Environmental Impact Statement & Tree Conservation Report 3387 Borrisokane Road

September 23, 2016

Submitted To:

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Project Number: GLNV 496

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1.0 INTRODUCTION

This report is an Environmental Impact Statement (EIS) written by Kilgour & Associates Ltd. (KAL) on behalf of Glenview Homes (Cedarview) Ltd. (Glenview) in support of their proposed development of the property at 3387 Borrisokane Road (the site). There are several triggers for this EIS including: 1) the presence of potential habitat for species at risk (SAR) including Butternut, Blanding's Turtle, and Bobolink; 2) presence of a natural corridor from the Cambrian Forest Urban Natural Area (Cambrian Forest) south of the site to the Jock River north of the site; and 3) the potential for fish and fish habitat within the unnamed drains crossing the site. This EIS also provides an inventory of trees currently on the site and a description of their ecological significance to the site and the surrounding area, thus serving as the Tree Conservation Report for the project.

The specific project supported by this EIS is the creation of a residential development area (the project). Natural heritage features in the surrounding area include significant woodland to the south of the site, the Jock River to the north, and the Jock River 100-year floodplain which crosses much of the site. Potential species at risk (SAR) and SAR habitat also have potential to be found on site.

2.0 PROPERTY INFORMATION

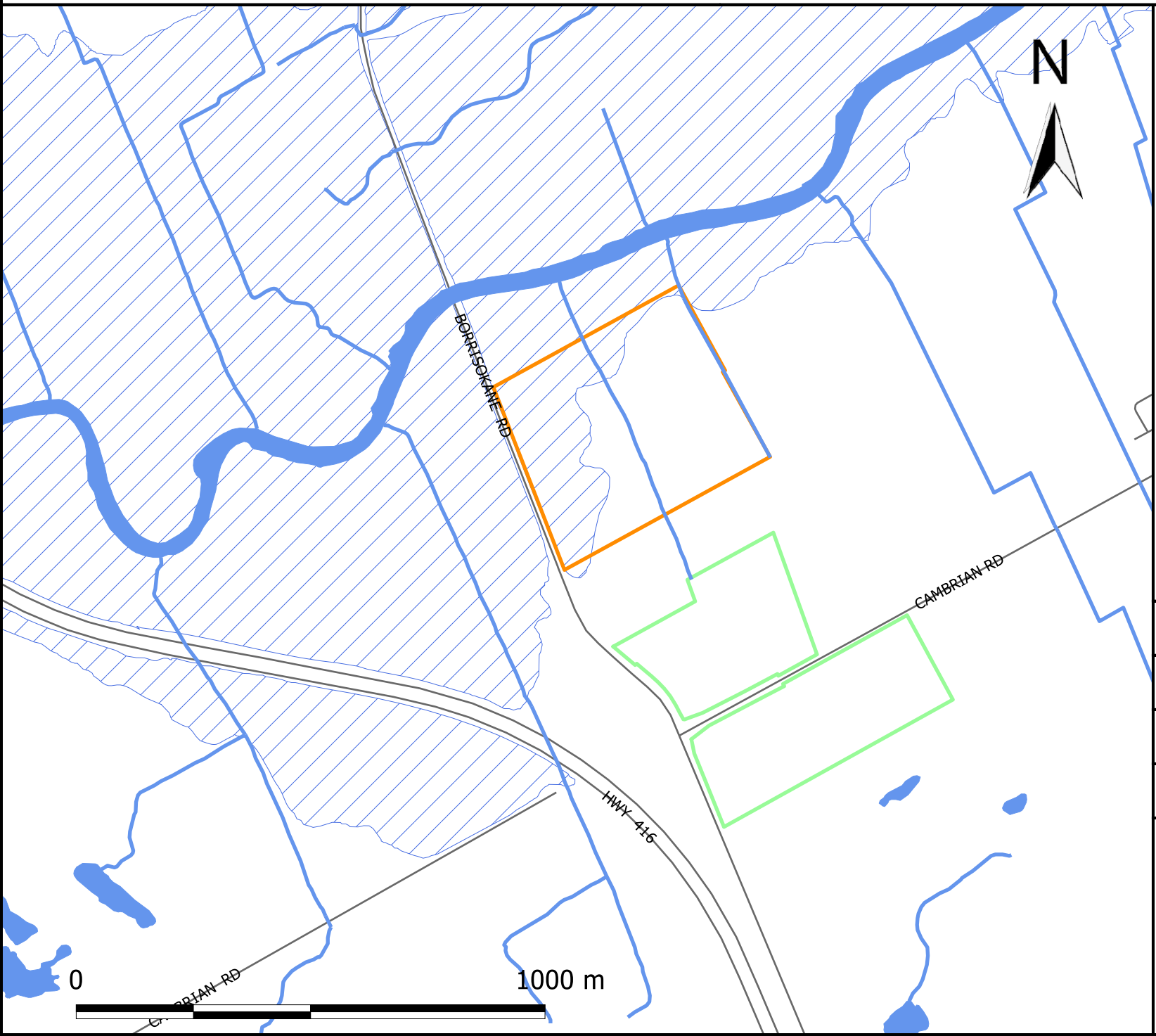
The subject property (Nepean, CON 3RF, LOT 12 SW 1/2; PIN: 045950069) is a 19.7 hectare (ha) parcel owned by Glenview, in the south end of Ottawa (Figure 1). The property is zoned as Developmental Reserve Zone (DR).

The purpose of this zone is to recognize lands intended for future urban development areas, limit the range of permitted uses to those which will not preclude future development options, and impose regulations which ensure a low scale and intensity of development to reflect the characteristics of existing land use (Ottawa Zoning By-law, 2016).

The Jock River occurs approximately 120 m to the north of the Site, and the floodplain for the Jock River occurs within the north and west areas of the Site (Figure 1). To the south of the Site (~ 150 m) is the Cambrian Forest Urban Natural Heritage Feature.

The property was historically used for agricultural activities as indicted in GeoOttawa aerial photography from 1976, and still is used for this purpose. Two unnamed drains on the property connect to the Jock River to the north.

Figure1 . Area context



Legend

- Property Line
- Floodplain
- Cambrian Woods

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3.0 SITE AND THE NATURAL ENVIRONMENT

3.1 Methodology and Area of Detailed Assessment

Colour digital aerial photographs from GeoOttawa (Ottawa, 2016) and Google Earth were used to initially identify natural environment features on the broader site through a desktop review. Ontario Base Map (OBM), GeoOttawa, and Ottawa OP Schedule L layers (Ottawa, 2007) were used to demarcate surface water, potential wetland areas, and other natural heritage system features and were overlaid on the aerial photographs to aid interpretation.

Additional information on natural heritage features and wildlife species for the site was obtained from online sources, which include but are not limited to:

- Natural Heritage Information Centre (MNRF, 2016a);
- Rideau Valley Conservation Authority (RVCA, 2016);
- Species at Risk Public Registry (Canada, 2016);
- Ontario Species at Risk List (MNRF, 2016b);
- Breeding Bird Atlas of Ontario (OBBA) (Cadman *et al*. 2007);
- Bat Conservation International species profiles (BCI, 2016); and,
- Reptiles and Amphibians of Ontario (Ontario Nature, 2016).

During numerous site visits the KAL biologists surveyed for potential SAR presence and habitat for SAR to occur on site, and identified and described other natural heritage features there.

3.2 Landform, Soils and Geology

The property is located within the Ottawa Valley Clay Plains which are composed of areas of Champlain Sea deposits, glacial deposits and drumlins, glaciofluvial deposits, shallow and exposed bedrock, and peat and muck from wetlands (RVCA 2010a). On a more local scale, the property occurs with the Piperville association, which is a group of soils developed in slightly acid to neutral, moderately coarse to medium-textured, marine, estuarine, and fluvial materials (Schut and Wilson, 1987). These soils are considered to be poorly drained and highly susceptible to surface puddling and sheet flow after heavy rain.

The property is mostly flat with a few small low lying areas throughout. Some of these areas are likely to be inundated with water, with potential to form ephemeral wetlands in the spring and early summer. There is evidence for this with the presence of small patches wetland vegetation (e.g., *typha latifolia*) in some of these low lying areas. The property also slopes near the two unnamed drains to allow sheet flow runoff to not be trapped in the cultivated fields.

There are no rocky outcrops on the site and no Earth Science Areas or Natural and Scientific Interest as designated by the Ministry of Natural Resources identified in OP Schedule K (Ottawa, 2014).

3.3 Surface Water, Groundwater and Fish Habitat

The site and adjacent lands lie within the Jock River watershed in the Barrhaven Catchment subwatershed (SWS) (RVCA, 2010b). The Jock River flows eastward to the Rideau River approximately 130 m north of the property. Two unnamed agricultural drainage ditches (herein the East and Central Drains) cross the property and connect to the Jock River.

The Barrhaven Catchment SWS provides fish habitat to 40 fish species (RVCA, 2010a). Very few of these species however, are likely to be found within the drains on the property, and none are designated as SAR in Ontario. A spring-time fisheries survey of the Centre and East Drains was completed on April 27, 2016 as part of the Headwater Drain Features Assessment (HDFA) for the site (Kilgour & Associates, 2016). Only one fish species, Brook Stickleback (*Culaea inconstans*), was observed during the HDFA in the Center Drain, near the Jock River and beyond the north property line. No fish were observed in the east drain during the HDFA or other surveys on site.

No Provincially Significant Wetlands or undesignated wetlands were indicated on the site by the City, RVCA, or MNRF mapping. However, the floodplain for the Jock River occurs on the west and north sections of the property (Figure 2). Although there were no wetlands observed on site, spring snow melt creates small wet depressions in the agricultural fields. These wet depressions are tilled annually and no wetland vegetation was present; however, they may be used by early spring breeding amphibians. These wet depressions were dry during site visits in late May and June. The drainage ditches were also dry during site visits in June, and are likely only inundated with water during spring freshet. Vegetation along the drainage channel is mainly composed of trees and shrubs.

3.3.1 East Drain

The East Drain is the remnant half of an agricultural drainage ditch running northwest along the east side the site (Figure 2). Both banks border former agricultural lands. Areas to the east had topsoil removed eight to ten years ago but have re-acquired some vegetative cover: scrubland for the upstream section, transitioning into regenerating deciduous forest to the north. The agricultural fields on the west bank had much of their topsoil removed in early 2016 in conjunction with geotechnical works on the site. The drain is treed both along the banks and in the channel but also includes dense a covering of grasses and sedges.

The East Drain is cut off from the Cambrian Forest at the south edge of the site, and therefore does not act as a connection between the Jock River and this natural feature. A short potion near the Jock River (within the floodplain) however, is subject to backwater conditions. Water was present throughout the reach at the time of surveying, due to the presence of a number of woody debris barriers close to the confluence with the Jock River and inputs from temporary active drainage works from neighbouring developments.

The substrate consisted of a mixture of clay and silt, and woody debris was highly abundant. Submergent vegetation was scarce. A remnant tile drain outflow from the former agricultural field to the east of the property was observed but no ground water inputs were evident. No fish or turtles were observed in this reach.

3.3.2 Center Drain

The Centre Drain runs northwest across the centre of the site from the access road to the Jock River (Figure 2). The east and west banks border agricultural fields and former agricultural fields where the topsoil has been removed. The drain is composed of trees and shrubs along the banks and within the channel. Additional instream vegetation consisted of grasses and sedges. The total vegetated width of the riparian corridor fans out widely to ~40 m near the Jock River; however, the vegetated corridor is only ~10 m wide as it crosses the Glenview property (i.e., 5 m on either side of the ditch is vegetated).

The Centre Drain provides a drainage pathway for the north block of the Cambrian Woods, though likely only seasonally. The Barrhaven South MSS (DSEL, 2013) found the north block of the Cambrian Forest and surrounding area to be relatively flat, such that little or no external run-off drains through. There was some flow at the time of sampling, but flows appeared to be almost entirely due to temporary active drainage from areas of adjacent development work. There is little connection from the Cambrian Forest to the Jock River as the upstream end of the reach was separated from Reach 3 by a roadway with no culvert. Only a barely discernable trickle passed under the road and no ground water inputs were evident. Most of the reach featured pooled water due to blockages by woody debris in the channel further downstream.

The substrate consisted of a mixture of clay and silt, and woody debris was highly abundant. Submergent vegetation was not present. Only two fish, both Brook Stickleback (*Culaea inconstans*) (i.e., a common and highly tolerant species), were observed in this reach near the downstream end. There were no frog calls recorded near this reach. A Snapping Turtle was observed in the Jock River in close proximity to the confluence and no turtles were observed along the reach.

3.3.3 Roadside Ditch

A roadside ditch with no discernable banks is present just off the western edge of the site adjacent to Borrisokane Road. It was completely dry however, during the time of primary survey (April 27, 2016) and during all subsequent surveys. The instream habitat is characterised by grasses, sedges, and cattails, with no areas of bare substrate. The riparian vegetation consists of grasses and sedges, with some shrubs being present downstream. The west drain borders Borrisokane Road to the west and agricultural fields to the east. No fish, frogs, or turtles were recorded here. This feature is outside of the project area and will not be subject to any development work as part of this project.

3.4 Vegetation and Land Cover

The Barrhaven Catchment SWS land cover is primarily composed of settlements and crop and pasture lands (38% and 22%, respectively) (RVCA 2010a). Roads comprise 13% of the area with woodlands (10%), sand and gravel (9%), grassland (5%), water (2%), and wetlands (1%), accounting for the remainder of the area.

Current Site land cover is depicted in Figure 2. Appendix 3 provides the species lists generated during the site visit. Air photos from 1976 indicate the site was previously used for agricultural activities with

hedgerows present between fields (Ottawa, 2016). The site appears to have the same composition as today except the hedgerows are large and have been allowed to expand outward slightly.

The site is composed entirely of agricultural fields (ELC Classification: OAG). The site also has two drainage channels running the length of the site from the southeast to northwest. These drainage channels occur within narrow but densely vegetated hedgerows of mostly non-native trees and shrubs (ELC classification: THDM3) (Manitoba Maple [*Acer negundo*], Crack Willow [*Salix fragilis*], Glossy Buckthorn [*Rhamnus frangula*], and Eastern Cottonwood [*Populus deltoides*]), with some native trees and shrubs (Green Ash [*Fraxinus pennsylvanica*], Black Cherry [*Prunus serotina*], Alternate-leaved Dogwood [*Cornus alternifolia*], American Elm [*Ulmus americana*], American Mountain Ash [*Sorbus americana*]).

The Cambrian Forest is approximately 150 m to the south of the site. It is composed generally of Red Maple swamp its eastern half and young Trembling Aspen forest its western half. The feature was thoroughly described in the Cambrian Woodland Management Plan (Kilgour & Associates et al., 2013). The Woodland Management Plan (WMP) places some constraints on the development of the surrounding lands, including imposing a requirement to maintain a wildlife corridor and hydrological connection between the swamp and the Jock River. The existing hydrological connection can be altered but development must preserve the swamp as a water source to the Jock River (i.e., the swamp must continue to drain to the River) while maintaining current water levels within the swamp. Any existing wildlife corridor functionality between the swamp/forest and the river must also be maintained. There is no direct requirement within the WMP however for these two ecological functions to be strictly collocated.

The area adjacent to the site on the south and east are composed of grassy areas, shrubland, and lowland wet depressions. This area has been previous cleared for development, but has begun to naturally regenerate in some parts. The area also has some patches of trees mostly in hedgerows and but a large regenerating forest area occurs to the northeast. Overall no natural heritage features, SAR, or potential SAR habitat were observed in this adjacent area.

3.5 Site Trees

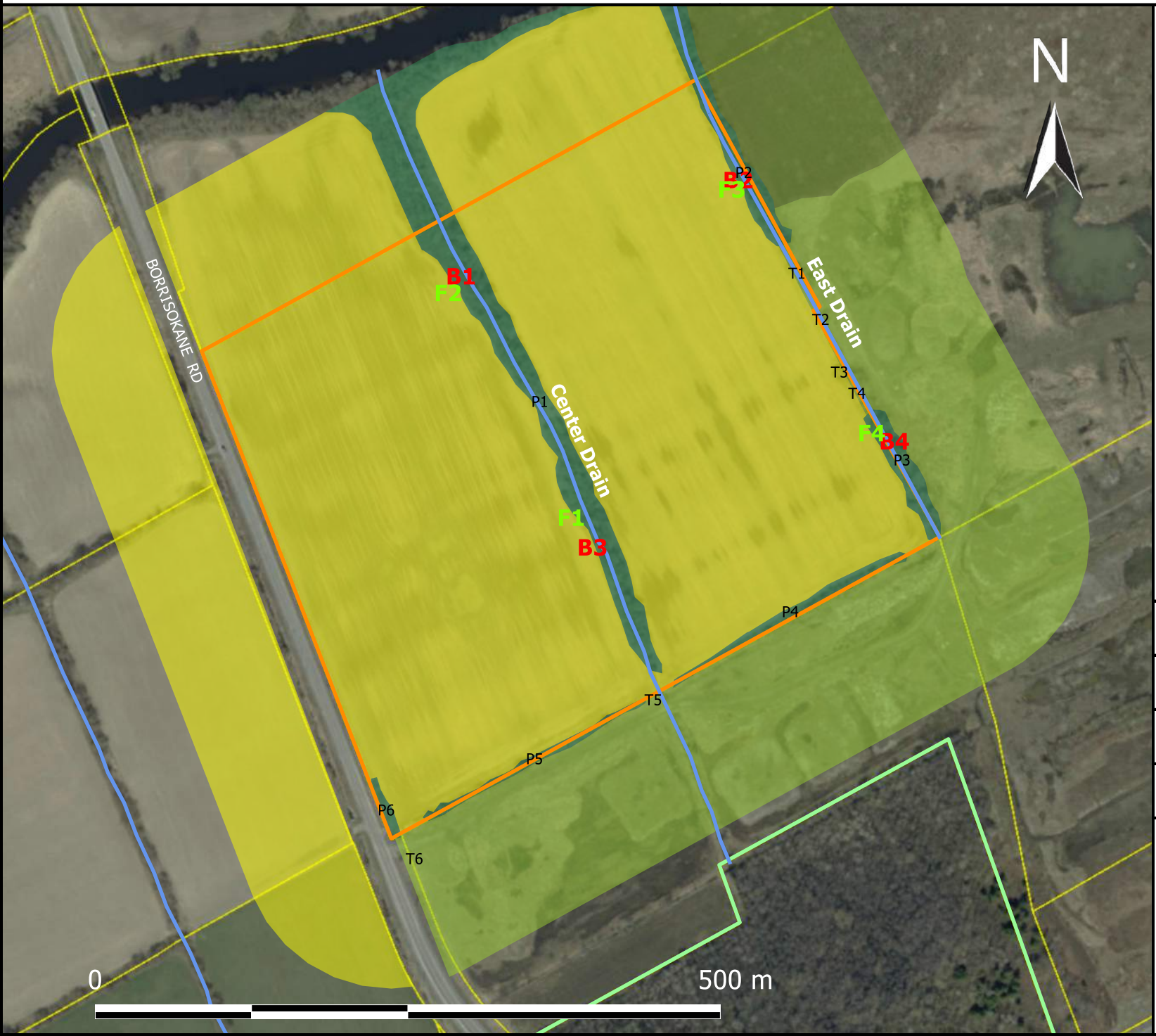
3.5.1 Trees

A tree inventory survey was completed on June 17, 2016 and all trees on Site were identified. Trees are limited to hedgerows and drainage channels within the site. Table 1 provides species and sizes for individual trees and tree patches as shown in Figure 2.

Tree ages were not specifically determined, but trees were present along drainage channels in the 1976 GeoOttawa air photo. Many large trees in excess of 60 cm DBH were observed on site within the central and eastern drainage channels; however, the majority of these are non-native species such as Manitoba Maple and Crack Willow (Table 1). Many large native trees such as Green Ash and Black Cherry were also observed on site; although the majority of these were showing signs of dieback. Some large Eastern Cottonwood were also observed on site, and though they are not native to the Ottawa region they have been naturalized and are considered an important component of urban forestry.

No SAR trees were observed on site during the 2016 field season.

Figure 2. Current vegetation and tree distribution



Legend

Property Line

ELC

- Agricultural
- Cultural Meadow
- Cultural Thicket
- Hedge Row

Cambrian Woods

Tree Inventory

- T# Single Tree
- P# Tree Patch/Hedgerow

Survey Stations

- F# Frog Station
- B# Bird Station

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Table 1. Patches and single trees identified on the site during tree surveys in 2016.

Location	Tree Species	Quantity	DBH (range) (cm)	Condition
Tree 1	Crack Willow	1	55	
Tree 2	Green Ash	2	45-50	
Tree 3	Crack Willow	1	50	Multi-stem (3)
Tree 4	Manitoba Maple	1	70	
-	Manitoba Maple	5	<10	
Tree 5	Eastern Cottonwood	2	15, 18	
Tree 6	Crack Willow	1	16	
Patch 1	Green Ash	1	30	Mostly dead
-	Crack Willow	15	30-60	
-	Manitoba Maple	25	10-50	
-	Green Ash	15	<10	
-	Black Cherry	5	<10	
-	Dogwood sp.	30	<10	
-	American Elm	15	<10	
-	Manitoba Maple	40	<10	
-	Buckthorn	15	<10	
Patch 2	Manitoba Maple	10	10-50	
-	Crack Willow	5	30-55	
-	Black Cherry*	1	70	Some dieback
-	Green Ash	1	35	
-	Green Ash	5	<10	
-	Mountain Ash	4	<10	
-	Dogwood Sp.	10	<10	
-	Manitoba Maple	15	<10	
Patch 3	Eastern Cottonwood*	5	70-90	
-	Crack Willow	9	45-70	
-	Green Ash	3	25-35	One dead, two alive
-	Manitoba Maple	15	20-60	
-	Black Cherry	1	50	
-	Manitoba Maple	20	<10	
-	Dogwood sp.	20	<10	
-	Green Ash	5	<10	
Patch 4	Manitoba Maple	5	40-60	
-	Green Ash	15	<10	
-	American elm	15	<10	
-	Manitoba Maple	25	<10	
Patch 5	Manitoba Maple	1	40	
-	Crack Willow	2	16, 21	
-	Green Ash	1	90	A lot of dieback
-	Green Ash	1	20-40	Multi-stem (4)

Location	Tree Species	Quantity	DBH (range) (cm)	Condition
Patch 5	Manitoba Maple	20	<10	
-	Crack Willow	15	<10	
-	Green Ash	20	<10	
Patch 6	Manitoba Maple	6	20-35	
-	American Elm	1	10-28	Multi-stem (3)

* = Potential specimen tree

3.5.2 Ecological Significance of Trees on the Site

Six trees on and adjacent to the site (five Eastern Cottonwood and one Black Cherry) may be considered as potential specimen trees (*i.e*. > 50 cm DBH, in good health and/or of regionally significance or rare species). A large Green Ash was observed on site as well, but is unlikely to be considered a specimen tree due to the amount of dieback observed.

The tree species on site are primarily species that are common as hedgerow species (i.e., Crack Willow and Manitoba Maple). Other species found along the drainage channels were unlikely to have been planted and instead were probably brought in from the nearby woodland to the south or the riparian woodlands to the north along the Jock River during times of flooding.

The main ecological functions of the site trees were to act as hedgerows between the agricultural fields. These hedgerows act as nesting habitat for birds and cover for other wildlife, but are not consider high quality habitat due to the their long, narrow composition.

The presences of snags on site are unlikely to provide roosting areas for SAR bat species. There are some large snags within the hedgerows on site, but these are unlikely to be attractive to SAR bat species for maternity roosts. The linear structure of the hedgerows and lack of adjacent foraging habitat should be unattractive to roosting SAR bats.

3.6 Wildlife

3.6.1 Amphibians

Methods

Three rounds of amphibian surveys were performed on the site. The surveys followed the protocols set forth by the Marsh Monitoring Program (Bird Studies Canada, 2003). Three surveys were completed to identify early, mid, and, late season breeding amphibian species in April, May, and June; respectfully. Survey were completed on nights of calm weather with temperatures above 5°C, 10°C, and 17°C for each of the three respective survey periods. Surveys began a half hour after sunset and finished by midnight with a five-minute recording period at each survey station. Amphibian species were recorded at each point along with estimated distance from observers, abundance code, estimate of individuals, and estimated direction.

Results

Amphibian surveys were performed on April 19, May 10, and June 1, 2016. Four stations were surveyed on site, two on each drainage channel, and two stations were surveyed in the Cambrian Forest to the south (Figure 2). Weather characteristics for the surveys are presented in Table 2. No SAR amphibians were observed on site during the field visits.

No amphibians were observed in either drainage channel during the first round of surveys, but Spring Peepers (*Pseudacris crucifer*) and Wood Frogs (*Lithobates sylvaticus*) were recorded in the Cambrian Forest (Appendix 3: Table 7). During Round two of the surveys an American Toad (*Anaxyrus americanus*) was recorded on site, and Spring Peeper, American Toad, and Gray Treefrog (*Hyla versicolor*) were recorded in the Cambrian Forest. Gray Treefrog and American Toad were recorded on site during round three surveys, and Gray Treefrog and Northern Leopard Frog (*Lithobates pipiens*) were recorded in the Cambrian Forest.

Table 2: Temperature and Weather conditions during Amphibian Surveys in April through June, 2016.

Round	Station	Air Temperature (°C)	% Cloud Cover	Wind (Beaufort Scale)	Precipitation
1	1	11	0	1	None
1	2	11	0	1	None
1	3	11	0	2	None
1	4	11	0	3	None
1	5	11	0	2	None
1	6	11	0	2	None
2	1	18	0	0	None
2	2	17	0	0	None
2	3	17	0	0	None
2	4	17	0	0	None
2	5	17	0	0	None
2	6	17	0	0	None
3	1	21	0	0	None
3	2	21	0	0	None
3	3	20	0	0	None
3	4	20	0	0	None
3	5	20	0	0	None
3	6	20	0	0	None

3.6.2 Turtles

Methods

Five rounds of turtle surveys were performed on the site in May, 2016. Visual encounter surveys were completed along the drainage channels on calm weather days with no precipitation. These involved slowly walking along each drainage channel and scanning ahead with binoculars.

Traditional basking surveys for turtles could not be used because of the density of the trees and shrubs growing in the drainage channels and lack of open areas for turtles to bask in.

Results

Visual encounter surveys were completed on May 6, 10, 12, 17, and 20, 2016. No turtles were observed within either drainage channel during any of the surveys; however, Midlands Painted Turtle (*Chrysemys picta marginata*) and Snapping Turtle (*Chelydra serpentina*) were observed in the Jock River north of the site.

The drainage channels are likely unpassable by turtles during most of the year except during times of high water. These generally occur only very early spring before turtles are mobile. The drainage channels are choked with deadfall and trees growing in the center of the channels (Crack Willow), making it unlikely that turtles and fish would move along the channel.

3.6.3 Birds

Methods

Three rounds of breeding bird surveys were completed on site in 2016. Breeding bird surveys (BBS) followed guidelines from Bird Studies Canada (Bird Studies Canada, 2001). The period for BBS in the Ottawa regions begins on May 24 and ends on July 10, and each BBS round was a minimum of 10 days apart.

The surveys were conducted on calm weather days with no precipitation from one half hour before sunrise until 11:00. Although BSC only recommends two rounds of breeding bird surveys, the potential presence of SAR on site requires a third breeding bird survey. Surveys were five minutes in duration with a two-minute habituation period preceding the surveys. All birds seen and heard were recorded along with associated breeding codes, and the estimated distance from the observer.

Results

Three rounds of BBS were completed on the site on June 1, 17, and July 8, 2016. Site characteristics and weather conditions for each survey are presented in Table 3. The BBS stations were focused on the center and eastern draining channels as these hedgerows were the only breeding bird habitat on site. The majority of the site was tilled agricultural land, which is used by only a couple of bird species for breeding (i.e., Killdeer), and therefore was not surveyed by itself.

Overall, 24 bird species were observed within 100 m of the survey point during the three rounds of surveys (Appendix 3: Table 6). Birds observed outside of 100 m from surveys stations, and those that were flying over the site, were not included in the species list as it is unlikely that they were breeding on or using the site. Song Sparrow (*Melospiza melodia*) were the most abundant species on site followed by American Goldfinch (*Spinus tristis*) and Cedar Waxwing (*Bombycilla cedrorum*). The majority of the bird species observed were using the forested hedgerow for breeding and foraging with the exception of Killdeer, which breed in agricultural fields.

Only one SAR bird species was observed near the site during the BBS. One Wood Thrush (*Hylocichla mustelina*) was observed within the center hedgerow on the neighboring property to the north. It is likely breeding the in the riparian forest corridor along the Jock River (i.e. to the north of the site). This area will not be affected by development of the project, and therefore this species would not be impacted.

Table 3: Temperature and weather conditions during breeding bird surveys in May through July, 2016.

Breeding Bird Station	Date	Temperature (°C)	Cloud Cover	Precipitation	Wind (Beaufort Scale)	Primary Habitat	Secondary Habitat
1	8-Jul-16	20	100	none	1	Agriculture	Deciduous Forest
2	8-Jul-16	19	100	none	3	Deciduous Forest/ shrubland	Agriculture
3	8-Jul-16	19	100	none	2	Agriculture	Deciduous Forest
4	8-Jul-16	19	100	none	4	Deciduous Forest/ wetland	Agriculture
1	1-Jun-16	13	0	none	2	Agriculture	Deciduous Forest
2	1-Jun-16	14	0	none	2	Deciduous Forest/ shrubland	Agriculture
3	1-Jun-16	13	0	none	2	Agriculture	Deciduous Forest
4	1-Jun-16	16	10	none	3	Deciduous Forest/ wetland	Agriculture
1	17-Jun-16	13	0	none	0	Agriculture	Deciduous Forest
2	17-Jun-16	13	0	none	0	Deciduous Forest/ shrubland	Agriculture
3	17-Jun-16	12	0	none	0	Agriculture	Deciduous Forest
4	17-Jun-16	16	0	none	0	Deciduous Forest/ wetland	Agriculture

3.7 Species at Risk Habitat

In response to our SAR information request for the property, the MNRF reviewed their NHIC database and internal records, and indicated a potential for 12 SAR listed under the *Endangered Species Act* (Ontario, 2007) and *Species At Risk Act* (Canada, 2002) to occur on or in proximity to the property: Bank Swallow [*Riparia riparia*], Barn Swallow [*Hirundo rustica*], Blanding's Turtle [*Emydoidea blandingii*], Bobolink [*Dolichonyx oryzivorus*], Butternut [*Juglans cinerea*], Eastern Meadowlark [*Sturnella magna*], Bridle Shiner [*Notropis bifrenatus*], Eastern Musk Turtle [*Sternotherus odoratus*], Eastern Wood-pewee [*Contopus virens*], Monarch [*Danaus plexippus*], Snapping Turtle [*Chelydra serpentina*], and Wood Thrush. Milksnake

(*Lampropeltis triangulum*) was also identified by the MNRF in their review, but has since been delisted from the *ESA*.

For full due diligence, Table 2 indicates the habitat requirements of these SAR plus others SAR potentially present within the broader area and whether the property may provide significant habitat. The list also includes additional entries for species under consideration for listing within the next two years.

Although there are large snags on site and trees with cavities, the linear composition of the hedgerows and lack of quality foraging habitat adjacent to site makes it unlikely that SAR bats would be found on site.

Table 4. Species-at-risk potential

Species Name	Provincial (ESA) Status	Habitat Requirement	Habitat on Site	Project Concerns Associated with Habitat on Site
Birds				
Bank Swallow (*Riparia riparia*)	Threatened	Colonial nester; burrows in eroding silt or sand banks, sand pit walls, and other similar habitats	No nesting habitat observed on or adjacent to Site, but may forage in open habitats nearby.	Negligible potential for presence. Not a concern.
Barn Swallow (*Hirundo rustica*)	Threatened	Species prefers to nest on manmade structures such and bridges, barns, and buildings near open terrestrial and aquatic habitats where it forages.	Cedarview road bridge may provide nesting areas, and the mix of agricultural land and surface water provide suitable forage adjacent to the site.	The site may be used for foraging but no potential nesting habitat was observed. Surrounding area has abundant open habitat foraging areas. Not a concern.
Bobolink (*Dolichonyx oryzivorus*)	Threatened	Periodically mown, dry meadow for nesting. Habitat (meadow) should be > 10 ha, and preferably > 30 ha before bobolink are attracted to the site. Not near tall trees	No suitable habitat on site. Potential within the neighbouring agricultural fields if allowed to go fallow, though active agricultural areas do not constitute habitat.	Negligible potential for presence. Not a concern.
Eastern Meadowlark (*Sturnella magna*)	Threatened	Prefers grasslands and pastures >5 ha in area with moderately tall grasses (25 to 50 cm) and abundant litter cover. High proportion of grasses to forbs and shrubs (<35% forbs and shrubs).	Agricultural lands on site, but no pasture or grassland habitat present.	Negligible potential for presence. Not a concern.
Eastern Wood-pewee (*Contopus virens*)	Special Concern	Prefers mature and intermediate-aged deciduous and mixed forest with an open understory. Often nests and forages near open areas and forest edges.	Deciduous forest hedgerows along the center and eastern drainage channels.	Negligible potential for presence. Not a concern.
Wood Thrush (*Hylocichla mustelina*)	Special Concern	Moist deciduous hardwood or mixed forests with trees >16 m in height, a closed canopy (>70%), moderate sub-canopy and shrub layer, fairly open forest floor, and moist soil.	Deciduous forest hedgerows along the center and eastern drainage channels near the Jock River.	Species may be present adjacent to the site. The species however, is not afforded habitat protection under the ESA and will not be impacted by development. Not a concern.

Species Name	Provincial (ESA) Status	Habitat Requirement	Habitat on Site	Project Concerns Associated with Habitat on Site
Butterflies				
Monarch (*Danaus plexippus*)	Special Concern*	Caterpillars require Milkweed species and are confined to meadow and open areas where it grows, while adults feed on nectar ins a variety of habitats.	Species may use milkweed species associated the edge of the hedgerow on site for nectaring.	The species is not currently protected under the *ESA.* The agricultural composition of the site is unlikely to provide habitat for Monarchs; therefore, this species is not a concern.
Fish				
Bridle Shiner (*Notropis bifrenatus*)	Special Concern*	Clear warm waters in stream and occasionally lakes with abundant submerged aquatic vegetation and bottom composed of silt and/ or sand.	Likely in the Jock River north of the site and may use drainage channels on site during spring flooding.	The species is not currently protected under the ESA.
Mammals				
Little Brown Myotis (*Myotis lucifuga*)	Endangered	Widespread, roosting in trees and buildings. Hibernate in caves or abandoned mines.	Few trees are sufficiently large to provide roosting cavities and few cavities observed. No hibernation habitat.	Negligible potential for presence. Not a concern.
Northern Long-eared Myotis (*Myotis septentrionalis*)	Endangered	Associated with boreal forests, choosing to roost under loose bark and in the cavities of trees. Hibernate in caves or abandoned mines.	No suitable habitat was observed on site.	Negligible potential for presence. Not a concern.
Eastern Small-footed Myotis (*Myotis leibii*)	Endangered	Species roosts in a range of habitats including under rocks, rocky outcroppings, buildings, under bridges, caves, mines, and hollow trees. Hibernate in smaller caves subject to air movement.	No suitable habitat was observed on site.	Negligible potential for presence. Not a concern.
Tri-colored Bat (*Pipistrellus subflavus*)	Endangered	Prefers to roost in trees on old forests but sometimes uses buildings. Forage over water courses or open fields with large	Few trees are sufficiently large to provide roosting cavities and few cavities observed. No hibernation habitat.	Negligible potential for presence. Not a concern.

Species Name	Provincial (ESA) Status	Habitat Requirement	Habitat on Site	Project Concerns Associated with Habitat on Site
		trees nearby. They never forage in deep woods. Hibernate in caves or abandoned mines.		
Turtles				
Blanding's Turtle (*Emydoidea blandingii*)	Threatened	Species prefers shallow water usually in large wetlands or shallow lakes with high abundance of emergent vegetation.	The drains on site do not present suitable habitat for this species, but species may occur on site due to proximately to Jock River.	Low potential for presence. The nearest nesting site was recorded at over 2 km from the site. But the Jock River does provide potential habitat.
Eastern Musk turtle (Sternotherus odoratus)	Special Concern*	Lakes, Rivers, and ponds with slow-moving water and soft mud bottoms. Often inhabits shallow water.	No overwintering habitat is found on site. Species is likely to be found in Jock River, but rarely travels more than 45 m from water for nesting.	Negligible potential for presence. Not a concern.
Snapping Turtle (*Chelydra serpentina*)	Special Concern*	Freshwater habitat characterized by slow-moving water with a soft mud bottom and dense aquatic vegetation.	Species may use the unnamed drainage channels on the site for travel and nesting.	The species is not currently protected under the ESA.
Vascular Plants				
Butternut (*Juglans cinerea*)	Endangered	Variable but typically on well-drained soils.	The majority of the site is cultivated land, but suitable habitat may be present along the unnamed drainage channels on the site.	Hedge rows on site are capable of support the species though none were observed on site.

* Species status is, or will soon be, under review and thus may change in the near future.
Species occurring or potentially having habitat on site.

3.8 Other Natural Heritage Features

There are no provincially or locally significant wetlands, wetlands found in association with significant woodlands, significant valleylands or Life Science Areas of Natural and Scientific Interest on or adjacent to the site (Figure 1).

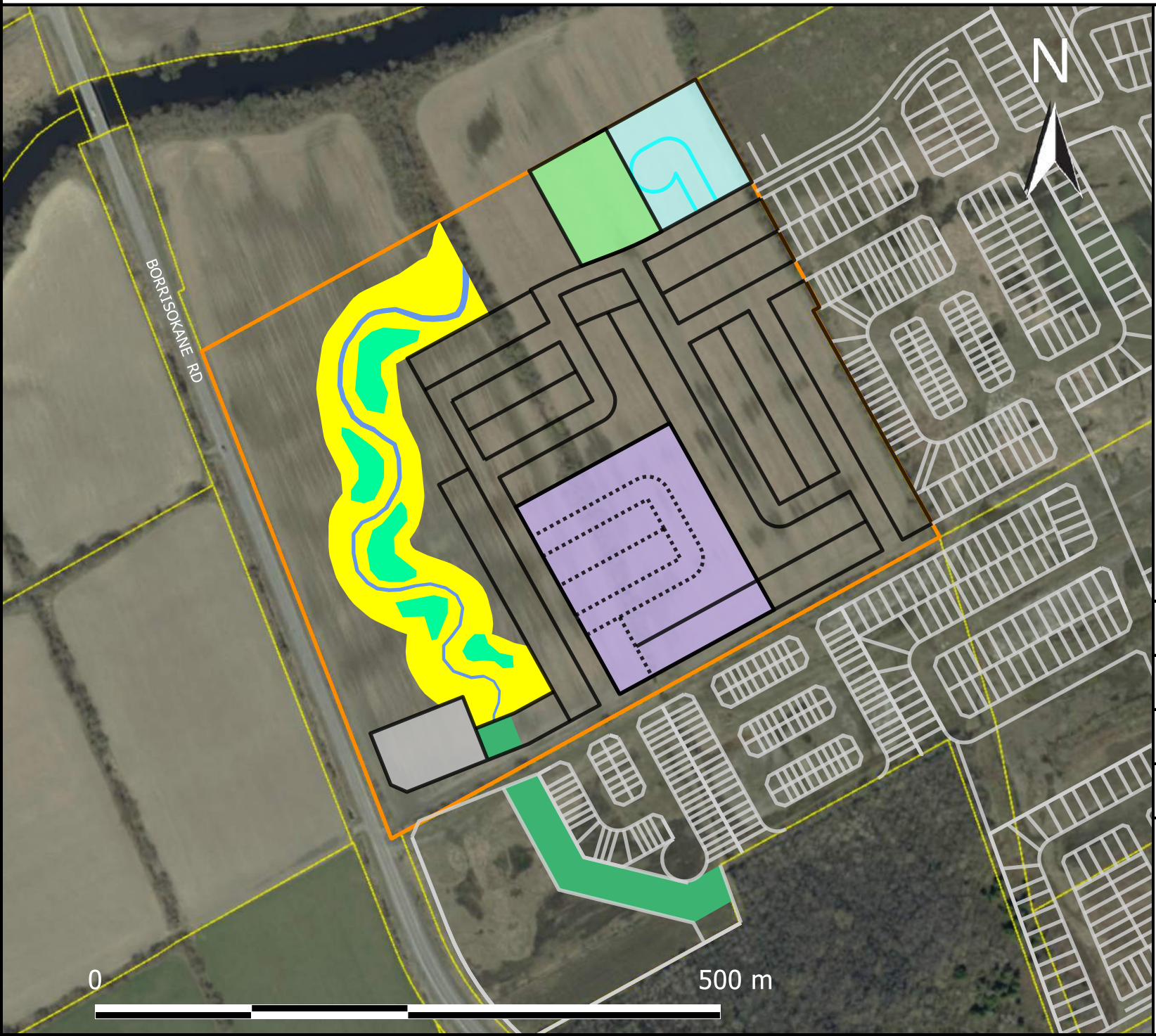
The Jock River occurs to the north of the site and the Cambrian Forest Urban Natural Heritage Feature occurs to the south. However, both of these natural features are well removed from the Site (>120 m) and are not predicted to be impacted by the development.

4.0 PROJECT DESCRIPTION

The development will include a 0.43 ha commercial block, a 2.4 ha school block, a 0.65 ha park, a 0.76 ha SWM pond and 5.50 ha (minimum) of residential land. The unit count is expected to range between 211 units (117 singles and 94 townhomes) and 288 units (179 singles and 109 townhomes) depending on development options within the School and SWM pond blocks. The community will be build-out over three phases with the first phase expected to start in early 2019 to permit the first occupancy by homeowners in late 2019 and the last closing in late 2022.

The East Drain will be removed along the eastern edge of the site, from its starting point at the south boundary down to the point where it intersects the floodplain. The existing Center Drain will be similarly removed above the floodplain, but will be relocated further westward.

Figure 3. Proposed development



Legend

- Property Line

Block Plan

- Commercial
- Park
- SWM Area
- School
- Block Layout
- Neighbouring Development
- Possible Additional Housing
- SWM Pond

Channel Relignment

- Creek Channel (2-5m wide)
- Creek Corridor (65m wide)
- Greenway (30m wide)
- Wet Meadow

Project: 496

Date: 2016-09-23

Drawn By: AF

Checked By: BK

KILGOUR & Associates

5.0 IMPACT ASSESSMENT

5.1 Impacts to Surface Water Features

The East Drain will be removed along the eastern edge of the site, from its starting point at the south boundary down to the point where it intersects the floodplain. The channel and its associated treed riparian buffer will be maintained within the floodplain. The HDFA for the site (Kilgour, 2016) found the only significant ecological function of the East Drain to be its contribution of surface water runoff to downstream features. Under the proposed development, water levels in the retained section, and thus below, will be supplied by contributions from the new adjacent storm water management pond. Removal of the upstream portion of this channel is thus not anticipated to have any negative impacts on the water balance in the catchment.

The existing Center Drain will be similarly removed above the floodplain, but will be relocated further westward. The realignment will allow the new section of the channel to be located with the extended stretch of the floodplain closer to Borrisokane Road. This arrangement allows sufficient space to construct using natural channel design principals including a sinusoidal low flow channel. It will be located within a 65 m wide treed corridor and include adjacent pond/wet meadow areas to provide increased frog habitat space. The new channel will not extend all the way to the swamp portions of the Cambrian Forest. Instead, it will connect to a green corridor designed to encourage movement of frogs between the swamp and new channel, and down to the Jock River.

The new channel will be supplied with water via a pipe under the green corridor from the swamp to the channel head. Conceptual cross sections are provided in Appendix 4. The new configuration will replace 510 m of linear, agricultural ditch, with 583 m of new channel constructed following principals of natural channel design. The new riparian corridor will represent a significant expansion from the current 10 m, and will provide 3.0 ha of permanent amphibian habitat. Water levels within the swamp will be maintained at current levels via a controlled inlet to the pipe system under the green corridor. The underground pipe system will provide cooled flows and the new channel will prevent fish from accessing the swamp, thereby maintaining its fish free status (important for some species of frogs). No negative impacts are anticipated to the ecological health of the catchment under the proposed realignment of the Center Drain.

No portion of either channel was found to provide fish habitat within the site boundaries. The bottom most reaches of the channels near the Jock River will remain unaltered and will continue to receive water.

5.2 Impacts to Wildlife Corridors

The Center Drain provides a wildlife corridor for amphibians between the Jock River and the Cambrian Woods, albeit of limited quality given its narrow channel and total lack of resident frogs. No turtles or other fauna were found to use the existing corridor. The realigned portion of the Center Drain will provide not only an improved amphibian corridor, but 3.0 ha of permanent habitat extending to within 200 m of the swamps to the south. The new green corridor between the top end of the channel and the swamp will provide safe passage for frogs along this final stretch. The vegetated corridor will be a flat bottomed, 30 m wide swath of grass with 60 cm vertical retaining wall sides, which is a sufficient height to contain and direct frogs along the corridor. It will slope upward though along the last short eastward section

nearest the swamp to provide a ramp to meet the edge of the wetland's berm edge. At road crossings, culverts will allow safe frog passage under the roadway. No negative impacts to wildlife corridors from the project are anticipated.

5.3 Impacts to Trees/ Significant Woodlands

Trees on site are only located along the drains, the majority of which are non-native (i.e., Manitoba Maple and Crack Willow). Some large native trees were observed in the drains, such as Green Ash and Black Cherry, but these trees were either dead or suffering from large amounts of dieback. All trees outside of the floodplain will be removed during development of the site. During creation of the project, trees will be planted on site at a quantity equivalent to at least one per lot and shall be native provincial species. No SAR tree or plant species were observed on site or are predicted to be impacted by the project.

The Cambrian Forest is designated as Significant Woodland and is approximately 150 m south of the site. This area is a large mature Red Maple forest that is connected with larger forest to the south across Cambrian Road. Riparian Woodlands exist within the floodplain of the Jock River and will be protected from development. Overall the impact to trees and Significant Woodlands is negligible, and therefore shall not be impacted by the project.

5.4 Impacts to Species at Risk

The only SAR found to occur adjacent to the site was Wood Thrush (Table 2, Figure 3). The species was observed in riparian woodland near the Jock River to the north of the site. Though the limited amount of tree cover along the Centre and East Drains on site is unlikely to present adequate nesting habitat for this species. The riparian forest along the Jock River is within the designated floodplain and therefore shall be protected from development.

Barn Swallows have the potential to use the Jock River Bridge on Borrisokane Road as a nesting site and may forage over the open habitats on site. No Barn swallows were observed on site during any of field visits. Additionally, the open habitat exists on all sides of the bridge that would present foraging habitat to this species; therefore, the development of the site is unlikely to affect local Barn Swallow populations.

While the Jock River may be considered potential habitat for Blanding's Turtles, the nearest element occurrence records for the species are over 2 km from the site. The existing drainage channels do not appear to be useful to Blanding's and Snapping Turtles as they are very shallow and narrow. Multiple visual observations were conducted along the drains to determine turtle use on site. No turtles were observed using these channels during field surveys. In addition, the presence of woody debris, large trees growing in the channel of the drains, and very steep banks makes it unlikely that turtles would use the drains as corridors.

Although large trees with cavities were observed along the drains on site it is unlikely that bat species would be present. The linear composition of the trees along the drains are unlikely to be attractive to bat species and provide the cover they require for maternity colonies. Potential bat maternity colony habitat exists in the riparian forest along the Jock River and Cambrian Forest, neither of which shall be impacted by development of the project.

Overall, the potential for the site to be used as SAR bat habitat is negligible; therefore, no impacts to SAR or SAR habitats are anticipated from the project.

5.5 Impacts to Wildlife

The agricultural composition of the site makes it unlikely to support a large and diverse wildlife community. Moreover, the linear nature of the treed drains does not provide cover for wildlife species equal to that found in the riparian woodlands along the Jock River and in the Cambrian Forest. Standard construction mitigations are anticipated to prevent impacts to any wildlife that occurs on the site; therefore, no impacts to wildlife are predicted from the project.

6.0 MITIGATIONS

6.1 Mitigations for Surface Water Features

The section of the East Drain to be removed currently only supplies water to the lower retained section during the spring freshet. The HDFA for the site (Kilgour, 2016) provides a management directive to maintain the equivalent recharge provide by this drain. Accordingly, there is no requirement to either maintain or replace the current form of this channels. Only the general contribution to the maintenance of the overall water balance within the watershed must be preserved through the provision of mitigation measures to convey clean storm water to downstream features. Under the new configuration, water levels in the retained section will be supplied by the new adjacent storm water management pond.

For the Center Drain, the HDFA recommended a management directive of ***Mitigation***. Under this directive, the drain and its existing riparian corridor may be maintained, relocated and/or enhanced. Where catchment drainage will be removed due to diversion of storm water flows, lost functions must be restored. The maintenance of on site and external flows will be accomplished through natural channel design techniques within the floodplain where a wider corridor is more readily achievable.

The proposed channel alterations will require permits to alter a waterway from the RVCA. Specific mitigations associated with the proposed alterations will be included in the detailed design and RVCA permit application and may include, but will not necessarily be limited to: the use of appropriate timing windows, the implementation of erosion sediment controls, revegetation standards, and oversite of works by fisheries biologists. Glenview will comply with all such directives to ensure the proposed channel work will not negatively impact the subwatershed.

6.2 Mitigation for Wildlife Corridors

Timing and phasing of the development will be conducted such that the new corridor will be in place before the existing corridor is removed.

6.3 Mitigations for Trees

Please note that this report does not constitute permission to remove any trees from the site. Removal of trees can only be undertaken upon the issuance of a tree removal permit from the City of Ottawa. This report may be used to support the application for that permit and to advise mitigation measures imposed by the permit. Accordingly, to minimize impact to the remaining trees on the property, the following protection measures are indicated as necessary during construction:

- Tree removal on site should be limited to that which is necessary to accommodate site construction.

- To minimize impact to remaining trees during future site development:

    - Erect a fence beyond the critical root zone (CRZ, i.e. 10 x the trunk diameter) of trees. The fence should be highly visible (e.g., orange construction fence) and paired with erosion control fencing. Pruning of branches is recommended in areas of potential conflict with construction equipment;

    - Do not place any material or equipment within the CRZ of the tree;

    - Do not attach any signs, notices or posters to any tree;

    - Do not raise or lower the existing grade within the CRZ without approval;

    - Tunnel or bore when digging within the CRZ of a tree;

    - Do not damage the root system, trunk or branches of any tree; and

    - Ensure that exhaust fumes from all equipment are NOT directed towards any tree's canopy.

- The *Migratory Bird Convention Act* (Canada, 1994) protects the nests and young of migratory breeding birds in Canada. The City of Ottawa guidelines require no clearing of trees or vegetation between April 1 and August 15, unless a qualified biologist has determined that no nesting is occurring within 5 days prior to the clearing (Ottawa, 2016d).

Specific trees to be planted on site will be identified in the landscape plan for the development. Trees species identified in this plan must be non-invasive and should be both native to the Ottawa area and tolerant of the site's sandy soils and generally urban setting. Recommended tree species to consider in the landscaping plan include Red Maple, which is currently present on site, with White Spruce, Pin Cherry, White Birch, Black Cherry, White Cedar, and Serviceberry as other suitable candidate species. Burr Oak may be considered where spacing allows for future showcase trees. Common Juniper, Maple-leaf Viburnum, Nannyberry, and Northern Bush-honeysuckle may be considered as appropriate shrub species.

6.4 Mitigations for Species at Risk

No SAR or potential SAR habitats were observed on site. For due diligence however, the site should be rechecked for SAR birds and Butternut if no site development occurs prior to September, 2018

6.5 Mitigations for Wildlife

Common wildlife species were observed on site during the field visit. The following mitigation measures shall be implemented during construction of the project on site:

- Areas shall not be cleared during sensitive time of the year for wildlife, unless mitigation measures are implemented and/or the habitat has been inspected for a qualified biologist.
- Site clearing should begin at the north end of the site and proceed southward to drive any wildlife towards the large forest.
- Do not harm, feed, or unnecessarily harass wildlife.
- 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).
- Drive slowly and avoid hitting wildlife where possible.
- 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.
- Checking the work site (including previously cleared areas) for wildlife, prior to beginning work each day;
- Inspecting protective fencing or other installed measures daily and after each rain event 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.

These mitigations will constitute the Wildlife Construction Protocol for this project.

7.0 SUMMARY AND RECOMMENDATIONS

It is our professional opinion that no negative impacts are anticipated to SAR, SAR habitat, or natural heritage features under the proposed property development.

Regards,
KILGOUR & ASSOCIATES LTD.

Terry Hams, MSc.
Ecologist

Anthony Francis, PhD.
Senior Ecologist/Project Manager

Appendix 1
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Appendix 2
Qualifications of Report Author

Anthony Francis, PhD

Dr. Francis is an ecologist with over 14 years of experience in both terrestrial and aquatic projects. His doctoral thesis work on global plant diversity patterns included conducting tree surveys across North America. As a consulting ecologist he has worked on diverse ecological projects including literature reviews of forestry management and species-at-risk; environmental studies of contaminants (metals and suspended particulates); geomatic and statistical analyses for federal and provincial ministries as well as for private industry; and aquatic and terrestrial species inventories. He has contributed to environmental impact statements and federal environmental screening assessments for creek realignments and other infrastructure projects across Ontario.

Terry Hams M.Sc.

Terry is a terrestrial ecologist with over 10 years of experience in terrestrial field work and five years of experience in ecological consulting. He has worked on various projects across the United States and Canada surveying for terrestrial plants and wildlife. Terry has worked on Environmental Assessments for potash mines, Environmental Impact Statements, Constraints Assessments, and Species at Risk Assessments. He has experience preforming of Species at Risk surveys across Canada and has extensive knowledge of terrestrial plant and wildlife species.

Appendix 3
Site Species Observations

Table 5: Plant and mammal species observed on site during the field surveys in 2016.

Common Name	Scientific Name
Plants	
Alternate-leaved Dogwood	*Cornus alternifolia*
American Elm	*Ulmus americana*
American Mountain Ash	*Sorbus americana*
Big-leaf Aster	*Eurybia macrophylla*
Black Cherry	*Prunus serotina*
Canada Anemone	*Anemone canadensis*
Coltsfoot	*Tussilago farfara*
Common Burdock	*Arctium minus*
Common Dandelion	*Taraxacum officinale*
Common Milkweed	*Asclepias syriaca*
Crack Willow	*Salix fragilis*
Eastern Cottonwood	*Populus deltoides*
Field Horsetail	*Equisetum arvense*
Glossy Buckthorn	*Rhamnus frangula*
Goldenrod Species	*Solidago* spp.
Hawthorn Species	*Crataegus* spp.
Honeysuckle Species	*Lonicera* spp.
Manitoba Maple	*Acer negundo*
Green Ash	*Fraxinus pennsylvanica*
Staghorn Sumac	*Rhus typhina*
Thistle Species	*Cirsium* spp.
Trembling Aspen	*Populus tremuloides*
Virginia Creeper	*Parthenocissus quinquefolia*
Wild Grape	*Vitis vinifera*
Wild Parsnip	*Pastinaca sativa*
Wild Raspberry	*Rubus idaeus*
Willow Species	*Salix* spp.
Mammal	
Coyote (tracks)	*Canis latrans*
Eastern Cottontail	*Sylvilagus floridanus*
Gray Squirrel	*Sciurus carolinensis*

Table 6: Abundance and breeding status of birds observed on site during breeding bird surveys in 2016.

Common Name	Scientific Name	Breeding Status	Abundance (mean ± standard deviation)	Comments
Alder Flycatcher	*Empidonax alnorum*	Possible	0.75 ± 0.96	
American Goldfinch	*Spinus tristis*	Probable	1.75 ± 0.96	
American Redstart	*Setophaga ruticilla*	Probable	1.25 ± 0.96	
American Robin	*Turdus migratorius*	Probable	1.5 ± 0.58	
Black-billed Cuckoo	*Coccyzus erythropthalmus*	Possible	0.25 ± 0.50	
Black-capped Chickadee	*Poecile atricapillus*	Probable	1 ± 1.41	
Brown-headed Cowbird	*Molothrus ater*	Probable	1 ± 1.41	
Cedar Waxwing	*Bombycilla cedrorum*	Probable	1.75 ± 0.50	
Common Yellowthroat	*Geothlypis trichas*	Probable	0.75 ± 0.96	
Downy Woodpecker	*Picoides pubescens*	Probable	0.5 ± 0.58	
Gray Catbird	*Dumetella carolinensis*	Probable	0.75 ± 0.50	
Hairy Woodpecker	*Leuconotopicus villosus*	Probable	0.25 ± 0.50	
Killdeer	*Charadrius vociferus*	Probable	1.25 ± 0.96	
Norther Cardinal	*Cardinalis cardinalis*	Probable	0.25 ± 0.50	
Northern Flicker	*Colaptes auratus*	Probable	0.25 ± 0.50	
Red-eyed Vireo	*Vireo olivaceus*	Probable	0.25 ± 0.50	
Red-winged Blackbird	*Agelaius phoeniceus*	Possible	0.75 ± 0.96	
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	Confirmed	0.5 ± 0.58	Juvenile observed

Song Sparrow	*Melospiza melodia*	Probable	3*	
Tree Swallow	*Tachycineta bicolor*	Possible	0.5 ± 1.00	
Warbling Vireo	*Vireo gilvus*	Probable	0.25 ± 0.50	
Willow Flycatcher	*Empidonax traillii*	Possible	0.25 ± 0.50	
Wood Thrush	*Hylocichla mustelina*	Possible	0.25 ± 0.50	
Yellow Warbler	*Setophaga petechia*	Probable	1.5 ± 1.29	

* = Standard Deviation is equal to zero.

Table 7: Abundance of amphibian species on site during amphibian surveys in 2016.

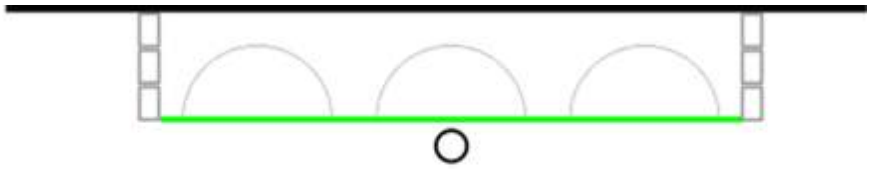
Round	Station	Species	Abundance Code	Estimated Individuals	Distance (m)
1	1	None	N/A	N/A	N/A
1	2	None	N/A	N/A	N/A
1	3	Spring Peeper	3	Unknown	>100
1	4	Spring Peeper	3	Unknown	>100
1	5	Spring Peeper	1	1	<100
1	5	Spring Peeper	3	Unknown	>100
1	5	Wood Frog	2	5 - 10	<100
1	6	Spring Peeper	3	Unknown	<100
1	6	Wood Frog	2	5 - 10	<100
2	1	None	N/A	N/A	N/A
2	2	None	N/A	N/A	N/A
2	3	Spring Peeper	3	Unknown	>100
2	4	Spring Peeper	3	Unknown	>100
2	4	American Toad	1	1	<100
2	5	Spring Peeper	1	3	<100
2	5	American Toad	1	1	<100
2	5	Gray Treefrog	1	1	<100
2	6	None	N/A	N/A	N/A
3	1	None	N/A	N/A	N/A

3	2	None	N/A	N/A	N/A
3	3	Gray Treefrog	1	1	<100
3	4	American Toad	1	1	<100
3	4	Gray Treefrog	1	1	<100
3	5	Gray Treefrog	1	3	<100
3	5	Northern Leopard Frog	1	1	<100
3	6	None	N/A	N/A	N/A

Appendix 4
Conceptual Cross-sections

The "Greenway" Frog Corridor

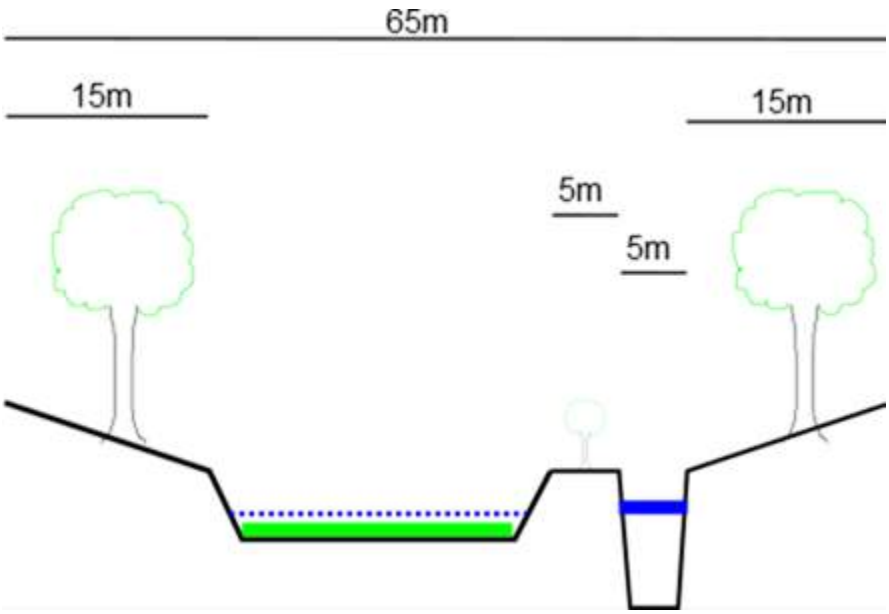
The preliminary "Greenway" design is a flat bottomed, 30 m wide swath of grass with 60 cm vertical retaining wall sides. It slopes upward though along the last short eastward section nearest the swamp to provide a ramp to meet the edge of the wetland's berm edge. The edges will be treed, but not the corridor. Trees can be part of plantings on private property as they are not necessary to making this work, but are a nice addition



At road crossings, culverts allow safe frog passage under the roadway.

The New Channel

The preliminary new channel design with the floodplain starts out at ~2 m width and opens to up to 5 m by the downstream connection point with the existing drain. The total corridor width is 65 m (i.e. equivalent to a 5 m channel with 30 m setbacks) though the corridor meanders left and right to within 15 m of the corridor edges. On the wide side of the meanders, grassed wet meadows/ponds span the space from 15 m to the corridor-edge to 5 m from the channel. Their depth is less than the channel and will only temporarily hold water in the spring to provide frog habitat. The corridor edges will be treed, with shrubs between the ponds and channel.



*Depth not to scale