Grants Creek Provincially Significant Wetland, and within 30 m of unevaluated wetland, require careful consideration including opportunities for low-impact development techniques. The Infrastructure Master Plan for the Western Annex Lands recommended that the boundaries of the Provincially Significant Wetland be staked by a qualified professional at the detail design stage to protect this feature and ensure that the designated setbacks are maintained (Jp2g Consultants Inc., 2019). In addition, it is recommended that all setback areas lacking in natural vegetation cover be enhanced through plantings of native vegetation including trees and shrubs generally.

The IHIA for the project indicates no net changes are anticipated to the hydrological functioning of the Grants Creek PES are anticipated. To replicate the current hydrological functioning, treated stormwater from SWM Pond 2 area would discharge to the PSW. The outlet structure of this pond should employ a level spreader-type design along the western side of the feature to release water into the wetland as a dispersed, subsurface flow instead of through a concentrated channelized outlet.

7.4.2 Significant Woodlands

The proposed development will retain all woodland areas within the 30 m set back to the Tay River that meet the definition of Significant Woodland per the Natural Heritage Reference Manual and/or the Official Plan of the Town of Perth. However, incursions into the edge of Significant Woodland associated with the Grants Creek PSW will total 2.6 ha. This would be offset with the conversion of 3.6 ha of the low-quality thicket to be replanted with deciduous tree cover. The detailed landscape plan for this area must still be completed. Wetland tree species including Silver Maple and Red Maples are recommended to be the dominant species within the planning mix. Gaps between the forested sections of the Tay River riparian edge clusters of invasive Phragmites and Buckthorn. It is recommended that invasive removal plans be developed and implemented in these areas as well as further reforestation efforts.

With tree planting and the removal of invasive species in the PSW Extension and along the Tay River, no net negative impacts are anticipated to the Significant Woodlands.

7.4.3 Significant Wildlife Habitat

Six types of habitat that meet the criteria of Significant Wildlife Habitat were identified on the Site, including Bat Maternity Colonies, Turtle Nesting Areas, Woodland Amphibian Breeding Habitat, Wetland Amphibian Breeding Habitat, Woodland Area-sensitive Bird Breeding Habitat, and Special Concern and Rare Wildlife Species (Table 16). While these SWH categories apply primarily to woodland and wetland features, is no area of the site that does not correspond with at least one potential SWH category. As reviewed in Table 16, however, the utility of lands within the development footprint as SWH is generally limited compared to the SWH-qualifying areas outside of the development footprint. Suitable if not more ideal ecosites for all six types of confirmed Significant Wildlife Habitat exist elsewhere on the Site and would be retained, such as in Grants Creek Provincially Significant Wetland and along the Tay River.

The recommended focus for development is the prevention of harm to wildlife using these areas following general wildlife management best practices (Section 7.5), with the retention of and improvements to (i.e. tree planting and removal of invasives) along the Tay River and in the PSW Extension. For the specific protection of Turtle Nesting Areas, it will be required that turtle exclusion fencing (per Appendix J) be installed and maintained around the perimeter of bank-side work sites associated with any construction on the Peter Street Bridge prior to May 1 of the year in which such works would begin. Fencing must be maintained there until at least October 15 of that year or the completion of the bridge works, whichever comes first. Fencing must be restored/reinstalled accordingly during each year of construction if bridge works extend beyond one year.

7.5 General Wildlife Management

The following mitigation measures should be implemented during project works to generally protect wildlife:

- Vegetation clearing should not take place during sensitive times of the year for wildlife (breeding season; early spring throughout summer) unless mitigation measures are implemented and/or the habitat has been inspected by a qualified biologist.
    - The MBCA protects migratory birds and the nests and young of migratory birds in Canada. No clearing of vegetation should occur during the breeding bird window to prevent impacts to birds. Combining the breeding bird window with the bat roosting season (April to September; MNRF, 2015c), no clearing of vegetation should occur between April 1 and September 30 inclusive to prevent impacts to both birds and bats.

- Do not harm, feed, or unnecessarily harass wildlife.

- Manage waste to prevent attracting wildlife to the site. Effective mitigation measures include litter prevention and keeping all trash secured in wildlife-proof containers and promptly removing it from the site, especially during warm weather.

- Drive slowly and avoid wildlife.

- Manage stockpiles and equipment on the site to prevent wildlife from being attracted to artificial habitat. Cover or contain any piles of peat, fill, brush, rocks and other loose materials and cap ends of pipes where necessary to keep wildlife out. Ensure that trailers, bins, boxes, and vacant buildings are secured at the end of each workday to prevent access by wildlife.

- Check the entire work site for wildlife prior to beginning work each day.

- Inspect ESC measures and protective fence and/or other installed wildlife exclusion measures daily and after each rain event to ensure their integrity and continued function.

- Monitor construction activities to ensure compliance with the project-specific protocol (where applicable) or any other requirements.

- Enforce a speed limit of 20 km/h during the active season (April 1 to September 30) to reduce wildlife mortality.

- Manage stockpiles and equipment at the work site to prevent wildlife from being attracted to artificial habitat. Cover and contain any piles of soil, fill, brush, rocks, and other loose materials and cap ends of pipes where necessary to keep wildlife out. Ensure that trailers, bins, boxes, and vacant buildings are secured at the end of each workday to prevent access by wildlife.

- Once construction is complete and the residences are occupied, it is recommended that new residents are encouraged through signage and public education to keep pets on leash during the bird breeding season (April 1 to August 31) and reptile active season (April 1 to October 31). It is recommended that landowners be provided with educational resources about keeping cats on a leash or indoors, as cats are one of the largest threats to bird populations (Blancher, 2013).

8.0 CONCLUSION

This report provides a set of mitigation measures for employment in the design and construction of the proposed development, including additional field studies and consultation with appropriate agencies. Our assessment within this report of the potential for impacts to the natural heritage system is based on the implementation of these mitigation measures. It is our professional opinion that based on the findings to date the proposed development could proceed without imposing significant negative impacts on natural features or their ecological functions if all mitigation measures provided within this report are followed.

9.0 CLOSURE

This report was prepared for exclusive use by Caivan (Perth GC) Ltd. and may be distributed only by Caivan (Perth GC) Ltd. Questions relating to the data and interpretation can be addressed to the undersigned.

Respectfully submitted,

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10.1 Personal Communication

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Norman, B. A/Management Biologist Ontario Ministry of Environment, Conservation and Parks. Personal Communication with KAL, February 2023.

Appendix A Qualifications of report authors and contributors

Sarantia Katsaras, BA

Sarantia is a biologist with a background in terrestrial ecology, specializing in species at risk wildlife. With nine years of fieldwork experience and five years of experience in environmental consulting, Sarantia has worked closely with a range of species at risk including: Chimney Swift, Common Nighthawk, Blanding's Turtle, Eastern Milksnake, Eastern Foxsnake, and Massasauga Rattlesnake. Sarantia has a diverse background and is skilled in breeding bird surveys, reptile mark-recapture, cover board surveys, visual encounter surveys, acoustic bat monitoring, anuran call surveys, wetland delineation, and vegetation inventories. Throughout her career, Sarantia has worked across Ontario in a variety of ecosystems including tallgrass prairie in Windsor-Essex, rock barrens and peatlands along eastern Georgian Bay, and boreal forest along the north shore of Lake Superior. Sarantia holds a BA (Hons) in Environmental Studies and has completed several certifications and professional courses including the Ontario Reptile and Amphibian Survey Methods Course. She also regularly volunteers as an assistant bander at the Hilliardton Marsh Research and Education Centre banding songbirds and owls. In addition to fieldwork, Sarantia provides office support through data management, background reviews, and writing Environmental Impact Studies.

Kesia Miyashita, MSc

Ms. Miyashita has over six years of experience in environmental consulting and more than ten seasons of field experience in ecosystems in Alberta and British Columbia. During her career in environmental consulting, she has completed environmental assessments for a variety of major infrastructure projects and urban developments. Her expertise is in vascular and non-vascular plant ecology, with experience in both terrestrial and wetland ecosystems; she has performed vegetation community inventories, rare plant surveys, and weed surveys in a variety of natural environments, including native forest, urban nature preserves, grasslands, and wetlands. Ms. Miyashita joined Kilgour & Associates in May of 2021 and has since contributed to numerous Environmental Impact Statements related to property severances. Ms. Miyashita is a Professional Biologist with the Alberta Society of Professional Biologists and a Qualified Wetland Science Practitioner in the province of Alberta.

Anthony Francis, PhD

Dr. Francis is a Senior Ecologist with 20 years of consulting experience to both government agencies and private industry. He has worked on a diversity of projects relating to species at risk, invasive species, terrestrial and aquatic habitat, environmental effects monitoring and mitigation, and fate/effects of contaminants. Within each of these subject areas, Dr. Francis has completed projects addressing specific site concerns and broader policy initiatives.

In the Ottawa area, Dr. Francis helps clients work their way through the land development process by producing key supporting studies such as Environmental Impact Statements, Integrated Environmental Reviews, and by obtaining various permits and approvals from local regulatory agencies including the conservation authorities and Ministries of Environment and Natural Resources. Dr. Francis is our local in-house geomatics specialist, capable of carrying out detailed and complex analyses of geospatial data of plant and animal distribution. He often utilizes his skills to carry out constraint studies prior to a client purchasing or planning a development for a property.

Bruce Kilgour, PhD

Kilgour obtained his formal training as a biologist at the University of Guelph (BSc, MSC) and University of Waterloo (PhD). Early in his career he worked for Fisheries and Oceans Canada as Monitoring Biologist,

and subsequently with environmental consulting firms in Vancouver, Guelph, and Ottawa. Dr. Kilgour has led Kilgour & Associates Ltd. since 2008. Over his 30+ year career he has applied his knowledge and experience of natural environment systems to the full life-cycle of industrial and government projects. He is experienced in the delivery of Environmental Impact Statements in support of land developments (housing, land severance, landfill expansion). He is also experienced in Environmental Assessments under Municipal Class and Federal processes in support of proposed infrastructure and industrial facilities including dams, hydro-electric facilities, piers, roads, and other linear corridors. As part of those EIS/EA processes, he has procured, on behalf of proponents, required environmental permits and approvals, often involving the development of environmental mitigation, restoration and/or compensation strategies related to species at risk (SAR) and fish and fish habitat (i.e., HADD).

Appendix B Pre-consultation notes from the Town of Perth

TOWN OF PERTH

MINUTES

DEVELOPMENT DISCUSSION TEAM (DDT) MEETING

Held: 10:30 a.m., Thursday, November 25, 2021

Location: Virtual/Zoom

First Meeting of the DDT Regarding the Golf Course Lands – Development

Attended By:

Hugo Lalonde, Applicant Caivan; hugo.lalonde@caivan.com
Susan Murphy; Caivan; susan.murphy@caivan.com
Melissa Dedemus; Caivan; melissa.dedemus@caivan.com
Adam Fobert; David Schaeffer Engineering Limited; afobert@dsel.ca
Marc Pichette; David Schaeffer Engineering Limited; mpichette@dsel.ca
Christopher Gordon; CGH Transportation; christopher.gordon@cghtransportation.com
John Kingsley; CGH Transportation; john.kingsley@cghtransportation.com
Alex Meacoe; Gemtec Consulting; alex.meacoe@gemtec.ca
Shaun Pelkey, Gemtec Consulting; shaun.pelkey@gemtec.ca
Anthony Francis; Kilgour and Associates; afrancis@kilgourassociates.com
Jocelyn Chandler; JFSA; jchandler@jfsa.com
Nadia De Santi, WSP; nadia.de-santi@wsp.com
Bradley Wright, Director of Development Services; development@perth.ca
Shannon Baillon, Director of Community Services; sbaillon@perth.ca
Grant Machan, Director of Environmental Services; gmachan@perth.ca
Brian Gass, Chief Building Official; cbo@perth.ca
Trevor Choffe, Fire Chief; firechief@perth.ca
Michael Touw, CAO; cao@perth.ca
Phil Mosher, Rideau Valley Conservation Authority; phil.mosher@rvca.ca
Sarah MacLeod-Neilson, Rideau Valley Conservation Authority; sarah.macleod-neilson@rvca.ca
Allison Gaudaur, Recording Secretary; dpsadmin@perth.ca

Presentation – Hugo Lalonde, Caivan Team

HL began the presentation acknowledging the Town's Infrastructure Master Plan (IMP), Official Plan, and Transportation Plan.

The Golf Course Lands are near the historic downtown core of the Town of Perth within a walkable distance to many amenities.

The initial phase of development will preserve the historic 9-hole golf course.

The proposed development plans were shared with the group. Identified access to the lands via the existing Peter St Bridge with a proposed bridge to the north connecting to the County lands, and the wetlands to the south. The intention is to ensure the river accessible.

There is a plan to repurpose the clubhouse to offer more services within the clubhouse including a spa, restaurant, and rental rooms available to the public. Still in the exploration phase.

Identified the collector spine of the subdivision in the center with another collector spine to the north onto county land along with a series of trails and ponds throughout the property.

The lot mix and lot size are yet to be determined. It is expected to be urban type densities.

BW inquired if all the proposed dwellings were to be single family homes.

HL indicated that a mix of single-family homes, townhouses and back-to-back town houses are in the initial scope of plans. Affordability is prevalent. Lot widths are yet to be determined 35-50 feet anticipated.

BW clarified the housing density split; 60-65% low density, 15-20% medium density, and 10-20% high density. Up zoning the lands to R4 could increase the potential for affordable housing. The Lanark County 2019 homelessness study identified a current need for 1000, 1-bedroom homes across the County. This is a missing component of the plans to date. The Council of the Town of Perth have concerns over affordable housing issues. The average income for residents of the town of Perth is the second lowest in the County.

HL Affordable housing is not something that has been looked at.

Planning a submission of a draft plan of subdivision in February or March of 2022.

Engineering Geo Tech: Adam Fobert (DSEL) presented next.

Reviewed the Town's IMP and would like to expediate the Town's infrastructure improvements with upgrades to the water intake and provide a water tower.

Identified two potential SWM ponds potentially discharging into the wetlands. Contemplated a third pond that would potentially discharge to the Tay River below the water intake.

Surveyed the existing system and noticed that pipes are at or near capacity. Cockburn pump station was at or near capacity from their survey. Considered two wastewater pump stations on site but costs were high. Based on the concept plan, this can get down to one pump station. Looking at a route that will go down Rogers Road into the existing sewers that service the industrial lands south of South Street. Investigating capacity issues. First route goes through the existing residential neighbourhood. Alternate route would be further south through the easements in the industrial lands.

Would like to know what needs to be done to get the first homes off the ground. Would like to talk to the Fire Chief about interim firefighting supplies to the site with the possibility of dry hydrants connected to the river.

The Fire Chief is open to discussions but requires more information.

GM made the developer aware of the redevelopment of Highway 7 in 2025/2026. There may be an option of a loop feed of the water and a proposed water tower north of highway 7. Wanted to know the commitment of a water tower at this location.

There may also be an option of a loop feed possibility with the proposed retirement home to be developed on Lanark County lands on the other side of the river.

The Director appreciated the one central location for the pump station.

Looking forward to the two options either through the subdivision or the Albany easement.

Looking at expanding the SAGR to the fifth and final cell. Going to apply the stormwater treatment grant to wastewater to allow wastewater to service 10,500 people. Will not upgrade unless there are serious capacity issues.

Caivan is willing to engage and work with the town to include the Town's water demands in the water modelling exercise.

HL – JD Barnes has flown the site and they have detailed topography of the Town. LiDaR information will be provided to the Town.

It was noted that the Development Charges (DC) By-law does not fully cover the golf course lands. It is understood that this is to be done in the near to medium timeframe.

BW indicated that an updated DC By-law is in the budget for 2022. Further information on water, sanitary, transportation etc. will provide cost estimates and further information to feed into DC by-law.

AF - stormwater management will flow potentially into the Tay River and Grants Creek. Investigating feasibility for LIDs for IEP and would like feedback from RVCA.

PM – LIDs supported by RVCA.

Transportation Christopher Gordon; CGH Transportation presented next.

CG – Preparing a Transportation Impact Study (TIS). Looking for some reports that were included in the Infrastructure Master Plan (IMP). Wants to know how the information was analyzed in the IMP. Mix of units that will be part of the development will make recommendations compared against the IMP. Propose using the existing bridge and determine the requirements for the proposed bridge. Location of the second crossing makes sense to a roadway that diverts the traffic from the historic downtown area. TIS will look at internal subdivision roads and what will be constructed for active modes of transportation.

HL – would like to streamline the process using Nadia De Santi as project manager and she will be making requests to the Town. Try not to create confusion and duplication of requests. Requested timeline for receiving information.

BW – a timeline will be provided next week (November 29 – December 3) for addressing data requests.

HL – standard cross sections of the town road widths 16.75, 20, 24. Plan for active transportation, sidewalks, setbacks, etc. Please send information as soon as possible

GM – provided some background information on the Peter St Bridge. It was built as a recreation bridge. In 2008 put on a new deck. Running construction equipment over this bridge is a concern. Will need to evaluate the structure capacity of this bridge. This will be a critical part of the traffic study. Challenges with width and capacity.

The Developer requested design drawings for the bridge. GM to provide.

HL – bridge considerations for other locations. Has there been any development planned for the Tayview property north of the Tay River?

PM – offered an idea would it be possible to access the property from the west through Tay Valley to connect to Ernest Way to avoid the river crossing.

HL - Will investigate options to the West.

Town response that Tayview lands to the north have had enquiries but no serious consultation or application. No updates on bridge crossings there.

HL – would like to advance the off-site infrastructure as much as possible to reduce the time between application and construction. Start designing and construction with draft plan review registered and serviced.

NDS – would like to combine Environmental Assessment (EA) process with any other public meetings together into one consultation.

HL – Proposal is to develop all the residential golf course lands as shown on schedule A from the Comprehensive Zoning By-law. Waiting for a comprehensive County review that will facility additional population growth for phase 2.

BW – Town is interested in pursuing population growth to 10,500. This will not be updated at this time in the Official Plan as 8,850 is the population target in the existing County plans. Council is aware of the potential growth. Plans are in place for all greenfield development in town.

HL – will include everything for the first phase of the development plan. Who will be reviewing the detailed engineering work?

GM – will have external review done.

Environmental: Tony Francis; Kilgour and Associates presented next.

TF – Ecological Land Classification (ELC) mappings, forest, field, swamp etc. with a few more areas to review. A few small channelized features encountered. Headwater Drainage Feature Assessment (HDFA) will need to be completed. Several golf course ponds in the area. Completed surveys around the site. Turtle study around the ponds. Bat monitoring stations identified with very little browns. Frog surveys have been done and will do more next year especially where the crossings are. Extensive bird study completed across the site with no whippoorwill on site. Potential snake habitat for the grey rat snake.

HL – servicing requirements, bridge, sanitary, crossing the Tay are on the to do list. Will compile a comprehensive list to capture everything.

TF – Will have appropriate setbacks to protect sensitive areas.

PM – Constraints to be mapped out first then the development. Integrate all studies: water budget, Environmental Impact Statement (EIS), Hydrological Impact Statement (HIS) or hydrological investigations and SWM to develop in a holistic way.

TF – acknowledged constraints will be mapped out clearly.

JC - Hazards and biological components need to layer in.

BW – requested the geospatial data to date to have in the Town system to overlay into our data layers.

It was noted that there is a need to get further studies completed and shared.

BW – in 2020 there was a Site Alteration and Tree Conservation by-laws to be aware of.

HL – the IMP set storm water management flows.

JC – how to obtain information and the approvals process.

Hydrogeology Alex Meacoe; Gemtec Consulting presented next

Site boundary has changed since preliminary investigation. Mapped the bedrock surveyed the contours. Advancing bore holes at 150m spacing. Bedrock coring to determine the strength of the bedrock. Monitoring wells for groundwater. Peter St and Rogers Road 75m spacings going along the length of the alignment. Bedrock depths, testing strength for excavation surfaces for monitoring wells.

Bridges – Rogers Road to Cockburn and beyond to South St and beyond wait until further design has occurred. Requires additional investigation.

SP – Permit to Take Water (PTTW) required for infrastructure extending below groundwater. 8 boreholes to be monitored from the time of installation and into next year. A number of monitors will be installed in the bore holes with data monitors to get a good idea of where the water table is throughout the development and along the proposed sewer grades.

Water samples will be taken to look at water chemistry.

Town to provide contaminated sites -GM. They will adjust locations to collect those samples to provide guidance to a contractor to install this infrastructure. GM – send any information requests to BW and GM will respond.

Monitoring wells to assess long term impacts, will do hydraulic testing to determine permeability of the rock and radius of influence

Look at water budget for the site. Mostly bedrock – boreholes will give an idea of soil stratigraphy.

Provide a geological framework model to understand the bedrock/groundwater system.

JC – studies relate to both construction and maintaining environmental natural heritage system. Will require wells in the wetland to get data on how the wetland is operating and will require vegetation removal. Does RVCA agree to the invasive approach or would RVCA prefer they stay on the periphery.

There was a request for how many wells?

SP – two locations. Shallow well depending on what they find and a slightly deeper one to determine discharge or recharge conditions.

PM - Leave with Phil and he will get back in a week.

AM – would like to start before Christmas depending on how the locates go.

JC – Gemtec is working on a Terms of Reference (TOR) set out with the RVCA around what work they are going to undertake with this development within the wetlands. Want to know what information or other documents RVCA might recommend for review. PM to follow-up on this.

Looking for Approval of site alterations within 120m of the wetlands. Want to provide all the studies required. Clarify the wetland boundaries, not looking at any remodeling of the Tay River or Grants Creek.

PM – asked about 2-D modelling.

JC – indicated that 1-D modelling will be used and 2-D modelling if needed only on the subject lands.

JC – There will be no development done on land that is flood susceptible.

There was a request for a list of submission requirements for the subdivision.

A draft list will be provided.

NDS – made a comment regarding the 3 original golf holes. Would the town require any cultural heritage surrounding these 3 holes? What are the Town's thoughts on the original holes?

BW – will investigate the heritage designation and get back to them.

NDS – wanted to know about urban design guidelines.

BW – will provide what the Town is looking for.

A discussion took place around servicing solutions with Ms. De Santi being the point contact for the project and Mr. Wright for the Town of Perth. Yet to be determined frequency of meetings to follow up with requests for information and discuss potential topics requiring additional information. Mr. Wight and Mr. Mosher to discuss and get back to Ms. De Santi next week.

NDS – wanted to know if Lanark County accepts digital submissions. Can the re-zoning be done with the town at the same time the draft plan of subdivision is with the County?

BW – Town submissions may be digital or in hard copy. Payment methods include cheque, credit card, and cash

NDS – wanted to know the Town and County timelines for approvals.

BW – Town's approval timelines are faster than the County's. Process depends on when the application comes in. Review takes a minimum of 1 – 2 weeks, it then goes to the Planning Advisory Committee once the appropriate notice requirements have been met. The following month it will go to the Committee of the Whole followed by Council approval later the same month.

NDS – would like to do joint applications with the County and the Town. Wanted to know if Ms. Stewart from the County could be part of theses meetings.

BW – indicated for Ms. De Santi to contact Ms. Stewart regarding the County's meeting attendance.

PM –Lots of legitimate constraints that can be documented. Concept is conceptual at present and requires more detail from the studies. The natural hazards and natural heritage features need to inform the development layout. Based on the concept today,

there appears to be development within the flooding hazard which should not occur. Have a further meeting to inform a TOR.

JC – Ms. De Santi will manage the conventional land planning application, rational, etc. The natural features and natural hazards will be with Ms. Chandler and will keep Ms. De Santi in the loop.

PM – wanted to have an idea of numbers of units planned.

HL – suggested a yield of 600 singles. There would be townhouses as well. Potentially 800 – 850 units. Will require more time to finesse the mix and the ratios then breakdown for Phase 1. Looking at the area that is currently designated residential and working within the 20-acre parcel. Phase 1 is looking at 150 – 200 units to account for lot types.

GM – number of phases?

HL – this is still being sorting out. The phasing size is anticipated to be 150 – 200 unites per phase. About 4 phases to use as a baseline.

BW –

- direction for greenfield development requires a secondary plan in place, this informs a secondary master plan. Provides planning rational for zoning amendment.
- Housing density, mixed housing, affordable housing. Need for mixed use and commercial use for this community including 10 – 20 businesses. Interested in providing 2 – 3 storey mixed use development.
- OP Policy guideline is to maintain the grid layout of the town.
- Parkland dedication by-law. Incorporate parkland into the concept plan. Ensure active trails and parkland associated with new development
- Looking at a financial impact study when low density is involved.
- Employment opportunities.
- Offering more residential opportunities, incorporate mixed use with commercial, affordable housing and urban design ideas.
- Sustainable design linkages of natural heritage features protected.
- Looking for complete communities, balancing accessibility, and active transportation.
- Trying to meet the PPS.

NDS – questioned the need for a secondary plan.

BW – A secondary plan must be completed. Greenfield development will require a secondary plan, infrastructure master plan, DC by-law. Facilitate good land use planning with the limited greenfield lands remaining in the town.

Meeting concluded at 12 noon.

Katherine Black <kblack@kilgourassociates.com>

RVCA FW: Golf Course Lands Scoping Discussion points

1 message

Jocelyn Chandler <jchandler@jfsa.com> Mon, Dec 13, 2021 at 3:44 PM
To: Bruce Kilgour <bkilgour@kilgourassociates.com>, Katherine Black <kblack@kilgourassociates.com>, Jonathon Burnett <jburnett@jfsa.com>, Christopher Gordon <christopher.gordon@cghtransportation.com>, Adam Fobert <AFobert@dsel.ca>, Steve Pichette <SPichette@dsel.ca>, Shaun Pelkey <Shaun.Pelkey@gemtec.ca>, Andrius Paznekas <andrius.paznekas@gemtec.ca>, Alex Meacoe <alex.meacoe@gemtec.ca>, "slivingstone@geocentric-env.com" <slivingstone@geocentric-env.com>
Cc: "De Santi, Nadia" <Nadia.De-Santi@wsp.com>, Hugo Lalonde <hugo.lalonde@caivan.com>

Hello there PerthGolf team,

Please find attached and below the RVCA comments/docs that respond to the initial scope documents they reviewed as part of the PERTH DDT meeting.

No real surprises except the discouragement of bed rock blasting, and the direction to use the runoff volume retention method.

I'll follow up with you each individually later this week or immediately in the new year. (except CGH who I think Nadia and Hugo will be working with).

j

From: Phil Mosher <phil.mosher@rvca.ca>
Sent: December 13, 2021 1:23 PM
To: Jocelyn Chandler <jchandler@jfsa.com>; Director of Planning <development@perth.ca>
Cc: Martin Czarski <martin.czarski@rvca.ca>; Jennifer Lamoureux <jennifer.lamoureux@rvca.ca>; Ferdous Ahmed <ferdous.ahmed@rvca.ca>; Brian Stratton <brian.stratton@mrsourcewater.ca>; Glen McDonald <glen.mcdonald@rvca.ca>; Evelyn Liu <evelyn.liu@rvca.ca>
Subject: FW: Golf Course Lands Scoping Discussion points

Hi Jocelyn and Bradley,

Could one of you please ensure that this is forwarded to Nadia (and any other relevant individuals)? I don't have Nadia's e-mail address.

Based on the preliminary information provided in the scope of work, our office has the following comments. Please let me know if there are any questions upon your review. Feel free to circulate to others as needed.

Generally:

- A constraints map, using information derived from relevant reports/studies, should be one of the first things produced. Once such a map is available, it will help our office review any potential future layouts of roads, dwellings and amenities to determine that these elements are consistent with the original IMP and recommendations of updated reports or studies.
- Stormwater management should not default to end-of-pipe treatment systems. Please see additional comments below. While ponds may ultimately be needed, a treatment train approach which prioritizes LID storm infrastructure as per MECP guidance is required.
- Outlets to the Tay River or Grants Creek will need to be carefully controlled with no SWM or sanitary bypass outletting upstream of the Town's Water Intake Supply.
- Extreme caution should be exercised with bedrock blasting, if needed at all. There is potential to negatively impact the groundwater system within a very unique ecological environment.
- We would be pleased to comment on more fulsome Terms of Reference when they are available.

Regarding DSEL's scope of work, please note:

- The item entitled "Preliminary stormwater facility sizing, general layout, and locations" should be updated to "Preliminary stormwater management design, including distributed Low Impact Development measures"

Regarding CGH's Technical Memorandum, please note:

- A 5th option which may be viable would be extension of the road network through Tay Valley Township and connecting to Ernest Way.

Regarding Hydrologic Impact/Hydrogeology, please note:

- The water budget, HIS for the wetland, and part of the hydrogeological study should not be distinct investigations. These should be included in an *integrated hydrological impact assessment* for the full site. The interpretations and findings must be aligned with the EIS interpretations and findings.
- The above assessment should produce water budget and runoff volume and water quality control targets (location, type, amounts) to maintain all aspects of the site's natural hydrological functions (storage, retention, infiltration, evapotranspiration, filtration, flow to wetland etc.) This should result in a LID / Green Infrastructure approach to stormwater servicing which results in a distributed treatment train approach.
- Legitimate constraints (shallow bedrock, contaminated areas, natural features, etc.) should be documented in the *Integrated Hydrologic Impact Assessment*
- The runoff volume retention method is recommended.
- The proposed borehole location layout seems reasonable.

Regarding Kilgour and Associates Technical Memorandum:

- The scope of works appears to be appropriate. We will be looking for recommendations which uphold and build upon original commitments made by the Town in the IMP. While 30 metre setbacks from the Grants Creek PSW were originally specified in the IMP, there may be instances where that distance should be increased, based on nearby natural heritage features or wildlife habitat.
- The significance of the woodland should also be considered and evaluated as part of this work. It is noted that a specific commitment from the IMP is that of a tree preservation plan.
- Any HDFA will need to be prepared in accordance with accepted methodologies. Specifically, please have regard for the following documents, copies of which have been attached (Jennifer Lamoureux has also included an e-mail with additional information):
  - Headwater Drainage Features Assessment Guideline
  - Headwater Drainage Features literature review highlighting the importance and value of HDFs
  - OSAP protocol S4M11 to be applied to complete the HDFA
  - Tay River Fish Habitat Plan 2003

Regarding JFSA's Briefing Memo:

- The JFSA memo just mentions 'site specific floodplain hazard extents' without any more detail. It would be helpful to know how the floodplain hazard extents will be delineated.
  - The extent of the Tay River floodplain on this site has been identified by our office and all development is to be located outside the floodplain. If the proposed work would question the accuracy or validity of the floodline, further discussion should occur regarding appropriate approach to be used.
- Any proposed hydraulic analysis on a potential bridge will include demonstration on no impact to upstream water levels or the creation of adverse impacts. This would include, but not be limited to, not affecting the function of the Haggart flow split as well as the WSC gauge at Perth.

Phil Mosher

Planner RPP, MCIP

phil.mosher@rvca.ca, 613-692-3571 x 1181 (Manotick) 613-812-1497 (Cell)

RVCA COVID-19 UPDATE: The health, safety and well-being of our clients and staff is our top priority. Our offices and facilities are closed to clients. Staff are working remotely and we do not anticipate any service disruptions. Visit www.rvca.ca/covid-19 for more.

Rideau Valley Conservation Authority

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** Caution : External Email /// Attention : Courriel externe **

---------- Forwarded message ----------
From: Jennifer Lamoureux <jennifer.lamoureux@rvca.ca>
To: Phil Mosher <phil.mosher@rvca.ca>
Cc:
Bcc:
Date: Thu, 2 Dec 2021 13:47:59 +0000
Subject: Tay River Golf Course Lands - Perth HDFA Comments

Good Morning Phil,

Thank you for the meeting yesterday regarding the proposed development on the golf course lands in Perth. Our desktop review of the RVCA Geoportal indicates that there are headwater drainage features within the study area. In addition, based on our experience many headwater drainage features are unmapped so a thorough investigation of the site will be required. The following is important information for proponents.

I have attached the following documents:

- Headwater Drainage Features Assessment Guideline
- Headwater Drainage Features literature review highlighting the importance and value of HDFs
- OSAP protocol S4M11 to be applied to complete the HDFA
- Tay River Fish Habitat Plan 2003

Headwater drainage features (HDFs) provide a multitude of ecological and hydrological functions such as recharge, discharge, infiltration, and the provision of food, water, sediments, nutrients, organic matter, and energy to downstream reaches. HDFs can provide aquatic and terrestrial habitats. The importance of maintaining HDFs on the landscape is accentuated by the fact that the largest portion of a stream or river's flow may be generated by the collective contributions of HDFs. HDFs are increasingly coming under pressure for alterations in form of relocation, removal, channelization, channel lowering, ditching, piping, flow diversion, tile drainage, terracing, etc. The functional attributes that are evaluated include hydrology (surface and groundwater), riparian conditions, terrestrial and aquatic habitat. The Conservation Authority has an interest in the preservation of HDFs, recognizing their important functions for watershed health and diversity. It is critical to understand existing conditions and their values before any proposed modifications.

The following policies apply in this regard:

1. Applications to potentially alter HDFs shall be assessed in accordance with the document titled "*Evaluation, Classification, and Management of Headwater Drainage Features Guideline. Toronto and Region Conservation Authority and Credit Valley Conservation, TRCA Approval July 2013 (Finalized January 2014).*
2. The applicant shall pre-consult with the Conservation Authority to ensure that the scope and timing of the evaluation are appropriate for the scale/type of the proposal, availability of information for the features, and the sensitivity of the features.
3. The evaluation of HDFs shall include collecting information that may be available in a watershed or subwatershed plan, catchment reports, an environmental management plan, fisheries management plan, etc.

The catchment reports for the Tay River – Town of Perth and Grant Creek should be consulted as important background information that can inform the project design.

https://watersheds.rvca.ca/subwatersheds-reports/tay-river/catchment-reports-tay-river/191-tay-river-town-of-perth/571-full-catchment-report

https://watersheds.rvca.ca/subwatersheds-reports/tay-river/catchment-reports-tay-river/186-grants-creek/228-grants-creek-catchment-report

In order for the Conservation Authority to issue future permits under the *Conservation Authorities Act* the guideline provides a consistent methodology to evaluate, classify and provide a management action for all HDF's. The results from the management classifications for HDF will inform what future permits are necessary and how best to manage them based on their function.

Detailed information pertaining to future in-water work and alterations to headwater features will be required for review by RVCA.

- channel modifications/realignments
- stormwater/discharge outlets
- flow diversions or alterations
- Other alterations not yet identified

I hope this is helpful.

Jennifer

Jennifer Lamoureux

Aquatic and Fish Habitat Biologist

Ext. 1108

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9 attachments

HDFA-final_2014.pdf
729K

Headwater Drainage Features Literature Review-March 2007.pdf
1525K

S4M11 v10 0428.pdf
1464K

Tay River Fish Habitat-final-2003.pdf
1790K

HDFA-final_2014.pdf
729K

Headwater Drainage Features Literature Review-March 2007.pdf
1525K

S4M11 v10 0428.pdf
1464K

Tay River Fish Habitat-final-2003.pdf
1790K

Tay River Golf Course Lands - Perth HDFA Comments.eml
7611K

Appendix C Pre-consultation notes from the County of Lanark

Pre-Consultation Meeting Notes - Perth Golf Course - Caivan

Virtual zoom meeting – January 14, 2022

In Attendance

Julie Stewart, Lanark County
Michelle Mahon, Lanark County
Terry McCann, Lanark County
Adam Fobert, David Schaeffer Engineering Ltd
Kyle Larmour, WSP
Christopher Gordon, CGH- Transport
John Kingsley, CGH Transport
Marc Pichette, DSEL Civil
Phil Mosher, RVCA
Sarah Macloed-Neilson, RVCA
Jocelyn Chandler, DSEL
Nadia De Santi, WSP
Grant Machan, Town of Perth
Trevor Choffe, Town of Perth
Michael Touw, Town of Perth
Brian Gass, Town of Perth
Tracy Zander, Representing Perth
Hugo Lalonde, Caivan

Hugo introduced the project, in summary:

- Potential of re-purposing existing clubhouse.
- Recognize the 9 hole golf course and the original 3 holes.
- A mix of single-family homes, townhouses and back to back townhouses are proposed.
- 650-800 units will be phased.
- Referred to current studies underway.
- Phase 1 within OP residential designation.

Julie Stewart added the County is proposing to initiate the review of population projections later in 2022, as per County Council's commitment to review in 5 years.

Tracy Zander asked if the studies and reports are for the whole site as a Master Plan ?

Hugo stated that the reports will address the site as a whole.

Town and County staff will coordinate the list of required studies/reports for submission and will provide the compiled list.

Christopher Gordon, looking for the previous traffic study.

Grant noted that he will see if he can obtain a copy and provide to CGH.

Terry McCann mentioned design work would be required where the road reaches the County property because of the existing buildings and parking lot. Setbacks to be addressed.

The road is also located within Tay Valley so coordination would have to happen with the Town, County and Tay Valley. Terry McCann is the main contact.

Hugo noted that the locations on the concept plan were derived from the Infrastructure Master Plan. They can revisit alignment as part of the traffic impact study

Shannon Baillon will forward the proposed extension of the Tay River trail system as pedestrian crossing which will have to be incorporated into the road design.

Nadia proposed bi-weekly meetings with the hope of submission in February, which Town and County staff will discuss availability

Adam Fober provided an update on the engineering work and that they are working with Stantec to update the IMP. In summary, proposing 3 stormwater management ponds, examining capacity and a water model.

Grant noted the need for a conversation around contributions required for an elevated water tower as well as the Town's plan for an expansion of the lagoon with the 5th SAGR system. Town staff can work with the civil engineers.

Nadia mentioned some discrepancies with the OP mapping.

Julie will coordinate a meeting with the Planners to discuss the Official Plan mapping and policies.

LANARK COUNTY

PLANS OF SUBDIVISION

PRE-CONSULTATION – checklist – Perth Golf Course

Report	Comments	Required Yes/No
Planning Rationale	Include justification Must have regard for PPS Lanark County Official Plan compatibility Local Official Plan compatibility Address OPA # 16	Yes Yes Yes Yes Yes
Hydrogeological Study, Terrain Analysis	Availability and suitability of water and waste water MOE – D-5-4 Guidelines MOE – D-5-5 Guidelines ODWSOG Checklist Summary & Sign-off Integrated Hydrologic Impact Assessment	Public Yes Yes
Environment Impact Study	SAR & Significant Habitat Wetlands Organic Soils Natural Heritage Features & Systems Significant Wetlands Significant Woodlands Significant Valleylands Significant Wildlife ANSI Fish Habitat Headwater Drainage Feature Assessment	Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes
Servicing Options Statement	Guidelines – MOE D-5-3	Yes
Stormwater Drainage Plan	Guidelines - MOE-2003 / MNR-2001 Checklist Summary & Sign-off	Yes
Grading Plan	Sloping land within lot to direct flow of surface water away from foundations & abutting properties.	Yes

LANARK COUNTY

PLANS OF SUBDIVISION

PRE-CONSULTATION – checklist – Perth Golf Course

Report	Comments	Required Yes/No
Sediment and Erosion Control Hazardous Sites	Flooding, erosion hazard Slope and Soil Stability Organic Soils Karst Topography	Yes Yes Yes
Archeological Investigation	Standards & Guidelines	Yes
Tree Preservation Plan or Tree Conservation Plan	Check with local municipality	
Other	**SEE ATTACHED Compiled List of Other Information / Study / Report Requirements**	
Draft Plan	To include: Planning Act 50(17) Ont. Reg. 544/06 Lot and block configuration Compatibility with adjacent uses Road access, street layout & Pedestrian amenities Parks & Open Space amenities Easement and right-of-way requirements	Yes

Compiled list of Other Information / Study / Report Requirements for the Perth Golf Course Lands

(Refer to the Standard County of Lanark Pre-Consultation Checklist as well)
Prepared By: County of Lanark and Town of Perth and RVCA

January 2022

Master Plan for the entire development.
Master Plan should include phasing plans and details of phases.

Bridge Assessment / Capacity Study

- impacts and review of capacity for existing Peter St bridge.
- consideration of alternate bridge on North St with traffic flows off of Peter Street, migration of lights from Foster St or potentially west into Tay Valley connecting to Ernest Way.
- triggers for 2nd bridge
- access to Tay Valley lands.
- Location, design and setbacks on County lands and use of existing County driveway and parking area.
- Developer to evaluate the crossing and determine when such would be required.
- Any proposed hydraulic analysis on a potential bridge will include demonstration of no impact to upstream water levels or the creation of adverse impacts. This would include, but not be limited to, not affecting the function of the Haggart flow split as well as the WSC gauge at Perth.

Water Supply (Provision of water supply)

- triggers and requirements for new elevated water tank
- improvements to pumping capacity at WTP

Stormwater design

- confirmation of minimal ponds
- outfalls downstream of WTP Intake Protection Zone
- Demonstrate low impact development measures which prioritize a treatment train approach in accordance with the MECP Stormwater Manual
- Confirmation of enhanced water quality treatment or better

Sanitary

- upfront installation
- triggers for capacity at wastewater treatment facility (when to construct 5th cell)

Cultural Heritage Assessment for the Golf Course.

Geotechnical Study

Integrated Hydrological Impact Assessment

– to provide a water budget and runoff volume and water quality control targets

- maintain all aspects of the site's natural hydrological functions (storage, retention, infiltration, evapotranspiration, filtration, flow to wetland, etc.)
- This approach should result in a LID / Green Infrastructure approach to stormwater servicing resulting in a distributed treatment train approach.
- Legitimate constraints (shallow bedrock, contaminated areas, natural features, etc.) should be documented
- Runoff volume retention method is recommended
-

Environmental

A constraints map, using information derived from relevant reports/studies, should be one of the first things produced.

Floodplain

- All development is to be located outside the floodplain as per provincial policy. If the proposed work would question the accuracy or validity of the floodline, further discussion should occur regarding appropriate approach to be used.
-

Wetlands

Fish Habitat

EIS

Hydrological Impact Statement or hydrological investigations

Water budget

- all environmental studies should be integrated in a holistic manner

Headwater Drainage Features Assessment

Significance of woodland should be considered and evaluated

The Infrastructure Master Plan made specific mention of a tree preservation plan

Reference to the meeting minutes from the Town of Perth and the County of Lanark and the Standard County of Lanark Checklist is required.

Appendix D Species at risk information request to MECP and response

Kilgour & Associates Ltd.
Environmental Consultants

May 18, 2021 **Our File: CAIV 1193.1**

Carolyn Hann
Management Biologist
Permissions and Compliance Section
Ontario Ministry of Environment, Conservation and Parks
10-1 Campus Drive
Kemptville, ON
K0G 1J0

Reference: Species at risk information request for the Perth Golf Course

Ms. Hann:

1.0 INTRODUCTION

This letter provided by Kilgour & Associates Ltd. (KAL) is a request for information relating to the potential presence of species at risk (SAR) near the Perth Golf Course located at 141 Peter Street, Perth, Ontario ("the Site"; Figure 1). This letter includes a desktop review of SAR occurrence records in the vicinity of the Site using the resources and guidelines outlined in the draft document, *Client's Guide to Preliminary Screening for Species at Risk* (Ministry of the Environment, Conservation and Parks (MECP), 2019). We (KAL) are seeking confirmation from MECP regarding the list of SAR that may occur on or near the Site. Potential impacts to SAR will be assessed via an Environmental Impact Study that we will be preparing for our client. If impacts to SAR are anticipated, we will recommend that our client notifies MECP and engages in consultation to further consider potential impacts, avoidance and/or mitigation measures, and whether the project may require an authorization under the *Endangered Species Act* (ESA).

1.1 Site Overview

The Site is approximately 141 ha in size and is dominated by open greens and fairways associated with the existing golf course, deciduous swamp of Grants Creek Provincially Significant Wetland, deciduous forest, and cultural meadow (Figure 1). The Site is bounded by the Tay River to the north and east, and Grants Creek and Grants Creek Provincially Significant Wetland to the south. The Site also contains two tributaries to the Tay River, a tributary of Grants Creek, floodplain of the Tay River and Grants Creek, and several patches of unevaluated wetland.

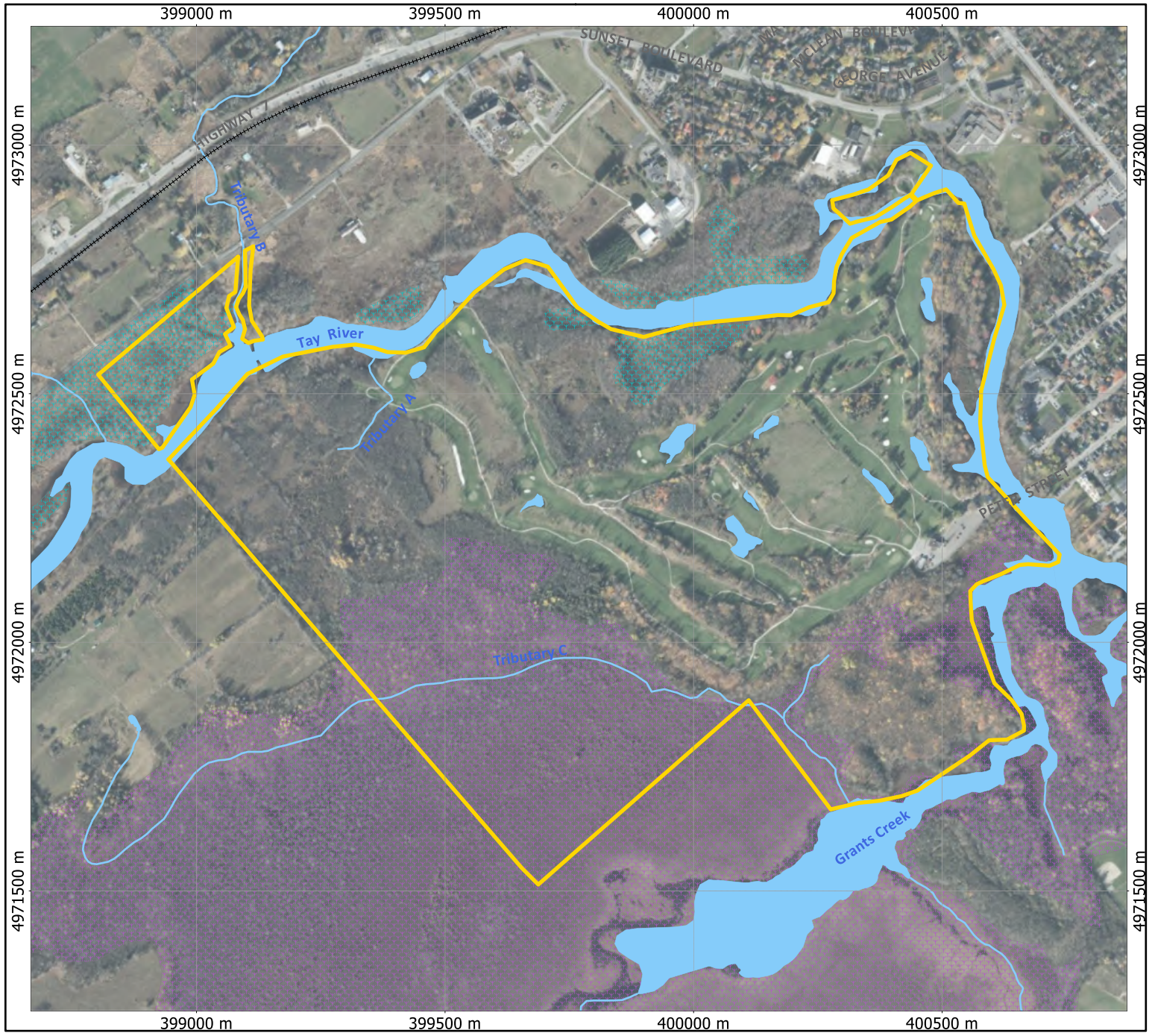


Figure 1 Map showing location context for the Site

Legend

- Site
- Provincially Significant Wetland
- Unevaluated Wetland
- Water

N

0 400 m

Project: 1193
Created By: RH
Checked By: KB
Universal Transverse Mercator - Zone 18 (N)
Printed on: 2021-04-28

KILGOUR & Associates

2.0 SPECIES AT RISK RESOURCES REVIEW AND RESULTS

We reviewed the following desktop resources to determine SAR occurrences on and/or near the Site.

- *Environmental Impact Statement Perth Golf Course Community Concept* (McIntosh Perry, 2012)
- Aquatic Species at Risk Map (DFO, 2019)
- Ontario Ministry of Natural Resources and Forestry (MNRF):
    - Natural Heritage Information Centre (MNRF, 2021a)
    - Land Information Ontario Provincially Tracked Species Grid Detail (MNRF, 2021b)
    - *Recovery Strategy for the Little Brown Myotis (*Myotis lucifugus*), Northern Myotis (*Myotis septentrionalis*) and Tri-colored Bat (*Perimyotis subflavus*) in Ontario* (Humphrey & Fotherby, 2019)
    - *Recovery Strategy for the Eastern Small-footed Myotis (*Myotis leibii*) in Ontario* (Humphrey, 2017)
- Rideau Valley Conservation Authortiy (RVCA):
    - *Tay River Subwatershed Report: Grants Creek Catchment* (RVCA, 2017a)
    - *Tay River Subwatershed Report: Glen Tay Catchment* (RVCA, 2017b)
- Species at Risk in Ontario (MECP, 2021)
- Species at Risk Public Registry (Government of Canada, 2021)
- Atlas of the Breeding Birds of Ontario 2001-2005 (Bird Studies Canada et al., 2009)
- Herp Atlas (Ontario Nature, 2019)
- iNaturalist (California Academy of Sciences and National Geographic Society, 2021)
- eBird (Cornell Lab of Ornithology, 2021)
- Bumble Bee Sightings Map (Bumble Bee Watch, 2021)

- *COSEWIC Assessment and Update Status Report on the American Ginseng* Panax quinquefolius *in Canada* (Committee on the Status of Endangered Wildlife in Canada (COSEWIC), 2000)

The results of the SAR desktop review are indicated in Table 1. Note that occurrence data in Table 1 from the Natural Heritage Information Centre (MNRF, 2021a), Land Information Ontario (MNRF, 2021b), eBird (Cornell Lab of Ornithology, 2021), and iNaturalist (California Academy of Sciences and National Geographic Society, 2021) are occurrences within ~5 km of the site. SAR occurrence data from the Atlas of the Breeding Birds of Ontario (Bird Studies Canada et al., 2009) and Herp Atlas (Ontario Nature, 2019) are based on the 10 x 10 km Atlas squares that the Site falls in (18UQ97 and 18VQ07).

Table 1 List of species at risk with potential to occur on or near the project site based on our desktop review

Species Name (*Latin name*)	Information Source
Birds	
Bank Swallow (*Riparia riparia*)	Bird Studies Canada et al. (2009)
Barn Swallow (*Hirundo rustica*)	Bird Studies Canada et al. (2009), McIntosh Perry (2012a), California Academy of Sciences and National Geographic Society (2021), MNRF (2021b)
Black Tern (*Chlidonias niger*)	MNRF (2021b)
Bobolink (*Dolichonyx oryzivorus*)	Bird Studies Canada et al. (2009), RVCA (2017b), MNRF (2021a,b)
Chimney Swift (*Chaetura pelagica*)	Bird Studies Canada et al. (2009), McIntosh Perry (2012a), California Academy of Sciences and National Geographic Society (2021), Cornell Lab of Ornithology (2021)
Common Nighthawk (*Chordeiles minor*)	Bird Studies Canada et al. (2009), Cornell Lab of Ornithology (2021)
Eastern Meadowlark (*Sturnella magna*)	Bird Studies Canada et al. (2009), RVCA (2017a,b), California Academy of Sciences and National Geographic Society (2021), Cornell Lab of Ornithology (2021), MNRF (2021a,b)
Eastern Wood-pewee (*Contopus virens*)	Bird Studies Canada et al. (2009), McIntosh Perry (2012a), California Academy of Sciences and National Geographic Society (2021)
Evening Grosbeak (*Coccothraustes vespertinus*)	Cornell Lab of Ornithology (2021)
Golden-winged Warbler (*Vermivora chrysoptera*)	Bird Studies Canada et al. (2009), MNRF (2021a)
Grasshopper Sparrow (*Ammodramus savannarum*)	Bird Studies Canada et al. (2009)

Species Name (*Latin name*)	Information Source
Olive-sided Flycatcher (*Contopus cooperi*)	Bird Studies Canada et al. (2009)
Short-eared Owl (*Asio flammeus*)	Bird Studies Canada et al. (2009)
Wood Thrush (*Hylocichla mustelina*)	Bird Studies Canada et al. (2009)
Mammals	
Eastern Small-footed Myotis (*Myotis leibii*)	Humphrey (2017)
Little Brown Myotis (*Myotis lucifugus*)	Humphrey and Fotherby (2019)
Northern Myotis / Northern Long-eared Bat (*Myotis septentrionalis*)	Humphrey and Fotherby (2019)
Tri-coloured Bat / Eastern Pipistrelle (*Perimyotis subflavus*)	Humphrey and Fotherby (2019)
Amphibians	
Western Chorus Frog (*Pseudacris triseriata*)	Ontario Nature (2019)
Arthropods	
Yellow-banded Bumble Bee (*Bombus terricola*)	Bumble Bee Watch (2021)
Reptiles	
Blanding's Turtle (*Emydoidea blandingii*)	RVCA (2017a), Ontario Nature (2019)
Eastern Musk Turtle / Stinkpot (*Sternotherus odoratus*)	RVCA (2017a,b), Ontario Nature (2019), MNRF (2021a,b)
Eastern Ribbonsnake *(Thamnophis sauritus)*	McIntosh Perry (2012a), RVCA (2017b), Ontario Nature (2019)
Gray Ratsnake *(Pantherophis spiloides)*	Ontario Nature (2019), MNRF (2021a,b)
Milksnake (*Lampropeltis triangulum*)	Ontario Nature (2019)
Northern Map Turtle (*Graptemys geographica*)	Ontario Nature (2019), California Academy of Sciences and National Geographic Society (2021)
Snapping Turtle (*Chelydra serpentina*)	McIntosh Perry (2012a), RVCA (2017b), Ontario Nature (2019), California Academy of Sciences and National Geographic Society (2021), MNRF (2021a,b)
Vascular Plants	
American Ginseng (*Panax quinquefolius*)	COSEWIC (2000)
Butternut (*Juglans cinerea*)	McIntosh Perry (2012a), California Academy of Sciences and National Geographic Society (2021)
Lichens	
Flooded Jellyskin (*Leptogium rivulare*)	MNRF (2021a,b)

We note that observation records on eBird (Cornell Lab of Ornithology, 2021) and iNaturalist (California Academy of Sciences and National Geographic Society, 2021) are crowd-sourced and rely heavily on data submitted by volunteer citizen scientists that are not necessarily vetted by experts. As such, observation records from these sources are considered non-confirmed by KAL, but are included in this information request based on guidelines set forth by MECP (2019).

3.0 CLOSURE

Thank you for considering this SAR information request for the Perth Golf Course. We look forward to any comments you may have. Questions relating to the contents of this letter can be addressed to the undersigned.

Respectfully submitted,

KILGOUR & ASSOCIATES LTD.

Katherine Black, MSc
Project Manager
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16-2285 St. Laurent Blvd, Ottawa, ON, K1G 4Z6

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Senior Review
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cc: Bruce Kilgour (KAL)
Kesia Miyashita (KAL)
Rob Hallett (KAL)

4.0 LITERATURE CITED

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Katherine Black <kblack@kilgourassociates.com>

2021-07-22_SAR information request for Perth Golf Course

Hann, Carolyn (MECP) <Carolyn.Hann@ontario.ca> Thu, Jul 22, 2021 at 3:20 PM
To: Katherine Black <kblack@kilgourassociates.com>

Hi Katie,

I have reviewed the attached for the Perth Golf Course location and addition to what you have noted in the attached I have the additional species at risk occurrence information for your consideration:

- Peregrine Falcon
- Monarch

There is also potential for:

- Whip-poor-will

Please note it remains the clients responsibility to:

- Carry out preliminary screening for their project,
- Obtain the best available information for all applicable information sources,
- Conduct necessary field studies or inventories to identify and confirm the presence of absence of species at risk or their habitat,
- Consider any potential impacts to species at risk that a proposed activity might cause, and
- Comply with the Endangered Species Act (ESA).

Additionally, while this data represents MECP's best current available information, it is important to note that a lack of information for a site does not mean that species at risk or their habitat are not present. There are many areas where the Government of Ontario does not currently have information, especially in more remote parts of the province. On-site assessments can better verify site conditions, identify and confirm presence of species at risk and/or their habitats. It is the responsibility of the proponent to ensure that species at risk are not killed, harmed, or harassed, and that their habitat is not damaged or destroyed through the activities carried out on the site.

Best,

Carolyn Hann

Management Biologist | Permissions and Compliance Section | Ontario Ministry of Environment, Conservation and Parks | 10-1 Campus Drive, Kemptville, Ontario, K0G 1J0 | PH: 613.355.7312 | Email: carolyn.hann@ontario.ca

From: Katherine Black <kblack@kilgourassociates.com>
Sent: May-18-21 11:21 AM
To: Species at Risk (MECP) <SAROntario@ontario.ca>
Cc: Anthony Francis <afrancis@kilgourassociates.com>; Bruce Kilgour <bkilgour@kilgourassociates.com>; Kesia Miyashita <kmiyashita@kilgourassociates.com>; Rob Hallett <rhallett@kilgourassociates.com>
Subject: SAR information request for Perth Golf Course

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Good morning,

Please find attached a species at risk (SAR) information request for the Perth Golf Course. The attached letter includes a desktop review of SAR occurrence records using the resources and guidelines outlined in the draft document, *Client's Guide to Preliminary Screening for Species at Risk* (MECP, 2019). We (Kilgour & Associates Ltd.) are seeking confirmation from MECP regarding the list of SAR that may occur on or near the project site.

We look forward to hearing from you soon. Please do not hesitate to contact us if you have any questions or concerns.

Kind regards,

Katie Black, MSc
KILGOUR & ASSOCIATES LTD.
Mobile: 647-202-8725
Ottawa: 613-260-5555
kblack@kilgourassociates.com
www.kilgourassociates.com

This communication is intended for use by the individual(s) to whom it is specifically addressed and should not be read by, or delivered to, any other person. Such communication may contain privileged or confidential information. If you have received this communication in error, please notify the sender and permanently delete the communication. Thank you for your cooperation.

Appendix E Results of breeding bird surveys in 2021 and 2022

Common Name	Scientific Name	Station(s) Observed	Date(s) Observed	Highest Breeding Evidence[1]	Comments
Alder Flycatcher	*Empidonax alnorum*	BBS-11, BBS-15, BBS-16	2021-05-28, 2021-06-15, 2022-05-25	Possible	
American Black Duck	*Anas rubripes*	BBS-1	2021-06-15	Possible	
American Crow	*Corvus brachyrhynchos*	BBS-1, BBS-4, BBS-5, BBS-7, BBS-8, BBS-9, BBS-12, BBS-13, BBS-14, BBS-15, BBS-17, BBS-18	2021-05-28, 2021-06-15, 2021-06-29, 2022-06-24	Possible	
American Goldfinch	*Spinus tristis*	BBS-1, BBS-4, BBS-5, BBS-6, BBS-7, BBS-8, BBS-9, BBS-10, BBS-11, BBS-16, BBS-17, BBS-18	2021-06-15, 2021-06-29, 2022-05-25, 2022-06-24	Probable	
American Redstart	*Setophaga ruticilla*	BBS-1, BBS-5, BBS-9, BBS-10, BBS-15, BBS-16, BBS-18	2021-06-29, 2022-06-10, 2022-06-24	Confirmed	Breeding confirmed. Active nest found on 2022-05-09 and fledglings observed on 2022-06-17.
American Robin	*Turdus migratorius*	BBS-1, BBS-2, BBS-3, BBS-4, BBS-5, BBS-6, BBS-7, BBS-8, BBS-9, BBS-10, BBS-11, BBS-12, BBS-13, BBS-14, BBS-15, BBS-16, BBS-17, BBS-18	2021-05-28, 2021-06-15, 2021-06-29, 2022-05-25, 2022-06-10, 2022-06-24	Confirmed	Breeding confirmed. Adult observed incubating eggs in nest on 2022-05-09; Fledglings observed on 2022-06-17.
American Tree Sparrow	*Spizelloides arborea*				Incidentally detected
American Woodcock	*Scolopax minor*				Incidentally detected

Common Name	Scientific Name	Station(s) Observed	Date(s) Observed	Highest Breeding Evidence[1]	Comments
Baltimore Oriole	*Icterus galbula*	BBS-1, BBS-3, BBS-4, BBS-5, BBS-6, BBS-8, BBS-10, BBS-11, BBS-12, BBS-13, BBS-15, BBS-16, BBS-17	2021-05-28, 2021-06-15, 2021-06-29, 2022-05-25	Probable	
Barn Swallow *	*Hirundo rustica*	BBS-9	2021-05-28	Possible	Foraging over Tributary B on 2022-05-12.
Barred Owl	*Strix varia*				Incidentally detected. Heard calling on 2022-04-29 and 2022-05-17; Observed roosting in a tree on 2022-06-03.
Belted Kingfisher	*Megaceryle alcyon*	BBS-16, BBS-18	2022-06-10	Possible	
Black-and-white Warbler	*Mniotilta varia*	BBS-12	2021-05-28	Possible	
Black-billed Cuckoo	*Coccyzus erythropthalmus*	BBS-12	2021-05-28	Possible	
Black-capped Chickadee	*Poecile atricapillus*	BBS-1, BBS-3, BBS-5, BBS-6, BBS-8, BBS-10, BBS-11, BBS-12, BBS-13, BBS-14, BBS-15, BBS-16, BBS-18	2021-05-28, 2021-06-15, 2021-06-29, 2022-05-25; 2022-06-24	Probable	
Blue Jay	*Cyanocitta cristata*	BBS-2, BBS-6, BBS-7, BBS-8, BBS-10, BBS-11, BBS-12, BBS-14, BBS-15, BBS-16, BBS-17, BBS-18	2021-05-28, 2021-06-15, 2021-06-29, 2022-05-25, 2022-06-10, 2022-06-24	Probable	
Brown Creeper	*Certhia americana*	BBS-6, BBS-12	2021-06-15, 2021-06-29	Possible	Note: Possible nest found on 2022-05-09.
Brown Thrasher	*Toxostoma rufum*	BBS-4, BBS-12	2021-06-29	Confirmed	Breeding confirmed. Active nest found on 2022-06-14.

Common Name	Scientific Name	Station(s) Observed	Date(s) Observed	Highest Breeding Evidence[1]	Comments
Brown-headed Cowbird	*Molothrus ater*	BBS-16, BBS-17	2022-05-25, 2022-06-26	Possible	
Canada Goose	*Branta canadensis*	BBS-7, BBS-16, BBS-17	2021-05-28, 2022-05-25, 2022-06-10	Confirmed	Breeding confirmed. Ducklings observed on 2022-06-14.
Cedar Waxwing	*Bombycilla cedrorum*	BBS-6, BBS-7, BBS-8, BBS-16, BBS-18	2021-05-28, 2021-06-15, 2021-06-29, 2022-05-25, 2022-06-10, 2022-06-24	Probable	
Chestnut-sided Warbler	*Setophaga pensylvanica*	BBS-1, BBS-4, BBS-6, BBS-7, BBS-9, BBS-11, BBS-15, BBS-16, BBS-17	2021-05-28, 2021-06-15, 2021-06-29, 2022-05-25, 2022-06-10	Probable	
Chimney Swift *	*Chaetura pelagica*	BBS-17	2022-05-25	Observed	Observed flying high in the sky over the Tay River; likely associated with chimneys in town
Chipping Sparrow	*Spizella passerina*	BBS-1, BBS-9, BBS-17	2021-06-14, 2021-06-29, 2022-06-10	Possible	
Clay-coloured Sparrow	*Spizella pallida*	BBS-10	2021-05-28	Possible	
Common Grackle	*Quiscalus quiscula*	BBS-1, BBS-2, BBS-3, BBS-4, BBS-6, BBS-7, BBS-8, BBS-9, BBS-11, BBS-13, BBS-16, BBS-17, BBS-18	2021-05-28, 2021-06-15, 2021-06-29, 2022-05-25, 2022-06-10, 2022-06-24	Confirmed	Breeding confirmed during 2022 BBS (active nests). Also, fledglings were observed on 2022-06-03 and 2022-06-14.

Common Name	Scientific Name	Station(s) Observed	Date(s) Observed	Highest Breeding Evidence[1]	Comments
Common Yellowthroat	*Geothlypis trichas*	BBS-1, BBS-2, BBS-3, BBS-4, BBS-5, BBS-7, BBS-8, BBS-9, BBS-10, BBS-11, BBS-12, BBS-13, BBS-14, BBS-15, BBS-16, BBS-17	2021-05-28, 2021-06-15, 2021-06-29, 2022-05-25, 2022-06-24	Probable	
Cooper's Hawk	*Accipiter cooperii*				Incidentally detected
Double-crested Cormorant	*Phalacrocorax auritus*				Incidentally detected
Downy Woodpecker	*Dryobates pubescens*	BBS-2, BBS-6, BBS-13	2021-05-28, 2021-06-15, 2021-06-29	Possible	
Eastern Kingbird	*Tyrannus tyrannus*	BBS-1, BBS-9, BBS-13, BBS-18	2021-06-15, 2021-06-29, 2022-06-10	Possible	
Eastern Meadowlark	*Sturnella magna*				Incidentally detected. Heard singing west of Tributary B (off-site) on 2022-05-12.
Eastern Phoebe	*Sayornis phoebe*	BBS-1, BBS-10, BBS-11, BBS-13, BBS-17, BBS-18	2021-05-28, 2021-06-29, 2022-06-10, 2022-06-24	Probable	
Eastern Wood-Pewee *	*Contopus virens*	BBS-5, BBS-6, BBS-7, BBS-8, BBS-11, BBS-12, BBS-14, BBS-18	2021-05-28, 2021-06-15, 2021-06-29, 2022-06-10	Probable	Breeding probable; based on incidental detections on-site in 2021 and 2022 during the breeding bird window.
European Starling	*Sturnus vulgaris*	BBS-1, BBS-6, BBS-8, BBS-13, BBS-17, BBS-18	2021-05-28, 2021-06-15, 2021-06-29, 2022-05-25, 2022-06-10, 2022-06-24	Confirmed	
Field Sparrow	*Spizella pusilla*				Incidentally detected

Common Name	Scientific Name	Station(s) Observed	Date(s) Observed	Highest Breeding Evidence[1]	Comments
Gray Catbird	*Dumetella carolinensis*	BBS-4, BBS-5, BBS-6, BBS-7, BBS-8, BBS-9, BBS-10, BBS-11, BBS-12, BBS-15, BBS-16	2021-05-28, 2021-06-15, 2021-06-29, 2022-06-10	Possible	
Great Blue Heron	*Ardea herodias*	BBS-8, BBS-18	2021-06-29, 2022-06-10	Possible	
Great Horned Owl	*Bubo virginianus*	OWL-3, OWL-4, OWL-5, OWL-6	2022-04-26	Possible	Detected during nocturnal owl survey.
Great Crested Flycatcher	*Myiarchus crinitus*	BBS-4, BBS-6, BBS-8, BBS-9, BBS-12, BBS-16	2021-06-29, 2022-05-25, 2022-06-10	Probable	
Green Heron	*Butorides virescens*	BBS-6, BBS-9, BBS-16	2021-06-15, 2021-06-29, 2022-05-25	Possible	
Hairy Woodpecker	*Leuconotopicus villosus*	BBS-3	2021-06-29	Possible	
Hermit Thrush	*Catharus guttatus*	BBS-16	2022-06-24	Possible	
House Finch	*Haemorhous mexicanus*	BBS-10	2021-06-29	Possible	
House Wren	*Troglodytes aedon*	BBS-9, BBS-15	2021-06-29	Possible	
Indigo Bunting	*Passerina cyanea*				Incidentally detected
Least Flycatcher	*Empidonax minimus*	BBS-15	2021-06-29	Possible	
Magnolia Warbler	*Setophaga magnolia*	BBS-16	2022-05-25	Possible	
Mallard	*Anas platyrhynchos*	BBS-1, BBS-18	2021-05-28, 2022-06-24	Possible	
Mourning Dove	*Zenaida macroura*	BBS-1, BBS-3, BBS-5, BBS-6, BBS-7, BBS-9, BBS-11, BBS-13, BBS-15, BBS-16, BBS-17, BBS-18	2021-05-28, 2021-06-15, 2021-06-29, 2022-05-25, 2022-06-10, 2022-06-24	Probable	
Mourning Warbler	*Geothlypis philadelphia*				Incidentally detected
Nashville Warbler	*Leiothlypis ruficapilla*	BBS-7, BBS-10	2021-05-28	Possible	

Common Name	Scientific Name	Station(s) Observed	Date(s) Observed	Highest Breeding Evidence[1]	Comments
Northern Cardinal	*Cardinalis cardinalis*	BBS-2, BBS-4, BBS-6, BBS-8, BBS-10, BBS-12, BBS-14, BBS-16, BBS-17	2021-05-28, 2021-06-29, 2022-05-25	Possible	
Northern Flicker	*Colaptes auratus*	BBS-2, BBS-3, BBS-4, BBS-9, BBS-14	2021-06-15, 2021-06-29	Possible	
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	BBS-9, BBS-17, BBS-18	2021-05-28, 2021-06-15, 2022-06-10, 2022-06-24	Probable	
Northern Waterthrush	*Parkesia noveboracensis*	BBS-12	2021-06-29	Probable	Probably breeding on-site. Male observed defending territory (chasing another male) on 2022-05-05.
Osprey	*Pandion haliaetus*				Incidentally detected
Ovenbird	*Seiurus aurocapilla*	BBS-7, BBS-12	2021-05-28, 2021-06-29	Possible	
Philadelphia Vireo	*Vireo philadelphicus*	BBS-16	2022-05-25	Possible	
Pileated Woodpecker	*Dryocopus pileatus*	BBS-3, BBS-7, BBS-10, BBS-12, BBS-13	2021-05-28, 2021-06-15	Possible	
Purple Finch	*Haemorhous purpureus*	BBS-9, BBS-15	2021-06-29	Possible	
Red-breasted Nuthatch	*Sitta canadensis*	BBS-6	2021-06-29	Possible	
Red-eyed Vireo	*Vireo olivaceus*	BBS-4, BBS-5, BBS-6, BBS-7, BBS-8, BBS-9, BBS-11, BBS-12, BBS-14, BBS-16, BBS-17, BBS-18	2021-05-28, 2021-06-15, 2021-06-29, 2022-05-25, 2022-06-10, 2022-06-24	Confirmed	Breeding confirmed. Active nest found on 2022-06-14 and 2022-06-17.

Common Name	Scientific Name	Station(s) Observed	Date(s) Observed	Highest Breeding Evidence[1]	Comments
Red-winged Blackbird	*Agelaius phoeniceus*	BBS-1, BBS-2, BBS-3, BBS-4, BBS-5, BBS-7, BBS-8, BBS-9, BBS-13, BBS-14, BBS-15, BBS-16, BBS-17, BBS-18	2021-05-28, 2021-06-15, 2021-06-29, 2022-05-25, 2022-06-10, 2022-06-24	Confirmed	Breeding confirmed. Female building nest on 2022-05-05.
Ring-billed Gull	*Larus delawarensis*	BBS-7, BBS-17	2021-05-28, 2022-06-10	Possible	
Rock Pigeon	*Columba livia*	BBS-17	2022-06-10	Possible	
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	BBS-1, BBS-4, BBS-5, BBS-6, BBS-7, BBS-9, BBS-10, BBS-11, BBS-12, BBS-16, BBS-17	2021-05-28, 2021-06-15, 2021-06-29, 2022-05-25, 2022-06-10	Probable	
Ruby-crowned Kinglet	*Regulus calendula*				Incidentally detected
Ruffed Grouse	Bonasa umbellus				Incidentally detected
Rusty Blackbird	*Euphagus carolinus*				Incidentally detected. Individual observed singing south of the Tay River on 2022-05-05.
Scarlet Tanager	*Piranga olivacea*	BBS-6	2021-06-29	Possible	
Song Sparrow	*Melospiza melodia*	BBS-1, BBS-2, BBS-3, BBS-4, BBS-5, BBS-6, BBS-7, BBS-8, BBS-9, BBS-10, BBS-11, BBS-13, BBS-14, BBS-15, BBS-16, BBS-17, BBS-18	2021-05-28, 2021-06-15, 2021-06-29, 2022-05-25, 2022-06-10, 2022-06-24	Probable	
Swamp Sparrow	*Melospiza georgiana*	BBS-7, BBS-9, BBS-12, BBS-15, BBS-16	2021-06-15, 2021-06-29, 2022-06-24	Possible	
Tennessee Warbler	*Leiothlypis peregrina*	BBS-7	2021-05-28	Possible	

Common Name	Scientific Name	Station(s) Observed	Date(s) Observed	Highest Breeding Evidence[1]	Comments
Tree Swallow	*Tachycineta bicolor*	BBS-2, BBS-9, BBS-17, BBS-18	2021-06-14, 2022-06-10, 2022-06-24	Possible	
Turkey Vulture	*Cathartes aura*	BBS-5, BBS-18	2021-06-14, 2022-06-24	Possible	
Veery	*Catharus fuscescens*	BBS-4, BBS-6, BBS-7, BBS-8, BBS-10, BBS-11, BBS-12, BBS-13, BBS-14, BBS-17	2021-05-28, 2021-06-15, 2021-06-29, 2022-06-10	Confirmed	Breeding confirmed. Adult observed carrying food or nesting material on 2022-06-17.
Warbling Vireo	*Vireo gilvus*	BBS-1, BBS-3, BBS-8, BBS-9, BBS-10, BBS-14, BBS-15, BBS-16, BBS-17, BBS-18	2021-05-28, 2021-06-15, 2021-06-29, 2022-05-25, 2022-06-10, 2022-06-24	Probable	
White-breasted Nuthatch	*Sitta carolinensis*	BBS-5, BBS-7, BBS-10, BBS-12, BBS-14, BBS-17, BBS-18	2021-06-15, 2021-06-29, 2022-06-24	Possible	
White-throated Sparrow	*Zonotrichia albicollis*	BBS-16	2022-06-10	Possible	
Wild Turkey	*Meleagris gallopavo*			Confirmed	Incidentally detected. Predated nest found on 2022-06-14.
Wilson's Snipe	*Gallinago delicata*	BBS-15	2021-05-28	Possible	
Winter Wren	*Troglodytes hiemalis*				Incidentally detected
Wood Duck	*Aix sponsa*	BBS-18	2022-05-25	Possible	
Wood Thrush *	*Hylocichla mustelina*	BBS-6, BBS-7, BBS-9, BBS-11, BBS-12, BBS-14	2021-05-28, 2021-06-15, 2021-06-29	Probable	Breeding probable; based on incidental detections on-site in 2021 and 2022 during the breeding bird window.

Common Name	Scientific Name	Station(s) Observed	Date(s) Observed	Highest Breeding Evidence[1]	Comments
Yellow Warbler	*Setophaga petechia*	BBS-1, BBS-2, BBS-3, BBS-4, BBS-5, BBS-6, BBS-7, BBS-9, BBS-10, BBS-11, BBS-13, BBS-14, BBS-15, BBS-16, BBS-17, BBS-18	2021-05-28, 2021-06-15, 2021-06-29, 2022-05-25, 2022-06-10, 2022-06-24	Probable	
Yellow-bellied Sapsucker	*Sphyrapicus varius*				Incidentally detected
Yellow-rumped Warbler	*Setophaga coronata*	BBS-7	2021-06-29	Possible	
Yellow-throated Vireo	*Vireo flavifrons*	BBS-1	2021-06-29	Possible	

***** = Species is listed under the ESA (Ontario, 2007).

[1]Breeding evidence is based on the following:

- **Observed** = Species observed in its breeding season (no breeding evidence).
- **Possible** = Species observed in its breeding season in suitable breeding habitat; singing male(s) present or breeding calls heard in suitable nesting habitat in breeding season.
- **Probable** = At least seven individuals singing or producing other sounds associated with breeding (e.g., calls or drumming), all heard during the same visit and in suitable nesting habitat during the species' breeding season; pair observed in suitable nesting habitat in nesting season; permanent territory presumed through registration of territorial song or the occurrence of an adult bird at the same place in breeding habitat on at least two days a week or more apart during the breeding season; courtship or display, including interaction between a male and a female or two males, including courtship feeding or copulation; visiting probable nest site; agitated behaviour or anxiety calls of an adult; brood patch on adult female or cloacal protuberance on adult male; nest building or excavation of nest hole by a wren or a woodpecker.
- **Confirmed** = Nest-building or excavation of nest hole by a species other than a wren or a woodpecker; distraction display or injury feigning; used nest or eggshells found (occupied or laid within the period of the survey); recently fledged young (nidicolous species) or downy young (nidifugous species), including incapable of sustained flight; adult leaving or entering nest sites in circumstances indicating an occupied nest; adult carrying fecal sac; adult carrying food for young; nest containing eggs; nest with young seen or heard.

Appendix F Results of turtle surveys in 2022

Date Observed	Common Name	Scientific Name	Location Observed (UTM)	Time Observed	Description	Incidental (Y/N)
2022-04-06	Snapping Turtle	*Chelydra serpentina*	-	-	In channelized area of Tributary C.	Y
2022-04-06	Midland Painted Turtle	*Chrysemys picta marginata*	-	-	Adult basking on edge of golf course pond.	Y
2022-04-29	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400142 4972430	11:45	Basking adult on edge of golf course pond.	N
2022-04-29	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400142 4972430	11:45	Basking adult on edge of golf course pond.	N
2022-04-29	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400142 4972430	11:45	Basking adult on edge of golf course pond.	N
2022-04-29	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400454 4972404	11:45	Basking adult on edge of golf course pond.	N
2022-04-29	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400389 4972313	11:45	Adult swimming underwater in golf course pond.	N
2022-04-29	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400168 4972438	12:49	Basking adult on edge of golf course pond.	N
2022-04-29	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400168 4972438	12:49	Basking adult on edge of golf course pond.	N
2022-04-29	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400168 4972438	12:49	Basking adult on edge of golf course pond.	N
2022-04-29	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400168 4972438	12:49	Basking adult on edge of golf course pond.	N
2022-04-29	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400168 4972438	12:49	Basking adult on edge of golf course pond.	N
2022-04-29	Midland Painted Turtle	*Chrysemys picta marginata*	18T 399757 4972324	13:18	Basking in a small flooded area dominated by emergent vegetation.	N
2022-04-29	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400339 4972452	13:36	Basking adult on edge of golf course pond.	N
2022-04-29	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400339 4972452	13:36	Basking adult on edge of golf course pond.	N
2022-04-29	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400339 4972452	13:36	Basking adult on edge of golf course pond.	N
2022-04-29	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400339 4972452	13:36	Basking adult on edge of golf course pond.	N
2022-04-29	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400339 4972452	13:36	Basking adult on edge of golf course pond.	N
2022-04-29	Midland Painted Turtle	*Chrysemys picta marginata*	18T 399978 4972427	13:48	Basking adult on edge of golf course pond.	N
2022-04-29	Midland Painted Turtle	*Chrysemys picta marginata*	18T 399978 4972427	13:48	Basking adult on edge of golf course pond.	N
2022-04-29	Midland Painted Turtle	*Chrysemys picta marginata*	18T 399978 4972427	13:48	Basking adult on edge of golf course pond.	N
2022-04-29	Midland Painted Turtle	*Chrysemys picta marginata*	18T 399660 4972760	14:02	Basking on a fallen tree in Tay River.	N
2022-04-29	Midland Painted Turtle	*Chrysemys picta marginata*	18T 399660 4972760	14:02	Basking on a fallen tree in Tay River.	N
2022-04-29	Midland Painted Turtle	*Chrysemys picta marginata*	18T 399660 4972760	14:02	Basking on a fallen tree in Tay River.	N

Date Observed	Common Name	Scientific Name	Location Observed (UTM)	Time Observed	Description	Incidental (Y/N)
2022-04-29	Eastern Musk Turtle	*Sternotherus odoratus*	18T 399612 4972738	14:02	Dead (shell only), found in Silver Maple swamp along edge of Tay River.	N
2022-04-29	Midland Painted Turtle	*Chrysemys picta marginata*	18T 399338 4972401	14:32	Adult aerial basking on a log in Tributary A.	N
2022-04-29	Eastern Musk Turtle	*Sternotherus odoratus*	18T 399402 4972574	15:03	Aquatic basking under floating aquatic vegetation along south side of Tay River.	N
2022-04-29	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400080 4972242	16:11	Basking adult on edge of golf course pond.	N
2022-04-29	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400080 4972242	16:11	Basking adult on edge of golf course pond.	N
2022-04-29	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400080 4972242	16:11	Basking adult on edge of golf course pond.	N
2022-04-29	Snapping Turtle	*Chelydra serpentina*	18T 399329 4972579	16:11	Adult aquatic basking among aquatic vegetation along south side of Tay River.	N
2022-05-05	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400355 4972345	11:15	Adult basking on the edge of golf course pond.	N
2022-05-05	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400355 4972345	11:15	Adult basking on the edge of golf course pond.	N
2022-05-05	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400355 4972345	11:15	Adult basking on the edge of golf course pond.	N
2022-05-05	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400355 4972345	11:15	Adult basking on the edge of golf course pond.	N
2022-05-05	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400355 4972345	11:15	Adult basking on the edge of golf course pond.	N
2022-05-05	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400355 4972345	11:15	Adult basking on the edge of golf course pond.	N
2022-05-05	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400355 4972345	11:15	Adult basking on the edge of golf course pond.	N
2022-05-05	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400355 4972345	11:15	Adult swimming/aquatic basking in golf course pond.	N
2022-05-05	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400355 4972345	11:15	Adult swimming/aquatic basking in golf course pond.	N
2022-05-05	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400355 4972345	11:15	Adult swimming/aquatic basking in golf course pond.	N
2022-05-05	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400464 4972396	11:22	Adult basking on the edge of golf course pond.	N

Date Observed	Common Name	Scientific Name	Location Observed (UTM)	Time Observed	Description	Incidental (Y/N)
2022-05-05	Snapping Turtle	*Chelydra serpentina*	18T 400465 4972714	11:30	Adult aquatic basking in golf course pond.	N
2022-05-05	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400465 4972714	11:30	Adult aerial basking on edge of golf course pond.	N
2022-05-05	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400465 4972714	11:30	Adult aerial basking on edge of golf course pond.	N
2022-05-05	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400261 4973644	13:04	Adult basking on a log on northwest side of Tay River.	N
2022-05-05	Snapping Turtle	*Chelydra serpentina*	18T 399575 4972616	14:38	Adult basking between golf course pond and sand trap. Potential nesting habitat.	N
2022-05-05	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400118 4972184	15:37	Adult basking on the edge of golf course pond.	N
2022-05-05	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400118 4972184	15:37	Adult basking on the edge of golf course pond.	N
2022-05-05	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400118 4972184	15:37	Adult basking on the edge of golf course pond.	N
2022-05-05	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400118 4972184	15:37	Adult basking on the edge of golf course pond.	N
2022-05-05	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400118 4972184	15:37	Adult basking on the edge of golf course pond.	N
2022-05-05	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400118 4972184	15:37	Adult basking on the edge of golf course pond.	N
2022-05-09	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400464 4972116	11:53	Adult basking on the edge of golf course pond.	N
2022-05-09	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400464 4972116	11:53	Adult basking on the edge of golf course pond.	N
2022-05-09	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400464 4972116	11:53	Adult basking on the edge of golf course pond.	N
2022-05-09	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400353 4972350	12:10	Adult basking on the edge of golf course pond.	N
2022-05-09	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400353 4972350	12:10	Adult basking on the edge of golf course pond.	N
2022-05-09	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400353 4972350	12:10	Adult basking on the edge of golf course pond.	N
2022-05-09	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400353 4972350	12:10	Adult aquatic basking in golf course pond.	N
2022-05-09	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400353 4972350	12:10	Adult aquatic basking in golf course pond.	N

Date Observed	Common Name	Scientific Name	Location Observed (UTM)	Time Observed	Description	Incidental (Y/N)
2022-05-09	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400353 4972350	12:10	Adult swimming in golf course pond.	N
2022-05-09	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400247 4972721	13:26	Adult aerial basking on a fallen tree trunk in the Tay River.	N
2022-05-09	Midland Painted Turtle	*Chrysemys picta marginata*	18T 399973 4972425	14:50	Adult basking on the edge of golf course pond.	N
2022-05-09	Midland Painted Turtle	*Chrysemys picta marginata*	18T 399973 4972425	14:50	Adult basking on the edge of golf course pond.	N
2022-05-09	Midland Painted Turtle	*Chrysemys picta marginata*	18T 399973 4972425	14:50	Adult aquatic basking in golf course pond.	N
2022-05-09	Midland Painted Turtle	*Chrysemys picta marginata*	18T 399663 4972254	15:11	Adult basking on the south end of a gold course pond.	N
2022-05-09	Snapping Turtle	*Chelydra serpentina*	18T 400554 4972430	12:05	Adult aquatic basking beside shore among aquatic vegetation east of marshy bay off Tay River.	N
2022-05-09	Northern Map Turtle	*Graptemys geographica*	18T 400575 4972410	12:05	Either adult male or juvenile female basking on rock ~4 m from shore in Tay River.	N
2022-05-09	Snapping Turtle	*Chelydra serpentina*	18T 400558 4972364	13:17	Adult aquatic basking in marsh in thicket and aquatic vegetation ~4 m from the shore of Tay River.	N
2022-05-09	Snapping Turtle	*Chelydra serpentina*	18T 400549 4972366	13:25	Adult aquatic basking in marsh in thicket and aquatic vegetation ~5 m from the shore of Tay River.	N
2022-05-09	Snapping Turtle	*Chelydra serpentina*	18T 400537 4972461	14:09	Adult aquatic basking in marsh off Tay River.	N
2022-05-09	Snapping Turtle	*Chelydra serpentina*	18T 400539 4972470	14:15	Adult traveling through marsh off Tay River.	N
2022-05-09	Snapping Turtle	*Chelydra serpentina*	18T 400525 4972494	14:31	Juvenile aquatic basking near shore among alders off Tay River.	N
2022-05-09	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400472 4972398	15:03	Incidentally observed in golf course pond, adult basking on the edge of golf course pond.	N
2022-05-09	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400472 4972398	15:03	Adult aquatic basking in golf course pond.	N

Date Observed	Common Name	Scientific Name	Location Observed (UTM)	Time Observed	Description	Incidental (Y/N)
2022-05-09	Eastern Musk Turtle	*Sternotherus odoratus*	18T 399391 4972579	16:17	Adult basking under floating aquatic vegetation in small bay of Tay River with an abundance of floating aquatic vegetation.	N
2022-05-09	Snapping Turtle	*Chelydra serpentina*	18T 399350 4972572	16:42	Adult aquatic basking in small bay off Tay River with an abundance of floating aquatic vegetation.	N
2022-05-09	Snapping Turtle	*Chelydra serpentina*	18T 399341 4972581	16:55	Adult basking under floating vegetation in a very small bay along Tay River.	N
2022-05-09	Eastern Musk Turtle	*Sternotherus odoratus*	18T 399162 4972560	17:19	Adult basking under floating aquatic vegetation in very small bay of Tay River with an abundance of floating aquatic vegetation.	N
2022-05-09	Eastern Musk Turtle	*Sternotherus odoratus*	18T 399153 4972448	17:27	Adult basking under floating aquatic vegetation in very small bay of Tay River with an abundance of floating aquatic vegetation.	N
2022-05-09	Eastern Musk Turtle	*Sternotherus odoratus*	18T 399149 4972552	17:37	Adult basking under floating aquatic vegetation in very small bay of Tay River with an abundance of floating aquatic vegetation.	N
2022-05-09	Eastern Musk Turtle	*Sternotherus odoratus*	18T 399149 4972552	17:42	Adult basking under floating aquatic vegetation in very small bay of Tay River with an abundance of floating aquatic vegetation.	N
2022-05-12	Eastern Musk Turtle	*Sternotherus odoratus*	18T 399074 4972599	10:47	Adult basking under aquatic vegetation in bay abundant with aquatic vegetation where Tributary B and the Tay River meet.	N
2022-05-12	Eastern Musk Turtle	*Sternotherus odoratus*	18T 399063 4972583	11:13	Adult basking among aquatic vegetation in bay abundant with aquatic vegetation where Tributary B and the Tay River meet.	N
2022-05-12	Eastern Musk Turtle	*Sternotherus odoratus*	18T 399063 4972583	11:13	Adult basking among aquatic vegetation in bay abundant with aquatic vegetation where Tributary B and the Tay River meet.	N
2022-05-12	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400711 4972268	12:09	Adult basking on rock south of bridge to golf course in Tay River.	Y
2022-05-12	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400699 4971861	14:42	Adult basking on rock in Grants Creek.	Y

Date Observed	Common Name	Scientific Name	Location Observed (UTM)	Time Observed	Description	Incidental (Y/N)
2022-05-26	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400575 4972410	9:10	Adult observed basking on rocks near shore in Tay River. Seen from bridge.	Y
2022-05-26	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400575 4972410	9:10	Adult observed basking on rocks near shore in Tay River. Seen from bridge.	Y
2022-05-26	Midland Painted Turtle	*Chrysemys picta marginata*	18T 399995 4972643	12:28	Adult aerial basking on log among aquatic vegetation along shore. Observed from boardwalk lookout on north side of Tay River.	Y
2022-05-26	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400012 4972647	12:35	Adult basking on log along south side of Tay River. (20 m from 12:28 PATU)	Y
2022-05-26	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400079 4972652	12:43	Aerial basking on vegetation hummock along shore of Tay River.	Y
2022-05-26	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400079 4972652	12:43	Aerial basking on vegetation hummock along shore of Tay River.	Y
2022-05-26	Snapping Turtle	*Chelydra serpentina*	18T 399993 4972680	12:48	Aquatic basking with head above water in front of the lookout (north side of Tay River).	Y
2022-05-26	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400941 4972045	14:00	Adult aerial basking on beaver lodge in Tay River, seen from bridge.	Y
2022-05-26	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400126 4972175	15:13	Adult aerial basking on rock at edge of golf course pond.	N
2022-05-26	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400126 4972175	15:13	Adult aerial basking on edge of golf course pond in grass.	N
2022-05-26	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400126 4972175	15:13	Adult aerial basking at golf course pond.	N
2022-05-26	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400126 4972175	15:13	Adult aerial basking at golf course pond.	N
2022-05-26	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400126 4972175	15:13	Adult aerial basking at golf course pond.	N
2022-05-26	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400126 4972175	15:13	Adult aerial basking at golf course pond.	N
2022-05-26	Midland Painted Turtle	*Chrysemys picta marginata*	18T 399984 4972275	15:21	Adult aquatic basking at edge of golf course pond.	N
2022-05-26	Midland Painted Turtle	*Chrysemys picta marginata*	18T 399945 4972390	15:27	Aerial basking on edge of golf course pond.	N
2022-05-26	Midland Painted Turtle	*Chrysemys picta marginata*	18T 399945 4972390	15:27	Aerial basking on edge of golf course pond.	N
2022-05-26	Midland Painted Turtle	*Chrysemys picta marginata*	18T 399945 4972390	15:27	Aerial basking on edge of golf course pond.	N
2022-05-26	Midland Painted Turtle	*Chrysemys picta marginata*	18T 399945 4972390	15:27	Aerial basking on edge of golf course pond.	N

Date Observed	Common Name	Scientific Name	Location Observed (UTM)	Time Observed	Description	Incidental (Y/N)
2022-05-26	Midland Painted Turtle	*Chrysemys picta marginata*	18T 399945 4972390	15:27	Aerial basking on edge of golf course pond.	N
2022-05-26	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400355 4972345	16:00	Adult aquatic basking in golf course pond.	N
2022-05-26	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400355 4972345	16:00	Adult aerial basking on edge of golf course pond.	N
2022-05-26	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400355 4972345	16:00	Adult aerial basking on edge of golf course pond.	N
2022-05-26	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400355 4972345	16:00	Adult aerial basking on edge of golf course pond.	N
2022-05-26	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400355 4972345	16:00	Adult aerial basking on edge of golf course pond.	N
2022-05-26	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400355 4972345	16:00	Adult aerial basking on edge of golf course pond.	N
2022-05-26	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400355 4972345	16:00	Adult aerial basking on edge of golf course pond.	N
2022-05-26	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400355 4972345	16:00	Adult aerial basking on edge of golf course pond.	N
2022-05-26	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400355 4972345	16:00	Adult aerial basking on edge of golf course pond.	N
2022-06-03	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400468 4972399	9:15	Adult aerial basking in golf course pond.	N
2022-06-03	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400468 4972399	9:15	Adult aerial basking in golf course pond.	N
2022-06-03	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400468 4972399	9:15	Adult aquatic basking in golf course pond.	N
2022-06-03	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400646 4971898	9:46	Adult aerial basking on a log on west side of Grants Creek.	N
2022-06-03	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400646 4971898	9:46	Adult aerial basking on a log on west side of Grants Creek.	N
2022-06-03	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400646 4971898	9:46	Adult aerial basking on a log on west side of Grants Creek.	N
2022-06-03	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400598 4971719	10:40	Adult aquatic basking on a log on south side of Grants Creek.	N
2022-06-03	Midland Painted Turtle	*Chrysemys picta marginata*	18T 399315 4972632	12:50	Adult aerial basking on a rock on north side of Tay River.	N
2022-06-03	Midland Painted Turtle	*Chrysemys picta marginata*	18T 399406 4972613	12:50	Adult aerial basking on a rock on north side of Tay River.	N

Date Observed	Common Name	Scientific Name	Location Observed (UTM)	Time Observed	Description	Incidental (Y/N)
2022-06-03	Snapping Turtle	*Chelydra serpentina*	18T 399336 4972589	13:04	Adult aquatic basking among aquatic vegetation in marshy area on SW side of Tay River.	N
2022-06-03	Snapping Turtle	*Chelydra serpentina*	18T 399343 4972585	13:10	Adult aquatic basking among aquatic vegetation in marshy area on SW side of Tay River.	N
2022-06-03	Midland Painted Turtle	*Chrysemys picta marginata*	18T 399387 4972576	13:15	Juvenile submerged move among aquatic vegetation in marshy area on SW side of Tay River.	N
2022-06-03	Eastern Musk Turtle	*Sternotherus odoratus*	18T 399358 4972582	13:15	Adult aquatic basking among aquatic vegetation in marshy area on SW side of Tay River.	N
2022-06-03	Midland Painted Turtle	*Chrysemys picta marginata*	18T 399127 4972593	15:04	Adult aerial basking on a log on north side of Tay River.	N
2022-06-03	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400409 4972292	13:15	Adult aerial basking on a branch of a tree in golf course pond.	N
2022-06-03	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400409 4972292	13:15	Adult aerial basking on a branch of a tree in golf course pond.	N
2022-06-03	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400409 4972292	13:15	Adult submerged move in golf course pond.	N
2022-06-03	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400409 4972292	13:15	Adult aquatic basking in golf course pond, carapace exposed and dry.	N
2022-06-03	Snapping Turtle	*Chelydra serpentina*	18T 400354 4972350	13:25	Adult aquatic basking in a shallow area of the golf course pond under some aquatic vegetation.	N
2022-06-03	Snapping Turtle	*Chelydra serpentina*	18T 400479 4972383	13:35	Adult foraging in golf course pond, looked as if it was foraging for small fish.	N
2022-06-03	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400487 4972657	13:45	Adult aquatic basking in golf course pond.	N
2022-06-03	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400146 4972423	14:33	Adult aerial basking on edge of golf course pond.	N
2022-06-03	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400146 4972423	14:33	Adult aerial basking on edge of golf course pond.	N
2022-06-03	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400146 4972423	14:33	Adult submerged move in golf course pond.	N
2022-06-03	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400006 4972435	14:50	Adult aquatic basking floating on top of aquatic vegetation near edge of golf course pond.	N

Date Observed	Common Name	Scientific Name	Location Observed (UTM)	Time Observed	Description	Incidental (Y/N)
2022-06-03	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400123 4972171	15:50	Adult aquatic basking on floating aquatic vegetation in golf course pond.	N
2022-06-03	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400123 4972171	15:50	Adult aquatic basking on floating aquatic vegetation in golf course pond.	N
2022-06-03	Midland Painted Turtle	*Chrysemys picta marginata*	18T 400123 4972171	15:50	Adult submerged move in golf course pond.	N
2022-06-14	Snapping Turtle	Chelydra serpentina	18T 399661 4972751	14:33	Adult aquatic basking in shallow bay off Tay River.	Y
2022-06-17	Midland Painted Turtle	Chrysemys picta marginata	18T 400646 4971898	9:35	Adult aerial basking on a log on west side of Grants Creek.	Y

Appendix G Regional species at risk screening

Species Name (*Taxonomic Name*)	Status under *Endangered Species Act* (ESA)	Status under Schedule 1 of the *Species at Risk Act* (SARA)	Observation Record Sources (within 10 km of the Site)	General Habitat Requirements	Site Suitability	Potential for Protected Elements[1]		Assessed Potential for Overall Negative Interactions with Protected Elements[2]
						Habitat	Individuals	
Birds								
Bald Eagle (*Haliaeetus leucocephalus*)	**Special Concern**	**Not at Risk**	Cornell Lab of Ornithology (2023a)	Nest in mature forests near open water. In large trees such as pine and poplar.	Trees along the banks of the Tay River may be suitable for nesting.	Moderate	Low Transient occurrence near the project area is possible.	Low Not observed. River-side nesting locations, if they did occur, would most likely be located within the protected setback.
Bank Swallow (*Riparia riparia*)	**Threatened**	**Threatened**	Birds Canada et al. (2009), Cornell Lab of Ornithology (2023a)	Colonial nester; burrows in eroding silt or sand banks, sand pit walls, and human-made sand piles. Often found on banks of rivers and lakes.	The banks of the Tay River on and near the Site are densely vegetated and do not have exposed silt or sand. RVCA noted that reaches of the Tay River close to the Site did not have signs of erosion (RVCA, 2017b, c). No suitable areas on or directly adjacent to the Site.	Negligible	Negligible Due to proposed timing of the project (tree and vegetation removal) transient occurrence near the project area is not possible.	Negligible Individuals not observed on site
Barn Swallow (*Hirundo rustica*)	**Special Concern**	**Threatened**	Birds Canada et al. (2009), McIntosh Perry (2012a), California Academy of Sciences and National Geographic Society (2023), MNRF (2023a, b), Cornell Lab of Ornithology (2023a), KAL 2021 and 2022 field studies	Nests on barns and other structures. Forages in open areas for flying insects. Lives in close association with humans and prefers to nest on structures such as open barns, under bridges, and in culverts.	Buildings associated with the golf course on the Site could potentially support nesting, along with the Peter Street bridge directly east of the Site. Watercourses and open areas on and adjacent to the Site are suitable for foraging. This species was observed foraging over the Tay River and Tributary B directly adjacent to the Site but is assumed to be nesting off-Site.	Moderate	Low Individuals not observed on site.	Low Individuals not observed directly on site the site. Areas proposed for development do not include suitable nesting structures (other than the Peter St. Bridge, where the species did not occur). The species is no longer protected under the ESA.
Black Tern (*Chlidonias niger*)	**Special Concern**	**Not at Risk**	MNRF (2023a, b), Cornell Lab of Ornithology (2023a)	Build floating nests in loose colonies in shallow marshes with abundant emergent vegetation, especially in cattails.	The Site does not appear to be suitable for nesting. Marsh areas within Grants Creek Provincially Significant Wetland south of the Site may provide suitable nesting sites.	Low	Low Individuals not observed on site	Low Doesn't use the site
Bobolink (*Dolichonyx oryzivorus*)	**Threatened**	**Threatened**	Birds Canada et al. (2009), RVCA (2017b), MNRF (2023a, b), California Academy of Sciences and National Geographic Society (2023), Cornell Lab of Ornithology (2023a)	Breeds in hayfields, pastures, agricultural fields, and abandoned fields with tall grass that are ≥5 ha, and preferably >30 ha.	Areas of cultural meadow on the Site are far below the typical size used for nesting and are located next to tall trees. Potential habitat does not appear to occur on the Site.	Low	Low Individuals not observed on site	Low
Canada Warbler (*Cardellina canadensis*)	**Special Concern**	**Threatened**	Cornell Lab of Ornithology (2023a), MNRF (2023a)	Prefers moist forests with dense shrub layers. Nests located on or near the ground on mossy logs or roots, along stream banks or on hummocks. Area-sensitive species that usually require a minimum of 30 ha of	Moist forests and treed and thicket swamps on the Site could be suitable for nesting.	Moderate	Low Individuals not observed on site	Low Individuals not observed on site. If nesting did occur, locations would occur adjacent to the river within the protected setbacks.

Species Name (*Taxonomic Name*)	Status under *Endangered Species Act* (ESA)	Status under Schedule 1 of the *Species at Risk Act* (SARA)	Observation Record Sources (within 10 km of the Site)	General Habitat Requirements	Site Suitability	Potential for Protected Elements[1]		Assessed Potential for Overall Negative Interactions with Protected Elements[2]
						Habitat	Individuals	
				continuous forest for breeding habitat (OMNR, 2000).				
Cerulean Warbler (*Setophaga cerulea)*	**Threatened**	**Endangered**	N/A	Prefers mature deciduous forests. Area-sensitive species that require large forests (>100 ha) (OMNR, 2000).	Deciduous forests on the Site could be suitable for nesting.	Negligible	Negligible	Negligible
Chimney Swift (*Chaetura pelagica*)	**Threatened**	**Threatened**	Birds Canada et al. (2009), McIntosh Perry (2012a), California Academy of Sciences and National Geographic Society (2023), Cornell Lab of Ornithology (2023a), MNRF (2023a), KAL 2022 field studies	Nests in traditional-style open brick chimneys (and rarely in hollow trees). Tends to stay close to water.	The Site does not appear to contain typical nesting habitat. However, this species has been observed foraging over the Tay River directly adjacent to the Site and is known to nest in the town of Perth (McIntosh Perry, 2012a).	Low (for the site itself)	Moderate. But not observed directly on the site. Transient presence would be associated directly with the river.	Low Transient presence associated directly with the river would not be affected by development away from the river.
Common Nighthawk (*Chordeiles minor*)	**Special Concern**	**Threatened**	Birds Canada et al. (2009), Cornell Lab of Ornithology (2023)	Nests in a wide variety of open sites, including beaches, fields, and gravel rooftops with little to no ground vegetation. They also nest in cultivated fields, orchards, urban parks, mine tailings and along gravel roads/railways but tend to occupy more natural sites.	Open meadows and clearings on the Site may have some (albeit limited) suitable for nesting. This species was not observed during targeted surveys in 2021 or 2012 (McIntosh Perry, 2012a).	Moderate	Low Not observed	Low While some portions of the Site may provide low quality potential to support nests, multiple studies have demonstrated absence, suggesting the Site is not suitable.
Eastern Meadowlark (*Sturnella magna*)	**Threatened**	**Threatened**	Birds Canada et al. (2009), RVCA (2017a, b), California Academy of Sciences and National Geographic Society (2023), Cornell Lab of Ornithology (2023a), MNRF (2023a, b), KAL 2022 field studies,	Breeds in hayfields, pastures, agricultural fields, and abandoned fields with tall grass that are ≥5 ha, and preferably >30 ha.	Areas of cultural meadow on the Site are below the typical habitat size and are located next to tall trees. Suitable habitat does not appear to occur on the Site. In 2021, an Eastern Meadowlark was detected off-site (north of Christie Lake Road).	Negligible	Low	Negligible The species would not be expected during or after the project.
Eastern Whip-poor-will (*Antrostomus vociferus*)	**Threatened**	**Threatened**	KAL (K. Black) personal communication with MECP (C. Hann), 2021, Cornell Lab of Ornithology (2023a)	Nests on the ground in open deciduous or mixed woodlands with little underbrush.	Most wooded areas on the Site are dense and have closed canopies. This species was not observed during targeted surveys in 2021 or 2012 (McIntosh Perry, 2012a).	Low	Low Most wooded areas on the Site are dense and have closed canopies. This species was not	Low

Species Name (*Taxonomic Name*)	Status under *Endangered Species Act* (ESA)	Status under Schedule 1 of the *Species at Risk Act* (SARA)	Observation Record Sources (within 10 km of the Site)	General Habitat Requirements	Site Suitability	Potential for Protected Elements[1]		Assessed Potential for Overall Negative Interactions with Protected Elements[2]
						Habitat	Individuals	
							observed during targeted surveys in 2021 or 2012 (McIntosh Perry, 2012a).	
Eastern Wood-Pewee (*Contopus virens*)	**Special Concern**	**Special Concern**	Birds Canada et al. (2009), McIntosh Perry (2012a), California Academy of Sciences and National Geographic Society (2023), Cornell Lab of Ornithology (2023a), MNRF 2023a), KAL 2021 and 2022 field studies	Woodland species often found in the mid-canopy layer near clearings and edges of deciduous and mixed forests.	This species was repeatedly observed throughout forested and treed swamp habitats in 2021 and 2022.	High	High This species was repeatedly observed throughout forested and treed swamp habitats in 2021 and 2022.	High
Evening Grosbeak (*Coccothraustes vespertinus*)	**Special Concern**	**Special Concern**	Cornell Lab of Ornithology (2023a)	Nests in trees or large shrubs; prefers mature coniferous forests but will also use deciduous forests, parklands, and orchards.	Woodlands and shrub thickets on the Site could be suitable for nesting.	Moderate	Low Not observed near the Site	Low Individuals have not occurred on site. If future nesting did occur, sufficient adjacent wooded areas would be present.
Golden Eagle (*Aquila chrysaetos*)	**Endangered**	**Not at Risk**	Cornell Lab of Ornithology (2023a)	Nest in remote, undisturbed areas, usually building their nests on ledges on a steep cliff/riverbank or large trees if needed. Most hunting is done near open areas such as large bogs or tundra. Migrant only.	The Site does not appear to contain typical habitat.	Negligible	Negligible Not observed	Negligible
Golden-winged Warbler (*Vermivora chrysoptera*)	**Special Concern**	**Threatened**	Birds Canada et al. (2009), MNRF (2023a), Cornell Lab of Ornithology (2023a)	Ground-nests in areas of young shrubs surrounded by mature forest. Often found in areas that have recently been disturbed such as field edges, hydro or utility right-of-ways, or logged areas.	Regenerating meadows and thickets on the Site could be suitable for nesting.	Moderate	Low Not observed on or near the Site	Low Individuals have not occurred on site. If future nesting did occur, sufficient adjacent wooded areas would be present.
Grasshopper Sparrow (*Ammodramus savannarum*)	**Special Concern**	**Special Concern**	Birds Canada et al. (2009)	Lives in open grassland areas with well-drained sandy soil. Will also nest in hayfields and pastures, as well as alvars, prairies, and occasionally grain crops such as barley. It prefers areas that are sparsely vegetated, and its nests are well hidden in the field, woven from grasses in a small cup-like	Areas of cultural meadow on the Site are below the typical habitat size and are located next to tall trees. Suitable habitat does not appear to occur on the Site.	Low	Low Not observed on or near the Site	Low

Species Name (*Taxonomic Name*)	Status under *Endangered Species Act* (ESA)	Status under Schedule 1 of the *Species at Risk Act* (SARA)	Observation Record Sources (within 10 km of the Site)	General Habitat Requirements	Site Suitability	Potential for Protected Elements[1]		Assessed Potential for Overall Negative Interactions with Protected Elements[2]
						Habitat	Individuals	
				shape. Prefers grasslands over ≥6 ha.				
Henslow's Sparrow (*Ammodramus henslowii*)	**Endangered**	**Endangered**	N/A	Prefers extensive, dense, tall grasslands where it can easily conceal its small ground nest. Tends to avoid fields that have been grazed or are crowded with trees and shrubs. Prefer ≥50 ha areas, but can inhabit ≥5 ha.	Areas of cultural meadow on the Site are below the typical habitat size and are located next to tall trees. Suitable habitat does not appear to occur on the Site.	Negligible	Negligible	Negligible
Horned Grebe (*Podiceps auritus*)	**Special Concern**	**Special Concern**	N/A	Nest in small ponds, marshes, and shallow bays that contain areas of open water and emergent vegetation. Migrant only.	The marshy bays off the Tay River and marsh habitats within Grants Creek Provincially Significant Wetland south of the Site may provide suitable migratory stopover areas.	Low	Low	Low
Hudsonian Godwit (*Limosa haemastica*)	**Threatened**	**No Status**	N/A	Use a wide variety of habitats during migration, such as freshwater marshes, saline lakes, flooded fields, shallow ponds, coastal wetlands, and mudflats. Migrant only.	The golf course ponds may provide marginally suitable migratory stopover areas.	Low	Low	Low
Least Bittern (*Ixobrychus exilis*)	**Threatened**	**Threatened**	Cornell Lab of Ornithology (2023a), MNRF (2023a)	Found in a variety of wetland habitats, but strongly prefers cattail marshes with a mix of open pools and channels.	The Site does not appear to contain potentially suitable habitat. Marsh habitats within Grants Creek Provincially Significant Wetland south of the Site may provide suitable nesting habitat.	Low	Low	Low
Lesser Yellowlegs (*Tringa flavipes*)	**Threatened**	**No Status**	Cornell Lab of Ornithology (2023a)	Breeds in boreal wetlands. Nests on dry ground or forest openings near peatlands, marshes, and ponds in the boreal forest and taiga (Government of Canada, 2021). Migrant only.	The Site does not appear to contain potentially suitable habitat. Marsh habitats within Grants Creek Provincially Significant Wetland south of the Site may provide suitable migratory stopover habitat.	Low	Low	Low
Loggerhead Shrike (*Lanius ludovicianus*)	**Endangered**	**Endangered**	N/A	Prefers pasture or other grasslands with scattered low trees and shrubs. Lives in fields or alvars (areas of exposed bedrock) with short grass, which makes it easier to spot prey.	The Site does not appear to contain potentially suitable habitat.	Negligible	Negligible	Negligible
Louisiana Waterthrush (*Seiurus motacilla*)	**Threatened**	**Threatened**	N/A	Found in large tracts of mature deciduous or mixed forests in steep, forested ravines with running streams. Clear headwater streams and associated wetlands are preferred sites, but it will also inhabit wooded swamps (Environment Canada, 2011).	The Site does not appear to contain potentially suitable habitat.	Negligible	Negligible	Negligible

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						Habitat	Individuals	
Olive-sided Flycatcher (*Contopus cooperi*)	**Special Concern**	**Threatened**	Birds Canada et al. (2009), Cornell Lab of Ornithology (2023a)	Found along coniferous or mixed forest edges forest edges and openings often located near water or wetlands. Will use forests that have been logged or burned if there are ample tall snags and trees to use for foraging perches.	The edges of the small patched of mixed forest on the Site could be marginally suitable.	Low	Low	Low
Peregrine Falcon (*Falco peregrinus*)	**Special Concern**	**Special Concern**	KAL (K. Black) personal communication with MECP (C. Hann), 2021, Cornell Lab of Ornithology (2023a)	Nests on tall, steep cliff ledges close to large bodies of water. Urban peregrines raise their young on ledges of tall buildings, even in busy downtown areas.	The Site does not appear to contain potentially suitable habitat.	Negligible	Low	Low
Red-headed Woodpecker (*Melanerpes erythrocephalus*)	**Endangered**	**Endangered**	N/A	Lives in open woodland and woodland edges and is often found in parks, golf courses, and cemeteries. These areas typically have many dead trees, which the birds use for nesting and perching.	Woodlands, woodland edges, and the golf course on the Site could be suitable.	Low	Negligible	Negligible
Red Knot (*Calidris canutus rufa*)	**Endangered**	**Endangered**	N/A	Prefer open beaches, mudflats, and coastal lagoons where they feast on molluscs, crustaceans, and other invertebrates. Migrant only; nests in far north.	The Site does not appear to contain suitable habitat.	Negligible	Low	Low
Red-headed Woodpecker (*Melanerpes erythrocephalus*)	**Endangered**	**Endangered**	N/A	Prefer open beaches, mudflats, and coastal lagoons where they feast on molluscs, crustaceans, and other invertebrates.	The Site does not appear to contain potentially suitable habitat.	Negligible	Negligible	Negligible
Rusty Blackbird (*Euphagus carolinus*)	**Special Concern**	**Special Concern**	Cornell Lab of Ornithology (2023a), KAL 2022 field studies	Prefers wet wooded or shrubby areas (nests at edges of boreal wetlands and coniferous forests). These areas include bogs, marshes, and beaver ponds.	Moist forests and treed and thicket swamps on the Site provide suitable habitat. Rusty Blackbird was detected in a swamp (SWD3-2) south of the Tay River in 2022.	High	High	High
Short-eared Owl (*Asio flammeus*)	**Threatened**	**Special Concern**	Birds Canada et al. (2009)	Lives in open areas such as grasslands, marshes, and tundra where it nests on the ground and hunts for small mammals.	The Site does not appear to contain potentially suitable habitat.	Low	Low	Low
Wood Thrush (*Hylocichla mustelina*)	**Special Concern**	**Threatened**	Birds Canada et al. (2009), California Academy of Sciences and National Geographic Society (2023), Cornell Lab of Ornithology (2023a), MNRF (2023a), KAL 2021 and 2022 field studies	Lives in mature deciduous and mixed (conifer-deciduous) forests. They seek moist stands of trees with well-developed undergrowth and tall trees for singing and perching. Usually build nests in Sugar Maple or American Beech.	This species was repeatedly observed throughout forested and treed swamp habitats in 2021 and 2022.	High	High	High

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Yellow Rail (*Coturnicops noveboracensis*)	**Special Concern**	**Special Concern**	N/A	Lives deep in the reeds, sedges, and marshes of shallow wetlands, where they nest on the ground. The marshy areas used by Yellow Rails have an overlying dry mat of dead vegetation that is used to make roofs for nests.	The Site does not appear to contain potentially suitable habitat. Marsh habitats within Grants Creek Provincially Significant Wetland south of the Site may provide suitable nesting habitat.	Negligible	Negligible	Negligible
Mammals								
Eastern Wolf (*Canis* sp. cf. *lycaon)*	**Threatened**	**Special Concern**	N/A	Not restricted to a specific habitat type but typically occurs in deciduous and mixed forest landscapes.	This species only occurs in Algonquin Provincial Park and surrounding townships, along with other areas in central Ontario including in and around Killarney Provincial Park, Kawartha Highlands Signature Site, and Queen Elizabeth II Wildlands (MECP, 2019a).	None	None	None
Eastern Cougar (*Puma concolor*)	**Endangered**	**No Status**	N/A	Lives in large, undisturbed forests or other natural areas where there is little human activity.	The Site does not contain suitable habitat.	None	Negligible	Negligible
Eastern Small-footed Myotis (*Myotis leibii*)	**Endangered**	**Not Listed**	Humphrey (2017)	In the spring and summer, Eastern Small-footed Myotis will roost in a variety of habitats, including in or under rocks, in rock outcrops, in buildings, under bridges, or in caves, mines, or hollow trees. Overwinters in caves and abandoned mines.	Forests on the Site may could provide suitable roosting locations and open areas could provide suitable foraging habitat. However, this species was not detected via acoustic monitoring in 2021 or 2022. It does not appear be present in the vicinity.	Low	Low	Low
Gray Fox (*Urocyon cinereoargenteus*)	**Threatened**	**Threatened**	N/A	Lives in deciduous forests and marshes. Their dens are usually found in dense shrubs close to a water source, but they will also use rocky areas, hollow trees, and underground burrows dug by other animals.	The range of this species has recently been reduced to west of Lake Superior in the Rainy River District and on Pelee Island in west Lake Eerie (MECP, 2020a).	None	None	None
Little Brown Myotis (*Myotis lucifugus*)	**Endangered**	**Endangered**	Humphrey and Fotherby (2019), KAL 2021 and 2022 field studies	During the day they roost in trees and buildings. They often select attics, abandoned buildings, and barns for summer colonies where they can raise their young. They can squeeze through very tiny spaces (as small as six millimetres across) allowing them access to many different roosting areas.	Forests on the Site could provide suitable roosting habitat and open areas could provide suitable foraging habitat. This species was detected across the Site and peripheral areas during acoustic monitoring surveys in 2021 and 2022.	High	High	High

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						Habitat	Individuals	
Northern Myotis / Northern Long-eared Bat (*Myotis septentrionalis*)	**Endangered**	**Endangered**	Humphrey and Fotherby (2019); NatureServe Canada (2021) – in region	Associated with deciduous and mixed forests, choosing to roost under loose bark and in the cavities of trees. They forage along and within forests as well as in hayfields and pastures adjacent to mixed forests.	Forests on the Site may could provide suitable roosting locations and open areas could provide suitable foraging habitat. However, this species was not detected via acoustic monitoring in 2021 or 2022. It does not appear be present in the vicinity.	Low	Low	Low
Tri-colored Bat / Eastern Pipistrelle (*Perimyotis subflavus*)	**Endangered**	**Endangered**	Humphrey and Fotherby (2019); NatureServe Canada (2021) – in region	Roosts mainly in trees during summer; overwinters in caves and mines along with other species, but often uses deeper parts of the hibernaculum. Foraging occurs in forested riparian areas, over water, and within gaps in forest canopies.	Forests on the Site could provide suitable roosting habitat and open areas could provide suitable foraging habitat. This species was detected across the Site and peripheral areas during acoustic monitoring surveys in 2021 and 2022.	High	High	High
Amphibians								
Western Chorus Frog (*Pseudacris triseriata*)	**Not Listed**	Great Lakes/ St. Lawrence population: **Threatened**	Ontario Nature (2019)	Inhabits forest openings around woodland ponds but can also be found in or near damp meadows, marshes, bottomland swamps, and temporary ponds in open country, or even urban areas.	Fish-free areas on the Site that hold water in the early spring (e.g., moist forests, treed and thicket swamps, ditches, etc.) could provide suitable habitat.	Moderate But the Site is not within a critical habitat area under SARA	Low No individuals were detected on the Site	None Neither the species nor its habitat is protected under relevant SAR legislation.
Arthropods								
American Bumble Bee (*Bombus pensylvanicus*)	**Special Concern**	**No Status**	COSEWIC (2018c) – in region	Habitat generalist. Requires a variety of habitat throughout it's life stages. Often found in or adjacent to open fields and meadows, grasslands, farmlands, and other undisturbed open habitats (Government of Canada, 2019).	The entire Site could be suitable ad habitat given that the species is a habitat generalist.	Moderate	Moderate	None Neither the species nor its habitat is protected under relevant SAR legislation.
Bogbean Buckmoth (*Hemileuca* sp. 1)	**Endangered**	**Endangered**	N/A	Restricted to open, chalky, low shrub fens containing large amounts of bogbean, an emergent wetland flowering plant.	The Site does not appear to contain potentially suitable habitat. Grants Creek Provincially Significant Wetland to the south of the Site may provide suitable habitat.	Low	Low	Low
Gypsy Cuckoo Bumble Bee (*Bombus bohemicus*)	**Endangered**	**Endangered**	N/A	Live in diverse habitats including open meadows, mixed farmlands, urban areas, boreal forest, and montane meadows. Host nests occur in abandoned underground rodent burrows and rotten logs.	Currently only known to occur in Pinery Provincial Park (MECP, 2019b).	None	None	None
Macropis Cuckoo Bee	**Not listed**	**Endangered**	N/A	Found in habitats supporting both Macropis bees and their	Has not been observed in Ontario in over 45 years (COSEWIC, 2011).	None	None	None

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						Habitat	Individuals	
(Epeoloides pilosulus)				food plant, Yellow Loosestrife (*Lysimachia*).				Neither the species nor its habitat is protected under relevant SAR legislation.
Monarch (*Danaus plexippus*)	**Special Concern**	**Special Concern**	KAL (K. Black) personal communication with MECP (C. Hann), 2021, California Academy of Sciences and National Geographic Society (2023), Toronto Entomologists' Association (2023)	Milkweeds are the sole food plant for Monarch caterpillars. These plants predominantly grow in open and periodically disturbed habitats such as roadsides, fields, wetlands, prairies, and open forests.	The Site contains milkweed in relatively small patches of meadow.	Moderate	Moderate	None Neither the species nor its habitat is protected under relevant SAR legislation.
Mottled Duskywing (*Erynnis martialis*)	**Endangered**	**No Status**	N/A	Requires host plants such as the New Jersey Tea and Prairie Redroot. These plants grow in dry, well-drained soils or alvar habitat within oak woodland, pine woodland, roadsides, riverbanks, shady hillsides, and tall grass prairies.	The Site does not appear to contain potentially suitable habitat.	Negligible	Negligible	Negligible
Nine-spotted Lady Beetle (*Coccinella novemnotata*)	**Endangered**	**No Status**	MNRF (2023a)	Occurs within agricultural areas, suburban gardens, parks, coniferous forests, deciduous forests, prairie grasslands, meadows, riparian areas, and isolated natural areas.	There have been no records of this species in Ontario since the mid-1990s (MECP, 2019c).	None	None	None
Rapids Clubtail *(Gomphus quadricolor)*	**Endangered**	**Endangered**	N/A	Inhabits a wide variety of riverine habitats ranging in size from the St. Lawrence River to small creeks. Larvae are typically found in microhabitats with slow to moderate flow and fine sand or silt substrates where they burrow into the stream bed. Adults disperse from the river after emerging and feed in the forest canopy and other riparian vegetation.	There are no records of this species in Lanark County (MECP, 2019d).	None	None	None
Rusty-patched Bumble Bee (*Bombus affinis*)	**Endangered**	**Endangered**	N/A	Can be found in open habitat such as mixed farmland, urban settings, savannah, open woods, and sand dunes.	The range of this species is limited to southwestern Ontario (MECP, 2019e).	None	None	None
Suckley's Cuckoo Bumble Bee (*Bombus suckleyi*)	**Endangered**	**No Status**	COSEWIC (2019) – in broad region	Habitat generalist. Host nests occur in meadows, old fields, farmlands, croplands, urban areas, and woodlands (COSEWIC, 2019).	The entire Site could provide suitable habitat given that the species is a habitat generalist. The mosaic of forests and meadow on the Site could provide suitable habitat. Although the Site may be	Moderate	Low	Low Presence is considered unlikely

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						Habitat	Individuals	
					within the species' range, there is limited data within the Perth region.			
Transverse Lady Beetle (*Coccinella transversoguttata*)	**Endangered**	**Special Concern**	N/A	Able to live in a wide range of habitats, including agricultural areas, suburban gardens, parks, coniferous forests, deciduous forests, prairie grasslands, meadows, and riparian areas.	There have been no records of the species in Ontario since 1990 (MECP, 2020b).	None	None	None
West Virginia White butterfly (*Pieris virginiensis*)	**Special Concern**	**No Status**	N/A	Lives in moist, deciduous woodlots. Requires a supply of toothwort, a small, spring-blooming plant that is a member of the mustard family, since if it the only food source for larvae.	Moist forests and deciduous swamps on the Site could provide suitable habitat, but toothwort was not observed on the Site.	Low	Low	None Neither the species nor its habitat is protected under relevant SAR legislation.
Yellow-banded Bumble Bee (*Bombus terricola*)	**Special Concern**	**Special Concern**	Wildlife Preservation Canada et al. (2023)	This species is a forage habitat generalist, able to use a variety of nectaring plants and environmental conditions. Can be found in mixed woodlands, particularly for nesting and overwintering, as well as a variety of open habitat such as native grasslands, farmlands, and urban areas.	The entire Site could be suitable ad habitat given that the species is a habitat generalist.	Moderate	Moderate	None Neither the species nor its habitat is protected under relevant SAR legislation.
Reptiles								
Blanding's Turtle (*Emydoidea blandingii*)	**Threatened**	**Endangered**	RVCA (2017a), Ontario Nature (2019), California Academy of Sciences and National Geographic Society (2023), MNRF (2023)	Quiet lakes, streams, and wetlands with abundant emergent vegetation. Also frequently occurs in adjacent upland forests.	Blanding's Turtle is known to occur in the Tay River and Grants Creek. Ponds at the golf course and the Tay River may provide suitable overwintering and breeding habitat. Tributaries and wetlands on the Site may act as travel corridors. Areas on the Site that are adjacent to surface water features may provide suitable nesting habitat.	High	Moderate (Not directly observed on the Site but know to occur in the vicinity)	High Presence in the Tay and Grants Creek defines the entire site as a mix Category 2 and 3 habitats.
Eastern Milksnake (*Lampropeltis triangulum*)	**Not Listed**	**Special Concern**	Ontario Nature (2019), California Academy of Sciences and National Geographic Society (2023), MNRF (2023a)	Found in variety of open, scrubby or edge habitats, including pastures.	Cultural meadows and cleared areas on the Site could provide suitable habitat.	Moderate	Moderate (Not directly observed on the Site but know to occur in the vicinity)	None Neither the species nor its habitat is protected under relevant SAR legislation.
Eastern Musk Turtle / Stinkpot (*Sternotherus odoratus*)	**Special Concern**	**Special Concern**	RVCA (2017a, b), Ontario Nature (2019), MNRF (2023a, b), California Academy of Sciences and National Geographic Society (2023), KAL 2021 and 2022 field studies	Found in ponds, lakes, marshes, and rivers that are generally slow-moving, have abundant emergent vegetation, and muddy bottoms that they burrow into for winter hibernation.	This species was observed on the Site in 2021 and 2022 in association with a golf course pond and the Tay River. Ponds at the golf course and the Tay River may provide suitable overwintering and breeding habitat. Tributaries and wetlands on the Site may act as travel corridors. Areas on the Site	High	High	Low The species is not protected under ESA. Perth is indicated as within a potential area of cricital habitat (https://www.sararegistry.gc.ca/virtual_sara/files/plans/rs_eastern_musk_turtle_e_proposed.pdf

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						Habitat	Individuals	
					that are adjacent to wetlands and watercourses may provide suitable nesting habitat. The Tay River north and east of the Site and Grants Creek south of the Site are known to provide habitat for Eastern Musk Turtle (RVCA, 2017a, b).			). As such, the federal government could extend SARA protections to the species for this project, but this is considered highly unlikely.
Eastern Ribbonsnake *(Thamnophis sauritus)*	**Special Concern**	**Special Concern**	McIntosh Perry (2012a), RVCA (2017b), Ontario Nature (2019), MNRF (2023a)	The Eastern Ribbonsnake is semi-aquatic. It is most frequently found along the edges of shallow ponds, streams, marshes, swamps, or bogs bordered by dense vegetation that provides cover. Abundant exposure to sunlight is also required, and adjacent upland areas may be used for nesting.	Areas adjacent to surface water features on the Site may provide suitable habitat. This species was observed on the Site by McIntosh Perry (2012a).	High	High	None Neither the species nor its habitat is protected under relevant SAR legislation.
Common Five-lined Skink (*Plestiodon fasciatus*)	Southern Shield population: **Special Concern**	Great Lakes/St. Lawrence population: **Special Concern**	N/A	Common Five-lined Skinks can be found underneath rocks on rocky outcrops in forest clearings.	The Site does not appear to contain potentially suitable habitat.	Negligible	Negligible	Negligible
Gray Ratsnake *(Pantherophis spiloides)*	Frontenac Axis population: **Threatened**	Frontenac Axis population: **Threatened**	Ontario Nature (2019), MNRF (2023a, b), California Academy of Sciences and National Geographic Society (2023), KAL 2021 field studies	Lives in a wide variety of woodland and open habitats across its range.	This species was observed basking on a rock pile in the Tay River in 2021. Most naturalized areas of the Site (i.e., not the golf course) provide suitable habitat.	High	High (Directly observed on northern edge of the Site)	High Observed presence defines the entire Site as a mix Category 2 and 3 habitats.
Midland Painted Turtle (*Chrysemys picta marginata*)	**Not Listed**	**Special Concern**	Ontario Nature (2019), California Academy of Sciences and National Geographic Society (2023), MNRF (2023a), KAL 2021 and 2022 field studies	Inhabits waterbodies such as ponds, marshes, lakes, and slow-moving creeks that have a soft bottom and provide abundant basking sites and aquatic vegetation.	This species was repeatedly observed in golf course ponds and along the Tay River in 2021 and 2022. Tributaries and wetlands on the Site may act as travel corridors. Areas on the Site that are adjacent to surface water features may provide suitable nesting habitat.	High	High	None Neither the species nor its habitat is protected under relevant SAR legislation.
Northern Map Turtle (*Graptemys geographica*)	**Special Concern**	**Special Concern**	Ontario Nature (2019), California Academy of Sciences and National Geographic Society (2023), MNRF (2023a), KAL 2022 field studies	Lives in rivers and lakeshores where it basks on emergent rocks and fallen trees throughout the spring and summer. In winter, they hibernate on the bottom of deep, slow-moving sections of river.	The species was observed basking on a rock in the Tay River east of the Site. Grants Creek adjacent to the Site may also provide suitable habitat. Areas on the Site that are adjacent to the Tay River or Grants Creek may provide suitable nesting habitat.	High	High	None Neither the species nor its habitat is protected under relevant SAR legislation.
Snapping Turtle (*Chelydra serpentina*)	**Special Concern**	**Special Concern**	McIntosh Perry (2012a), RVCA (2017b), Ontario	Spend most of their lives in the water. Prefer shallow waters so they can hide under the soft mud	Snapping Turtle was repeatedly observed on the Site in 2021 and 2022. Snapping Turtles are known	High	High	None

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						Habitat	Individuals	
			Nature (2019), California Academy of Sciences and National Geographic Society (2023), MNRF (2023a, b), KAL 2021 and 2022 field studies	and leaf litter with only their noses exposed to the surface to breathe.	to nest at the golf course and along the bank of the Peter Street bridge. Ponds at the golf course and the Tay River may provide suitable overwintering and breeding habitat. Tributaries and wetlands on the Site may act as travel corridors.			Neither the species nor its habitat is protected under relevant SAR legislation.
Spotted Turtle (*Clemmys guttata*)	**Endangered**	**Endangered**	N/A	Semi-aquatic and prefers ponds, marshes, bogs, and even ditches with slow-moving, unpolluted water and an abundant supply of aquatic vegetation.	Ponds at the golf course and the Tay River could provide suitable overwintering and breeding habitat. Tributaries and wetlands on the Site could act as travel corridors. Areas on the Site that are adjacent to wetlands and watercourses could provide suitable nesting habitat.	Low	Negligible Not identified as occurring the vicinity	Low
Wood Turtle (*Glyptemys insculpta*)	**Endangered**	**Threatened**	N/A	Prefers clear rivers, streams, or creeks with a slight current and sandy or gravelly bottom. Wooded areas are essential habitat but they are found in other habitats such as wet meadows, swamps, and fields.	Wooded areas on the Site may provide suitable habitat. The Tay River and Grants Creek south of the Site may provide suitable habitat.	Low	Negligible Not identified as occurring the vicinity	Low
Fish								
American Eel (*Anguilla rostrata*)	**Endangered**	**No Status**	MNRF (2023a)	Primarily nocturnal, hiding in soft substrate or submerged vegetation during the day.	The species is not known to occur in the Tay River or Grants Creek, but it occurs in upstream lakes (e.g., Christie Lake; MNRF (2023a)).	Low	Low	Low
Bridle Shiner (*Notropis bifrenatus*)	**Special Concern**	**Special Concern**	MNRF (2023a)	Prefers clear water with abundant vegetation over silty or sandy substrate.	Known to occur in the Tay River watershed. Tributaries on the Site could provide marginal habitat. Nearby Tay River and Grants Creek may provide suitable habitat, but no fish habitat is present directly on the Site	Low	Low	Low
Channel Darter (*Percina copelandi*)	**Special Concern**	**Special Concern**	N/A	Prefers clean streams and lakes with moderate current over sandy or rocky substrate.	This species is not known to occur in the Tay River or Grants Creek watersheds. Tributaries on the Site may could marginal habitat. Nearby Tay River and Grants Creek could provide suitable habitat if present in the area.	Low	Negligible	Negligible
Lake Sturgeon (*Acipenser fulvescens*)	**Endangered**	**No Status**	N/A	Only found in large lakes and rivers. Forages in cool water, 4-9 m deep over soft substrate; spawns in shallower, fast-flowing areas over rocks or gravel.	This species is not known to occur in the Tay River or Grants Creek watersheds. The Site does not contain suitable habitat. The Tay River is a warm water system and, in reaches adjacent to the Site, it is	None	None	None

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						Habitat	Individuals	
					shallower than the species' preferred depth.			
Northern Brook Lamprey (*Ichthyomyzon fossor*)	**Special Concern**	**Special Concern**	N/A	Inhabits clear, coolwater streams. The larval stage requires soft substrates such as silt and sand for burrowing which are often found in the slow-moving portions of a stream. Adults are found in areas associated with spawning, including fast flowing riffles comprised of rock or gravel.	This species is not known to occur in the Tay River or Grants Creek watersheds. The Site does not contain suitable habitat. The Tay River and Grants Creek are warm water systems and there is no evidence of riffles within the vicinity of the Site.	None	None	None
Northern Sunfish (*Lepomis peltastes*)	**Special Concern**	**Special Concern**	N/A	Lives in shallow vegetated areas of quiet, slow flowing rivers and streams, as well as warm lakes and ponds with sandy banks or rocky bottoms.	This species is not known to occur in the Tay River or Grants Creek watersheds. Tributaries on the Site may provide marginal habitat. Nearby Tay River and Grants Creek may provide suitable habitat, if present in the area.	None	None	None
River Redhorse (*Moxostoma carinatum*)	**Special Concern**	**Special Concern**	N/A	Lives in shallow vegetated areas of quiet, slow flowing rivers and streams, as well as warm lakes and ponds with sandy banks or rocky bottoms.	This species is not known to occur in the Tay River or Grants Creek watersheds. Tributaries on the Site may provide marginal habitat. Nearby Tay River and Grants Creek may provide suitable habitat, if present in the area.	None	None	None
Silver Lamprey (*Ichthyomyzon unicuspis*)	**Special Concern**	**Special Concern**	N/A	Requires clear water where they can find fish hosts, relatively clean stream beds of sand and organic debris for larvae to live in, and unrestricted migration routes for spawning. Larvae live 4-7 years in burrows (prefer soft substrates); filter-feed on plankton.	This species is not known to occur in the Tay River or Grants Creek watersheds. The Site does not contain suitable habitat. The Tay River may provide suitable habitat, if present in the area.	None	None	None
Vascular Plants								
American Chestnut (*Castanea dentata*)	**Endangered**	**Endangered**	N/A	Typical habitat is upland deciduous forests on sandy acidic soils. Occurs with Red Oak, Black Cherry, Sugar Maple, and beech.	The Sugar Maple forest (FOD5-1) in the southeastern portion of the Site could provide suitable habitat, but the species is not known to occur in the area.	Negligible	Negligible	Negligible
American Ginseng (*Panax quinquefolius*)	**Endangered**	**Endangered**	COSEWIC (2000)	Grows in rich, moist, but well-drained, and relatively mature, deciduous woods dominated by Sugar Maple, White Ash, and American Basswood.	The fresh-moist Sugar Maple – lowland ash forest (FOD6-1) patches on the Site could provide marginal habitat, but these areas have poor drainage.	Low	Low	Low

Species Name (*Taxonomic Name*)	Status under *Endangered Species Act* (ESA)	Status under Schedule 1 of the *Species at Risk Act* (SARA)	Observation Record Sources (within 10 km of the Site)	General Habitat Requirements	Site Suitability	Potential for Protected Elements[1]		Assessed Potential for Overall Negative Interactions with Protected Elements[2]
						Habitat	Individuals	
Black Ash (*Fraxinus nigra*)	**Endangered**	**No Status**	MNRF (2023a), KAL 2021 and 2022 field studies	Predominantly a wetland species found in swamps, floodplains, and fens.	Black Ash trees were observed in the SWD3-2 and SWD2-1 treed swamp ELC units in 2021 and 2022.	High	High	High
Butternut (*Juglans cinerea*)	**Endangered**	**Endangered**	McIntosh Perry (2012a), California Academy of Sciences and National Geographic Society (2023), MNRF (2023a), KAL 2021 and 2022 field studies	Commonly found in riparian habitats but is also found on rich, moist, well-drained loams and well-drained gravels, especially those of limestone origin.	Butternut trees were observed in the southern and southeastern portion of the Site in 2021 and 2022.	High	High	High
Eastern Prairie Fringed-orchid (*Platanthera leucophaea*)	**Endangered**	**Endangered**	N/A	Populations are found in three main habitat types: fens, tallgrass prairie, and moist old fields.	The Site does not appear to contain suitable habitat.	Negligible	Negligible	Negligible
Ogden's Pondweed *(Potamogeton ogdenii)*	**Endangered**	**Not Listed**	N/A	Ogden's Pondweed grows in clear, slow-moving streams, beaver ponds, and lakes.	Ponds at the golf course and tributaries on the Site could provide suitable habitat. The Tay River north and east of the Site and Grants Creek south of the Site could provide suitable habitat, , but the species is not known to occur in the area.	Low	Negligible	Negligible
Lichens								
Black-foam Lichen (*Anzia colpodes*)	**No Status**	**Threatened**	MNRF (2023b); NatureServe Canada (2021)	Grows on the trunks of mature deciduous trees growing on level or sloped land where high humidity is supplied by nearby wetlands, lakes, or streams. The most common host is Red Maple but it also occurs on White Ash, Sugar Maple, Red Oak, and very occasionally on other species.	Assumed to no longer occur in Ontario (COSEWIC, 2015).	None	None	None
Flooded Jellyskin (*Leptogium rivulare*)	**No Status**	**Special Concern**	MNRF (2023a, b)	Grows in seasonally flooded habitats, typically on the bark of deciduous trees, on rocks along the margins of seasonal ponds, and on rocks along shorelines and stream/riverbeds.	Treed swamps on the Site may provide suitable habitat.	Moderate	Moderate	Moderate

Species Name (*Taxonomic Name*)	Status under *Endangered Species Act* (ESA)	Status under Schedule 1 of the *Species at Risk Act* (SARA)	Observation Record Sources (within 10 km of the Site)	General Habitat Requirements	Site Suitability	Potential for Protected Elements[1]		Assessed Potential for Overall Negative Interactions with Protected Elements[2]
						Habitat	Individuals	
Pale-bellied Frost Lichen (*Physconia subpallida*)	**Endangered**	**Endangered**	N/A	Typically grows on the bark of hardwood trees such as White Ash, Black Walnut, and American Elm. Can also be found growing on fence posts and boulders.	There are no recent records of the species in the Lanark County area (MECP, 2019f).	None	None	None

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1 The potential for occurrence of protected habitats and individuals within the project area is estimated based on the following considerations:

	Habitat	Individuals
None	It is not possible for the habitat of the species to occur in proximity to the project site	The species is documented as no longer occurring in the ecoregion or could not occur in proximity to the project area.
Negligible	The usage of the project site as habitat is possible but would be highly unlikely/unusual.	Transient occurrence near the project area is possible but is very unlikely.
Low	The project site includes areas that could be used by the species as habitat, but such usage is considered unlikely given the quality of the feature, a lack of individuals in the broader area, or other (relative) site considerations.	Transient occurrence near the project area possible, but the species would be unlikely to use or require the area.
Moderate	The project site includes areas that could reasonably be expected to provide confirmed or defined habitat within a time frame relevant to the project.	The species occurs in the vicinity and could actively use the site, or transient occurrence should be anticipated.
High	The project site includes areas confirmed to actively provide habitat or to constitute habitat based on official habitat description guidance documents.	The species is confirmed as present on, and actively using the site.

2 The potential for negative project interaction with species and/or their habitat is estimated considering both the likelihood of presence and the general details of the project (e.g., timing, extent), and following the definitions below. If the potential differs for habitat and individuals, the higher value is reported, unless otherwise justified

	Habitat	Individuals
None	It is not possible for the species to occupy the site area due to access barriers.	The species is documented as no longer occurring in the ecoregion
Negligible	Negligible habitat potential, or low habitat potential and the project would not be anticipated to alter the habitat.	Negligible occurrence potential for presence, or absence during the entire span of the project.
Low	Low habitat potential, or medium habitat potential and the project would not be anticipated to alter the habitat.	Low occurrence potential for presence, or the project design excludes individuals in a non-harassing manner by default.
Moderate	Medium habitat potential, or high habitat potential and the project would not be anticipated to alter the habitat (as expressed by MECP).	Medium occurrence potential for presence, or the project design excludes individuals in accordance with agency guidelines/directives by default (i.e., outside of mitigation measures prescribed in this report).
High	The project area will alter identified habitat.	The project will interact with individuals.

Appendix H HDFA

Headwater Drainage Feature Assessment
Caivan Communities Perth

2023-01-31

Version 1

KILGOUR & ASSOCIATES LTD.
www.kilgourassociates.com

Project Number: CAIV 1193.1

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List of Acronyms and Abbreviations

EEM – Environmental Effects Monitoring
EIS – Environmental Impact Statement
IER – Integrated Environmental Review
KAL – Kilgour & Associates Ltd.
TCR - Tree Conservation Report

1.0 INTRODUCTION

This report is a Headwater Drainage Feature Assessment written by Kilgour & Associates Ltd. (KAL) on behalf of Caivan Communities (Caivan) in support of potential future residential development on Caivan's Western Annex Lands in Perth, Ontario. The report provides a detailed description of the headwater drainage features (HDFs) crossing and/or near to the Caivan property following the field methodologies identified with the *Evaluation, Classification and Management of Headwater Drainage Features Guidelines* (TRCA & CVC, 2014), herein the HDF Guidelines.

2.0 HEADWATER DRAINAGE FEATURES

2.1 Overview

This study identifies and describes 23 HDFs located on, or in close proximity to, the Caivan Property (Figure 1).

There are two main groups of channels, that flow across the property at some stage. The Caivan property consists of a mixture of manicured lawn (golf course), forest, meadow, and wetland. Adjacent lands consist of residential homes, downtown Perth, as well as the Tay River.

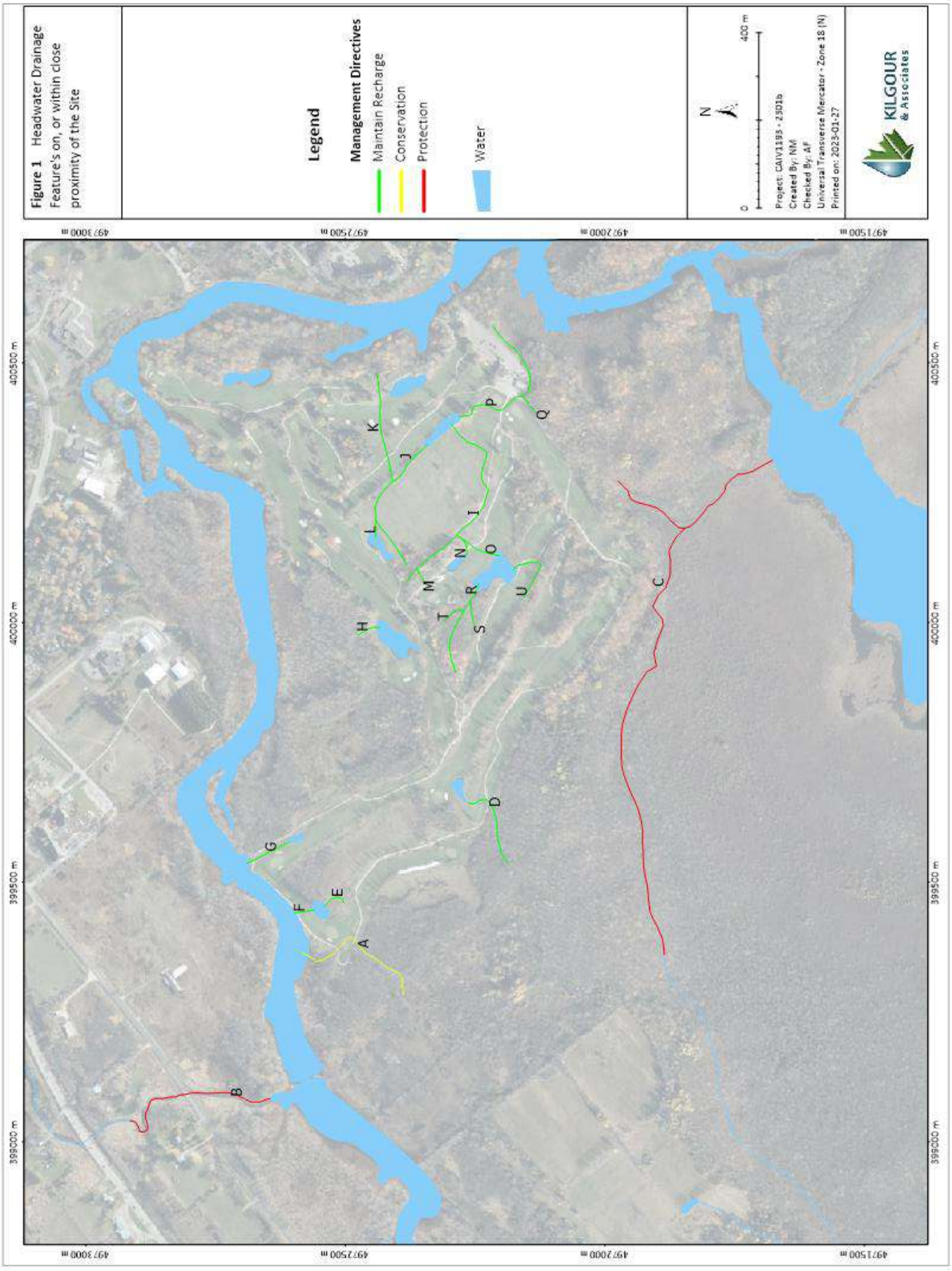
The first group of Headwater Drainage Features primarily, or in some cases entirely convey water from outside of the golf course footprint. The second group, alternatively, conveys water primarily, or entirely within the golf course footprint.

A brief visual inspection of the Site on June 10, 2021, coupled with wetland delineation, turtle surveys, and amphibian breeding surveys, suggested that very few tributaries on Site convey water beyond the spring freshet. In most cases, the tributaries located within the golf course footprint were constructed as overflow drainage feature for the golf course ponds during the spring freshet, and potentially during periods of large rain events.

2.2 Assessment Methodology

The Standard level of assessment follows Ontario Stream Assessment Protocol (OSAP) methodologies for descriptions of flow conditions, riparian vegetation and site features that are important components of habitat (headwater sampling protocol OSAP S4.M10), and includes an electrofishing survey to describe fish and fish habitat (OSAP S4.M10). Additionally, an ecological land classification (ELC) was applied to the riparian zone of each segment as a means of documenting community type and an assessment of amphibian breeding should be conducted following the Marsh Monitoring Protocol (MMP). A turtle survey was also completed according to the Ministry of Natural Resources and Forestry's (MNRF) protocol.

OSAP investigations of HDFs were conducted on June 10, 2021, May 10, 2022, and electrofishing surveys coupled with summer drainage feature surveys on July 20, 2021. The assessments of amphibian breeding, following the MMP, were conducted on May 19 and June 24, 2021, and turtle surveys following MNRF protocols on April 29, May 05, 09, 12, 25, and June 03, 2022.


Figure 1 Headwater Drainage Feature's on, or within close proximity of the Site
Legend
Management Directives
Maintain Recharge
Conservation
Protection
Water
N
0
400 m
Project: CAIV1193 - 2301a
Created By: NM
Checked By: AF
Universal Transverse Mercator - Zone 18 (N)
Printed on: 2023-01-27
KILGOUR & Associates
497 1500 m
497 2000 m
497 2500 m
497 3000 m
400500 m
400000 m
399500 m
399000 m
A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U

2.3 General Reach Descriptions

Images of Reaches A through U are available in Appendix A.

2.3.1 Periphery Reaches

2.3.1.1 Tributary A

Tributary A is a 280 m intermittent ephemeral drainage feature that originates in a thicket swamp, flows through lowland deciduous forest, then a short distance through the golf course via two culverts under cart paths, and into the Tay River via a wooded area.

The upstream portion of Tributary A mostly lacks in-stream vegetation. The reach along the golf course was mowed close to the banks, with in-stream vegetation dominated by cattails (Typha sp.), Reed Canary Grass (*Phalaris arundinacea*), Common Duckweed (*Lemna minor*), and bur-reed (*Sparganium sp.).* Within the upstream forested area, Tributary A has a well-defined channel with a mean bankfull width of approximately 4.5 m over mucky, organic substrate. This tributary appears to be a constructed feature as it is relatively linear, particularly along the upstream reach, where it ends at an old farm fence before transitioning into regenerating thicket swamp. This channel was potentially excavated to support previous agricultural uses on lands west of the upstream extent.

Intermittent pools were present in July during fish surveys; however, due to hydrologic disconnect and minimal standing water, fish surveys were not conducted. Tadpoles and Green Frog (*Rana clamitans*) individuals were observed in this reach, as well.

2.3.1.2 Tributary B

Tributary B is a perennial stream located north of the Tay River on the northwestern portion of the Site. It appears to receive flows from Blueberry Marsh Provincially Significant Wetland approximately 5km north of the Site; however, only ~185m of the downstream section of this tributary was assessed during field surveys. This section of the reach surveyed is located south of the Christie Lake Road bridge and flows through meadow surrounded by Silver Maple (*Acer saccharinum*) swamp followed by meadow marsh before reaching the Tay River.

Tributary B has a clearly defined bed and banks and evidence of sorted substrate. The substrate consisted of clay, sand, cobble, and gravel. In-stream vegetation consists of a mix of narrow- and broad-leaved emergent plants, robust emergent plants, floating plants, and submerged plants.

A total of 114 fish were captured including: Central Mudminnow (*Umbra limi*), White Sucker (*Catostomus commersoni*), Hornyhead Chub (*Nocomis biguttatus*), Golden Shiner (*Notemigonus crysoleucas*), Common Shiner (*Luxilus cornutus*), Blackchin Shiner (*Notropis heterodon*), Bluntnose Minnow (*Pimephales notatus*), Creek Chub (*Semotilus atromaculatus*), Brown Bullhead (*Ameiurus nebulosus*), Rock Bass (*Ambloplites rupestris*), Pumpkinseed (*Lepomis gibbosus*), Johnny Darter (*Etheostoma nigrum*). In addition to fish species, two frog species, American Bullfrog (*Lithobates catesbeianus*) and Northern Leopard Frog (*Lithobates pipiens*) were observed in this tributary.

2.3.1.3 Tributary C

Tributary C is a 550 m reach that flows through Grants Creek Provincially Significant Wetland from west and then southeast into Grants Creek. This intermittent stream has a braided channel through the wetland and appeared to have standing water and intermittent pools throughout the year (i.e., no evidence of organized surface flow). A defined channel form is more prevalent towards the downstream end near Grants Creek, but the upstream portion consists of complex microtopography of numerous small depressions and "fingers" within the wetland where water pools and eventually drains towards Grants Creek. These depressions and fingers may be relics of past flows or may represent wildlife corridors.

In the spring, these upstream areas contained patches of shallow standing water interspersed by raised hummocks. These hummocks, serving as the banks of the tributary were dominated by Speckled Alder (*Alnus incana*). The substrate surface of the wetland was mostly dry or surface-damp with some remnant puddles less than 0.1 m in depth. Where standing water was present, substrate consists of muck and detritus. There was no in-stream vegetation throughout this tributary.

No fish were observed in this reach due to low water levels; however, the downstream end of Tributary C near the confluence with Grants Creek likely provides direct and permanent fish habitat given the hydrological connection to the creek. Several frog species were observed within the vicinity of the feature, including American Toad (*Anaxyrus americanus*), Gray Treefrog (*Dryophytes versicolor*), Green Frog, and Spring Peeper (*Pseudacris crucifer*). This feature would likely provide ideal breeding and egg-laying habitat for amphibians.

2.3.1.4 Tributary D

Tributary D is a 100 m ephemeral reach that conveys spring runoff from a golf course pond into an Ash Forest (Fresh-Moist Ash Lowland Deciduous Forest Type: FODM7-2) on the western edge of the golf course. The upstream portion of this tributary is a grassed swale on the golf course that connects to the pond via a culvert under a cart path. Downstream of the cart path, the channel within the forested area appears to be a constructed feature because the channel is linear and ends abruptly at an area of non-excavated land. It is likely that this feature was created to convey overflow water from the pond to the forest.

Tributary D was dry throughout the late spring and summer of 2021. However, the presence of wetland obligate species in the transitional area between forest and swale, such as Fowl Mannagrass (*Glyceria striata*), Spikerush (*Eleocharis palustris*), Water-plantain (*Alisma* sp.), Marsh Speedwell (*Veronica scutellata*), and Purple Loosestrife (*Lythrum salicaria*; Figure 12), suggests that it may be ephemeral. Tributary D therefore potentially provides flow or water storage functions for a short time during and after the spring freshet and potentially following large rain events. Amphibians that were observed within the vicinity of this feature include American Bullfrog, American Toad, Gray Treefrog, and Spring Peeper.

2.3.2 Golf Course Reaches

2.3.2.1 Tributary E and F

Tributary E and F are 35 m and 80 m, respectively, and are located on the northwest corner of the golf course. These tributaries function as the inlet and outlet tributaries associated with the golf course pond they connect to. Both tributaries were only wet during the spring site visit, have no defined channel or in-stream vegetation, indicating they are ephemeral and only convey runoff during the spring freshet. Tributary F connects to the Tay River via a culvert under a cart path, so there is some potential for this tributary to contribute allochthonous material from the golf course pond to the Tay River. These tributaries do not have a defined channel, and spring freshet flows are conveyed through a swale of manicured lawn. Frogs were observed adjacent to this feature such as American Toad, Gray Treefrog, Green Frog, and Spring Peeper.

2.3.2.2 Tributary G

Tributary G is an 85m shallow grassed swale located on the northwest corner of the golf course and functions as an outlet for overflow of a golf course pond during spring freshet and potentially during large rainfall events. Surface flows are conveyed over the grassed swale to the Tay River through a culvert under a cart path. There is potential for this tributary to contribute allochthonous material from the golf course pond to the Tay River. Lack of a defined channel, in-stream vegetation, and substrate are indicators of an ephemeral stream.

2.3.2.3 Tributary H

Tributary H is a 35 m shallow grassed swale located on the northern portion of the golf course, and functions as the outlet for a golf course pond where it drains to a Silver Maple Swamp (ELC code SWD 3-2). The feature conveys surface flows over the manicured lawn for approximately 20 m before it enters the swamp. This feature effectively functions as an overflow feature for the pond during the spring freshet and during heavy rain events. Lack of a defined channel, in-stream vegetation, and substrate are indicators of an ephemeral stream.

2.3.2.4 Tributaries L K and J

Tributary L, K, And J are 30, 165, and 285 m ephemeral shallow grassed swales located in the centre of the golf course that drain south into a golf course pond and to the eastern edge of the golf course into a wetland that connects to the Tay River. These tributaries capture overflow from a golf course pond and assist in drainage of spring freshet runoff along the golf course.

Tributaries L, K, and J were dry during late spring and summer surveys; however, the presence of emergent aquatic vegetation within Tributary J such as Broadleaf Cattail (*Typha latifolia*) is an indication that this feature may function as water storage for a short period of time after the spring freshet.

2.3.2.5 Tributaries I M N and O

Tributaries I, N, and O are 400, 20, and 85 m ephemeral shallow grassed swales, respectively. Tributary M is a 30 m excavated linear drainage feature within a small patch of forest. All four of these tributaries are located in the centre of the golf course and drain south into a golf course pond. Tribuary N and O function as overflow drainage features for two separate golf course ponds.

All four of these tributaries were dry during late spring and summer surveys; however, presence of in-stream obligate aquatic vegetation in Tributary O and I such as Broadleaf Cattail and Reed Canary Grass (*Phalaris arundinacea*) suggest that these features may function as water storage for a short period of time after the spring freshet.

2.3.2.6 Tributary P and Q

Tributary P is a 275 m ephemeral drainage feature that captures the overflow runoff from a golf course pond via a culvert at the southern edge of the pond and drains south into a thicket swamp (SWT2-1). The upstream section of this feature is a shallow grassed swale that flows south towards a swamp thicket under a golf cart path via a culvert. Downstream of the culvert, the tributary has a defined channel and runs along and eventually into a swamp thicket. Tributary Q is a 54 m ephemeral excavated linear drainage feature that flows northeast into Tributary P alongside the swamp thicket downstream of the culvert.

2.3.2.7 Tributaries R S and T

Tributary R, S, and T are 35, 80, and 50 m ephemeral grassed swales that convey overland surface flow during spring freshet into a golf course pond. There is no substrate or in-stream vegetation, the riparian vegetation is dominated by a meadow community in the upstream reaches and manicured lawn on the golf course as the downstream section of Tributary R approaches the golf course pond. Lack of a defined channel, in-stream vegetation, and substrate are indicators of an ephemeral stream.

2.3.2.8 Tributary U

Tributary U is a 140 m ephemeral drainage feature located in the centre of the golf course. The upstream section of this tributary captures spring freshet runoff in a shallow swale within a small forest patch, and drains south, and then east along the golf course in a small grassed swale under a golf cart path via a culvert, and eventually into a golf course pond. Lack of a defined channel, in-stream vegetation, and substrate are indicators of an ephemeral stream.

2.3.3 Adjacent Watercourses

2.3.3.1 Grants Creek

Grants Creek is classified as a warm water system (RVCA, 2017a). Twenty-eight species of fish are known to occur in Grants Creek, including Brown Bullhead, Largemouth Bass, Smallmouth Bass, Northern Pike, Pumpkinseed, and White Sucker (RVCA, 2017a; MNDMNRF, 2022c). In 2016, Grants Creek was assessed as having low to moderate levels of instream wood structure in the form of branches and trees (RVCA, 2017a). The instream and riparian habitat complexity of Grants Creek is considered low within Grants Creek Provincially Significant Wetland (RVCA, 2017a). However, the wetland habitat provides the critical benefits of flood storage, water quality treatment, increased biodiversity, and important aquatic and terrestrial habitat (RVCA, 2017a). Substrates in Grants Creek near the Site are dominated by cobble, sand, and silt. Instream morphology here consists of runs and pools dominated by submerged plants.

Water quality in Grants Creek at the Glen Tay Road crossing (i.e., RVCA's closest monitoring station to the Site) was assessed as "Fair" for 2015-2017, indicating that water quality is usually protected but is occasionally threatened or impaired (RVCA, 2017a). From 2006 to 2017, average concentrations of total

phosphorous, Kjeldhal nitrogen, and aluminum at this location exceeded guidelines while average *Escherichia coli* concentrations fell below guidelines (RVCA, 2017a). Grants Creek was assessed as having more than a 30 m buffer along 94% of its banks, with buffer areas dominated by natural wetland and forest conditions, resulting in a near absence of signs of erosion (RVCA, 2017a).

2.3.3.2 Tay River

The Tay River is classified as warm water system (RVCA, 2017b). The following 14 fish species were observed in the Tay River near the Site by McIntosh Perry in May and August of 2010 (2012a): Central Mudminnow (*Umbra limi*), Brook Stickleback (*Culaea inconstans*), Rock Bass (*Ambloplites rupestris*), Pumpkinseed (*Lepomis gibbosus*), Bluegill (*Lepomis macrochirus*), Golden Shiner (*Notemigonus crysoleucas*), Banded Killifish (*Fundulus diaphanus*), Blacknose Shiner (*Notropis heterolepis*), Brown Bullhead (*Ameiurus nebulosus*), White Sucker (*Catostomus commersonii*), Common Shiner (*Luxilus cornutus*), Smallmouth Bass (*Micropterus dolomieu*), Northern Pike (*Esox lucius*), Shorthead Redhorse (*Moxostoma macrolepidotum*), Hornyhead Chub (*Nocomis biguttatus*), Logperch (*Percina caprodes*), Creek Chub (*Semotilus atromaculatus*), and Johnny Darter (*Etheostoma nigrum*). The substrate of areas within the Tay River sampled by McIntosh Perry (2012a) consisted of muck and detritus. Average water depth was approximately 2.5 m and the channel width was approximately 20 m during these fish community surveys (McIntosh Perry, 2012a). Fish habitat structures noted within the Tay River at that time included submergent and emergent vegetation and organic debris. Observed fish habitat within the Tay River was assessed as suitable for spawning, nursery, rearing, foraging, and as migration areas for baitfish and sportfish species. A weir associated with a bridge over the Tay River at the golf course may hinder fish migration, increase upstream sediment deposition, and reduce sediment transport downstream.

Surface water chemistry of the Tay River at Rogers Road was assessed by RVCA as “Good” over 2015 to 2017, indicating only a minor degree of threat or impairment with conditions rarely departing from natural or desirable levels (RVCA, 2017c). Average concentrations of total phosphorous, Kjeldhal nitrogen, and *E. coli* at this location during 2006 to 2017 fell below water quality guidelines (RVCA, 2017b). Most of the shoreline along the length of the Tay River has a natural buffer greater than 30 m, consisting mostly of forest, scrubland, wetland, and meadows (RVCA, 2017b). The Site encompasses two catchments of the Tay River; natural buffers are more prevalent in the Glen Tay catchment of the Tay River compared to the Town of Perth catchment where it is more urbanized (RVCA, 2017b, c). Riparian vegetation communities on Site along the Tay River are dominated by woody species (trees and/or shrubs; Figure 13). The shoreline of the Tay River is mowed to the banks along the northeastern and northwestern edges of the golf course (i.e., highly altered). Reaches of the Tay River close to the Site that were surveyed by RVCA had no signs of erosion (RVCA, 2017b, c).

2.4 Component Classifications

The following tables summarize the functions provided by the 21 reaches

Table 1 Hydrology Classification of the headwater drainage features on the Western Annex Lands, 2022

Drainage Feature	Hydrology Classification					
	Assessment Period	Flow Conditions		Flow Classification	Modifiers	Hydrological Function
		Description	(OSAP Code)			
A	May 10, 2022 June 10, 2021 July 20, 2021	Minimal Surface flow Intermittent pools Intermittent pools	3 2 2	Intermittent	No source other than spring run-off and after heavy rain. Input from a wetland and discharges into the Tay River	**Contributing Functions**
B	May 10, 2022 June 10, 2021 July 20, 2021	Surface flow substantial Surface flow substantial Surface flow substantial	5 5 5	Perennial		**Important Functions**
C	May 10, 2022 June 10, 2021 July 20, 2021	Standing Water Standing water Dry	2 1 1	Intermittent	No source other than spring freshet and heavy rain. Overflow from a golf course pond into a forest	**Valued Functions**
D	May 10, 2022 June 10, 2021 July 20, 2021	Standing water Standing water Dry	2 2 1	Ephemeral	A grassed swale with no source other than spring run-off and after heavy rain. Outlets into a wetland.	**Recharge Functions**
E	May 10, 2022	Standing water	2	Ephemeral	No source other than spring run-off and after heavy rain. Outlets into a pond	**Recharge Functions**
F	May 10, 2022	Standing water	2	Ephemeral	No source other than spring run-off and after heavy rain. Inlet from a pond, and discharges into the Tay River	**Recharge Functions**
G	May 10, 2022	Standing water	2	Ephemeral	No source other than spring run-off and after heavy rain. Inlet from a pond, and discharges into the Tay River	**Recharge Functions**
H	May 10, 2022	Standing water	2	Ephemeral	No source other than spring run-off and after heavy rain. Inlet from a pond and discharges into a wetland	**Recharge Functions**
I	May 10, 2022	Interstitial flow	3	Ephemeral	No source other than spring run-off and after heavy rain. Connects tributaries M, N, and O and drains into a pond. Inputs are two ponds	**Recharge Functions**
J	May 10, 2022	Standing water	2	Ephemeral	No source other than spring run-off and after heavy rain. The lower end branch of tributary L, which is input by a pond, and Tributary J discharges into a pond.	**Recharge Functions**
K	May 10, 2022	Standing water	2	Ephemeral	No source other than spring run-off and after heavy rain. Input from a pond and discharges into a wetland along the Tay River	**Recharge Functions**

Drainage Feature	Hydrology Classification					
	Assessment Period	Flow Conditions		Flow Classification	Modifiers	Hydrological Function
		Description	(OSAP Code)			
L	May 10, 2022	Dry	1	Ephemeral	No source other than spring run-off and after heavy rain. Input from a pond and connects to both tributaries K and J which discharge into a wetland and pond	**Recharge Functions**
M	May 10, 2022	Standing water	2	Ephemeral	No source other than spring run-off and after heavy rain. Discharges into tributary I	**Recharge Functions**
N	May 10, 2022	Standing water	2	Ephemeral	No source other than spring run-off and after heavy rain Outflow from pond and discharges into tributary I	**Recharge Functions**
O	May 10, 2022	Interstitial flow	3	Ephemeral	No source other than spring run-off and after heavy rain Outflow from pond and discharges into tributary I	**Recharge Functions**
P	May 10, 2022	Interstitial flow	3	Ephemeral	No source other than spring run-off and after heavy rain Outflow from pond and discharges into adjacent wetland	**Recharge Functions**
Q	May 10, 2022	Minimal surface flow	2	Ephemeral	No source other than spring run-off and after heavy rain. Discharges into tributary P	**Recharge Functions**
R	May 10, 2022	Standing water	2	Ephemeral	No source other than spring run-off and after heavy rain	**Recharge Functions**
S	May 10, 2022	Standing water	2	Ephemeral	No source other than spring run-off and after heavy rain	**Recharge Functions**
T	May 10, 2022	Standing water	2	Ephemeral	No source other than spring run-off and after heavy rain	**Recharge Functions**
U	May 10, 2022	Standing water	2	Ephemeral	No source other than spring run-off and after heavy rain	**Recharge Functions**

Table 2 Riparian Classification for headwater drainage features on the Western Annex Lands, 2022

Drainage Feature	Riparian Classification			
	OSAP Descriptions	**OSAP Riparian Codes**	**ELC Codes**	**Riparian Conditions**
A	RUB - Forest LUB - Forest	RUB - 5 LUB - 5	FOM FOM	**Important Functions**
B	RUB - Wetland LUB - Wetland	RUB - 7 LUB - 7	FOM FOM	**Important Functions**
C	RUB - Wetland LUB - Wetland	RUB - 7 LUB - 7	SWT SWT	**Important Functions**
D	RUB - Lawn LUB - Lawn	RUB - 2 LUB - 2	- -	**Limited Functions**
E	RUB - Lawn LUB - Lawn	RUB - 2 LUB - 2	- -	**Limited Functions**
F	RUB - Lawn LUB - Lawn	RUB - 2 LUB - 2	- -	**Limited Functions**
G	RUB - Lawn LUB - Lawn	RUB - 2 LUB - 2	- -	**Limited Functions**
H	RUB - Meadow LUB - Meadow	RUB - 2 LUB - 2	- -	**Limited Functions**
I	RUB - Lawn LUB - Lawn	RUB - 2 LUB - 2	- -	**Limited Functions**
J	RUB - Lawn LUB - Lawn	RUB - 2 LUB - 2	- -	**Limited Functions**
K	RUB - Lawn LUB - Lawn	RUB - 2 LUB - 2	- -	**Limited Functions**
L	RUB - Lawn LUB - Lawn	RUB - 2 LUB - 2	- -	**Limited Functions**
M	RUB - Forest LUB - Forest	RUB - 5 LUB - 5	FOM FOM	**Limited Functions**
N	RUB - Lawn LUB - Lawn	RUB - 2 LUB - 2	- -	**Limited Functions**
O	RUB - Lawn LUB - Lawn	RUB - 2 LUB - 2	- -	**Limited Functions**
P	RUB - Lawn LUB - Wetland	RUB - 2 LUB - 7	- SWT	**Important Functions**
Q	RUB - Lawn LUB - Wetland	RUB - 2 LUB - 7	- SWT	**Important Functions**
R	RUB - Meadow LUB - Meadow	RUB - 4 LUB - 4	CUM CUM	**Limited Functions**
S	RUB - Meadow LUB - Meadow	RUB - 4 LUB - 4	CUM CUM	**Limited Functions**
T	RUB - Meadow LUB - Meadow	RUB - 4 LUB - 4	CUM CUM	**Limited Functions**
U	RUB - Lawn LUB - Lawn	RUB - 2 LUB - 2	- -	**Limited Functions**

Table Notes: RUB – right upstream bank, LUB – left upstream bank

Table 3 Fish and Fish Habitat Classification for the headwater drainage features on the Western Annex Lands, 2022

Drainage Feature	Riparian Classification		
	Fish Observation · Fishing effort	Fish & Fish Habitat Designation*	Modifiers/Notes
A	Not enouh wet area to shock	Contributing Functions	Allochthonous transport through feature to the Tay River
B	Fish present, no SAR present; 776 SS = 2.22 s/m²	Important Functions	114 fish caught belonging to 12 species. All species are very common and highly tolerant
C	Not enouh wet area to shock	Contributing Functions	Allochthonous transport through feature to the Tay River
D	Dry	Limited Functions	
E	Dry	Limited Functions	
F	Dry	Contributing Functions	Allochthonous transport through feature to the Tay River
G	Dry	Contributing Functions	Allochthonous transport through feature to the Tay River
H	Dry	Limited Functions	
I	Dry	Limited Functions	
J	Dry	Limited Functions	
L	Dry	Limited Functions	
K	Dry	Contributing Functions	Allochthonous transport through feature to the Tay River
M	Dry	Limited Functions	
N	Dry	Limited Functions	
O	Dry	Limited Functions	
P	Dry	Limited Functions	
Q	Dry	Limited Functions	
R	Dry	Limited Functions	
S	Dry	Limited Functions	
T	Dry	Limited Functions	
U	Dry	Limited Functions	

Table 4 Terrestrial Classifications on the Western Annex Lands, 2022

Drainage Feature	Description	Amphibians	Terrestrial Classification
A	This reach provides habitat to the adjacent wetland upstream and provides a corridor the Tay River downstream	Eggs, tadpoles, and Green Frogs were observed in the feature.	Valued Function
B	There is wetland habitat adjacent to the feature, and it could provide a corridor from the wetland upstream to the Tay River downstream.	Frogs were observed wihtin this feature (Northern Leopard Frog and Green Frog).	Valued Function
C	This reach is within a wetland and connects to the Tay River downstream	Frogs were observed adjacent to this feature (American Toad, Gray Treefrog, Green Frog, Spring Peeper)	Important Functions
D	There is no wetland habitat present. This feature connects a forest to a golf course pond, and as such is not considered a corridor.	Frogs were observed in the vicinity of this feature (American Bullfrog, American Toad, Gray Treefrog, Spring Peeper)	Limited Functions
E	There are no adjacent wetland areas, This reach discharges into a golf course pond.	Frogs were observed within the vicinity of this feature (American Bullfrog, American Toad, Gray Treefrog, Green Frog, Spring Peeper)	Limited Functions
F	There are no adjacent wetland areas. This feature is a grassed swale. This reach connects a golf course pond to the Tay River. It is unlikely that the riparian vegetation (manicured lawn) would provide a corridor	Frogs were observed within the vicinity of this feature (American Bullfrog, American Toad, Gray Treefrog, Green Frog, Spring Peeper)	Limited Functions
G	There are no adjacent wetland areas. This reach connects a golf course pond to the Tay River. It is unlikely that the riparian vegetation (manicured lawn) would provide a corridor	No frogs were observed in the vicinity of this feature	Limited Functions
H	There is wetland habitat downstream of this feature; however, it connects to a golf course pond and as such is not considered a corridor.	No frogs were observed in the vicinity of this feature	Limited Functions
I	There are no adjacent wetland areas. This tributary connects two ponds on the golf course; however, it is unlikley that the riparian vegetation (manicured lawn) would provide a corridor	No frogs were observed in the vicinity of this feature	Limited Functions
J	There are no adjacent wetland areas. This tributary connects two ponds on the golf course; however, it is unlikley that the riparian vegetation (manicured lawn) would provide a corridor	No frogs were observed in the vicinity of this feature	Limited Functions
L	There are no adjacent wetland areas. This tributary connects two ponds on the golf course; however, it is unlikley that the riparian vegetation (manicured lawn) would provide a corridor	No frogs were observed in the vicinity of this feature	Limited Functions
K	This stream connects a pond to a wetland. While there is a connection to a wetland, the upstream reach is a golf course pond, and the feature is tile drained underground across the golf course. As such, it is not considered a corridor.	No frogs were observed in the vicinity of this feature	Limited Functions
M	There are no adjacent wetland areas.	No frogs were observed in the vicinity of this feature	Limited Functions
N	There are no adjacent wetland areas.	No frogs were observed in the vicinity of this feature	Limited Functions
O	There are no adjacent wetland areas.	No frogs were observed in the vicinity of this feature	Limited Functions

Drainage Feature	Description	Amphibians	Terrestrial Classification
P	There is wetland habitat downstream of this feature; however, it connects to a golf course pond and as such is not considered a corridor.	No frogs were observed in the vicinity of this feature	Limited Functions
Q	There is wetland habitat downstream of this feature; however, it connects to a golf course pond and as such is not considered a corridor.	No frogs were observed in the vicinity of this feature	Limited Functions
R	There are no adjacent wetland areas.	No frogs were observed in the vicinity of this feature	Limited Functions
S	There are no adjacent wetland areas.	No frogs were observed in the vicinity of this feature	Limited Functions
T	There are no adjacent wetland areas.	No frogs were observed in the vicinity of this feature	Limited Functions
U	There are no adjacent wetland areas.	No frogs were observed in the vicinity of this feature	Limited Functions

2.5 Reach Summary

Dimensions of the Headwater Drainage Features are summarized in Table 5 below.

Drainage Feature	Length (m)	Mean Bankfull Width (m)	Mean Wetted Width (m)	Mean Depth (m)
A	280	7.5	4.7	0.276667
B	185*	8	5.7	0.3
C	550	-	0.7	0.55
D	100	5.8	3.166667	0.33
E	80	0.983333	2.333333	0.056667
F	35	4.2	0.7	0.055
G	85	0.775	2.6	0.085
H	35	4.05	1.9	0.13
I	400	4.066667	2.233333	0.165
J	285	3.733333	1.416667	0.11
L	30	0.92	-	-
K	165	1.82	0.65	0.12
M	30	1	1.6	0.41
N	20	3.1	2.8	0.3
O	85	4.1	2.65	0.275
P	275	4.2	1.966667	0.146667
Q	54	3.1	0.54	0.22
R	35	3.75	0.65	0.2
S	80	1.2	0.3	0.04
T	50	1	0.75	0.18
U	140	1.23	1.15	0.24

Table Notes: * = the area of the tributary assessed. In Tributary B the total length of the feature is 5 km, and it connects to the … provincially significant wetland

3.0 MANAGEMENT RECOMMENDATIONS

The classification categories identified in Section 2 provide the basis of the management recommendations provided here. The following flow chart (Figure 2) combines and translates the classification results to management recommendations.

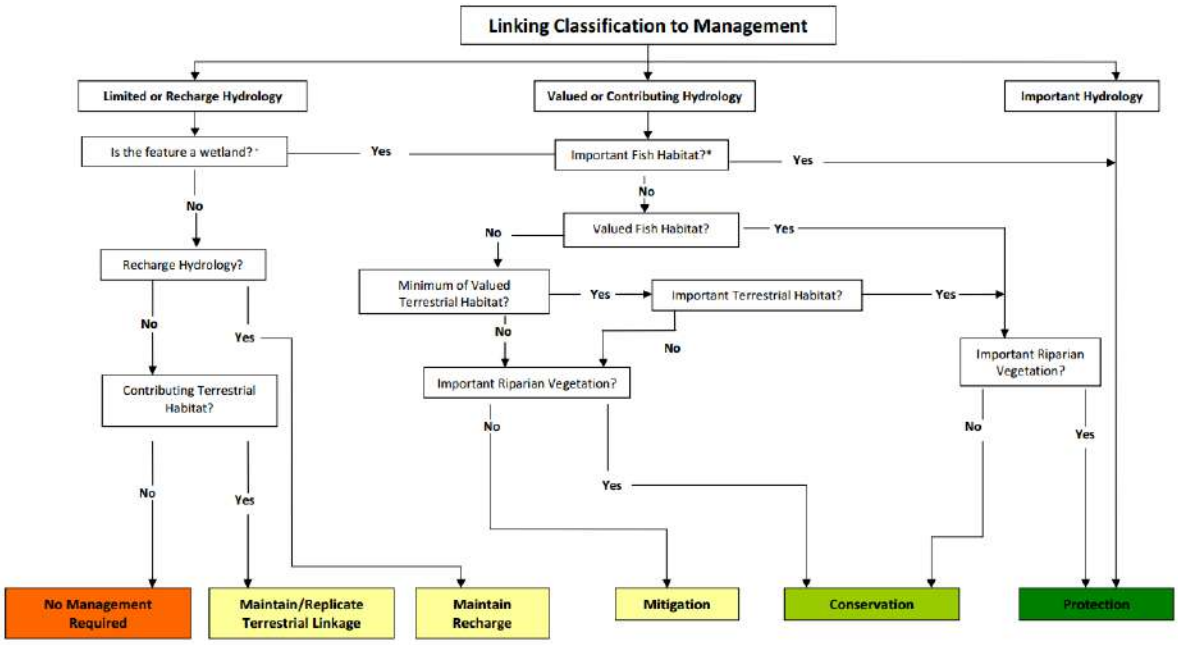


Figure 2 Headwater Drainage Feature Assessment (HDFA) flow chart providing direction on management options

3.1.1 Periphery Reaches

3.1.1.1 Tributary A

This feature is an intermittent excavated drainage feature and grassed swale with a direct connection from a thicket swamp to the Tay River. The channel however has been modified and made linear, and its drainage passes through two culverts and over a portion of the golf course. Following the HDFA Guide flow chart linking component classification to management directives, this reach:

1. Provides Contributing Hydrology;
2. Provides Important Riparian vegetation;
3. Provides Contributing Fish Habitat; and,
4. Provides Important Terrestrial Habitat.

This chain of classification descriptors leads to a management directive of **Conservation** for this reach. This feature may be maintained or, if necessary relocated, using natural channel design techniques to maintain or enhance overall productivity of the reach. In its current form as a linearized drainage channel

from a wetland to the Tay River, there could potentially be setbacks or riparian corridors maintained in the upstream section of the tributary where water is input from the swamp thicket. Downstream of the forest would not require a setback or riparian corridor, pe se. Any portion of this channel however, that is realigned away from serving directly as a linearized drainage feature, would require an enhanced riparian corridor. If catchment drainage will be removed due to diversion of stormwater flows, lost functions should be restored through enhanced lot level controls (e.g. restore original catchment using clean roof drainage). External flows must be maintained or replaced and the drainage feature must (re)connect to downstream features.

3.1.1.2 Tributary B

This feature is a perennial channel located within an area of silver maple swamp with a direct connection to the Tay River and Blueberry Marsh Provincially Significant Wetland. It provides direct fish habitat and is an integral part of the surrounding forest ecosite. Following the HDFA Guide flow chart linking component classification to management directives, this reach:

1. Provides Important Hydrology;
2. Provides Important Fish Habitat;
3. Provides Important Riparian Vegetation; and,
4. Provides Valued Terrestrial Habitat

The first factor leads to a management directive of **Protection**. Other factors such as its fish habitat and corridor functionality to the PSW upstream further add to this directive. As such, this reach may be maintained and/or enhanced, but cannot be relocated. The feature should be protected, and its riparian zone enhanced where feasible. The hydro-period must be maintained. Use natural channel design techniques or wetland design to restore and enhance existing habitat features if and where needed. Stormwater management systems must be designed to avoid impacts (i.e., sediment, temperature) to this tributary.

3.1.1.3 Tributary C

This feature is an intermittent braided channel that drains through the Grant's Creek Provincially Significant Wetland into Grant's Creek. Water is present in the spring as a result of seasonally extended contributions from wetlands with no standing water (i.e., surface-damp) by July. Standing water contributes to groundwater recharge and can function as amphibian breeding habitat. Following the HDFA Guide flow chart linking component classification to management directives, this reach:

1. Provides Valued Hydrology;
2. Provides Important Riparian vegetation;
3. Provides Contributing Fish habitat; and,
4. Provides Important Terrestrial Habitat.

This chain of classification leads to a management directive of **Protection**. Other factors such as its fish habitat and corridor functionality to the PSW upstream further add to this directive. As such, this reach may be maintained and/or enhanced, but cannot be relocated. The feature should be protected and its riparian zone enhanced where feasible. The hydro-period must be maintained. Use natural channel design techniques or wetland design to restore and enhance existing habitat features if and where needed.

Stormwater management systems must be designed to avoid impacts (i.e. sediment, temperature) to this tributary.

3.1.1.4 Tributary D

This feature is an ephemeral grassed swale that captures overflow from a golf course pond and discharges into a constructed linearized channel within a forest just west of the golf course. Following the HDFA Guide Flow chart linking component classification to management directives, this reach:

1. Provides Recharge Hydrology;
2. Provides Limited Riparian vegetation;
3. Does not provide fish habitat; and,
4. Provides Limited Terrestrial Habitat.

The chain of classification leads to a management directive of **Maintain Recharge**. This feature provides ephemeral flow and water storage functions during and (for a short time) after spring freshet and following large rain events only. Additionally, amphibians were heard calling during MMP surveys; however, there is no wetland areas present, and this feature connects a forest to a golf course pond, and as such, is not considered a corridor. There is no requirement to retain the feature per se, but overall water balance for the area must be maintained by providing mitigation measures to infiltrate clean stormwater.

3.1.2 Golf Course Reaches

3.1.2.1 Tributary E and F

Tributary E and F temporarily convey flows from a golf course pond into the Tay River during the spring freshet and potentially during large rainfall events. Following the HDFA Guide Flow chart linking component classification to management directives, this reach:

1. Provides Recharge Hydrology;
2. Provides Limited Riparian vegetation;
3. Does not provide fish habitat (except for F which Contributes Fish Habitat); and,
4. Provides Limited Terrestrial Habitat.

The chain of classification leads to a management directive of **Maintain Recharge**. There is no requirement to retain the feature per se, but overall water balance for the area must be maintained by providing mitigation measures to infiltrate clean stormwater.

3.1.2.2 Tributary G

Tributary G temporarily conveys overflow from a golf course pond to the Tay River during the spring freshet and potentially during large rainfall events. Following the HDFA Guide Flow chart linking component classification to management directives, this reach:

1. Provides Recharge Hydrology;

2. Provides Limited Riparian vegetation;
3. Provides Contributing Fish Habitat; and,
4. Provides Limited Terrestrial Habitat.

The chain of classification leads to a management directive of **Maintain Recharge**. There is no requirement to retain the feature per se, but overall water balance for the area must be maintained by providing mitigation measures to infiltrate clean stormwater.

3.1.2.3 Tributary H

Tributary H temporarily conveys overflow from a golf course pond to a wetland (swamp thicket) during the spring freshet and potentially during large rainfall events. While there is no defined channel, this feature contributes to the hydrologic recharge of the wetland. Following the HDFA Guide Flow chart linking component classification to management directives, this reach:

1. Provides Recharge Hydrology;
2. Provides Limited Riparian vegetation;
3. Does not provide fish habitat; and,
4. Provides Limited Terrestrial Habitat.

The first factor leads to a management directive of **Maintain Recharge**. There is wetland habitat downstream of this feature; however, it conveys overflow from a golf course pond, and as such is not considered a corridor. There is no requirement to retain the feature per se, but overall water balance for the area must be maintained by providing mitigation measures to infiltrate clean stormwater.

3.1.2.4 Tributary L, J, and K

Tributaries L and J temporarily convey overflow water from a golf course pond into another golf course pond, as well as a wetland during the spring freshet and potentially during large rainfall events. Tributary K conveys flow from Tributary through tile drainage into a wetland adjacent to the Tay River Following the HDFA Guide Flow chart linking component classification to management directives, these reaches:

1. Provides Recharge Hydrology;
2. Provides Limited Riparian vegetation;
3. Does not provide fish habitat; and,
4. Provides Limited Terrestrial Habitat.

The chain of classification leads to a management directive of **Maintain Recharge**. There is wetland habitat downstream of this feature; however, it conveys overflow from a golf course pond, through tile drainage underneath the golf course, and as such is not considered a corridor. There is no requirement to retain the feature per se, but overall water balance for the area must be maintained by providing mitigation measures to infiltrate clean stormwater.

3.1.2.5 Tributaries I M N and O

Tributaries I, M, N, and O temporarily convey spring freshet runoff to a golf course pond. Tributary N and O are sourced from a golf course pond. Following the HDFA Guide Flow chart linking component classification to management directives, these reaches:

1. Provides Recharge Hydrology;
2. Provides Limited Riparian vegetation (except for Tributary M which is Important Riparian vegetation);
3. Does not provide fish habitat; and,
4. Provides Limited Terrestrial Habitat.

The chain of classification leads to a management directive of **Maintain Recharge**. There is no requirement to retain the feature per se, but overall water balance for the area must be maintained by providing mitigation measures to infiltrate clean stormwater.

3.1.2.6 Tributary P and Q

Tributaries P and Q temporarily transport ephemeral flow or water storage functions during and (for a short time) after spring freshet and following large rain events only. The upstream section of Tributary P functions as overflow for a golf course pond, through a shallow grassed swale, and the downstream section of Tributary P, as well as Tributary Q, are roadside ditches that convey water to a wetland adjacent to the golf course. Following the HDFA Guide Flow chart linking component classification to management directives, these reaches:

1. Provides Recharge Hydrology;
2. Provides Important Riparian vegetation;
3. Does not provide fish habitat; and,
4. Provides Limited Terrestrial Habitat.

The chain of classification leads to a management directive of **Maintain Recharge**. There is no requirement to retain the feature per se, but overall water balance for the area must be maintained by providing mitigation measures to infiltrate clean stormwater.

3.1.2.7 Tributary R, S, and T

Tributaries R, S, and T temporarily convey surface flows during the spring freshet through a meadow alongside a small forest patch in the centre of the golf course into a golf course pond. Following the HDFA Guide Flow chart linking component classification to management directives, these reaches:

1. Provides Recharge Hydrology;
2. Provides Limited Riparian vegetation;
3. Does not provide fish habitat; and,
4. Provides Limited Terrestrial Habitat.

The first factor leads to a management directive of **Maintain Recharge**. There is no requirement to retain the feature per se, but overall water balance for the area must be maintained by providing mitigation measures to infiltrate clean stormwater.

3.1.2.8 Tributary U

Tributary U temporarily convey surface flows during the spring freshet alongside a small patch of forest and over a shallow grassed swale in the centre of the golf course into a golf course pond. Following the HDFA Guide Flow chart linking component classification to management directives, these reaches:

1. Provides Recharge Hydrology;
2. Provides Limited Riparian vegetation;
3. Does not provide fish habitat; and,
4. Provides Limited Terrestrial Habitat.

The first factor leads to a management directive of **Maintain Recharge**. There is no requirement to retain the feature per se, but overall water balance for the area must be maintained by providing mitigation measures to infiltrate clean stormwater.

4.0 CLOSURE

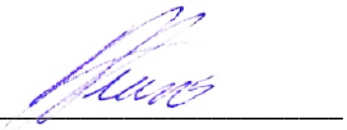
This report provides detailed descriptions of the HDFs on and/or near Caivan's property, as well as management recommendations to direct future development near those features. Points of clarification can be addressed to the undersigned.

Respectfully submitted,

KILGOUR & ASSOCIATES LTD.



Nick Moore, BSc
Biologist



Anthony Francis, PhD
Project Director

5.0 LITERATURE CITED

Toronto and Region Conservation Authority (TRCA) and Credit Valley Conservation (CVC). 2014. Evaluation, Classification and Management of Headwater Drainage Features Guideline.

Appendix A Site Photos

Tributary A



Tributary B



Tributary C



Tributary D



Tributary E





Tributary F





Tributary G



Tributary H



Tributary I



Tributary J



Tributary K



Tributary L



Tributary M



Tributary N



Tributary O



Tributary I



Tributary P





Tributary Q



Tributary R



Tributary S



Tributary T



Tributary U


Azimuth/Bearing: 254° S74W (4544mils-True (±13°)
Elevation Angle: -09.5°
Horizon Angle: 00.1°
Zoom: 1.0X
Trib U


Date & Time: Wed, Apr 06, 2022, 15:19:28 EDT
Position: 18 N 409140 4972127 (±10.4m)
Altitude: 140m (±14.3m)
Datum: WGS-84
Azimuth/Bearing: 031° N31E (0551mils-True (±13°)
Elevation Angle: -13.8°
Horizon Angle: 02.2°
Zoom: 1.0X
Trib U

Appendix I Tree Preservation Plan

1.0 INTRODUCTION

Kilgour & Associates Ltd. (KAL) was retained by Caivan (Perth GC) Ltd. ("Caivan") to provide a Tree Preservation Report (TPR) in support of their application for the proposed development of the Western Annex Lands (141 Peter Street) in Perth, Lanark County, Ontario ("the Site"; Figure 1). The purpose of a TPR is to demonstrate how tree cover will be retained on sites subject to development using a "design with nature approach" to planning and engineering. A design-with-nature approach incorporates the natural features of a site into the design and engineering of a proposed development.

Field surveys in 2021 and 2022 delineated vegetation communities on the Site, and at present, anticipated areas of vegetation clearing have been identified; however, a tree survey to characterize anticipated impacts to trees on-site has not yet been completed. This report identifies and describes treed areas on-site prior to development and indicates areas that are likely to be impacted under the current plans. Subsequent tree surveys within impacted areas are proposed for spring and summer 2023 to more fully characterize the extent of impacts to individual trees.

Trees within the Town of Perth are valued for their economic, social and environmental benefits; as such, a permit may be required for the injuring or destruction of trees under the Tree Conservation Bylaw (Bylaw No. 4892). According to the Bylaw, a technical report may be required to support a permit application, as indicated by the Director of Planning and Protective Services for the Town of Perth. This report serves as a preliminary technical report, characterizing areas of potential tree removal; subsequent updates to this report following the tree surveys would further document impacts to individual trees and would support permit applications.

2.0 PROPERTY INFORMATION

The Site is owned by Caivan Communities (contact person: Hugo Lalonde) and is currently in the planning phase for a new residential community encompassing a portion of the Western Annex Lands (141 Peter Street) in Perth, Lanark County, Ontario (Figure 1). The Site is located on a portion of the Perth Golf Course and adjacent undeveloped lands, which comprise wetlands and deciduous forests (Lots 1, 25, 26, and 27, Concessions 1 and 2). The Site is approximately 147 hectares (ha).

The Site is bordered by:

- The Tay River, forested lands, agricultural lands, and Christie Lake Road to the north;
- The Tay River and residential neighbourhoods in the Town of Perth to the east;
- Forested lands, Grants Creek Provincially Significant Wetland, and Grants Creek to the south; and
- Forested lands and agricultural lands to the west.

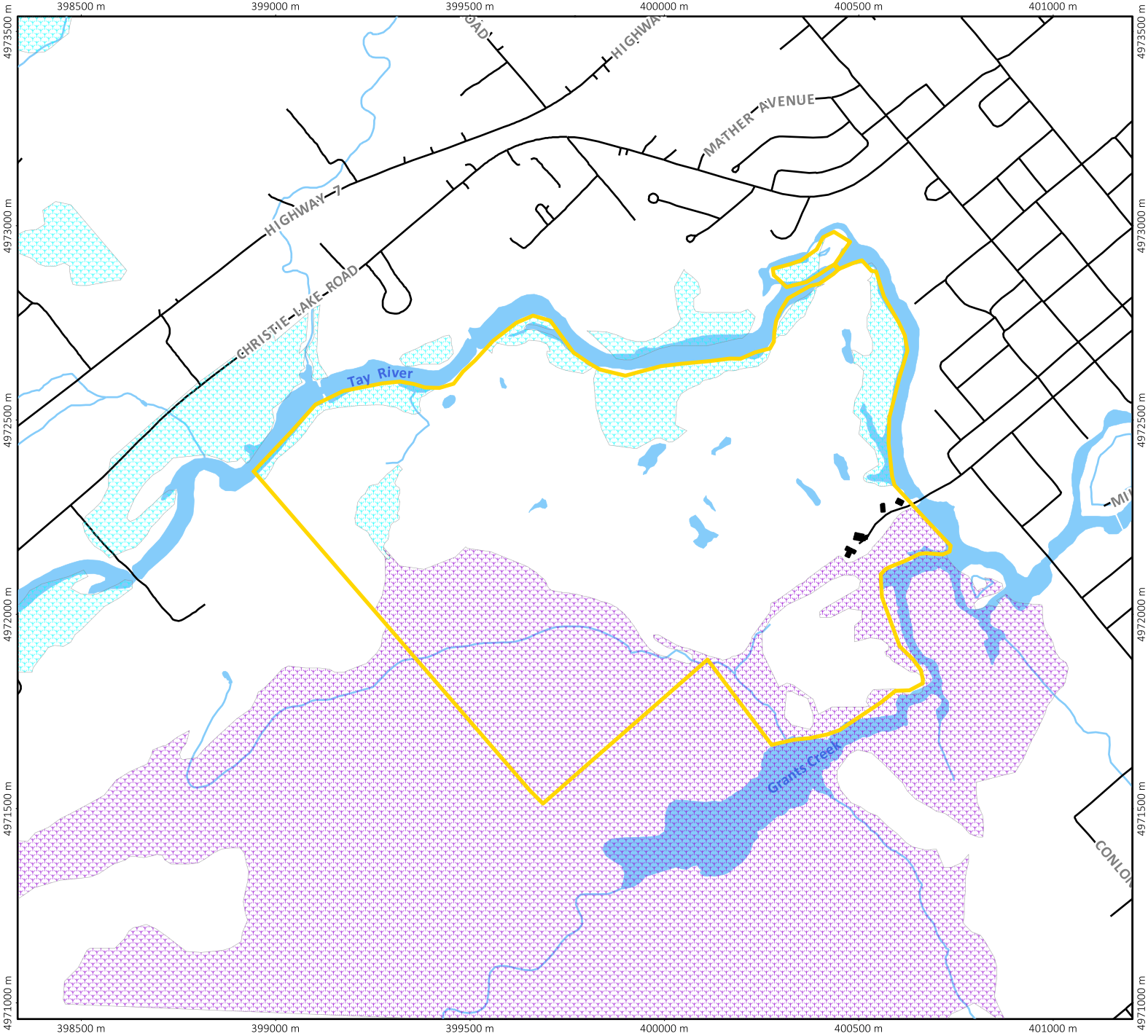


Figure 1 Map showing the location of the Site

Legend

- Site
- PWS (Existing boundary)
- Unevaluated Wetland
- Water

N

0 400 m

Project: CAIV1193 - 2203b
Universal Transverse Mercator - Zone 18 (N)

KILGOUR & Associates

2.1 Property Owner and Applicant Contact Information

Table 1 Organization, role, contact person, phone number, and email address for property owner and applicant

Organization	Role	Contact Person	Phone Number	Email Address
Caivan (Perth GC) Ltd.	Director, Land Development	Hugo Lalonde	613-518-1864, ext. 503	hugo.lalonde@caivan.com

2.2 Arborist Contact Information and Qualifications

Table 2 Organization, role, contact person, phone number, and email address for arborists

Organization	Role	Contact Person	Phone Number	Email Address
KAL	Biologist	Kesia Miyashita, MSc	(613) 260-5555	kmiyashita@kilgourassociates.com
KAL	Biologist	Anthony Francis, PhD	(613) 260-5555	afrancis@kilgourassociates.com

Kesia Miyashita (MSc) has over eight years of experience in environmental consulting and more than ten seasons of field experience in ecosystems in Alberta and British Columbia. During her career in environmental consulting, Ms. Miyashita has completed environmental assessments for a variety of major infrastructure projects and urban developments. Her expertise is in vascular and non-vascular plant ecology; she has performed vegetation community inventories, rare plant surveys and weed surveys in a variety of natural environments, including native forest, urban nature preserves, grasslands, and wetlands.

Anthony Francis (PhD) is a Senior Ecologist with 20 years' consulting experience to both government agencies and private industry. He has worked on a diversity of projects relating to species at risk (SAR), invasive species, terrestrial and aquatic habitat, environmental effects monitoring and mitigation, and fate/effects of contaminants. Within each of these subject areas, Dr. Francis has completed projects addressing specific site concerns and broader policy initiatives. Dr. Francis' academic background is in spatial ecology with a focus on tree species diversity. As a Senior Ecologist at KAL, he regularly completes TCRs, Environmental Impact Statements, and Integrated Environmental Reviews for land development projects throughout Ottawa and eastern Ontario. He is also a certified Butternut Health Assessor (BHA #104).

3.0 PROPOSED DEVELOPMENT

The proposed development involves the creation of a residential subdivision comprising 900 to 1000 units in the western portion of the Perth Golf Course (i.e., the back nine holes) and adjacent lands dominated by deciduous forest and cultural thicket. Proposed residential units consist of a combination of townhouses and single-family residences.

The proposed development will accommodate setbacks of 30 m from Grants Creek Provincially Significant Wetland and the Tay River over the majority of the project area; a few exceptions are noted to accommodate proposed roadways. Stormwater management plans are currently in development. The proposed development is anticipated to have no adverse impacts on surrounding surface water. Stormwater management ponds are anticipated to discharge to the Tay River and to the Grants Creek Provincially Significant Wetland.

The total development footprint covers 45.85 ha. All existing vegetation within this area will be removed as part of site preparation. Site preparation activities (e.g., vegetation clearing and grading) are anticipated to commence in late 2023 and continue into early 2024. Site servicing and construction of houses is planned to initiate in fall 2023, with the first home closing in May 2025.

A 4.11 ha pocket, however, is situated towards the western side of the development associated with an extended projection from the Grants Creek PSW (the “PWS Extension”). That small area, currently comprised primarily of cultural thick/thicket swamp, is proposed to be extensively renaturalized as discussed below.

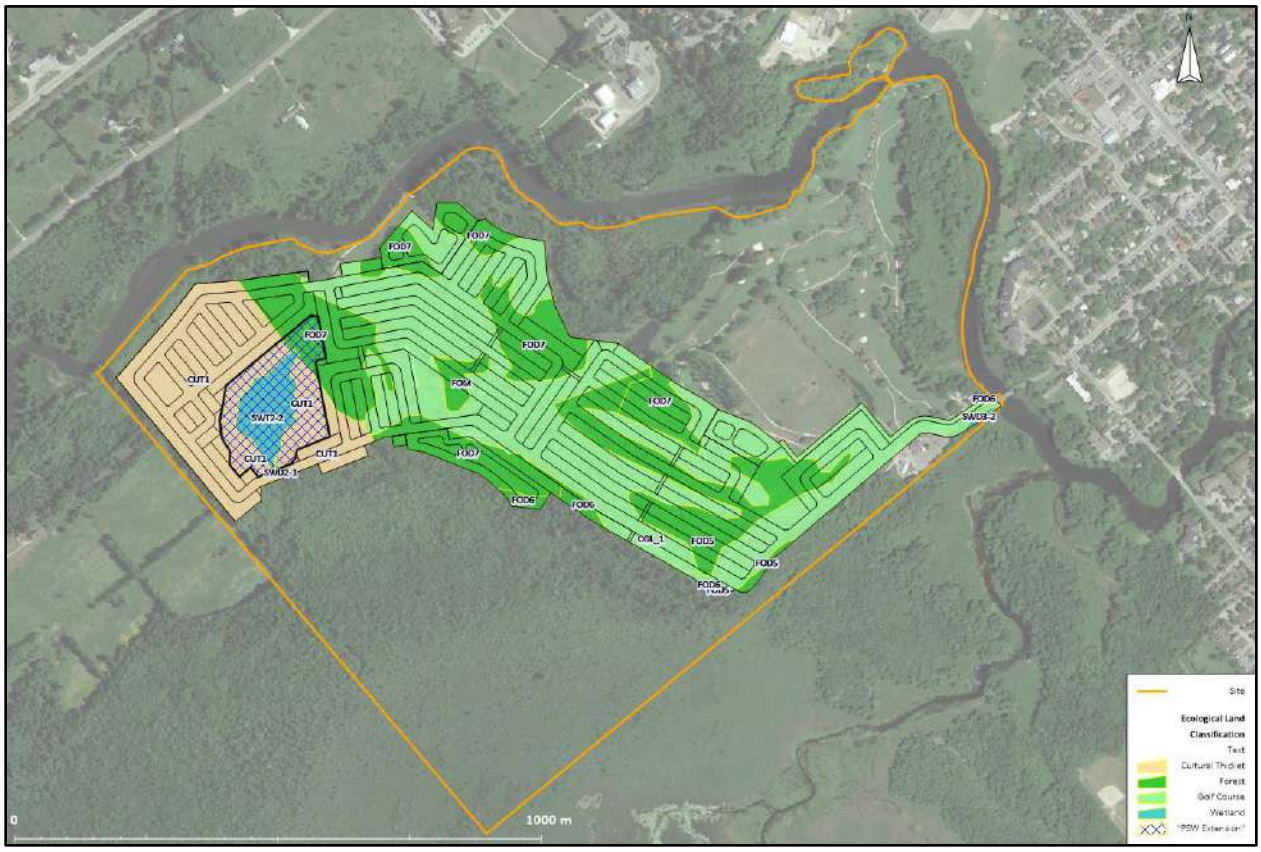


Figure 2 Map showing the proposed development and treed areas

4.0 EXISTING TREE COVER WITHIN THE DEVELOPMENT AREA

An Ecological Land Classification exercise (ELC) was undertaken on May 28, June 4, June 10, June 15 and July 14, 2021 and May 25, 2022 using standard ELC methods for Ontario (Lee et al., 1998). This method provides a consistent approach to identify, describe, name, and map vegetation communities or physiographic features on the landscape based on dominant plant species and soil composition. At present, a detailed inventory of trees on the Site has not yet been completed. Further tree surveys are planned for spring and summer 2023.

The results of the ELC differentiated predominantly treed units from open areas. When the current development plans were overlaid on the ELC maps, the extent of treed ecosites that will be subject to tree clearing could be identified (Table 3). Note that the 22.08 ha golf course area was characterized primarily as an open (i.e., not forested) ELC unit; however, manicured portions of the golf course include scattered standalone mature trees, with species such as Green Ash (*Fraxinus pennsylvanica*), White Pine (*Pinus strobus*), apple (*Malus* sp.), White Oak (*Quercus alba*), Sugar Maple (*Acer saccharum*), Silver Maple (*Acer saccharinum*), Jack Pine (*Pinus banksiana*), and Eastern Cottonwood (*Populus deltoides*). Such scattered, individual trees would be quantified and characterized as part of the upcoming tree inventory.

Table 3 Treed ELC Units and Anticipated Area of Required Tree Clearing

ELC Unit	Anticipated Extent of Tree Clearing (ha)
CUT1	7.76
FOD5	4.81
FOD6	0.46
FOD7	9.99
FOM	0.56
SWD2	0.04
SWD3	0.06
Sum	**23.68**

4.1 Trees Within Ecosites of the Development Area

Mineral Cultural Thicket Ecosite (CUT1)

The northwestern portion of the Site is comprised of a cultural thicket dominated by dense shrub cover including Common Prickly-ash, European Buckthorn, and a species of hawthorn. This vegetation community represents regeneration post-anthropogenic disturbance (i.e., agriculture). It includes remnant hedgerows dominated by Green Ash and Black Cherry, with Green Ash saplings present throughout thicket areas. Ground cover is minimal given the dense shrub cover, but patches of open areas include upland sedges, and grasses. Soils are variable but appear to consist mostly of sandy loams over shallow bedrock.

Dry-Fresh Sugar Maple – White Ash Deciduous Forest Type (FOD5)

The central portion of the golf course contains a remnant and irregularly shaped forest patch dominated by Sugar Maple, White Ash (*Fraxinus americana*), and White Oak. The canopy here also includes Basswood, American Elm (*Ulmus americana*), and Black Cherry. This degraded forest area relatively lacks shrub cover and understory vegetation and includes exposed rock over variable topography. Fringes of this forest area are dominated by European Buckthorn, Tartarian Honeysuckle (*Lonicera tatarica*), White Ash saplings, and Common Prickly-ash.

Fresh-Moist Sugar Maple – Lowland Ash Deciduous Forest Type (FOD6)

A small patch of lowland forest patches co-dominated by Sugar Maple and Green Ash with Eastern White Cedar (*Thuja occidentalis*) will be removed from the southeastern tip of the site. This forested area has evidence of disturbance (e.g., trash), likely due to proximity to the golf course, and representing the transition between adjacent wetland (swamp) and upland areas. The subcanopy primarily consists of Common Prickly-ash, followed by Green Ash saplings and European Buckthorn.

Fresh-Moist Ash Lowland Deciduous Forest Type (FOD7)

This vegetation type exists within a forested area in the central portion of the golf course, along the western edge of the golf course, and within and along the northwestern portion of the golf course. These areas are lowland forests dominated by Green Ash (**Error! Reference source not found.**). The canopy also includes scattered cover of White Willow (*Salix alba*), Black Poplar (*Populus nigra*), White Oak, and Bur Oak (*Quercus macrocarpa*). The subcanopy is dominated by European Buckthorn (*Rhamnus cathartica*) and Common Prickly-ash (*Zanthoxylum americanum*) and includes Bebb's Willow (*Salix bebbiana*). This ecosite is typically associated with moist to fresh moisture regimes and is characterized by well-drained to poorly-drained soils.

Mixed Forest Ecosite (FOM)

This degraded ecosite is associated with the eastern portion of the FOD5 forest patch described above and a small forest patch in the western portion of the golf course. These forest patches include a relatively unique mix of canopy species, likely due to management, that does not correlate with a more detailed ecosite or vegetation type per ELC. They contain a combination of more than 25% coniferous tree species cover and more than 25% deciduous tree species cover, making these units mixed forests. The canopy in these areas is co-dominated by Trembling Aspen (*Populus tremuloides*), White Ash, White Birch (*Betula papyrifera*), Scots Pine (*Pinus sylvestris*), and White Pine. The subcanopy is dense with European Buckthorn and White Ash saplings.

Black Ash Mineral Deciduous Swamp Type (SWD2-1)

A small connection point of the PWS Extension will be crossed by a new roadway. Trees here consist of Silver Maple, American Elm, and Eastern White Cedar. The understory is sparse in most areas and consists of a scattered cover of Black Ash saplings, and Speckled Alder**.**

Silver Maple Mineral Deciduous Swamp Type (SWD3-2)

A narrow ribbon of Silver Maple swamp extends into the southern edge of the entrance ROW at the Peter Street Bridge. In addition to Silver Maple, the canopy of these swamps contains Black Ash and American Elm. The subcanopy is relatively open in most areas, with fringes and lower-lying areas sometimes dominated by Speckled Alder, Silver Maple and Black Ash saplings, and Red-osier Dogwood.

4.2 Trees Associated with the PSW Extension

The PSW Extension is comprised of a Willow Mineral Thicket Swamp Type (SWT2) ecosite. A willow-dominated thicket swamp, this area also contains large numbers of Speckled Alder and European Buckthorn. It is surrounded by CUT1 cultural thicket and a small portion FOD7 forest as described above.

4.3 Species at Risk

Five Butternut trees were observed on the Site, concentrating in forested areas along the Tay River on the north edge of the Site. Butternut prefers moist, well-drained soils and is often found in sunny openings near forest edges and along watercourses (MECP, 2021e). The habitat regulation for Butternut under the ESA reflects a "root harm prevention zone" based on the tree's diameter and breast height (DBH) measured in metres from the stem, with the maximum zone being 25 m (Government of Ontario, 2021.

A formal Butternut Health Assessment has not been undertaken for any of the trees. None of the Butternuts are anticipated to be required to be removed, though the proximity of the new entrance road may necessitate a species-at-risk permit from the MECP in lieu of the potential harm of that proximity. The need for a permit will be confirmed by the BHA.

5.0 MITIGATION MEASURES

5.1 Site Preparation and Construction

The following mitigation measures must be applied during Site preparation and construction:

- Tree removal should be limited to that which is necessary to accommodate construction.
- Tree and vegetation clearing should not take place during sensitive times of the year for wildlife (breeding season; early spring throughout summer) unless mitigation measures are implemented and/or the habitat has been inspected by a qualified biologist.
    - The *Migratory Birds Convention Act* protects the nests and young of migratory breeding birds in Canada. No clearing of vegetation shall occur between April 15 and July 31, unless a qualified biologist has determined that no nesting is occurring within five days prior to the clearing (City of Ottawa, 2015).
- To minimize impacts to remaining trees during development (City of Ottawa, 2015):
    - Erect a fence beyond the CRZ of retained trees. The fence should be highly visible (orange construction fence) and paired with erosion and sediment control fencing. Pruning of branches is recommended in areas of potential conflict with construction equipment;
    - Do not place any material or equipment within the CRZ of trees unless otherwise approved by the Director;
    - Do not attach any signs, notices, or posters to any trees unless otherwise approved by the Director;
    - Do not raise or lower the existing grade within the CRZ of trees unless otherwise approved by the Director;
    - Do not extend any hard surface or significantly change landscaping within the CRZ of trees unless otherwise approved by the Director;
    - Do not damage the root system, trunk, or branches of any remaining trees unless otherwise approved by the Director;
    - Use tunneling or boring when digging within the CRZ of a tree; and
    - Ensure that exhaust fumes from equipment are not directed towards any tree's canopy.

5.2 Tree Planting Recommendations

To offset vegetation loss, native tree and shrub species must be planted. Plantings may occur at ground level, on top of structures, in adjacent rights-of-way, in parks, or any other existing or future public space. Landscaping plans must be prepared to the satisfaction of the Town of Perth.

To offset the anticipated impacts of vegetation clearing, portions of the CUT1, SWT2, FOD7 and SWD2 are designated for improvement under the proposed design. Within such designated areas, there may be need for isolated tree clearing to accommodate new tree planting, control of invasive shrubs and other improvements. These areas are anticipated to be fully reforested. Removing the Common Buckthorn and planting suitable native trees would expand the forested and treed swamp areas would improve the overall condition of the forest by encouraging native species and limiting the presence of invasive edge species.

To promote canopy coverage throughout the new community, trees should be planted at an equivalent of 1.5 trees per lot with a minimum of one tree per on each house lot and the remainder to be planted in public areas as required such as parks or school yards.

The following tree and shrub species are recommended for planting and should be used to direct the development of the landscape plan for the Site. The following species are appropriate given site conditions and are native and non-invasive: Alternate-leaf Dogwood (*Cornus alternifolia*), Basswood (*Tilia americana*), Bitternut Hickory, Black Cherry (*Prunus serotina*), Black Walnut (*Juglans nigra*), Bur Oak (*Quercus macrocarpa*), Chokecherry (*Prunus virginiana*), Eastern White Cedar, Hawthorns (*Crataegus* spp.), Ironwood (*Ostrya virginiana*), Largetooth Aspen (*Populus grandidentata*), Maple-leaf Viburnum (*Viburnum acerifolium*), Nannyberry (*Viburnum lentago*), Northern Bush-honeysuckle (*Diervilla lonicera*), Peachleaf Willow (*Salix amygdaloides*), Pin Cherry (*Prunus pensylvanica*), Red Maple (*Acer rubrum*), Red Oak, Serviceberries (*Amelanchier* spp.), Sugar Maple, Silver Maple, Trembling Aspen, White Birch (*Betula papyrifera*), Yellow Birch (*Betula alleghaniensis*), White Oak (*Quercus alba*), and White Pine (*Pinus strobus*).

The “PSW Extension” and the surrounding space are to be extensively replanted deciduous swamp moist deciduous forest surrounding the wetland area with a landscape plan still to be developed. Silver Maple should be the dominant species in the wetland area with Red Maple dominant in the moist forest. Trees planted here, along the 30 m setback to Tay River, and along the setback to the Grants Creek PSW will not be counted toward the 1.5 trees per lot through the community.

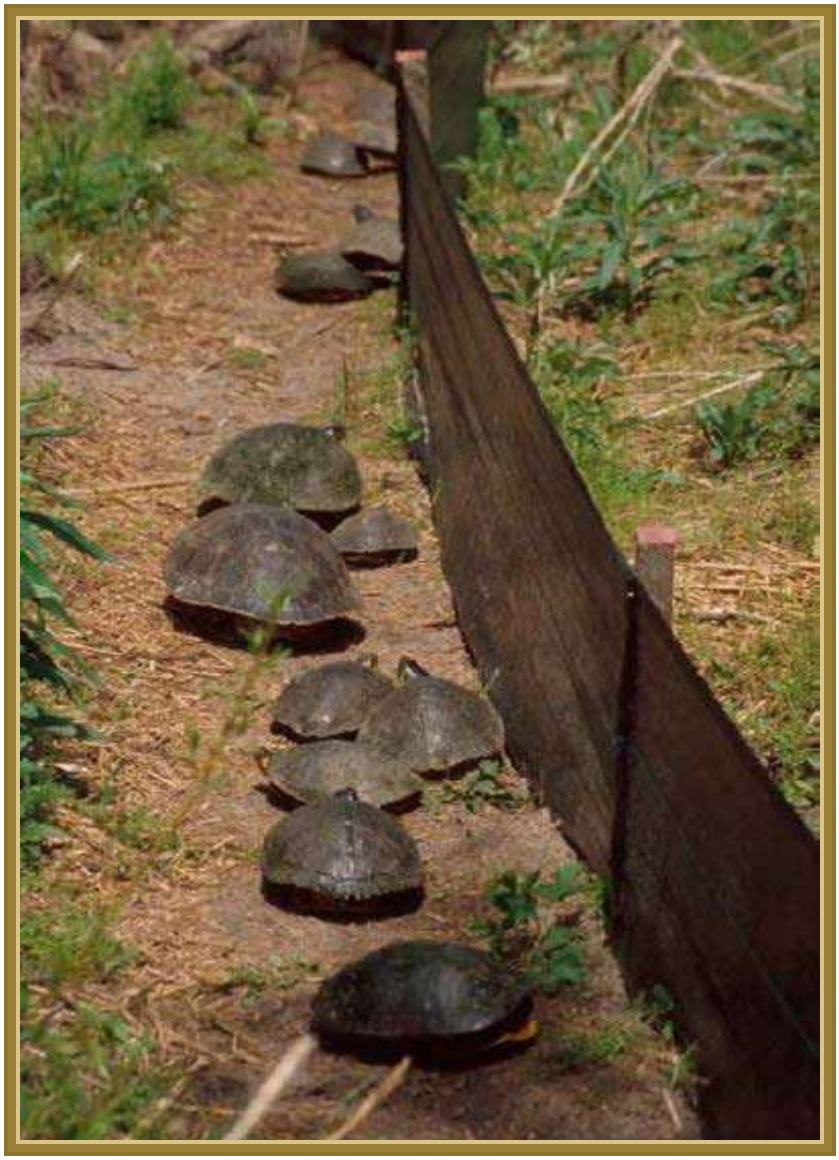
Appendix J Turtle and Snake Fencing Guidelines

SPECIES AT RISK BRANCH
BEST PRACTICES TECHNICAL NOTE

REPTILE AND AMPHIBIAN EXCLUSION FENCING

Version 1.1

July 2013



Ministry of Natural Resources

Ontario

July 2013

Ontario Ministry of Natural Resources
Species at Risk Branch

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Cover illustration: Photograph by Matthew J. Aresco, Conservation Director, Nokuse Plantation

Before an activity can be initiated, permissions, approvals or authorizations may be required from MNR (e.g. Endangered Species Act authorization, Wildlife Scientific Collector's Authorization) or other agencies, levels of government (e.g. a conservation authority, municipality, federal or provincial government), or landowners. It is your responsibility to ensure that all necessary permissions, approvals and authorizations are acquired prior to proceeding with your activity.

This document presents information as of the point in time of publication and is meant to be updated through time as improved information becomes available.

Cette publication hautement spécialisée, Reptile and Amphibian Exclusion Fencing Best Practices n'est disponible qu'en anglais en vertu du Règlement 671/92 qui en exempte l'application de la Loi sur les services en français. Pour obtenir de l'aide en français, veuillez communiquer avec le ministère des Richesses naturelles au Pamela Wesley,705-755-5217.

Document History

Revision Number	Revision Date	Summary of Changes	Originated	Reviewed	Authorized
1.1	**June, 2013**	**Pre-publishing edits**	**June, 2013**	**June, 2013**	**June, 2013**

REPTILE AND AMPHIBIAN EXCLUSION FENCING - BEST PRACTICES -

The purpose of this guidance document is to provide an overview of proven design and installation techniques for reptile and amphibian exclusion fencing. Though this document points to site and species-specific design requirements, it is important to recognize that every situation is different. This guidance is not meant to replace site-specific advice obtained from local MNR staff or experienced exclusion fencing contractors. Moreover, exclusion fences are only effective when well planned, properly constructed, and maintained.

Exclusion fencing seeks to eliminate access to specific areas where activities that could harm animals are occurring (e.g. active aggregate operations, construction sites, and roads). The selection and installation of exclusion fencing can present some challenges, particularly if multiple species are being excluded. For example, some reptiles and amphibians are able to dig under fencing while others can climb over. Some may also take advantage of burrows dug by other animals. To maintain effectiveness, the bottom of the fence should be buried or secured firmly to the ground and minimum height recommendations (Table 1) are considered.

Exclusion fence design should consider the target species as well as those that might be unintentionally impacted. Fencing material should not pose a risk of entanglement or permit individuals to pass underneath or between openings. Landscape features such as topography and substrate need to be considered as they may constrain fencing design.

Including plans for fencing in advance of a project can increase efficiency and fence effectiveness. For example, long-term road projects that will include a permanent sound barrier could design the sound barrier such that it also meets the specifications of the required exclusion fence.

EFFECTIVE FENCE CHARACTERISTICS

The fence burial and height recommendations listed in Table 1 below have been compiled from scientific literature, established management practices, and practitioner best advice. These are general recommendations and at times other specifications may be more appropriate. For instance, in areas where the substrate does not permit fence burial, weighing down the fence with heavy items (e.g. sand bags) or backfilling may be acceptable. Where needed, speak with your local MNR staff or experienced exclusion fencing contractor to develop site-specific plans.

If multiple species are being excluded from the same area, and the species-specific fencing specifications differ, the uppermost minimum height and greatest depth recommendation should be used (Table 1). If you are excluding both Blanding's Turtle and Gray Ratsnake, for example, the exclusion fence should be a minimum of 2 m tall (see Gray Ratsnake section below for additional details).

Exclusion fences should be installed prior to emergence from hibernation. A survey of the enclosed/secluded area should be conducted immediately following fence installation to ensure that no individuals have been trapped on the wrong side of the fence.

Table 1. Recommended burial depth and height requirements of exclusion fencing for reptiles and amphibians. Recommended height is the height of the fence after it has been installed including the buried components and any installed overhangs or extended lips.

SPECIES	RECOMMENDED DEPTH OF FENCE BURIED (cm) *	RECOMMENDED HEIGHT OF FENCE (cm) **
Turtles – general	10 – 20	60
Eastern Musk Turtle, Wood Turtle	10 – 20	50
Massasauga, Eastern Hog-nosed Snake, Butler's Gartersnake, Queensnake	10 – 20	60
Gray Ratsnake & Eastern Foxsnake	10 – 20	200
Fowler's Toad	10 – 20	50
Snakes - general	10 – 20	100
Common Five-lined Skink	10 – 20	unknown
Salamanders	10 – 20	30

*** does not include the 10 cm horizontal lip that should extend outward an additional 10 – 20 cm (see Figure 2)**
**** the height of fencing has been provided as an approximate. Fencing materials may in fact not be available in proportions that would allow for these precise measurements. It is most effective, if the height and burial depth recommendations are met.**

DURATION OF ACTIVITIES & DEGREE OF ANTICIPATED DISTURBANCE

The type of disturbance, the proximity to disturbance, and the planned fence longevity are factors that influence which type of exclusion fence is most effective. For short-term activities (i.e. 1 to 6 months) such as minor road repairs, a light-duty geotextile fence is appropriate. Longer term or permanent fencing projects, however, require more durable materials such as – heavy-duty geotextile, wood, concrete, woven-wire, sheet metal, vinyl panels, or galvanized mesh.

GEOTEXTILE FENCES

Geotextile fences (e.g. silt fences) come in many types and qualities. They can be very effective for the temporary exclusion of reptiles and amphibians. For the purposes of this document, temporary use ranges from a few months up to 2-3 years. Winter weather is generally damaging to geotextile materials and the cost of maintenance over the long-term should be considered during the planning phase. Depending upon the quality, geotextile can be resistant to UV degradation and the bio-chemical soil environment.

Light-duty Geotextile Fencing:

Light-duty geotextile fencing is made of nylon material and is typically purchased with wooden stakes pre-attached at 2 m to 3 m intervals (Plate 1). It can also come without pre-attached stakes. Light-duty geotextiles are largely intended for projects with shorter durations of only a few months in duration and up to one season.

Geotextile fencing with nylon mesh lining should be avoided due to the risk of entanglement by snakes.

To use light-duty geotextile fencing:

- Fencing fabric is effective if attached to wooden, heavy plastic or metal stakes using heavy-duty wire staples or tie-wire (Figure 2).
- Secure the fence on posts that are placed at 2 m to 3 m apart. If using the greater recommended distance between posts, additional maintenance may be required to maintain effectiveness.
- Securely drive the stakes into the ground to a recommended depth of 30 cm. The fencing fabric should be buried to the recommended specifications in Table 1 and back-filled with soil.
- For snakes, supporting posts should be staked on the activity side (e.g. on the side facing the aggregate stock pile or the road - Figure 2).
- Light-duty geotextile fences are not effective where rocks or other hard surfaces prevent proper anchoring of fence posts and burial of the fence fabric.
- Light-duty geotextile fences are not effective where a large amount of concentrated run-off is likely or to cross streams, ditches or waterways without specific modifications.
- Contact your local MNR staff or experienced exclusion fencing contractor for advice and recommendations.
- See general best practices section below for additional details.

Generally, light-duty geotextile fences are not effective if they exceed 1 metre in height unless purposely manufactured for greater height (e.g. stakes placed at closer intervals or cross braces). If greater height is required consider using heavy duty geotextile, hardware cloth or other fencing materials.

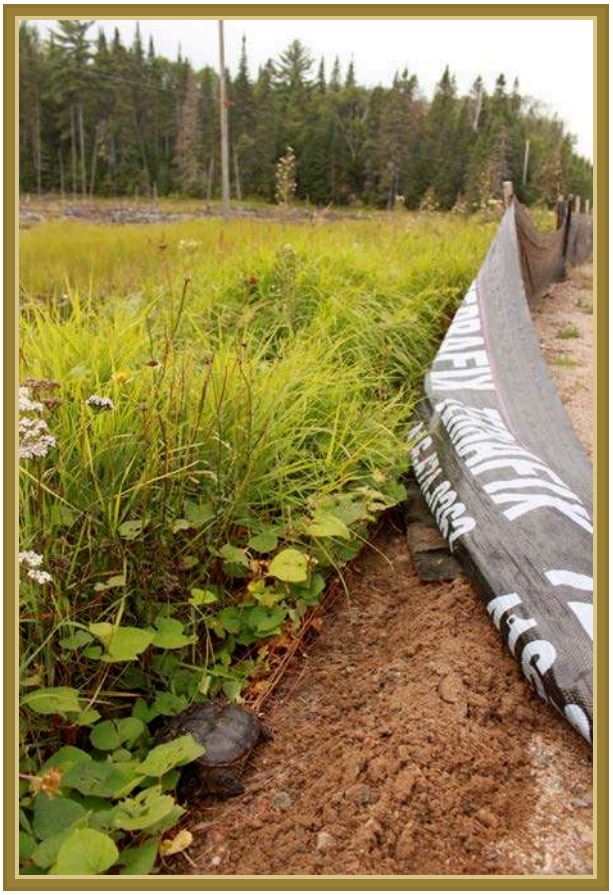


Plate 1. Light-duty geotextile fencing with pre-attached wooden stakes used to exclude turtles from a road as seen on a regular maintenance check (photo credit: Brad Steinberg).

Heavy-duty Geotextile Fencing:

Heavy-duty geotextile fencing is typically constructed of a thick felt-like fabric. It may also be called ‘double row’ or ‘trenched’ fencing. For support, this fencing uses a woven wire fence (e.g. chain link) or some other structure (Plate 2). It is recommended that a minimum density of 270R or equivalent woven geotextile fabric is used.

Heavy-duty geotextile material can be effective for up to 2 or 3 years with proper maintenance. This type of fencing can be damaged by small mammals chewing through or torn by heavy debris (e.g. tree branches). Therefore, it may be best suited to turtles, which are less likely to take advantage of holes or tears in the fabric. If

used to exclude snakes or other animals, more maintenance may be required.

Heavy-duty geotextile fencing:

- The wire fence should be installed on the activity side to prevent animals from leveraging and climbing into the exclusion area while allowing the animal to escape if they find themselves on the wrong side (Figure 2).
- Geotextile fences across streams, ditches or waterways should have case-specific modifications.
- Contact your local MNR staff or experienced exclusion fencing contractor for advice.
- See light-duty geotextile section above and general best practices below for additional details.



Plate 2. Example of a heavy-duty geotextile fencing used to exclude snake species (photo credit: Jeremy Rouse).

HARDWARE CLOTH FENCES

Hardware cloth (also known as galvanized mesh or Birdscreen) is durable, cost effective and useful for excluding reptiles and amphibians. The fence should be made of heavy galvanized hardware cloth with a ¼ inch mesh. For fences intended to exclude small snakes, a ⅛ inch mesh may be more effective. In contrast, fencing intended to exclude turtle species can have a larger mesh size (e.g. ½ inch). Larger mesh may have a longer lifespan as it is constructed from a thicker material compared to smaller mesh sizes.

To use hardware cloth fencing:

- Secure the fence on posts placed a recommended 2.5 m apart with the stakes on the activity side (Figure 2).
- Pull the mesh taught and staple or secure with screws and a metal stripping to prevent the mesh from being ripped when pressure is applied.
- Installing a top rail or folding the mesh over a taut smooth wire reduces tearing (Plates 3 and 4).
- An outward facing lip installed on the species side ensures that snakes and amphibians are unable to climb or jump over the fence (Figure 2; Plate 4)
- Tears can be mended with 18-gauge galvanized wire.
- See general best practices section below for additional details.



Plate 3. Example of a galvanized mesh fencing used for the long-term exclusion of snakes and turtles from the adjacent highway (photo credit: Megan Bonenfant).



Plate 4. Long-term to permanent exclusion fencing using galvanized mesh with over-hanging lip to prevent animals from climbing or jumping over (photo credit: Megan Bonenfant).

WOOD LATH SNOW FENCING

In certain circumstances, wood lath snow fencing can be effective at excluding turtles. This fencing is typically constructed from soft wood slats that have been woven together with 13-gauge wire and is then attached to steel fence posts which have been driven into the ground.

Wood lath fencing is cost effective and can easily be laid down during the winter to prevent damage. The durability of the material, however, is not meant for very long-term use (e.g. more than 3 years), unless regular maintenance occurs.

To use wood lath snow fencing:

- The fencing should be attached to heavy plastic or metal stakes using heavy-duty wire staples or tie-wire.
- The stakes are recommended to be placed at 2 to 3 m intervals and securely driven into the ground 30 cm or more.
- Wood lath snow fencing across streams, ditches or waterways should have case-specific modifications.
- Wood lath snow fencing lends itself well to being combined with other types of material to ensure complete exclusion.
- See general best practices section below for additional details.



Plate 5. Example of a wood lath snow fencing used to exclude turtles (photo credit: Karine Beriault).

EXCLUSION FENCING FOR GRAY RATSNAKE AND EASTERN FOXSNAKE

Gray Ratsnake and Eastern Foxsnake are the largest snakes in Ontario - reaching nearly 2 m in length. They are also excellent climbers. For this reason, fencing intended to exclude either of these species has additional recommended design specifications.

- The fence should be at least 2 m high.
- The material on the species side (Figure 2) should be smooth to prevent the snakes from climbing into the excluded area.
- Stakes should be on the activity side of the fence (Figure 2).
- Due to the increase in fence height, it is valuable to decrease the distance between posts or install diagonal braces.
- See general best practices section below for additional details.

CONCRETE, SHEET METAL & VINYL WALLS

Concrete, metal or vinyl walls can stand alone or be combined with woven wire or chain link fences. They are durable, require minimal maintenance and are effective in excluding target species from high risk areas and guiding them to crossing structures or other desired locations (Plates 6 and 7). This fence type is comprised of a continuous vertical face of concrete, metal or vinyl sheeting with no gaps. Concrete walls can be installed as either pre-cast sections or pour directly in place.



Plate 6. Stand-alone continuous concrete wall used to exclude salamander species installed as pre-cast forms (photo credit: Steven Roorda).



Plate 7. Pre-formed vinyl sheeting fence intended to exclude salamanders for a construction site (photo credit: Herpetosure Ltd.)

The wall height depends upon the target species, but they are usually between 45 and 60 cm tall and buried 25 cm. Concrete, metal or vinyl exclusion fencing is most appropriate for salamanders, skinks, small snakes, and small turtles. For large turtle species, a chain link fence can be installed directly on top of the concrete wall for complete exclusion.

HABITAT CONNECTIVITY

Habitat connectivity is the connectedness between patches of suitable habitat or the degree to which the landscape facilitates animal movement. Exclusion fencing installed along roads or other large projects can effectively reduce or eliminate habitat connectivity for animals. In these scenarios, exclusion fencing should be considered with eco-passages in order to maintain connectivity. Fencing in isolation should be viewed as a temporary method to reduce mortality until species movement can be restored. Where eco-passages are not feasible they should be identified for consideration with any future road work or development to improve connectivity.

During the installation of fencing with an eco-passage, it is important that the fencing sits flush with the passage to ensure that

there are no gaps where animals can squeeze through.



Plate 7. A wood turtle travelling through a dry eco-passage. Ecopassages such as this help to ensure the long-term connectivity of seasonal habitat for this and other reptile and amphibian species (photo credit: Amy Mui).

GENERAL BEST PRACTICES:

- To deter digging, bury the fence 10 cm down with an additional 10 cm horizontal lip (Figure 2).
- Backfill and compact soil along the entire length on both sides of the fence (Figure 2).
- Once the fence is installed, a survey should be done to ensure that no individuals have been trapped inside (speak with MNR for survey advice).
- Exclusion fencing intended to exclude snakes should have the stakes installed on the activity side (opposite the normal requirement for sediment control fencing) to prevent snakes from using the stakes to maneuver over the fencing.
- For snakes and toads, the fence should have an overhanging lip on the species side (Figure 2).
- Fences should be inspected after spring thaw and at regular intervals throughout the active season, especially following heavy rain events. This is particularly important for geotextile fences. Any damage that affects the integrity of the fence (e.g. tears, loose edges, collapses, etc.) should be fixed promptly.
- Tall or woody vegetation on the species side of the fence should be managed if there is a risk that it may enable the animals to climb over. This is most important during spring and fall. Proceed cautiously to not harm animals protected plant species during vegetation removal.
- When installing an eco-passage, fencing or exclusion walls should be used as a guiding system to direct animals to passage openings.
- Natural screens such as trees or shrubs can help to reduce road access and can be combined with fencing to provide protection of individuals from predation.
- Install fences with a turn-around at the ends furthest from the wetland habitat and at any access areas to assist in redirecting animals away from any fence openings (Figure 1).
- Curving the ends of the fencing inward (i.e. away from the road or construction site) may help to reduce access to these locations. The ends may also be tied off to natural features on the landscape such as trees or rock cuts.

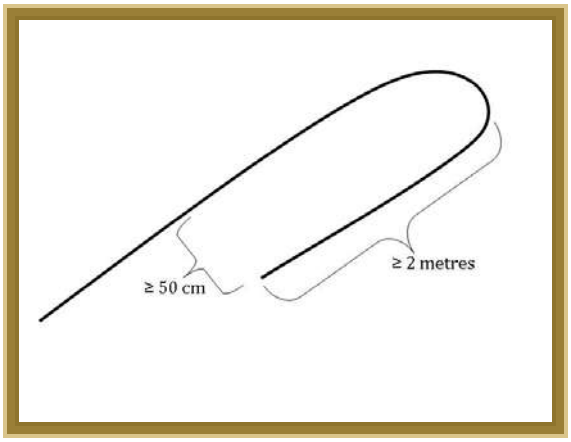


Figure 1. Diagram of the ends of the fence designed to curve inward in order to direct animals away from the area of exclusion.

WATER MOVEMENT & DRAINAGE

- In areas where surface water run-off may erode a soil-based backfill, consider using rocks or sand bags. Ensure these materials cannot be used by animals to climb over the fence.
- Where possible, minimize the number of water crossings: when necessary, it should occur where flow is minimal.
- Fence posts in waterways or areas prone to seasonal flooding should be driven rather than dug – unless following established best practices.
- Fencing should be placed above the high water mark anticipated for high water events such as spring freshet or periods of heavy or continuous rainfall.

TOPOGRAPHY:

- Fence posts should be closer together in undulating topography.
- Fences installed on slopes have a different effective height depending upon whether the animal will be approaching from the up or down slope. The fence height can be adjusted accordingly.

Improvements or questions regarding exclusion fencing can be brought to the local MNR Species at Risk Biologist or other MNR staff.

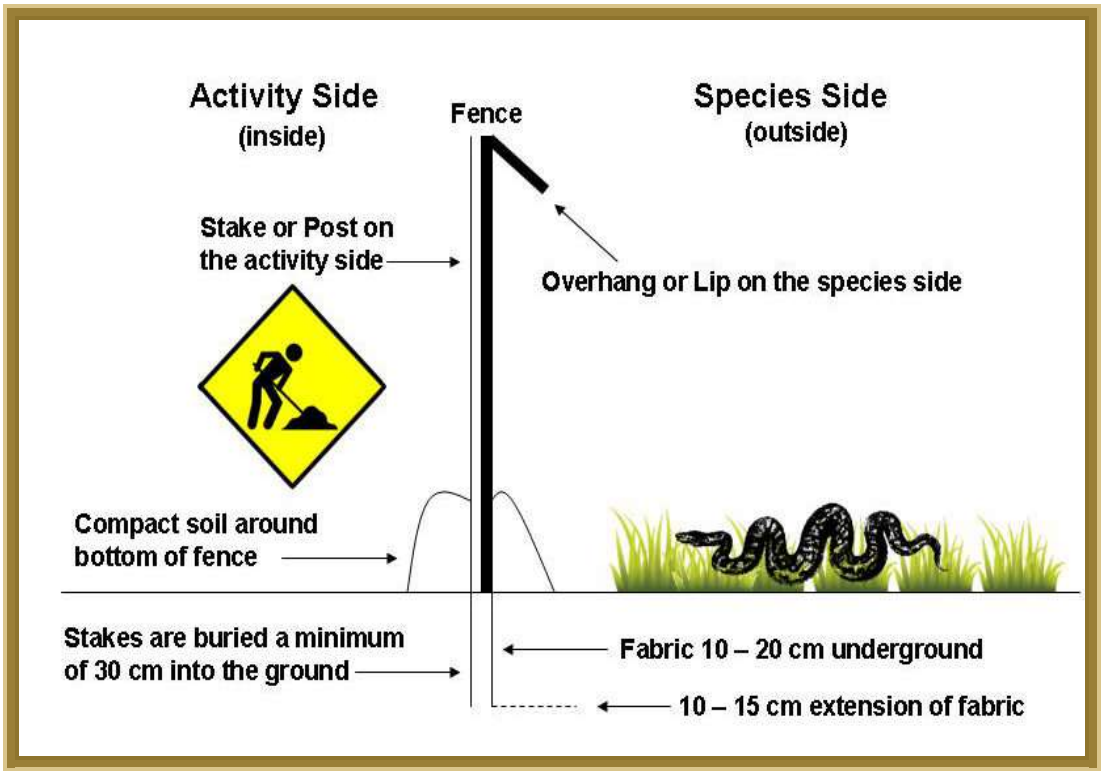


Figure 1. A side view of a basic exclusion fence including an overhang or flexible lip to deter animals from climbing or jumping over the fence. Placement of the stake on the Activity Side or on the inside of excluded area is also illustrated. This is particularly important for snake species which may use the stakes to maneuver over the fence.

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For additional information:

Visit the species at risk website at
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