Environmental Impact Study for the Proposed Extension of the Leitrim Boardwalk

Final Report

August 29, 2022

Version 3

Prepared for South Nation Conservation

KILGOUR & ASSOCIATES LTD.
www.kilgourassociates.com

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EXECUTIVE SUMMARY

This report is an Environmental Impact Study (EIS) prepared by Kilgour & Associates Ltd. on behalf of South Nation Conservation (SNC) in support of their proposed extension of a boardwalk in the Provincially Significant Leitrim Wetland near the intersection of Findlay Creek Drive and Netley Circle in Ottawa ("the Site").

The goal of this EIS is to function as a comprehensive plan that addresses SNC's Regulation Policies under Ontario Regulation 170/06 by:

- Identifying natural heritage features on and adjacent to the Site, including characteristics of the Leitrim Wetland;
- Assessing potential impacts of the proposed boardwalk extension to existing features; and
- Recommending mitigation measures to minimize or eliminate identified impacts.

Existing ecological conditions of the Site were characterized through a review of background information, including data on the Leitrim Wetland provided by SNC. A single site visit was conducted in June 2022 to a) characterize existing ecological conditions along the existing boardwalk, the proposed boardwalk extension route options, and the associated 50 m buffer, and b) confirm the findings of the background review. Vegetation communities were identified and mapped in the field using standard Ecological Land Classification (ELC) methods for Ontario. The classifications from ELC were used to determine whether potential habitat for a given species at risk (SAR) or other ecological value may be present.

The Leitrim Wetland is located within the South Nation River Watershed and contributes to the headwaters of Findlay Creek. Findlay Creek drains into the North Castor River and eventually the South Nation River. Findlay Creek flows along the north side of the Leitrim Wetland along Findlay Creek Drive and then east through the Findlay Creek residential community. The area of Leitrim Wetland addressed in this report is privately owned and is in the process of being donated to SNC. It is currently owned by: 1534524 Ontario Inc., Findlay Creek Properties (South) Ltd., Tartan Investments Corporation, and Findlay Creek Properties Ltd.

An existing boardwalk approximately 300 m long was constructed in the Leitrim Wetland in 2012. This out-and-back boardwalk starts at a crushed gravel path along Findlay Creek Drive and traverses multiple wetland communities, including marsh, thicket swamp, and coniferous swamp, and ends at a viewing platform situated on the edge of a watercourse within the Leitrim Wetland. The intent of the proposed boardwalk extension is to make the boardwalk route a point-to-point trail that starts and ends in different locations. The proposed boardwalk extension options are approximately 500 m long and would include a crossing over Findlay Creek. This EIS reviews two alignment options; the exact route of the boardwalk extension will be informed in part by this EIS, but the end point will be located within the adjacent property at roll #061460007013947.

The crossing over Findlay Creek would consist of a clear span bridge that would not directly alter the stream bed or bank. The clear span bridge structure (including bridge approaches, abutments, footings, and armouring) would be built entirely above the high-water mark. Since no structures would be placed on the stream bed or banks, there would be no direct alteration of natural channel processes. However, construction of the clear-span bridge has the potential to negatively affect riparian vegetation, which

directly contributes to fish habitat by providing shade, cover, food resources, and areas for spawning. In addition, the use of machinery during construction and run-off of stormwater during operation could introduce deleterious substances to the creek and/or result in erosion and sedimentation. Fisheries and Oceans Canada's measures to protect fish and fish habitat when constructing clear-span bridges should be followed to minimize negative effects to riparian vegetation and water quality.

The boardwalk extension would consist of an untreated wood deck and railing and would traverse wetland communities including cedar swamp, thicket swamp, and cattail marsh. The end point is associated with upland cultural meadow. The dimensions of the extended boardwalk would be similar to those of the existing boardwalk, with the walkway being approximately 2 to 3 m wide. The boardwalk would be sufficiently elevated such that it would not impede flows associated with seasonal flooding.

The proposed project is intended to be complete in the fall or winter of 2022. Construction would therefore occur during low water levels and outside of the sensitive periods for fish, birds, and bats, but coincides with the regional turtle overwintering period (i.e., approximately October 15 to March 31). To mitigate potential impacts to overwintering turtles, construction would avoid open water areas suitable for hibernation.

Vegetation removal would be limited to that which is necessary to accommodate construction and operation. Vegetation removal and construction would be conducted manually (i.e., by hand) and with small machinery to minimize disturbance. Construction will be supported by equipment (e.g., mini excavator), with most of the work taking place in the winter months to minimize impacts. Machinery will avoid open water areas in the winter to avoid adversely impacting overwintering turtles. Adjustments should be made to the alignment of the boardwalk extension based on field conditions during detailed design and construction to avoid healthy, mature trees and any potentially remnant areas of the previously reported calcareous fen. Vegetation clearing during site preparation presents an opportunity for management of Glossy Buckthorn in the Leitrim Wetland. These activities should be paired to improve the wetland while preventing additional disturbance to wetland vegetation associated with invasive species management separate from boardwalk construction.

During operation, the extended boardwalk would increase human presence in the Leitrim Wetland. This could increase general disturbance such as noise pollution; litter; vandalism; the capture, collection, disturbance, and/or destruction of flora and fauna; interaction of pets with wildlife; and erosion and sedimentation. The extended boardwalk could also contribute to further spread of invasive species during construction and operation. Providing a designated route that does not allow pedestrians or pets to stray into the wetland would help concentrate human presence. Construction of the boardwalk should incorporate educational signage to inform the public of the sensitivity of the wetland and the importance of minimizing impacts to it. The implementation of simple "backyard" habitat creation projects such as the installation of bird nesting boxes could help offset potential negative effects to wildlife. Further, vegetation monitoring should be conducted (e.g., through photo-monitoring or permanent survey plots) to characterize changes to vegetation communities in the vicinity of the boardwalk and to potentially trigger intervention such as invasive species management. If portions of the previously reported calcareous fen remain, this area should be monitored in detail to ensure its persistence.

This report provides a set of mitigation measures for employment in the design and construction of the proposed project, including measures to minimize potential negative effects to wetland vegetation,

wildlife, fish, and water quality. 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 boardwalk extension could proceed without imposing significant negative impacts on natural features or their ecological functions if all mitigation measures provided within this report are followed.

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List of Acronyms and Abbreviations

DFO – Department of Fisheries and Oceans (Fisheries and Oceans Canada)
e.g. – *exempli gratia*
EIS – Environmental Impact Study
ELC – Ecological Land Classification
ESA – *Endangered Species Act*
ha – hectare
i.e. – *id est*
KAL – Kilgour & Associates Ltd.
km – kilometre
m – metre
MECP – Ministry of Environment, Conservation and Parks
MNRF – Ministry Natural Resources and Forestry
SAR – species at risk
SARA – *Species at Risk Act*
SNC – South Nation Conservation

1.0 INTRODUCTION

This report is an Environmental Impact Study (EIS) prepared by Kilgour & Associates Ltd. (KAL; Appendix A) on behalf of South Nation Conservation (SNC) in support of their proposed extension of a boardwalk in the Provincially Significant Leitrim Wetland near the intersection of Findlay Creek Drive and Netley Circle in Ottawa ("the Site"; Figure 1). The proposed boardwalk extension is approximately 500 m long and would include a crossing over Findlay Creek. Two alignment options are considered here; the exact route of the boardwalk extension will be informed in part by this EIS, but the end point will be located within the adjacent property at roll #061460007013947.

Section 7.5.3 of SNC's Regulation Policies under Ontario Regulation 170/06 (SNC, 2022) indicate that boardwalks (e.g., narrow, raised planked trails) within a Provincially Significant Wetland may be permitted in accordance with SNC's general policies for development and where it is demonstrated that:

a) an Environmental Impact Study demonstrates minimal interference;
b) the boardwalk is above the Riverine Flooding Hazard;
c) the boardwalk is constructed with materials that do not interfere with the Provincially Significant Wetland; and
d) the design minimizes the development footprint; and
e) where unavoidable, intrusions on significant natural features, hydrologic functions, or ecological functions are minimized, and it is demonstrated that best management practices including site and infrastructure design and appropriate remedial measures will adequately restore and enhance features and functions.

The goal of this EIS is to function as a comprehensive plan that addresses the above requirements by:

- Identifying natural heritage features on and adjacent to the Site, including characteristics of the Provincially Significant Leitrim Wetland;
- Assessing potential impacts of the proposed boardwalk extension to existing features; and
- Recommending mitigation measures to minimize or eliminate identified impacts.

1.1 General Property Information

The Site includes a portion of the Provincially Significant Leitrim Wetland (hereafter "Leitrim Wetland") located off Findlay Creek Drive near the intersection of Findlay Creek Drive and Netley Circle (Figure 1). More specifically, this EIS focuses on two proposed boardwalk extension route options along with a 50 m buffer (Figure 2). The Leitrim Wetland is located within the South Nation River Watershed and contributes to the headwaters of Findlay Creek. Findlay Creek drains into the North Castor River and eventually the South Nation River.

An existing boardwalk approximately 300 m long was constructed in the Leitrim Wetland in 2012 (SNC, 2018). This out-and-back boardwalk starts at a crushed gravel path along Findlay Creek Drive and traverses multiple wetland communities, including marsh, thicket swamp, and coniferous swamp, and ends at a viewing platform situated on the edge of a watercourse within the Leitrim Wetland. The intent of the proposed boardwalk extension is to make the boardwalk route a point-to-point trail that starts and ends in different locations (Figure 2).

Near the existing boardwalk and proposed extension area, Findlay Creek flows along the north side of the Leitrim Wetland along Findlay Creek Drive and then east through the Findlay Creek residential community. The area of Leitrim Wetland addressed in this report is privately owned and in the process of being donated to SNC. It is currently owned by 1534524 Ontario Inc., Findlay Creek Properties (South) Ltd., Tartan investments Corporation, and Findlay Creek Properties Ltd.

The Site is bordered by:

- Residential communities to the north and east;
- Leitrim Wetland to the south; and
- Leitrim Wetland bisected by Albion Road to the west.

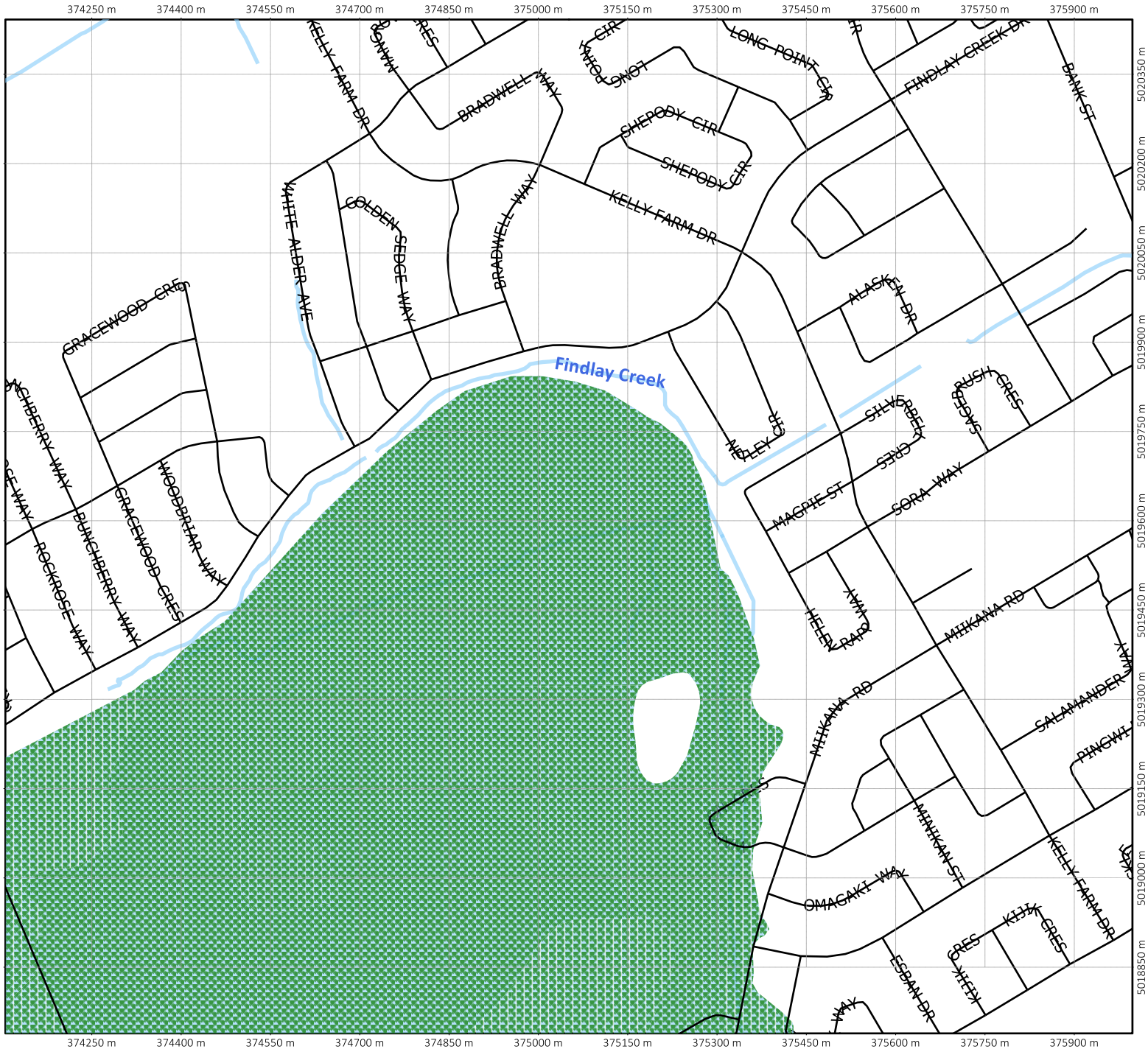

Figure 1 Map showing the location of the Leitrim Wetland

Legend

Provincially Significant Wetland

N

0 >100 m

Project: SNC 1360
Map File: SNC 1360a.map
MTM Zone 9
(NAD 83)
Printed on: 2022-07-14

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Figure 2 Map showing the existing boardwalk and proposed boardwalk extension route in Leitrim Wetland (the Site)

Legend

- Existing Trail
- Proposed Boardwalk Option 1
- Proposed Boardwalk Option 2

50 m Buffer

- Proposed Boardwalk
- Existing Trail

N

0 100 m

Project: SNC 1360
Map File: SNC 1360 20220818.map
MTM Zone 9
(NAD 83)
Printed on: 2022-08-25

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2.0 ENVIRONMENTAL POLICY CONTEXT

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

2.1 The Provincial Policy Statement, 2020

The Provincial Policy Statement (PPS) was issued under Section 3 of the *Planning Act* (1990a). The current PPS came into effect on May 1, 2020. Natural features are afforded protections under Section 2.1 of the PPS. 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., woodlands, wetlands, wildlife 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.

2.2 City of Ottawa Official Plan

The City of Ottawa Official Plan (2021) provides direction for future growth in the City and is a policy framework to guide physical development. The Official Plan was first approved in 2003 and is updated every five years.

2.3 *Species at Risk Act*, 2002

The federal *Species at Risk Act*, 2002 (SARA) 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 SARA is to prevent populations of wildlife from becoming Extirpated, Endangered, or Threatened, provide recovery strategies for Endangered and 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*, 1994 and listed as Endangered, Threatened, or Extirpated under Schedule 1 of SARA are protected wherever they occur in Canada, regardless of land ownership.

2.4 *Endangered Species Act*, 2007

The provincial *Endangered Species Act*, 2007 (ESA) is administered by the Ministry of Environment, Conservation, and Parks (MECP) and provides protection for SAR and their habitat. The Act prohibits killing, harming, harassing, possessing, transporting, buying, or selling Extirpated, Endangered, and Threatened species. Species listed as Endangered, Threatened, or Extirpated and their habitats (e.g., areas essential for breeding, rearing, feeding, hibernation, and migration) are automatically afforded legal protection under the ESA.

2.5 *Fisheries Act*, 1985

The federal *Fisheries Act,* 1985 is administered by Fisheries and Oceans Canada (DFO) and provides protections to fish, fish habitat, and fisheries. Specifically, the *Fisheries Act* provides:

- Protection for all fish and fish habitat.
- Prohibition against the "harmful alteration, disruption or destruction of fish habitat (HADD)".
- Prohibition against causing "the death of fish by means other than fishing".

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

2.6 *Migratory Birds Convention Act*, 1994

The *Migratory Birds Convention Act*, 1994 (MBCA) is federal legislation administered by ECCC that provides protection for migratory birds listed under the Act. The disturbance, destruction, take, and killing of migratory birds, their eggs, and their nests are prohibited under the Act. The “incidental take” and work 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) is prohibited.

2.7 *Fish and Wildlife Conservation Act,* 1997

The provincial *Fish and Wildlife Conservation Act*, 1997 (FWCA) 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 of specially protected species and the requirement for provincially issued licenses for the hunting or trapping of “furbearing” or “game” animals.

2.8 *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*, 1990 (Government of Ontario, 1990b). The Act provides mechanisms to regulate works and site alterations that have a potential to affect erosion, flooding, land conservation, and 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*.

3.0 METHODS

3.1 Desktop and Background Data Review

3.1.1 Agency Consultation

The Site is located within the jurisdictions of SNC, the Ottawa District of the MECP, the City of Ottawa, and DFO. The scope of this EIS was determined in consultation with SNC. A letter request for confirmation of SAR potential related to the Site was submitted to MECP on May 6, 2022. A response had not yet been received at the time of writing this report, though it is considered unlikely that MECP would indicate potential for SAR beyond those already considered in this EIS. The City of Ottawa was not consulted regarding the scope of this EIS; however, it is expected that they will be involved in the project through their active membership in the Leitrim Wetland Advisory Committee (SNC, 2018). The proposed boardwalk extension has potential to interact with fish habitat but is unlikely to require review by DFO if appropriate mitigation measures are followed. DFO has therefore not been consulted but may be engaged if the project scope changes.

3.1.2 Records Review

Colour digital aerial photographs from geographic information system mapping applications 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 to review relevant information and to guide field studies. This included reviewing relevant data and reports provided by SNC. The review of existing information also included a desktop assessment of species listed under SARA and the ESA having some potential to occur in the broader area. Background information was obtained from available resources, which include:

- Aquatic Species at Risk Map (DFO, 2022)
- Ontario Ministry of Northern Development, Mines, Natural Resources and Forestry (MNDMNRF):
    - Natural Heritage Information Centre (MNDMNRF, 2022a)
    - Land Information Ontario Provincially Tracked Species Grid Detail (MNDMNRF, 2022b)
    - Recovery Strategy for the Little Brown Myotis (*Myotis lucifugus*), Northern Myotis (*Myotis septentrionalis*) and Tri-colored Bat (*Perimyotis subflavus*) in Ontario (Humphrey and Fotherby, 2019)
    - Recovery Strategy for the Eastern Small-footed Myotis (*Myotis leibii*) in Ontario (Humphrey, 2018)
- Species at Risk in Ontario (MECP, 2022a)
- Species at Risk Public Registry (Government of Canada, 2022)
- Atlas of the Breeding Birds of Ontario 2001-2005 (Birds Canada et al., 2009)

- Ontario Reptile and Amphibian Atlas (Ontario Nature, 2019)
- iNaturalist (California Academy of Sciences and National Geographic Society, 2022)
- eBird (Cornell Lab of Ornithology, 2022)
- Bumble Bee Watch (Wildlife Preservation Canada et al., 2022)
- Ontario Butterfly Atlas (Toronto Entomologists' Association, 2022)
- Reports and data shared by SNC:
    - Leitrim Wetland turtle fyke net capture data from 2022 (Blanchett, unpublished)
    - Findlay Creek Monitoring Program (SNC, 2021)
    - Effects of landscape composition on wetland occupancy by Blanding's Turtles (*Emydoidea blandingii*) as determined by eDNA and visual surveys (Fyson and Blouin-Demers, 2021)
    - Leitrim Wetland Management Plan (SNC, 2018)
    - Findlay Creek fish sampling data from 2010 and 2018 (SNC, unpublished)
    - Leitrim Wetland Snapping Turtle (*Chelydra serpintina*) sightings map (SNC, unpublished)
    - Leitrim Wetland vegetation communities map (SNC, 2010)
    - Leitrim Wetland vegetation communities map (Golder Associates, 2009)

3.2 Field Survey

A site visit was conducted on June 22, 2022 to a) characterize existing ecological conditions along the existing boardwalk, the proposed boardwalk extension route, and the associated 50 m buffer, and b) confirm the findings of the background review.

3.2.1 Vegetation

Vegetation communities were identified and mapped in the field using standard Ecological Land Classification (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 soils and plant species composition. This method results in a standardized description of each vegetation community to determine the natural diversity and variability of communities within a site, and to provide insight into available habitat 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.

Desktop reviews informed how the Site may be divided into vegetation communities based on variation in land cover, topography, and vegetation structure. 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. Representative photos of each ELC unit on the Site were taken and are included with the community descriptions in this report.

All incidental observations were recorded while on Site. Birds were identified by song and/or direct visual observation.

4.0 RESULTS

4.1 Surface Water and Fish Habitat

Findlay Creek drains the Leitrim Wetland into the North Castor River and eventually the South Nation River. The Leitrim Wetland contains several open-water channels and flooded areas that contribute to the headwaters of Findlay Creek (Figure 2). The Leitrim Wetland is mostly groundwater fed and therefore provides relatively cold water to the creek (SNC, 2018). Findlay Creek was historically characterized as a cold-water stream and was stocked with Brook Trout (*Salvelinus fontinalis*) and Brown Trout (*Salmo trutta*) by the Province in the 1990s, but was not known to provide habitat for naturally reproducing trout populations (SNC, 2018; 2021). MNRF continues to stock Findlay Creek with Brown Trout, with approximately 500 yearlings released annually (MNRF, 2022c). Based on recent temperature monitoring, the reach of the creek upstream of the Site at Albion Road is still characterized as a cold-water system, while downstream of the Leitrim Wetland at Kelly Farm Drive the creek is a cool-water system (SNC, 2021).

SNC conducted fish sampling of Findlay Creek in 2010 and 2018 via electrofishing at Kelly Farm Drive, Blais Road, Hawthorne Road, and the Metcalfe Golf Club (SNC, unpublished). The results of this fish sampling are summarized in Table 1. In general, a total of 15 fish species were captured. The most frequently encountered fish species in upstream reaches closer to the Site (Kelly Farm Drive and Blais Road) were Common White Sucker, Northern Redbelly Dace, Brook Stickleback, Creek Chub, and Central Mudminnow. All collected fish species are typical of the Ottawa area. No provincially and/or nationally listed (SAR) fish species were captured.

Table 1 Summary of fish sampling of Findlay Creek conducted by SNC in 2010 and 2018

Year	Station	Date	Species Common Name	Species Scientific Name	Count
2010	Kelly Farm Drive	2010-09-02	Bluntnose Minnow	*Pimephales notatus*	8
			Central Mudminnow	*Umbra limi*	43
			Common Shiner	*Luxilus cornutus*	17
			Common White Sucker	*Catostomus commersonii*	6
			Creek Chub	*Semotilus atromaculatus*	51
			Darter spp.	Etheosomatidae	10
			Fathead Minnow	*Pimephales promelas*	3
2018	Blais Road	2018-07-18	Creek Chub	*Semotilus atromaculatus*	67
			Bluntnose Minnow	*Pimephales notatus*	22

Year	Station	Date	Species Common Name	Species Scientific Name	Count
			Common White Sucker	*Catostomus commersonii*	130
			Longnose Dace	*Rhinichthys cataractae*	35
			Northern Redbelly Dace	*Chrosomus eos*	128
			Central Mudminnow	*Umbra limi*	69
			Brassy Minnow	*Hybognathus hankinsoni*	47
			Northern Pearl Dace	*Margariscus margarita*	3
			Blacknose Dace	*Rhinichthys atratulus*	1
			Darter spp.	Etheosomatidae	56
			Brook Stickleback	*Culaea inconstans*	102
2010	Hawthorne Road	2010-09-02	Blacknose Dace	*Rhinichthys atratulus*	5
			Bluntnose Minnow	*Pimephales notatus*	3
			Brook Stickleback	*Culaea inconstans*	10
			Central Mudminnow	*Umbra limi*	32
			Common Shiner	*Luxilus cornutus*	21
			Common White Sucker	*Catostomus commersonii*	9
			Creek Chub	*Semotilus atromaculatus*	30
			Darter spp.	Etheosomatidae	15
			Northern Redbelly Dace	*Chrosomus eos*	15
			Pumpkinseed	*Lepomis gibbosus*	2
2018	Metcalfe Golf Course	2018-07-17	Brassy Minnow	*Hybognathus hankinsoni*	1
			Central Mudminnow	*Umbra limi*	1
			Common Shiner	*Luxilus cornutus*	3
			Bluntnose Minnow	*Pimephales notatus*	4
			Longnose Dace	*Rhinichthys cataractae*	12
			Creek Chub	*Semotilus atromaculatus*	10
			Pumpkinseed	*Lepomis gibbosus*	1
			Rock Bass	*Ambloplites rupestris*	1
			Darter spp.	Etheosomatidae	8

SNC collected and analyzed benthic macroinvertebrate communities of Findlay Creek downstream of the Leitrim Wetland between Kelly Farm Drive and Bank Street from 2015 to 2020 (SNC, 2021). Compared to unimpaired sites in the South Nation watershed, benthic macroinvertebrate communities in this upstream reach of Findlay Creek ranged from unimpaired (i.e., similar to reference sites) to impaired (i.e., different from reference sites). A recommendation arising from this biomonitoring included enhancing the stream to increase shading and improve water quality.

SNC also monitored water quality of Findlay Creek at Kelly Farm Drive and Blais Road from 2010 to 2020 (SNC, 2021). In general, phosphorous levels were below provincial standards while exceedances of *E. coli* were observed in approximately 50% of the sampling events. *E. coli*, nutrient levels, and sulphates were higher at Blais Road (downstream) compared to Kelly Farm Drive (upstream). In contrast, chloride and metal concentrations were higher near the headwater area compared to downstream. Sulphate and chloride concentrations have increased over time within Findlay Creek at both sampling stations.

4.2 Vegetation

Six ELC units were delineated for the Site; three are wetland classifications and three are terrestrial classifications (Figure 3). Each ELC unit and the dominant vegetation therein is described in detail below. 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 or near the Site.

4.2.1 Wetland Communities

Non-native Mineral Deciduous Thicket Swamp Type (SWT2-13)

A significant portion of the Site was composed of dense thicket swamp dominated by non-native Glossy Buckthorn (*Rhamnus frangula*; Figure 4). Other tall shrub species present in this vegetation community included Sandbar Willow (*Salix interior*), Pussy Willow (*Salix discolor*), Red Elderberry (*Sambucus racemosa*), and Common Buckthorn (*Rhamnus cathartica*). Scattered tree cover included species such as White Willow (*Salix alba*), Green Ash (*Fraxinus pennsylvanica*), White Cedar (*Thuja occidentalis*), Red Maple (*Acer rubrum*), and Tamarack (*Larix laricina*). Lower-growing shrub species included Prickly Gooseberry (*Ribes cynosbati*). Ground cover was dominated by a mix of herbs, ferns, and graminoids, including Spotted Jewelweed (*Impatiens capensis*), Tufted Loosestrife (*Lysimachia thyrsiflora*), Purple Loosestrife (*Lythrum salicaria*), Reed-canary Grass (*Phalaris arundinacea*), Spotted Joe-pye Weed (*Eutrochium maculatum*), Stinging Nettle (*Urtica dioica*), Royal Fern (*Osmunda regalis*), Sensitive Fern (*Onoclea sensibilis*), Ostrich Fern (*Matteuccia struthiopteris*), Lake Sedge (*Carex lacustris*), Riverbank Grape (*Vitis riparia*), Dewberry (*Rubus pubescens*), and Marsh Bedstraw (*Galium palustre*). The duration of spring flooding is likely short in this thicket swamp, with substrates being aerated at the surface at the time of the site visit.

Figure 3 Map showing the Ecological Land Classification units for the Site

Legend

Existing Boardwalk

Proposed Boardwalk

Option 1

Option 2

ELC Polygons

CUM1

CUT1-1

FODM11

MAS2-1

SWC1-1

SWT2-13

N

0 100 m

Project: SNC 1360
Map File: SNC 1360 20220818 nm.map
MTM Zone 9
(NAD 83)
Printed on: 2022-08-18

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Figure 4 Photo showing Non-native Mineral Deciduous Thicket Swamp

White Cedar Mineral Coniferous Swamp Type (SWC1-1)

The interior of the Leitrim Wetland in the vicinity of the existing boardwalk and proposed extension route consisted of coniferous swamp (Figure 5). The canopy of this swamp was almost entirely dominated by White Cedar, including many fallen and leaning cedar trees. In some areas, the understory was shaded with few species and little vegetation cover. In other areas, the subcanopy was dominated by Glossy Buckthorn with Red Elderberry present. Lower-growing woody species included Red Raspberry (*Rubus idaeus*) and Prickly Gooseberry. Ground species included Royal Fern, Riverbank Grape, Purple Loosestrife, Red Maple saplings, Dewberry, Sensitive Fern, Spotted Jewelweed, Marsh Bedstraw, Fragrant Bedstraw (*Galium triflorum*), Purplestem Angelica (*Angelica atropurpurea*), Wrinkleleaf Goldenrod (*Solidago rugosa*), and Tall Blue Lettuce (*Lactuca biennis*). It is expected that this cedar swamp floods during the spring freshet but is surface-dry by early to mid-summer.

Figure 5 Photo showing White Cedar Mineral Coniferous Swamp

SNC previously noted a rare calcareous fen community northeast of the end of the existing boardwalk, near the interface of thicket swamp and coniferous swamp (SNC, 2010; 2018). This area was not investigated in detail during the site visit, but no fen indicator species were observed here or elsewhere in the Leitrim Wetland. The significant invasion of this area by Glossy Buckthorn was reported back in 2003 (Cumming Cockburn Limited and Golder Associates, 2003). It is likely that Glossy Buckthorn has continued to outcompete sensitive fen species that thrive in open-canopy areas with full sun and calcium-rich soils, such as Northern Pitcher-plant (*Sarracenia purpurea*).

Cattail Mineral Shallow Marsh Type (MAS2-1)

The northeastern edge of the Leitrim Wetland consisted of a marsh dominated by Common Cattail (*Typha latifolia*; Figure 6) with various channels and flooded areas. Other species here included Common Reed (*Phragmites australis*; abundant along the drain in the southeastern portion of the Site), Reed-canary Grass, Purple Loosestrife, Tufted Loosestrife, Marsh Bedstraw, and Water Parnsip (*Sium suave*). Aquatic vegetation included Floating Pondweed (*Potamogeton natans*) and European Frog-bit (*Hydrocharis morsus-ranae*).

Figure 6 Photo showing Cattail Mineral Shallow Marsh

4.2.2 Terrestrial Communities

Sumac Deciduous Shrub Thicket Type (CUT1-1)

A steeply sloped berm dominated by tall shrubs was observed directly south of Findlay Creek along the north side of the Site. The dominant tall shrub species was Staghorn Sumac (*Rhus typhina*), followed by Sandbar Willow and White Poplar. Young White Willow and Green Ash trees were also present. Ground species included Purple Loosestrife and Reed-canary Grass.

Mineral Cultural Meadow (CUM1)

The north side of Findlay Creek along Findlay Creek Drive consisted of upland meadow dominated by graminoids and herbs, including Reed-canary Grass, Kentucky Bluegrass (*Poa pratensis*), Bird Vetch (*Vicia cracca*), Yarrow (*Achillea millefolium*), Canada Thistle (*Cirsium arvense*), Wild Parsnip (*Pastinaca sativa*), Black Medic (*Medicago lupulina*), Common Starwort (*Stellaria graminea*), Bluntleaf Sandwort (*Moehringia lateriflora*), Smooth Brome (*Bromus inermis*), Oxeye Daisy (*Leucanthemum vulgare*), Alsike Clover (*Trifolium hybridum*), White Campion (*Silene alba*), Common Milkweed (*Asclepias syriaca*), Lesser Burdock (*Arctium minus*), Canada Goldenrod (*Solidago canadensis*), and fleabane sp. (*Erigeron*).

Naturalized Deciduous Hedgerow Ecosite (FODM11)

The area along the path leading up to the existing boardwalk consisted of a naturalized deciduous hedgerow dominated by Largetooth Aspen (*Populus grandidentata*), Green Ash, White Willow, and Glossy Buckthorn. Lower-growing woody species included Red Raspberry, Riverbank Grape, and Virginia Creeper

(*Parthenocissus quinquefolia*). Ground species included Canada Goldenrod, Bird's-foot Trefoil (*Lotus corniculatus*), Oxeye Daisy, Black Medic, Yellow Salsify (*Tragopogon dubius*), Tall Buttercup (*Ranunculus acris*), White Campion, Common Milkweed, and Wild Strawberry (*Fragaria vesca*).

4.3 Incidental Wildlife Observations

In addition to common songbirds, the following wildlife species were observed during the site visit: Midland Painted Turtle (*Chrysemys picta marginata*) and Virginia Rail (*Rallus limicola*). Both observations were associated with the cattail marsh on the Site. The turtle observation was associated with only a shell, while the Virginia Rail demonstrated breeding evidence (i.e., agitated behaviour and anxiety calls of adult).

4.4 Species at Risk

The potential for SAR to interact with the proposed project was assessed based on a review of existing information (i.e., SAR habitat requirements and occurrence records), ELC communities (i.e., habitat availability), and the site visit (Appendix B). SAR assessed as having a moderate to high potential to interact with the proposed boardwalk extension are summarized in Table 2. Those with a moderate potential are known to occur within 10 km of the Site, and suitable habitat for the species exists on the Site. SAR with a high potential are those that are known to occur on or adjacent to the Site with suitable habitat for the species on the Site. All other SAR with potential to occur in the Findlay Creek area based on their documented ranges were assessed as having a low, negligible, or no potential to interact with the proposed project due to lack of occurrence records and/or suitable habitat (Appendix B).

Table 2 Species at risk with a moderate to high potential to interact with the proposed development

Common Name	Taxonomic Name	Status under ESA	Status under Schedule 1 of SARA	Potential to Interact with the Proposed Project
Birds				
Eastern Wood-pewee	*Contopus virens*	Special Concern	Special Concern	Moderate
Olive-sided Flycatcher	*Contopus cooperi*	Special Concern	Threatened	Moderate
Rusty Blackbird	*Euphagus carolinus*	Special Concern	Special Concern	Moderate
Red-shouldered Hawk	*Buteo lineatus*	Special Concern	Special Concern	High
Short-eared Owl	*Asio flammeus*	Special Concern	Special Concern	High
Wood Thrush	*Hylocichla mustelina*	Special Concern	Threatened	Moderate
Mammals				
Little Brown Myotis	*Myotis lucifugus*	Endangered	Endangered	High
Amphibians				
Western Chorus Frog	*Pseudacris triseriata*	No Status	Great Lakes-St. Lawrence population: Threatened	High
Reptiles				
Blanding's Turtle	*Emydoidea blandingii*	Threatened	Endangered	Moderate
Midland Painted Turtle	*Chrysemys picta marginata*	No Status	Special Concern	High

Common Name	Taxonomic Name	Status under ESA	Status under Schedule 1 of SARA	Potential to Interact with the Proposed Project
Snapping Turtle	*Chelydra serpentina*	Special Concern	Special Concern	High
Arthropods				
Monarch	*Danaus plexippus*	Special Concern	Special Concern	Moderate
Vascular Plants				
Butternut	*Juglans cinerea*	Endangered	Endangered	Moderate

In addition to the species provided in Table 2, Land Information Ontario indicated a record for a "restricted species" within 5 km of the Site (MNDMNRF, 2022b). An occurrence of a "restricted species" represents a species with publicly restricted access to taxonomic and locational information due to its sensitive nature (MNDMNRF, 2022a). Examples of "restricted species" include American Ginseng (*Panax quinquefolius*) and Spotted Turtle (*Clemmys guttata*) which are frequently illegally collected for root harvesting and the pet trade, respectively. Since KAL does not have access to details regarding the "restricted species", we are unable to perform an assessment on its potential to occur on the Site. Details regarding the "restricted species" were requested in the letter submitted to MECP on May 6, 2022 regarding SAR potential for the Site; a response had not yet been received at the time of writing this report.

Species that are listed as Special Concern or have no status under the ESA are not afforded individual or habitat protection under the Act. However, these species and their habitats may be protected by the City of Ottawa if habitat areas meet the criteria for Significant Wildlife Habitat for Special Concern species (MNRF, 2015a). 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. These species would not normally be protected as SAR on public or privately owned land. However, the Federal Minister of the ECCC can and has imposed SARA protections on non-federal projects planned within habitat areas for the species that are regionally highly significant. Such habitat areas are not expected to occur on the Site. However, if they did, it is unlikely that they would be significantly altered through the proposed project if the mitigation measures provided in this report are followed. That is, the mitigation measures provided in this report are anticipated to mitigate potential impacts to all SAR in Table 2.

The remaining SAR that were assessed as having a moderate to high potential to interact with the proposed project are listed as Threatened or Endangered under the ESA; these species receive individual and habitat protection under the Act. On-Site habitat assessments for these SAR are presented below.

4.4.1 Little Brown Myotis

Little Brown Myotis is fairly common in the Ottawa region (Humphrey and Fotherby, 2019; KAL observations), and the species has previously been observed in the Leitrim Wetland (DFO, 2003; SNC, 2018). Roosting habitat for Little Brown Myotis varies, but mostly includes buildings and trees (Humphrey and Fotherby, 2019). Suitable trees for maternity roost sites include any standing live or dead tree ≥10 cm diameter at breast height with cracks, crevices, hollows, cavities, and/or loose or naturally exfoliating bark (MNRF, 2017). Suitable roosting trees exist within the vicinity of the proposed project area, particularly in the coniferous swamp. The adjacent open marsh habitat would provide suitable foraging habitat. Hibernacula for Little

Brown Myotis 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 an Endangered species, Little Brown Myotis receives "general habitat protection" under the ESA; no defined protection currently exists for the species. Generally, trees that this species uses for roosting cannot be significantly altered during the roosting season (April to September inclusive; MNRF, 2015b).

4.4.2 Blanding's Turtle

Blanding's Turtle is known to occur within 5 km of the Site (MNDMNRF, 2022b), but details regarding this occurrence record (i.e., date and exact location of observation) are unknown. Suitable habitat for Blanding's Turtle exists on the Site, particularly in marsh and open water areas in the northeastern portion of the Leitrim Wetland. However, recent turtle surveys at the Leitrim Wetland using fyke nets, visual encounter surveys, and environmental DNA did not yield observations of Blanding's Turtle (Fyson and Blouin-Demers, 2021; Blanchett, unpublished). Regardless, given the availability of suitable habitat and the presence of the species in the vicinity, Blanding's Turtle is still considered to have a moderate potential to occur on the Site. Habitat protection for Blanding's Turtle under the ESA would apply to the Leitrim Wetland if the species were observed within 2 km (MECP, 2022b).

4.4.3 Butternut

Butternut trees were not observed during the Site visit, but the species is known to occur in the area (MNDMNRF, 2022a; 2022b; California Academy of Sciences and National Geographic Society, 2022). Suitable habitat for Butternut on the Site includes upland areas adjacent to Findlay Creek. The habitat regulation for Butternut under the ESA reflects a "root harm prevention zone" based on the size of the trunk, with the maximum zone being 25 m from the trunk (Government of Ontario, 2021).

4.5 Significant Wildlife Habitat

Guidelines and criteria for the identification of Significant Wildlife Habitats in ecoregion 6E are provided by MNRF (2015a). Significant Wildlife Habitats are identified based on the presence of certain habitat types (identified through ELC codes) and the presence and/or groupings of certain species. The Site is associated with one type of habitat that meets the criteria for confirmed Significant Wildlife Habitat and four types of habitats that meet the criteria for candidate Significant Wildlife Habitat (Table 3).

Table 3 Types of potential Significant Wildlife Habitat associated with the Site

Type of Significant Wildlife Habitat	Rationale
Habitat for Special Concern and Rare Wildlife Species (Confirmed)	Several provincially rare species and species listed as Special Concern under the ESA have been observed in the Leitrim Wetland, including Snapping Turtle, Red-shouldered Hawk, and Short-eared Owl (DFO, 2003).

Type of Significant Wildlife Habitat	Rationale
Turtle Wintering Areas (Candidate)	Snapping Turtle and Midland Painted Turtle are both known to occur on the Site (SNC, 2018; Blanchett, unpublished), and the Site includes swamp and marsh ecosites. Potential wintering areas would be those where water is sufficiently deep to prevent freezing to depth along with soft, muddy substrates.
Woodland Raptor Nesting Habitat (Candidate)	The Site appears to be contiguous with >30 ha of coniferous swamp/forest and was previously reported to provide potential nesting habitat for numerous raptors, including Red-shoulder Hawk (Cumming Cockburn Limited, 1991).
Woodland and Wetland Amphibian Breeding Habitat (Candidate)	The Site includes swamp and marsh habitats, and several species of amphibians have been observed on the Site (DFO, 2003). Confirmation of this type of Significant Wildlife Habitat may result in the identification of amphibian movement corridors, another type of Significant Wildlife Habitat.
Deer Yarding Area / Deer Winter Congregation Area (Candidate)	The Site contains coniferous swamp and White-tailed Deer is known to occur in the area (DFO, 2003).

5.0 DESCRIPTION OF THE PROPOSED PROJECT

Two alternative alignments are currently considered for the proposed boardwalk. The two options share the same alignment at the south limit of the Site for approximately 238 m. Option 1 would then traverse predominantly marsh communities adjacent to Findlay Creek for approximately 923 m. The Option 1 boardwalk extension is approximately 531 m in total length. Option 2 would extend along the interface of thicket swamp and marsh communities for approximately 272 m, with a total length of approximately 510 m. Option 1 is a marginally longer alignment; however, situated within relatively open marsh communities, Option 1 would minimize the need for tree clearing and thereby minimize the overall footprint of impacts within the wetland. Option 1 would also facilitate management of Common Reed infestations along Findlay Creek. Option 2 represents a relatively shorter alignment; however, the location of the alignment within an area of thicket swamp may require additional tree clearing if trees are encountered within the alignment. By traversing the edge of thicket swamp, Option 2 would facilitate management of Glossy Buckthorn infestations, with potential to improve the condition of the wetland in this area and protect the marsh community from further infestation of Glossy Buckthorn.

Both alignment options would include a crossing over Findlay Creek, with the end point located within the adjacent property at roll #061460007013947. The crossing over Findlay Creek would consist of a clear span bridge that would not directly alter the stream bed or bank.

The boardwalk extension would consist of an untreated wood deck and railing and would traverse wetland communities including cedar swamp, thicket swamp, and cattail marsh. The end point is associated with upland cultural meadow. The dimensions of the extended boardwalk would be similar to those of the existing boardwalk, with the walkway being approximately 2 to 3 m wide. The boardwalk would be sufficiently elevated such that it would not impede flows associated with seasonal flooding.

The proposed project is intended to be complete in the fall or winter of 2022. Construction would therefore occur during low water levels and outside of the sensitive periods for fish, birds, and bats, but coincides with the regional turtle overwintering period (i.e., approximately October 15 to March 31; City of Ottawa, 2015). To mitigate potential impacts to overwintering turtles, construction would avoid open water areas suitable for hibernation. Vegetation removal would be limited to that which is necessary to accommodate construction and operation. Vegetation removal and construction would mostly be conducted manually (i.e., by hand) to minimize disturbance. Construction may be supported by equipment (e.g., mini excavator); machinery travel would be predominantly confined to assembled portions of the boardwalk and/or upland areas to minimize direct impacts to wetland areas. Small machinery may operate directly within the wetland areas during the winter months to clear the boardwalk path. Such work would not take place within open water areas.

6.0 IMPACT ASSESSMENT AND MITIGATION

6.1 Surface Water and Fish Habitat

The boardwalk extension would be designed to minimize direct impacts to surface water and fish habitat, including avoiding areas with open water that may act as fish habitat. The crossing over Findlay Creek would consist of a small-scale clear span bridge that would completely span the creek without altering the stream bed or bank. The bridge structure (including bridge approaches, abutments, footings, and armouring) would be built entirely above the high water mark. Since no structures would be placed on the stream bed or banks, there would be no direct alteration of natural channel processes. However, construction of the clear span bridge has the potential to negatively affect riparian vegetation, which directly contributes to fish habitat by providing shade, cover, food resources, and areas for spawning. In addition, the use of machinery during construction and run-off of stormwater during operation could introduce deleterious substances to the creek and/or result in erosion and sedimentation.

The following DFO measures to protect fish and fish habitat when constructing clear span bridges should be followed (DFO, 2007):

- Riparian vegetation removal should be limited to that which is necessary to accommodate construction and operation. Minimize the riparian area temporarily disturbed by accessing the work area from adjacent upland areas and the existing boardwalk. When practical, prune or top interfering vegetation instead of uprooting.

- Avoid building on meander bends, braided streams, alluvial fans, active floodplains, or any other area that is inherently unstable and may result in the alteration of natural stream functions or erosion and scouring of the bridge structure.

- Ensure that the clear span bridge is properly designed to address channel processes at flows above the normal high water mark.

- Design and construct bridge approaches so that they are perpendicular to the watercourse to minimize loss or disturbance to riparian vegetation.

- Design the bridge so that stormwater run-off from the bridge deck, side slopes, and approaches is directed into a vegetated area to remove suspended solids, dissipate velocity, and prevent sediment and other deleterious substances from entering the creek.

- Generally, there are no restrictions on timing for the construction of clear span structures as they do not involve in-water work. However, if there are any activities with the potential to disrupt sensitive fish life stages, these should adhere to the appropriate fisheries timing windows (i.e., no in-water works from March 15 to July 1).

- Machinery fording the watercourse to bring equipment required for construction to the opposite side is limited to a one-time event (over and back) and should only occur if an existing crossing at another location is not available or practical to use.

    - To exercise this option, the stream bed at the fording site must be comprised of stable gravel or bedrock and the stream banks must be low and stable.

    - If minor rutting is likely to occur, stream bank and bed protection methods (e.g., swamp mats, pads) should be used provided they do not constrict flows or block fish passage.

    - Grading of the channel banks for the approaches is not permitted.

    - If the channel bed and banks are steep and highly erodible (e.g., dominated by organic materials and silts) and erosion and degradation are likely to occur because of equipment fording, then a temporary crossing structure or other practice should be used to protect these areas.

    - Time the one-time fording to prevent disruption to sensitive fish life stages by adhering to appropriate fisheries timing windows.

    - Fording should occur under low flow conditions and not when flows are elevated due to local rain events or seasonal flooding.

- Utilize effective erosion and sediment control measures to prevent the entry of sediment into the watercourse. Inspect installed measures regularly during construction and make all necessary repairs if damage occurs.

    - KAL does not recommend silt fence and/or construction fence for this project as the installation and removal of fencing is anticipated to increase impacts to the wetland outside of the project footprint. Instead, erosion and sediment control measures should focus on retaining existing native vegetation, limiting the duration of soil exposure, and re-vegetating with native species where feasible.

    - Vegetate any disturbed areas by seeding/planting native vegetation and cover such areas with coco-matting to prevent erosion and to help seeds germinate. Seeding/planting of native species should be prioritized over natural colonization due to the significant presence of invasive species at the Site (i.e., Glossy Buckthorn and Common Reed). That is, if areas

with exposed soil are not seeded/planted, it is expected that invasive species will spread aggressively into these areas.

- If there is insufficient time remaining in the growing season, the site should be stabilized (e.g., covered with erosion control blankets) and vegetated the following spring. Effective erosion and sediment controls should be maintained until re-vegetation of disturbed areas is achieved.

- Operate machinery above the high water mark (i.e., on land or on previously built segments of boardwalk) in a manner that minimizes disturbance to the banks of the watercourse.
    - Machinery is to arrive on site in clean condition and is to be maintained free of fluid leaks, invasive species, and noxious weeds.
    - The Ontario Invasive Plant Council's *Clean Equipment Protocol for Industry* (Halloran et al., 2013) should be followed for equipment entering and leaving the Site to prevent the spread of invasive alien plant species.
    - Wash, refuel, and service machinery and store fuel and other materials for the machinery >30 m from the water and wetland to prevent any deleterious substance from entering.
    - Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.
    - Restore banks to their original condition if any disturbance occurs.
- Stabilize any waste materials removed from the work site to prevent them from entering the watercourse. This could include covering soil piles with biodegradable mats or tarps or planting them with native species.

If the above measures cannot be followed, then the project may require DFO's opinion on options that should be considered to avoid contravention of the *Fisheries Act*.

SNC will not maintain the boardwalk during the winter but it is anticipated that it will still be used by the public during the winter months. If the boardwalk is to be maintained during the winter, salt/sand usage should be avoided if feasible, and snow piles that may contain salt from snow removal should be positioned away from the wetland and Findlay Creek to avoid potential negative effects on water quality.

A previous recommendation arising from biomonitoring of Findlay Creek by SNC included enhancing the stream to increase shading and improve water quality (SNC, 2021). If feasible, areas on the Site along Findlay Creek should be planted with native tree species in conjunction with boardwalk construction to achieve this goal.

6.2 Vegetation

Vegetation clearing, including tree removal in portions of cedar swamp, would be required to accommodate construction. The Site falls outside of the City of Ottawa's Tree Protection By-law and therefore formal permission from the City is not required for tree removal. Vegetation removal would be limited to that which

is necessary to accommodate construction and operation. The proposed Option 1 alignment would minimize the need for tree clearing overall, as it is situated within relatively open marsh areas. Option 1 would also enable management of Common Reed infestations within the marsh through reclamation activities undertaken while installing the boardwalk. The proposed Option 2 alignment may require more tree and shrub vegetation clearing to accommodate construction equipment and boardwalk installation, due to the dense thicket swamp community and the possibility of encountering trees (as defined as having diameter at breast height greater than 10 cm) within the alignment. However, construction in this area would provide opportunities for management of Glossy Buckthorn at the interface of the thicket swamp and marsh communities, with potential to improve the condition of the thicket swamp and protect the marsh from Glossy Buckthorn infestation. In total length, Option 2 is a marginally shorter route compared to Option 1

Adjustments should be made to the alignment of the boardwalk extension based on field conditions during detailed design and construction to avoid healthy, mature trees and any potentially remnant areas of the previously reported calcareous fen. Vegetation clearing during site preparation presents an opportunity for management of Glossy Buckthorn in the Leitrim Wetland, especially along the southern portion of the boardwalk extension, which traverses thicket swamp dominated by Glossy Buckthorn. These activities should be paired to improve the wetland while preventing additional disturbance to wetland vegetation associated with invasive species management separate from boardwalk construction.

The boardwalk deck would be situated above the surface of the wetland, with direct impacts to the wetland beyond vegetation removal limited to the boardwalk alignment. A mini-excavator or other small piece of equipment on tracks will likely be used to complete vegetation clearing during the winter months when the ground is frozen. Winter vegetation clearing will ensure clearing takes place outside applicable bird and bat restriction windows. Open water areas will be avoided to mitigate impacts on potential hibernating turtles. Following vegetation clearing, a small track machine will install helical piles, which will support the boardwalk deck. To the extent possible, equipment will utilize previously-completed sections of the boardwalk to minimize traversing wetland areas.

The intent of the proposed boardwalk extension is to make the boardwalk route a point-to-point trail that starts and ends in different locations, rather than the current out-and-back route. Point-to-point, looping trails tend to experience less vandalism, littering, and off-trail use compared to a dead-end style trail. It is anticipated that the boardwalk extension will reduce litter, vandalism, and off-trail use within the Leitrim Wetland relative to the current condition. The point-to-point alignment would help concentrate human presence. Construction of the boardwalk should incorporate educational signage to inform the public of the sensitivity of the wetland and the importance of minimizing impacts to it. Further, vegetation monitoring should be conducted (e.g., through photo-monitoring or permanent survey plots) to characterize changes to vegetation communities in the vicinity of the boardwalk and to potentially trigger intervention such as invasive species management. If portions of the previously reported calcareous fen remain, this area should be monitored in detail to ensure its persistence.

6.3 Species at Risk

6.3.1 Little Brown Myotis

Tree removal, albeit minimal, may result in a loss of roosting habitat for Little Brown Myotis and other bat species. However, suitable roosting habitat exists elsewhere in the Leitrim Wetland where trees would be

retained. Foraging habitat on the Site over open wetland communities would remain. As an Endangered species, Little Brown Myotis receives "general habitat protection" under the ESA; no defined protection currently exists for the species. Generally, trees that at-risk bats use for roosting cannot be significantly altered during the roosting season (April through September inclusive; MNRF, 2015b).

6.3.2 Blanding's Turtle

The proposed project timeline interacts with the regional turtle overwintering period (i.e., approximately October 15 to March 31; City of Ottawa, 2015). To mitigate potential impacts to overwintering Blanding's Turtles and other species of turtles, site preparation and construction would avoid open water areas suitable for hibernation. These areas include those where water is sufficiently deep to prevent freezing to depth along with soft, muddy substrates. A qualified biologist should conduct a sweep of the finalized boardwalk route prior to construction to ensure avoidance of such habitat areas. The boardwalk should also consider design features that ensure safe wildlife passage, including turtles.

Site preparation and construction may also coincide with the period during which turtles travel to hibernacula in the fall. Accordingly, a Wildlife Scientific Collector's Authorization should be obtained from the MNDMNRF in the event that migrating reptiles need to be relocated out of harm's way. Reptiles should only be handled by a qualified biologist. Any encounters with Threatened and Endangered reptile species should be reported to the MECP within 24 hours of an encounter.

6.3.3 Butternut

The sweep of the boardwalk route prior to site preparation and construction should also include searching for Butternut. Butternut is most likely to occur in upland habitat adjacent to riparian areas. If present, measurements of Butternut trunk diameter are required to determine the root harm prevention zone of encountered trees and whether they would interact with the project. By law, 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 any Butternuts that have protected root zones that overlap with the project footprint should be assessed by a Butternut health expert to determine their health status and associated follow-up actions (e.g., notifying MECP, planting compensation trees, etc.).

6.4 General Wildlife Management

The proposed project has the potential to impact wildlife species during construction and operation as previously described. The construction of the boardwalk presents an opportunity for simple "backyard" habitat creation projects that could offset potential negative effects to wildlife. For instance, a variety of bird nesting boxes could be added throughout the Leitrim Wetland. Educational signage could be used to highlight the importance of keeping pets leashed and to deter pedestrians from collecting, capturing, and harming flora and fauna.

The following mitigation measures should be implemented during site preparation and construction 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 (April 8 to August 28; Government of Canada, 2018) to prevent impacts to birds. Combining the breeding bird window with the bat roosting season (April to September; MNRF, 2015b), 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.

- Manage stockpiles and equipment on the site to prevent wildlife from being attracted to artificial habitat. Cover or contain any piles of peat, brush, rocks and other loose materials and cap ends of pipes where necessary to keep wildlife out. Ensure that trailers, bins, and boxes 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.

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

7.0 CLOSURE

This report was prepared for exclusive use by SNC and may be distributed only by SNC. Questions relating to the data and interpretation can be addressed to the undersigned.

Respectfully submitted,

KILGOUR & ASSOCIATES LTD.

Kesia Miyashita, MSc
Senior Biologist

Bruce Kilgour, PhD
Senior Review

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9.0 LITERATURE CITED

Birds Canada, Canadian Wildlife Service (Environment and Climate Change Canada), Ministry of Northern Development, Mines, Natural Resources and Forestry – Government of Ontario, Ontario Field Ornithologists (OFO), and Ontario Nature. 2009. Atlas of the Breeding Birds of Ontario 2001-2005. Available online at: https://www.birdsontario.org/jsp/datasummaries.jsp

Blanchett, S. Unpublished. Leitrim Wetland turtle fyke net capture data.

Bumble Bee Watch. 2022. Bumble Bee Sightings Map. Available online at: https://www.bumblebeewatch.org/app/#/bees/map?filters=%7B%22sightingstatus_id%22:%5B%5D,%22species_id%22:%5B%2237%22%5D,%22province_id%22:%5B%5D%7D

California Academy of Sciences and National Geographic Society. 2022. iNaturalist. Available online at: https://www.inaturalist.org/

City of Ottawa. 2015. Environmental Impact Statement Guidelines. Available online at: https://documents.ottawa.ca/sites/documents/files/documents/eis_guidelines2015_en.pdf

Cumming Cockburn Limited. 1991. Planning for Leitrim, An Integrated Approach – Volume 1: Environmental Analysis. Prepared for the City of Gloucester.

Cumming Cockburn Limited and Golder Associates. 2003. Environmental Management Plan, Leitrim External Storm Sewer System, City of Ottawa. Prepared for the City of Ottawa.

The Cornell Lab of Ornithology. 2022. eBird: An online database of bird distribution and abundance. Available online at: https://ebird.org/home

Environment Canada. 2015. Recovery Strategy for Little Brown Myotis (*Myotis lucifugus*), Northern Myotis (*Myotis septentrionalis*), and Tri-colored Bat (*Perimyotis subflavus*) in Canada [Proposed]. Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa. ix + 110 pp.

Fisheries and Oceans Canada (DFO). 2003. Canadian Environmental Assessment Act, Environmental Assessment Screening Report for Creek Reconstruction, Stormwater Management, Findlay Creek, City of Gloucester (Leitrim External Storm System). Prepared for the City of Ottawa.

Fisheries and Oceans Canada (DFO). 2007. Fisheries and Oceans Canada Pacific Region Operational Statement: Clear Span Bridges. Version 3.0. Available online at: https://docs2.cer-rec.gc.ca/ll-eng/llisapi.dll/fetch/2000/90464/90552/548311/552813/901260/956863/A3H8Z0_-_DFO_Operational_Statement_KP_533_5.pdf?nodeid=957020&vernum=-2

Fisheries and Oceans Canada (DFO) 2022. Aquatic Species at Risk Map. Available online at: https://www.dfo-mpo.gc.ca/species-especes/sara-lep/map-carte/index-eng.html

Fyson, V.K. and G. Blouin-Demers. 2021. Effects of landscape composition on wetland occupancy by Blanding's turtles (*Emydoidea blandingii*) as determined by eDNA and visual surveys. *Canadian Journal of Zoology*, https://doi.org/10.1139/cjz-2021-0004

Golder Associates. 2009. Leitrim Wetland Photomonitoring: Plant Communities and Photomonitoring Locations.

Government of Canada. 1985. Fisheries Act, 1985 (R.S.C., 1985, c. F-14). Available online at: https://laws-lois.justics.gc.ca/eng/acts/f-14/

Government of Canada. 1994. Migratory Birds Convention Act, 1994 (S.C. 1994, c. 22). Available online at: https://laws-lois.justice.gc.ca/eng/acts/m-7.01/

Government of Canada. 2002. *Species at Risk Act*. 2002. S.C. 2002, c. 29. Available online at: https://laws.justice.gc.ca/eng/acts/S-15.3/

Government of Canada. 2018. General nesting periods of migratory birds. Available online at: https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/general-nesting-periods/nesting-periods.html#toc1

Government of Canada. 2022. Species at Risk Public Registry. Available online at: http://www.registrelep-sararegistry.gc.ca/sar/index/default_e.cfm

Government of Ontario. 1990a. *Planning Act*, R.S.O. 1990, c. P.13. Available online at: https://www.ontario.ca/laws/statute/90p13

Government of Ontario. 1990b. *Conservation Authorities Act*, R.S.O. 1990, c. C.27. Available online at: https://www.ontario.ca/laws/statute/90c27

Government of Ontario. 1997. *Fish and Wildlife Conservation Act*, 1997, S.O. 1997, c. 41. Available online at: https://www.ontario.ca/laws/statute/97f41

Government of Ontario. 2007. *Endangered Species Act*. 2007. S.O. 2007, c.6. Available online at: https://www.ontario.ca/laws/statute/07e06

Government of Ontario. 2021. O. Reg. 830/21: Exemptions – Barn Swallow, Bobolink, Eastern Meadowlark and Butternut. Available online at: https://www.ontario.ca/laws/regulation/r21830#BK29

Halloran, J., H. Anderson and D. Tassie. 2013. Clean Equipment Protocol for Industry. Peterborough Stewardship Council and Ontario Invasive Plant Council. Peterborough, ON.

Humphrey, C. and H. Fotherby. 2019. Recovery Strategy for the Little Brown Myotis (*Myotis lucifugus*), Northern Myotis (*Myotis septentrionalis*) and Tri-colored Bat (*Perimyotis subflavus*) in Ontario. Ontario Recovery Strategy Series. Prepared by the Ministry of the Environment, Conservation and Parks, Peterborough, Ontario. vii + 35 pp. + Appendix. Adoption of the Recovery Strategy for the Little Brown Myotis (*Myotis lucifugus*), the Northern Myotis (*Myotis septentrionalis*), and the Tri-colored Bat *(Perimyotis subflavus*) in Canada (Environment and Climate Change Canada 2018).

Humphrey, C. 2017. Recovery Strategy for the Eastern Small-footed Myotis (*Myotis leibii*) in Ontario. Ontario Recovery Strategy Series. Prepared for the Ontario Ministry of Natural Resources and Forestry, Peterborough, Ontario. vii + 76 pp.

Lee, H.R., W. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig, and S. McMurray. 1998. Ecological Land Classification for Southern Ontario: First Approximation and its Application. Ontario Ministry of Natural Resources, North Bay.

Ministry of Environment, Conservation and Parks. 2022a. Species at Risk in Ontario. Available online at: https://www.ontario.ca/page/species-risk-ontario

Ministry of Environment, Conservation and Parks. 2022b. General Habitat Description for the Blanding's Turtle (Emydoidea blandingii). Available online at: https://files.ontario.ca/mecp-blandings-turtle-general-habitat-description-en-2021-04-20.pdf

Ministry of Natural Resources. 2010. Natural Heritage Reference Manual for Natural Heritage Policies of the Provincial Policy Statement, 2005. Second Edition. Available online at: https://docs.ontario.ca/documents/3270/natural-heritage-reference-manual-for-natural.pdf

Ministry of Natural Resources and Forestry. 2015a. Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E. OMNRF Regional Operations Division: Southern Region Resources Section, Peterborough, Ontario. 39 pp.

Ministry of Natural Resources and Forestry. 2015b. Technical Note: Species at Risk (SAR) Bats. OMNRF Regional Operations Division. 37 pp.

Ministry of Northern Development, Mines, Natural Resources and Forestry. 2022a. Natural Heritage Information Centre: Make Natural Heritage Map. Available online at: https://www.ontario.ca/page/make-natural-heritage-area-map

Ministry of Northern Development, Mines, Natural Resources and Forestry. 2022b. Land Information Ontario Provincially Tracked species Grid Detail. Available online at: https://geohub.lio.gov.on.ca/datasets/provincially-tracked-species-grid-detail

Ontario Nature. 2019. Herp Atlas. Available online at: https://ontarionature.org/programs/citizen-science/reptile-amphibian-atlas/species/

South Nation Conservation. Unpublished. Findlay Creek fishing sampling data from 2010 and 2018.

South Nation Conservation. Unpublished. Snapping Turtle sightings map (no date).

South Nation Conservation. 2010. Leitrim Wetland vegetation communities map.

South Nation Conservation. 2018. Leitrim Wetland Management Plan. Ottawa, Ontario. 39 pp.

South Nation Conservation. 2022. Regulation Policies - Ontario Regulation 170/06: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses. Available online at: https://www.nation.on.ca/sites/default/files/2022%2002%20SNC%20S.%2028%20Regulation%20Policies%20-%20Final.pdf

South Nation Conservation. 2021. 2020 Findlay Creek Monitoring Program. Finch, Ontario. 8 pp.

Toronto Entomologists' Association. 2022. Ontario Butterfly Atlas. Available online at: https://www.ontarioinsects.org/atlas/

Appendix A Qualifications of Report Authors

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.

Bruce Kilgour, PhD

Dr. Kilgour is an ecologist, with a background in monitoring, study design and ecological inventory, and specialized in aquatic sciences, fisheries and fish habitat. He has applied his 30+ years of experience in natural environment studies to the full life-cycle of industrial and government capital projects. He has conducted Municipal Class, Provincial, and Federal process environmental assessments in support of proposed infrastructure and industrial facilities including dams, piers, roads, and other linear corridors. As part of those 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. Dr. Kilgour has developed and delivered monitoring programs for pulp and paper mills, metals mines, oil sands operations, and municipal wastewater facilities.

Katherine Black, MSc

Ms. Black has nearly seven years of comprehensive field, laboratory, and report-writing experience in biology with proven decision-making skills when it comes to solving environmental and logistical issues. She has worked in a variety of research settings, including technical laboratories, greenhouses, construction sites, and remote fly-in field sites. Ms. Black's background is predominantly in terrestrial ecology; she has performed vegetation and wildlife surveys in a variety of natural and disturbed environments, including wetland, tundra, field, and forest environments. Katie joined Kilgour & Associates Ltd. in January of 2019 and has since contributed to numerous Environmental Impact Studies (EIS), Tree Conservation Reports (TCR), Headwater Drainage Features Assessments (HDFA), Integrated Environmental Reviews (IER), Constraints Analyses, Existing Conditions Reports, delineation of natural heritage features, species at risk (SAR) monitoring, erosion and sediment control inspections, and water quality monitoring. Ms. Black is a certified Ontario wetland evaluator and has supported several land development projects requiring wetland delineation, evaluation, permitting, and compensation. This includes liaising with environmental agencies such as Conservation Authorities, the MNDMNRF, Environment and Climate Change Canada, the National Capital Commission, DFO, and local municipalities. Ms. Black also assists land development clients by applying her knowledge of the *Endangered Species Act* to projects that have the potential to interact with SAR. This involves determining appropriate mitigation measures in consultation with the MECP to minimize potential impacts to habitat areas for SAR. Before her employment at Kilgour & Associates Ltd., Ms. Black worked as a Project Manager for an ecohydrology research group at McMaster University where she provided technical field and logistical support for research projects relating to SAR habitat monitoring and wetland restoration at a large construction site (wind energy project) in eastern Georgian Bay.

Appendix B 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)	Habitat Description	Potential or Confirmed Habitat on the Site	Potential to Interact with Development of the Site (None, Negligible, Low, Moderate, or High)[1]
Birds						
Bald Eagle (*Haliaeetus leucocephalus*)	**Special Concern**	**Not at Risk**	Cornell Lab of Ornithology (2022)	Nest in mature forests near open water. In large trees such as pine and poplar.	None.	Low.
Bank Swallow (*Riparia riparia*)	**Threatened**	**Threatened**	Bird Studies Canada et al. (2009), Cornell Lab of Ornithology (2022)	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.	None.	Low.
Barn Swallow (*Hirundo rustica*)	**Threatened**	**Threatened**	Bird Studies Canada et al. (2009), Cornell Lab of Ornithology (2022)	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.	None.	Low.
Black Tern (*Chlidonias niger*)	**Special Concern**	**Not at Risk**	N/A	Build floating nests in loose colonies in shallow marshes, especially in cattails.	Cattail marsh may provide suitable habitat.	Low.
Bobolink (*Dolichonyx oryzivorus*)	**Threatened**	**Threatened**	Bird Studies Canada et al. (2009), MNDMNRF (2022a), Cornell Lab of Ornithology (2022), MNDMNRF (2022b), California Academy of Sciences and National Geographic Society (2022)	Periodically mown, dry meadow for nesting. Habitat (meadow) should be >10 ha, and preferably >30 ha before Bobolink are attracted to the area. Not near tall trees.	None.	Low.
Canada Warbler (*Cardellina canadensis*)	**Special Concern**	**Threatened**	N/A	Prefers wet forests with dense shrub layers. Nests located on or near the ground on mossy logs or roots, along stream banks or on hummocks.	Cedar swamp and thicket swamp may provide suitable habitat.	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)	Habitat Description	Potential or Confirmed Habitat on the Site	Potential to Interact with Development of the Site (None, Negligible, Low, Moderate, or High)[1]
Cerulean Warbler (*Setophaga cerulea)*	**Threatened**	**Endangered**	N/A	Prefers mature deciduous forests.	None.	Negligible.
Chimney Swift (*Chaetura pelagica*)	**Threatened**	**Threatened**	Cornell Lab of Ornithology (2022)	Nests in traditional-style open brick chimneys (and rarely in hollow trees). Tends to stay close to water.	None.	Low.
Common Nighthawk (*Chordeiles minor*)	**Special Concern**	**Threatened**	Cornell Lab of Ornithology (2022)	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.	None.	Low.
Eastern Meadowlark (*Sturnella magna*)	**Threatened**	**Threatened**	Bird Studies Canada et al. (2009), MNDMNRF (2022a), Cornell Lab of Ornithology (2022), MNDMNRF (2022b), California Academy of Sciences and National Geographic Society (2022)	Periodically mown, dry meadow for nesting. Habitat (meadow) should be >10 ha, and preferably >30 ha before Eastern Meadowlark are attracted to the area. Not near tall trees.	None.	Low.
Eastern Whip-poor-will (*Antrostomus vociferus*)	**Threatened**	**Threatened**	N/A	Suitable breeding habitats generally include open and half treed areas and often exhibit a scattered distribution of treed and open space. Lays eggs directly on the forest floor. Roosts are typically located in forest habitat on a low branch or directly on the ground.	None.	Negligible.
Eastern Wood-pewee (*Contopus virens*)	**Special Concern**	**Special Concern**	Bird Studies Canada et al. (2009), Cornell Lab of Ornithology (2022)	Woodland species often found in the mid-canopy layer near clearings and edges of deciduous and mixed forests.	Edges of cedar swamp and thicket swamp may provide suitable habitat.	Moderate.

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Evening Grosbeak (*Coccothraustes vespertinus*)	**Special Concern**	**Special Concern**	N/A	Nests in trees or large shrubs; prefers mature coniferous forests but will also use deciduous forests, parklands, and orchards.	Cedar swamp and thicket swamp may provide suitable habitat.	Low.
Golden Eagle (*Aquila chrysaetos*)	**Endangered**	**Not at Risk**	N/A	Nests 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.	None.	Negligible.
Golden-winged Warbler (*Vermivora chrysoptera*)	**Special Concern**	**Threatened**	N/A	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.	None.	Negligible.
Grasshopper Sparrow (*Ammodramus savannarum*)	**Special Concern**	**Special Concern**	Bird Studies Canada et al. (2009), Cornell Lab of Ornithology (2022)	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 shape.	None.	Low.
Henslow's Sparrow (*Ammodramus henslowii*)	**Endangered**	**Endangered**	SNC (2018; historic record)	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.	None.	Low.
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.	Cattail marsh and open water areas may provide suitable habitat.	Low.
Least Bittern (*Ixobrychus exilis*)	**Threatened**	**Threatened**	N/A	Found in a variety of wetland habitats, but strongly prefers cattail marshes with a mix of open pools and channels.	Cattail marsh and open water areas may provide suitable habitat.	Low.
Loggerhead Shrike (*Lanius ludovicianus*)	**Endangered**	**Endangered**	SNC (2018; historic record), MNDMNRF (2022b)	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.	None.	Low.

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Olive-sided Flycatcher (*Contopus cooperi*)	**Special Concern**	**Threatened**	Cornell Lab of Ornithology (2022)	Found along natural forest edges and openings. Will use forests that have been logged or burned if there are ample tall snags and trees to use for foraging perches.	Cedar swamp edges (with ample snags) would provide suitable habitat.	Moderate.
Peregrine Falcon (*Falco peregrinus*)	**Special Concern**	**Special Concern**	California Academy of Sciences and National Geographic Society (2022)	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.	None.	Low.
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.	None.	Negligible.
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.	None.	Negligible.
Rusty Blackbird (*Euphagus carolinus*)	**Special Concern**	**Special Concern**	Cornell Lab of Ornithology (2022), California Academy of Sciences and National Geographic Society (2022)	Prefers wet wooded or shrubby areas. Nests at edges of boreal wetlands and coniferous forests. These areas include bogs, marshes, and beaver ponds.	Most of the Site would provide suitable habitat.	Moderate.
Red-shouldered Hawk (*Buteo lineatus*)	**Not at Risk**	**Special Concern**	SNC (2018)	Breeds in a variety of forest types, including bottomland hardwood, riparian areas, flooded deciduous swamps, and upland mixed deciduous-coniferous forest; nearby wetlands or other aquatic areas are essential.	Most of the Site would provide suitable habitat.	High.
Short-eared Owl (*Asio flammeus*)	**Special Concern**	**Special Concern**	SNC (2018), Cornell Lab of Ornithology (2022)	Lives in open areas such as grasslands, marshes, and tundra where it nests on the ground and hunts for small mammals.	Cattail marsh would provide suitable habitat.	High.
Wood Thrush (*Hylocichla mustelina*)	**Special Concern**	**Threatened**	Bird Studies Canada et al. (2009), MNDMNRF (2022a), Cornell Lab of Ornithology (2022)	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	Cedar swamp may provide marginal habitat.	Moderate.

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				nests in Sugar Maple or American Beech.		
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.	Cattail marsh would provide suitable habitat.	Low.
Mammals						
Algonquin Wolf (*Canis* sp.)	**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.
Eastern Cougar (*Puma concolor*)	**Endangered**	**Not at Risk**	N/A	Lives in large, undisturbed forests or other natural areas where there is little human activity.	None.	Negligible.
Eastern Small-footed Myotis (*Myotis leibii*)	**Endangered**	**Not at Risk**	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.	The Site lacks preferred roosting habitat.	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.
Little Brown Myotis (*Myotis lucifugus*)	**Endangered**	**Endangered**	SNC (2018), Humphrey and Fotherby (2019)	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	Cedar snags would provide roosting habitat.	High.

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				access to many different roosting areas.		
Northern Myotis / Northern Long-eared Bat (*Myotis septentrionalis*)	**Endangered**	**Endangered**	N/A	Associated with boreal forests, choosing to roost under loose bark and in the cavities of trees.	Mature trees may provide roosting habitat.	Low.
Tri-coloured Bat / Eastern Pipistrelle (*Perimyotis subflavus*)	**Endangered**	**Endangered**	N/A	Roosts mainly in trees during summer; overwinters in caves and mines along with other species, but often uses deeper parts of the hibernaculum.	Most mature trees are coniferous and therefore are considered unsuitable.	Negligible.
Amphibians						
Western Chorus Frog (*Pseudacris triseriata*)	**Not at Risk**	Great Lakes-St. Lawrence population: **Threatened**	SNC (2018)	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.	Most of the Site would provide suitable habitat.	High.
Arthropods						
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.	Likely none. However, if a fen community still exists on the Site, bogbean and therefore suitable habitat may exist.	Negligible.
Gypsy Cuckoo Bumble Bee (*Bombus bohemicus*)	**Endangered**	**Endangered**	MNDMNRF (2022a), MNDMNRF (2022b)	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.

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Macropis Cuckoo Bee *(Epeoloides pilosulus)*	**Not at Risk**	**Endangered**	N/A	Found in habitats supporting both Macropis bees and their food plant, Yellow Loosestrife (*Lysimachi*a).	Has not been observed in Ontario in over 45 years (COSEWIC, 2011).	None.
Monarch (*Danaus plexippus*)	**Special Concern**	**Special Concern**	Toronto Entomologists' Association (2022), California Academy of Sciences and National Geographic Society (2022)	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.	Upland vegetation communities on the Site may provide suitable habitat; milkweed was observed in these areas.	Moderate.
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.	None.	Negligible.
Nine-spotted Lady Beetle (*Coccinella novemnotata*)	**Endangered**	**Not at Risk**	N/A	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.
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 Ottawa (MECP, 2019d).	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.
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,	There have been no records of the species in Ontario since 1990 (MECP, 2020b).	None.

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				deciduous forests, prairie grasslands, meadows, and riparian areas.		
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 it is the only food source for larvae.	None.	Negligible.
Yellow-banded Bumble Bee (*Bombus terricola*)	**Special Concern**	**Special Concern**	Bumble Bee Watch (2022), California Academy of Sciences and National Geographic Society (2022)	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.	Most of the Site may provide suitable habitat given that the species is a generalist.	Moderate.
Lichens						
Black-foam Lichen (*Anzia colpodes*)	**No Status**	**Threatened**	N/A	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.
Flooded Jellyskin (*Leptogium rivulare*)	**No Status**	**Special Concern**	N/A	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.	None.	Negligible.

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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 Ottawa area (MECP, 2019f).	None.
Reptiles						
Blanding's Turtle (*Emydoidea blandingii*)	**Threatened**	**Endangered**	Ontario Nature (2019), MNDMNRF (2022b), California Academy of Sciences and National Geographic Society (2022)	Quiet lakes, streams, and wetlands with abundant emergent vegetation. Also frequently occurs in adjacent upland forests.	Cattail marsh and open water areas would provide suitable habitat.	Moderate.
Eastern Musk Turtle / Stinkpot (*Sternotherus odoratus*)	**Special Concern**	**Special Concern**	N/A	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.	Cattail marsh and open water areas may provide marginal habitat.	Low.
Eastern Ribbonsnake *(Thamnophis sauritus)*	**Special Concern**	**Special Concern**	N/A	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.	Cattail marsh and riparian areas would provide suitable habitat.	Low.
Midland Painted Turtle (*Chrysemys picta marginata*)	**Not at Risk**	**Special Concern**	SNC (2018), Ontario Nature (2019), MNDMNRF (2022a), Blanchett (unpublished), KAL field observations (2022)	Inhabits waterbodies, such as ponds, marshes, lakes and slow-moving creeks that have a soft bottom and provide abundant basking sites and aquatic vegetation. Often bask on shorelines or on logs and rocks that protrude from the water.	Cattail marsh and open water areas would provide suitable habitat.	High.

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)	Habitat Description	Potential or Confirmed Habitat on the Site	Potential to Interact with Development of the Site (None, Negligible, Low, Moderate, or High)[1]
Milksnake (*Lampropeltis triangulum*)	**Not at Risk**	**Special Concern**	N/A	Found in variety of open, scrubby or edge habitats, including pastures.	None.	Negligible.
Northern Map Turtle (*Graptemys geographica*)	**Special Concern**	**Special Concern**	California Academy of Sciences and National Geographic Society (2022)	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.	None.	Negligible.
Snapping Turtle (*Chelydra serpentina*)	**Special Concern**	**Special Concern**	SNC (2018), Ontario Nature (2019), Blanchett (unpublished), MNDMNRF (2022a), MNDMNRF (2022b), California Academy of Sciences and National Geographic Society (2022), SNC (undated)	Spend most of their lives in the water. Prefer shallow waters so they can hide under the soft mud and leaf litter with only their noses exposed to the surface to breathe.	Cattail marsh and open water areas would provide suitable habitat.	High.
Spiny Softshell (*Apalone spinifera*)	**Endangered**	**Endangered**	N/A	Found primarily in rivers and lakes but also in creeks, ditches, and ponds near rivers. Habitat requirements are open sand or gravel nesting areas, shallow muddy or sandy areas to bury in, deep pools for hibernation, areas for basking, and suitable habitat for crayfish and other food species.	None.	Negligible.
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.	Cattail marsh and open water areas may provide suitable habitat.	Low.

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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.	None.	Negligible.
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.	None.	Negligible.
American Ginseng (*Panax quinquefolius*)	**Endangered**	**Endangered**	N/A	Grows in rich, moist, but well-drained, and relatively mature, deciduous woods dominated by Sugar Maple, White Ash, and American Basswood.	None.	Negligible.
Butternut (*Juglans cinerea*)	**Endangered**	**Endangered**	MNDMNRF (2022a), MNDMNRF (2022b), California Academy of Sciences and National Geographic Society (2022)	Commonly found in riparian habitats but is also found on rich, moist, well-drained loams and well-drained gravels, especially those of limestone origin.	Riparian and upland areas adjacent to Findlay Creek would provide suitable habitat.	Moderate.
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.	Likely none. However, if a fen community still exists on the Site, suitable habitat would exist.	
Fish						
American Eel (*Anguilla rostrata*)	**Endangered**	**Endangered**	N/A	Primarily nocturnal, hiding in soft substrate or submerged vegetation during the day.	None.	Negligible.
Bridle Shiner (*Notropis bifrenatus*)	**Special Concern**	**Special Concern**	N/A	Prefers clear water with abundant vegetation over silty or sandy substrate.	None.	Negligible.

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)	Habitat Description	Potential or Confirmed Habitat on the Site	Potential to Interact with Development of the Site (None, Negligible, Low, Moderate, or High)[1]
Channel Darter (*Percina copelandi*)	**Special Concern**	**Threatened**	N/A	Prefers clean streams and lakes with moderate current over sandy or rocky substrate.	None.	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.	None.	Negligible.
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.	None.	Negligible.
Cutlip Minnow (*Exoglossum maxillingua)*	**Threatened**	**Special Concern**	N/A	Lives in warmer rivers and creeks with clear, slow-moving water, and a rocky or gravel bottom.	None.	Negligible.
Northern Sunfish (*Lepomis peltastes*)	**Special Concern**	**No Status**	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.	None.	Negligible.
River Redhorse (*Moxostoma carinatum*)	**Special Concern**	**Special Concern**	N/A	Prefers fast-flowing, clear rivers over rocky substrate.	None.	Negligible.
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.	None.	Negligible.

[1]**None**: the range of the species does not overlap with the Site, the species is documented as no longer occurring in the ecoregion, or it is extremely unlikely for the species to occupy the Site due to access barriers.
Negligible: No observation records exist for within 10 km of the Site and the Site does not contain suitable habitat. The species has potential for unpredictable presence on/use of the Site.
Low: No observation records exist for within 10 km of the Site but suitable habitat exists on the Site, or suitable habitat does not exist on the Site but observation records exist for within 10 km.
Moderate: The species is known to occur within 10 km of the Site and suitable habitat exists on the Site.
High: The species is known to occur on or adjacent to the Site and suitable or confirmed habitat exists on the Site.

LITERATURE CITED

Birds Canada, Canadian Wildlife Service (Environment and Climate Change Canada), Ministry of Northern Development, Mines, Natural Resources and Forestry – Government of Ontario, Ontario Field Ornithologists (OFO), and Ontario Nature. 2009. Atlas of the Breeding Birds of Ontario 2001-2005. Available online at: https://www.birdsontario.org/jsp/datasummaries.jsp

Bumble Bee Watch. 2022. Bumble Bee Sightings Map. Available online at: https://www.bumblebeewatch.org/app/#/bees/map?filters=%7B%22sightingstatus_id%22:%5B%5D,%22species_id%22:%5B%2237%22%5D,%22province_id%22:%5B%5D%7D

California Academy of Sciences and National Geographic Society. 2022. iNaturalist. Available online at: https://www.inaturalist.org/

Committee on the Status of Endangered Wildlife in Canada. 2011. COSEWIC Assessment and Status Report on the Macropis Cuckoo Bee (*Epeoloides pilosulus*) in Canada. Available online at: https://www.registrelep-sararegistry.gc.ca/virtual_sara/files/cosewic/sr_macropis_cuckoo_bee_0911_eng.pdf

Committee on the Status of Endangered Wildlife in Canada. 2015. COSEWIC Assessment and Status Report on the Black-foam Lichen (*Anzia colpodes*) in Canada. Available online at: https://sararegistry.gc.ca/virtual_sara/files/cosewic/sr_Black-foam%20Lichen_2015_e.pdf

The Cornell Lab of Ornithology. 2022. eBird: An online database of bird distribution and abundance. Available online at: https://ebird.org/home

Fisheries and Oceans Canada (previously Department of Fisheries and Oceans, "DFO"). 2022. Aquatic Species at Risk Map. Available online at: https://www.dfo-mpo.gc.ca/species-especes/sara-lep/map-carte/index-eng.html

Humphrey, C. and H. Fotherby. 2019. Recovery Strategy for the Little Brown Myotis (*Myotis lucifugus*), Northern Myotis (*Myotis septentrionalis*) and Tri-colored Bat (*Perimyotis subflavus*) in Ontario. Ontario Recovery Strategy Series. Prepared by the Ministry of the Environment, Conservation and Parks, Peterborough, Ontario. vii + 35 pp. + Appendix. Adoption of the Recovery Strategy for the Little Brown Myotis (*Myotis lucifugus*), the Northern Myotis (*Myotis septentrionalis*), and the Tri-colored Bat *(Perimyotis subflavus*) in Canada (Environment and Climate Change Canada 2018).

Humphrey, C. 2017. Recovery Strategy for the Eastern Small-footed Myotis (*Myotis leibii*) in Ontario. Ontario Recovery Strategy Series. Prepared for the Ontario Ministry of Natural Resources and Forestry, Peterborough, Ontario. vii + 76 pp.

Ministry of Environment, Conservation and Parks. 2019a. Algonquin Wolf. Available online at: https://www.ontario.ca/page/algonquin-wolf

Ministry of Environment, Conservation and Parks. 2019b. Gypsy Cuckoo Bumble Bee. Available online at: https://www.ontario.ca/page/gypsy-cuckoo-bumble-bee

Ministry of Environment, Conservation and Parks. 2019c. Nine-spotted Lady Beetle. Available online at: https://www.ontario.ca/page/nine-spotted-lady-beetle

Ministry of Environment, Conservation and Parks. 2019d. Rapids Clubtail. Available online at: https://www.ontario.ca/page/rapids-clubtail

Ministry of Environment, Conservation and Parks. 2019e. Rusty-patched Bumble Bee. https://www.ontario.ca/page/rusty-patched-bumble-bee

Ministry of Environment, Conservation and Parks. 2019f. Pale-bellied Frost Lichen. Available online at: https://www.ontario.ca/page/pale-bellied-frost-lichen

Ministry of Environment, Conservation and Parks. 2020a. Gray Fox. Available online at: https://www.ontario.ca/page/grey-fox

Ministry of Environment, Conservation and Parks. 2020b. Transverse Lady Beetle. Available online at: https://www.ontario.ca/page/transverse-lady-beetle

Ontario Nature. 2019. Herp Atlas. Available online at: https://ontarionature.org/programs/citizen-science/reptile-amphibian-atlas/species/

Toronto Entomologists' Association. 2022. Ontario Butterfly Atlas. Available online at: https://www.ontarioinsects.org/atlas/