Environmental Impact Statement
Mattamy – Half Moon Bay West

Revised Report
February 28, 2019

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Project Number: MATT514

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1.0 INTRODUCTION

This report is an Environmental Impact Statement (EIS) written by Kilgour & Associates Ltd. (KAL) on behalf of Mattamy Homes in support of their ongoing development within the Half Moon Bay area (herein the site). It is a minor update to the previous report dated November 16, 2017. 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) an adjacent, City-of-Ottawa-owned, Urban Natural Area (Cambrian Forest UNA#57); 3) a natural corridor from the UNA north to the Jock River across part of the property; and 4) the West Clarke Municipal Drain, which is located on the eastern half of the site. This EIS also provides an inventory of trees currently on the site and a description of their ecological significance to both the site and the surrounding area, thus serving as the Tree Conservation Report for the project.

2.0 PROPERTY INFORMATION

The 60 ha proposed development area is located in the Barrhaven Ward (Nepean Con 3 RF PT Lots 11; and 12 Plan 4M1428 PT BLK;182 and RP 4R21085 PT PART 1; RP 4R22668 PT Part 1 RP; 4R22695 PT Part 1 RP 4R22744). It will extend over all, or parts, of five existing property parcels:

- 3454 Greenbank Rd. – western half (PIN: 045951743);
- 3508 Greenbank Rd. – western half (PIN: 045951750);
- 3900 Cambrian Rd. (PIN: 045951748);
- 3345 Borrisokane Rd. (PIN: 045951650); and
- an un-numbered property (PIN: 045922324).

The entire site is zoned as a Development Reserve. The zone identifies lands intended for future urban development areas, limiting the range of permitted uses to those that will not preclude future development options, and imposes regulations that ensure a scale and intensity of development to reflect the characteristics of existing land use (Ottawa Zoning By-law, 2016).

The Jock River occurs approximately 30 m to the north of the site with the floodplain extending well onto the site's north side. Development is proposed set back 90 m from the river's edge. The Cambrian Forest Urban Natural Heritage Feature is adjacent to parts of the western site edge.

Most of the site was historically used for agricultural activities as indicted in GeoOttawa aerial photography from 1976, except for the south west corner, which used to be an extension of the forests within the UNA. The site was cleared, stripped of topsoil and prepped for grading by 2008.

3.0 SITE AND THE NATURAL ENVIRONMENT

3.1 Methodology and Area of Detailed Assessment

Colour digital aerial photographs from the geoOttawa mapping system and Google Earth were used to initially identify natural environment features on and near the site. Ontario Base Map (OBM), geoOttawa,

and Ottawa OP Schedule L layers 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 (NHIC, 2016);
- Rideau Valley Conservation Authority (RVCA, 2016);
- Species at Risk Public Registry (Canada, 2016);
- Ontario Species at Risk List (MNRF, 2016);
- 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 occurs within 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 site however, has since been stripped of topsoil and has undergone significant re-grading such that soils are likely no longer representative of the area.

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 wetland-like areas in the spring and early summer. No original soil structures or layers exist on the surface. The site generally slopes down very gently northward to the Jock River. No rocky outcrops nor geology capable of supporting cave structures are present on site. The site is not located within a wellhead protection area and no Earth Science Areas or Natural and Scientific Interest as designated by the Ministry of Natural Resources identified in Ottawa OP Schedule K.

Figure 1: Current vegetation and tree distribution.

Legend

ELC

- AG
- CUM
- CUT
- HR
- FOD8-1
- FOM8-1
- FOC4-1
- SWD5-1
- SWD3-1
- SWC3-1

Cambrian Woods UNA

Floodplain

Current Reaches

- Reach
- Remnant channel

Tree Inventory

- T# Single Tree
- HR# Patch/Hedgerow

N

0 200 m

Project:MATT HMBW3a
Created By: AF
Checked By: BK
Universal Transverse Mercator - Zone 18 (N)
Printed on: 2016-12-05

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3.3 Surface Water, Groundwater and Fish Habitat

The site and adjacent lands lie within the Jock River watershed in the Barrhaven Catchment Subwatershed. The Jock River flows eastward to the Rideau River north of the property. The broader Barrhaven Catchment SWS provides fish habitat to 40 fish species (RVCA, 2010). 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.

The realigned West Clarke Drain flows across the eastern end of the site. Two other unnamed agricultural drainage ditches (herein Drain 1 and Drain 2) cross the property near its western end. These small agricultural drains received only the most cursory coverage within CDP planning process. The features are sketched within a single figure within the Jock River Reach 1 Subwatershed Study (Stantec, 2007 – herein "JRR1"), though are unlabeled in any way and are not otherwise addressed. A Headwater Drain Features Assessment (HDFA) of Drains 1 and 2 was completed in 2016 by Kilgour & Associates (2016). Only one fish species, Brook Stickleback (*Culaea inconstans*), was observed on site during the HDFA in Drain 2, near the Jock River well north of any proposed development areas line. Drain 2 provides drainage from the swamp of the Cambrian Woods (UNA57) to Jock, but is, in fact dry for most of the year.

No Provincially Significant Wetlands or undesignated wetlands were indicated on the site by the City, RVCA, or MNRF mapping.

3.3.1 West Clarke Drain

The West Clark Drain is/was a highly channelized watercourse originally sourced from groundwater discharge from wooded areas south of site. Much of this wooded area have now been removed, and the rest of which will soon be removed under ongoing development as per the Barrhaven South CDP. The channel had also received base flow from agricultural drains, though these have now also been removed. The substrate consists of a thick layer of muck and peat in the upper reaches and of sand and clay in the lower reaches. The channel frequently went dry in the summer months before the disturbances to it's sources. In January 2017, much of the West Clark Drain was temporarily realigned ~150 m westward. This temporary realignment was approved by DFO (Fisheries Authorization: 05-HCAA-CA4-01840), the Ontario MoE (ECA: 1153-ACHP3E) and by the RVCA (Permit to Alter a Waterway: RV5-23/16T).

The remainder of the original channel and its temporarily-realigned downstream reach will ultimately be decommissioned and filled. Removal of and compensation for this feature was originally planned for under the *Barrhaven South CDP: Conceptual Fish Habitat Compensation Plan* (Niblett 2007). Under the CDP, the West Clarke Drain was to be compensated for primarily by the construction of a SWM pond within the site with a new outlet channel designed and constructed following principals of natural channel design. The total channel length called for was approximately 466m long.

The nearly completed new SWM pond and outlet channel were approved under MoE Amended ECA #6068-AWUPL5 and an RVCA Letter of Permission from Hal Stimson (RVCA) to Jason Rumer (Mattamy) dated March 15, 2018. They are consistent with the *Barrhaven South CDP: Conceptual Fish Habitat Compensation Plan* (Niblett 2007).

3.3.2 Unnamed Drains

The two unnamed drains on site were briefly noted within early supporting documents for the Barrhaven South CDP. They were excluded however, within Fish Habitat Compensation Plan (Niblett, 2007) and so there is no pre-existing mitigation/compensation plan for these features (i.e. they were not considered within the combined compensation effort discussed above). These drains and other minor surface water features were studied though through a Headwater Drainage Feature Assessment (Kilgour, 2016).

Drain 1

Drain 1 is the remnant half of an agricultural drainage ditch running along the northwest edge the site along the site boundary with Glenview's Property there (Figure 1). The west bank borders 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 of the west bank had much of their topsoil removed in early 2016 in conjunction with archaeological surveys of the site. The drain was narrowly treed in parts both along the banks and in the channel but also included stretches of grasses and sedges.

With Drain 1 cut off from the Cambrian Forest at the south edge of the site, it does not act as a connection between the Jock River and this natural feature. This also means the remnant channel has no headwater source. Other than for a brief period during snow melt of the spring freshet, the feature is dry down to its near its bottom most end well north of the Mattamy property line. A short portion near the Jock River (well within the floodplain), is subject to backwater filling. No fish were observed in Drain 1 during the HDFA study or other surveys on site.

The substrate consists of a mixture of clay and silt, and woody debris was highly abundant. A remnant tile drain 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 ever observed in this reach.

As reach was never discussed in either the JRR1 or Niblett (2007), no specific directive exists for its management beyond the HDFA (Kilgour 2016). Considering that the feature has no headwater source and is now an abandoned, mostly-dry ditch, the HDFA provides management directive of only to **"**Maintain Recharge"**.** Under this directive, there is no requirement to either maintain or replace the current form of this channel. Only its (limited) contribution to the maintenance the overall water balance within the broader watershed must be preserved. i.e. Jock River cannot receive less water because of its removal. Existing (highly limited) surface water flows previously routed through that channel can instead conveyed as clean stormwater through the SWM system of the community to the downstream receivers (i.e. the Jock River).

Drain 2

Drain 2 runs northwest across the centre of Glenview's property with its upstream most reach crossing the western end of the Mattamy site (Figure 1). The east and west banks border agricultural fields and former agricultural fields with the topsoil removed. The drain has some trees and shrubs along the banks and within the channel. Additional instream vegetation includes 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 adjacent Glenview property (i.e. 5 m on either side of the ditch is vegetated), with only sparse patches remaining on the Mattamy site.

Drain 2 provides a drainage pathway for the north block of the Cambrian Woods UNA, though generally only seasonally. The Barrhaven South MSS found the north block of the Cambrian Forest and surrounding area to be relatively flat, conveyance through and from the feature is limited. The substrate consists of a mixture of clay and silt, and woody debris was highly abundant. Submergent vegetation is 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 very 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 but no turtles were observed along the reach.

For this feature, the HDFA (Kilgour 2016) provides management directive of "Mitigation**"**. This fully allows for both the channel and riparian corridor to be relocated elsewhere within the catchment as required (under a permit from the RVCA), though the relocated feature must provide an equivalent level of habitat. The HDFA recognizes that the habitat provided by the feature is limited. As such, it only requires that the corridor for the new drainage feature connect the Cambrian Woods to the Jock River in a manner that it 1) allows for frog transit between the two features, 2) prevents fish from obtaining access to the swamp, and 3) does not alter water levels within the swamp.

Directives within the JRR1 for habitat features to be constructed within this catchment as part of its development under the CDP are focused on the realignments of the larger area drains (i.e. the Todd, Corrigan and two Clarke drains). The JRR1 does state generally however, that:

> *The design and implementation of the open portion of the tributaries should confirm to the objectives outlined in the CFCP. A 30m wide corridor should be provided with the meandering main low flow channel designed using principle of natural channel design with a series of riffle and pool and deeper embayment at the mouth. Riparian vegetation should be established/improved along both sides of the rehabilitated tributary to provide channel shading, temperature benefits, wildlife habitat, and improve aquatic habitat. A 5m buffer from the top of the bank to the property line should be provided on either side of the tributary, where a pathway could be located. These pathways should be integrated with the recreational trail system along the Jock River. These tributary corridors and 5 m buffer from top of bank will be dedicated at no cost to the City of Ottawa.*

Roadside Ditch

A roadside ditch is present along the western edge of the Site adjacent to Borrisokane Rd. It was completely dry however, during the primary HDFA survey (April 27, 2016) and during all subsequent surveys. The instream habitat is characterised by grasses with few sedges or cattails, and with no areas of bare substrate. No fish, frogs, or turtles were recorded here. This feature conveys drainage from western edge of the Cambrian Woods to the Jock River. It will not be altered.

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 2010). 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 1. Appendix 3 provides the species lists generated during site visits. Air photos from 1976 indicate the site was previously used primarily for agricultural activities with hedgerows present between fields (Ottawa, 2016). The two main blocks of the Cambrian Forest UNA both used to extend further east across the site. These wooded areas were cleared back to their present extent as part of the pre development of the site (these are discussed below).

The cleared lands, having had their top soil removed, are now cultural meadows (CUM) composed of sparsely grassy areas with some wet depressions. Vegetation here consists of small patches of grasses including taller species (>1m - Timothy, Canary Reed Grass) and shorter species (<1m - perennial rye grass, Kentucky Bluegrass), and a sparse covering of common forbs such red clover, white clover, birds foot trefoil, wild parsnip vetch and some aster species. Ground cover over the site is patchy at best. Lilac, buckthorn and poplar saplings have also begun spreading over some parts of the cultural meadow.

Shrub regrowth at the north end of the site is sufficient to class this portion as a cultural thicket (CUT). Species here include Eastern Cottonwood, Trembling Aspen, Balsam Popular, Black Cherry, Manitoba Maple, American Elm, Trembling Aspen, Eastern Cottonwood, Balsam Popular and willow species. The vast majority of these plants are < 10 cm dbh. All are under 20 cm dbh.

The cleared portion of the site has some patches of trees mostly in remnant hedgerows or sprouting up along windrows. Trees are described in Section 3.5.

The Cambrian Woods UNA represents one the largest blocks of contiguous remnant forest within the highly disturbed Jock River-Barrhaven sub-catchment. The area was identified within the Jock River Reach I Subwatershed Plan, though not targeted specifically for conservation efforts. The Jock River-Barrhaven sub-catchment however, in which the Cambrian Forest is located, is identified as having very little forest cover (only 11%) due to historic land management practices.

The Cambrian Woods were specifically identified within the Barrhaven South CDP process as City staff indicated their desire to preserve the core area of the Cambrian Woods UNA #57 through acquisition. The City explored two acquisition mechanisms namely allocation of Municipal funds, or land exchange for City owned-lands outside Barrhaven South. A land exchange agreement between the City and Mattamy Homes Ltd. saw the core of the Cambrian Woods area (8.73 ha of Parts 1 and 2 of Lot 11, and 11.03 ha of Parts 3 and 4 of Lot 10, Concession 3, Rideau Front, Geographic Township of Nepean on draft survey plan 06-10-675-00) conveyed to City in exchange for land in Orleans (9.34 ha of Lots 3 and 4, Concession 9, Geographic Township of Cumberland being part of PINS 14525-3018 and 14525-3033 on draft survey plan 06-10-544-06) conveyed to Mattamy. The Cambrian Wood Woodland Management Plan (Kilgour 2013) established how the City owned UNA forest could/would be maintained and managed while permitting the development of the adjacent Mattamy owned lands.

The Woodland Management Plan (WMP) placed some constraints on the development of the surrounding lands, including the 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 core of the north UNA forest block consists of Red Maple (SWD3-1) and Black Ash (SWD5-1) deciduous swamps. Maple swamp areas are dominated by Red Maple (30-35 cm dbh) with Silver Maples subdominant. Ash swamp areas are dominated by Black Ash which is generally smaller (<20 cm dbh). Basswood, White Birch and Balsam poplar are also present throughout the area. Ground cover includes Back Current, Red-Oiser Dogwood, Dwarf Raspberry, Wood Nettle, False Nettle, Swamp Fly Honeysuckle, Virgin's Bower, Bittersweet and Enchanter's Nightshade, Plus Ostrich, Wood and Sensitive Ferns. The swamp communities abut the eastern edge of the block edging the proposed development areas. This newly exposed forest edge has significant incursions of common buckthorn.

The north and west edges of the north UNA forest block consist of a contiguous band of fresh moist poplar deciduous forest (FOD8-1) composed primarily of trembling aspen. Other tree species present include Manitoba Maple, Balsam Poplar, White Birch with some young Crack Willow along the edges. Common buckthorn is found throughout the community and is especially abundant along the western edge, which has been subject to significant wind throw damage. Several large Green Ash are growing on the north-east edge. Except for this section, the forest edge along the north side is located approximately 5 m south of the property line, leaving a gap of cultural meadow.

The eastern forested edge of the north block extends approximately 30 m over the property line onto Mattamy's site. This forest edge, as per the WMP, is to be cut back to within 5m of the property line (on Mattamy's side).

The southern UNA wood block is significantly more coniferous than the northern wood block. The western edge of the forest is fresh-moist cedar coniferous forest (FOC4-1) sub-dominated with White Spruce and Balsam Fir. This area western edge has experienced a significant amount of wind throw damage. Most of the central portion of this block is a fresh-moist poplar mixed forest (FOM8-1). The community includes Trembling Aspen, White Spruce, Balsam Fir, White Birch, Manitoba Maple, Balsam Poplar, Basswood, White Elm and a small a number of Black Cherries. The understory includes Glossy Buckthorn, Red-Osier Dogwood, Staghorn Sumac, Red Elderberry, Round-Leaved Dogwood, Pussy Willow, Slender Willow, Speckled Alder, Nannyberry and Grey Dogwood, False Dogwood as shrubbery with False Nettle, Poison Ivy, Sensitive Fern, Foamflower, Common Strawberry, Rattlesnake Fern and Dwarf Raspberry as ground cover. Forest cover is especially dense in the northwest corner. There is a dense White Cedar swamp inclusion toward the west side (SWC3-1).

Land in the adjacent development area has been stripped right to the property line along much of eastern edge of the forest. The fresh-moist white cedar coniferous forest (FOC4-1), is dominated by White Cedar – many of which are quite large, old and beginning senesce – with some larger Burr Oaks.

The southern edge of the development area occurs along a forested edge of young, regenerating moist poplar deciduous forest (FOD8-1). While this treed edge is currently contiguous with a larger, forested area, in 1976 it was 50 m further south. The current edge thus represents relatively recent regrowth and should not be considered as part of a Significant Woodland under the City's proposed new woodland policy. This new wooded buffer however, will serve to mitigate potential impacts of site development south of Cambrian Rd. on the older portions of the contiguous forest to south.

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 were limited mainly to the windrows, hedgerows, and regenerating thicket areas. Table 1 provides species and size (diameter at breast height [DBH]) for individual trees and tree patches as shown in Figure 1.

Tree ages were not specifically determined, but trees along drainage channels and within the remaining forested area were present in the 1976 GeoOttawa air photo. Large trees in excess of 50 cm DBH were observed on site within the hedgerows; however, the majority of these are non-native species such as Manitoba Maple (*Acer negundo*) and Crack Willow (*Salix fragilis*) (Table 1). A few large Green Ash (*Fraxinus pennsylvanica*) and were also observed on site in the hedgerows, but most of there were not very healthy and showed substantial signs of dieback. Some large trees were also observed in the eastern edge of the Cambrian Forest.

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

Table 1. Patches and single trees identified during tree inventory surveys of site in June, 2016.

Location	Tree Species	Quantity	DBH (range) (cm)	Condition/Notes
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	
Tree 5	Willow Species	1	20	
Tree 6	Willow Species	1	25	
Tree 7	Green Ash	1	10-15	multi-stem (4)
Tree 8	Eastern Cottonwood	2	15, 18	
Tree 9	Crack Willow	1	16	
Tree 10*	Eastern White Cedar	1	45-65	Multi-stem (4)
Tree 11	White Ash	1	~65	
Tree 12	Eastern White Cedar	1	~55, ~65	Double-stem
Tree 13	Eastern White Cedar	1	~60	
Tree 14*	Eastern White Cedar	10	40-75	Small patch
Tree 15	Eastern White Cedar	4	45-65	Small patch
Tree 16*	Eastern White Cedar	1	~60	
Tree 17*	Eastern White Cedar	10	45-65	Small patch
Tree 18*	Bur Oak	1	~55	
Tree 19	Green Ash	1	~55	
Hedgerow 1	Black Cherry	2	45-70	Some dieback
-	Crack Willow	14	30-70	
-	Dogwood sp.	30	<10	
-	Eastern Cottonwood	5	70-90	
-	Green Ash	4	25-35	One dead, two alive
-	Green Ash	10	<10	
-	Manitoba Maple	25	10-60	
-	Manitoba Maple	35	<10	
-	Mountain Ash	4	<10	
Hedgerow 2	Eastern Cottonwood	4	10-20	
Hedgerow 3	Manitoba Maple	8	10-15	
-	Manitoba Maple	~20	<10	
-	Staghorn Sumac	~15	<10	
-	Willow Species	~15	<10	
Hedgerow 4	Willow Species	2	20-25	
-	Manitoba Maple	5	10-20	
-	Manitoba Maple	~15	<10	
-	Staghorn Sumac	~10	<10	
-	Willow Species	~10	<10	
Hedgerow 5	Willow Species	~25	10-25	
-	Manitoba Maple	~15	10-30	
-	Eastern Cottonwood	5	10-25	
-	Willow Species	~40	<10	
-	Manitoba Maple	~40	<10	
-	Eastern Cottonwood	~10	<10	
-	Staghorn Sumac	~15	<10	
-	Hawthorn Species	~15	<10	
Hedgerow 6	Willow Species	~15	10-25	

Location	Tree Species	Quantity	DBH (range) (cm)	Condition/Notes
-	Manitoba Maple	~10	10-25	
-	Eastern Cottonwood	~10	10-25	
-	Willow Species	~45	<10	
-	Manitoba Maple	~40	<10	
-	Eastern Cottonwood	~25	<10	
-	Trembling Aspen	~20	<10	
-	Balsam Popular	~10	<10	
-	Staghorn Sumac	~35	<10	
Hedgerow 7	Green Ash	3	30-40	dieback on many
-	Crack Willow	8	40-75	dieback on many
-	Manitoba Maple	6	25-40	
-	Willow Species	~20	<10	
-	Manitoba Maple	~20	<10	
-	Green Ash	~10	<10	
-	Trembling Aspen	~10	<10	
-	American Elm	5	<10	
-	Staghorn Sumac	~25	<10	
Hedgerow 8	Manitoba Maple	5	40-60	
-	Green Ash	~15	<10	
-	American elm	~15	<10	
-	Manitoba Maple	~25	<10	
Hedgerow 9	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)
-	Manitoba Maple	~20	<10	
-	Crack Willow	~15	<10	
-	Green Ash	~20	<10	
Hedgerow 10	Manitoba Maple	6	20-35	
-	American Elm	1	10-28	Multi-stem (3)
Hedgerow 11	American Elm	1	N/A	Snag
-	Eastern Cottonwood	~25	10-40	
-	Eastern Cottonwood	5	50-80	Mostly dead
-	Manitoba Maple	~20	15-30	
-	White Birch	11	15-35	
Hedgerow 12	Manitoba Maple	~25	10-30	
-	American Elm	3	13, 16, 21	Mostly dead
-	Green Ash	~20	10-30	
-	Crack Willow	1	50-65	Multi-stem (6), some dieback
-	Eastern Cottonwood	4	10-15	
-	Trembling Aspen	~10	10-25	

* To be retained

3.5.2 Ecological Significance of Trees on the Site

Most of the site had previously been cleared for development, but in the years since, some regeneration has occurred. Trees on site are mostly isolated within 12 patches and a few individual trees scattered throughout. The majority of trees on site are non-native Manitoba Maple (*Acer negundo*), Crack Willow

(*Salix fragilis*), and Eastern Cottonwood (*Populus deltoides*), with native species of Trembling Aspen (*Populus tremuloides*), Green Ash (*Fraxinus pennsylvanica*), Black Cherry (*Prunus serotina*), American Elm (*Ulmus americana*), and Willow species (*Salix* spp.) present in lower abundance. Ten potential specimen trees were recorded on site in the eastern edge of the Cambrian Forest. Large trees on site were not classified as specimen trees because they were either non-native or showing signs of dieback.

Patch 1 is the remnant hedgerow along Drain 1. It includes some larger willows and ash trees, most of which are in poor condition. Patches 2 through 6 (windrows) are all small, mostly linear areas of young trees (less than 30 cm DBH) and saplings that provide limited nesting areas to birds and cover for wildlife. These areas were originally created by piling of topsoil during clearing of the site in 2008. No tree crevices or snags were observed in these patches during the surveys which makes it unlikely to be SAR bat habitat. These small patches are not predicted to provide potential SAR habitat.

Patches 7 through 9, 11, and 12 (hedgerows) are also small linear patches, but they are composed of a combination of some large Crack Willow, Manitoba Maple and Green Ash with small trees of the same species and saplings. These patches are part of the hedgerows visible in the 1976 air photos, which is the reason that they contain the largest trees on site. A few snags were also present in these patches; however, it is unlikely that these patches would provide SAR bat habitat due to their linear composition. Additionally, these small patches are not predicted to provide potential SAR habitat.

Patch 10 is also a linear patch of trees that appear to have been planted since 1991. This patch is only the width of an individual tree and consists of a few Manitoba Maple and one American Elm with any understory or shrubs. It provides very little ecological value to wildlife.

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 or near the site: on Drains 1 and 2, and at two stations in the Cambrian Forest to the south. 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 within Drains 1 and 2, and the 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.

Drains 1 and 2 likely provide limited utility as corridors by turtles during most of the year except possibly 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), greatly reducing the potential for turtles and fish to 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 (BSC) (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 and near 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 centered on the center and eastern draining channels as these hedgerows were the only breeding bid 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 on site during the BBS. One Wood Thrush (*Hylocichla mustelina*) was observed within the center hedgerow to the north of the site. It is likely breeding the in the riparian forest corridor along the Jock River to the north of the site. This area is not predicted to be affected by development of the project and therefore this species should 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

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*], 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. Open areas are sparsely vegetated and regularly subject to ongoing ground works. 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).	No suitable habitat on site. Open areas are sparsely vegetated and regularly subject to ongoing ground works. 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 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; however, species is not afforded habitat protection under the ESA.
Butterflies				

Species Name	Provincial (ESA) Status	Habitat Requirement	Habitat on Site	Project Concerns Associated with Habitat on Site
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. Interior of the UNA may provide some habitat but this area will remain undisturbed. 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 trees nearby. They never forage in deep woods. Hibernate in caves or abandoned mines.	Few trees are sufficiently large to provide roosting cavities and few cavities observed. Interior of the UNA may provide some habitat but this area will remain undisturbed. No hibernation habitat.	Negligible potential for presence. Not a concern.
Turtles				

Species Name	Provincial (ESA) Status	Habitat Requirement	Habitat on Site	Project Concerns Associated with Habitat on Site
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. Transient presence is possible due to proximately to Jock River, but is considered very unlikely given the highly disturbed conditions over most of the site.	Low potential for presence. The nearest nesting site was recorded at over well over 2 km from the site. But the Jock River does provide potential habitat. None observed on site.
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

Impacts to and modifications of the Cambrian Woods UNA, as well as appropriate mitigations for those impacts and other plans for the acceptable usage of the feature and its incorporation into the broader community plan, were determined through the *Cambrian Woods Woodland Management Plan (*Kilgour 2013). Other than the UNA, there are no wetlands found in association with significant woodlands, provincially or locally significant wetlands, significant valleylands or Life Science Areas of Natural and Scientific Interest on or adjacent to the site.

The Jock River occurs to the north but is well removed from the site and is not predicted to be impacted by the development. Drain 2 connects the UNA to the Jock River, and as such provides a limited wildlife corridor for amphibians. This drainage feature is to be rerouted along the edge on the floodplain on the west side of the site. The new drainage corridor will be vegetated with native riparian plants including shrubs and trees, and will include additional wet meadow areas adjacent to the new channel.

4.0 PROJECT DESCRIPTION

The development (Figure 2) will include mostly residential space with a mix of townhomes and singles (945 lots in total), with employment lands (2.24 ha), two commercial blocks (2.87 ha), three parks (3.88 ha), a secondary school block (6.05 ha) and a SWM pond facility including a ~400 m corridor for an outlet channel to be built following principals of natural channel design (4.07 ha). The community will be build-out over four phases with the first phase expected to start in December 2018 to permit the first occupancy by homeowners in June 2019, with the last closing in approximately 2024.

Drain 1 will be removed along the western edge of the site, from its starting point at the south boundary down to the point where it intersects the floodplain. Drain 2 will be similarly removed above the floodplain (including from on the adjacent Glenview lands), but will be relocated further westward. On Mattamy's lands, it will be located within a 40 m wide corridor, equivalent to the generally guidance of the JRR1, i.e. a 30 m wide vegetated route with an additional 10 m for potential pathways (though no pathways are currently planned here).

The West Clarke Drain was temporarily realigned westward in January of 2017. The feature will be subsequently rebuilt to include a SMP pond with the outlet channel consistent with the Barrhaven South CDP: Conceptual Fish Habitat Compensation Plan. The outlet channel will approximately 66 m shorter than originally identified within the JRR1, though the wetted area will be designed to be 17% wider to ensure the same amount of fish habitat is created. The channel corridor will be 40 m wide as per the JRR1.

The eastern forested edge of the north UNA block will be cut back to 5 m from the property line, as per the WMP. Other forest edges are already behind the property line and will not be further adjusted. The WMP had originally called for rear yards to be located along the entire length of the Cambrian Woods, with fencing to be installed to separate the resident from natural/buffer areas. Since that time, City staff have frequently indicated over various other planning efforts that the separation provided by fencing between residential and natural areas is frequently violated by home owners, thus defeating its purpose. Eventual, unauthorized extensions of yards into natural spaces negatively impact those features. The street grid has been redrafted to instead provide window streets and parkland along most of the length

of the forest. This setup is anticipated to minimize rear yard incursions into the forest. The raised grades of the roadways are not expected to alter water flows into or out of the eastern edge of the swamp as lands along that side had previously been regraded and raised above the level of forest ground anyway.

Several of the northern most blocks of the site do extend slightly into the current 100-year floodplain. The RVCA however, has agreed to minor flood plain modifications proposed by Mattamy/DSEL that will see the floodplain boundary edged northward here, with corresponding capacity increases to be incorporated into final grading plan for the Mattamy and Glenview communities and the associated new channels.

Figure 2: Community plan

Legend

Community Plan
- Block Plan
- Other
- Apartment Block
- Buffer
- Commercial
- Employment
- New Channel Corridor
- Park
- Pathway
- SWM
- Secondary School
- Woodlot (Cambrian Woods UNA)

N

0 200 m

Project:MATT HMBW5
Created By: AF
Universal Transverse Mercator - Zone 18 (N)
Printed on: 2019-02-28

KILGOUR & Associates

5.0 IMPACT ASSESSMENT

5.1 Impacts to Surface Water Features

The eastern edges of both blocks of the Cambrian Woods have separated from lands to the east by windrows and other site grading alterations since approximately 2008. The swamp itself currently receives its water from lands to the south of the south block of the forest. Water moves to the north block from the south block through a culvert under Cambrian Rd located at approximately mid point of the forest. Planned roads and houses east of the blocks will not alter this arrangement. There is no development currently planned south of the south block that would alter water inflows to the feature. Lands on the north side of woods are lower and as such, only receive outflows from the swamp. So long as drainage there is not increased or decreased, water levels within the swamp are anticipated to remain unaffected.

The Drain 1 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, waters from that portion of the sub-catchment will be convey to the Jock instead through Clarke SMP pond or through the realigned Drain 2.

Drain 2, including portions on Glenview's lands, will be similarly removed from above the floodplain, but will be relocated further westward. The realignment will allow the new section of the channel to be located within the extended stretch of the floodplain closer to Borrisokane Rd. This arrangement allows sufficient space to reconstruct the feature using natural channel design principals including a sinusoidal low flow channel. It will be located within a 65 m wide treed corridor and will include adjacent pond/wet meadow areas to provide increased frog habitat space. Over Mattamy's lands, the new channel corridor will angle back to its original point of departure from the Cambrian Forest. Consistent with the JRR1, the natural corridor will be 30 m with an additional 10 m width allotted for pathway potential. No pathways are planned however, for this corridor. The additional 10 m will thus simply provide more riparian space. Landscaping details for this portion of park space will be provided within in the final community landscape plan, but will vegetated so as to provide a transition zone from the open, active (i.e. generally mowed and maintained lawn) areas of the park and the natural, treed channel corridor. The natural corridor provides itself an improved access path to the swamp over the one currently present, offering a wider travel route and extending to the swamp from better and closer breeding habitat areas (i.e. the new extra-wide corridor through the floodplain with its wet ponds).

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. Water flow from the swamp down Drain 2 is limited during most years as the channel dries by early summer. This will remain the case for the new channel is as there is no increase (or decrease) anticipated to flow from the swamp. No negative impacts are anticipated to the ecological health of the catchment under the proposed realignment of Drain 2.

The West Clark Drain has been removed as per existing permits and was replaced by a temporary drainage channel and with a sediment control pond. The final details of the ultimate drain realignment are yet to

be determined but will be consistent with the existing Barrhaven South CDP: Conceptual Fish Habitat Compensation Plan (Niblett 2007).

5.2 Impacts to Wildlife Corridors

Drain 2 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 Drain 2 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 corridor through Mattamy's lands between the top end of the wider corridor within the floodplain, and the swamp, will provide safe passage for frogs along this final stretch. The vegetated corridor will consist of a 40 m wide, swath of grass with trees along the periphery and 2 m wide channel down the middle to convey flows. 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, broad 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

As most of the site consists of cleared land, the impacted treed areas are limited in size. Apart for some grown on windrows, trees on site are only located along the drains, the majority of which are non-native (i.e., Manitoba Maple and Crack Willow), or along the eastern edge of the north UNA forest block. 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 of these trees outside of the floodplain will be removed during development of the site.

The north edge of the north forest block, as previously described, is currently set back form the existing property line. Forest along this area is primarily rapidly growing, early successional poplar. Drainage along this edge is towards the Jock River. No setback is required from the property boundary of the residential community and, as per the Cambrian Woods Woodland Management Plan, a pathway is recommended along this edge to permit public access along, but not into the forest.

No significant trees occur along the route of the proposed corridor of the realigned Drain 2 on Mattamy's land. Some trees within the flood plain at the north end of Drain 2 on Glenview's property will be removed to accommodate the new channel there but, as channel grading will ease into the existing channel alignment by the property's edge, no impacts due to the realignment are anticipated to City trees. Details for that portion of the work however, must be addressed within the EIS for Glenview's development.

Trees on Mattamy's land where the northern most blocks will extend into the floodplain (i.e. within the north end of Hedgerow 3) will be removed as those areas are to be re-graded, though no significant trees were noted here. Trees located on adjacent City-owned land are not anticipated to be impacted as re-grading will taper down to existing grades at the property boundary.

The eastern edge of the north forest block currently extends ~30 m past the edge of the Cambrian Woods property line into the development area. This extension of the forest into the development area provides

some natural screening with respect to edge effects to the forest areas within the Cambrian Woods proper, but is rife with invasive buckthorn that tappers off somewhat towards more interior areas further from edge disturbance. The Woodland Management Plan recommends a 5 m buffer between the new residential community and the Cambrian Woods eastern property limit for the north block. The eastern edge of the south forest block currently ends at the property boundary. Because of the senescence of larger, older Eastern White Cedar along this boundary, the forest is already quite open along this edge. As such, development to the property line is not expected to lead to increased edge effects and thus no buffer is required between residential development and the forest. Mitigations provided within the Cambrian Woods Woodland Management Plan (Kilgour 2013) are anticipated to prevent negative impacts on the remaining UNA wood lot.

5.4 Impacts to Species at Risk

The only SAR found to occur adjacent to the site was Wood Thrush. The species was observed in riparian woodland near the Jock River to the northwest of the site. Though the limited amount of tree cover along Drains 1 and 2 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 Cedarview Road as a nesting site and may forage over the open habitats on Site. No Barn swallows however, were observed on site during any of the field visits. Additionally, open habitat existing on all side of the bridge presents ideal foraging habitat to this species there (i.e. offsite); 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 almost 3 km from the site. The Drains 1 and 2 do not appear to be useful to Blanding's or 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. Additionally, 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. The West Clarke Drain is even further removed from Blanding's observation. It is now very highly disturbed, nearly dry most of the year. It is not considered to be useful turtle habitat and has been approved for removal.

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 the interior of the Cambrian Woods, neither of which shall be effect 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 highly disturbed lands of the site, stripped of their topsoil and vegetation make it unlikely to support a large or 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 does occur on the site; therefore, no impacts to wildlife are predicted from the project.

6.0 MITIGATIONS

6.1 Mitigations for Surface Water Features

The portion of Drain 1 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 Recharge* for this drain. Accordingly, there is no requirement to either maintain or replace the current form of this channel. Only the general contribution to the maintenance the overall water balance within the watershed must be preserved through the provision of measures to permit conveyance of water to downstream features, which will be accomplished through the area stormwater management system. The remaining downstream portion of Drain 1 (i.e. within the floodplain) is kept wet by backwater from the Jock River. This condition will continue. Surface water runoff from the community will be treated by the new adjacent storm water management pond and will continue be supplied to the Jock River.

For the portion of Drain 2 on Mattamy's lands, a 2 m wide, linear, shallow V-shaped channel will convey flows through the new 40 m wide corridor. Unlike the lower portions of realigned feature on neighbouring lands to the north, this portion of the channel is intentionally designed as a straight, well-vegetated run with no riffle/pool sequence. It must convey flows and accommodate frog passage, but it must specifically be unsuitable as fish habitat, as per the HDFA (Kilgour 2016). The realigned feature will meander as natural channel with riffle/pool sequences along the lower reaches of the corridor, i.e. north of Mattamy's lands where its location within the flood plain allows for such a design along with adjacent wet meadow/pool areas to further increase frog habitat. Check dams to located along this reach will further prevent fish migration up the channel. The locations and sizes of the dams however, must be calculated considering site grades to ensure that water is not backed up into the upper corridor (i.e. Mattamy lands) or into the swamp.

The proposed channel alterations will require permits to alter a waterway from the RVCA. Specific mitigations associated with the proposed alterations including, but not necessary limited to, the use of appropriate timing windows, the implementation of erosion sediment controls, revegetation standards, and oversite of works by fisheries biologists, will be provided and detailed within the RVCA permits. Mattamy will comply with all such directives to ensure the proposed channel work will not negatively impact the subwatershed.

The invert of the top end of the channel at the swamp must be carefully maintained during channel construction at its current elevation (91.35 m) such that no more or no less water leaves the headwater area via that route, thus maintaining water levels within the swamp. As part of the monitoring program (required by RVCA for all new realignments and to be developed as a requirement of the permit to alter

a waterway), the elevation of the invert at the top end must be measured annually by a register Ontario Land Surveyor for a period of five years. If the height of the invert changes, the channel bottom at that point must be repaired and reinforced by Mattamy to ensure water balance within the swamp is maintained.

Future development of the employment lands parcel must include a grading plan such that any surface water runoff from the adjacent swamp is fully directed along the south edge of the parcel so that no contributions to either the new channel or to the roadside ditch cross the employment lands. Moreover, the employment lands must be graded such that any runoff generate from that area is directed only to the roadside ditch on the western edge of the site (with any appropriate treatment – e.g. OGS – in place as per the future design of that parcel) so as to limit to the extend possible the addition of road salt laden, or otherwise contaminated, flows to the new corridor.

Any works near water will, at minimum, require standard erosion and sediment control mitigation measures to protect receiving waters from sediment laden runoff, including:

- a multi-barrier approach to provide erosion and sediment control;
- retention of existing vegetation and stabilize exposed soils with vegetation where possible;
- limiting the duration of soil exposure and phase construction;
- limiting the size of disturbed areas by minimizing nonessential clearing and grading;
- minimizing slope length and gradient of disturbed areas;
- maintaining overland sheet flow and avoid concentrated flows; and
- storing/stockpiling all soil away (e.g. greater than 15 metres) from watercourses, drainage features and top of steep slopes.

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. The existing channel must be removed outside of May and June as this is the period in which frogs would be most likely to be using the feature. The center of the corridor along the edges of the channel should be planted with a hydrophilic grass mix. Trees to be planted should include primarily Red Maples, interspersed with compatible species such as Balsam Fir and White Birch. Final details of plant species and locations will be established within the site landscape plan.

Culverts for the corridor at the road crossing from Mattamy's lands to the neighbouring development to the north must be designed to provide sufficient space to ease frog passage. While a box culvert is preferred, round metal culverts are acceptable so long as they provide at least 50 cm of height over a flat, natural bottom with at least 1 m of width per culvert tube with at least three such culverts (or the equivalent space if using fewer). The top edge along the road and the channel edges approaching both sides of the culverts must either be surrounded by permanent amphibian fencing so as to constrain and

direct frogs through the culverts and limit direct access to the road above. Alternatively, if the transition of the channel to the roadway is constructed as a headwall such that it, and the approaching side walls for at least 5 m, consist of hard (near) vertical surfaces (stone or concrete) of at least 60 cm of height, no such fencing would be required as those surfaces would then function to directly constrain frogs appropriately.

6.3 Mitigations for Trees/ Significant Woodlands

To protect the Cambrian Woods, mitigations and compensation measures provided in the WMP (Kilgour 2013) must be implemented. The WMP recommends a 5 m buffer between the new residential community and the Cambrian Wood's eastern property limit for the north block. Residences backing onto this side of the forest should be backed with continuous fencing along the entire edge. No gates or other access should be permitted along this line. Healthy trees existing within the five meter buffers should be retained to the extent possible, and should be augmented with dense plantings of Red Maple and other suitable hydrophilic (Balsam Fir, Yellow Birch, Service Berry) trees to maximize the screening effect. Final details of the planting plan must be established as part of the community landscape plan and will depend upon the number of trees within the buffer that are ultimately deemed retainable. Inserting trees however, on a ~4 m spacing allows for two rows within the buffer of ~65 trees each; planting is thus anticipated require ~130 saplings.

A two- to three-year program of active buckthorn removal should also be implemented along within this buffer and an additional 25 m into the Cambrian Wood allowing new buffer trees to grow sufficiently to begin naturally shading out invasive species. Mattamy would be responsible to implement both the tree planting and Buckthorn monitoring programs. These should be implemented as part of the site landscaping program (with planting details to be provided in the site landscape plan) and be commenced upon completion of the roads and lot servicing of adjacent areas.

The extent of Buckthorn coverage must be determined within the 25 m removal zone prior to commencing. Buckthorn removal should begin before planting of the new trees, then be repeated the following year. Small trees (up to 1 m) may be pulled out of the ground directly in mid-October when the soil is moist. Branches with fruits however, should be carefully cut and removed before hand to limit seed dispersal. Large trees may be girdled followed by the careful application of an herbicide to the wound to prevent sprouting. All Buckthorn material must be transported to a City disposal facility where it can be decomposed in high-heat windrows sufficient to kill any seeds or propagules.

Tree planting can occur in the fall after Buckthorn removal or in the following spring. The Buckthorn removal efforts must be repeated in the second fall season. Success of the planting/removal program is to be measured in the fall of the third year. The target for the planting program should be 95% survival rate of new trees. The target for Buckthorn removal is an 80% reduction in coverage. During the third autumn of the program, Mattamy will be responsible for a third round of Buckthorn removal and/or the (re)planting of sufficient saplings to meet the 95% target should the indicated targets not be met at that time.

The WMP also requires the establishment of two walking paths through the woodlot, one through each block. They are intended to connect points along forest vertices that would likely serve as access points

for shortcuts regardless, thus allowing community access to the forest while helping to direct foot traffic though less sensitive parts of the features. Mattamy would construct these pathways following or upon completion of homes along located along the forest edge consistent with the directives of the WMP. As per the WMP, removal of potentially hazardous snags near to the pathways must be part of the trail construction.

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 adjacent to 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* 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.

Trees are to be planted throughout the new community at a density equivalent to no less than one tree per lot, though the distribution of specific planting locations may be varied from necessarily planting on every lot, as may be dictated by individual lot considerations. Importantly, this planting density is in addition to tree planting requirements within the realigned Drain 2 corridor and within the Cambrian Woods buffer (as per the WMP – Kilgour 2013). 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:

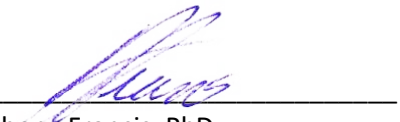
- Areas shall not be cleared during sensitive time of the year for wildlife, unless mitigation measures are implemented and/or the habitat has been inspected for a qualified biologist.
- Site clearing should begin at the north end of the site and proceed southward to drive any wildlife towards the large 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.

Where roadways will cross retained drainage features, bridges or culverts used to span the channel must be designed to provide sufficient space to ease amphibian and turtle passage. While a box culvert is preferred, round metal culverts are acceptable so long as they provide at least 50 m of height over a flat, natural bottom with at least 1m of width. The top edge along the road and the channel edges approaching both sides of the culverts must either be surrounded by permanent amphibian/and turtle fencing so as to constrain and direct wildlife through the culverts and limit direct

access to the road above. Alternatively, if the transition of the channel to the roadway is constructed as a headwall such that it, and the approaching side walls for at least 5 m, consist of hard (near) vertical surfaces (stone or concrete) of at least 60 cm of height, no such fencing would be required as those surfaces would then function to directly constrain and direct wildlife appropriately.

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.



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 18 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.

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 Lilac	*Syringa vulgaris*
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