ENVIRONMENTAL IMPACT STATEMENT

210 & 220 MAPLE CREEK COURT, CITY OF OTTAWA, ONTARIO

Project No.: 0CP-15-0429

Prepared for:

Mark Kauhanen
BBS Construction Ltd.
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Ottawa, ON
K2C 0P9

Prepared by:

McIntosh Perry Consulting Engineers Ltd.
115 Walgreen Road, R.R.3
Carp, Ontario
K0A 1L0

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Version 004
September 11, 2020

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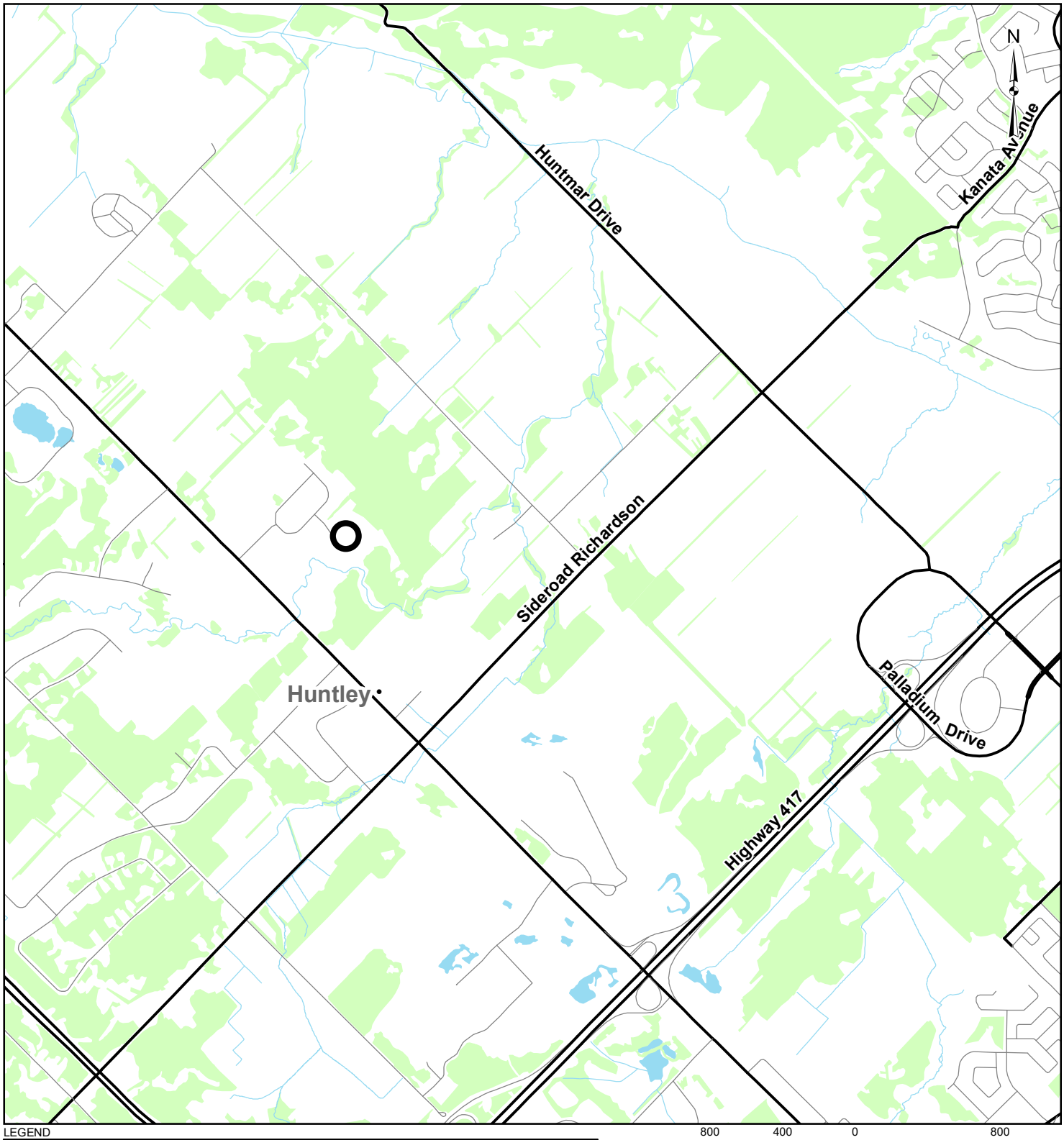
1.0 PROPERTY INFORMATION

The subject properties are owned by Mr. Jamie Wall. They are located at 210 and 220 Maple Creek Court, within the approved Reis Road Industrial Park. The properties are described as Parts 4 & 5, Plan 27R-17169 Geographic Township of Huntley, Part Lot 7 Concession 2, City of Ottawa, Property Identification Numbers 045370626 and 045370625. The subject properties cover approximately 3.47 ha and are located at the end of the roundabout on Maple Creek Court. The current planning designation is *Carp Road Corridor Rural Employment Area*. The zoning is *Rural General Industrial* (RG5).

Based on an analysis of Google Earth and geoOttawa (City of Ottawa, 2019) aerial imagery, historically the subject properties were partially forested, while adjacent lands were utilized for agricultural purposes and also forested. The existing properties are currently undeveloped. The southern lot (220 Maple Creek Court) was initially cleared in 2005 and the northern lot (210 Maple Creek Court) was fully cleared in 2018 prior to the tree clearing by-law being in place. There are no buildings or infrastructure located on or under the existing site.



LEGEND

- Site Location
- Local Road
- Major Road
- Watercourse
- Waterbody
- Wooded Area

800 400 0 800

Scale 1:30,000 Metres

REFERENCE

GIS Data provided by the Ontario Ministry of Natural Resources and Forestry, 2017.

CLIENT: BBS CONSTRUCTION (ONTARIO) LTD.

PROJECT: 210 MAPLE CREEK COURT

TITLE: KEY PLAN

McINTOSH PERRY
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PROJECT NO: CP15-0429		FIGURE:
Date	Jan., 18, 2017	1
GIS	JD	
Checked By	HL	

2.0 METHODOLOGY

In order to satisfy survey requirements outlined in the City of Ottawa's *Environmental Impact Statement Guidelines* (2015a), field investigations were conducted on January 16, 2017, by H. Lunn of McIntosh Perry Consulting Engineers Ltd. (McIntosh Perry) as well as May 14, 2019, by E. Pohanka of McIntosh Perry. The City of Ottawa's *Environmental Impact Statement Guidelines* (2015a) indicates that "*site visit(s) will occur during the growing season rather than in winter, when snow cover and normal seasonal dormancy severely limit potential observations*." The field investigation on May 14, 2019 was conducted during appropriate growing season.

The field investigations included the following:

- Full walk-through of the proposed development area, and visual observations of adjacent habitat;
- Identification and confirmation of the presence of natural heritage features, including watercourses, water bodies, Provincially Significant Wetlands (PSW), Significant Woodlands and Significant Wildlife Habitat;
- Tree and other plant identification, where site conditions/snow coverage allowed;
- Butternut tree location(s) (if observed);
- Bird and other wildlife identification, and
- Identification and assessment of wildlife habitat, potential breeding, nesting and feeding areas, where site conditions/snow coverage allowed.

Assessed vegetation was classified and mapped using the Ministry of Natural Resources and Forestry's (MNRF) Ecological Land Classification (ELC) vegetation community codes.

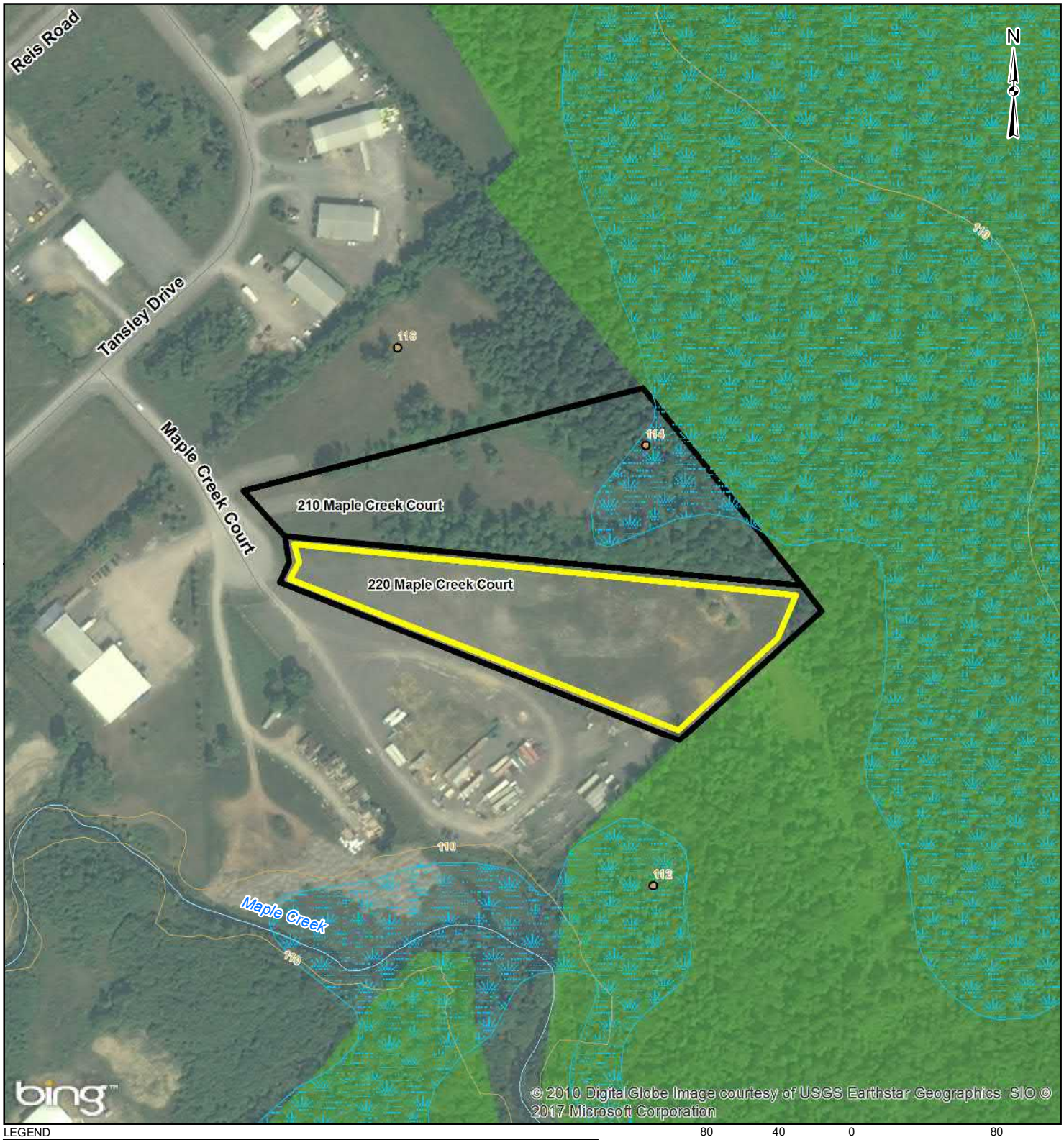
Wildlife species noted during the field investigations were identified by signs, visual observations, and vocalizations. For the purpose of this assessment, all wildlife observed within and adjacent to the study limits were recorded and considered to be residents or visitors of the area.

Photographs were taken of the subject property during the field investigations and have been included in **Appendix A** of this report. **Table 1** summarizes the details of the field investigations conducted in the study area.

Table 1: Summary of Field Investigations					
Date	**Surveyors**	**Time On Parcel**	**Temperature**	**Weather Conditions**	**Purpose of Visit**
January 16, 2017	H. Lunn	8:00 a.m. – 11:00 a.m.	-6 °C	Sunny, moderate wind, no precipitation	Natural features evaluation, species at risk (SAR)/SAR habitat screening, vegetation, and wildlife inventory.
May 14, 2019	E. Pohanka	8:30 a.m. – 10:00 a.m.	6 °C	Overcast, cool, raining, trace amount	Natural features evaluation, species at risk (SAR)/SAR habitat screening (including Bobolink and Eastern Meadowlark, vegetation, and wildlife inventory.

3.0 DESCRIPTION OF THE SITE AND THE NATURAL ENVIRONMENT

The following sections (3.1 to 3.5, inclusive), provide a description of the ecological functions provided by the site and identify any functions that contribute to the area being identified as "significant". **Figure 2 – Natural Features Map** identifies the natural features within and adjacent to the study area based on background information through a desktop review. **Figure 3 – Constraints and Opportunities Map** identifies all terrestrial and aquatic natural features, natural ecosystems, vegetation communities, and potential SAR habitat observed to be present on-site, and adjacent to the site, based on the field investigations. Information provided in the following sections was gathered during the January 16, 2017 and May 14, 2019 field investigations and through background information sources [e.g., Land Information Ontario database (LIO), Atlas of the Breeding Birds of Ontario (ABBO), Ontario Nature's Ontario Reptile and Amphibian Atlas (ORAA), etc.



LEGEND

- Property Boundary
- Cultural Meadow (CUM) and Potential Bobolink/Eastern Meadowlark/Grasshopper Sparrow Habitat
- Significant Woodland
- Spot Height (masl)
- Contour (masl)
- Local Road
- Major Road
- Watercourse
- Unevaluated Wetland

80 40 0 80

Scale 1:3,000 Metres

REFERENCE

GIS Data provided by the Ontario Ministry of Natural Resources and Forestry, 2017.

CLIENT: BBS CONSTRUCTION (ONTARIO) LTD.

PROJECT: 210 MAPLE CREEK COURT

TITLE: NATURAL ENVIRONMENT

McINTOSH PERRY
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PROJECT NO: CP15-0429		FIGURE:
Date	Jan., 19, 2017	2
GIS	JD	
Checked By	HL	

LEGEND

- Property Boundary
- Red-winged Blackbird Nest
- Song Sparrow Nest
- Wild Turkey Egg
- Basswood
- Scot's Pine
- White Spruce
- Cultural Meadow (CUM)
- Potential Groundwater
- Wet Cattail Area
- Wet Horsetail Area
- Significant Woodland

80 40 0 80

Scale 1:3,000 Metres

REFERENCE

GIS Data provided by the Ontario Ministry of Natural Resources and Forestry, 2020.

CLIENT: BBS CONSTRUCTION (ONTARIO) LTD.

PROJECT: 210 & 220 MAPLE CREEK COURT

TITLE: CONSTRAINTS AND OPPORTUNITIES

McINTOSH PERRY
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Tel: 613-836-2184 Fax: 613-836-3742

PROJECT NO: CP15-0429		FIGURE:
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3.1 Landforms, Soils, and Geology

The general topography of the study area was nearly level. *Soils of the Regional Municipality of Ottawa-Carleton (Excluding the Ottawa Urban Fringe) Ontario Soil Survey Report No. 58* identified the soils on the subject property as from the Jockvale series; fine sandy loam, loamy fine sand, or fine sand (Schut et al., 1987). These soils have imperfect drainage (Schut et al., 1987).

A *Potable Water Supply Assessment* was prepared by Paterson Group Inc. (2017). They concluded that the existing confining nature of the upper bedrock of the aquifer is unlikely to be impacted by contamination or other effects as part of the commercial development. The only potential offsite sources of groundwater contamination identified within the vicinity of the study area are potential spills and road salt use along Maple Creek Court, and the neighbouring waste transfer station.

3.2 Surface Water, Groundwater and Fish Habitat

Background information indicated that a watercourse, Maple Creek, is present approximately 120 m south of the subject properties (**Figure 2**). Background information and observations made during the field investigations did not suggest any surface water was present within the subject property.

Though surface water was not observed, Schedule 2 of the City of Ottawa's *Carp Road Corridor Community Design Plan* indicates that the subject property is located in a High Recharge Area. This is an area where surface water is known to infiltrate the ground. In addition, GIS layers from geoOttawa maps (City of Ottawa, 2019) indicate that a portion of the unevaluated wetland has the potential to be present on the property at 210 Maple Creek Court (**Figure 2**). Wetland habitat was not observed on either subject property during the field investigation. However, potential groundwater was observed within the subject property due to iron staining and film on standing water on the south side of the rock fence line between the two subject properties (**Photo 8**). Cattails were present on the north side of the rock fence line (**Photo 7**). A wet area with cattails was also present in the northeast corner of the study area (**Photo 12**). Wet areas with horsetails and phragmites were present in the southeast corner of the study area (**Photos 9 & 10**). These areas were not extensive, and there was no evidence that the unevaluated wetland identified through the LIO database was still present within the study area.

3.3 Vegetation Cover

At the time of the January 16, 2017 field investigation, the majority of the subject property at 210 Maple Creek Court was devoid of woody vegetation (**Photos 1 to 3**). Due to the timing of the field investigation, and the amount of snow cover present, a determination of herbaceous vegetation communities using ELC was not possible on this property. Two trees (non-native species), were observed at the west end of the property, closest to Maple Creek Court: Scot's pine (*Pinus sylvestris*) and white fir (*Abies concolor*). No other woody vegetation was present on the 210 Maple Creek Court subject property. Snow cover prevented any observations of herbaceous vegetation on this property.

During the May 14, 2019 field investigation, 210 and 220 Maple Creek Court consisted of a cultural meadow (CUM) with very sparse woody vegetation. The study area was free of snow which allowed for a thorough inventory of vegetations species present during the field investigation. Vegetation species composition in the cultural meadow included less than 5% woody species cover. Woody vegetation species observed within the cultural meadow (concentrated within the boundary between the subject properties 210 and 220 Maple Creek Court), included mature speckled alder (*Alnus incana*), shrub willows (*Salix* spp.), common blackberry (*Rubus allegheniensis*), red-osier dogwood (*Cornus sericea*), balsam poplar (*Populus balsamifera*) saplings, and eastern white-cedar (*Thuja occidentalis*) saplings (**Photo 6**). The majority of the woody plants found in the cultural meadow were concentrated along the rock fence line dividing the two subject properties as well as along the south and east boundaries of the study area. These shrubs appeared to be in good health and ranged in heights up to approximately 2 m. Three (3) individual trees were observed within the cultural meadow within the study area. A Scot's pine (*Pinus sylvestris*) was identified approximately 8 m north of the rock fence and 40 m east of Maple Creek Court. This Scot's pine appeared to be healthy and was approximately 4 m in height. A white spruce (*Picea glauca*) was identified in the cultural meadow approximately 15 m north of the rock wall and 25 m east of Maple Creek Court. This white spruce appeared young, healthy, and approximately 4 m in height. A large mature basswood (*Tilia americana*) was identified at the northwest boundary of the study area approximately 50 m east of Maple Creek Court. The basswood tree appeared to be healthy, although some dead branches were present and was approximately 20 m in height. All other tree and shrub species listed in **Table 2** were identified adjacent to the study area.

The lands adjacent to the northeast and southeast include mixed deciduous forest and swamp. The cultural meadow consisted of a mix of ground cover, grasses, herbaceous wildflower species, and the wetland conditions described in Section 3.2. During the May 14, 2019 field investigation, the study area was surveyed for Butternut (*Juglans cinerea*) and their seedlings. None were observed on or adjacent to the study area.

According to *Vascular Plants of the City of Ottawa, with Identification of Significant Species* (Brunton, 2005), all vegetation species observed on the property and adjacent lands are common in the surrounding area, and none are considered to be rare on the landscape.

A full listing of vegetation species observed on 210 and 220 Maple Creek Court can be found in **Table 2**. These species were observed in and adjacent to the study area during the January 16, 2017 and May 14, 2019 field investigations conducted by McIntosh Perry staff.

Table 2: Vegetation Species List

Common Name	Scientific Name	Status According to Brunton (2005)
Trees		
American beech	*Fagus grandifolia*	Common
balsam poplar	*Populus balsamifera*	Common

Table 2: Vegetation Species List		
Common Name	**Scientific Name**	**Status According to Brunton (2005)**
baswood	*Tilia americana*	Common
black cherry	*Prunus serotina*	Common
eastern white-cedar	*Thuja occidentalis*	Common
green ash	*Fraxinus pennsylvanica*	Common
ironwood	*Ostrya virginiana*	Common
red maple	*Acer rubrum*	Common
Scot's pine	*Pinus sylvestris*	Rare (frequently planted)
sugar maple	*Acer saccharum*	Common
trembling aspen	*Populus tremuloides*	Common
white birch	*Betula papyrifera*	Common
white fir	*Abies concolor*	N/A
white spruce	*Picea glauca*	Common
Shrubs		
alternate-leaved dogwood	*Cornus alternifolia*	Common
common buckthorn	*Rhamnus cathartica*	Common (aggressive invasive)
glossy buckthorn	*Frangula alnus*	Common (aggressive invasive)
hawthorn sp.	*Crataegus* spp.	Unknown (likely common species)
ninebark	*Physocarpus opulifolius*	Uncommon (plus adventives)
red-osier dogwood	*Cornus sericea*	Common
riverbank grape	*Vitis riparia*	Common
shrub willow	*Salix* spp.	Unknown
speckled alder	*Alnus incana*	Common
wild red raspberry	*Rubus strigosus*	Common
Herbaceous Plants		
Aster sp.	Asteraceae	Unknown
black-eyed Susan	*Rudbeckia hirta*	Common
broad-leaved cattail	*Typha latifolia*	Common
bull thistle	*Cirsium vulgare*	Common
coltsfoot	*Tussilago farfara*	Uncommon (spreading common)

Table 2: Vegetation Species List		
Common Name	**Scientific Name**	**Status According to Brunton (2005)**
common dandelion	*Taraxacum officinale*	Common
common evening-primrose	*Oenothera biennis*	Common
common milkweed	*Asclepias syriaca*	Common
common mullein	*Verbascum thapsus*	Common
common scouring-rush	*Equisetum hyemale*	Common
common yarrow	*Achillea millefolium*	Common
cow vetch	*Vicia cracca*	Common
curled dock	*Rumex crispus*	Common
field pennycress	*Thlaspi arvense*	Common
goldenrod sp.	*Solidago* spp.	Unknown
grass sp.	Poaceae	Unknown
ground-ivy / Creeping Charlie	*Glechoma hederacea*	Common
hawkweed sp.	*Hieracium* spp.	Unknown
phragmites	*Phragmites australis australis*	Uncommon (locally abundant adventive)
Queen Anne's lace	*Daucus carota*	Common
red clover	*Trifolium pratense*	Common
sweet white violet	*Viola blanda*	Common
trout-lily	*Erythronium americanum*	Common
white sweet-clover	*Melilotus alba*	Common
wild parsnip	*Pastinaca sativa*	Common
wild strawberry	*Fragaria virginiana*	Common

The City of Ottawa identified Significant Woodland as present within the subject properties. The field investigation confirmed that Significant Woodland is not present within either subject property. As noted in Section 1.0 of this report, no forested habitat exists within the subject properties. However, the forested habitat was observed to be present adjacent to the subject properties (northeast and southeast). This habitat is also identified by the City of Ottawa as Significant Woodland (**Figure 2**). Observations of the adjacent forested habitat were made during the field investigations (**Photos 4, 7, 11, 12, 14, & 20**). In addition, recent aerial photography from Google Earth (9/5/2016) was reviewed to determine the character of the historical vegetation community (i.e. within the past 5 years). The City of Ottawa confirmed that the forested habitat adjacent to the subject properties has characteristics of Significant Woodland.

The field investigation confirmed that the adjacent forested habitat consisted of mixed forest and deciduous woodlands. Dominant species observed included: black cherry, green ash, sugar maple, eastern white-cedar, American beech, and ironwood. Google Earth aerial photographs (9/5/2016) depict continuous forest, with interior forest habitat located more than 100 m inside the edge of the forest patch. In addition, GIS layers from geoOttawa maps (City of Ottawa, 2019) show unevaluated wetland habitat and Maple Creek are present within the patch of forest adjacent to the subject properties. These observations and information confirm that the forested habitat adjacent to the subject properties is Significant Woodland. Therefore, the subject properties would be considered to be present on what the *Natural Heritage Reference Manual for Natural Heritage Policies of the Provincial Policy Statement, 2005* (2010) refers to as "Adjacent Lands" (i.e., lands within 120 m of Significant Woodlands where impacts must be considered).

3.4 Wildlife

The subject property is located in the St. Lawrence Lowlands Ecoregion within the Mixed Plains Ecozone (Crins et al., 2009). Characteristic wildlife within this Ecoregion includes black bear, moose, deer, wolf, hare, chipmunk, other small mammals, waterfowl, turtles, snakes, and various bird species. A complete list of wildlife species observed during the field investigations can be found in **Table 3**.

Table 3: Wildlife Observations

Species Name	Resident/Visitor	Evidence	Abundance on Site	Site Use
Amphibians				
spring peeper (*Pseudacris crucifer*)	Visitor	Call	Common	Foraging
Mammals				
coyote (*Canis latrans*)	Resident	Tracks	Common	Foraging
red fox (*Vulpes vulpes*)	Resident	Tracks	Common	Foraging
white-tailed deer (*Odocoileus virginianus*)	Resident	Tracks	Common	Foraging
Birds				
American Crow (*Corvus brachyrhynchos*)	Resident	Observed	Common	Flyover
American Goldfinch (*Spinus tristis*)	Resident	Call	Common	Foraging
American Redstart (*Setopha ruticilla*)	Visitor	Call	Common	Adjacent land
American Robin (*Turdus migratorius*)	Visitor	Observed	Common	Foraging

Table 3: Wildlife Observations				
Species Name	**Resident/Visitor**	**Evidence**	**Abundance on Site**	**Site Use**
Black-capped Chickadee (*Poecile atricapillus*)	Resident	Observed	Common	Adjacent land
Blue Jay (*Cyanocitta cristata*)	Resident	Observed	Common	Adjacent land
Canada Goose (*Branta canadensis*)	Visitor	Observed	Common	Foraging
Chestnut-sided Warbler (*Setophaga pensylvanica*)	Visitor	Observed	Common	Adjacent land
Common Raven (*Corvus corax*)	Resident	Call	Common	Foraging
Eastern Phoebe (*Sayornis phoebe*)	Visitor	Observed	Common	Foraging
Mallard (*Anas platyrhynchos*)	Visitor	Observed	Common	Flyover
Ovenbird (*Seiurus aurocapilla*)	Visitor	Call	Common	Adjacent land
Red-winged Blackbird (*Agelaius phoeniceus*)	Visitor	Observed	Common	Foraging/Nest
Savannah Sparrow (*Passerculus sandwichensis*)	Visitor	Observed	Common	Foraging
Song Sparrow (*Melospiza melodia*)	Visitor	Observed	Common	Foraging
Turkey Vulture (*Cathartes aura*)	Visitor	Observed	Common	Flyover
White-throated Sparrow (*Zonotrichia albicollis*)	Visitor	Call	Common	Adjacent land
Wild Turkey (*Meleagris gallopavo*)	Resident	Eggs	Common	Nesting habitat
Yellow Warbler (*Setophaga petechia*)	Visitor	Call	Common	Adjacent land
Yellow-bellied Sapsucker (*Sphyrapicus varius*)	Visitor	Observed	Common	Adjacent land
Yellow-rumped Warbler (*Setophaga coronata*)	Visitor	Observed	Common	Adjacent land

Remains of two (2) eggs from Wild Turkeys were observed on the ground within the study area during the May 14, 2019 field investigation (**Photo 20**). This species can breed early in the spring on open ground. It is likely that

Wild Turkeys utilized the study area for breeding. Remains of a nest were observed in the cattail area in the northeast corner of the study area during the May 14, 2019 field investigation (**Photo 13**). This nest was most likely constructed by a Red-winged Blackbird in previous years (**Photos 14 & 15**). Another nest was also observed in a shrub willow along the south side of the rock fence line (**Photo 16**). This nest was most likely constructed by Song Sparrows in previous years (**Photo 17**).

3.5 Habitat for Species at Risk

Information obtained from background sources (i.e., LIO, ABBO, ORAA), indicated that there was the potential for SAR and SAR habitat to be present on the subject properties. SAR with the potential for habitat to be present on the subject properties are listed below in **Table 4**.

Table 4: Species at Risk Potentially Present within the Study Area

Species Name	Scientific Name	Provincial Status	SAR Habitat Potentially Present on Subject Properties & Adjacent Lands	Source
Bird Species				
Bald Eagle	*Haliaeetus leucocephalus*	Special Concern	No	ABBO
Bank Swallow	*Riparia riparia*	Threatened	No	ABBO
Barn Swallow	*Hirundo rustica*	Threatened	No	ABBO
Black Tern	*Chlidonias niger*	Special Concern	No	ABBO
Bobolink	*Dolichonyx oryzivorus*	Threatened	No	LIO
Canada Warbler	*Cardellina canadensis*	Special Concern	Yes (adjacent forested lands only)	ABBO
Cerulean Warbler	*Setophaga cerulea*	Threatened	No	ABBO
Chimney Swift	*Chaetura pelagica*	Threatened	No	ABBO
Common Nighthawk	*Chordeiles minor*	Special Concern	No	ABBO
Eastern Meadowlark	*Sturnella magna*	Threatened	No	LIO
Eastern Whip-poor-will	*Caprimulgus vociferus*	Threatened	No	LIO
Eastern Wood-Pewee	*Contopus virens*	Special Concern	Yes (adjacent forested lands only)	ABBO
Golden-winged Warbler	*Vermivora chrysoptera*	Special Concern	No	ABBO
Grasshopper Sparrow	*Ammodramus savannarum*	Special Concern	No	ABBO
Least Bittern	*Ixobrychus exilis*	Threatened	No	ABBO

Table 4: Species at Risk Potentially Present within the Study Area				
Species Name	**Scientific Name**	**Provincial Status**	**SAR Habitat Potentially Present on Subject Properties & Adjacent Lands**	**Source**
Loggerhead Shrike	*Lanius ludovicianus*	Endangered	No	LIO
Olive-sided Flycatcher	*Contopus cooperi*	Special Concern	No	ABBO
Peregrine Falcon	*Falco peregrinus*	Special Concern	No	ABBO
Red-headed Woodpecker	*Melanerpes erythrocephalus*	Special Concern	No	ABBO
Short-eared Owl	*Asio flammeus*	Special Concern	No	ABBO
Wood Thrush	*Hylocichla mustelina*	Special Concern	Yes (adjacent forested lands only)	ABBO
Vegetation Species				
Butternut	*Juglans cinerea*	Endangered	Yes (none observed)	LIO
Turtle Species				
Blanding's Turtle	*Emydoidea blandingii*	Threatened	Yes (Maple Creek and unevaluated wetlands only)	LIO, ORAA
Snapping Turtle	*Chelydra serpentina*	Special Concern	Yes (Maple Creek and unevaluated wetlands only)	LIO, ORAA
Mammal Species				
Little Brown Myotis	*Myotis lucifugus*	Endangered	Yes (adjacent forested lands only)	General range

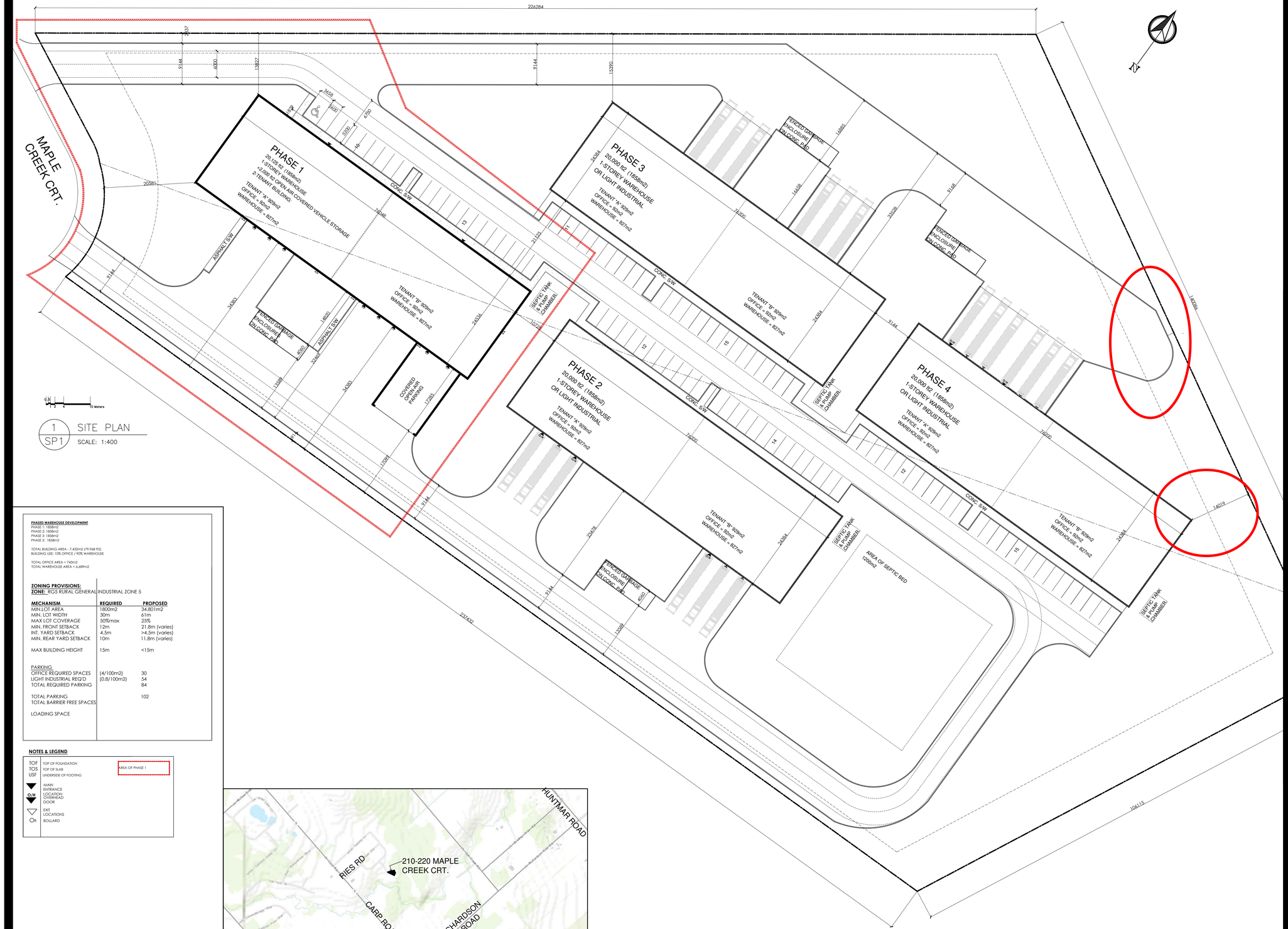
Potential habitat for the Bobolink, Eastern Meadowlark, and Grasshopper Sparrow was observed to be present within the cultural meadow habitat on the subject property at 220 Maple Creek Court (**Photos 1 to 3**) during the January 16, 2017 field investigation. Due to the time of year in which the field investigation was conducted, confirmation of species presence could not be made. The Bobolink, Eastern Meadowlark, and Grasshopper Sparrow are classified as grassland species. The Bobolink breeds in hayfields and other grasslands with relatively tall vegetation. Eastern Meadowlarks prefer open human-modified landscapes, including hayfields, pastureland, meadows, and other grassland types. The Grasshopper Sparrow prefers drier sites to those of the Bobolink and Eastern Meadowlark. It is found mainly in sparsely vegetated grasslands, with a varying amount of forb and shrub growth. They occasionally are also found in cultivated cereal crop or hay fields. A survey for Bobolink, Eastern Meadowlark, and Grasshopper Sparrow was conducted during the May 14, 2019 field investigation. It was determined that the study area was small and consisted mainly of wildflowers and other non-graminoid herbaceous plants. The study area also included wetland conditions in the east end and wet soils. These conditions were concluded not to be suitable habitat for grassland SAR bird species.

No butternut trees were observed on or within 50 m of the subject property boundaries, during the 2017 and 2019 field investigations. Therefore, it can be concluded that the species is not present at this time within the subject property boundaries or adjacent lands and will not be impacted by the proposed development.

It should be noted that the Significant Woodland (**Figure 2**) on the adjacent property provides potential habitat for the following species: Canada Warbler, Eastern Wood-Pewee, Wood Thrush, and Little Brown Myotis. In addition, the adjacent unevaluated wetland and Maple Creek (**Figure 2**) provide potential habitat for the Snapping Turtle and Blanding's Turtle. Habitat for any of these species was not observed to be present within subject property boundaries as the wetland conditions within the study area were not extensive or provided suitable water depths or vegetation communities. Habitat for all other species listed in **Table 4** was not observed to be present within subject property boundaries or on adjacent lands, during the field investigations.

4.0 DESCRIPTION OF THE PROPOSED PROJECT

The proposed development will consist of four (4) warehouse buildings approximately 1,865 m^2 in size. The proposed development will be completed in phases. Parking and drive aisles will be provided throughout the site, with landscaping located around the perimeter of the site. **Figure 4** provides a site plan for the proposed development.



PHASED WAREHOUSE DEVELOPMENT
PHASE 1: 1858m2
PHASE 2: 1858m2
PHASE 3: 1858m2
PHASE 5: 1858m2

TOTAL BUILDING AREA - 7,432m2 (79,968 ft2)
BUILDING USE: 10% OFFICE / 90% WAREHOUSE

TOTAL OFFICE AREA = 743m2
TOTAL WAREHOUSE AREA = 6,689m2

ZONING PROVISIONS:
ZONE: RG5 RURAL GENERAL INDUSTRIAL ZONE 5

MECHANISM	REQUIRED	PROPOSED
MIN.LOT AREA	1800m2	34,801m2
MIN. LOT WIDTH	30m	61m
MAX LOT COVERAGE	50%max	25%
MIN. FRONT SETBACK	12m	21.8m (varies)
INT. YARD SETBACK	4.5m	>4.5m (varies)
MIN. REAR YARD SETBACK	10m	11.8m (varies)
MAX BUILDING HEIGHT	15m	<15m
PARKING		
OFFICE REQUIRED SPACES	(4/100m2)	30
LIGHT INDUSTRIAL REQ'D	(0.8/100m2)	54
TOTAL REQUIRED PARKING		84
TOTAL PARKING		102
TOTAL BARRIER FREE SPACES		
LOADING SPACE		

NOTES & LEGEND

TOF	TOP OF FOUNDATION
TOS	TOP OF SLAB
USF	UNDERSIDE OF FOOTING
	MAIN ENTRANCE
O/H	LOCATION OVERHEAD DOOR
	EXIT LOCATIONS
	BOLLARD
	AREA OF PHASE I

SITE KEY MAP

REVISION		
NO.	DATE	REVISION
1		
2		
3		
4		
5		

CIVIL / SURVEYOR:
McINTOSH PERRY

ARCHITECT:

BUILDING A REPUTATION ON EXCELLENCE
BBS CONSTRUCTION (ONTARIO)LTD.
1805 WOODWARD DRIVE,
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www.bbsconstruction.ca

WALL SOUND
2434894 Ontario Inc.

PROJECT:
WALL SOUND - PHASED
OFFICE / WAREHOUSE PROJECT
210 / 220 MAPLE CREEK COURT

DRAWING TITLE:
SITE PLAN

PROJECT N°:	397-16
SCALE:	AS NOTED
DRAWN BY:	MK
DATE:	24/10/2016

DRAWING NO.
SP1

5.0 IMPACT ASSESSMENT

It is not anticipated that the proposed development will have a significant negative impact on terrestrial vegetation present on the subject property. The proposed development is located within an industrial park, within cultural meadows and previously cleared areas, which do not appear to contain sensitive, rare or significant vegetation species. In addition, there is less than 5 % woody vegetation coverage on the subject properties, and vegetation species observed are considered common in the area.

Based on the current site plan, negative impacts that could occur to the adjacent Significant Woodland as a result of the proposed development include effects such as the introduction of invasive species and damage to root systems/critical root zone of trees. The site plan (**Figure 4**) depicts one area where the pavement is proposed to be placed within 1.54 m of the edge of the Significant Woodland. The remaining development maintains a 10 m or greater buffer from the Significant Woodland edge. Development in close proximity to the Significant Woodland may cause the introduction of non-native and/or invasive species into this habitat. In addition, development this close to mature trees may cause negative impacts to the critical root zone of trees directly adjacent to the area. Aside from the select trees directly adjacent to the proposed development, overall habitat within the Significant Woodland is not anticipated to be negatively impacted by the proposed development.

The subject properties currently provide foraging habitat for common mammals and birds within the area (e.g., red fox, white-tailed deer, Savannah Sparrow, etc.) as well as nesting habitat for Wild Turkeys. The few trees, shrubs and cultural meadow habitat found on the subject properties also provide nesting habitat for migratory birds during the breeding/nesting season from April 1 to September 5 of any year. The development will remove a small amount of these types of habitat from the surrounding area. Mitigation measures are outlined in Section 6.0 to avoid impacts to wildlife species during construction.

It is not anticipated that SAR will be impacted as part of the project works due to the lack of Butternut presence and that the study area does not provide suitable habitat for SAR grassland birds. However, SAR bird and bat habitat potentially present in the adjacent Significant Woodlands may be impacted due to the placement of pavement within 1.54 m of this habitat. The Eastern Wood-pewee may be impacted if present, due to their preference for edge habitats. Habitat for this species is afforded protection as habitat for 'Species of Special Concern' is considered 'Significant Wildlife Habitat' under the *Provincial Policy Statement* (PPS) (2020) and the *City of Ottawa Official Plan* (2003). However, the Eastern Wood-pewee was not observed to be present during field surveys.

5.1 Identifying Cumulative Impacts

It is recommended that the current site plan be re-evaluated to accommodate the existing critical root zone of adjacent trees within the Significant Woodland, in order to prevent cumulative impacts to this feature through the loss of mature trees. If this can be accommodated, then by following the recommended mitigation measures outlined in Section 6.0 of this report, cumulative impacts should be avoided to the Significant Woodland.

Alternatively, the critical root zones of the trees that have the potential to be impacted by the current site plan could be determined, and their loss could be off-set by re-planting additional native tree species elsewhere on the property. A list of suitable species can be found in **Appendix B**.

6.0 MITIGATION

In order to minimize or eliminate environmental impacts from construction and development, the following mitigation measures are recommended:

- To prevent the introduction and spread of invasive plant species into the site and adjacent Significant Woodland, equipment utilized during construction should be inspected and cleaned in accordance with the *Clean Equipment Protocol for Industry* (**Appendix C**);
- In order to prevent negative impacts to the adjacent Significant Woodland and the sensitive habitat present within, it is recommended that a vegetated buffer be maintained, at minimum, within the critical root zone of trees along the woodland edge, between the proposed development and the adjacent Significant Woodland. Planting native species within this buffer and all associated "landscaped" areas is encouraged, as they will be better adapted to the local site conditions and provide a contributory function to the Significant Woodland located adjacent to the subject property. A list of suitable species can be found in **Appendix B**;
- In accordance with Appendix 10 of the *Environmental Impact Statement Guidelines* for the City of Ottawa, no clearing of any vegetation should occur between April 1 and September 5, unless a qualified biologist has determined that no nesting is occurring within 5 days prior to the clearing. Note: these dates are based upon breeding bird nesting data for eastern Ontario, provided by Bird Studies Canada (Hussell and Lepage, 2019). The nests and eggs of many species are protected under the federal and/or provincial legislation (i.e., *Migratory Birds Convention Act, Fish, and Wildlife Conservation Act*);
- In accordance with the *Protocol for Wildlife Protection during Construction* (**Appendix D**), reduce potential wildlife usage of the cultural meadow habitat (**Figure 2**) by mowing outside of the breeding season (i.e., before April 1), then maintain as mowed grass until on-site work begins;
- Should any SAR be discovered throughout the course of the work, and/or should any SAR or their habitat be potentially impacted by on-site activities, operations shall stop to avoid any negative impacts to SAR or their habitat, until further instructions by the Ministry of Environment, Conservation, and Parks (MECP). Operations must be modified to avoid any negative impacts to SAR or their habitat, until further direction is provided by the MECP;
- In accordance with recommendations regarding trees and woodlands found in Appendix 10 of the *Environmental Impact Statement Guidelines* for the City of Ottawa, the following mitigation measures should be employed to avoid negative impacts to the trees present within the adjacent Significant Woodland:
    - Erect a fence at the outer limit of the critical root zone (CRZ) of trees on the edge of the Significant Woodland. The CRZ is defined as the distance around the tree at a radius of 10 times the diameter of the tree (at breast height);
    - Do not place any material or equipment within the CRZ of the trees on the edge of the Significant Woodland;

- Do not attach any signs, notices or posters to any tree;
- Do not raise or lower the existing grade within the CRZ of the trees on the edge of the Significant Woodland without approval from the City of Ottawa;
- Tunnel or bore when digging within the CRZ of the trees on the edge of the Significant Woodland, and
- Ensure that exhaust fumes from all equipment are not directed towards any tree's canopy on the edge of the Significant Woodland.

7.0 MONITORING

An Erosion and Sediment Control plan has been prepared for the development (Lot Drading, Drainage, Sediment and Erosion Control Plan; Drawing # C101). Following these measures should result in no erosion impacts to the adjacent significant woodlands.

The landscape plan for the site includes two (2) areas of reforestation efforts (Landscape Plan; L1). These areas will include up to 410 mixed native seedlings. To ensure the success of the reforestation areas, spring, summer, and fall inspections (one visit each) to review survivability and general conditions should take place over the course of three (3) years. Report summaries will be submitted to the landscape architect and include details on replacement and maintenance suggestions (I.e. weed suppression).

Standard daily monitoring should be conducted within the construction areas prior to work start-up, to ensure no wildlife or SAR will be impacted.

8.0 SUMMARY AND RECOMMENDATIONS

Negative impacts on vegetation and wildlife species present on the subject property can be moderated by implementing the recommended mitigation measures found in Section 6.0 of this report. Given the current site plan, minor negative impacts are anticipated to select mature trees at the periphery of the Significant Woodland where the proposed development is to occur within 1.54 m of the woodland edge. If the site plan is not amended to accommodate these trees, the critical root zones of these trees could be determined, and their loss could be off-set by re-planting additional native tree species elsewhere on the property. Impacts on SAR are not anticipated as part of the current site plan.

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10.0 LIMITATIONS

The investigations undertaken by McIntosh Perry with respect to this report and any conclusions or recommendations made in this report reflect McIntosh Perry's judgment based on the site conditions observed at the time of the site inspection on the date set out in this report, and on information available at the time of the preparation of this report.

This report has been prepared for specific application to this site and it is based, in part, upon visual observation of the site, and terrestrial investigations at various locations during a specific time interval, as described in this report. Unless otherwise stated, the findings cannot be extended to previous or future site conditions, or portions of the site which were unavailable for direct investigation.

If site conditions or applicable standards change or if any additional information becomes available at a future date, modifications to the findings, conclusions and recommendations in this report may be necessary.

If you have any question, comments, or concerns, please do not hesitate to contact the undersigned at McIntosh Perry at 613-203-5470.

Sincerely,
McIntosh Perry Consulting Engineers Ltd.

_____
Erik Pohanka, B. Sc.
Biologist

Appendix A – Photographs

Photo 1: Subject property at 210 Maple Creek Court in winter conditions, facing east. 16 January 2017.

Photo 2: Subject properties at 210 and 220 Maple Creek Court in winter conditions, facing southeast. 16 January 2017.

Photo 3: Subject properties at 210 and 220 Maple Creek Court in winter conditions, facing west towards Maple Creek Court. 16 January 2017.

Photo 4: Subject property at 220 Maple Creek Court in spring conditions, facing east. 14 May 2019.

Photo 5: Subject property at 210 Maple Creek Court in spring conditions, facing west. 14 May 2019.

Photo 6: Subject property at 210 Maple Creek Court (left), subject property at 220 Maple Creek Court (right) and rock fence line (middle), facing east. 14 May 2019.

Photo 7: Wet cattail area on north side of rock fence line and shrub area on south side of rock fence line, facing east. 14 May 2019.

Photo 8: Iron staining and film on standing water suggesting potential ground water on south side of rock fence line. 14 May 2019.

Photo 9: Wet horsetail area in southeast corner of study area, facing southeast. 14 May 2019.

Photo 10: Wet phragmites area in southeast corner of study area, facing east. 14 May 2019.

Photo 11: Mixed deciduous forest adjacent to the northeast and southeast sides of the study area. 14 May 2019.

Photo 12: Wet cattail area in the northeast corner of the study area. 14 May 2019.

Photo 13: Old Red-winged Blackbird (*Agelaius phoeniceus*) nest in the cattail area in the northeast corner of the study area. 14 May 2019.

Photo 14: Female Red-winged Blackbird (*Agelaius phoeniceus*) present in the edge of the mixed deciduous forest adjacent to the east side of the study area. 14 May 2019.

Photo 15: Male Red-winged Blackbird (*Agelaius phoeniceus*) along the stone fence line within the study area. 14 May 2019.

Photo 16: Song Sparrow (*Melospiza melodia*) nest in a shrub willow along the stone fence line within the study area. 14 May 2019.

Photo 17: Song Sparrow (*Melospiza melodia*) present within the study area. 14 May 2019.

Photo 18: Savannah Sparrow (*Passerculus sandiwchensis*) present within the study area. 14 May 2019.

Photo 19: Canada Goose (*Branta canadensis*) present within the study area. 14 May 2019.

Photo 20: Eastern Phoebe (*Sayornis phoebe*) present in the edge of the mixed deciduous forest adjacent to the east side of the study area. 14 May 2019.

Photo 21: One of two Wild Turkey (*Meleagris gallopavo*) eggs found on the ground within the study area. 14 May 2019.

Photo 22: White-tailed deer (*Odocoileus virginianus*) tracks found in the study area. 14 May 2019.

Appendix B – Native Tree and Shrub Species Appropriate for Planting

Native Tree and Shrub Species Appropriate for Planting			
Common Name	**Latin Name**	**Plant Description**	**Growing Conditions**
Tree Species			
eastern white-cedar	*Thuja occidentalis*	• up to 15 m in height • excellent windbreaker when planted in buffer strips	Full sun to partial shade; shallow, moist or dry, non-acidic soil; tolerant of flooding
sugar maple	*Acer saccharum*	• up to 35 m in height	Prefers deep, rich, moist soil; can tolerate shade but grows better in full sun
black cherry	*Prunus serotina*	• up to 22 m in height	Tolerates different moisture levels and a variety of soils; full sun
Shrub Species			
speckled alder	*Alnus incana*	• up to 6 m in height • habitat for nesting migratory birds • food source for birds	Various soil types; tolerant of flooding, full sun to partial shade
red-osier dogwood	*Cornus sericea*	• 1 to 2 m in height • valuable wildlife food	Moist soil; tolerant of flooding, full sun to partial shade

Appendix C – Clean Equipment Protocol for Industry

Clean Equipment Protocol for Industry

Inspecting and cleaning equipment for the purposes of invasive species prevention

Invasive Species Centre
Catalyst for research and response

Ontario

Peterborough County Stewardship

Ontario Invasive Plant Council

Publication Information

Halloran, Joe, Anderson, Hayley and Tassie, Danielle. 2013. Clean Equipment Protocol for Industry. Peterborough Stewardship Council and Ontario Invasive Plant Council. Peterborough, ON.

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For more information on invasive plants in Ontario, visit www.ontario.ca/invasivespecies, www.ontarioinvasiveplants.ca, www.invadingspecies.com or www.invasivespeciescentre.ca

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Introduction

Why Invasive Plants are a Problem

Invasive alien species are "a growing environmental and economic threat to Ontario. Alien species are plants, animals and microorganisms that have been accidentally or deliberately introduced into areas beyond their normal range. Invasive species are defined as harmful alien species whose introduction or spread threatens the environment, the economy, or society, including human health (Government of Canada 2004)." (Ontario Invasive Species Strategic Plan, 2012). The great majority of plant invasions occur in habitats that have been disturbed either naturally or by humans (Rejma´nek 1989; Hobbs and Huenneke 1992; Hobbs 2000).

The ecological effects of invasive species are often irreversible and, once established, they are extremely difficult and costly to control or eradicate. According to Pimental et al. (1999), invasive species in the U.S. cause economic and environmental damages totalling over $138 billion per year, with agricultural weed control and crop losses totalling approximately $34 billion per year. Exact figures for the total economic and environmental damages are not available for Canada. In Ontario however, the costs of dealing with just one invasive species is astonishing; Zebra Mussels cost Ontario power producers who draw water from the lake $6.4 million per year in increased control/operating costs and about $1 million per year in research costs (Colautti et al. 2006).

Invasive species can spread to new areas when contaminated mud, gravel, water, soil and plant material are unknowingly moved by equipment used on different sites. This method of spread is called an unintentional introduction, and is one of the four major pathways for invasive species introduction into a new area of Ontario (Ontario Invasive Species Strategic Plan, 2012).

Buckthorn removal, Lynde Shores Conservation Area.
Photo by: Central Lake Ontario Conservation Authority

Invasive plant seed and propagules (plant material, i.e. rhizomes) have the ability to travel sight unseen in mud attached to or lodged in various parts and spaces between parts of vehicles, machinery and other mechanical equipment. A recent study at Montana State University found that most seeds (99% on paved roads and 96% on unpaved roads) stayed attached to the vehicle after traveling 160 miles (257 km) under dry conditions.

Invasive plant species are commonly transported on or in vehicles and construction equipment when they are moved to new locations. Those vehicles include four-wheel drives, excavators, tractors, loaders, water trucks and all-terrain vehicles. Failure to properly clean vehicles and machinery of soils, mud, and contaminated water that may contain invasive species seed and propagules can result in permanent, irreversible environmental impacts. These impacts can mean substantial cost to the landowner, land manager and/or the user. Businesses may also face liability issues for activities and operations that result in the introduction of invasive species.

Some of the invasive species in Ontario which have been known to spread through equipment transfer include:

- **Common Buckthorn** *(Rhamnus cathartica)*
- **Dog-strangling Vine** *(Cynanchum rossicum)*
- **Garlic Mustard** *(Alliaria petiolata)*
- **Giant Hogweed** *(Heracleum mantegazzianum)*
- **Glossy Buckthorn** *(Frangula alnus)*
- **Japanese Knotweed** *(Polygonum cuspidatum)*
- **Miscanthus or Chinese Silver Grass** *(Miscanthus sinensis)*
- **Phragmites or Common Reed** *(Phragmites australis subsp. australis)*
- **Reed Canary Grass** *(Phalaris arundinacea)*
- **Wild Parsnip** *(Pastinaca sativa)*
- **Wild Chervil** *(Anthriscus sylvestri)*

Dog-strangling vine
(Cynachum rossicum)
Photo by: Hayley Anderson

Garlic Mustard
(Alliaria petiolata)
Photo by: Ken Towle

Phragmites
(Phragmites australis subsp. Australis)
Photo by: Michael Irvine

These plants impact biodiversity by out-competing native species for space, sunlight, and nutrients. They can also have impacts on road and driver safety by physically blocking intersection sightlines, and in the case of Phragmites and Miscanthus, may fuel intense grass fires if ignited, which can damage utility stations and hydro lines.

The harmful effects of invasive species include:

- Physical and structural damage to infrastructure
- Human health hazards (i.e. Giant Hogweed and Wild Parsnip exposure)
- Delays and increased cost in construction activities
- Environmental damage (i.e. erosion)
- Aesthetic degradation
- Loss of biodiversity
- Reduced property values
- Loss of productivity in woodlots and agriculture

Why Cleaning Vehicles and Equipment is Important

Passenger and recreational vehicles as well as heavy machinery are major vectors for spreading terrestrial invasive species into new areas.

It is much more costly to control invasive species after their establishment and spread than it is to prevent their spread. The spread of invasive species through unintentional introduction can be minimized significantly by the diligent cleaning of vehicles and equipment when leaving one site and moving to the next. In the case of large properties, cleaning before moving to a new site is recommended, even if it is within the same property.

This guide has been developed for the construction, agriculture, forestry and other land management industries, to provide equipment operators and practitioners with tools and techniques to identify and prevent the unintentional introduction of invasive species. It establishes a standard for cleaning vehicles and equipment and provides a guide where current codes of practice, industry standards or other environmental management plans are not already in place.

Passenger and recreational vehicles include:

- 2WD and 4WD cars
- 2WD and 4WD trucks
- All Terrain Vehicles (ATV's)
- Motorbikes
- Snowmobiles

Heavy machinery includes:

- Trucks
- Tractors
- Mowers
- Slashers
- Trailers
- Backhoes
- Graders
- Dozers
- Excavators
- Skidders
- Loaders
- Water Tankers and Trucks

Dog-strangling Vine plants attached to ATV.
Photo by: Francine Macdonald

Plant material attached to bobcat.
Photo by: TH9 Outdoor Services

Impacts of Invasive Species on Industry

Construction

In the UK, Japanese Knotweed (*Polygonum cuspidatum* or *Fallopia japonica*) is classified as a hazardous material. When construction occurs in established Japanese Knotweed stands workers sift the soil to remove root fragments and institute treatment plans to ensure that the Knotweed does not re-sprout, as it can damage housing foundations by growing through concrete and asphalt. The contractors must also thoroughly clean their equipment, and dispose of the contaminated soil at biohazard waste sites. While we do not have these requirements in Ontario, Japanese Knotweed is present here.

Invasive plant species can also increase site preparation and weed control costs, and reduce property values. For example, in Vermont the presence of the aquatic invasive plant Eurasian Watermilfoil (*Myriophyllum spicatum*) depressed shoreline residence property value by as much as 16.4% (Zhang and Boyle, 2010).

Forestry/Agriculture

Invasive plant species which become established in forests will out-compete native species and prevent forest re-generation after logging or natural disturbance. Dog-strangling Vine (*Cynanchum rossicum*) is of particular concern in conifer plantations. This species thrives in the filtered light and open soils of mature plantations, and suppresses seedling establishment of native hardwoods. If its invasion continues, very few juvenile trees will survive to fill the shrinking canopy of over-mature pines. Reforestation sites are also susceptible; the thick mats of vegetation and aggressive competition from Dog-strangling Vine decrease available planting space and increase costs as more mature vegetation needs to be planted in order to ensure the new vegetation can outcompete the invasive plant. As a result, expensive control programs are often required.

Land Management (Trail Use/Maintenance)

Recreational trail use and the maintenance of trails can facilitate the transport of invasive plant material and seeds, and create open and disturbed sites that are prime locations for the establishment of invasive species. Studies have proven that trails act as corridors which assist in the spread of invasive plant species. Humans, their pets, and vehicles such as ATV's can be vectors of invasion along trails because seeds and plant pieces can be carried on equipment and clothing. In addition, frequent trampling along trails alters soil properties, limits the growth of some native species, and creates conditions that may favour the growth of non-native species (Kuss et al. 1985; Marion et al. 1985; Yorks et al. 1997).

Roadsides/Utilities

Invasive species can increase the cost of roadside and utility maintenance by requiring additional maintenance and control efforts. The presence of invasive species can also provide a safety hazard. In the case of Phragmites and Miscanthus (invasive grass species), along with interrupting sight lines, the dead stalks which remain standing each autumn also provide combustible material. Fires in these stands burn intensely, and can damage utilities and hydro lines. Phragmites along roadsides is generally assumed to be spread through the transport and burial of rhizome fragments through ditching, ploughing, and other human activities that transport rhizomes on machinery. Studies have shown that vehicles and road-fill operations can transport invasive plant seeds into uninfested areas, and road construction and maintenance operations provide optimal disturbed sites for seed germination and seedling establishment (Schmidt 1989; Lonsdale & Lane 1994; Greenberg et al. 1997; Trombulak & Frissell 2000).

Steps to Prevent the Unintentional Introduction of Invasive Species from Equipment

Inspection and cleaning of all machinery and equipment should be performed in accordance with the procedures, checklists and diagrams provided in this protocol.

When visiting more than one site, always schedule work in the sites that are the least disturbed and free of known invasive species first, and visit sites with known invasive species infestations last. This will greatly reduce the risk of transferring plants to new locations.

When to Inspect

Inspection should be done before:

- Moving vehicles out of a local area of operation
- Moving machinery between properties or sites within the same property where invasive species may be present in one area, and not in another
- Using machinery along roadsides, in ditches, and along watercourses
- Vehicles using unformed dirt roads, trails or off road conditions
- Using machinery to transport soil and quarry materials
- Visiting remote areas where access by vehicles is limited

Inspection should be done after:

- Operating in areas known to have terrestrial invasive plants or are in high risk areas (i.e. recently disturbed areas near known invaded areas)
- Transporting material (i.e. soil) that is known to contain, or has the potential to contain, invasive species
- Operating in an area or transporting material that you are uncertain contain invasive species
- In the event of rain. If mud contains seeds, they can travel indefinitely until it rains or the road surface is wet, allowing for long distance transport. This may result in transporting seeds to areas where those species did not previously exist

How to Inspect

- Inspect the vehicle thoroughly inside and out for where dirt, plant material and seeds may be lodged or adhering to interior and exterior surfaces.
- Remove any guards, covers or plates that are easy to remove.
- Attention should be paid to the underside of the vehicle, radiators, spare tires, foot wells and bumper bars.

If clods of dirt, seed or other plant material are found, removal should take place immediately, using the techniques outlined below.

When to Clean

Vehicles and heavy equipment that stay on formed and sealed roads have a low risk of spreading invasive species. Cleaning is only required when inspection identifies visible dirt clods and plant material or when moving from one area to another.

Depending on the invasive species present, vehicles may need to be cleaned even when deep snow is present. Phragmites, for example, can still be spread, even in packed snow because the seed heads are usually above the surface of the snow. Other plants, such as Dog-strangling vine, will be contained beneath deep snow.

**Regular inspection of vehicles and machinery will identify if any soil or plant material has been collected on or in vehicles and machinery.*

Where to Clean

Clean the vehicle/equipment in an area where contamination and seed spread is not possible (or limited). The site should be:

- Ideally, mud free, gravel covered or a hard surface. If this option is not available, choose a well maintained (i.e. regularly mowed) grassy area.
- Gently sloping to assist in draining water and material away from the vehicle or equipment. Care should be taken to ensure that localized erosion will not be created, and that water runs back into the area where contamination occurred.
- At least 30m away from any watercourse, water body and natural vegetation.
- Large enough to allow for adequate movement of larger vehicles and equipment.

**Safely locate the vehicle and equipment away from any hazards. If mechanized, ensure engine is off and the vehicle or equipment is immobilized.*

How to Clean Inside

Clean the interior of the vehicle by sweeping, vacuuming or using a compressed air device. Particular attention should be paid to the floor, foot wells, pedals, seats and under the seats.

How to Clean Outside

Knock off all large clods of dirt. Use a pry bar or other device if necessary.

Identify areas that may require cleaning with compressed air rather than water such as radiators and grills. Clean these areas first prior to using water.

Clean the vehicle with a high pressure hose in combination with a stiff brush and/or pry bar to further assist the removal of dirt clods.

Start cleaning from the top of the vehicle and work down to the bottom.

Emphasis should be placed on the undersides, wheels, wheel arches, guards, chassis, engine bays, radiator, grills and other attachments.

When the cleaning is finished avoid driving through the waste water when removing the vehicle or equipment from the cleaning site.

For equipment such as water trucks that may be exposed to aquatic invasive species, trucks should be disinfected with bleach solution before conducting work in a new area. For further information please refer to the Invading Species Awareness Program's Technical Guidelines listed under Contacts and Resources.

Hosing down a vehicle in Queensland Australia
Photo by: TH9 Outdoor Services

Final Inspection Checklist

Conduct a final inspection to ensure the following general clean standard has been achieved:

- No clods of dirt should be visible after wash down.
- Radiators, grills and the interiors of vehicles should be free of accumulations of seed, soil, mud and plant material parts including seeds, roots, flowers, fruit and or stems.

Diagrams have been provided to assist in quickly identifying key areas to inspect and clean on a variety of vehicles associated with the targeted industries. These can be used in combination with vehicle checklists to ensure all areas of the vehicles have been inspected and cleaned.

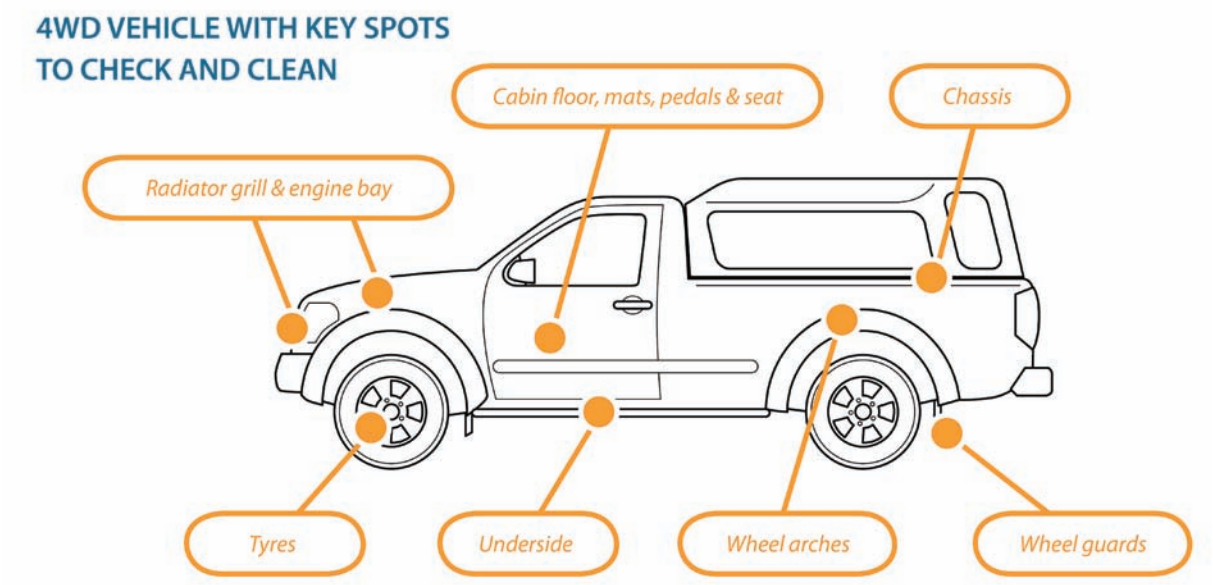
Equipment Required

- A pump and high pressure hose OR High pressure water unit
- Minimum water pressure for vehicle cleaning should be at least 90 pounds per square inch. Water can be supplied as high volume/low pressure or low volume/high pressure (NOAA Fisheries Service).
- Air compressor and blower OR Vacuum
- Shovel
- Pry bar
- Stiff brush or broom

Cleaning station at construction site.
Photo by: Mark Heaton, OMNR

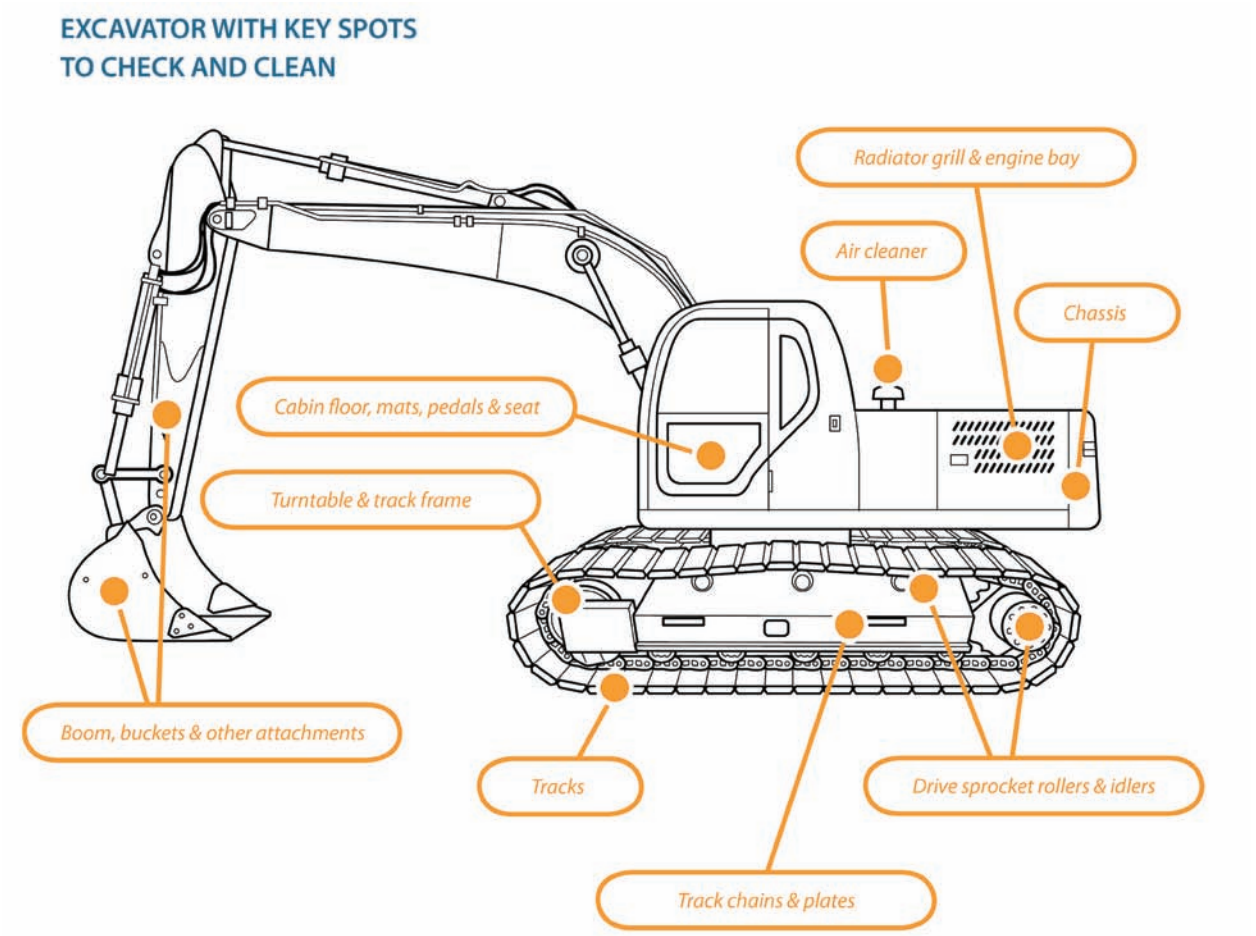
Inspection and Cleaning Diagrams and Checklists

2WD and 4WD Vehicles



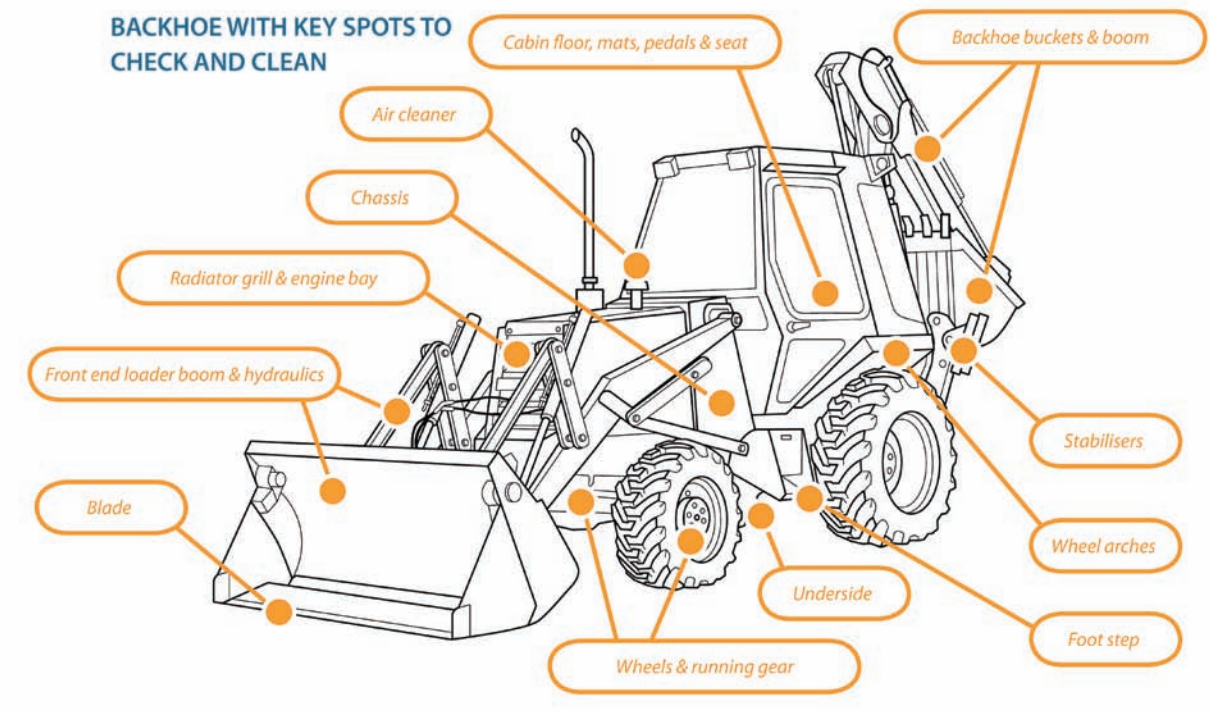
		✓
Cabin	Floor, mats, pedals, seats	
Engine	Radiators, engine bay, grill	
Body	Underside, chassis, crevices, ledges, bumper bars	
Wheels	All wheels (including spare), wheel arches, guards	
Tray	Floor, canopy (if included)	

Excavator



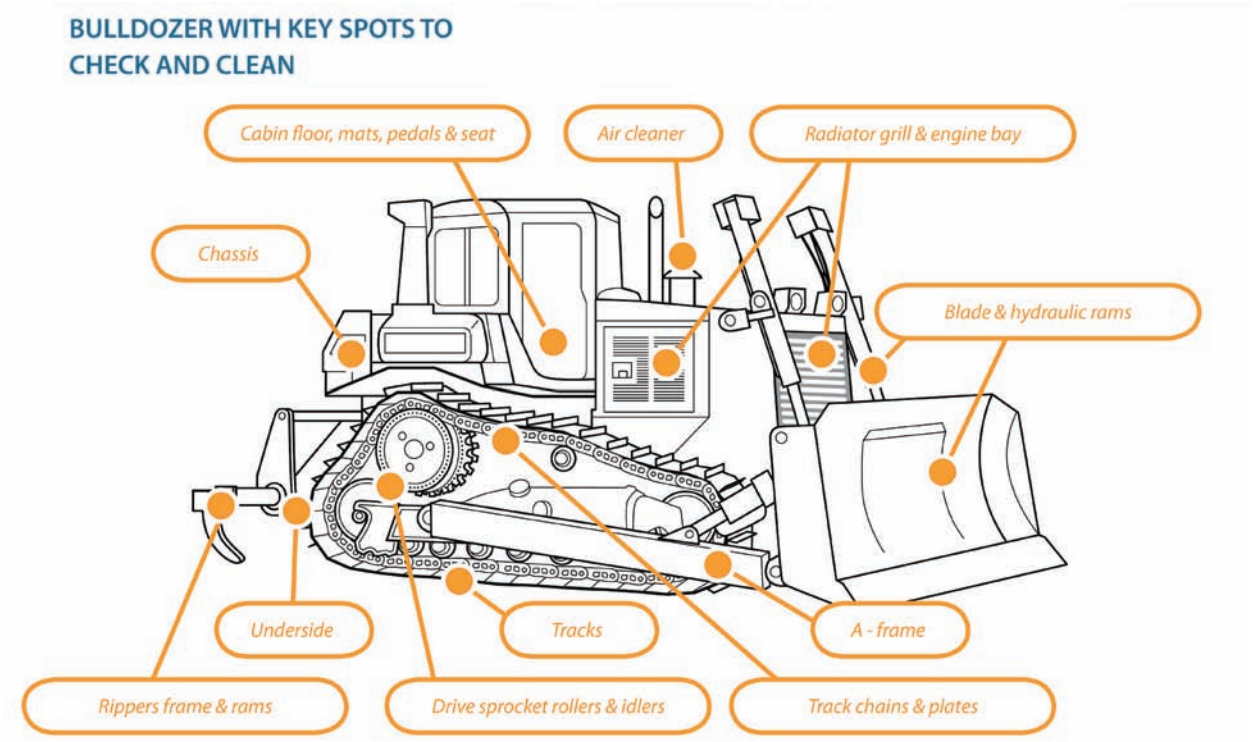
		✓
Cabin	Floor, mats, pedals, seats	
Engine	Radiators, engine bay, grill, air cleaner	
Tracks	Tracks, track frame, drive sprocket rollers, idlers	
Body Plates	Plates of cabin	
Body	Ledges, channels	
Bucket		
Booms		
Turret Pivot		

Backhoe



		✓
Cabin	Floor, mats, pedals, seats, foot step	
Engine	Radiators, engine bay, grill, air cleaner	
Wheels	All wheels (including spare), wheel arches, guards	
Front end loader	Blade, hydraulics, booms	
Backhoe	Buckets, boom, hydraulics, stabilizers	

Bulldozer



		✓
Cabin	Floor, mats, pedals, seats	
Engine	Radiators, engine bay, grill, air cleaner	
Tracks	Tracks, track frame, drive sprocket rollers, idlers	
Body Plates	Belly plates and rear plates	
Body	Ledges, channels	
Blade	Pivot points, hydraulic rams, a-frame	
Ripper	Ripper frame, ripper points	

Contacts and Resources

Ontario Invasive Species Strategic Plan 2012. Government of Ontario. Online, accessed May 8, 2012.
http://www.mnr.gov.on.ca/stdprodconsume/groups/lr/@mnr/@biodiversity/documents/document/stdprod_097634.pdf

Invasive Species Management for Infrastructure Managers and the Construction Industry 2008. Wade, M. Booy, O. and White, V. Online, accessed April 27, 2012
http://www.ciria.org/service/Web_Site/AM/ContentManagerNet/ContentDisplay.aspx?Section=Web_Site&ContentID=9001

T.I.P.S (Targeted Invasive Plant Solutions) Highway Operations. British Columbia Invasive Species Council. Online, accessed May 8, 2012
http://www.bcinvasiveplants.com/iscbc/publications/TIPS/Highways_Operations_TIPS.pdf

Invading Species Awareness Program Workshop Manual: Aquatic Invasive Species: An Introduction to Identification, Collection and Reporting of Aquatic Invasive Species in Ontario Waters (includes information on decontaminating equipment).
http://www.invadingspecies.com/download/publications/manuals/WorkshopManual.pdf

Reporting Invasive Species

To report invasive species, or view maps of existing records, visit the Invading Species Awareness Program website www.invadingspecies.com/report/ or www.eddmaps.org/Ontario.

Or call the OFAH/MNR Invading Species Awareness Program Hotline at **1-800-563-7711**

Acknowledgements

We gratefully acknowledge NRM South (Tasmania, Australia) for allowing the use of their artwork and text from their "Keeping it Clean – A Tasmanian Field Hygiene Manual to Prevent the Spread of Freshwater Pests and Pathogens".

We also sincerely thank the Clean Equipment Protocol Working Group and the Ontario Invasive Plant Council Committees and Board of Directors for their ongoing support and valuable input into this document, and the Canada-Ontario Invasive Species Centre and Ontario Ministry of Natural Resources for the support in creating this protocol.

Clean Equipment Protocol Working Group:

Diana Shermet, Central Lake Ontario Conservation Authority; Paula Berketo, Ontario Ministry of Transportation; Travis Cameron, Ontario Ministry of Natural Resources; Jennifer Hoare, Ontario Parks; Michael Irvine, Ontario Ministry of Natural Resources; Alison Kirkpatrick, OFAH/MNR Invading Species Awareness Program; Erika Weisz, Ontario Ministry of Natural Resources; Amanda Chad, Ontario Power Generation; Nancy Vidler, Lambton Shores Phragmites Community Group; Nigel Buffone, Du Pont Canada Company; Ewa Bednarczuk, Lower Trent Conservation Authority

We also gratefully acknowledge the input and direction from Francine MacDonald, James Rockwood, Anne-Marie Roussy, Stephen Smith, Caroline Mach, Patricia Lowe, John Bowen, Karen Hartley, and the Southern Ontario Community Forest Managers group.

More Information:

Ontario Invasive Plant Council: www.ontarioinvasiveplants.ca

Appendix A: Identification of Invasive Plants found in Ontario

- **Common Buckthorn** (*Rhamnus cathartica*) and **Glossy Buckthorn** (*Frangula alnus*)
- **Dog-strangling Vine** (*Cynanchum rossicum*)
- **Garlic Mustard** (*Alliaria petiolata*)
- **Japanese Knotweed** (*Polygonum cuspidatum*)
- **Phragmites or Common Reed** (*Phragmites australis subsp. australis*)
- **Giant Hogweed** (*Heracleum mantegazzianum*)

common & glossy buckthorn

(Rhamnus cathartica & R. frangula)

Plant type: Shrub/small tree

Arrangement: Common buckthorn are sub-opposite (almost opposite). Glossy buckthorn are alternate.

Leaf: The common buckthorn leaf is egg shaped, edge of the leaf is "pebbled" (small rounded teeth). Veins converging toward leaf top. The glossy buckthorn leaf is more slender (tear drop shaped) and smooth margined.

Bark: Smooth, young bark with prominent raised patches or lenticels; rough texture and peeling bark when mature.

Seed/Flowers: Flowers are green-yellowish, small and inconspicuous. Green berries becoming purplish/black in late summer, berry > 1 cm in diameter.

Buds/Twigs: Common buckthorn has thorn-like tip on many twigs. Glossy buckthorn buds have no bud scales and lack thorny tips to twigs.

Habitat: Various - forest, thickets, meadows, dry to moist soils.

Similar native species: Native dogwoods, which lack the thorny "tip". Native dogwoods are truly opposite in arrangement of twigs; only alternate leaved (pagoda) dogwood has alternate branching.

dog-strangling vine
(Cynanchum rossicum & C. nigrum)

Plant type: Herb, twining vine

Arrangement: Opposite

Leaf: Lance shaped, smooth margin (edge)

Bark: n/a

Seed/Flowers: Bean shaped seed pod with seeds attached to downy 'umbrellas'. Flowers - pink (C. rossicum) or purple (C. nigrum) with five petals.

Buds/Twigs: n/a

Habitat: Dry to moist soils; more dominant in meadows and woodland edges.

Similar native species: Swamp milkweed (Asclepias incarnata spp.), is an upright plant, typically found in wetland habitats.

garlic mustard
(Alliaria petiolata)

Plant type: Herb

Arrangement: Alternate

Leaf: Saw tooth like edge, elongated heart shape. Garlic/onion smell when crushed. Leaves are kidney shaped with prominent veins.

Bark: n/a

Seed/Flowers: Cluster of small white flowers with four petals. Small black < 1 mm rounded seed found in elongated 'tube-like' seed pods (similar to a bean pod).

Buds/Twigs: n/a

Habitat: Various – dry to moist soils, in all habitat types, less often in meadows.

Similar native species: n/a

japanese knotweed
(Polygonum cuspidatum)

Plant type: Herb, 2 - 4 m in height.

Arrangement: Alternate

Leaf: Tear drop shaped, sharp pointed, dark green, flattened at base.

Bark: n/a

Seed/Flowers: Flowering stalk of many small greenish-white flowers.

Buds/Twigs: Large plant with a 'bamboo-like' stem. Stem light green maturing to tan colour.

Habitat: Moist to wet soils found in wetlands, water-courses and roadside ditches.

Similar native species: None.

common reed
(Phragmites australis)

Plant type: Grass

Arrangement: Alternate

Leaf: Broad leaf > 1 cm wide.

Bark: n/a

Seed/Flowers: Dense cascading 'broom-like' flower head. 'Cottony' in appearance when mature.

Buds/Twigs: Stems rough and ridged, ligule a densely hairy band. Mature plants > 3 m tall.

Habitat: Moist to wet soils. Found in wetlands, water- courses and road side ditches.

Similar native species: Species of mannagrass (Glyceria sp) including tall northern, eastern and rattlesnake grass. A native common reed exists but has a smooth stem and the ligule is not hairy. It is also quite rare.

giant hogweed
(Heracleum mantegazzianum)

Plant type: Herb. Mature plants can be over 3m tall.

Arrangement: Alternate

Leaf: Lobed leaf 1-2 m wide, lobes sharp-pointed.

Bark: n/a

Seed/Flowers: Small, white flowers in a large umbrella-shaped cluster, .75 m wide.

Buds/Twigs: Hairy stem with purple spots.

Habitat: Fresh to wet soils in forests, swamps, meadows, marshes.

Similar native species: Cow parsnip *(Heracleum maximum)* – has smaller flowers, no purple spots on stems.Angelica (Angelica atropurpurea) has a rounded-topped flower cluster and leaves divided into many leaflets.

Do not touch this plant because it is poisonous. If you do, wash your skin immediately in cool soapy water and do not expose the area to sunlight.

Seek professional advice before removing.

Identification of Invasive Plants found in Ontario Photos by:

Credit Valley Conservation, Greg Bales, Ken Towle, Patrick Hodge,
Ontario Federation of Anglers and Hunters, Francine Macdonald, Matt Smith

Ontario
Invasive Plant Council

Appendix D – Protocol for Wildlife Protection during Construction

PLANNING AND GROWTH MANAGEMENT
URBANISME ET GESTION DE LA CROISSANCE

Protocol for
Wildlife Protection
during Construction

August 2015

ottawa.ca
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TTY 613-580-2401

City of Ottawa Protocol for Wildlife Protection during Construction

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City of Ottawa Protocol for Wildlife Protection during Construction

PREAMBLE

The updated City of Ottawa Protocol for Wildlife Protection during Construction has been developed in response to a direction provided by Council on July 17, 2013, as part of the City's Wildlife Strategy. The protocol is a compilation of best practices that serves as a guide and a common frame of reference for the City and the development industry in addressing wildlife protection during construction. The protocol also serves as a guide and frame of reference for City staff involved in planning and carrying out capital projects or other activities that may affect wildlife and wildlife habitat. The protocol itself is not intended to define new requirements for wildlife protection during construction, nor does the protocol provide for proponents of development a means to not adhere to other applicable legislation such as the *Endangered Species Act, 2007* or the *Migratory Birds Convention Act*. The techniques and methods to provide for wildlife protection will continue to be identified by proponents of development through studies that are required as set out in the Official Plan (e.g., Environmental Impact Statements, Tree Conservation Reports) to meet legislative requirements and with consideration to best practices as compiled within this document. Specific requirements for wildlife protection will continue to be defined by staff in consultation with proponents and their consultants, and included as conditions of approval where appropriate through subdivision, condominium and site plans.

1 Introduction

This protocol is intended to help reduce the direct impacts of development on wildlife that occur during construction. It also provides some guidance on how to help reduce conflicts between residents and wildlife in newly-constructed neighbourhoods, through better wildlife-proofing and awareness. The protocol complements and supports the City's Environmental Impact Statement (EIS) Guidelines, which address impact assessment and mitigation in a more general way during the development planning and review process, and the Tree Conservation Report (TCR) Guidelines, which address impact assessment and mitigation for trees. The protocol promotes best management practices relating to sensitive timing windows for clearing, pre-stressing, site clearing, construction site management, wildlife encounters, wildlife-proofing, and owner awareness.

1.1 Application of protocol

This protocol may be used to guide wildlife protection planning in plans of subdivision, plans of condominium, and site control plans for properties that include or are located adjacent to wildlife habitat, including:

- areas of tall grass;
- shrubs;
- trees or woodlands;
- watercourses;
- wetlands; or,
- complex features such as rock piles, junk heaps, or vacant structures.

Applicants will be advised of the protocol's relevance to their site at pre-consultation.

If a proposed development requires an Environmental Impact Statement or a Tree Conservation Report under the policies of the Official Plan, any recommendations in the EIS/TCR related to mitigating impacts to wildlife from construction activity will be expected to meet or exceed the standard of protection established in this protocol. The recommendations from the EIS/TCR will be used by City staff during the development review process to develop conditions of approval for the project.

This protocol also provides useful information for City staff and members of the public, which can be referred to when planning other projects and activities, such as the development of single lots under a building permit, the construction of new infrastructure, or in non-development related vegetation clearing.

1.2 Other Legislative Requirements

This protocol provides guidance on best practices to protect Ottawa's wildlife during construction and related activities. There are several legislative requirements for the protection of various species or groups of wildlife (e.g., provincial *Fish and Wildlife Conservation Act, 1997* and *Endangered Species Act, 2007*; federal *Species at Risk Act, Migratory Birds Convention Act*, and *Fisheries Act*). It remains the responsibility of the property owners and their agents to ensure that their actions comply with all applicable legal requirements.

1.3 Wildlife Expertise

Project proponents will typically rely on professional biologists or environmental consultants to advise them with respect to wildlife. Other potential sources of information and advice on wildlife include wildlife service providers, wildlife rehabilitators and other local experts, as well as relevant agency staff (e.g., Ministry of Natural Resources and Forestry, Canadian Wildlife Service). Links to various sources of additional information that may be useful in wildlife protection planning are provided in Section 4 of this protocol.

Wildlife rehabilitators provide care for orphaned or recuperating wildlife, with the aim of returning them to the wild when they are able to care for themselves. Rehabilitators must receive authorisation from the Ministry of Natural Resources and Forestry (and/or Environment Canada, for migratory birds) on an annual basis. There are very few authorised rehabilitators in the Ottawa area (see links in Section 4). By making pre-arrangements with wildlife rehabilitators, as recommended in this protocol, project proponents can help rehabilitators to

determine whether local capacity exists to handle their potential needs. Rehabilitators and other local experts can also advise proponents on ways to avoid injuring or orphaning wildlife, thus reducing the need for rehabilitation. Similarly, pre-arrangements should be made with local veterinarians to ensure that they are able to treat injured wildlife.

2 Best Practices

2.1 Project-specific Wildlife Protocol

For some projects where an EIS has identified large areas of wildlife habitat, or particularly sensitive areas of wildlife habitat, a project-specific wildlife protocol may be needed to ensure that the recommendations in the EIS are appropriately implemented during construction. The following information should be clearly conveyed to the on-site staff as part of the project-specific wildlife protocol, via notes on plans, handouts and/or on-site briefings:

- Schedule for pre-construction activities such as inspections for wildlife, installation of protective fencing, pre-stressing, and on-site briefings for contractors;
- Description of wildlife mitigation measures to be used during construction, including;
    - Identification of any natural areas, trees or other features to be retained;
    - Placement and specifications of required protection measures (e.g., fencing, signs);
    - Phasing and direction of site clearing activities;
    - Any recommendations regarding internal access routes for vehicles and other heavy equipment, vehicle parking, materials staging and stockpiling, fuel storage and handling, etc.; and,
- Guidance on how to deal with wildlife encounters, including any species at risk that may be present, and arrangements for dealing with injured or orphaned wildlife. This guidance should be summarized in a handout suitable for quick reference by on-site staff (see example in Appendix 1).

When a project-specific wildlife protocol is needed, it should typically be developed close to or following approval of the project, when the plans have been finalized and more information on scheduling is available. For projects involving early servicing or other site preparation activities in advance of approval, the EIS consultant should provide appropriate advice on wildlife protection measures prior to the commencement of on-site activities. This can be done in conjunction with the Tree Conservation Report requirements, where applicable.

2.2 Sensitive Timing Windows

The greatest disruption to wildlife generally occurs when a site is cleared, removing the existing habitat. The timing of site clearing should be carefully considered, because the impacts to wildlife will be greater during sensitive times of the year. During the winter, overwintering and hibernating wildlife may be physically unable to escape from the site, or may freeze or starve to death if forced to leave their dens and food caches. In the spring and summer, most species are more mobile, but mothers will be laying eggs or bearing young. The most profound impacts to wildlife occur when they are displaced from their habitat at such critical times during their life cycle. Table 1 identifies sensitive times of the year for various habitat types and wildlife. This information can be used to determine what time(s) of year may be sensitive at a particular site, based on which types of habitat and wildlife are actually

present. Where possible, site clearing should be planned to occur outside of the applicable sensitive time(s); otherwise, additional mitigation measures should be employed to reduce the impacts.

These timing windows are provided for guidance only, and should not be relied upon in cases where legislated restrictions apply (e.g., under the *Endangered Species Act, 2007*). The federal *Migratory Birds Convention Act* prohibits the unauthorized killing or harassment of migratory birds and the disturbance or taking of their nests and eggs, but does not refer to specific timing windows. The Canadian Wildlife Service (Environment Canada) provides information on how to avoid impacts to migratory birds and their nests during construction, including the timing of bird breeding seasons in Canada (see list of Additional Resources in Section 4.0 below) in order to assist proponents in their project planning; however, these are not legislated dates, and the federal prohibitions apply throughout the year.

All sites should be inspected by a biologist prior to clearing, to identify any potential wildlife issues (e.g., hibernating animals or nursing mothers and their young, etc.) and to inform or adjust mitigation planning as needed. The timing and scope of this inspection will vary depending on the type and extent of habitat to be affected, the availability of existing information about the wildlife on the site (from an EIS or other sources), and the anticipated timing for site clearing. Table 1 includes recommendations for specific habitat searches that should be included in the scope of the EIS, where applicable, or the site inspection. For more information about the timing of site inspections and associated pre-stressing activities that should occur prior to clearing, see Section 2.3, Pre-stressing below.

In cases where site clearing needs to occur during sensitive times of the year (and no regulated restrictions apply) additional mitigation measures may be needed to reduce impacts to wildlife. Potential mitigation measures include:

- More intensive pre-stressing to encourage resident wildlife to leave the site;
- Installation of appropriate nesting boxes around the periphery of the site, to compensate for nesting sites (e.g., cavity trees, squirrel dreys) that will be removed;
- In some cases, where winter food caches will be lost and other sources of food are scarce, supplemental food sources may need to be temporarily provided in safe locations away from the work space;
- Retention of qualified agents to provide on-site monitoring during site clearing, and/or on-call advice and assistance;
- Pre-arrangements made with wildlife rehabilitators and qualified veterinarians to ensure appropriate care of orphaned or injured wildlife.

2.3 Pre-stressing

"Pre-stressing" is a term used to describe actions taken to encourage wildlife to move away from a site prior to the onset of construction. Common methods of pre-stressing include having one or more people walk the site while talking loudly or playing loud music, or placing pieces of cloth or other objects that carry a strong human scent into animal dens. To be effective, these measures may need to be combined and repeated several times over the course of two to three weeks. Some common pre-construction activities, such as surveying, or installing protective fencing, can contribute to pre-stressing. In urban areas where wildlife are already accustomed to human presence, pre-stressing using human sounds and scents may be less effective; other repellants may be needed.

Table 1: Sensitive times for wildlife in various habitats, with recommendations for reducing impacts of construction*

Habitat Type	Wildlife	Sensitive time(s)	Recommendations
Grasslands and old fields	Migratory birds and raptors Small mammals and other wildlife Note: several Species at Risk birds use grasslands and open habitats; consult Ministry of Natural Resources and Forestry (MNRF).	April through mid-August (breeding season for most species) Mid-October through March (for overwintering woodchucks, if present)	Reduce potential wildlife usage by mowing outside of breeding season, then maintain as mowed grass until on-site work begins. Woodchucks, if present, may persist on mowed sites. Avoid impacting burrows during sensitive times for this species, where possible.
Shrubs or trees (growing as individuals or in small clumps or hedgerows)	Migratory birds and raptors Small mammals and other wildlife	The following only apply if wildlife are actually using the habitat: March through mid-August (breeding season for most species) Mid-October through March (for cavity trees or other den sites)	Retain a biologist to inspect habitat. If no active nests or dens are present, clearing should be done within a few days of inspection (during sensitive times of year, clearing should occur the same day if possible).
Thickets or woodlands	Migratory birds and raptors Mammals and other wildlife Note: several Species at Risk use thicket, edge and woodland habitats; consult MNRF.	March through mid-August (breeding season for most species) Mid-October through March (for overwintering wildlife)	Do not clear during sensitive times of the year, unless mitigation measures are used to reduce risks to wildlife. The Canadian Wildlife Service does not support relying on inspections for migratory bird nests in such habitats, due to the difficulty of locating all nests and the risk to the birds.
Complex features (e.g., piles of	Mammals and other wildlife (e.g., snakes)	March through July (breeding season for most	Retain a biologist to inspect habitat prior to removal. In cases where

*NOTE: The information in this Table can be used to determine what time(s) of year may be sensitive at a particular site, based on which types of habitat and wildlife are actually present. Where possible, site clearing should be planned to occur outside of the applicable sensitive time(s); otherwise, additional mitigation measures should be employed to reduce the impacts. The recommendations provided do not address Species at Risk requirements under the *Endangered Species Act, 2007*. For situations involving Species at Risk, regulated timing restrictions, mitigation measures or compensation requirements may apply (consult the Ministry of Natural Resources and Forestry for more information).

Table 1: Sensitive times for wildlife in various habitats, with recommendations for reducing impacts of construction*

Habitat Type	Wildlife	Sensitive time(s)	Recommendations
rock or wood, stone walls, derelict vehicles, junk heaps, etc.)		species) October through March (for overwintering wildlife, including snakes)	presence of wildlife is confirmed or uncertain, disassemble slowly, outside of relevant sensitive time(s), to reduce potential impacts and allow wildlife time to relocate.
Vacant buildings or other structures	Some birds Small mammals and other wildlife (e.g., snakes) Note: some Species at Risk, including barn swallows and little brown bats, use buildings and other structures; consult MNRF.	March through mid-August (breeding season for most species) Mid-October through March (for overwintering wildlife)	Retain a biologist to inspect habitat prior to removal. In cases where presence of wildlife is confirmed or uncertain, demolition may need to be done in controlled stages, outside of relevant sensitive time(s), to reduce potential impacts and allow wildlife time to relocate.
Wetlands and waterbodies	Migratory birds, including waterfowl Mammals Aquatic reptiles and amphibians Fish Note: many Species at Risk use wetlands and other aquatic habitats; consult MNRF.	March through August (breeding season for most species); note that this includes regulated in-water timing restriction for warmwater fishes (March 15 to June 30) August through October (emergence of hatchling turtles, if turtle nests are present) Mid-October through March (for overwintering wildlife, including turtles)	Do not clear during sensitive times of the year, except in cases where exclusion fencing or other mitigation measures can be used to reduce risks to wildlife. Exclusion fencing can be useful when working in or around these habitats, to prevent wildlife (especially turtles) from entering work areas. Fish and other highly aquatic wildlife such as turtles and frogs may need to be relocated prior to commencing work (permits required from MNRF for relocation).

*NOTE: The information in this Table can be used to determine what time(s) of year may be sensitive at a particular site, based on which types of habitat and wildlife are actually present. Where possible, site clearing should be planned to occur outside of the applicable sensitive time(s); otherwise, additional mitigation measures should be employed to reduce the impacts. The recommendations provided do not address Species at Risk requirements under the *Endangered Species Act, 2007*. For situations involving Species at Risk, regulated timing restrictions, mitigation measures or compensation requirements may apply (consult the Ministry of Natural Resources and Forestry for more information).

Timing and frequency of pre-stressing activities will vary depending on the site context, the amount of information known about wildlife at the site, and the proposed schedule for site clearing. Suggested site inspection and pre-stressing schedules are as follows:

- For sites with good wildlife information and/or little habitat to be affected, that will be cleared outside of any applicable sensitive timing windows (low risk of impacts): one site inspection combined with pre-stressing within a few days prior to clearing.
- For sites with poor wildlife information and/or larger areas of habitat being affected, that will be cleared outside of any known sensitive timing windows (moderate risk of impacts): first site inspection 2-3 weeks in advance, with pre-stressing and follow up inspections as needed based on results; final inspection/pre-stressing on the day before clearing for each phase.
- For sites that will be cleared during sensitive times of the year (high risk of impacts): first site inspection 3+ weeks in advance with multiple pre-stressing and follow up inspections; final inspection/pre-stressing on the day before clearing for each phase.

Note: for sites located within or adjacent to existing developed areas, nearby residents should be informed about the onset of pre-stressing activities and the potential for increased encounters with wildlife dispersing from the site. Sources of information on avoiding conflicts with wildlife should be provided (see Section 4). The City's Noise By-law needs to be respected.

2.4 Site Clearing

Vegetation removal (including mowing of tall grass) and other site clearing activities should proceed in phases, generally moving from the most disturbed part of the site (closest to existing development) towards the least disturbed part of the site. Even on small sites that can be cleared in a single day, it is important to follow this pattern in order to "herd" wildlife out of the site into adjacent undisturbed habitat, or towards the nearest habitat. Some examples of possible scenarios are provided below. Site clearing should be timed to avoid disturbance of habitat areas during sensitive times of the year (see Section 2.2) where possible.

Scenario 1: The work space directly abuts a natural area or open space that will be protected and retained.

Site clearing activities should begin at the far side of the property from the retained natural area and proceed towards it. The goal is to ensure that any wildlife within the work space can retreat into the retained natural area without having to cross cleared lands.

Scenario 2: There is an existing natural connection (stream corridor, hedgerow or other natural linkage) between the work site and a nearby natural area.

Site clearing activities should be phased to funnel wildlife towards the existing connection. Areas of habitat within the work space should not become isolated from the connection until the final stages of this process.

Scenario 3: The site includes one or more isolated areas of habitat to be cleared, with no existing connection to other natural areas nearby.

One or more open "escape routes" between the habitat and the edge of the site should be maintained until the final phases of vegetation clearing are completed. These escape routes should be defined on the site with fencing to ensure they stay open, and to help channel wildlife movement. Clearing should begin at the far side of the habitat and proceed towards the designated escape route.

In all cases, each area to be cleared should be inspected (and, if necessary, pre-stressed) by the project biologist one more time the day before clearing, to determine whether any trees or other habitat features are still being used by wildlife. Any occupied trees/features should be flagged for temporary retention for at least one additional day, to allow wildlife a last chance to move out. In cases where occupancy is uncertain, the same precaution should apply. If they do not leave on their own, then it may be necessary to have a professional wildlife service provider relocate them, in accordance with applicable laws (e.g., *Fish and Wildlife Conservation Act, 1997* for most commonly encountered wildlife species). Relocation is not an option for some species; for example, if a migratory bird is nesting on site, a protected buffer zone may need to be established and maintained until the birds are finished nesting (the width of such buffer zones varies depending on the species, and should be determined by the project biologist in consultation with Environment Canada). This may affect the phasing or overall schedule for site clearing and subsequent on-site activities.

Any fencing between the work space and the natural habitat to which wildlife are being directed during site clearing must allow for wildlife passage; otherwise, wildlife may be unable to escape from the site. Acceptable fencing options are those which provide low gaps at the bottom of the fence to permit passage by small to medium species, and which are no more than 1.2 m high for larger species such as deer to leap over. Plastic snow fencing can be used, if suitable gaps are provided at intervals along the bottom edge (these can be cut out, or natural gaps caused by uneven terrain at the base of the fence). Once the work space has been cleared, these gaps should be closed or a more secure perimeter fence can be installed to reduce the risk of wildlife returning to the site.

2.5 Construction Site Management

Construction sites are normally managed to promote safety, efficiency and legal compliance. Site management is a key factor in reducing the overall environmental impact of the project, by controlling the risks of environmental contamination, soil compaction, and damage to trees and other natural features intended for retention. It also helps to reduce the risks to wildlife, by controlling the activities on-site that could directly or indirectly harm them.

All personnel should be briefed about wildlife protection measures at the outset of the project, in order to ensure that these measures are clearly understood and appropriately implemented. The briefing needs to provide an overview of the mitigation measures that are being used at the site, as well as instructions on what do to if and when wildlife are encountered during the work. It should also include information on any species at risk that may be present, and what to do if one is seen. A laminated handout summarising key information on wildlife protection should be kept on-site at all times for reference by staff (see example of a handout in Appendix 1). The handout should be tailored to suit the needs of each specific project, but should address the following subjects:

- General provisions – e.g., do not harm, feed or unnecessarily harass wildlife; drive slowly and avoid hitting wildlife where possible; keep site tidy and secure
- Species at risk – basic identification tips and recommendations (needs to be modified to address species most likely to be encountered at the site)
- Contact information for:
    - Project biologist / wildlife service provider
    - Ministry of Natural Resources and Forestry, Kemptville (for species at risk)
    - Wildlife rehabilitators and veterinarians (for orphaned or injured wildlife)

The management of the site needs to specifically address how to avoid attracting wildlife to the work space. Although on-site activities will generally discourage wildlife from entering the work space during the day, they may be drawn to the site at night (or on weekends) if it appears to provide sources of food, water or shelter. The following common attractants should be controlled or eliminated:

- Food wastes and other garbage – effective mitigation measures include waste control (prevent littering); keeping all trash secured in wildlife-proof containers, and prompt removal from the site (especially in warm weather).
- Water – effective mitigation measures include ensuring proper site drainage to limit standing pools of water; fencing off temporary storm ponds and other waterbodies within the work space (and not permitting wildlife access to any potentially contaminated waterbodies); and, use appropriate sediment and erosion control measures to protect the quality of surface water adjacent to or downstream of the work space.
- Shelter – effective mitigation measures include covering or containing piles of soil, fill, brush, rocks and other loose materials; capping ends of pipes where necessary to keep wildlife out; ensuring that trailers, bins, boxes, and vacant buildings are secured at the end of each work day to prevent access by wildlife.

While all personnel need to be aware of the wildlife protection measures, one or more people should be specifically tasked with ensuring that those measures are properly implemented, by performing the following duties:

- Checking the work site (including previously cleared areas) for wildlife, prior to beginning work each day;
- Regularly inspecting protective fencing or other installed measures to ensure their integrity and continued function; and,
- Monitoring construction activities to ensure compliance with the project-specific protocol (where applicable) or any other requirements.

For simple, low-risk projects, construction staff may be able to undertake this work (with help from contracted professionals if any issues arise). Large-scale or complex projects may benefit from the presence of a part or full time specialist such as an environmental officer, biologist or wildlife service provider, particularly during site clearing. Professional expertise is strongly recommended in cases where site clearing is being carried out during sensitive times of the year.

2.6 Wildlife Encounters

Ideally, the mitigation measures described above would allow all local wildlife to vacate the site before it was cleared, and no wildlife would return until the project was completed. In reality, however, it is very likely that wildlife will be encountered on-site at some point during the construction process. Wildlife may return to the site after dark, seeking the habitat that used to

be there. They may also be attracted to the site if it appears to provide food, water or shelter, as previously described in Section 2.5. Proper site management will reduce the risk of wildlife trying to move back onto the site, while daily inspections before work begins will reduce the risk of harm to any wildlife that has wandered in overnight.

Any wildlife encountered during site clearing or subsequent construction activities should be allowed to exit the site on their own, via safe routes. Construction staff should not attempt to capture or handle most kinds of wildlife, unless an animal is in imminent peril or is injured and cannot wait for rescue by qualified personnel. Improper handling can result in injuries to both workers and wildlife, and may in some cases contravene provincial or federal legislation. Removal and relocation of mammals, in particular, should only be done by qualified wildlife service providers working in accordance with applicable laws (i.e., *Fish and Wildlife Conservation Act, 1997*).

If young birds or mammals are discovered on a site, contact the project biologist, a wildlife rehabilitator, or other wildlife expert for advice. In most cases, they should be left alone. The mother is very likely nearby and will return if given the chance. For primarily nocturnal species like raccoons and skunks, she may wait until evening to move her family to a safe location.

Useful equipment for wildlife encounters:

- Work gloves, to reduce the risk of injury from bites or scratches
- Push broom for gently redirecting small mammals, reptiles or amphibians
- Clean (uncontaminated) towels or blankets and assorted containers such as plastic sweaterboxes, cat carriers, and a large bin or garbage can for capturing and transporting injured or orphaned wildlife (note: small cardboard boxes or unwaxed paper bags are best for small birds)

Scratches and bites from animals, whether domestic or wild, can result in serious infections and/or transmit diseases. Immediate medical treatment should be sought for any person injured by an animal.

2.7 Wildlife-proofing

Wildlife can cause significant property damage and even health and safety issues when they seek shelter in, on or under buildings. Wildlife-proofing measures have been developed to address these problems, but many of these measures are typically installed by building owners in response to an issue, rather than being installed proactively during the construction of the building. The Ontario Building Code (OBC) does not address the subject of wildlife-proofing in great detail. It does require that sources of natural ventilation (other than windows) be constructed to provide protection from insects and weather, and that outdoor air intakes and exhaust outlets should be screened to prevent entry of animals and insects. However, these requirements alone may not protect a building from wildlife determined to find a way in. The most common access points are through vents, chimneys, roofs and eaves; wildlife will also frequently seek shelter underneath porches, stairs and raised decks.

Builders and contractors are encouraged to go beyond the requirements of the OBC and provide their clients with additional built-in protection against wildlife. This could include upgrading materials to use more wildlife-resistant metal components instead of plastic. Heavy screening or other exclusion measures could be installed to keep wildlife out of crawl spaces under porches or exterior stairs, including below grade to deter digging animals. Quality

assurance programs should include checking for any loose external fittings or gaps that could allow access by wildlife.

Buildings which feature large windows or other expanses of glass may need a different type of wildlife-proofing. These buildings can pose a risk to birds, which may not recognise the glass as a barrier. Many birds are injured and killed in collisions with glass each year, especially during spring and fall migration. Several major cities across North America, including Toronto and Vancouver, have introduced bird-friendly design guidelines to address this issue. FLAP Canada also provides advice on how to reduce risks to birds on its website (see Section 4, Additional Resources, below). Architects are encouraged to consider the potential risks to birds when designing buildings with glass exteriors or large banks of windows, and to take steps to reduce those risks.

2.8 Owner Awareness

Once construction has been completed, the potential conflicts between people and wildlife living in the new development can generally be best handled through education. "Owner Awareness Packages" are commonly required as a mitigation measure for new developments in or adjacent to natural areas. These packages are intended to inform residents about the environmental significance and sensitivities of the natural areas, and also to provide guidance on how to avoid having (or causing) problems, including conflicts with wildlife. There are many available sources of information to draw upon when assembling such packages (see Section 4). The finished product may consist of a simple brochure or one-pager, or may be a more comprehensive handbook. It should include:

- Basic information about common wildlife that may be expected to occur in the area;
- Information about any species at risk that residents should be aware of, and the legal protections associated with these species;
- Information on potential implications of allowing pets to roam unattended (including possible impacts to pets and/or wildlife, as well as legal restrictions under municipal and provincial regulations);
- Recommendations for maintenance of any wildlife-proofing measures included in the building;
- Suggestions on other ways to avoid or reduce human-wildlife conflicts; and,
- Sources of additional information.

3 Conclusion

By following this protocol and planning ahead for wildlife protection, project proponents should be able to reduce construction-related impacts on Ottawa's wildlife, remain compliant with federal and provincial legislation, and help residents to avoid problems with wildlife in the longer term.

4 Additional Resources

City of Ottawa – information on Ottawa's wildlife and conflict avoidance at http://ottawa.ca/en/residents/water-and-environment/animals-ottawas-wildlife

Environment Canada (Canadian Wildlife Service) – information on avoiding incidental take of migratory birds at http://www.ec.gc.ca/paom-itmb/default.asp?lang=En&n=C51C415F-1

Environment Canada (Canadian Wildlife Service) – general nesting periods of migratory birds in Canada at http://www.ec.gc.ca/paom-itmb/default.asp?lang=En&n=4F39A78F-1

FLAP Canada – information on how to reduce building-related risks to birds, including links to various cities' bird-friendly design guidelines, at http://www.flap.org/index.php

Government of Canada – Species at Risk Public Registry, including information on all federally listed species at risk, at http://www.registrelep-sararegistry.gc.ca/default.asp?lang=en&n=24F7211B-1

Ministry of Natural Resources and Forestry – information on Species at Risk in Ontario at http://www.ontario.ca/environment-and-energy/species-risk

Ministry of Natural Resources and Forestry – contact information for authorized wildlife rehabilitators at http://www.ontario.ca/environment-and-energy/find-wildlife-rehabilitator

Ministry of Natural Resources and Forestry – illustrated instructions on safe handling of turtles, snakes, amphibians and birds, as well as directions on appropriate relocation and reporting of species at risk encounters, in the "Ontario Species at Risk Handling Manual: For Endangered Species Act Authorization Holders" at http://files.ontario.ca/environment-and-energy/species-at-risk/mnr_sar_tx_sar_hnd_mnl_en.pdf

Ministry of Natural Resources and Forestry – Species at Risk Branch Best Practices Technical Note on Reptile and Amphibian Exclusion Fencing, at http://files.ontario.ca/environment-and-energy/species-at-risk/mnr_sar_tx_rptl_amp_fnc_en.pdf

Ottawa-Carleton Wildlife Centre – information on commonly encountered species and conflict avoidance at http://wildlifeinfo.ca/index.html

Ottawa Humane Society – emergency response for injured wildlife, guidance on common wildlife issues, and information on wildlife service providers at http://www.ottawahumane.ca/protection/wildlifeissues.cfm

Ottawa Stewardship Council – Species at Risk Handbook for Ottawa at http://www.ottawastewardship.org

Rideau Valley Wildlife Sanctuary – wildlife rehabilitation centre; information on what to do for apparently orphaned or injured wildlife at http://www.rideauwildlife.org/index.html

Wild Bird Care Centre – wild bird rehabilitation centre; information on avoiding conflicts with birds and what to do for apparently orphaned or injured birds at http://wildbirdcarecentre.org/index.php

Appendix 1: Example of On-site Reference Handout

General Provisions:

- Watch out for wildlife while driving, and avoid hitting them, provided that it is safe to do so.
- Ensure sediment and erosion control measures (i.e., silt fencing) and other protective measures are in place prior to beginning work. Inspect them regularly, and particularly after storm events, to ensure their continued effectiveness.
- Prior to beginning work each day, check for wildlife by conducting a thorough visual inspection of the work space and immediate surroundings.
- Restrict all activities, vehicles and materials to the designated work space. Do not disturb areas identified for retention.
- Secure stockpiled materials, vehicles and structures against wildlife entry.
- Litter and other waste materials must be appropriately contained and promptly disposed of.
- Do not feed any wildlife or leave food out where it could attract them.

For health and safety reasons, and for protection of animals, removal and relocation of mammals must only be done by qualified and properly equipped personnel. Call the wildlife service provider [NAME] at (613) XXX-XXXX for assistance.

For injured wildlife, call the Ottawa Humane Society Emergency Services at (613) 725-1532. For injured birds, call the Wild Bird Care Centre at (613) 828-2849.

Scratches and bites from animals, whether domestic or wild, can result in serious infections and/or transmit diseases. Seek medical treatment immediately for any person injured by an animal.

Wildlife Encounters:

- **Do not harm any wildlife.** Many species are protected under provincial and/or federal legislation. Legal protection of egg-laying species applies to their eggs as well. Penalties for contravening these Acts can be severe.
- **Stand back** and allow the animal to leave the site. Wildlife may be encouraged to move away from the work area by shouting, waving of arms, clapping of hands or gentle redirection using a push broom. Contact project biologist / wildlife service provider for assistance if needed (e.g., if young animals are found). Do not unnecessarily harass any wildlife.
- **Turtles** may need to be helped to safety. Our most common species, Painted and Snapping Turtles, are protected under the Fish and Wildlife Conservation Act, 1997. If one of these turtles is found in the work area, it can be gently removed to a safe location nearby. Wear gloves, or use a broom to steer the turtle into a bucket or other container. Handle with care to avoid injury to the turtle or yourself, particularly when dealing with Snapping Turtles, which may bite or scratch. Turtles may also wet themselves when handled.
- Most of Ottawa's **snakes** are protected under the Fish and Wildlife Conservation Act, 1997. None of them are venomous, but bites may cause infections. Some produce a foul-smelling musk when handled, instead of biting. Snakes will usually try to escape or hide when disturbed, and only defend themselves when trapped. If a snake is found in the work area, it should be gently herded out to a safe location.
- **Stop work immediately** if any species protected under the Endangered Species Act, 2007 are seen in or near the work site (see attached sheet for tips on identifying some commonly encountered species). Take a photograph if possible, to confirm the sighting, and contact the project biologist at (613) XXX-XXXX and the Ontario Ministry of Natural Resources and Forestry – Kemptville District, at (613) 258-8204 or sar.kemptville@ontario.ca. Additional measures to avoid impacts may be required by the Ministry before work can restart.

Commonly Encountered Species Protected under the Endangered Species Act, 2007

For more information on Ottawa's species at risk, refer to http://www.ottawastewardship.org

Barn Swallow

Dark metallic blue above, buff to orange below. Long, deeply forked tail and pointed wings. Very quick and agile in flight. Cup-shaped nests built of mud and plant fibres on buildings and other structures, including bridge supports and culverts.

Male

Female

Nest

Bank Swallows are similar in shape to Barn Swallows, but do not have such long, deeply forked tails. They are dull brown above and white underneath, with a brownish band across the chest. They nest in burrows dug in exposed soils on steep slopes (e.g., sand pits, fill piles).

Blanding's Turtle

Bright yellow chin and throat. Highly domed, speckled shell up to 28 cm (11 in) in length.

Eggs small, oval and white. Usually less than 12 eggs per nest.

^ Photo courtesy of R. van de Lande

Bobolink

Males black with white back and cream hood during spring and summer breeding season. Females and non-breeding males streaky brown. Nests on the ground in open grasslands and hayfields.

All photos by A. MacPherson unless otherwise specified.

Butternut

Also known as White Walnut. Each leaf has several pairs of leaflets on either side of the main stalk, and one leaflet at the tip. Leaves and twigs grow in an alternating pattern along the branches. The nuts resemble limes or lemons in shape, and have greenish-yellow fuzzy rinds covering a hard, brown, ridged shell.

Butternut tree (centre)

Butternut leaves and fruit

Opened shell of butternut (without rind)

The closely related Black Walnut, which is not a species at risk, has round nuts like tennis balls. Its leaves are very similar to Butternut's leaves, but the terminal leaflet at the tip of each leaf is often much smaller than the other leaflets, or missing entirely. Ash trees may also appear similar to Butternut at first, with very similar leaves, but ash leaves and twigs grow in opposite pairs rather than alternating.

Eastern Meadowlark

Streaky grayish-brown bird with bright yellow front marked by black "V." Short tail has white edges on each side. Nests on the ground in open grassy areas; often seen perching on fence posts or shrubs.

All photos by A. MacPherson unless otherwise specified.

Appendix E – Personnel Resumes

Erik Pohanka, Biologist

Experience

7 years total

Stream Survey Crew Leader

Electrofishing Crew Leader (Class 2) Backpack

OBBN Sampling Crew Leader

OSAP Surveyor

Lake water quality sampling

Lake habitat mapping

Species at Risk monitoring

Invasive species removals

Fish sampling

Ontario Fish identification

Bird identification

Fish Identification Tree and shrub identification

Preparation of mitigation measures

Construction monitoring

Education

- Fish and Wildlife Technologist Diploma, Sir Sandford Fleming College
- Fish and Wildlife Technician Diploma, Sir Sandford Fleming College
- Bachelor of Science Degree in Biology with Honours, Trent University

Erik is a Fish and Wildlife Biologist with 8 years of experience in several types of environmental surveys and monitoring programs. Mr. Pohanka has led crews on stream surveys, fish sampling, water quality monitoring and Species at Risk inventories. Mr. Pohanka is an expert in the identification of fish, birds, trees, shrubs, herpetiles, and aquatic invertebrates of Ontario. Mr. Pohanka has worked on several Species at Risk monitoring and surveying projects and has acquired provincial authorization for Species at Risk monitoring in the past.

Relevant Project Experience

MTO - Highway 71 Rehabilitation Fisheries and Terrestrial Assessments (2015)

- Conducted fisheries assessment on thirty-six (36) culverts along Highway 71 in the Kenora area which included electrofishing surveys, water chemistry sampling, and fish habitat mapping on fish-bearing streams.
- Conducted terrestrial assessments along the highway including identification of flora and fauna, SAR habitat, and vegetative communities.
- Sampled for asbestos on the coating of one (1) culvert in the study area.
- Prepared fisheries and terrestrial existing conditions and impact assessment reports.

MTO - Highway 11 and Highway 17 Culvert Rehabilitations Fisheries Assessment (2015)

- Fisheries assessment on six (6) culverts on Highway 11 near Nipigon and eight (8) culverts on Highway 17 near Thunder Bay which included electrofishing surveys, identified and mapped fish habitat on fish-bearing streams.
- Prepared fisheries conditions and impact assessment reports.

MTO - Simcoe County Culvert Replacements and Pavement Rehabilitation (2016)

- Conducted fisheries assessments on Highway 89 culvert, Highway 12 culvert, and Highway 400 culverts.
- Conducted terrestrial assessments at each culvert including identification of flora and fauna, SAR habitat, and vegetative communities.
- Prepared reports for fisheries and terrestrial existing conditions and impact assessments.
- Prepared an Environmental Screening Document (ESD) for the culverts and Highway 89 pavement rehabilitation area.

MTO - Odessa Road Highway 401 Underpass Rehabilitation (2016)

- Prepared a consultation plan for the Odessa Road Underpass on Highway 401, which included public notices, contact lists and distribution scheduling.
- Conducted a terrestrial ecosystems existing conditions investigation.
- Prepared a terrestrial ecosystems existing conditions and impact assessment report.

MTO - Northeast Region 3 Local Roads Board Structures (Sault Ste. Marie) (2016)

- Conducted fisheries, terrestrial, and socio-economic surveys on three (3) structures in the Sault Ste. Marie area.

- Prepared Impact Assessment reports and Environmental Screening Documents (ESD) for each structure.
- Prepared a consultation plan for each structure which included public notices, contact lists and distribution scheduling.

MTO - Highway 101 and Highway 129 Structures (2016)

- Conducted electrofishing surveys, water chemistry sampling, and fish habitat mapping on four (4) structures on Highway 101 and Highway 129 in the Chapleau area.
- Conducted terrestrial ecosystems investigations for each structure including identification of flora and fauna, SAR habitat, and vegetative communities.
- Conducted designated substance sampling on the structures by taking paint, wood, and concrete samples for analysis.
- Prepared Impact Assessment reports for fisheries, terrestrial, and socio-economic factors associated with the structures.

MTO - Highway 11 and 17 Structural Culvert Replacements (2016)

- Conducted electrofishing surveys, water chemistry sampling, and fish habitat mapping on three (3) structures on Highway 11 in the Nipigon area and Highway 17 in the Dryden area.
- Conducted terrestrial ecosystems investigations for each structure including identification of flora and fauna, SAR habitat, and vegetative communities.
- Conducted designated substance sampling on the structures by taking paint, wood, and concrete samples for analysis.
- Prepared Impact Assessment reports for fisheries, terrestrial, and socio-economic factors associated with the structures.

MTO - Highway 11 Rehabilitation in Matheson (2016)

- Conducted electrofishing surveys, water chemistry sampling, and fish habitat mapping on fish-bearing streams associated with Highway 11 rehabilitation area near Matheson, Ontario.
- Conducted terrestrial ecosystems investigations along the highway including identification of flora and fauna, SAR habitat, and vegetative communities.
- Prepared fisheries and terrestrial existing conditions and impact assessment reports.
- Conducted designated substance sampling on culverts and other roadway structures by taking paint, wood, and concrete samples for analysis.

MTO – Highway 4 (Clinton) Bayfield River Bridge Replacement (2017)

- Conducted a Tree Inventory for the Bayfield River Bridge study area in Clinton, Ontario that documented species, diameter at breast height (DBH), condition, and the presence of cavities in each tree.
- Conducted a Vegetation Inventory within the study area.
- Documented the socio-economic factors within the study area.
- Prepared fisheries and terrestrial impact assessment memos.

MTO – Highway 62 Rawdon Creek Bridge (2017)

- Prepared a Mitigation Plan for Barn Swallows which included the existing available habitat, instructions on project registration with the MNRF, and mitigation measures.
- Designed the structure and placement of a nesting kiosk to compensate for disturbed Barn Swallow nesting habitat.

MTO – CNR and CPR Terrestrial Reviews (2017)

- Conducted a terrestrial review for a CPR Subway crossing over Highway 7 in Norwood which included a site investigation and background review.
- Prepared a preliminary Terrestrial Impact Assessment Report for the CPR Subway crossing as well as a CNR Subway crossing over Highway 401 in Napanee.

MTO – Highway 537 Rehabilitation and Jumbo Creek Culvert Replacement (2017)

- Conducted Blanding's Turtle hibernation screenings for environmental drilling operations along Highway 537 which included surveying and video recording the substrate under ice and water associated with Jumbo Creek.
- Conducted water chemistry sampling and fish habitat mapping on Jumbo Creek.
- Conducted terrestrial ecosystems investigations along the highway including identification of flora and fauna, SAR habitat, and vegetative communities.
- Prepared fisheries and terrestrial existing conditions and impact assessment reports.
- Prepared Project Notification Form for MTO.

MTO – Highway 17 Long Lake Road in Sudbury (2017)

- Conducted electrofishing surveys, water chemistry sampling, and fish habitat mapping on fish-bearing streams associated with Highway 71 rehabilitation area in Sudbury.
- Conducted terrestrial ecosystems investigations along the highway including identification of flora and fauna, SAR habitat, and vegetative communities.
- Prepared fisheries and terrestrial existing conditions and impact assessment reports.
- Conducted designated substance sampling on culverts and other roadway structures by taking paint, wood, and concrete samples for analysis.
- Designed exclusionary fencing for SAR turtles throughout the contract limits and prepared Special Provisions for the Tender.

MTO – Highway 11 and Highway 652 Culverts in Cochrane (2017)

- Conducted electrofishing surveys, water chemistry sampling, and fish habitat mapping on streams associated with Highway 11 and Highway 652 culverts in the Cochrane area.
- Conducted terrestrial ecosystems investigations at each structure including identification of flora and fauna, SAR habitat, and vegetative communities.
- Prepared fisheries and terrestrial existing conditions and impact assessment reports.
- Conducted designated substance sampling on culverts and other roadway structures by taking paint, wood, and concrete samples for analysis.

MTO – Central Region Fisheries Locations (2017)

- Conducted electrofishing surveys, water chemistry sampling, and fish habitat mapping on waterbodies associated with various structures in the Hamilton and Niagara.
- Prepared fisheries existing conditions reports.

MTO – Highway 6 Culverts (2017)

- Conducted electrofishing surveys, water chemistry sampling, and fish habitat mapping on waterbodies associated with culverts in the Hamilton area.
- Prepared fisheries existing conditions reports.

MTO – Highways 17, 538, and 638 Preliminary and Detail Designs (2017)

- Conducted water chemistry sampling and fish habitat mapping on watercourses associated with two bridges, a CNR overpass, and a Highway 17 culvert.
- Conducted terrestrial ecosystems investigations for each structure including identification of flora and fauna, SAR habitat, and vegetative communities.
- Prepared preliminary fisheries and terrestrial existing conditions and impact assessment reports with regards to different design alternatives for the replacement of a Highway 638 bailey bridge over Thessalon River.

MTO – Highway 17 Culverts in Renfrew (2017)

- Conducted fisheries assessments multiple culverts on Highway 17 in the Renfrew area which included electrofishing surveys, water chemistry sampling, and fish habitat mapping.
- Acquired License to Collect Fish for Scientific Purposes from MNRF.

MTO – Highway 401 Pickering Structures (2018)

- Conducted electrofishing surveys, water chemistry sampling, and fish habitat mapping on streams associated with Highway 401 culverts in the City of Pickering.
- Conducted terrestrial ecosystems investigations at each structure and two overhead structures crossing Highway 401 including identification of flora and fauna, SAR habitat, and vegetative communities.
- Mapped and prepared Special Provisions for invasive plant species control.
- Prepared fisheries and terrestrial existing conditions and impact assessment reports.

MTO – Highway 404 Rehabilitation (2018)

- Conducted electrofishing surveys, water chemistry sampling, and fish habitat mapping on streams associated with two culverts on Highway 404 in the City of Markham.
- Conducted terrestrial ecosystems investigations along the highway in the cities of Markham and Toronto and two overhead structures crossing Highway 404 including identification of flora and fauna, SAR habitat, and vegetative communities.
- Mapped and prepared Special Provisions for invasive plant species control.
- Prepared fisheries and terrestrial existing conditions and impact assessment reports.

MTO – Highway 17 Junction Creek Bridge Replacement in Sudbury (2018)

- Conducted electrofishing surveys, water chemistry sampling, and fish habitat mapping Junction Creek associated with the bridge on Highway 17 culverts in Sudbury.
- Conducted terrestrial ecosystems investigations at the structure including identification of flora and fauna, SAR habitat, and vegetative communities.
- Conducted nocturnal acoustic bat monitoring to determine potential utilization of the bridge structure by SAR bats.
- Prepared fisheries and terrestrial existing conditions and impact assessment reports.

MTO – Highway 17 Culverts in Massey (2018)

- Conducted fisheries assessments multiple culverts on Highway 17 in the Massey, Ontario area which included electrofishing surveys, water chemistry sampling, and fish habitat mapping.

MTO – Central Region Fisheries Locations (2018)

- Conducted electrofishing surveys, water chemistry sampling, and fish habitat mapping on waterbodies associated with various structures in the Burlington and Hamilton areas.
- Prepared fisheries existing conditions reports.

MTO – Highway 21 (Bayfield) Bayfield River Bridge Replacement (2018)

- Conducted a Tree Inventory for the Bayfield River Bridge study area in Bayfield, Ontario that documented species, diameter at breast height (DBH), condition, and the presence of cavities in each tree.
- Conducted a Vegetation Inventory within the study area including invasive species mapping.
- Documented the socio-economic factors within the study area.
- Prepared fisheries and terrestrial impact assessment memos.

MTO – Highway 400 Innisfil (2018)

- Conducted terrestrial ecosystems investigations for the Highway 400/Innisfil Beach Road interchange and CNR overpass in the Innisfil, Ontario area.
- Conducted a Tree Inventory documented species, diameter at breast height (DBH), condition, and the presence of cavities in each tree in the study area.
- Conducted grassland avian SAR (Eastern Meadowlark and Bobolink) surveys in the study area.
- Prepared a terrestrial ecosystems existing conditions and impact assessment report.

MTO – Highway 401 Choate Road Overpass (2018)

- Conducted terrestrial ecosystems investigations for the Highway 401/Choate Road overpass in Port Hope, Ontario.
- Mapped and prepared Special Provisions for invasive plant species control.
- Prepared a terrestrial ecosystems existing conditions and impact assessment report.

MTO – Highway 417 Underpasses and Ramp (2018)

- Acquired background fisheries information for three (3) underpasses on Highway 417 and a Highway 417/Highway 416 ramp in the City of Ottawa.

MTO – Highway 400 Barrie Detail Design (2018)

- Conducted electrofishing surveys, water chemistry sampling, and fish habitat mapping on streams associated Highway 400 in the City of Barrie.
- Conducted terrestrial ecosystems investigations along the highway in Barrie including identification of flora and fauna, SAR habitat, and vegetative communities.
- Prepared fisheries and terrestrial existing conditions and impact assessment reports.

MTO – Highway 17 Locha Creek Culvert (2018-2019)

- Conducted Eastern Meadowlark surveys and environmental field investigations on Locha Creek Culvert on Highway 17 in Renfrew County.
- Prepared fisheries and terrestrial existing conditions and impact assessment reports.

MTO – Highway 401 Nudell Bush Road Underpass (2019)

- Acquired background environmental information for the Highway 401/Nudell Bush Road underpass in the Township of South Dundas, Ontario.
- Conducted spring and summer terrestrial ecosystems field investigation within the study area including identification of flora and fauna, SAR habitat, and vegetative communities.
- Prepared terrestrial existing conditions and impact assessment report.

MTO – Highway 17 Bobolink Compensation Habitat Monitoring (2019)

- Coordinated with landowner to conduct Bobolink habitat monitoring during the bird breeding season.
- Conducted three (3) site visits with the landowner to determine the presence, nesting activities, and use of Bobolink compensation habitat near Highway 17 in Renfrew County.

MTO – Highway 17 141 Culverts (2019)

- Conducted visual fisheries assessments on 141 culverts on Highway 17 in Renfrew County which included water chemistry sampling and fish habitat mapping.
- Prepared fisheries and terrestrial existing conditions and impact assessment reports.

MTO – Highway 11 from Severn River Bridge to Kahshe Lake (2019)

- Conducted electrofishing surveys, water chemistry sampling, and fish habitat mapping on streams associated with approximately 8 km of Highway 11 from Severn River Bridge to South Kahshe Lake Road in the Town of Gravenhurst.

- Conducted terrestrial ecosystems investigations along the highway including identification of flora and fauna, SAR habitat, and vegetative communities.

MTO – Highway 28 Lily Creek Culvert and Snake Creek Bridge (2019)

- Conducted electrofishing surveys, water chemistry sampling, and fish habitat mapping of Lily Creek Culvert and Snake Creek Bridge associated with the bridge on Highway 28.
- Conducted terrestrial ecosystems investigations at the structures including identification of flora and fauna, SAR habitat, and vegetative communities.
- Prepared fisheries and terrestrial existing conditions and impact assessment reports.

MTO – Highway 115 Culverts (2019)

- Conducted fisheries assessments at multiple culverts on Highway 115 in the Peterborough area which included electrofishing surveys, water chemistry sampling, and fish habitat mapping.
- Conducted terrestrial ecosystems investigations at the structures including identification of flora and fauna, SAR habitat, and vegetative communities.

MTO – Highway 7 Perth (2020)

- Conducted fisheries assessments at multiple culverts on Highway 7 in the Town of Perth which included electrofishing surveys, water chemistry sampling, and fish habitat mapping.
- Conducted terrestrial ecosystems investigations at the structures including identification of flora and fauna, SAR habitat, and vegetative communities.
- Conducted a Vegetation Inventory within the study area including invasive species mapping.
- Prepared fisheries and terrestrial existing conditions and impact assessment reports.

MTO – Highway 7 Wemyss to Carleton Place (2020)

- Conducted fisheries assessments at multiple culverts on Highway 7 from the community of Wemyss to the town of Carleton Place which included electrofishing surveys, water chemistry sampling, and fish habitat mapping.
- Conducted terrestrial ecosystems investigations at the structures including identification of flora and fauna, SAR habitat, and vegetative communities.
- Conducted a Vegetation Inventory within the study area including invasive species mapping.
- Provided guidance and assessments for the environmental impacts of borehole drilling along Highway 7 associated with proposed passing lanes near the Town of Havelock.
- Prepared fisheries and terrestrial existing conditions and impact assessment reports.

MTO – Highway 401 Halleck's Road Underpass (2020)

- Acquired background environmental information for the Highway 401/Halleck's Road underpass in the Township of Elizabethtown-Kitley.
- Conducted fisheries assessments at a structural culvert on the west side of the underpass which included electrofishing surveys, water chemistry sampling, and fish habitat mapping.
- Conducted spring and summer terrestrial ecosystems field investigation within the study area including identification of flora and fauna, SAR habitat, and vegetative communities.
- Prepared terrestrial existing conditions and impact assessment report.

MTO – Highway 401 Port Hope (2020)

- Conducted fisheries assessments at multiple culverts and in the Ganaraska River on Highway 401 from in the Town of Port Hope which included electrofishing surveys, water chemistry sampling, and fish habitat mapping.

- Conducted terrestrial ecosystems investigations at each structure and along the highway including identification of flora and fauna, SAR habitat, and vegetative communities.
- Conducted a Vegetation Inventory within the study area including invasive species mapping.
- Prepared fisheries and terrestrial existing conditions and impact assessment reports.

Highway 11 Rehabilitation of CNR and Trent-Severn Bridges Design Build in Washago (2016)

- Conducted an environmental screening site visit to document the existing conditions of two underpasses on Highway 11 near Washago. Prepared a memo for the client to outline the site conditions.
- Prepared a consultation plan for the project which included public notices, contact lists and distribution scheduling.

Highway 400 Overpass and Overhead Design Build in Barrie (2016)

- Performed environmental site inspections on the Tiffin Street Overpass and Barrie-Collingwood Railway Overhead on Highway 400 to document the site conditions during construction.
- Prepared a photographic record of the site visit and a memo outlining the environmental conditions, concerns, and mitigation measures.

Highway 11 Design Build in Mattice (2017)

- Conducted electrofishing surveys, water chemistry sampling, and fish habitat mapping on fish-bearing streams associated with Highway 11 design build area near Mattice, Ontario.
- Conducted terrestrial ecosystems investigations along the highway including identification of flora and fauna, SAR habitat, and vegetative communities.
- Conducted designated substance sampling on culverts and other roadway structures by taking paint, wood, and concrete samples for analysis.
- Conducted fish removals on several culvert replacements during construction. Fish were rescued from isolated culvert sites and released into the natural watercourse outside of the construction sites. Provided guidance for compliance with environmental regulations.

Highway 28 Design Build (2016 - 2018)

- Acquired several Licenses to Collect Fish for Scientific Purposes for fisheries surveys and fish removals on several crossing on Highway 28 (Bancroft area). This included coordination and consultation with two MNRF districts.

Highway 60 Design Build (2018)

- Acquired several Licenses to Collect Fish for Scientific Purposes for fisheries surveys and fish removals on several crossing on Highway 60 in the Parry Sound area.

QEW Joshua Creek Culvert CA (2017)

- Conducted environmental compliance site inspection on Joshua Creek Culvert on the Queen Elizabeth Way in Oakville during Contract Administration.
- Prepared a memo of the observations and potential impacts as well as mitigation measures that should be implemented.

Highway 403 Desjardins Canal Bridges CA (2017 – 2018)

- Conducted environmental compliance site inspections on the Desjardins Canal Bridges on Highway 403 in Hamilton during Contract Administration.
- Prepared a memos of the observations and potential impacts as well as mitigation measures that should be implemented.
- Conducted avian screening on the study area to determine nesting activities in areas to be cleared for construction.

Highway 118 Boshkung Lake Bridge CA Barn Swallow Kiosk (2018)

- Conducted environmental screening on the Boshkung Lake Bridge on Highway 118 in Carnarvon, Ontario area during Contract Administration to determine suitability for Barn Swallow nesting in the bridge structure.
- Designed structure and placement of a Barn Swallow nesting kiosk for compensation of lost nesting habitat.

Highway 41 Hennessey's Creek Culvert (2019)

- Conducted breeding bird surveys of the culvert replacement area for Hennessey's Creek Culvert on Highway 41. Provided the contractor with advice on preventing harm or harassment to breeding migratory birds within areas to have vegetation cleared.
- Conducted fish removal at the isolated existing culvert. Fish were rescued from isolated work area and released into the natural watercourse outside of the construction area. Provided guidance for compliance with environmental regulations.
- Conducted an environmental inspection to assess the rehabilitation of the watercourse to ensure proper streambed conditions had been installed (including proper substrate materials and low flow channel).

Highway 62 Bird's Creek Culvert Emergency Repair (2019)

- Conducted fish removal at Bird's Creek Culvert on Highway 62 in Bancroft prior to emergency concrete pouring in the culvert. Provided guidance for isolating the work area to prevent deleterious substances from entering the watercourse.
- Conducted water quality monitoring prior to, during, and after concrete pouring to monitor for any leaks within the culvert isolation measures.
- Provided guidance for stream rehabilitation after concrete pouring and during the installation of streambed materials. Prepared a memo summarizing the emergency works and their compliance with environmental regulations.

Highway 7 Permanent Turtle Fence Installations in Kaladar (2019)

- Conducted inspections in summer and fall on several lengths of permanent exclusionary turtle fencing during construction on approximately 13 km of Highway 7 west of Kaladar. Inspected the placement locations, materials used, progress of the installations. Screened the work area for any SAR presence.
- Inspected several rock outcroppings within the work area to inspect for the presence of Gray Ratsnake due to proposed rock scaling.
- Prepared a memo to summarize the inspections of the permanent exclusionary turtle fencing and Gray Ratsnake habitat in the rock cut areas.

City of Timmins - Kraft Creek Bridge Rehabilitation Environmental Screening (2015)

- Conducted an environmental review for Kraft Creek Bridge in the City of Timmins which included desktop background information gathering, correspondence with regulatory agencies, and permit acquisition.
- Conducted environmental screening site visit to document the existing conditions of the bridge site.
- Prepared memos for the client outlining the site conditions and potential SAR habitat.
- Prepared a contact list for stakeholders, agencies, and landowners. Prepared and sent notification letters to the contacts.

Grey and Bruce County Culvert Fisheries Assessment (2015)

- Corresponded with regulatory agencies for background information and permit acquisition.
- Conducted electrofishing surveys on two concrete box culvert crossings in the Counties of Grey and Bruce.
- Documented fish presence, fish habitat, and compiled a vegetation inventory.
- Prepared a memo to the client outlining the site conditions.

Town of Caledon McLaren Road Bridge Replacement (2016)

- Compiled a vegetation inventory of the Winston Churchill Boulevard Bridge site in the Town of Caledon.

- Created a Species At Risk Mitigation Plan for Redside Dace under the 'Aquatic Species' exemption in O. Reg. 242/08 for McLaren Road Bridge. The plan included a summary of construction activity, potential impacts, mitigation measures, actions for overall benefits, and monitoring requirements.

City of Markham Structures Environmental Review (2016)

- Conducted environmental reviews for thirteen (13) structures within the City of Markham which included desktop background information gathering, correspondence with regulatory agencies, and permit requirements.
- Conducted site visits on the structures to document potential SAR habitat and other significant environmental factors.
- Prepared Mitigation Plan for Redside Dace for certain structures within the project existing available habitat, instructions on project registration with the MNRF, and mitigation measures.
- Registered particular culvert replacements with the MNRF for Species at Risk.
- Installed data loggers in piezometers associated with one of the structures as well as recording well water levels using a water level tape. Ongoing monitoring and data retrieval is being conducted.

City of Markham Structures Environmental Review (2017)

- Conducted environmental reviews for thirteen (10) structures within the City of Markham which included desktop background information gathering, correspondence with regulatory agencies, and permit requirements.
- Conducted site visits on the structures to document potential SAR habitat and other significant environmental factors.
- Prepared Mitigation Plan for Redside Dace for certain structures within the project which outlined existing available habitat, instructions on project registration with the MNRF, and mitigation measures.

City of Markham Feasibility Study (2018)

- Conducted environmental screening of several proposed pathway extensions and connections within the City of Markham. The screenings included a vegetation inventory, wildlife inventory, fish and fish habitat conditions, and documenting potential SAR habitat.
- Prepared a memo documenting the existing environmental conditions of each site and the factors of the feasibility for the proposed pathways in regard to the environmental impacts.

City of Ottawa Piperville Road Bridge (2019)

- Conducted environmental reviews Piperville Road Bridge within the City of Ottawa which included desktop background information gathering, correspondence with regulatory agencies, and permit requirements.
- Conducted site visits on the structure to document potential SAR habitat (including Barn Swallow nesting history) and other significant environmental factors.
- Prepared a technical Environmental Memo which outlined existing available habitat and mitigation measures.

City of Ottawa Species at Risk Screenings (2019)

- Conducted rapid assessments on hundreds of City of Ottawa renewal locations for Species at Risk (SAR) concerns and mitigation measures. Conducted assessments on priority locations on an as-needed basis.
- Provided monthly updates on screening locations completed.
- Conducted site visits on locations to determined Barn Swallow nesting activities and SAR turtle habitat to update the mitigation measures and risk assessments.
- Conducted field screenings on specifically requested locations to determine impacts to SAR with regards to specific works and provided memo summaries.
- Conducted an audit of previously screened locations to determine accuracy of assessment of Blanding's Turtle habitat.

City of Ottawa Jockvale Bridge Monitoring (2019)

- Conducted site visits prior to bird nesting season to inspect the conditions of exclusionary bird netting.

- Provided a summary memo of the exclusionary bird netting and made recommendations for repairs or improvements.

City of Ottawa Various Turtle Fence Monitoring Projects (2019)

- Coordinated with the Contractor to review locations and specifications for installing turtle exclusionary fences. Coordinated with Contractor to mitigate or repair deficiencies and damage to fences on an as-needed basis.
- Conducted weekly inspections on several turtle exclusionary fencing locations in the west end, east end, and south end of the City of Ottawa.
- Provided summary memos for each week of inspections for each project outlining existing conditions and recommendations for the turtle exclusionary fencing.
- Conducted sweeps for turtle presence of turtles and turtle nesting activities along Anderson Road prior to installation of turtle exclusionary fences.

City of Ottawa McLean Bridge Monitoring (2019)

- Conducted site visits during the bird nesting season to inspect the occupation of six (6) Barn Swallow nest cups installed on McLean Bridge in Manotick, Ontario.
- Conducted bird surveys during the nest cup inspections to determine the presence of Barn Swallows within the vicinity of McLean Bridge.

City of Kingston Belle Island Land Crossing Removals (2019)

- Conducted environmental monitoring during the removal of two (2) land crossings to Belle Island in the City of Kingston. Provided advise on sedimentation control, erosion control, and grading activities. Prepared a memo to document the activities and monitoring services.

City of Ottawa Species at Risk Screenings (2020)

- Conducted rapid assessments on hundreds of City of Ottawa renewal locations for Species at Risk (SAR) concerns and mitigation measures. Conducted assessments on priority locations on an as-needed basis.
- Provided monthly updates on screening locations completed.
- Conducted site visits on locations to determined Barn Swallow nesting activities and SAR turtle habitat to update the mitigation measures and risk assessments.
- Conducted field screenings on specifically requested locations to determine impacts to SAR with regards to specific works and provided memo summaries.
- Reviewed and revised mitigation measures, Blanding's Turtle mapping, and screening protocol.

City of Ottawa Fairmile View Park EIS (2020)

- Conducted environmental field screening for proposed development of city property on Fairmile Road in the City of Ottawa. The screening included a vegetation inventory, wildlife inventory, fish and fish habitat conditions, and documenting potential SAR habitat.
- Prepared an Environmental Impact Statement (EIS) addressing the environmental concerns and mitigation measures to be implemented for the proposed development.

City of Ottawa Small Culvert Replacements (2020)

- Conducted electrofishing surveys, water chemistry sampling, Species at Risk habitat inventories, and fish habitat mapping on streams associated with multiple small culverts across the City of Ottawa.
- Prepared fish and fish habitat existing conditions and impact assessment reports.

The Nation Municipality Route 800 Reconfiguration (2020)

- Met with representatives of South Nation Conservation Authority to discuss project details and background information.

- Conducted a background review of natural heritage features and SAR and SAR habitat presence within the study area.
- Conducted natural heritage screening of the Route 800/St. Albert Road intersection for potential reconfiguration. The screening included a vegetation inventory, wildlife inventory, fish and fish habitat conditions, and documenting potential SAR habitat.

City of Ottawa Various Turtle Fence and Bird Netting Monitoring Projects (2020)

- Coordinated with the Contractor to review locations and specifications for installing turtle exclusionary fences. Coordinated with Contractor to mitigate or repair deficiencies and damage to fences on an as-needed basis.
- Conducted weekly inspections on several exclusionary turtle fence and bird netting locations in the west end, east end, and south end of the City of Ottawa.
- Provided summary memos for each week of inspections for each project outlining existing conditions and recommendations for the turtle exclusionary fencing.

Metrolinx Natural Heritage Screening on Stouffville Rail Corridor (2016)

- Conducted an avian screening and vegetation inventory for Metrolinx within the Stouffville Rail Corridor in Toronto.
- Conducted a background review of natural heritage features and SAR and SAR habitat presence within the study area.
- Prepared a memo of the findings and summarized potential impacts and mitigation measures for vegetation removal activities within the study area to avoid harm to breeding birds.

Metrolinx Natural Heritage Screening on Bradford GO Station (2016)

- Conducted natural heritage screening for Metrolinx within the Bradford GO Station in Bradford for potential parking lot expansion. The screening included a vegetation inventory, wildlife inventory, fish and fish habitat conditions, and documenting potential SAR habitat.
- Conducted Acoustic Monitoring for bat presence within the site.
- Completed a Tree Inventory for the site which documented species, diameter at breast height (DBH), conditions, and presence of cavity trees.
- Conducted a background review of natural heritage features and SAR and SAR habitat presence within the study area. Prepared a memo of the findings and summarized potential impacts and mitigation measures for fish habitat, wildlife habitat, SAR, and vegetation within the study area.

Metrolinnx SAR Screening on Gormley GO Station (2016)

- Conducted a SAR screening for Metrolinx within the Gormley GO Station construction site to document the presence of Bank Swallows (*Riparia riparia*).
- Identified Bank Swallow nesting and took a photographic record of the site.
- Prepared a memo for Metrolinx outlining the mitigation measures and recommendations to avoid harm to Bank Swallows within the site.

Metrolinx Butterfly Habitat Planting (2017)

- Conducted wildflower planting in several Metrolinx properties to promote butterfly habitat which included hundreds of individual plantings.
- Coordinated supplies and public volunteers for planting wildflowers in a Metrolinx bus maintenance property.

Metrolinx Natural Heritage Screening on Two Bridges Newmarket (2020)

- Conducted a background review of natural heritage features and SAR and SAR habitat presence within the study area.
- Conducted natural heritage screening for Metrolinx on Holland River East Bridge and Clubinis Creek Bridge of the existing rail in the Town of Newmarket for potential rail expansion. The screening included a vegetation inventory, presence of cavity trees, wildlife inventory, fish and fish habitat conditions, and documenting potential SAR habitat.

Six Nations Bridge 7 Rehabilitation (2017)

- Conducted natural heritage site investigation of Bridge 7 in the Six Nations Reserve.
- Conducted a background review of natural heritage features and SAR and SAR habitat presence within the study area.
- Prepared environmental Special Provisions for the Tender.

Six Nations Bridge 15 Rehabilitation (2017)

- Conducted natural heritage site investigation of Bridge 15 in the Six Nations Reserve.
- Conducted a background review of natural heritage features and SAR and SAR habitat presence within the study area.
- Prepared environmental Special Provisions for the Tender.

Mississaugas of the New Credit Bridge 13 Rehabilitation (2017)

- Conducted natural heritage site investigation of Bridge 13 in the Mississaugas of the New Credit Reserve.
- Conducted a background review of natural heritage features and SAR and SAR habitat presence within the study area.
- Prepared environmental Special Provisions for the Tender.

MVCA Class EA Carp River Design (2020)

- Conducted a Tree Inventory and Vegetation Inventory on Carp River in the City of Ottawa for a Class Environmental Assessment prepared for Mississippi Valley Conservation Authority (MVCA). Recorded wildlife presence and potential SAR habitat.
- Documented streambed conditions for channelization assessment and took photographic record.

Bird and Bat Mortality Monitoring for wpd Springwood and Whittington Wind Projects (2015-2019)

- Bi-weekly bird and bat mortality monitoring at a total of seven (7) turbines across two wind projects from May to October of 2015 to 2018 (inclusive) as part of a four-year monitoring program.
- Weekly raptor mortality monitoring in November of 2015 to 2017 (inclusive).
- Searcher efficiency trials conducted once per season during the monitoring period (spring, summer, autumn).
- Scavenger efficiency trials conducted once per month during the monitoring period (May to October).
- Forest Breeding Bird Surveys conducted twice in June of 2015 to 2017 (inclusive) at the Whittington Wind Project.
- Data analysis and reporting to stakeholders and agencies with mitigation recommendations.

Great Circle Solar Farm Environmental Screenings (2015)

- Conducted environmental reviews for eight (8) proposed solar sites within West Nipissing, New Liskeard, and Kirkland Lake which included desktop background information gathering and correspondence with regulatory agencies.
- Conducted environmental screening site visits to document the existing conditions of proposed solar sites.
- Prepared memos for the client outlining site conditions and potential SAR habitat.

Aria Solar Site Erosion and Sediment Monitoring (2015)

- Weekly site visits between June and August of 2015. Recorded the site conditions with regards to erosion and sedimentation during construction and took photographic records.
- Provided suggestions for areas in need of remediation. Provided recommendations for mitigation measures.

Boralex Total Suspended Solids (TSS) Monitoring for the Niagara Region Wind Corporation Construction Project (2016)

- Sampling for the Niagara Region Wind Farm across the Niagara Peninsula region at seventy-seven (77) turbine construction sites. Water discharge from construction pits were sampled for Total Suspended Solids (TSS). Photos of sites and notes were taken.
- Conducted private well-water sampling for a variety of parameters on request from landowners.

OYA Solar Well-Water Sampling (2017)

- Conducted private well-water sampling for a variety of parameters within the Newcastle, Ontario area for post-construction monitoring of the OYA Solar Project.

Solar Provider Group Environmental and SAR Screenings (2017 – 2018)

- Conducted environmental screenings of several proposed solar project areas across Ontario. The screenings included a vegetation inventory, wildlife inventory, fish and fish habitat conditions, and documenting potential SAR habitat.
- Conducted several rounds of SAR surveys based on the site conditions and available SAR habitat at each site.
- Prepared environmental screening memos and SAR survey memos documenting observations and potential mitigation measures and legislative requirements.

Nanticoke Solar Hydrological Monitoring (2018)

- Conducted flow velocity monitoring on several streams in Nanticok, Ontario area as part of pre-construction monitoring for the Nanticoke Solar project.
- Conducted water chemistry sampling for pre-construction water quality parameters including turbidity readings. Instructed contractors on the sampling protocols and methods of sample submissions.
- Coordinated with contractors to set up velocity monitoring stations at each site for pre- and post-construction velocity monitoring.

Euro Landscaping Breeding Bird Screening (2016)

- Conducted avian screenings and a vegetation inventory for Euro Landscaping within Stonebrook Park in Mississauga.
- Conducted a background review of natural heritage features and SAR and SAR habitat presence within the study area.
- Prepared a memo of the findings and summarized potential impacts and mitigation measures for vegetation removal activities within the study area to avoid harm to breeding birds.

Feedmill Creek Fish Removal (2016)

- Led an electrofishing crew by administering safety training and fishing techniques to contractor.
- Conducted a fish removal on Feedmill Creek in Ottawa in an isolated work area to safely relocate fish from the work site into downstream waters.
- Prepared a report for the MNRF regarding the electrofishing activities as a mandatory requirement for the scientific collector's permit used for the fish removal.

Drag Lake Dam and Horseshoe Dam SAR Training (2017)

- Prepared Species at Risk information documents catered to the Drag Lake Dam and Horseshoe Dam rehabilitation sites in Haliburton.
- Administered SAR identification training to the contractor for Drag Lake Dam and provided discussion about SAR concerns on the work site.

Edmond's Lock Fish Removal (2018-2019)

- Conducted fish removal during winter conditions at Edmond's Lock on Rideau River in Smiths Falls. Fish were rescued from isolated lock site and released into the natural watercourse outside of the construction area. Provided guidance for compliance with environmental regulations.
- Identified and humanely euthanized invasive fish species (Round Goby) which were caught during the fish rescue and provided guidance to the contractor in cases of encountering more invasive fish.
- Conducted water turbidity sampling throughout the site for water discharge monitoring. Monitored the construction site for general environmental concerns.

Hog's Back Lock Fish Removal (2019)

- Conducted fish removal during winter conditions at Hog's Back Lock on Rideau River in the City of Ottawa. Provided guidance for compliance with environmental regulations.

- Conducted water turbidity sampling throughout the site for water discharge monitoring. Monitored the construction site for general environmental concerns.

Robert X Fish Removal (2019)

- Conducted fish removal during winter conditions at Minto Harmony development in Barrhaven in the City of Ottawa. Fish were rescued from isolated site and released into the natural watercourse outside of the construction area. Provided guidance for compliance with environmental regulations.

HSP Carling Campus Turtle Relocation (2019)

- Conducted 11 consecutive days of turtle trapping with the intention of removing SAR turtles from stormwater ponds at Carling Campus in the City of Ottawa. Trapping included setting several baited hoop traps and basking traps into the stormwater ponds and conducting frequent checks for turtles.
- Conducted basking surveys for the presence of turtles in the ponds, SAR bird surveys adjacent to the ponds, and nocturnal beaver surveys.
- Collected trapping information into monitoring record.
- Provided SAR training to contractor and other stakeholders for guidance on SAR identification and protocols to follow in cases of encountering SAR.

Tilden Lake Dam Fish Removal (2019)

- Conducted fish removal at the Tilden Lake Dam north of North Bay. Fish were rescued from isolated dam site and released into the natural watercourse outside of the construction area. Provided guidance for compliance with environmental regulations.

Blackstone Development Fish Removals (2019)

- Conducted fish multiple removals at storm water ponds at the Blackstone Development in Kanata. Fish were rescued from isolated site and released into the natural watercourse outside of the construction area. Provided guidance for compliance with environmental regulations.

Strandherd Drive Expansion Ottawa (2020)

- Conducted a breeding bird survey of the access route to the construction laydown on Strandherd Drive. Provided the contractor with advice on preventing harm or harassment to breeding migratory birds within areas to have vegetation cleared.
- Provided SAR training to contractor for guidance on SAR identification and protocols to follow in cases of encountering SAR.

DSquared Expedited Culverts (2020)

- Conducted several rounds of grassland breeding bird SAR surveys based on the site conditions and available SAR habitat at a culvert replacement site in the west end of the City of Ottawa.
- Provided SAR training to contractor for guidance on SAR identification and protocols to follow in cases of encountering SAR.

Ross and Anglin Crow Lake Bridge (2020)

- Conducted a SAR bird nesting survey on the Bolingbroke Bridge on Crow Lake Road in the Township of Tay Valley.
- Conducted a sweep of the road for turtle nesting activity.

Rambo Creek Rehabilitation (Burlington) (2016)

- Conducted a Tree Inventory and Vegetation Inventory on Rambo Creek in Burlington for Water's Edge Environmental Solutions. Recorded wildlife presence and potential SAR habitat.
- Documented streambed conditions for channelization assessment and took photographic record.
- Prepared a memo for the client outlining the existing conditions of the stream and recommendations for vegetation removal, streambed rehabilitation, and SAR concerns.

Villeneuve Quarry EIS (2018)

- Conducted environmental screening of the Villeneuve Quarry property in Timmins. The screening included a vegetation inventory, wildlife inventory, fish and fish habitat conditions, and documenting potential SAR habitat.
- Conducted nocturnal acoustic bat monitoring to determine potential utilization of the bridge structure by SAR bats.
- Prepared an Environmental Impact Statement (EIS) addressing the environmental concerns and mitigation measures to be implemented for the proposed quarry and pit works.

5015 Centennial Lake Road Retaining Wall (2019)

- Conducted environmental screening and background review of 5015 Centennial Lake Road property in the Township of Greater Madawaska.
- Prepared a Request for Review for the construction of a retaining wall to be submitted to Fisheries and Oceans Canada (DFO) and communicated with DFO during the review.

5598 Ardoch Road EIS (2019)

- Conducted environmental field screening of the 5598 Ardoch Road property in Ardoch, Ontario. The screening included a vegetation inventory, wildlife inventory, fish and fish habitat conditions, and documenting potential SAR habitat.
- Prepared an Environmental Impact Statement (EIS) addressing the environmental concerns and mitigation measures to be implemented for the proposed development.

Minto Mahogany Creek Reconstruction (2019)

- Prepared Post-Effectiveness Monitoring Plan for the reconstruction of Mahogany Creek in the Minto Mahogany development of Manotick, Ontario. The Plan included an outline of the 5-year plan for post-construction monitoring on the effectiveness of the reconstruction of Mahogany Creek. Prepared annual Post-Effectiveness Monitoring Report to summarize results of monitoring.
- Conducted Ontario Stream Assessment Protocol (OSAP) point-transect sampling for channel structure, substrate and bank conditions throughout the site.
- Monitored progress and health of woody and herbaceous riparian plantings as well as determined locations for photographs throughout the site.

Possess the Land Church EIS (2019)

- Conducted environmental field screening for proposed development of Possess the Land property in the City of Ottawa. The screening included a vegetation inventory, wildlife inventory, fish and fish habitat conditions, and documenting potential SAR habitat.
- Prepared an Environmental Impact Statement (EIS) addressing the environmental concerns and mitigation measures to be implemented for the proposed development.

Maple Creek Court EIS (2019)

- Conducted environmental field screening for proposed development of property on Maple Creek Court in the City of Ottawa. The screening included a vegetation inventory, wildlife inventory, fish and fish habitat conditions, and documenting potential SAR habitat.
- Prepared an Environmental Impact Statement (EIS) addressing the environmental concerns and mitigation measures to be implemented for the proposed development.

Perthmore Subdivision EIS (2019)

- Conducted environmental field screening for proposed development of Perthmore Development property in the Town of Perth. The screening included a vegetation inventory, wildlife inventory, fish and fish habitat conditions, and documenting potential SAR habitat.
- Prepared an Environmental Impact Statement (EIS) addressing the environmental concerns and mitigation measures to be implemented for the proposed development.

Blossom Park EIS (2019)

- Conducted environmental field screening for proposed development of property on Bank Street in the Blossom Park community of the City of Ottawa. The screening included a vegetation inventory, wildlife inventory, fish and fish habitat conditions, and documenting potential SAR habitat.

6776 Rothbourne Road EIS (2019)

- Conducted environmental field screening for proposed development of property at 6776 Rothbourne Road in the City of Ottawa. The screening included a vegetation inventory, wildlife inventory, fish and fish habitat conditions, and documenting potential SAR habitat. The screening also included a review of the previously delineated Provincially Significant Wetland (PSW) within the property.
- Provided wetland construction details including compensation areas, planting plans, and impact assessments.
- Prepared an Environmental Impact Statement (EIS) addressing the environmental concerns and mitigation measures to be implemented for the proposed development.

Carleton Severances McDonald's Corners EIS (2020)

- Conducted environmental field screening for proposed severances of a forested property in the Town of McDonald's Corners. The screening included a vegetation inventory, wildlife inventory, fish and fish habitat conditions, and documenting potential SAR habitat.
- Prepared an Environmental Impact Statement (EIS) addressing the environmental concerns and mitigation measures to be implemented for the proposed severances.

Beaver Lake EIS (2020)

- Conducted environmental field screening for proposed building development of a shoreline property at 49A South Shore Drive in the Township of Stone Mills. The screening included a vegetation inventory, wildlife inventory, fish and fish habitat conditions, and documenting potential SAR habitat.
- Prepared an Environmental Impact Statement (EIS) addressing the environmental concerns and mitigation measures to be implemented for the proposed severances.

Land Ark Homes Westport Subdivision EIS (2020)

- Conducted headwater drainage features field assessments for proposed development property in the Town of Westport. The assessment included a rapid assessment of the various features, connectivity, fish habitat, and hydrological features of a headwater tributary to Upper Rideau Lake.
- Conducted nocturnal amphibian monitoring at several stations along the headwater tributary.
- Prepared a Headwater Drainage Features (HDF) Assessment summarizing the evaluation of the headwater tributary within the study area, classifying the tributary, and proposed management recommendations to be implemented for the proposed development.

Playvalue Toys EIS Addendum (2020)

- Conducted environmental field screening for proposed additional development of property at 130 David Manchester Road in the City of Ottawa. The screening included a vegetation inventory, wildlife inventory, fish and fish habitat conditions, and documenting potential SAR habitat.
- Prepared an addendum to the previous Environmental Impact Statement (EIS) addressing the environmental concerns and mitigation measures to be implemented for the proposed development.

Matthew Wheeler, Senior Ecologist

Experience

15 Years Total, include 12 years of Species at Risk experience

Education

- Bachelor of Arts, Honours Geography, Guelph, Ontario, 2004
- Post Graduate Certificate in Ecological Restoration, Niagara College, 2008

Awards

- Consulting Engineers of Ontario **Creative Solutions Award** for developing solutions for conservation of Species at Risk during construction work.

Affiliations

- Lifetime Member, Field Botanists of Ontario (2008–present)

Additional Training

- Sedge Identification Workshop, New York Flora Association, 2013
- Grass Identification Workshop, Royal Botanical Gardens, 2013
- Certified Ontario Wetland Evaluator – OMNR, 2012
- Ecological Land Classification – OMNR, 2010
- MTO/DFO/OMNR Fisheries Protocol Training Session
- Certified Ontario Seed Collector, Forest Gene Conservation Association, 2009
- Natural Heritage Information Centre Species at Risk Data Sensitivity Training – OMNR, 2008
- University of Guelph, Wetland Plant Taxonomy and Identification Workshop, 2011
- WHMIS Training, 2012
- Mycorestoration Training, 2006
- Soil Bioengineering, 2006

Matthew Wheeler is a Senior Ecologist with over 15 years of experience supplying environmental expertise in the completion of mine reclamation, pit/quarry reclamation, ecological restoration of disturbed systems, biological inventories, Species at Risk assessments, wildlife surveys, environmental monitoring for construction, and tender assembly. He is well versed in municipal, provincial and federal environmental legislation. He has co-authored Best Management Practice reports for compliance with the Endangered Species Act and the *Migratory Birds Convention Act*. Matthew has been involved in the design, implementation, construction administration and post-construction monitoring for rehabilitation of disturbed sites throughout Ontario. He is accustomed to ensuring that proposed strategies are "biddable and buildable", and that they are carried out in compliance with environmental legislation.

Relevant Project Experience

Species at Risk Conservation Projects

Mr. Wheeler has worked on turtle conservation project across Ontario from the creation of wetlands, nesting habitat and installation of permanent exclusion measures. He has developed and carried out turtle relocation projects to remove turtles from stormwater ponds scheduled for construction work. He has been involved in targeted surveys to document the presence or absence of SAR reptiles in accordance with provincial survey methodology.

- **2018-** Led an intensive road ecology monitoring project in Orillia for MTO to determine the efficacy of permanent turtle exclusion fencing and artificial turtle nesting habitat. A SAR turtle was confirmed using a small diameter culvert to cross beneath the highway.

- **2017-**Secured agency approval to relocate Blanding's Turtle eggs discovered in a material stockpile at Deloro Mine site during rehabilitation activities. Protocol for egg relocation was developed, eggs were safely transported, eggs incubated indoors, and 9 Blanding's Turtles were successfully hatched and released back into their wetlands.

- **2016-2018-** Conducted SAR turtle surveys. Obtained a federal SAR permit to capture and relocate turtles from a federal property requiring pond maintenance. Deployed hoop nets and embarked on short term turtle capture and relocation program. Post construction monitoring is being conducted to determine which turtles are returning back to the pond post-construction.

- **2017-2018-**Led extensive surveys for Gray Ratsnakes and other SAR herpetofauna along provincial roadways to determine impacts of infrastructure improvement activities at 17 locations across Eastern Ontario.

- **2017**-Obtained permits to capture (via hoop net trapping), handle, transport and relocate turtles from a stormwater pond in Kingston. All activities were completed under a permit issued by the Wildlife Animal Care Committee. In total 29 turtles were safely removed from the work area.

- **2016**-Designed and secured funding to carry out a research project to utilize trained canines to detect nests of Blanding's Turtles to conserve their nests during road Construction Projects. Successfully carried out the pilot research project to demonstrate that conservation dogs can detect the presence of Blanding's Turtle nests for conservation efforts. This project won a Creative Solutions Award from the Consulting Engineers of Ontario for the innovative conservation measures aimed at improving road construction projects while conserving SAR turtles.
- **2016**- Designed and acquired provincial agency approval to install 4200 meters of permanent turtle exclusion fence in Ottawa to reduce incidents of road mortality. Designed the turtle exclusion fence and associated tender documents to allow contractors to bid on the project. Post-fence construction monitoring documented zero incidents of turtle road mortality post-fence installation.
- **2015**-Secured funding and approvals to install two runs of permanent exclusion fencing in Bancroft area to reduce turtle road mortality. Designed the permanent exclusion fence and included all contract elements to precure construction services for fence installation.
- **2015**-Secured funding to install 950 m of permanent turtle exclusion fencing along a turtle road mortality hotspot in Kingston. Designed and installed a permanent turtle exclusion fence to decrease incidents of road mortality and constructed turtle nesting habitat to increase recruitment in the local population.
- **2015**-Obtained permits to capture (via hoop net trapping), handle, transport and relocate turtles from a stormwater pond in Kingston. All activities were completed under a permit issued by the Wildlife Animal Care Committee. In total 45 turtles were safely removed from the work area including Blanding's Turtle.
- **2014**- Obtained provincial legislative exemptions for a mine reclamation site that may have resulted in adverse impacts to Blanding's Turtles. Designed turtle exclusion measures to exclude SAR turtles from the work area. Provided technical guidance to ensure all work was carried out in accordance with provincial exemptions and that construction work incorporated mitigation measures to reduce or eliminate impacts to SAR turtles and their habitat.
- **2013**- Provided technical analysis of turtle road mortalities at four (4) road crossing locations utilized by turtles in Kingston. Services provided included roadway monitoring for presence of turtle species and nests, documenting spatial location of turtle occurrences (GPS), habitat delineation and assessment, mapping turtle and habitat data, identification of animal movement corridors and recommended multiple mitigation measures to reduce turtle road mortality. Provided results to Kingston City Council to discuss ways to mitigate road mortalities and conserve local turtle populations.
- **2013-2017**-Provided technical guidance for a mine reclamation project in Southern Ontario to avoid adverse impacts to turtles and other SAR. This included technical guidance to prevent adverse impacts to turtles and their habitat. Developed a written protocol to safely remove a Blanding's Turtle nest encountered in the work area and transport it to a wildlife care facility. Obtained provincial approval to follow the protocol. All 9 Blanding's Turtle eggs were successfully removed from the nest, incubated in captivity and all eggs hatched into juveniles. Young turtles were released to suitable habitat away from the work area.

Mine Reclamation Projects

Ontario Ministry of Northern Development and Mines [MNDM] *– Kam Kotia Mine Site in Timmins, ON, Tailing Consolidation and Reclamation of the Southern Un-Impounded Tailings, 2018-2020.* ***Role: Ecologist.***

McIntosh Perry filled the role of technical advisors to GHD (the contractor) as they carried out the collection of tailings at Kam Kotia mine site and reclamation of an expansive peatland impacted by Acid Mine Drainage (AMD). McIntosh Perry worked with GHD to discuss emergent issues during reclamation, land forming methods, re-vegetation techniques, sourcing of plant materials and plant material installation to promote colonization.

Ontario Ministry of Northern Development and Mines [MNDM] *– Kam Kotia Mine Site in Timmins, ON, Re-vegetation Test Plots Northern Un-Impounded Tailings, 2018.* ***Role: Ecologist.***

Field investigations were undertaken to characterize the soil conditions at Kam Kotia mine site in terms of texture, pH and metal concentration. Test plots were developed to review the response of vegetation and seed mixes within an area of Acid Mine Drainage. Dolomitic limestone was applied in a test area and was compared to a control area which received no treatment. Both areas were seeded with a commercial seed mix. This area is being monitored to determine the effect of raising soil pH to facilitate seed germination, plant establishment/growth and cost-effective methods of reclamation. McIntosh Perry procured the contractor, designed the test plots, supervised the installation of test plots and conducted monitoring at Kam Kotia Mine site.

Ontario Ministry of Northern Development and Mines [MNDM] *– Kam Kotia Mine Site in Timmins, ON, Monitoring the Vegetation Community on "Dry" Tailings Cover, 2013.* ***Role: Ecologist.*** Field investigations were undertaken to characterize the vegetation community growing on an engineered "dry" cover at the Kam Kotia Mine site. The report details the vascular plant community composition on the "dry" cover. Soil samples were taken and analysed to document the properties of the growing medium. The existing conditions were documented and analysed to target a Desired Future Condition (DFC) for the vascular plant community. Recommendations were outlined to maintain the vegetation community in optimal condition and to maintain the integrity of the Geosynthetic Clay Liner (GCL) which provides a barrier between the atmosphere and acid generating tailings. A long-term monitoring plan was developed to ensure the vegetation community on the "dry" cover was maintained.

Ontario Ministry of Northern Development and Mines [MNDM] *– Kam Kotia Mine Site in Timmins, ON, Development of a Re-vegetation Plan, 2012-2013.* ***Role: Ecologist.*** Uncontrolled release of acid generating tailings at this former copper-zinc mine occurred from 1943-1972. It is estimated that over 500 hectares of land were impacted at the Kam Kotia mine site. Conducted field work at the mine site during the fall of 2012. He conducted flora and fauna surveys and soil sampling. A site assessment documented existing conditions on the property. Soils on the property were characterized as having pH values of 3.0. Led the development of a Re-vegetation Plan that aims to provide long-term vegetation cover for 180 hectares of land impacted by tailings. The re-vegetation plan focused on the use of native plant species known to inhabit the mine site and surrounding areas.

Ministry of Environment*- Environmental Monitoring of Deloro Mine Site, (2012-2018)* ***Role: Ecologist.***

Mr. Wheeler completed environmental monitoring at the Deloro mine site when contractors were actively working within the Industrial Mine Area and Young's Creek. Environmental inspection was undertaken to review sediment and control measures for proper placement, installed technique and maintenance. Peer reviews were completed of the site to ensure the contractor was meeting the technical specification as outlined in the contract documents and to ensure compliance with provincial and federal environmental legislation. This included reviews of monthly memos and periodic site inspection to validate the content of memos. All information collected and reviewed was written in an Environmental Memo and provided to the Contract Administrator for the owner's longterm records. Mr. Wheeler also acted on behalf of the owner to consult agencies during emergent issues during construction to seek approvals for unanticipated events (e.g. obtaining approvals from the MNRF to excavate and remove Blanding's Turtle eggs from stockpiled sand, incubate them in captivity, and release turtles to the site upon hatching). Mr. Wheeler is familiar with the permits and authorizations for Deloro Mine site, the species at risk that inhabit the site and the specific mitigation measures that need to be enacted during reclamation work.

Ministry of Environment *– Deloro Mine Site, Design of Riverbank Restoration in the Industrial Mine Area, (2011).* ***Role: Ecologist.***

During the course of McIntosh Perry's construction contract administration work at the Deloro Tailings Area, we were awarded a contract to prepare design drawings and specifications for the restoration of the Moira River Bank. The banks of this river were impacted by mine wastes for over 1000 m. An assessment of soil quality, native vegetation and topography was undertaken. Mr. Wheeler designed the the re-vegetation component of this remedial program. The objective was to remove contaminated soil and sediments from the west bank of the River and ensure suitable re-vegetation and restoration to pre-industrial conditions to the extent possible. Matt conducted site visits, assessed native vegetation, and provided comment on the proposed re-vegetation approach for other areas of the mine site to ensure soil stability post-reclamation work and to have the resulting plant community match pre-mining conditions. Alternative re-vegetation options were presented to the client to provide long-term vegetation solutions that are cost effective, low maintenance, and prevent erosion. Matt Wheeler provided most of the re-vegetation expertise (live staking and other measures). He signed drawings and reviewed appropriate specifications for this work, including contacting suppliers of nursery stock.

Solar Energy Project (Private Client) *– Monitoring Re-vegetation Efforts, Eastern Ontario, 2013.* ***Role: Ecologist.*** A solar farm in eastern Ontario was monitored to document off-site impacts caused by sediment laden water originating from the property. On-site and off-site conditions were documented to provide an overview of existing conditions. Mitigation measures were recommended to the client to prevent off-site impacts. Monitoring data was evaluated and the client was provided with alternative site preparation and re-vegetation techniques to ensure future mitigation designs are more effective and to prevent off-site impacts.

The Ontario Aggregate Resources Corporation *– Rehabilitation of Pits and Quarries, 2008-2010.* ***Role: Ecologist.*** Mr. Wheeler worked with landowners, regulatory agencies, contractors and co-workers to rehabilitate over 60 aggregate properties across Ontario. Applied skill sets in biological identification (flora/fauna/SAR) and habitat characterization to evaluate pre-restoration habitat conditions and determined appropriate restoration targets (native ecosystem or farmland). Planting plans were developed and implemented to use native plants to restore former aggregate properties into habitat for common, rare and at-risk flora and fauna. Designed and constructed habitat features for wildlife, including herpetofauna (prairies, savannahs, wetlands, forests, snake hibernacula, etc.). Applied knowledge contained in scientific journals, COSEWIC, COSSARO and other documents to create herpetofauna habitat. Wetlands were created to provide habitat to turtles, frogs, snakes, amphibians (frogs, newts, salamanders). A snake hibernaculum was created at one property to benefit common and SAR snakes. Contributed to the development of a technical guide titled "*Best Practices Guidelines for Aggregate Rehabilitation Projects; Extracting the Benefits for Species at Risk and Rare Habitat*". Facilitated research partnerships whereby University faculty investigated techniques to improve results of aggregate restoration projects. Research projects examined techniques and processes involved in creation of rare habitats such as tallgrass prairie, alvar, fen, savannah, and other initiatives.

Environmental Assessment / Species at Risk Assessment / Mitigation

Environmental assessments completed by Mr. Wheeler have incorporated fisheries, wetland delineation, water quality, botanical inventories, wildlife identification, natural resource enhancement and ecological restoration. Mr. Wheeler has been the Senior Ecologist on large scale and small-scale Environmental Assessment assignments in both the public and private sector. These projects have involved providing natural resource inventories, species at risk inventory/assessment, baseline environmental studies, habitat studies, and ecological/environmental assessments. Specifically, the studies have included:

- *Collection of terrestrial field data* Mr. Wheeler is a trained Ontario Wetland Evaluation System and Ecological Land Classification to provide uniform classification processes of vegetation types and soil types across the province. This provides a comprehensive and consistent tool for ecosystem description, inventory and interpretation to facilitate Ecological Land-Use Planning and Ecosystem Management.
- *Species-at-risk surveys* Mr. Wheeler has over 12 years of experience consulting regulatory agencies, conducting field surveys during the appropriate season and time of day (including nocturnal surveys), assessing the impacts of the project on SAR, handling SAR wildlife, developing mitigation plans, and obtaining permits/approvals/authorizations.
- *Fish and fish habitat inventory and impact assessments* have been completed for bridges, culverts and structures throughout Ontario for various MTO projects. All work has been completed in accordance with *MTO/DFO/OMNR Fisheries Protocol for Protecting Fish and Fish Habitat on Provincial Transportation Undertakings*.

Species at Risk (SAR) assessments completed by Mr. Wheeler include assessment of study areas for the presence/absence of SAR and their habitat. SAR assessments are a component of most Environmental Impact Assessments and Construction Projects. This includes developing and modifying proposed construction activities, or management plans, to mitigate any potential impacts on SAR and their habitat. Specific activities related to SAR have included pre-screening field inventories prior to construction activities in areas of concern. Field survey data collection includes the use of Global Positioning Systems (GPS) units to record species occurrences and habitat types. GPS data collected in the field is used.

City of Kingston *– Four Road Crossing Locations, Turtle Crossing Mitigation Measures, 2013-2015.* ***Role: Ecologist.*** Provided ecological services and designed mitigation measures to reduce turtle mortality in the City of Kingston. Services included roadway mortality surveys, documenting locations of turtle species and nests (GPS), habitat delineation and assessment, mapping turtle and habitat data, identification of animal movement corridors, identification of threats to turtles and recommended multiple mitigation measures to reduce turtle road mortality. Reviewed scientific literature, consulted with ecological experts from the United States. Secured $60,000 in provincial funding to assist with the City's species at risk conservation efforts. Designed a 950 m turtle exclusion fence and three (3) nesting sites. Completed construction administration to ensure the fence and nesting features were constructed as per the tender documents.

Canadian Forces Base (CFB) *– Borden, Species at Risk Surveys, 2013.* ***Role: Ecologist.*** Undertook surveys at CFB Borden to document occurrences of species at risk (SAR) turtles on the base. This work was a part of a larger project looking at SAR and their habitat on CFB Borden property.

Environmental Assessments, MTO

Mr. Wheeler has 10 years of experience delivering Environmental Assessment work under the Environmental Assessment for Provincial Transportation Facilities process. He has been involved with preliminary design, detail design, design-build, construction administration and post-construction monitoring assignments across Ontario for various MTO regions. He has been involved with over 100 projects and assignments. His MTO experience includes the acquisition of permits/approvals/authorizations, agency and public consultation, biological inventories, technical reporting, and tender assembly.

Professional Experience

McIntosh Perry Consulting Engineers Ltd., Kingston, ON (2014 – current), ***Senior Ecologist / Practice Area Lead***

McIntosh Perry Consulting Engineers Ltd., Kingston, ON (2011 – 2014), ***Intermediate Ecologist***

The Ontario Aggregate Resources Corporation, Burlington, ON (2008- 2010), ***Habitat Restoration Technologist***

Canadian International Development Agency, Christiana, Jamaica (2006), ***Rural Development Project Manager***

Cataraqui Region Conservation Authority, Kingston, ON (2004-2005), ***Watershed Technician***